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DEPARTMENT OF THE INTERIOR

AGENCY: Office of Surface Mining Reclamation and Enforcement (OSM)

30 CFR Chapter VII: Subchapter K – Permanent Program Performance Standards: Parts 810, 811, 812, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828

Surface Coal Mining and Reclamation Operations Permanent Regulatory Program

ACTION: Proposed rules.

SUMMARY: The Office of Surface Mining Reclamation and Enforcement is seeking comments on these proposed rules which would implement a nationwide permanent program for the regulation of surface and underground mining operations by the States and the Federal Government as required by the Surface Mining Control and Reclamation Act of 1977 (SMCRA). These proposed rules are intended to strike a balance between protection of the environment and agricultural productivity and the Nation's need for coal as an essential source of energy.

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{Preamble: 43 FR 41734}

SUBCHAPTER K – PERMANENT PROGRAM PERFORMANCE STANDARDS

Parts 810 – 828 contain the minimum performance standards which must be contained in a State program in order for the program to be approved by the Secretary. These performance standards also represent the minimum standards which will be contained in a Federal program adopted for non-Federal and non-Indian lands within a State.

Parts 810 – 812 discuss matters of general applicability throughout the Subchapter. Parts 815 - 828 contain the standards for coal exploration, the different methods of coal mining, those special mining situations identified in the Act as having to meet separate or additional performance standards requirements, coal processing facilities operated independent of mines and in situ processing.

The manner in which this Subchapter is to be utilized in developing a State or Federal program is contained in Subchapters C and D, respectively. All operations discussed in Subchapter K will be subject to permit requirements at least as stringent as those contained in Subchapter G upon implementation of a State or Federal Program. All these operations will also be subject to bonding requirements which meet the standards of Subchapter J. Inspection of operations and enforcement of applicable performance standards are governed by Subchapter L and any additional requirements of the approved State program or the applicable Federal program.

The drafters of Subchapter K considered a great deal of technical literature, all existing State regulatory schemes for coal mining, experiences under OSM's interim regulatory program, the legislative history of the Act, experience and expertise of other government agencies, and comments received on prepublication drafts of this Subchapter, in arriving at the version of the proposed rules published today. These sources are detailed in the separate discussions of the various parts of this Subchapter set forth below.

This Subchapter contains minimum performance standards applicable to all persons engaged in coal exploration or surface coal mining and reclamation operations, including the surface effects of underground mining, in situ processing and coal processing facilities operated independent of mines, to the extent the activities occur on non-Federal and non-Indian lands in a State with an approved State program or in which a Federal program has been implemented. Additional and more stringent requirements may be found in the State or Federal program, in other State laws or in conditions imposed on the operator by the regulatory authority in the permit. {41735}

In developing these performance standards, the Office of Surface Mining has attempted to strike a reasonable balance. We have weighed the additional cost and inconvenience to the operator against the necessity to protect against long term environmental damage and potential harm to the public. We believe the obligations imposed by the performance standards are reasonable and necessary to accomplish the intended goals of the Act.

The proposed rules published today contain the minimum performance standards which would be in effect under an approved State program or a Federal program. In drafting this Subchapter, consideration was given to organizing each

related group of Sections in a format different from that contained in the version published today. This alternative format would have set forth the standards much as they are proposed today and then have followed each related group of Sections with two additional provisions. The first additional provision would have set forth the minimum objectives to be achieved if a State wished to adopt different detailed requirements from those proposed in the OSM regulations. The second additional provision would have set forth any regional variations which would apply to the performance standard.

The alternative format was rejected primarily because the drafters believe that a more meaningful range of regional variations and criteria for evaluating alternative State proposals can be achieved by eliciting comments to the single standard proposed. OSM encourages the public, in reviewing Subchapter K, to suggest regional variations and criteria for evaluating State suggestions for each of the many standards contained in this Subchapter. Those comments which will be most helpful are those which contain proposed language for the rules and which are accompanied by technical or other literature supporting the proposal. After these regulations are adopted in final form, additional regional variations for alternative means of obtaining the goals of these performance standards can be authorized by amendment to Subchapter K either on OSM's initiative or in response to a petition for rulemaking under Section 700.12 of this Chapter of regulations, or in the rulemaking proceeding which will accompany approval of a State program or adoption of a Federal program.

Each Part in this Subchapter is organized to parallel the applicable topics as they are contained in the Act. OSM considered organizing Parts 816 and 817 differently. This alternative organization would have set forth the performance standards in a manner which paralleled the most common logical mining sequence, dividing each Part into subparts for site preparation, mining, reclamation and permanent abandonment of the minesite. The prepublication drafts distributed by OSM on July 21, 1978, contained Part 816 organized in this alternative fashion. Many comments were received both from within OSM and from the public, objecting to the awkwardness and confusion generated by the logical mining sequence. Most commenters agreed that it would not assist the mine operator to comply with the standards nor would it aid enforcement. After consideration of these comments, the logical mining sequence was abandoned for the topical format contained in these proposed rules.

One significant issue OSM intends to address in its final rules, and which is not adequately treated in the proposed rules published today, is pre-existing non-conforming structures. Public comment on this issue is encouraged.

The following are the structures which might be found on a minesite, either completed or in construction, at the time these regulations go into effect: Roads and associated structures; Impoundments; Sedimentation ponds; Fills; Berms; Benches; Waste banks; Waste dams; Discharge structures; Diversions; Highwalls; Rail loops; Rail sidings; Rail spurs; Refuse areas; Shafts; Spoil piles; Utility lines; Terraces; Drains; Wells; Exploration holes; Boreholes; Barricades; Fences; Bridges; Culverts; Storage areas; Mine buildings; Tipples; Storage or repair facilities; Surge ponds; Processing plants; Slurry pipelines; Conveyors; and other manmade structures or areas disturbed by mining.

Non-compliance on the effective date of a State or Federal program might be regulated in any one or more of the following alternative manners:

(a) The regulatory authority might require that the structure be brought into compliance or demolished as soon as possible, based on a proposed reconstruction or demolition plan submitted by the operator with the permit application and approved by the regulatory authority as consistent with sound engineering practices and the purposes of the Act.

(b) The regulatory authority might require stabilization of the area and cessation of operations until the structure is brought into compliance.

(c) The regulatory authority might grant a variance for the structure, to the extent it was completed or non-complying construction was committed to, prior to the effective date of the State or Federal program.

(d) The regulatory authority might grant a variance for the structure, to the extent it was completed or non-complying construction was committed to, on the date these regulations become effective.

Different structures may require different treatment, depending on the feasibility of reconstruction or modification and the environmental effect of the noncompliance and of reconstruction or modification. The public should frame their comments on this issue in terms of the particular structures for which a recommended alternative is proposed. In addition, technical literature and other background material would be useful to the office in evaluating the comments.

OSM has not decided whether to promulgate separate rules for each type of pre-existing nonconforming structure, or a single general rule to cover this subject. However, OSM currently believes that these structures should be required to comply with the requirements of this Subchapter before a permit is issued or as soon as possible thereafter. {41735}

PART 810 – PERMANENT PROGRAM PERFORMANCE STANDARDS – GENERAL PROVISIONS

PART 811 – APPLICABILITY TO REGULATORY PROGRAMS

PART 812 – INDEX

These Parts introduce the permanent program performance standards which are contained in Subchapter K.

In Part 810, Section 810.1 briefly summarizes the role of Subchapter K in the permanent program regulations and Section 810.2 highlights major categories of mining activities and their effects which are addressed in Subchapter K. The list is not intended to be exhaustive. Rather, it is provided to enable the reader to obtain an overview of several of the types of mining practices and effects of mining which the Act and this lengthy and highly technical Subchapter seek to address.

Part 811 is intended to enable the reader of the regulations to determine the relationship between the performance standards in this Subchapter and the performance standards requirements which will be implemented under State programs and Federal programs for non-Federal and non-Indian lands. The Office expects that State programs will vary in the degree of stringency imposed on various mining and reclamation activities. In some States, programs existing on the date of these proposed rules impose some performance obligations which exceed the requirements of this Subchapter. States are in the best position to evaluate the needs of their mining industry and environment and to determine when standards stricter than those set forth are appropriate. The Office is giving the States latitude to structure the environmental and other performance standards of their programs around their needs based on different physical and environmental circumstances in a State. Any variations, additions, or supplements in the State programs are permissible so long as they are not prohibited by other portions of this Chapter, the Act, or other applicable laws or regulations, and so long as the standards implemented by the State include, at a minimum, standards as stringent as this Chapter. {41736}

Section 811.12 provides that the standards of this Subchapter will constitute the minimum standards under a Federal program, which may include additional, more stringent, requirements if appropriate to achieve the purposes of the Act. The Office considered providing that the standards of this Subchapter would be the performance standards under every Federal program, without any variation. However, Section 504(a) of the Act requires each Federal program to "take into consideration the nature of the State's terrain, climate, biological, chemical, and other relevant physical conditions." Accordingly, Federal programs may include more stringent requirements, if conditions require them to meet the purposes of the Act.

Because of the length, complexity and highly technical nature of this proposed Subchapter, the office believes it would be useful to assist the reader with the detailed index system which is contained in Part 812.

Section 812.12 contains an alphabetical list of topics addressed in this Subchapter with citations to the Sections of the Subchapter where they are discussed. The Office has attempted to provide a complete list. However, references may inadvertently be omitted or misstated, and the reader should not rely exclusively on this list.

OSM is particularly interested to know whether this index system is useful to the reader. Also, we would appreciate receiving comments as to how the system might be improved. For example, should there be a similar alphabetic index to the entire Chapter? Also, should the index in Part 812 be expanded to include references to portions of the permit regulations and bonding regulations which relate directly to the performance standards? {41736}

PART 815 – COAL EXPLORATION

Part 815 proposes minimum performances standards for persons involved in coal exploration and is intended to prevent degradation of environmental quality and danger to life and property during and after coal exploration activities.

The philosophy of this Part is that any person engaged in coal exploration activities must conduct such activities with the least resultant damage to the environment.

Proposed Section 815.4 reflects the requirements of proposed Part 776 and the reader is referred to the discussion of that Part, earlier in this Preamble.

Section 815.11 proposes that persons conducting exploration shall, while onsite possess evidence of their compliance with the notice and authorization requirements for exploration. The Office feels this requirement is necessary to monitor unauthorized exploration.

Subsection 815.12(a) proposes that the exploration operator record the amount of coal removed during exploration, and keep current records and display them upon demand to the regulatory authority.

Proposed Subsection 815.12(c) would require that the operator limit vehicular traffic. The Office realizes that a certain amount of travel by light utility vehicles off established roads is necessary in coal exploration and considers that such travel can be done with reasonable care during dry periods in most areas without significantly damaging the environment. Public comment on this issue is invited.

Subsection 815.16(e) proposes minimum topsoiling and revegetation standards for areas of heavy usage. The Office expects that most true exploration will not require significant topsoiling or revegetation.

Subsection 815.12(h) proposes measurement, to the maximum practicable extent, of important environmental characteristics of the exploration area. The measurements pertain to but are not limited to water quality, revegetation, soils, vegetation, hydrogeology, biology, geology, alluvial valley floors, air quality, meteorology, and surface water flow.

Subsection 815.12(i) proposes that all environmental monitoring data collected during exploration be made available to the regulatory authority. Public comment is solicited on the extent, if any, to which the data should be deemed confidential, and the extent to which it might be available for use during proceedings to designate land unsuitable under proposed Parts 760 765.

Section 815.13 proposes that a person selling coal removed during exploration must have a permit to do so, unless the person has demonstrated to the regulatory authority's satisfaction that the sale is necessary for testing purposes. The Office believes that if a person engaged in exploration is selling the coal extracted during purported exploration, the operation should be under a permit as are all significant commercial mining operations. However, the Office believes that if the person is solely selling extracted coal to a testing company in order to obtain required information, the person should be allowed to do so without having to obtain a permit. {41736}

PART 816 – PERMANENT PROGRAM PERFORMANCE STANDARDS – SURFACE MINING

Sections 816.1 and 816.2 set forth the scope and objectives of this Part, respectively. Part 816 contains the minimum performance standards which will be applicable under a State or Federal program for surface mining activities. Surface mining includes methods commonly known as contour mining, area mining, and strip mining and removal of coal from waste piles.

SECTION 816.11 - SIGNS AND MARKERS.

This proposed section specifies requirements for identification and warning signs and for markers of permit perimeter, buffer zones, and topsoil storage piles. The regulations seek to balance the desire to reduce cost and bother to the permittee against the need for ample identification in the interest of citizen participation, inspection by the regulatory authority, employee guidance and protection of the public. Proper markings of perimeters and working areas will be particularly valuable in preventing equipment operators from inadvertently entering areas not authorized for disturbance and should help eliminate arguments over location of perimeters. Properly posted signs and markers reduce hazards to the health and safety of the general public and mine personnel and prevent adverse affects to the environment.

The authority for this Section is found in Sections 102, 201, 501, 503, 504, 515, 517, and 701 of the Act.

Literature on which the requirements are based include:

1. 30 CFR 77.1202.
2. Colorado State Land Reclamation Board, Rules and Regulations promulgated under the Open Mining Reclamation Act of 1973.
3. Maryland Department of Natural Resources, Geological Survey-Bureau of Mines, Bituminous Coal Strip Mine and Auger Mine Regulations of 1973, Section 08.06.01(.03).
4. Montana Department of State Lands, Rules and Regulations promulgated under the Montana Strip and Underground Mine Act of 1978, Section 26 2.10(10).
5. Ohio Department of Natural Resources, Division of Reclamation, Rules Nos. 1501:13 9 01, 1501:13 9 05 (May 15, 1978, as revised and effective August 28, 1978). {41737}
6. Ohio Rev. Code Ann. Section 1518.16 (1975).
7. Tennessee State Department of Conservation, Division of Surface Mining, Rules and Regulations, Chapter 0400 3 2.05, 1975.
8. West Virginia Department of Natural Resources, Surface Mining Reclamation Regulations, Chapter 20 6, Series VII, 1973.
9. Wyoming State Department of Environmental Quality, Land Quality Division, Land quality rules and regulations, 1975 (as amended).

Marker dimensions are not specified in OSM's permanent program performance standards. However, signs and markers would be required to be permanently installed and to meet other general criteria of the proposed Section. Several States establish specific marker specifications: 30 CFR 77.1303(g); Maryland, at Section 08.06.01(.03); Ohio Rev. Code Ann. Section 1513.16(b)(1); Tennessee, at Chapter 0400 3 2.05; West Virginia, at Sections 2.27 and 10.09.

The drafters considered requiring identification signs to carry all pertinent permit and approval numbers. However, this alternative was rejected in favor of the proposed Subsection (c) which requires only the current coal mining and reclamation operations permit numbers. Existing State rules and regulations require the posting of similar identification signs. For example, Colorado requires posting of signs during application for a permit (Colorado, 1973). Maryland operations must be identified by posting a monument at the beginning of each operation and as otherwise required (Maryland, at Section 08.06.01(.03) while other States specify actual sign dimensions as found in the following references. Ohio Rev. Code Ann., Section 1513.16(b)(1), and Tennessee at Chapter 0400 3 2.05.

Signs and markers shall be maintained for as long as they serve a purpose. The operator's obligation extends throughout the life of the permit. Such requirements will result in periodic inspections being made to ensure that signs and markers are in place and legible and to insure that the information they convey is correct. This will assist enforcement and make more meaningful all opportunities for citizen involvement in the regulation of mining and regulation activities.

The drafters considered specific requirements for minimum marker spacing but decided to leave responsibility for determining spacing of perimeter markers to the discretion of the regulatory authority so that specific site conditions could be considered. State regulations currently require that markers be placed at the end of the strip area or as otherwise required. (See Montana and Wyoming rules and regulations.)

Buffer zones are to be identified and posted to assure that unnecessary disruption and degradation of stream channels will not occur. The drafters considered requiring buffer zone markers to be posted at no more than 200-foot intervals along the interior boundary of the buffer zone and requiring that the marker say: ""Buffer Zone – Limited Access." These specific requirements were rejected in order to permit greater flexibility in type and minimum spacing. Buffer zone markers are deemed necessary to provide notice to equipment operators that special effort is required when mining in the vicinity of streams. It should be noted, however, that the requirement for buffer zone markers does not preclude mining through streams where specifically approved by the regulatory authority under the controlled conditions established in proposed subsection 816.57(a).

Although the proposed requirement for blasting signs, markers, and signals was believed to be excessive during public review of the interim regulations, this requirement will remain intact to provide notification to any person entering the permit area of the potential hazard relating to the use of explosives and flyrock. However, in order to provide for greater flexibility in selecting type and size of marker to be placed, only general guidelines are included in these draft regulations.

Additional safety precautions must be exercised in the immediate vicinity of the blast area. As stated in Tennessee, Chapter 0400 3 2.05, MSHA regulations, 30 CFR 77.1303, the operator must guard those areas in which holes are awaiting firing.

Adequate marking of topsoil storage areas is required around all areas utilized to stockpile topsoil or other designated subsoils pursuant to Section 816.23. Some commenters objected to the requirement for topsoil markers, on the grounds that topsoil storage areas are well known to employees and that disturbance of topsoil storage areas is not currently a significant problem. The Office proposes that topsoil markers continue to be required because these proposed regulations will result in more care in topsoil handling and storage than has previously been the practice.

One commenter has suggested that an additional provision be added in this Section to require a sign on coal processing waste dams, as currently proposed in subsection 816.93(i). Public comment is solicited as to whether the requirement for dam signs should appear only in Section 816.93, only in Section 816.11, or in both places.

SECTIONS 816.13 – 816.15 - CASING AND SEALING OF DRILLED HOLES AND OPENINGS.

Except for the differences noted below, proposed Sections 816.13 – 816.15 are substantially identical to the proposed underground mining performance standards in Sections 817.13 – 817.15. The reader is referred to the appropriate portions of the Preamble for Part 817 for information concerning the technical basis, alternatives considered, and statutory authority for these Sections. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections are based on Section 515 of the Act. While the Office considers the effects of improperly protected holes and entryways to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should be appropriately reflected in the regulations.

While proposed Section 816.13 requires holes to be closed as they are uncovered in the course of surface mining, Section 817.13 requires all holes in the permit area to be closed. An additional difference is proposed with respect to precautions to be taken in connection with openings to be used for the return of underground waste to mine workings. These distinctions are required by the distinct differences between surface mining and deep mining.

SECTIONS 816.21 – 816.25 - TOPSOIL.

These Sections contain proposed regulations for achieving the requirements of paragraphs 515(b)(5) and (6) of the Act, as well as certain of the provisions relating to revegetation, protection of the hydrologic balance, minimization of air pollution and prompt reclamation. These Sections require that persons conducting surface mining activities remove topsoil or other approved plant growth material prior to operations, save it for later use in a manner conducive to protecting the primary root medium from contamination and erosion and redistribute it in a manner which will enhance its productivity. Systematic handling and storage practices can protect the soils physical and chemical characteristics necessary to sustain vegetation while it is in storage and after it has been redistributed onto the regraded area. These proposed regulations are intended to minimize water pollution and provide a medium for plant growth capable of returning mined land to a condition and/or use equal to or higher than that prior to mining.

Authority for these regulations is contained in Sections 102, 201, 501, 503, 504, 507, 508, and 515 of the Act.

The technical literature used in preparing Sections 816.21 816.25 includes: {41738}

1. Aldon, Earl F., Reclamation of coal-mined land in the Southwest, *Jour. of Soil and Water Cons.*, Vol. 33, No. 2, 1978, pp. 75 79.
2. Baker, James B. and W. M. Broodfoot, Site Evaluation for Light Important Southern Hardwoods, USDA, Forest Service General Technical Report 80 14, 1977.
3. Carmen, Willard H., Forest Site Quality Evaluation in the United States, *Advances in Agronomy*, Vol. 27, pp. 225 226, Academic Press, Inc., 1975, pp. 225 226.
4. Colorado, Rules and Regulations of the Land Reclamation Board.
5. Lull, Howard, W., USDA, Forest Service, Misc. Pub. No. 768, 1959.
6. McCormack, Donald E., Soil Reconstruction: Selecting Materials for Placement in Mine Reclamation, *Mining Congress Journal*, 1976.
7. McCormack, Donald E., Research and Applied Technology Symposium, 2d, Oct. 22 24, 1974, Louisville, KY.
8. Montana, Rules and Regulations adapted pursuant to Title 50, Chapter 10, R.C.M. 1947.
9. Plass, William T., Reclamation of Coal-Mined Land in Appalachia, *Jour. of Soil and Water Cons.*, Vol. 33, No. 2, 1978, pp. 56 61.

10. Power, J. F., R. E. Ries, and F. M. Sandoval, Reclamation of Coal-Mined Land in the Northern Great Plains, Jour. of Soil and Water Cons., Vol. 33, No. 2, 1978, pp. 69-74.

11. United States Department of Agriculture Soil Conservation Service, Soil Taxonomy, Agricultural Handbook No. 436, and United States Department of Agriculture, Soil Conservation Service, Agriculture Handbook No. 18.

Sections 816.2 – 816.25, propose procedures to be followed by the permittee to preserve the chemical and physical properties of the soil, reconstruct the disturbed area, and restore the productive capacity of the disturbed area.

Plass, 1978, p. 57, states that "Reclamation begins with an evaluation of the overburden." Powers, et al., 1978, p. 73, write that, "Many reclamation problems can be solved by covering undesirable spoils with good soil." Yields of several crops as affected by thickness of subsoil and topsoil spread over acidic (SAR=26) mine soils are illustrated by Plass, 1978, Table 6, p. 72. McCormack, 1976, p. 19, wrote that, "Burying the A and B horizons under many feet of spoil during the surface mining operation is certainly not compatible with full restoration of productive potential."

Planning, prior to handling and placement of overburden materials, may facilitate disposal of large rocks and toxic substances. The objectionable materials should be carefully buried, while materials suitable for use in the re-establishment of vegetative cover should be properly placed on the area to be restored or segregated for later use. It is important to control the material placed on the surface to serve as the growth medium if the disturbed area is to be successfully revegetated in accordance with proposed Sections 816.111 – 816.117.

The requirements of proposed Section 816.22 are essential for reconstructing a plant growth medium, soil, that will create the most favorable qualities for plant growth.

Six inches of soil is thought to be a minimum practical depth necessary for root development and essential for the land to be restored to a condition at least capable of supporting its premining use.

Soil profiles vary widely in thickness, from mere films to those many feet thick, and deep layers, say to 6 feet, may need to be examined because of their importance to drainage, etc. (Agriculture Handbook No. 18, p. 174.) Also, plant roots require soil horizons that are able to supply adequate water, air and nutrients (Agriculture Handbook No. 18, p. 249). Thus, the friable nature of the A horizons causes them to be the most favorable material for seed beds among existing materials at most sites.

McCormack, 1976, stated, "In most areas, the A horizon of the natural soil is vastly superior to any underlying soil horizon or geologic strata. Even if it is only 3 or 4 inches thick, careful handling and return of this horizon to the surface is required for most successful reclamation. The soil survey indicates the thickness of the A horizon and properties that are important to reclamation, including texture, structure, organic matter content and pH." To mix the various soil horizon during removal could be counter productive to restoration of the disturbed area to a level at least equal to the premining capability.

The regulatory authority, might require removal and separation of the B horizon or portions of the C horizon or other substrata if necessary to obtain soil productivity.

Plass, 1978, p. 57, states that proper topsoiling may involve the removal and storage of the A, B and C horizons. McCormack, 1976, p. 19, states that "Instances where the geological strata is better suited for the productive growth of plants, although uncommon, do exist in a few areas and should be recognized before final plans for excavating and regrading are made." Similarly, the Montana Rules and Regulations (Sections 26 2.10(10) s10280(8)(d) and 26 1.10(10)s10340(s) provide for the use of plant growth materials, other than topsoil, when those materials are determined superior in production potential to the topsoil of a disturbed area.

Agriculture Handbook No. 18 states on page 250 that "Some plant roots penetrate to much greater depths than commonly believed." Also, McCormack, 1976, wrote, "Most A horizons are less than 10 inches thick – too thin for a favorable root zone for most plants. Other favorable material must be placed below the A horizon in order to create a favorable root zone several feet in thickness." In most areas the B horizon is more satisfactory in the root zone than is material from geologic strata but McCormack says these materials need evaluation and the one most suited to restoring production should be chosen. The lower horizons ordinarily possess qualities that are less favorable for plant growth. Thus, to mix these materials will ordinarily lessen the productive potential. However, mixing or the use of substitute material would be authorized under Section 816.22 when these practices can be advantageous to the establishment of permanent vegetation and restoring the disturbed area to the pre-mining production potential.

The mixing of topsoil and selected overburden is an acceptable practice when the mixture produces a soil medium more suitable for land use capability and productivity than topsoil. Alternative strata may be used as a growth medium when topsoil is either of inadequate quality or quantity.

Colorado and Montana, in their regulations, recognize the importance, under certain conditions, of providing for the use of overburden other than topsoil. While McCormack states that vertical sections above coal formations generally are widely varied in their suitability for covering a disturbed area, he goes on to state that, ""Instances where the geological strata are better suited for the productive growth of plants, although uncommon, do exist in a few areas and should be recognized before final plans for excavating and regrading are made."

All determinations of suitability of various horizons and their appropriate handling ought to be based on previously performed analyses and adequate field trials.

Proposed Section 816.23 is intended to protect the physical and chemical qualities of topsoil while that material is being stored. Plass, 1978, p. 57, writes that ""planned placement may segregate material suitable for revegetation," and McCormack, 1976, states that burying the A and B horizons under many feet of spoil during the surface mining operation is certainly not compatible with full restoration of productive potentials. {41739}

Under Section 816.24, compaction that restricts root penetration must be avoided during topsoil redistribution since closely packed soil can be relatively impermeable. Scarification of regraded land before the topsoil is replaced is generally the most effective treatment to prevent slippage. The regulations do not make it a mandatory practice. However, measures necessary to eliminate slippage must be undertaken in all cases.

McCormack, 1976, wrote that ""of greater importance than any other factor in achieving successful reclamation of surface mined land is the nature of the soil left at the surface after mining. The nature of this soil determines the choices available for plant species." McCormack goes on to say ""soils should be reconstructed so as to have a sequence of horizons chosen from the best available soils and geologic strata. This will create the most favorable qualities for plant growth." The topsoil must be uniformly redistributed in a manner that assures placement and compaction compatible with the needs of the species that will be used to restore the disturbed area to its premined potential. The placement of toxic materials on or near the surface will severely restrict the productive capacity of the area.

Lull, 1959, p. 27, found that soil compaction drastically reduced the pore space through which water moves in the soil, thereby reducing infiltration and percolation, increasing runoff, and encouraging erosion. Baker, 1977, said the growth of hardwoods depends on the following soil factors:

- (a) Soil physical condition
- (b) Moisture availability during growing season
- (c) Nutrients available
- (d) Aeration.

These same factors must be considered so that the redistributed soil layers will support the vegetation required under Section 816.111-816.117.

Like Section 816.22, Section 816.25 would provide for utilization of the results of soil tests, trials, analyses and surveys required by Sections 779.21 and 779.26 of these proposed regulations. The availability of mineral elements essential to plant growth varies considerably in strata of the overburden. This wide variation in available plant nutrients makes it advisable to sample the surface material to determine if the proposed land use and vegetative plan is feasible. If the strata of the overburden contains good supplies of mineral nutrients, these materials if properly used on the mined and graded lands will provide adequate nutrients. However, some soil materials will require the addition of amendments to establish vegetation that can be sustained on the disturbed area.

SECTIONS 816.31 – 816.38 - ROADS AND OTHER TRANSPORTATION FACILITIES.

These proposed Sections pertain to the location, construction, drainage and restoration of mine access and haul roads and other transportation facilities such as railroad loops, spurs and sidings. The standards set forth in these Sections are intended to ensure the minimization of the adverse effects to hydrology, fish and wildlife and their habitats, and public and private property as a result of the construction and utilization of mine roads.

The authority to establish these performance standards is found in Sections 102, 201, 501, 503, 504, and 515 of the Act.

The literature, State laws and regulations, and other materials used in preparing these regulations include the following in addition to those works cited in the Preamble sections below which discuss proposed Sections 816.41- 816.57:

1. Mudd, S.W., 1968, Surface Mining, American Institute of Mining Metallurgical and Petroleum Engineers, New York, N.Y.
2. Parker, P.E., 1965, Criteria for Designing and Locating Logging Roads to Control Sediment, Intermountain Forest and Range Experiment Station, U.S. Forest Service, Ogden, Utah.
3. U.S. Department of Agriculture, 1977, Forest Service General Provisions and Standard Specifications for Construction of Roads and Bridges
4. U.S. Department of Interior, Bureau of Mines, 1977, Design of Surface Mine Haulage Roads Manual, Information Circular 8758.
5. Weigle, W.K., 1965, Designing Coal Haul Roads for Good Drainage, U.S. Forest Service, Central States Forest Experiment Station, Berea, Kentucky.
6. West Virginia Department of Natural Resources, Division of Reclamation, (no date), Drainage Handbook for Surface Mining, (Revised 1 1 75).

Coal mine access and haul roads were identified in the 1950's and 1960's as being responsible for much of the watershed disturbance associated with surface mining operations. Abandoned roads associated with surface mining contribute substantially to stream sedimentation thus affecting the water quality of streams flowing from mined watersheds. In order to control or substantially reduce these adverse impacts, criteria are required to ensure the proper design, construction, maintenance, and reclamation of roads and other transportation facilities associated with surface mining operations. Although the Office recognizes that there may be objections to specific design criteria as being unnecessary, the criteria being proposed today are in fact necessary since effluent limitations will not apply to all roads. Design and construction specifications will ensure control of erosion and pollution and successful reclamation. Many of the criteria in these proposed Sections are drawn from interim program regulations. 30 CFR 715.17(l)-(m) 42 Fed. Reg. 62688 (December 13, 1977).

In developing these regulations, considerable thought was given to the cost involved to the mine operator. While additional costs will be incurred by the operator under these regulations, some of these costs will be offset by longer equipment life, lower equipment maintenance, higher productivity, lower "lost time" and increased safety.

Paragraph 515(b)(4) of the Act is specific in requiring the operator to conduct operations in a manner to stabilize surface areas to effectively control erosion. Also, paragraph 515(b)(10)(B)(i) of the Act requires the operator to conduct surface coal mining operations in a manner to control or prevent additional contributions of suspended solids to streamflow, or runoff outside the permit area, using the best technology currently available. Accordingly, the proposed rules require that mine access and haul roads shall be located, insofar as possible, on ridges or on available flat and stable slopes, to minimize disturbance to the hydrologic balance. In addition, mine roads may not be located in perennial streams (paragraph 515(b)(18) of the Act). Stream fords are prohibited (paragraph 515(b)(17) of the Act) unless specifically approved by the regulatory authority.

Certain design, construction, and maintenance criteria have been provided in these proposed regulations that will assure that mine roads will comply with paragraph 515(b)(10) of the Act. Guidelines for developing these criteria can be found in sources such as laws and regulations currently mandated by most mining states, design and construction criteria for developing logging roads on National Forest lands and in the road construction standards set forth by the American Association of State Highway and Transportation Officials (AASHTO) for State, Federal and county highways. The standards set by AASHTO were developed to apply for the most part to relatively high speed roads with vehicle design speeds of 35 miles per hour or more which are public requiring asphaltic or concrete surfacing.

In the past, the AASHTO standards have not generally been applied to mine access or haul roads that connect from the mine site to a public road or highway. The Office believes that the cost of construction and subsequent reclamation of such roads is not warranted. Adequate environmental and safety protection can be provided for most mine roads by the less stringent standards in the proposed regulations. Some criteria for designing and locating logging roads on National Forest lands are appropriate for mine roads, and these have been adopted for grade, drainage and surfacing requirements. Generally these roads are constructed and designed to meet the environmental conditions in the western States where most of the timber harvesting on National Forest lands occurs. In addition to logging roads standards, much reliance was placed on current State laws and regulations that govern mine access and haul roads. {41740}

There are a few coal mining States that allow grades of 20 percent or more for mine roads. The majority of the States, however, have established 15 percent as the maximum grade (Bureau of Mines, 1977). West Virginia does not allow mine haulageways having sustained grades exceeding 10 percent, with maximum grade not to exceed 15 percent for 300 feet. These basically are the gradient requirements for mine roads adopted in proposed Section 816.34.

Many of the requirements of these Sections are based on considerations in technical literature cited in the portions of the Preamble relating to proposed Sections 816.41- 816.57. The reader is referred to those portions of the Preamble for further discussions of the hydrologic considerations which led to proposed Sections 816.31- 816.38.

Proposed subparagraph 816.32(b)(3)(vi) requires that each layer of embankment material be compacted to achieve a density determined in accordance with American Association of State Highway and Transportation Officials (AASHTO) standard method T 99 74. Although this subsection as proposed, applies to roads that are to remain in place and use for more than 5 years, the Office recognizes that some might consider it too restrictive. For instance, should T 99 74 be applicable to embankment material consisting of rock, broken stone, or fragmented material of such size as to render the placing of 12-inch layers impractical and is the limited variance available under Subparagraph (b)(iv) adequate? The Office solicits comments on alternative methods for determining the desired compaction of embankment layers. Similar comments are solicited for alternative procedures to proposed subparagraph 816.32(b)(2)(vii) relating to moisture content of embankment material.

Under Section 816.34 of the proposed regulations the design and construction criteria for all but the most temporary mine roads require that ditches, cross drains and ditch relief drains be based on a discharge capacity capable of passing the peak runoff from a 10-year 24-hour precipitation event.

The Office recognizes that there are non-complying haul roads and access roads and other transportation facilities. Many of these haul and access roads and other transportation facilities were designed and constructed prior to enactment of the Surface Mining Control and Reclamation Act of 1977. They may not comply with the grade or location requirements, ditching, culvert, or road surfacing standards, or stream crossing or embankment provisions of the proposed permanent regulatory program.

Public comment is solicited as to the extent, if any, it is appropriate that these pre-existing, nonconforming mine roads and other transportation facilities not be required to be reconstructed to meet the design criteria of the regulations. An alternative considered was requiring additional drainage structures for pre-existing roads such as ditches, crossdrains or ditch relief dams in areas of excessive erosion, siltation or sedimentation outside the permit area. Placement of the drainage structures should not cause any major change in the vertical or horizontal alignment of the roads or other transportation facilities. The Office believes that non-complying roads should not be exempt from the provisions of proposed Section 816.38 Restoration of Roads. However, it may be appropriate for the regulatory authority to provide variances for the reclamation of pre-existing roads in areas where fill material is not available for backfilling to original contour or topsoil to meet the standards is not available because they have not been planned for during the design stages of the mine road or other transportation facilities.

SECTION 816.39 - SUPPORT FACILITIES AND UTILITY INSTALLATION.

Proposed Section 816.39 pertains to facilities that support the mining operation or other public facilities such as pipelines which cross the mining operation.

Authority for proposed Section 816.39 derives from Sections 102, 201, 501, 503, 504, 515, and 701 of the Act.

Public comment is elicited as to whether there are any particular environmental or other risks from the manner in which these facilities are constructed or utilized at minesites which would be the basis for additional specific standards. At this time, the Office believes the general language of this proposed Section will provide adequate basis for meaningful regulatory authority review of plans for the facilities, and for enforcement actions which result in furthering the environmental and other goals of the Act.

SECTIONS 816.41 – 816.57 - HYDROLOGIC BALANCE.

These proposed Sections would require that surface coal mining and reclamation operations be planned and conducted so as to minimize disturbance to the prevailing hydrologic balance. The purpose of these requirements is to ensure that both long-term and short-term adverse changes in the hydrologic balance that could be caused by mining and reclamation activities will be prevented or minimized.

The authority for these Sections is set forth in the Act at Sections 102, 201, 501, 503, 504, 507, 508, 510, 515, 517, 519, 701, and 717.

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Proposed section 816.41 sets forth in general terms the hydrologic requirements for surface mining activities. In light of the testimony presented before Congress during deliberations over the Act, the requirements of the Act and State regulations on the subject, details are provided which are believed to be sufficient to ensure that all surface coal mining and reclamation operations are conducted in an environmentally acceptable manner. The process of surface mining involves a number of changes in land cover, drainage pattern, and nature of the overburden that may markedly alter the hydrology of an area.

Past studies have documented changes in flooding, base flows, sedimentation and water quality in streams draining mined watersheds (Curtis 1972 (a), (b), 1973, 1974, Davis 1967, Gilley et al. 1977, Plass 1975, Simpson 1972). In addition, potential impacts can occur to the groundwater resource and in downstream channel – forming processes although these latter changes are less easily documented and usually become a consideration only when relatively larger areas are mined. These various impacts result because interruptions in one or more components of the hydrologic cycle of an area often affect other components in the system (Gregory and Walling, 1973). For example, the changes in water yield associated with forest cutting can result in stream channel instability problems (Galbraith 1973). Therefore, it is important that the hydrologic balance of an area to be mined be altered as little as possible as a result of surface mining.

The proposed regulations are structured on the premise that the permittee must research and understand the hydrologic balance in the affected area as well as understand the affect of mining on that balance so that operations are planned and conducted to minimize disturbances both on-site and off-site. Since the hydrologic balance may be restored only after long periods of time, it is necessary for the permittee to project long-term implications of the mining.

Proposed Section 816.42 contains minimum water quality standards and effluent limitations which would be required by the Office if the Section is adopted.

In developing these standards, an alternative considered by the drafters in response to public comment was to do no more than incorporate by the reference EPA's Effluent Guidelines and Standards for the Coal Mining Point Source Category under the National Pollution Discharge Elimination System permits program. This alternative was analyzed and rejected for several reasons.

First, the proposed effluent limitations would be applied throughout the entire phase of surface coal mining and reclamation operations, as required for the protection for the hydrologic balance by Section 515 (b)(10) of the Act, whereas EPA's effluent limitations regulations apply only to the active phase of mining operations. The extension of effluent limitations to discharges from areas disturbed by mining after final grading or active final operations of an underground mine is necessary to ensure protection of the hydrologic balance, including the quality and quantity of surface water, until reclamation is completed. There is no basis in the Act to distinguish between phases in the mining and reclamation operations for the purpose of justifying less stringent requirements. {41745}

The effluent limitations proposed would apply to all surface mining operations conducted within ""disturbed areas," until such time as the requirements of the Act are met for achieving successful reclamation. Severe water pollution effects occur as a result of discharges from mining operations after the active phase of mining. Therefore, the Office believes that protection of the environment would be significantly impaired by mere adoption of the EPA effluent limitations regulations.

A second reason why this alternative is not being adopted, is that U.S. EPA's regulations apply only to existing point source discharges of water from mining operations and do not apply to non-point source discharges. Section 515(b)(10) of the Act, however, requires that all impacts resulting from mining on the hydrologic balance be regulated. As was noted by the United States District Court for the District of Columbia in consideration of the interim regulations under the Act, regulation of non-point source pollutional discharges from surface coal mining and reclamation operations is needed under the Act. Surface Coal Mining Regulation Litigation ____ F. Supp. ____ (MEM. OP. at 14 15) (D.D.C., 1978). The Office's proposed effluent limitations would apply to non-point source discharges, and provide substantial protection to hydrologic balance on a national basis which would not be afforded by mere adoption of the EPA's effluent limitations regulations.

The third reason why use of the EPA regulations alone is believed to be insufficient in that these regulations do not apply at all to discharges of groundwater. Therefore, the use of those regulations would have major adverse environmental impact as compared to the effluent limitations proposed for adoption by the Office.

A second alternative to the Office's proposed effluent limitations regulations suggested by a commenter was that, rather than specifying effluent limitations based upon total suspended solid discharges of 35 milligrams per liter daily maximum, 70 milligrams per liter daily average on a uniform minimum national base, the Office propose regulations which would establish suspended solid limitations upon the basis of actual impact of each discharge in increasing suspended solid loads on the particular receiving surface waters. This proposal would require that, as to each discharge from mining, a baseline be established on the levels of total suspended solids in the receiving waters above the point of a discharge and limitations be established so as not to allow for loads to ""significantly impact" upon receiving waters. Upon consideration, the Office has decided not to adopt this alternative for two reasons.

First, the EPA effluent limitations regulations require for coal mining that discharges be limited on a uniform national basis to not greater than 35 milligrams per liter daily maximum, 70 milligrams per liter daily average for total suspended solids. Under Section 702(a) of the Act, the Office must adopt regulations at least as stringent as those promulgated by EPA. Therefore, the Office does not believe it has legal authority to adopt this proposed alternative. Second, Section 515(b)(10) of the Act requires that discharges of suspended solids from areas disturbed by mining operations be limited by the use of the ""best technology currently available." The effluent limitation for total suspended solids under the proposed regulations represent the ""best technology currently available," for controlling suspended solids. Establishing effluent limitations merely upon the basis of the quantities of sediment in receiving waters would not represent the use of the ""best technology currently available." This represents another basis on which the Office believes it lacks the legal authority to adopt the proposed alternative.

The Surface Mining Control and Reclamation Act of 1977 is broadly intended to protect society and the environment from the adverse effects of coal mining while EPA's effluent guidelines are based on technological capabilities of the industry for protection of water quality and ecology. Consequently, to meet the requirements of the Act to minimize disturbances to the prevailing hydrologic balance, these proposed regulations incorporate those effluent limitations currently promulgated by the EPA, establish maximum limitations for suspended solids for the West, require representative sampling for determining

compliance with limitations and identify specific minesite development requirements. Thus, compliance with the proposed regulations should minimize water quality and ecological impacts previously documented. (Curtis, 1973; Curtis, 1974; Dyer and Curtis, 1977; Simpson, 1977; USDA, 1973; US FS, 1972; Gruble and Ryder, 1972; US DOI, 1967; Brayley, 1954; Striffler, 1973; Turner, 1958; Kinney, 1964; Warner, 1973.)

The Office has, in the past, discussed the pertinent regulations and statutes with the EPA and has received that Agency's written concurrence to identical requirements to these regulations as they relate to water quality standards. Both agencies will strive to minimize duplicative efforts in standard setting, permit issuance, monitoring requirements, inspections, and enforcement. The Office notes that EPA has proposed standards of performance for new sources in the coal mining point source category. 42 FR 46932 (Sept. 19, 1977). When EPA adopts final regulations, the Office will incorporate regulations which are at least as stringent.

Operations in compliance with the requirements of an NPDES permit should have little difficulty in complying with the effluent limitations and monitoring requirements of these proposed regulations. The Office's limitations on suspended solids for mines located in the Western states are expected to result in limitations identical to NPDES limitations.

One footnote in the proposed table for effluent limitations makes clear the intent to allow permittees to raise the pH of certain discharges to facilitate meeting the manganese standards. Since the higher pH should be quickly reduced by receiving waters, there should be no adverse impact upon water uses. If this practice is found to have adverse impacts on water quality the standard will be changed.

The regulations would require application of the effluent limitations only to discharges from the disturbed areas and not to discharges from areas the permittee has not disturbed through mining and reclamation. The term ""disturbed area" has been carefully defined to exclude areas in which the disturbance is limited to diversion ditches, sedimentation ponds, or access and haul roads when they are constructed, operated, and maintained in accordance with these regulations. These areas have been excluded because installation of treatment facilities necessary to ensure compliance with effluent limitations is not considered by the Office to be cost effective for this type of installation. However, the operator must ensure that runoff and discharges from these areas do not result in degradation of water quality in receiving streams to the extent that applicable water quality standards are violated. Compliance with the requirements for construction, operation, and maintenance of the structures located in these areas should minimize the affects on water quality. If necessary, however, the Office will promulgate more stringent limitations and requirements in the future to protect water quality. {41746}

The extension of effluent limitations to discharges from disturbed areas after final grading is necessary to ensure protection of the hydrologic balance, including the quality and quantity of surface water, until reclamation is completed. However, compliance with the reclamation standards specified in the proposed rules should preclude problems in meeting the effluent limitations during the reclamation period.

Moreover, various State regulatory agencies extend effluent limitations to discharges from lands that have been regarded and planted but which had not yet been released from bond obligations or other permit requirements. It was found that States extend effluent limitations or water quality criteria to all phases of coal mining and reclamation operations. The termination of such requirements is normally tied to release of further permittee responsibility for mining and reclamation and this is often at the time of final bond release. In keeping with this practice, the Office proposes that effluent limitations apply to all surface mining operations conducted within ""disturbed areas" until such time as the requirements of this Chapter are met for achieving successful reclamation.

The greater restriction in footnote 3 on total suspended solids in the interior western United States is necessary to minimize disturbances to the hydrologic balance in areas where erosion is extensive, water quality is critical, and soils are irreplaceable. Benoit, 1975; Dollhoph, et al., 1977; Dyer and Curtis, 1977; Gilley, et al., 1977; McWorter, et al., (no date); and Rahn, 1976.

Under proposed Section 816.42, the permittee would be required to install and operate an automatic lime feeder or other acid neutralization facility where the pH of waters discharged from areas disturbed by mining is normally less than 6.0. An exemption, however, would be provided in the proposed regulations for small mines producing less than 500 tons of coal per day so that the regulatory authority could approve of the use of a manual neutralization device, if treatment requirements were small and infrequent. One comment received by the Office proposed that this exemption be eliminated, so that automatic lime treatment or other neutralization devices be used on all effluent discharges with a pH of less than 6.0. Upon analysis of this alternative the Office has decided not to adopt it. Requiring the use of an automatic neutralizing device when,

for the small mines involved, manual treatment is sufficient would be an added burden upon the operators of those mines, with negligible additional environmental benefit.

Proposed Section 816.43 provides for protection of the hydrologic balance of the mining area by proposing standards for the diversion and conveyance of surface flow and shallow ground water flow. Diversions represent an important environmental tool. Diversions may not be required in all cases – they will be required where necessary to prevent or minimize water pollution.

The terms "peak runoff" and "recurrence interval" are used as opposed to specifying a time period, since the intent is to design the diversion channels to pass safely maximum runoff rates that may occur in the region. These may vary, for example, from a 6-hour storm in one area to a 24-hour storm in another. It would be necessary for a permittee to identify the peak runoff expected in a 3-year and 10-year period either from extrapolation of flow records or by determining storm rainfall for the appropriate recurrence interval and estimating runoff using accepted methods such as those in US SCS, 1960; USDA, 1961. The periods and recurrence intervals proposed differ from those promulgated in the interim program as a result of comments received by the Office concerning the long record of safe diversion construction of the Soil Conservation Service using the 3- and 10-year recurrence intervals. Some commenters suggested using no fixed recurrence interval for temporary diversions, but this suggestion was rejected as not offering enough specific environmental protection to meet the requirements of Sections 515 and 508 of the Act. The permittee would not be expected to divert flows which exceed the design storm.

Temporary diversions are preferable to permanent diversions in the vast majority of cases; thus, permanent diversions must be approved by the regulatory authority. The intent of the requirement in subsection 816.43(b) remains to minimize additional contributions of suspended sediment to the surface water system.

Alternatives were considered for designing permanent diversions and conveyances of overland flow and shallow ground water flow. The selected criterion specifies using a 10-year recurrence interval storm along with a freeboard based on the formula $F=1 (0.025 \times v \times d)$ unless the regulatory authority specifies a larger storm. This was selected because the Office believes it affords a reasonable degree of environmental protection without undue overdesign. One alternative considered would have required designing permanent diversions for storms with a 100-year recurrence interval, or larger if specified by the regulatory authority.

Additional alternative storm recurrence intervals considered for the design of temporary nonstream diversions included: 10-year, 5-year, 3-year, and 1-year 24-hour rainfall events.

Proposed Section 816.44 is based in large part on Galbraith, 1973 and Pfankuch, 1975. The terms "peak runoff" and "recurrence interval" are used instead of specifying a time period, since the intent is to design the diversion channels to safely pass maximum runoff amounts that may occur in a region. The 10-year and 100-year intervals are used for design, since the 10-year limit is consistent with general practice and affords an effective level of environmental protection for temporary structures and the 100-year period is generally accepted as a basis for design of intermittent and small perennial streams. Illinois Department of Mines and Minerals, 1976, and U.S. SCS, 1971. It will be necessary for a permittee to identify the peak runoff expected in a 10-year and 100-year period either from extrapolation of flow records or by determining rainfall for the appropriate recurrence interval and estimating runoff using accepted procedures, such as those found in US SCS, 1960, or US DC, 1961.

The alternatives considered for the design of permanent and temporary stream channel diversions were the same as considered for overland flow diversions, and the reader is referred to the portions of this Preamble which discussed proposed Section 816.43 (Diversions and conveyances of overland flow and shallow groundwater flows).

Proposed Section 816.45 focuses on the erosion and sediment control measures that are used in conjunction with sedimentation ponds covered in Section 816.46. The emphasis in planning mining operations should be on controlling erosion to minimize the sediment that is received downstream. These erosion and sediment control measures are the basis for establishing credits to be used in reducing the volume of sediment storage that will be needed in the sediment ponds.

Disturbed areas are most vulnerable to erosion when the surface is bare. Erosion can be minimized when this exposure is kept to the shortest practical time and, where practicable, earth-work activities such as diversions and pond construction are not conducted during wet seasons. Final dressing and grading should be done progressively and/or mulching should be done where revegetation may be delayed (U.S. EPA, 1976a). Backfill material can also be shaped to lessen overland runoff as an

erosion control measure (Curtis, 1971b; Dollhopf, 1977). Chemical binders and tacks can be used effectively to stabilize bare soil areas from erosion until vegetation is established (U.S. EPA 1976a). {41747}

Diversions to keep runoff from undisturbed areas away from disturbed areas serve to lessen the amount of sediment to be handled and the magnitude of runoff event that must be used to design sediment ponds (U.S. EPA, 1976a, U.S. SCS, 1971). A variety of detention and retention devices may be employed in the disturbed areas to reduce overland flow volumes or velocities and entrap sediment (Tryon et al. no date; U.S. EPA, 1976a; USDADSC, 1971; WVA DNR, 1975).

Section 816.47 – Sedimentation Ponds : The Office proposes to require sedimentation ponds in conjunction with other sediment control measures as ""best technology currently available" to prevent to the extent possible additional contributions of suspended solids to streamflow or runoff outside the permit area. See Section 515(b)(10) of the Act. It appears to be well established that sedimentation ponds used with other sediment control measures are ""state of the art" for controlling sedimentation from surface coal mining operations. The Environmental Protection Agency has undertaken a number of studies to determine the best methods for controlling sediment laden flow. EPA studies have concluded that sedimentation ponds are the key to controlling sediment. According to EPA, such ponds are ""the most effective structures for trapping sediment." The conventional method for controlling sediment that reaches the periphery of the mining operations is through the construction of a sediment retention pond to intercept the surface runoff before it leaves the mining site. Erosion and Sediment Control – Surface Mining in the Eastern United States, at 65 (1976). Another EPA study indicates sediment ponds are the last line of defense (treatment) before the water leaves the mine area. Hill, Sedimentation Ponds – A Critical Review, at 2 (Oct. 1976). According to one of the leading commentators in the field, sediment ponds should be located as close to the sediment source as possible and before drainageways reach the main stream. Grim and Hill, Environmental Protection in Surface Mining of Coal, EPA 670/2 74 093 at 103 (Oct. 1974).

Also, several States, including West Virginia, Pennsylvania, Kentucky and Montana now require sediment ponds as part of the mining operations. Hill, at 13 (1977).

Simply stated, sediment ponds are structures used to slow down water runoff in order to allow sediment particles to settle out. The ponds must provide sufficient water storage volume to detain the runoff long enough for particle settling. As the reservoir fills due to trapped sediment, the water storage capacity decreases. Therefore, additional sediment storage volume must be provided in order to prevent the total volume of the reservoir from falling below the volume required for particle settlement.

To draw down the water in the pond at a controlled rate so as to assure the required water detention time, a pipe is placed through the pond embankment. If the runoff overtops the embankment, erosion could occur which can ultimately lead to pond failure and hazards to life downstream. For this reason, sufficient discharge capacity must be provided from the pond in the form of an emergency spillway to eliminate the possibility of overtopping the embankment on rare precipitation events.

In mountainous areas several small ponds in series may be more desirable because of topographic constraints. Passing water from one pond to another can also improve detention time. Moreover, one small pond can be used to pre-treat or remove the bulk of the large particles thus reducing the need to clean out a larger polishing pond. Hill, at 14 (1977).

The mechanics of sediment laden flow are complex. The major factors governing the efficiency of a sediment pond are the geometry of the basin, the inflow hydrograph, the inflow sediment graph, the outlet design, the hydraulic behavior of the flow within the basin, control devices within the basin which minimize short-circuiting, turbulence, and resuspension, the characteristics of the sediment and the settling behavior of the suspended sediment particles and the detention time. Ward, Simulation of the Sedimentology of Sediment Detention Basins at 32 (1977); Oscanyan, Design of Sediment Basins for Construction Sites (1975).

In addition to a sediment pond, other sediment control measures which may be necessary to achieve and maintain applicable effluent limitations include the use of vegetative buffers, sediment traps, sand bags, straw bales, and log and pole structures. Grim and Hill, at 102 (1974); Erosion and Sediment Control Surface Mining in the Eastern United States, 60 65 (1976).

The Department proposes to allow operators and the regulatory authority to select the mix of sediment control measures to be used in conjunction with sediment ponds to achieve applicable water quality standards.

Legal Authority: Sedimentation pond design criteria are supported by Sections 102, 201(c), 501(b), 503(a) and (b), 515(b)(10), 515(b)(24) and 516 of the Act. See also Surface Mining Regulation Litigation, Civil Action No. 78 162 at 3

(Mem. Op. August 24, 1978).

Sediment storage volume. Subsections 816.46(b)(1) and (2) of the proposed regulations provide methods for calculating the required sediment storage capacity to store the expected sediment accumulation in the reservoir during its useful life. Two methods are used for making the computations and both are acceptable in this proposed regulation. First, the operator may use the Universal Soil Loss Equation (USLE), gully erosion rates and the appropriate sediment delivery ratios. The Universal Soil Loss Equation projects the sheet rill and gully erosion from disturbed areas as a function of rainfall energy, soil erodability characteristics, length and steepness of slope, and the type of cover present. Procedures for making the USLE predictions are well established and accepted by the engineering and scientific community. Meyer, *Sediment Yields from Roadsides: An Application of the Universal Soil Loss Equation*, at 289, (Dec. 1975); Boysens, *A Procedure for Estimating Urban Sediment Yield*, at 3, (Dec. 1975); Haan, *Hydrology and Sediment Control from Surface Mined Areas*, at 5.1 (1978); Wischmeir, *Predicting Rainfall Erosion Losses from Cropland East of the Rocky Mountains*, (1965); USDA, 1975, *Procedure for Computing Sheet and Rill Erosion on Project Areas*, SCS Technical Release No. 5 (Rev.); Heineman, *Volume Weight of Reservoir Sediment*, 181 197 (1962).

The sedimentation pond must be designed to store sediment volume from the drainage area to the pond for a minimum of three years. This minimum design requirement is proposed to assure that ponds have sufficient sediment capacity to last the duration of the surface coal mining and reclamation operation. Hill, *Sedimentation Ponds – A Critical Review*, at 11 (1977). For some area mines the pond may need to collect sediment for more than 3 years. Therefore, it is expected that sediment storage volume will have to be increased to accommodate the additional sediment volume. Hill, at 11 (1977). Alternatively, adequate sediment storage volume may be maintained by more frequent removal of sediment.

The Universal Soil Loss Equation and the gully erosion rates must be used in conjunction with a delivery ratio because some of the sediment eroded from disturbed areas is deposited before reaching the reservoir by natural vegetation, stream channels, and mine pits. The gross erosion from the surface coal mining operation reduced by a delivery ratio quantifies this effect. Procedures for making these calculations are summarized in Haan, at 548 (1978); and US SCS National Engineering Handbook Section 3. {41748}

Alternatively, an operator may design the pond with a sediment storage volume of 0.1 acre-feet for each acre of disturbed area within the upstream drainage area. The basis for 0.1 acre-feet for each acre of disturbed area as an initial design requirement is a study by Curtis, *Sediment Yield from Strip mines Watersheds in Eastern Kentucky* (1974). Five settling basins were studied in Breathitt County, Kentucky, to measure the sediment yield from surface mined watersheds. Data collected included disturbed area, storage area, sediment yield, and accumulated precipitation. Based upon this data, Curtis concluded that there was little correlation between sediment yield and the amount of land disturbed during surface mining. In his view, methods of mining and handling the overburden were the major factors controlling sediment yield. Likewise, reclamation measures, including prompt revegetation, were determined to be important to minimize the sediment yield. He then concluded that the design criterion of 0.2 acre-feet for each acre of expected disturbance be retained. This recommendation was qualified, however, to the extent that mining and reclamation methods were refined and improved.

One commenter has submitted updated unpublished data collected by Curtis at the same sites between 1973 and 1977. All the data collected by Curtis is now available for public comment and analysis. The data show considerable disparity in sediment yields depending upon the type of mining operation. A 0.2 acre-feet per acre of disturbed area storage volume requirement is probably justified for operations with poor on-site mining and reclamation methods. Curtis, at 99 (1974).
I11Based upon this data the Department proposes 0.1 acre-feet per acre of disturbed area as a starting point for determining required storage volume for sediment ponds. If the operator utilizes on-site erosion and sediment control measures, such as prompt and progressive backfilling, prompt revegetation, adequate mulching, and sediment traps, the regulatory authority may approve a sediment storage volume not less than .035 acre-feet for each acre of disturbed area within the upstream drainage area. To obtain the reduction in sediment storage volume, the operator must show the sediment removed by other control methods is equal to the reduction in sediment storage volume. Thus, .035 acre-feet for each acre of disturbed area is proposed as a nationwide minimum sediment storage volume for sedimentation ponds. Simpson, *Westmoreland Resources*, Comments on the Interim Final Rules, (March 23, 1978); National Coal Association, Comments and data on the proposed interim regulatory program, Oct. 1977. Robbins, Comments on the Interim Final Rules, (March 15, 1978).

Detention time. The pond must also be designed to detain sediment laden water for a period of time sufficient to allow the water to come to rest and clarify itself. This pond ""theoretical detention time" is defined as the average time that the design flow is detained within the sediment pond. Haan, *Hydrology and Sediment Control from Surface Mined Areas*, at 6.6 (1978).

The Department proposes that each sediment pond provide a 24-hour theoretical detention time for the water inflow or runoff entering the ponds from a ten-year 24-hour precipitation event. The design storm event is based upon EPA regulations, 42 FR 21380 and the development Document for Interim Final Effluent Limitation Guidelines and New Source Performance Standards. (1976).

The regulatory authority is to determine runoff by considering soil type, ground cover, slope, moisture conditions, and other physical characteristics. A twenty-four hour theoretical detention time is a necessary starting point to capture sediment laden flow from surface coal mining operations. It appears that trap efficiencies greater than 90 percent will be required if water quality standards are to be maintained. Ward, at 30 (1978). Studies of actual pond detention time versus theoretical detention time have shown the actual detention time to be 30 to 70 percent theoretical detention time with most ponds falling into the lower category. Hill, at 11 (1977). Assuming sedimentation ponds are approximately 50 percent efficient, to obtain 94 percent removal efficiency, 12 hours actual detention time or 24 hours theoretical detention time is necessary. Kathuria, at 56 (1976).

Sedimentation ponds designed with a 24 hour theoretical detention time are in routine use. For example, sedimentation ponds in Poland are typically designed with detention times of inflow from one to five days. A study of ponds in Poland show actual detention time to be two to four times less than the theoretical time. Janiak, Purification of Waters from Lignite Mines, at 59, May 1975.

The regulatory authority is authorized to approve a theoretical detention time not less than 10 hours when the person engaged in surface coal mining operations has demonstrated that the improvement in sedimentation removal efficiency is equivalent to the reduction in detention time as a result of pond design, size distribution of particles, or specific gravity of particles. The pond effluent must also be shown to achieve and maintain applicable effluent limitations. The 10 hour theoretical detention time specified is proposed as the minimum time necessary to separate by gravitational settling suspended particles that commonly occur from surface mined areas. Generally, single basins which provide an average detention time less than 10 hours, will not meet applicable effluent limitations. Hill, (1977).

The Office proposes to allow the regulatory authority to approve a theoretical detection time less than 24 hours when the person has demonstrated to the regulatory authority that chemical treatment will achieve and maintain the applicable effluent limitations; is harmless to flora and fauna; is planned under the supervision of a registered professional engineer; and the treatment facility is operated by a qualified person approved by the regulatory authority. Chemical treatment or flocculants can be applied to the water to cause the particles to come together with each other or with a heavier chemical to facilitate settling. Fine silts and clays often carry a negative charge, which causes the particles to repel each other and stay in suspension for longer times. Chemical treatment is sometimes necessary to affect negatively charged colloidal particles causing them to become attracted to each other and form larger masses which settle out. Types of coagulant include metal salts (aluminum sulfate, ferrous sulfate, feric chloride), metal hydroxides (aluminum hydroxide, calcium hydroxide), and synthetic polymers or polyelectrolytes (anionic, cationic, nonionic). Selection of the coagulant and the required dosage is an important factor in design of a chemical treatment system. Erosion and Sediment Control – Surface Mining in the Eastern United States, at 69 (1976).

The use of chemical flocculating agents is beginning to see more widespread use. In the past, polymer electrolytes and several other chemicals have been widely used in water treatment facilities. Flocculating agents provide an economic solution to meeting water quality goals on large surface mining areas. On three watersheds near Centralia, Washington, water quality was maintained within the applicable effluent limitations for an estimated cost of \$1 0.00 per acre of runoff. Suppliers of chemical agents indicate they are now being widely used throughout the United States. Ward, at 24 (1978). See also Ward, at 59 (1977). Janiak, at 67 (1975); Kathuria, at 5 (1976). See also H. R. Report No. 95 218 (1977).

In the domestic water treatment field, alum and feric chloride have been used to reduce suspended sediment. In England, wire baskets filled with alum brickettes are placed in the inflow channels leading to sedimentation ponds. Hill, at 18, 19 (1977). {41749}

Dewatering. Subsection 816.46(d) requires a non-clogging dewatering device (which can be a principal spillway) to achieve and maintain the required theoretical detention time. The dewatering device and the principal spillway are required to pass the runoff resulting from a 10 year 24 hour precipitation event without use of the emergency spillway. If the design flow passes through the emergency spillways, there is no practical way to detain it. Thus, the detention time would be inadequate. For this reason, flow through the emergency spillway is restricted to precipitation events exceeding the 10 year 24 hour event. Erosion and Sediment Control – Surface Mining in the Eastern United States, Vol. 2 at 55 (1976); Hill, at 17 (1977); Haan, at 6.1 6.27 (1978).

The sediment pond dewatering devices may be designed in a number of ways. One method is to place the inlet of the principal spillway (usually a pipe spillway) at the elevation of the required sediment storage. A second method would be to place the inlet elevation of the principal spillway at an elevation above the required sediment storage elevation. If this latter alternative is selected, sediment clean out would not be necessary when sediment accumulates to 60 percent of the required sediment volume. However, the reduction in settling storage must not reduce the actual detention time below the theoretical detention time.

Short-circuiting. To assure that actual detention time approaches theoretical detention time, the Department proposes that sedimentation ponds shall be designed, constructed and maintained to prevent short circuiting. Short circuiting is caused by high velocity jet action of incoming water, wave action, inlet and outlet design. Hill, at 10 (1976). The shape of the pond has a major bearing on short circuiting of flow. Teardrop and tooth-shaped ponds usually have less short circuiting than elongated ponds perpendicular to the inlet. A long, narrow, snake-shaped pond would probably be the best shape. Hill, at 16 (1977). Methods of minimizing short circuiting include baffles, partitioning the pond into chambers, maintaining a length to width ratio of five to one, constructing an energy dissipater at the pond entrance, modifying the inflow, or adding two or more basins in series. *Erosion and Sediment Control – Surface Mining in the Eastern United States*, at 68 (1976). See also Ward, at 57 (1977). Janiak, at 59 (1975). Schiebe, *Control of Water Retention Time in Small Reservoirs*, ASAE Meeting (1977).

Sediment removal. Subsection 816.46(h) generally requires sediment removal when the volume of sediment accumulates to 60 percent of the required sediment storage volume. This requirement is necessary to assure that the pond has adequate sediment storage as a reserve for future precipitation events inasmuch as runoff events are not entirely predictable. Additionally, the remaining water volume (40% of required sediment volume) reduces the velocity in flows and decreases the chance for scour and resuspension of previously settled sediment. When resuspension occurs, the concentration of suspended solids in the outflow has been shown to exceed the concentration of the inflow to the pond. *Erosion and Sediment Control – Surface Mining, the Eastern United States, Vol. 2* at 53 (1976); Hill, at 11, 13, 14 (1976); Kathuria, *T3Effectiveness of Surface Mine Sedimentation Ponds*, EPA 600/2 76 117 (1976); Haan, at 6.1 6.27 (1978); Oscanyan, *Design of Sediment Basins for Construction Sites* (1975).

General design requirements. A number of other standard design and construction requirements are proposed in the regulations. These include spillway design, required freeboard, allowance for settlement, minimum top width, required embankment side slopes, foundation preparation, fill materials and placing, spreading, and compaction requirements. These are general minimum requirements required in construction of similar sized ponds. US SCS, *Practice Standard 378-Pond*. I11 Alternatives considered. The Office considered a number of alternatives to the design criteria proposed for sediment ponds. The Office weighed allowing coal operators to use any sediment control measures to achieve and maintain applicable effluent limitations and control sediment. However, based upon the literature in the field, it appears unlikely that water quality standards will be achieved and maintained without sediment ponds.

Second, the Office considered alternative sediment storage volumes, detention times and dewatering devices for sediment ponds. For example, 0.2 acre-feet per acre of disturbed area was considered as a national standard and preliminarily rejected as unnecessary for all surface coal mining operations. Also, a 10 hour theoretical detention time was rejected as inadequate to achieve water quality standards. In this regard, the literature appears to say that sediment ponds must be designed with trap efficiencies exceeding 90 percent to achieve and maintain water quality goals. Therefore the Office has proposed a 24 hour theoretical detention time corresponding to 94 percent efficiency.

Proposed Section 816.47 is intended to control the release of effluents having relatively high velocities which can scour unprotected channels of receiving streams (US DOI, 1960). Scouring can destroy the aquatic, biotic communities of the receiving stream in the immediate discharge area as a result of physical factors, such as trauma, displacement, and destruction of habitat, and it can adversely impact water quality and ecology for relatively large distances downstream as a result of excessive suspended material. Most biological effects of suspended materials are also physical in character, including asphyxiation by the mechanical blockage of respiration, inhibition of photosynthesis by the obstruction of sunlight, and the irritation of gills, which may render the affected organisms more readily susceptible to infections (Hynes, 1972; and Wibler, 1969).

The proposed regulations identify devices generally applicable for dissipating water energy and preventing scour. Flexibility is provided for use of any method or combination of methods that will preclude channel deepening or enlargement.

Proposed Section 816.48 identifies measures for avoiding acid or other toxic mine drainage which might result in significant degradation of the water quality and ecology of receiving streams (US DOI, 1969; Kinney, 1964; Warner, 1978; Turner, 1958; Braley, 1954; Striffler, 1973). Biological effects may be acute or chronic in nature depending upon many factors including the type and concentration of toxic pollutants contained in the drainage, the biological species exposed to the pollutants, and the time of exposure.

The methods are broad in character and cover the practical options known for avoiding mine drainage, and some State regulations, e.g. Alabama, Tennessee, Virginia, Texas, Louisiana, Maryland, Montana, Ohio, West Virginia, South Dakota, and Illinois, specify similar methods.

Another method which was considered for inclusion is the use of drainage systems under buried spoil material to remove water contacting the problem spoils. However, this method is considered by the Office generally to be impractical because of associated handling, treatment, and time requirements. If appropriate, the regulatory authority could require this method under proposed subsection 816.48(b).

Proposed Section 816.49 sets minimum standards for permanent impoundments. The potential for development of permanent impoundments is greater in a region mined by the area method than in regions mined by the contour method, due to topographic and other limitations associated with the latter method. Consequently, most of the impoundments would probably be located in the central and western states and would probably be developed primarily for recreational activities, for wildlife, or for livestock watering. {41750}

The Soil Conservation Service documents that are to be used as the basis for designing permanent dams or ponds were selected because these standards are widely used and accepted. See U.S. Soil Conservation Service, Earth embankments and foundations (1976), U.S. Soil Conservation Service Engineering Standard for Debris Basin for Control of Sediment from Surface Mining Operations in Eastern Kentucky (1971). The SCS has ""built" 1.7 million ponds as of September 30, 1977, and is presently assisting in the design and construction of about 50,000 per year. In addition, they have constructed over 8,000 dams under PL 83 566 and PL 504 programs, Johnson, 1978. SCS standards have proven to be workable and are not so overly restrictive economically as to prohibit construction of small impoundments.

Public comment is solicited on whether the responsibility for maintenance and other safety considerations associated with permanent impoundments should be explicitly accepted by the landowner, or a governmental agency, before the regulatory authority could authorize them. Past experience has not shown this to be a particular problem.

Proposed Section 816.50 provides for ground water protection by prohibiting uncontrolled discharge of water. Uncontrolled discharge has been the source of most documented adverse impacts to date upon water quality and ecology. Control of this water is possible through the proper location, design, construction, and utilization of pits, cuts, auger holes, and other excavations.

Proposed Section 816.51 is intended to protect the recharge capacity of aquifers in the mine area. Uncontrolled mining and reclamation practices can result in significant degradation of infiltration rates, decline in water level and flow from springs, and changes in water-bearing characteristics within any aquifer-recharge area.

The impacts of surface mining on ground water may vary considerably depending on the scope and extent of the resource, infiltration rate, the porosity and permeability of the excavated overburden, the compaction of the backfill in disturbed areas, whether mining operations are above or below the water table, and the extent of ground water use in the recharge areas.

In many areas of the eastern United States, surface mining operations are in geohydrologic areas similar to the area studied by H. T. Hopkins and D. S. Mull and reported in Collier, et al., 1970. In this area, authors concluded that there was no significant change in the occurrence and movement of ground water as a result of surface mining operations.

In the western area of the United States, the effect of surface mining on ground-water resources will be variable as indicated in Northern Great Plains Resource Program, 1974. I11 Technical literature utilized as support for proposed sections 816.50 and 816.51 includes: Hardaway, Coal Mining and Ground Water (1978); Erosion and Sediment Control in the Eastern U.S. (1976) Hardaway Memorandum Rosebud Mine Trip Report, (July 1976).

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Proposed Section 816.52 would require surface and ground water monitoring where there is a potential that the water resources of the mining area may be adversely impacted by the mining. Adverse impacts of mining upon water resources are well documented. Curtis, 1974; Dyer and Curtis, 1977; Simpson, 1977; USDA, 1973; US FS, 1972; Grubb and Ryder, 1972; US DOI, 1967; Bealey, 1954; Striffler, 1973; Turner, 1958; Kinney, 1964; Warner, 1973. These impacts, however, can be either prevented or minimized through the use of available demonstrated technology at a cost that should be small in comparison to basic production costs: EPA, 1976; ICF, 1977. Monitoring is essential for determining the effectiveness of the technology, forewarning of problems, ensuring that problems are not inadvertently created, and documenting compliance with permit limitations. Monitoring requirements will be identified in the mining permit.

Surface water monitoring requirements should be tailored to the wastewater and available treatment facilities. Wastewaters with highly variable concentrations and quantities of potential contaminants must be sampled more frequently than discharges which have relatively constant or low levels of contaminants. If adequately designed, operated, and

maintained, settling ponds and automatic neutralization facilities (for acid waters) will assure that the treated effluent will be relatively constant in character and contain low levels of contaminants, therefore requiring a minimum of monitoring to document compliance with the permit limitations.

Since the provisions of the Federal Water Pollution Control Act and this Act are compatible, the surface water monitoring requirements under both Acts are proposed to be coordinated in accordance with subsection 816.52(b).

Ground water monitoring would be required at only those sites where there is a possibility of disruption or degradation of the ground water system. Ground water systems can be extremely complicated; consequently, to design a monitoring program of value, it is essential that information be available on the basic geohydrological characteristics of the potentially impacted aquifers. Additionally, sampling procedures must be carefully developed to obtain representative samples. Installation of sampling and observation wells may be the only feasible alternative for monitoring many of the potentially impacted aquifers. Establishment of baseline conditions is also essential, requiring sampling in advance of mining.

Monitoring may also be required to measure progress toward restoration of recharge capacity. This monitoring would normally consist of measuring infiltration rates and permeabilities of backfilled materials. Additionally, in providing for the protection of the surface mining area's recharge capacity the regulatory authority might establish monitoring requirements including a combination of consistent criteria from paragraphs (a), (b) and (c) below:

(a) No monitoring of ground water occurrence and movement will be required when:

- (1) The regulatory authority determines that occurrence and movement of ground water and spring flows will not be affected by the surface mining;
- (2) The mined zone is not a significant water-bearing unit; or
- (3) Ground water use in the area affected by surface mining is insignificant.

(b) Periodic monitoring of ground water levels in shallow piezometers might be required when: _

- (1) The mined zone is a water-bearing unit of some current or potential future use as the source of limited water supply; or
- (2) Surface mining lowers water levels, decreases the yield of nearby springs, and degrades infiltration rates.

(c) Periodic monitoring of ground water levels and pumping tests to determine the aquifer characteristics prior to and after surface mining starts might be required when:

- (1) The surface mining zone is a significant water-bearing unit of current or potential future use for public, agricultural, industrial or domestic supplies;
- (2) Surface mining has significantly lowered the water table, decreased spring flows, and degraded infiltration rates; or
- (3) The occurrence and movement of ground water has been affected by the mining.

One comment received proposed that the Office limit monitoring requirements to the procedures established under the EPA's National Pollution Discharge Elimination System (NPDES) permit program. The Office considered this alternative and decided not to adopt it. As is explained in the discussion of the proposal to adopt only the EPA's effluent limitations above, EPA's regulation of water discharges from coal mining covers only point-source discharges during the active operation phase of coal mining to surface waters.

One comment received proposed that all operators be required to conduct continuous total suspended solids/sediment monitoring in the first, second and third streams downstream from discharges from the areas disturbed by a particular operation. Under this proposal, the permittee would be required to monitor the stream beds of total suspended solids in receiving streams into which discharges from a mine immediately occur and the receiving stream into which the immediately receiving stream is a tributary. Suspended solids monitoring would also be required of the succeeding stream into which the first receiving and second receiving stream discharge. Upon analysis of this alternative, the Office decided it warrants further consideration and specifically solicits public comment.

Under Sections 507(b)(11) and 510(b)(3) of the Act and the regulations being proposed at Parts 779, 780 and 783 784 and Section 786.15, monitoring of the kind suggested by this proposal will be needed as a general matter, prior to the issuance of a permit. However, that monitoring will in large part be conducted, for areas outside a proposed mine plan area, not by the permit applicant/operator, but rather by State and Federal agencies who conduct water quality and quantity sampling programs.

On the other hand, while the Act does require monitoring of the impacts on the hydrologic balance of surface coal mining and reclamation operations during the conduct of those operations, it does not specify that the permittee conduct monitoring of surface waters outside the permit/mine plan area. See Sections 515(b)(10) and 517 of the Act. The Office believes that it will be necessary for the regulatory authority to insure that total suspended solids/sediment loads in receiving streams of drainage from surface coal mining and reclamation operations be adequately monitored for as far downstream as is needed to assess the impacts of particular and groups of mining operations. Therefore, in order to assure adequate protection of the hydrologic balance as required by the Act, it is believed that monitoring for considerable stretches of streams downstream from the vicinity where surface coal mining and reclamation operations are conducted would be advisable. Discretion, however, is conferred by the Act as to the determination of how far downstream from mining operations these monitoring stations must be located and as to exactly which entities should conduct offsite monitoring in receiving surface waters.

There would appear to be no measurable environmental effects between the choice of specifying that permittees or the regulatory authority or some other government agency conduct downstream sediment monitoring. In any of these events, the necessary monitoring would be accomplished. However, there may be significant environmental impact as to the choices between specifying only very general criteria for downstream surface water sediment monitoring, as opposed to specifying that one, two or three downstream streams be monitored. The differing impacts between these two alternatives are dependent, of course, upon the extent to which it is necessary, on a national basis, that sediment transport for mining operations through surface waters be monitored as far as the third downstream stream from mining operations. The Office intends to conduct further analysis of this matter, utilizing the technical literature identified in the Preamble portions which discuss Sections 816.41 816.57 of the proposed regulations and any comments received. {41752}

Under Sections 515(b)(10) and 517 of the Act, surface coal mining and reclamation operations are required to be periodically monitored for both surface and ground waters impacts, in order to minimize disturbances to the hydrologic balance both on and off the minesite throughout the entire phase of those operations. The Office believes that it does not have the legal authority to limit monitoring requirements for coal mining merely to those utilized by EPA. In addition, utilization of the agency's monitoring requirements alone, would have a major adverse environmental impact, by the failure to require monitoring of non-point source discharges and groundwater impacts at all, and by failing to cover monitoring of point source discharges to surface waters after the active operational phase of mining.

As proposed, OSM's monitoring requirements would not specify particular locations and the exact number of samples to be collected for total suspended solids, in order to assess the impacts upon the waters receiving discharges from areas disturbed by mining. Instead, this matter would be left largely to the discretion of the regulatory authority for determination on a case-by-case basis.

Proposed Section 816.53 provides that, under certain circumstances, the regulatory authority may approve the transfer of exploratory or monitoring wells for use as water wells. Approval of such well transfer will be accompanied by a transfer of primary responsibility for any liability for danger and eventual plugging without release of liability of the mine operator. The Office recognizes that standards for the construction of potable water supply wells generally require construction practices which assure protection from surface pollution, whereas monitoring wells constructed for ground-water data collection are designed only for these limited purposes. Since wells intended for potable supply uses are usually subject to inspection and subject to approval by local public health department officials, it is expected that the regulatory authority may require certification from the local government agency before the well transfer is approved for potable supply use. Stock and irrigation uses, when well yields are sufficient for these purposes, usually do not require inspection and approval.

Proposed Section 816.54 would call for surface mining practices to be performed in such a manner that water is not contaminated, interrupted, or diminished by the mining operations. The replacement of domestic, agricultural, industrial or other legitimate water supply when impaired by the mining operations is required under Section 717 of the Act.

Proposed Section 816.55 provides for protection of the mining area's hydrologic balance by restricting the discharge of waste water, including coal processing waste, into underground mine voids. Use of underground mines for wastewater disposal has the potential of degrading ground water aquifers and stream flow.

However, such practices may be more cost effective than surface disposal facilities for an equivalent degree of environmental protection and, additionally, advantageous in such areas as fire protection, abatement of acid mine drainage, and subsidence control, by filling mine voids through sedimentation of suspended solids, may be provided by the practice. Consequently, the regulations would allow the practice provided that all necessary precautions are taken to assure the protection of the area's water resources. It should be noted that the regulatory authority's approval of such a practice will be

based on environmental protection criteria, not economics. The Office considered an outright ban on all discharges into underground mine workings. However, the drafters determined that this might unduly preclude environmentally viable measures such as those authorized under the proposed rules.

Proposed Section 816.57 protects stream channels and contemplates that the regulatory authority would review and evaluate proposals to conduct any operations within 100 feet of a perennial or intermittent stream. Thus, if operations can be conducted within 100 feet of a stream in an environmentally acceptable manner, they may be approved. TVA, 1971; Karr & Schlosser, 1977. This concept does permit the use of erosion and drainage control measures near the channel if approved by the regulatory authority. These exemptions are necessary if the environmental impacts are to be minimized or prevented. The 100-foot limit is based on typical distances that should be maintained to protect stream channels from sedimentation. Site-by-site distance determinations would be impractical and very difficult to enforce. It should be noted that under the proposed rules, an operator could not mine through a stream unless it had been diverted around the area of disturbance.

The general rule recognizes that buffer zones are an effective method to be used in conjunction with a sediment pond to prevent sedimentation to streams by runoff from disturbed surface areas (Karr & Schlosser, 1978, 229). See also: Grim and Hill, Environmental Protection in Surface Mining of Coal (U.S. EPA, 1974); Weigle, Designing Coal Haul Roads for Good Drainage (USDA Forest Service, 1965) and Guidelines for Construction of Mine Roads (Region X U.S. EPA Appendix "D" to Grim and Hill, supra.) It also recognizes that small streams may have considerable biologic complexity worthy of protection under Section 515(b)(24) of the Act, even if the streams are not perennial (Hynes, H.B.N., 1970, p. 403). However, since even the most ephemeral streams may have a benthic biota, the Office believes that some reasonable level of biological community complexity should exist in streams before they deserve direct protection. The definition of "macroinvertebrate biological community" in Section 701.5 seeks to do this by eliminating from consideration most of the very small forms of stream biota which have brief, ephemeral life spans, unless they are joined in the biota by longer lived, larger, and complex forms of life which characterize the more permanent streams. (Hynes, supra).

Although it would not be necessary to establish the exact gradient of an entire stream channel through which mining has been allowed, it is necessary to reproduce the combination of the average gradient, channel configuration, channel roughness, and channel bank stability in order to minimize disturbances to the sediment transport process. In effect, the gradient must be reestablished to the degree necessary to allow natural fluvial processes to continue, thus, the requirement to maintain the average stream gradient for diversions that are to remain in place after operations are completed.

SECTION 816.59 - COAL RECOVERY.

This Section would address two persistent problems of coal mining: (1). The loss of coal resources when a mining operation does not result in the recovery of all the coal at a particular mining site; and (2). Recurrent environmental degradation when land is reopened for mining to recover the remaining coal. The regulation would, if adopted, require the operator to conduct mining operations so as to maximize resource recovery. This would be accomplished by mining all available coal at a minesite which it is economically feasible to extract. {41753}

The authority for this proposed Section is found in Sections 102, 201, 501, 503, 504, 510, and 515 of the Act.

The Office considered including specific language requiring the recovery of all coal economically feasible to be recovered from a site, but did not include such language in the proposed regulations. The proposed regulations would instead be satisfied by a good faith demonstration by the operator to the regulatory authority that all coal which is economically feasible to recover will be mined.

The most commonly mentioned percentages were 85, 90, and 95. These alternatives were not included for three reasons. First, it is difficult to precisely define the amount of coal existing at a site prior to mining, because of variable thickness of seams and partings, variable quality of the coal, and variations in depth of overburden. Second, health and safety considerations may preclude attainment of fixed percentages of recovery. Third, constant variation in thickness of seams, quality of coal, depth of overburden, and mining conditions would require a continuous monitoring and detailed ongoing exploration program which is believed to be beyond the capability of the regulatory authority to undertake or oversee. However, the Office will continue to consider whether fixed percentage recovery standards should be required.

Public comment on an express requirement for recovery of coal economically feasible to recover versus this implied requirement is invited.

A second alternative of requiring a separate list of cost variables and resource figures from the operator was also considered but not included at this time. Public comment is invited on the utility of requiring this information in permit application, for use by the regulatory authority according to a fixed formula for determining economic feasibility of recovery.

The reader's attention is directed to proposed regulations for determining recoverable reserves under a Federal lease, recently published by the United States Geological Survey, 43 Fed. Reg. 29631 (July 10, 1978).

Under the proposed regulations published today, the regulatory authority would monitor the mining operations to assure that the operator is proceeding in compliance with the mining plan and with the determination of recoverable coal. Variations in recoverability may be necessary where dictated by quality of coal resources, by health and safety considerations, by the geometry of the mine workings, and by other factors.

SECTIONS 816.61 – 816.68 - USE OF EXPLOSIVES.

These Sections are being proposed to protect the safety and property of the public, underground mines, and ground and surface waters outside of permit areas from blasting performed in surface coal mining activities.

Prior to the enactment of Pub. L. 95 87, the Subcommittee on Energy and Environment of the House Committee on Interior and Insular Affairs heard extensive testimony on the extent and the nature of the hazards associated with blasting in surface mining. Surface Mining Control and Reclamation Act of 1977: Hearings on H.R. 2 before the Subcommittee on Energy and Environment of the House Comm. on Interior and Insular Affairs, 95th Cong., 1st Sess. (1977). Those hearings indicated that the process by which coal is surface mined required a great deal of blasting to fracture the rock strata which overlies the coal seam.

When explosives are detonated, large amounts of energy are rapidly released by means of a chemical reaction. The most dramatic effect of the release of these vast quantities of energy is the generation of flying debris, rocks, dust, and other materials which, during the blast, can be lofted in the air and dropped directly upon persons and property near strip mine sites. Ibid. This "'flying debris" can be widespread and has resulted in people being killed by rocks crashing through their roofs. Id. at 289, 305, 313. Hearings, supra, Appalachian Peoples Service Organization); 211 (Statement of Judy Stephenson, Director, Save Our Mountains, Inc.).

In addition, blasting causes "'air blast." The noise and concussions resulting from air blasts produce severe annoyances to people caught in the wake of an air blast pressure wave and often cause damage in forms of:

""electrical black-outs from destroyed transformers and downed lines, the obstruction of stream beds, damage to structural foundations, damage to sidewalks, cracking or separation of masonry, doors thrown out of plumb, windows cracked by excessive air pressure or concussion, damage to walls and paneling and loosening of cabinet fixtures."

Hearings, supra Part II at 284, 13 (Testimony of Center for Science in the Public Interest); Hearings, supra Part III at 25 (Testimony of Rev. R. Baldwin Lloyd, Appalachian Peoples Service Organization); 210 (Earl Cheatwood, Alabama Needs Federal Coal Surface Mining Legislation). Hearings, supra Part IV at 227 (Testimony of Northern Plains Resource Council.)

The cumulative effects of the damage inflicted upon the victims of mine blasting have been enormous. Property damage in Appalachia alone was estimated at \$1 .5 billion for the years 1965 1975. Hearings, supra Part II at 283. In at least one State, private insurance firms and Federal agencies have denied property insurance and guaranteed loans for prospective purchasers of dwellings near mines as a result of the damage caused by surface mining blasting. Ibid.

Sections 816.61-816.68 are proposed under the authority of Section 102, 201, 501, 503, 504, 515, 517 and 719 of the Act.

B. Materials used by OSM to develop these regulations include:

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2. Barnes, Jack (John B.), 1977, The effects of strip mine blasting on residential structures – Ayshire Mine, Warrick and Vanderburg Counties, Indiana : Paper presented to the Indiana Academy of Science, Indianapolis, Ind., Oct. 28, 1977, 19 p.

3. Coal Mine Health and Safety Act of 1977 and 75 CFR, Subpart N.
4. Grim, E. and Hill, R., 1974, Environmental Protection in Surface Coal Mining (U.S. Environmental Protection Agency, No. 1BB040).
5. Kentucky Department of Mines and Minerals, 1977, Laws and regulations governing explosives and blasting: Lexington, Ky., p. 1.
6. Maryland Geological Survey, Bureau of Mines, 1973, Blasting restrictions (08.06.05.09) and Regulations governing blasting (08.06.05), in Bituminous coal strip mines and auger regulations, Maryland Department of Natural Resources Rules and Regulations, p. 23.
7. Medearis, Kenneth, 1976, The development of rational damage criteria for low-rise structures subjected to blasting vibrations: A Report of the National Crushed Stone Association: Kenneth Medearis Associates, Fort Collins, Colo., and Valley Forge, Pa., 94 p. (duplicated report).
8. Miller, P. H., (no date), Blasting vibrations and air blast : Park Central, Ill., Atlas Powder Co., 16 p.
9. Nicholls, H. R., Johnson, C. F., and Duvall, W. I., 1971, Blasting vibrations and their effects on structures : U.S. Bureau on Mines Bulletin 656, p. 13 29.
10. Old Ben Coal Company, Comments to Office of Surface Mining (1978).
11. Pennsylvania Department of Environmental Resources, Rules and Regulations, Title XXV, Pennsylvania Code, Ch. 211. {41754}
12. Research Energy of Ohio, Inc., Comments to Office of Surface Mining, 1978.
13. Siskind, D. E., 1977, Structure vibrations from blast produced noise, in 18th International Rock Mechanics Symposium, June 1977, Keystone, Colo.: Proceedings, p. 1A3 1 1A3 5.
14. Siskind, D. E., Stachura, V. J., and Radcliffe, K. S., 1976, Noise and vibrations in residential structures from quarry production blasting – measurements at six sites in Illinois : U.S. Bureau of Mines Report of Investigation RI 8168, 17 p.
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16. Siskind, D. E., and Summers, C. R., 1974, Blast noise standards and instrumentation : U.S. Bureau of Mines, Environmental Research Program, Technical Progress Report ("TPR 78").
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Section 816.61 contains general requirements for the use of explosives. Under the provisions of proposed Sections 816.61 and 816.64(e) all blasting operations involving the use of more than the equivalent of 5 pounds of TNT would be required to be conducted according to published time schedules.

Five pounds equivalent of TNT has been selected on the basis of blasting experience which shows that charges of this size can cause significant disturbance when used in an improper blast design. Since commercial explosives and blasting agents have approximately the same energy as TNT, the five pound limit would apply to all commercial blasting products. Section 816.61 would provide for the protection against the adverse effects of blasting by specification of certain minimum training requirements for the personnel used by the industry to conduct blasting operations. Persons working with explosives would be required to be familiar with the Mine Safety and Health Administration (MSHA) regulations, in order to protect the health and safety of workers and the general public. They would also have to be familiar with the Bureau of Alcohol, Tobacco, and Firearms, Department of Treasury regulations to assure that explosives do not fall into unauthorized hands. The proposed requirement for current and valid certificates would be accomplished under the training and certification programs to be instituted under proposed Subchapter M, as part of the permanent regulatory program.

The preblasting survey requirement proposed under Section 816.62 is mandated under Section 515(b)(15)(E) of the Act. That Section of the Act expressly establishes the one-half mile distance requirement. Provision is made for requiring approval by the regulatory authority of those persons actually performing the survey on behalf of the mining operator to insure that the survey procedures will be competently performed. Public comments and suggestions are requested with respect to the minimum standards, if any, which OSM should require be met by a person to be approved by the regulatory authority to conduct preblasting surveys. Such comments should be supported where possible, by appropriate technical literature.

The object of the survey would be twofold. One is to increase communication between the mining entity and the public about blasting operations. Therefore, survey procedures are proposed with a minimum level of formality. The second object of the survey is to provide for the establishment of a preblasting record as to the existing condition of structures and other physical facilities within the survey area, so that operations may be designed to avoid damage and to provide a baseline record against which the effects of the mining-related blasting can be assessed.

Examination of relevant technology thus far has revealed no current, reliable methods for either predicting the weights of individual charges that would prevent damage to structures or determining the condition of structures in terms of resistance to vibration of structural and nonstructural elements. As a result, the procedures for pre-blasting surveys are limited to determining the conditions of relevant structures and to document any preblasting damage. However, because technology for the types of prediction and determination discussed here may be developing for useful application, the Office specifically invites comments and supporting materials as to whether additional or modified procedures from those set forth in the proposed text should be required in the final regulations.

The interim program regulations require the schedule to specify time increments of not more than 4 hours, but not to cover all hours of the working day. The wording in those regulations has been subject to various interpretations. The permanent program regulations propose to leave the number and length of time increments open but restrict the aggregate length of the time increments to four hours per day. This change clarifies the requirement and would still give the mine operator sufficient flexibility to carry out routine blasting activities.

The proposed blasting schedule would inform local residents of their right to a preblasting survey and advise them of how to obtain such a survey. The resident would also be told how the public will be protected from inadvertently entering the blasting area. Audible blast warnings and all-clear signals would be described. A description of emergency situations which will permit the operator to deviate from the schedule will be part of the schedule.

The Office has considered whether the notice should be required to contain the weight and types of explosives to be used. However, because these will vary with each blast, it was decided that this information need not have to be in the notice. Available information also indicates that it is not possible to predict, in advance, all emergency conditions that can occur when blasting. The notice, therefore, would identify the types of emergencies (defined in Section 816.65) that the regulatory authority has approved for blasting at other than scheduled times.

Under proposed paragraph 816.65(a)(1), blasting would be restricted to daylight hours, with provision for the regulatory authority to further limit the times of blasting. Blasting would be restricted to daylight hours for two reasons.

First, blasting at night significantly increases hazards to mine workers and makes site access-security and protection of the public much more difficult. Second, blasting at night is much more disruptive to the peace and comfort of nearby residents. The overwhelming majority of surface mines already restrict their blasting activities to daylight hours without unduly hampering the efficiency of operations.

The interim program regulations require notification of the meaning of the warning signals to be given only to "persons within the permit area". Because many people may commute to work regularly within the permit area, the proposed permanent program regulations would require notification to these persons so that they may be afforded the same protection as local residents.

Under paragraph 816.65 (a)(4), specific quantitative standards are proposed to control the adverse effects of air blast resulting from blasting in surface mining operations. Air blast is a compression wave that travels through the atmosphere in much the same way as a sound wave. It is caused when energy from the explosion is released directly into the atmosphere or by the movement of the ground surface after blasting. (Miller, (no date), pp. 10-15). {41755}

When air blast is audible to the human ear, it is called noise. When air blast creates low frequency energy and is inaudible, it is called concussion. Air blast is measured as an overpressure (air pressure above atmospheric pressure), either in pounds per square inch (psi) or in decibels (dB).

Air blast can cause both structural damage and annoyance to people and animals. Air blast can cause external masonry and internal plaster to crack and can damage windows. The most common effects of air blast are: (1) disturbances created by the rattling of windows, panels and doors which give the impression that the structure is vibrating; and, (2) generation of loud noise which may be beyond human tolerance. High levels of low frequency air blast can cause hearing damage, even though the human hearing system does not register the sensation as sound. Siskind and Summers TPR - 78, pp. 15-16.

The method proposed for controlling air blast is a scale of decibel peak standards. An alternative control considered by the drafters was a requirement for the stemming of all blast holes. Stemming is a procedure where explosives placed in a bore hole are covered with fill material, to damp the blast effect. Miller, (no date) at 14. At the time of the promulgation of the interim performance standards, it was determined that the prescribed amounts of stemming was impossible to comply with

under many conditions. See 42 Fed. Reg. T162658 (Dec. 13, 1977). No further information on this issue has come to the attention of the Office. However, if such information becomes available, the Office will further consider the advisability of promulgation of stemming requirements. Accordingly, comments on the use of stemming as a means for the national regulation of air blast are specifically invited.

A decibel scale is a logarithmic scale directly related to overpressure and is the scale commonly used to measure sound and airblast. All airblast instrumentation measures in decibel units. Various instruments respond to different frequency spectra in measuring airblast. To avoid undue restrictions on the type of instrumentation that an operator can use to measure airblast, the Bureau of Mines has developed a table, shown in Paragraph 816.65(a)(6), allowing for variations in instrumentation frequency response. Air blast frequency is measured in Hertz (Hz) which is equivalent to cycles per second.

Airblast levels and appropriate measurement instrumentation specifications are presented in the table. The values were derived from structure response data collected by two ongoing Bureau of Mines research projects ("Airblast Assessment and Control" and "Determination of Criteria for Ground Vibration Damage from Surface Mine Blasting"). These two projects are scheduled to be finished October 1, 1978, and there are plans to publish the complete results of both projects in the fall of 1978.

The Bureau of Mines plotted and analyzed hundreds of structure response, ground vibration, and airblast time histories. The Bureau of Mines derived an appropriate airblast vs. ground vibration equivalence, consistent with the latest data on structure response, damage, and tolerable levels. While further analysis is planned on both the currently existing body of data and additional measurements, the values in the table are believed to represent the latest state-of-the-art in understanding airblast effects on structures and methods of airblast measurement. (Bureau of Mines summaries of this research have been submitted to the Office and are available in the OSM Administrative Record.)

Two independent approaches were used to derive the values in the table. The more rigorous analysis involved determination of the structure response associated with the already recommended 1.0 inch per second ground vibration. Plots were made of the data within four classes: one-story homes, two-story homes, corner responses (structural), and mid-wall responses (non-structural).

The airblast response data were then similarly analyzed, except that the above four categories were each examined for six frequency intervals, including the four included in the table. The results of this series of comparisons were within a narrow range, probably because the two natural frequencies of structure corners and walls are within fairly narrow ranges.

The mid-wall and corner motions could be controlled by peak-flat (0.1-500 Hz) airblasts of 135 to 137 dB-linear, and C-slow maximums of 109-112 dBC. The corner responses, which are related to potential damage, justified a maximum airblast level of 137 dB-linear, when the most disadvantageous combination of structure response to ground vibration and structure response to airblast was considered. Consequently, the use of 135 dB-linear (0.1 Hz) represents a small safety factor over the ground vibration standard of 1.0 in/Section This factor was needed to reduce human annoyance factors, due to mid-wall motions and associated rattling. C-weighted-slow responses were similarly analyzed with the maximum value of 109 dBC-slow recommended for the same reason.

A second, independent technique was used to analyze the airblast response data, involving displacement-produced strain which is related to cracking in interior walls. Displacement itself is not a good damage descriptor because of its frequency dependence (unlike particle velocity). However, the structure walls and corners have definite frequency ranges, so an analysis was performed to determine the airblast levels associated with the lowest damage case, 0.016 inches maximum wall displacement. For both mid-walls and gross-structure motions (corners), the most strict values were derived by taking the lowest natural frequencies typically encountered, 12 Hz and 6 Hz, respectively. In all cases, the associated airblast damage level for both one and two story homes equaled or exceeded the 135 dB-linear (0.1 Hz) peak linear and 109 dBC-slow, with most values within a few dB of these limits. The compatible results of these two independent analyses lends considerable strength and validity to the results.

The use of the C-slow scale has been recommended by the Committee on Hearing and Bioacoustics Working Group 69 to the US EPA. It is uncertain whether this method is superior to peak-linear but it does provide a logical alternative airblast monitoring system and is under continuing study.

Siskind, 1974 (TPR-78) was based on a few mine blasts and an analysis of a great deal of other data. The values recommended in the table in Section 816.65(a)(6) are slightly stricter than TPR-78, with the 6 Hz value of 130 dBL in the

table corresponding to the recommended absolute minimum damage level of 136 dB-linear (5 Hz) of TPR-78. Consequently, these recommendations should not only prevent airblast damage, but also should reduce annoyance factors.

The industry is believed to be capable of meeting the airblast values, if proper blast designs are utilized. This will require additional care by operators with thin parting layers and other confinement problems, as poorly stemmed charges can easily exceed the values specified. Most mining operations and blast engineering consultants have equipment which has flat frequency response down to 5 Hz, and will be designing to meet the 130 dB criterion.

Proposed Section 816.65(a)(6) has been drafted to indicate that any one of the four specified frequency ranges may be used to characterize airblast.

Under paragraph 816.65(a)(7) the Office proposes to condition the use of explosives within specified distances, upon prior approval of the regulatory authority and other relevant entities. The Office is aware that blasting can be conducted safely within the distances set forth in the proposed regulations. However, the legislative history of the Act and technical studies reviewed show that significant adverse effects still continue to occur to persons and property at distances both within and beyond those limits being proposed. Accordingly, the Office proposes to establish distance limits to protect public health and safety. {41756}

The Office has considered arguments that these restrictions conflict with the provisions of Section 522(e) of the Act, because the proposed regulation's distances are more stringent than those of the Act. Subsections 522(e)(4)-(5) of the Act prohibit any coal mining within 300 feet of certain structures and 100 feet of public roads and cemeteries. However, the Office has decided that the blasting distance restrictions do not conflict with Section 522(e), as was recognized in consideration of a similar regulation under the interim regulatory program. *Surface Mining Regulation Litigation*, 11 ERC 1593, 1603, (D.D.C., 1978). As the court held there, the limitation on blasting by distance restriction, coupled with the requirement of prior approval of the regulatory authority, is within the power of the Office to promulgate under Section 515(b)(15), of the Act because it is not an absolute prohibition on mining as is contained in Section 522(e) of the Act.

The proposed blasting distance restrictions are based on several factors. First, is the recognition that Congress was itself specifically aware that blasting damage can extend far beyond a few hundred feet from the site of the blast. Even early versions of the bill recognized that blasting could cause damage far beyond the permit area. Section 515(b)(15) of the 1974 Act limited the type of explosives and detonating equipment based upon the conditions of the site "so as to prevent (i) injury to persons, (ii) damage to public and private property outside the permit area. . . ." (Emphasis supplied.) This subsection remained intact in the final bill. See Section 515(b)(15)(C) of the Act.

During its consideration of the bill in the 1977 session, Congress approved a number of amendments to provide greater protection to residents who lived outside the permit area. One of the amendments, later Section 515(b)(15)(E), provided for a pre-blasting survey upon the request of a resident or owner of a structure within one-half mile of the permit area. In expressing his support for this amendment, Congressman Udall said:

"This problem has been one of the most troublesome for individuals living in such areas. The gentleman offered several amendments to protect homeowners and to provide notice in case of blasting. I think this is a good amendment and strengthens the bill. 123 Cong. Rec. H. 3825 (April 29, 1977)."

Most significantly, during the hearings conducted by the House Subcommittee prior to the passage of the Act, it was indicated that the Congress expressly expected that the Office would promulgate regulations to establish the type of blasting distance restrictions now being proposed and that such restrictions were already being achieved by the industry. During those hearings, one group testifying proposed additions to the draft Section 515(b)(15) of the Act, including an absolute ban on strip mining within 1000 feet of any occupied dwelling, public building, school, church, community center, public park, or cemetery. This recommendation was based on extensive travel throughout the coal fields and findings that blowouts on the sides of highwalls would throw flyrock out on a neighboring community for a distance of about 1000 feet. Hearings on H.R. 2 before the Subcommittee on Energy and Environment of the House Committee on Interior and Insular Affairs, 95th Cong., 1st Sess. (1977), Part II at 286 289. Congressman Seiberling, the Chairman of the Subcommittee, indicated that this should be implemented by way of regulation, rather than amendment of the Act. *Id.*, at 293. 111 That Subcommittee also heard from one of the largest mining industrial groups in the country on the feasibility of these distance restrictions:

"We have solved the blasting problem in Pennsylvania. We are closely regulated. Our mine inspector has to approve our blasting procedure and the plan on which we are going to notify the people. . . . The State of Pennsylvania has a standard for the maximum size of a blast for strip mining. We are not permitted to exceed that standard. When we get closer to buildings

and homes than 1,000 feet, we often must reduce that standard ." Hearings, supra Part III at 89 (Statement of W. Harger, President, Western Pennsylvania Surface Mine Operators' Association). (Emphasis added).

In addition to Congress' specific expectation that the Office establish specific distance restrictions on blasting, technical studies received by it show that the proposed limits of 1,000 feet from buildings and 500 feet from other facilities are well within the ranges of damage caused by blasting involved in mining. A study performed by a professor of geology at Indiana State University indicated that there was structural damage caused by blasting to 89 percent of the buildings within a 2 ½ mile radius of the Ayrshire Mine in Warrick County, Ind. John Barnes, 1977. See 123 Cong. on Residential Structures-Ayrshire Mine (1977). See 123 Cong. Rec. 8133 (May 20, 1977). Vibration damage to natural scenic formations in the West has been noted as far as one-quarter of a mile (1,320 feet) from the site of the blast. (Grim and Hill, 1974, p. 93.) Instrumentation currently in use is capable of measuring noise and vibration in order to assess damage from blast vibrations at distances up to 1,000 feet from the blast. (Siskind and Stachura, 1977.)

The distance limitation for blasting within 500 feet of an underground mine is expressly required by Section 515(b)(12) of the Act. The Office is soliciting suggestions on the definition of the active workings of a mine for these purposes. It is not the intent of the Office to prohibit blasting from the vicinity of inactive portions of underground mines, in circumstances where there is no risk of danger to life, property or the environment.

Under the proposed regulations, approval of the regulatory authority for waiver of the distance limits would depend primarily upon the results of a preblasting survey or other appropriate investigation. Similar criteria have been previously upheld for the interim regulatory program in Surface Mining Regulation Litigation, supra, 11 ERC at 1603.

The Office considered requiring a waiver from affected landowners before mining within the 1,000-foot distance limit would be approved. However, the landowner is believed to be adequately protected by other portions of the blasting regulations, principally by the requirement that the person conducting blasting demonstrate to the regulatory authority that blasting within the 1,000-foot distance limit can and will be done safely.

The Office has proposed a requirement for flyrock limitations and solicits suggestions on this subject. Bureau of Mines contract report J0366017, by Management Science Associates, identifies flyrock as the major cause of in-mine accidents. A further study has been funded to quantify the flyrock problem. The requirement which is being proposed for flyrock limitation would prohibit rock from being thrown outside the mine property boundaries, would prohibit rock from being thrown more than half the distance from the blast to the nearest dwelling, other inhabited structure, or right-of-way, and would prohibit rock from being thrown past the regulated access zone specified in proposed Section 816.65(a)(4).

To prevent injury to persons and damage to structures within and around the area of operations from the effects of ground vibration caused by blasting, the Office proposes to establish a maximum peak particle velocity limitation of not more than 1 inch per second at the immediate location of those structures. {41757}

Blasting causes large amounts of energy to be released in the form of vibrations; that is, shock waves radiating from the site of the blast. It is this shock wave that fragments the rock near boreholes in which explosives are detonated. As the shock waves travel or propagate, they stabilize and become seismic waves. Seismic waves which propagate through the earth are called body waves. Those which propagate along the surface of the earth or travel to the surface and are reflected back into the earth are called surface waves. (Miller (no date)).

These seismic waves displace the rock or soil particles of which the earth is composed, causing these particles to oscillate. Particle velocity defines "... how fast a particle or structure is moved by passing seismic waves, measured in inches (millimeters) per second." (Grim and Hill, 1974 page 94). It is the speed at which the passing seismic waves move the ground under structures that determines the likelihood of damage. Ibid.

To prevent such damage, the Office proposes to adopt a regulatory scheme whereby the peak-particle velocity would always be limited at a minimum to 1 inch per second. Allowance is also made for the regulatory authority to reduce this limit in particular cases so as to account for certain listed site-specific characteristics. Subsection 816.65(j). Further, to ease in application of the 1-inch per second limit in the field, blasting vibrations would be considered to be within that limit if a distance-to-charge weight, per delay of explosives, formula set out at Subsection 816.65(m) is followed.

The proposed 1 inch per second peak particle velocity limit is based primarily upon Subsection 515(b) (10) and paragraph 515(b)(15)(c) of the Act and a review of technical materials. Those materials reveal a correlation between damage to

structures and ground motion, such that the Office believes it necessary to limit particle velocity to a maximum of 1 inch per second to prevent such damage.

The first study considered by the Office was that of Nicholls, 1971. That study represents the culmination of a 10-year study by the Bureau of Mines to analyze the effects of ground vibrations and air blast on structures. In the course of its work, the Bureau conducted its own experiments and reviewed previously published data in order to establish reliable damage criteria. The Bureau concluded that peak particle velocity was more closely associated with damage to structures than any other single measurement. Nicholls, 1971, p. 22. The Bureau recommended 2 inches per second as a "safe vibration criterion", that is, the point at which, in its view, there "appears" to be a reasonable separation between the safe and the damage zones. Nicholls, 1971, p. 23. The Bureau classed 2 inches per second as a "probability type criterion." BOM 656, p. 24. By this it meant that at a peak particle velocity of 2 inches per second the probability of damage was small. The Bureau acknowledged, however, that "the safe vibration criterion is not a value below which damage will not occur and above which damage will occur." Ibid.

Because damage still occurred at the 2-inch per second level, according to Nicholls, the Office finds that a 1-inch per second limit is needed. The 1-inch per second level is derived from Figure 3.7 of Nicholls, 1971, p. 25. As that scattergram indicates, 1-inch per second is the point at which damage did not occur.

In addition, OSM believes that the following factors, when weighed with Nicholls, 1971, further support the selection of a 1-inch per second limit. Many of the complex questions involving damage caused by blasting in coal surface mining were not investigated by the Bureau of Mines. Nicholls, 1971, was based not upon blasting in coal surface mining, but blasting in quarries, at construction sites, and mechanical simulations of actual blast vibrations. Conditions unique to surface coal mining justify a more stringent standard.

Generally, surface mining involves greater amounts of explosives, shots of longer duration, and more frequent firing than does quarrying, for instance. Cumulative effects of repeated blasting, even at low peak particle velocities, could increase the severity of the damage caused by blasting. Barnes, 1977. The geology of the blasting site may affect the propagation of seismic waves. Nicholls, 1971, p. 53; Barnes, 1977, at 13. The frequency of waves and their effect upon structures may be an important factor in determining damage caused by blasting. Medearis, 1976, p. 1. Where the frequencies of the ground vibration and the resonant frequency of the structure being vibrated are the same or nearly the same, there is a greater potential for damage. This seems to be the case in surface mining. Medearis, 1976, p. 53. These factors make surface coal mine blasting potentially more damaging than the blasting on which BOM 656 is based.

In addition to Nicholls, 1971, other technical studies reviewed by the Office support a 1-inch per second limit. The study of Barnes, 1976 investigated damage to structures in the vicinity of surface coal mining operations in Indiana and primarily used the number, length and width of structural cracks as indication of damages. This was essentially the same methodology as was employed by Nicholls and the studies reviewed in Nicholls, 1971. Barnes' observations show that blasting at 2 inches per second may cause damage. Barnes, 1976, at 12.

Ashley and Parkes, 1976 is a study of problems encountered by two British companies in constructing tunnels in urban areas. For protection of property in good repair, those authors recommend a 1-inch per second standard. In addition to technical studies, the Office also notes that at least one of the largest coal producing States adopted a 1-inch per second standard to regulate surface coal mine blasting prior to enactment of the Act. 25 Pa. Code Section 211.45.

Compliance with a peak particle velocity of 1, rather than 2 inches per second, involves only the reduction in the maximum weight of explosives in pounds per millisecond delay period. It does not require the installation and use of additional special control equipment. Information provided to the Office by one industry member and an engineering firm indicate that mining operations can be consistently conducted within the 1-inch per second limit. Comments of Old Ben Coal Company, 1978 (112 of 155 blasts had a velocity of less than T30.5 inch per second); Comments of Research Energy of Ohio, Inc. 1978.

Under the proposal, achievement of the 1-inch per second limit may, in general, be made in either of two ways. First, blasting will be deemed to be in compliance with the 1-inch per second limit if conducted according to the standard equation at Subsection 816.65(m). As an alternative, seismograph measurements can be used to establish that blasting is conducted without exceeding the 1-inch per second limit.

The first alternative, use of a standard equation, is based upon a standard formula for determining the weight of explosives that, if detonated at intervals of 8 milliseconds or longer, will not cause peak particle velocities to exceed 1-inch

per second at specified distances. This formula was derived from a special study done for the Office by the Bureau of Mines which is available for public inspection in the Washington office and copies of which will be made available for inspection upon request at the regional offices.

Coal mine blast vibration data were analyzed and the scale factor of 60 was derived empirically. The scale factor is defined as the distance from the blast to the structure of interest, divided by the square root of the maximum weight of explosive fired per delay. The table in proposed subsection 816.65(m) correlates the distance and charge weight needed for a scale factor of 60. The table distances are minimum distances which must be maintained between the blast and a structure for the given charge weight. For instance the distance 300, divided by the square root of 25, the charge weight, equals a scaled distance of 60. {41758}

The regulation in proposed subsection 816.67(b), would provide for the use of a lower scaled distance, upon approval of the regulatory authority, if the mine operator can prove, through submission of blasting reports including seismograph records, that this lower scaled distance will not produce vibrations greater than 1 inch per second. Nicholls, 1971 determined that a scaled distance of 50 would protect against vibrations greater than 2 inches per second. The Bureau of Mines study done for the Office determined that the scaled distance of 60 would protect against vibrations greater than 1 inch per second.

A millisecond is 1/1000 of a second. A millisecond delay between explosions is used to prevent vibrations produced by two explosive charges from reinforcing each other and producing higher vibration levels. Nicholls, 1971, determined that a delay interval of 8 milliseconds or greater will prevent such reinforcement. The Office considered raising this minimum delay interval to 17 milliseconds, based on An Investigation into Delay Blasting, 1975, the University of Maryland, which showed that delay electric blasting caps can have significant errors in firing time. However, the delay electric blasting caps manufactured by duPont, Atlas, and Hercules, the only domestic manufacturers, all have minimum delay intervals of 25 milliseconds, which will prevent vibration reinforcement even with these inaccuracies. When detonating cord delays are used, they are initiated in a series sequence one after the other. Therefore, the likelihood that two 8 millisecond detonating cord delays will fire within a short enough time period to significantly reinforce each other is very small.

Extending the delay interval to 17 milliseconds would introduce a hazard. Because the delay elements are initiated sequentially on the ground surface, some charges will detonate before all the initiators in a blast have been activated. This increases the possibility of differential burden movement which will separate the charge in the blasthole. This results in undetonated explosive being left in the burden after blasting. This undetonated explosive is prone to detonation by the subsequent activities of heavy equipment. In view of the foregoing discussion, the 8 millisecond delay interval has been retained.

Under the alternative method of implementation of the 1-inch per second limit, seismographic measurements could be used. This could be done in two ways. First, seismograph records of every shot would be obtained. Proposed subsection 816.67(a). Second, seismographs would be used to develop sufficient data to establish that use of a modification to the standard weight-distance equation of Subsection 816.65(m) would still result in compliance with the 1-inch per second limit. Proposed subsection 816.67(b). The latter provision is based on recognition that there may be peculiarities of certain site-specific factors warranting a change from use of the standard equation. All such changes would, however, be first approved by the regulatory authority. If deemed necessary, the regulatory authority could require a seismograph recording of all blasts.

As an additional safeguard, the Office is also proposing an additional peak-particle velocity ground motion limitation on blasting. Subsection 816.65(n). This requirement would prevent structures and persons from being subjected to excessive vibrations which approach steady state. Human beings are known to be more disturbed by steady state vibrations than by brief, impulsive type vibrations. Structures are also more responsive to steady state vibrations, especially when the frequency of the vibration approximates the resonant frequency of the structure.

The Office is also soliciting suggestions on the use of surface delay systems in conjunction with in-hole delays, either electric or nonelectric. Combinations of surface and in-hole delay systems result in more scatter or randomness in initiator firing times. However, in many instances these systems have proved to be very useful in reducing ground vibrations. The Office feels that these systems should be used only where blasting reports, accompanied by seismograph records, demonstrate that a particular delay pattern will not produce peak particle velocities greater than 1 inch per second. 111As was discussed above, in conjunction with the 1-inch per second ground motion limit under Section 816.65, the Office proposes to allow the use of seismographs as an alternative to the standard explosives weight-distance formula. It is also proposed under Section 816.67, that the regulatory authority may require persons engaged in blasting to make seismographic recordings, even if the standard formula is being adhered to. This authority is provided to insure that the standard formula

factors are effective for limiting ground motion from blasting in all relevant situations and for identifying those cases where additional precautions are needed to preclude damage or injury to the public and the environment from blasting.

Seismograph records may be used to establish the validity of using a modified equation to limit ground vibrations to 1 inch per second. If this proposed Section is adopted, upon receipt of a petition accompanied by appropriate blasting reports and seismograph records, the regulatory authority could approve the use of a scaled distance less than 60 if it has been shown that the reduced scaled-distance will not result in vibrations greater than 1 inch per second. The requirement that the seismograph record contain a calibration signal of the gain setting is to assure that the gain setting used in calculating the vibration level is identical to that used during the recording process.

SECTIONS 816.71 – 816.73 - DISPOSAL OF EXCESS SPOIL.

Spoil disposal practices in surface mining over the years have had a major impact on the environment and represented a significant hazard to life and property. The requirements set forth in these Sections of the proposed regulations protect life, property, and the environment by establishing criteria for proper disposal of fill material to achieve adequate drainage control and stability. The requirements in the interim program performance standards are proposed to be broadened to include alternatives of utilizing the West Virginia method of rock core drainage. The use of this method has been controversial it is highly touted in practice by operators, and eyed somewhat skeptically by the engineering profession.

Authority for these proposed Sections is found in Sections 102, 201, 501, 503, 504, 507, 508, 510, and 515 of the Act.

Literature utilized in the preparation of these proposed regulations includes:

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Applicable State and Federal laws comparable to or containing similar requirements include but are not limited to:

1. 30 USC 801, MSHA regulations
2. 33 USC 1151-75 Water Pollution Control Act
3. Chapter 20, Article 6 West Virginia Code _""Surface Mining and Reclamation Control Act"
4. Chapter 20 Article 6C, West Virginia Code _""The Coal Refuse Disposal Control Act"
5. ""Pennsylvania Clean Streams Law," 35 Pa. Stat. Anon, Section 691.1 et seq.
6. ""Solid Waste Management Act," 35 Pa. Stat. Anon, Section 6001 et seq.
7. Title 25 Pennsylvania Code, Chs. 95, 97, 101, 125.
8. Ch. 20 Art. 5, W.Va. Code, ""Water Pollution Control Act"
9. 40 CFR 136. ""Protection of the Environment"

Proposed Section 816.71 requires controlled placement utilizing current prudent engineering practices utilized in embankment construction for all types of permanent fills.

Maintaining stability protects the public and the environment from the adverse results of failure. Compatibility with surroundings and the approved postmining land use minimizes the adverse effects of mining as required in the Act. American Society of Civil Engineers, 1977; Tromson, 11972; DOE, 1977, 1978; Eliassen, 1969, Greer, 1960; Grin, 1974; National Coal Board, 1970; Skelly and Loy, 1977; Weight, 1966; West Virginia DNR, 1975; and Wood, 1976.

Proper engineering practices require that all organic material be removed to allow for proper foundation preparation before fill placement, and to prevent the existence of weak, unstable zones within the embankment. Topsoil must be stockpiled for later use as required by the American Society of Civil Engineers, 1977; American Society of Civil Engineers, 1972; Bishop, 1973; DOE, 1977; Greer, 1960; Havers, 1971; Huang, 1978; Kimble, 1974; Lambe, 1969; Leonards, 1962; National Coal Board, 1970; US SCS, 1969; Taylor, 1948; Terzaghi, 1967; US BOR, 1973; US Corps of Engineers, 1971; USDA, (no date); US DOI, 1976; USN, 1963; West Virginia DNR, 1975; and Wood, 1976.

Slope protection and vegetation of all unprotected areas should be provided contemporaneously with construction, consistent with standard maintenance procedures for permanent structures under construction. Adams, et al., 1974; Bonny and Frein, 1973; Brundage, 1974; BOM, 1973; Capp, et al., 1975; Capp and Gillmore, 1974; Capp and Adams, 1971; Charmbury and Chubb, 1973; Coalgate et al., 1973; Czapowskyj and Writer, 1970; Czapowskyz and Sowa, 1973; Davidson, 1974; Dean, 1972; Dean and Havens, 1971; Department of Energy (Canada), 1972; D'Appolonia, 1975; Eigenbrod, 1971; Eliassen, 1969; James, 1966; Jones et al., 1973; Leroy, 1972; National ASN Association, 1972; National Coal Board, 1970; Peterson and Geshwind, 1973; Riley and Rinier, 1972; SCS, 1974; Sorrell, 1974; Spirik, 1973; Thompson and Hutnik, 1971; Welsh and Hutnik, 1972; White et al., 1973; and Wood and Thiegood, 1955.

The prohibition against depressions or impoundments is proposed to preserve the structural integrity of the fill by limiting sources of water introduced into the embankment.

Limiting the use of terraces to sites where approved by the regulatory authority as necessary to control erosion or enhance stability is proposed to maintain embankment out slopes compatible with the surroundings.

The use of keyway cuts and buttresses is intended to increase the stability of the embankment where steep foundation conditions necessitate special treatment to resist the sliding movement created by the weight of the fill. Bishop, 1973; Chirionis, 1972, Curry, 1977; DOE, 1977; Huang, 1978; Lambe, 1969; Leggett, 1962; National Coal Board, 1970; Skelly and Loy, 1977; SCS, 1969; Taylor, 1948; Terzaghi and Peck, 1967; US BOR, 1973; U.S. Corps of Engineers, 1971; USN, 1963; Weigle, 1966; and Wood, 1976.

To monitor potentially hazardous changes effectively, frequent inspections are mandatory. The proposed inspection procedure is standard for embankment construction, both in content and frequency. The procedures for maintaining records of inspection, notification of the regulatory authority, and certification of the construction by a registered professional engineer provides quality control records which indicate the close scrutiny necessary to provide for proper construction. (See 30 USC 77.215 3; WV Code; PA Code.)

Proposed Subsection 816.71(l) requires subdrain networks which allow for control of all ground water beneath a disposal area. Lack of control can result in ground water saturating portions of the fill and, as a consequence, endangering the structural integrity of the embankment. The rock underdrain fill construction is designed to keep water from infiltrating into the body of the fill.

The proposed Subsection 816.71(n) requires that the foundation be analyzed to assure the site is or can be utilized without danger of foundation problems during or after construction. Improper foundation treatment could lead to instability and variance from the purpose of the Act. American Society of Civil Engineers, 1977; American Society of Civil Engineers, 1969; Bishop, 1962; Dept. of Energy (Canada), 1972; D'Appolonia, 1975; Forrester and Whittaker, 1976; Hvorslev, 1948; Lambe et al., 1969; Leggett, 1962; Leonards, 1962; National Coal Board, 1970; Taylor, 1948; Terzaghi & Peck, 1967; Terzaghi, 1943; US DOI, 1976; US DOI, 1968; U.S. Navy Bureau of Yards and Docks, 1963; Wood et al., 1976; Thomson et al., 1972; and Department of Energy (Canada), 1977.

Proposed Section 816.72 requires that valley fills shall have a minimum static factor of safety of 1.5. Reduced factor of safety requirements for remote areas were considered as alternatives, but the size and variability of sites and the potential for significant environmental harm negated the validity of the alternative. The 1.5 safety factor was chosen over lower values to insure an adequate margin of safety. A 1.5 safety factor is standard engineering practice for structures located where failure could cause loss of life, property damage, or significant environmental harm. American Society of Civil Engineers, 1977; ASCE, 1969; Bishop, 1973; Bishop 1955; DOE (Canada), 1972; D'Appolonia, 1975; Lambe and Whitman, 1969; Nat. Coal Board, 1970; Taylor, 1948; Terzaghi & Peck, 1967; Terzaghi, 1943; US DOI, 1976; U.S. Navy, 1963; Wood, 1976; Thompson et al., 1972; and DOE (Canada) 1977.

Proposed Subsection 816.72(b) outlines subdrain requirements. The main rock underdrain is constructed to provide passage for water infiltrating the fill. It is a common, accepted engineering and construction practice never to allow surface water to infiltrate a soil mass and to minimize the hydrostatic pressure within the fill. Lateral interceptors ensure collection and transport of all major sources of ground water beneath the disposal area.

The prerequisite for drains in areas of actual or projected seepage implements requirements in Section 515(b)(22)(C) of the Act and parallels standard engineering requirements. American Society of Civil Engineers, 1977; American Society of Civil Engineers, 1972; Ceceigren, 1967; Chassie and Goughnour, 1976; Chironis, 1977; DOE, 1977; Green and Raney, 1975; Hopkins et al., 1975; Huang et al., 1975; Lambe and Whitman, 1969; Leggett, 1962; Leonards, 1972; National Coal Board, 1970; Skelly and Loy, 1977; SCS, 1969; SCS, 1974; SCS, 1975; Taylor, 1948; Terzaghi and Peck, 1967; Terzaghi, 1943; USBOR, 1973; U.S. Corps. of Engineers, 1971; U.S. Corps of Engineers, 1952; USN, 1963; Weigle, 1966; West Virginia DNR, 1975; and Wood, 1976. {41761}

Filters must be provided which are compatible with the fill, the foundation, and each other. This is a standard engineering criterion which premises the potential for blockage of drains by migration of fine materials.

The sizing criteria are derived from standard drain design in texts and publications, and from performance of actual drains in the field. American Society of Civil Engineers, 1977; American Society of Civil Engineers, 1972; Cedergren, 1967; Chassie, 1976; Chironis, 1977; DOE, 1977; Greene and Raney, 1975; Hopkins, et al., 1975; Huang, 1975; Huang, 1978; Lambe 1969; Leggett, 1962; Leonards, 1962; National Coal Board, 1970; Skelly and Loy, 1977; SCS, 1969; SCS, 1974; SCS, 1975; Taylor, 1948; Terzaghi, 1967; Terzaghi, 1943; US BOR.

Subdrain material must be durable to prevent degradation which could lead to blockage and subsequent failure. This is a standard design criterion for drain design and construction. Astin, 1976; Cedergren, 1967; DOE, 1977; Lambe, 1969; Lambe, 1951; Leonards, 1962; SCS, 1969; SCS, 1975; Taylor, 1948; Terzaghi and Peck, 1967; US BOR, 1973; U.S. Corps of Engineers, 1952; USDA (no date); and USN, 1963.

The proposed 18 inch lift requirement is based on additional information which has been gathered on the process of constructing earth-fill structures in a series of horizontal lifts. This information shows that a variety of lift thicknesses was required for fill construction by different methods and contractors. The more conservative requirements allowed lifts only a few inches thick between compactions, the less conservative allowed up to 6 feet. Most authorities agreed that it was the compaction and removal of pore spaces that was important for fill stability. Because the agencies authorizing the construction of earth-fill dams and groins, both of which have possible failure consequences similar to those of fills, require lift thicknesses of 3 to 8 inches and because the agencies have extensive experience and empirical evidence for their decisions, the Office has proposed an 18 inch change of the rule on lift thickness, which varies from the interim program

regulations which require 4 foot lifts. If the operator can show by continuous in place density monitoring that the spoil density specified in the design certified by a registered professional engineer is being attained throughout each lift thickness employed, thicker lifts will be allowed not to exceed 4 feet in thickness. American Society of Civil Engineers, 1977; American Society of Civil Engineers, 1972; Astin, (no date); Bishop and Henkel, Goughnour, 1976; Chironis, 1977; Thomson and Podon, 1972; Cummins et al., 1965; Curtis, 1973; Depaid, 1974; DOE, 1977; Denevich et al., 1976; Holtzard Gibbs, 1956; Hvorslev, 1948; Huang et al., 1975; Huang, 1978; Kimble, 1974; Lambe, 1969; Lambe, 1951; May, 1963; Meyerhof, 1970; Superfesky and Williams, 1978; Taylor, 1948; Terzaghi and Peck, 1967; Terzaghi, 1943; USBOR, 1973; U.S. Corp of Engineers, 1971; USN, 1963; and Weigle, 1966; Grim and Hill (1974); Skelly and Loy (1978).

Diversion of runoff is required to prevent the erosion of a coal processing waste disposal area, or other water which could decrease the overall stability of the site. A 6-hour duration storm was considered, but the 24-hour storm produces a peak substantially larger in total volume than the 6-hour hydrograph. American Society of Civil Engineers, 1969; Corps of Engineers, 1952; Department of Energy (Canada), 1972; D'Appolonia, 1975; Good et al., 1970; Leonards, 1962; Marks, 1975; SCS, 1969; SCS, 1975; Terzaghi, 1967; US DOI, 1976; U.S. Navy Bureau of Yards and Docks, 1963; and West Virginia Department of Natural Resources, (no date). Brater and King, 1976; Chow, 1959; Davis and Sovenson, 1969; Department of Energy (Canada), 1972.

The proposal to allow terraces is intended to break the length of the slope, thus allowing the water to maintain low, nonerosive velocities. All slope values proposed are standard slopes for fill construction which are flat enough to limit or retard erosion. American Society of Civil Engineers, 1972; Chironis, 1977; Aury, 1977; Eliassen, 1969; Greene, 1960; Greene, 1975; Grim, 1974; Kimble, 1974; SCS, 1969; USDA, (no date); and West Virginia DNR, 1975.

A maximum 2:1, 1v:2h outslope limitation is proposed, as also specified by MSHA in 30 CFR 77.214. This slope reflects combinations of accessibility and stability.

Proposed Section 816.73 contains the requirement for placing spoil fills in the uppermost reaches of the drainage area to reduce the size of drainage areas necessary to be controlled. The rock-core chimney drain allowance was based on the following course of events. On December 13, 1977, final rules were adopted for the interim surface mining reclamation and enforcement program developed pursuant to the Act. These rules covered the disposal of spoil from surface mining in areas other than mine workings or excavations, and specifically authorized the rock underdrain system of fill construction. Following adoption of rules, the Office received petitions for change of the Federal rules affecting head-of-hollow fills. The Office instituted an investigation of the allegations of the petitions, which result in these proposed revisions of the earlier rules.

Petitions from the State of West Virginia and from coal mine operators in that State alleged that the Office was being too narrow in defining only one construction method for building head-of-hollow fills. They claimed that the "rock-core system" authorized in West Virginia provided as much, or more, protection as the "rock-underdrain system" in the interim program. Several professional engineers have expressed concern with long-term clogging of the rock core by fine-grained sediment in the drainage and in some cases piping (internal erosion) caused by the flow of water within the fill which could lead to instability and potential failure of the fill. To date the Office is not convinced that rock core fills are potentially less stable than the rock underdrain fills. However, it may be that the total rock core described in the West Virginia method is not necessary.

Some engineers have expressed doubt that the rigorous West Virginia construction requirements could be adequately monitored in a State that was just beginning a strict inspection program and that inadequate engineering practices would be more likely to result in failure in the rock core system. It is critical that the rock core maintain its permeability throughout. If one impermeable section is placed or if a section becomes impermeable, the result could be disastrous. On the basis of the investigation, the office is proposing a permanent program revision to the regulations permitting the rock core system of head-of-hollow fills to be used at the discretion of the regulatory authority with adequate inspection and supervision. At the same time, the Office is instituting a formal study through the National Academy of Engineering to investigate, in depth, the potential for failure of the types of head-of-hollow fills.

The rock-core drain system is designed to direct water falling on the surface of the fill to a central rock core by means of surface grading. The rock core extends from the toe to the head of the fill and from the base to the surface of the fill. A system of lateral underdrains will dispose of water from seeps emerging beneath the fill. Filters are provided for the core and subdrains. A drainage pocket of less than 10,000 gallon capacity at the head of the fill is designed to handle surges from heavy runoff conditions. { 41762}

The major advantage of the rock core construction appears to be its ability to cope with long-term differential settlement of the fill that results in a surface grade toward the center of the fill, where settlement is usually greatest. In areas where such settlement is unavoidable, the regulatory authority might specify rock core drains as the construction method; in other areas, diversion of the water from the fill might be the preferred construction method. Other criteria such as side hill conditions, shot spacing, or haulage methods could affect the design of the fill. For both cases, the key to preventing erosion is adequate design and construction of diversion and surface drainage systems. In all cases, only the precipitation that falls on a fill may run over it. The path such precipitation travels should be the one that minimizes erosion. Lateral interceptors ensure collection and transport of all major sources of ground water beneath the disposal area. This is a standard design criterion for drains and may be found in numerous soil mechanics and engineering references. Greene and Raney, 1975; Skelly and Loy, 1977, 1978; and West Virginia DNR, 1975. In no case may a rock core method be used where there is drainage from above the fill.

SECTION 816.79 - PROTECTION OF UNDERGROUND MINING.

Proposed Section 816.79 is intended to protect the health and safety of miners working in surface and underground mines adjacent to each other and to assure that economically feasible underground mining is not foreclosed by nearby surface mining activities, causing both a loss of resource recovery and possible environmental degradation.

This Section is proposed under the authority of Sections 102, 201, 501, 503, 504, 515, and 516 of the Act.

As specified in Section 515(b)(12) of the Act, proposed Section 816.79 would create a 500-foot separation of surface mining activity and underground mine workings. Variances from this distance would be left to the discretion of the regulatory authority, the Mine Safety and Health Administration (MSHA) and any appropriate State safety agency. An alternative considered was specifying unique situations where the proximity limitation would be waived, such as recovery of partially mined coal deposits in danger of wastage through mine fires. The Office believes that each case would be different enough to thwart the utility of an extended list of special cases; thus this alternative was rejected. A second alternative considered was the complete reliance upon MSHA regulations for mines beyond the 500-foot limit. This alternative was rejected because the drafters believe that a joint decision on close proximity of surface and underground mining is warranted due to the different mandates of OSM and MSHA.

SECTIONS 816.81 – 816.88 - COAL PROCESSING WASTE.

The increased production of waste from mechanized mining and recent waste structure failures underscore the need for regulation of the siting, construction and reclamation of coal waste piles.

The proposed regulations represent an extension of the Mine Safety and Health Administration (MSHA) regulations on coal refuse under 30 CFR 77.214- 77.215 and the current practices of standard engineering.

In addition to disposal under these sections, the proposed permanent program regulations would allow disposal of coal processing waste in fills (proposed paragraph 816.71(k)(1)) and in and behind (proposed Sections 816.91 816.93).

Proposed sections 816.81- 816.88 are authorized in the act in sections 102, 201, 501, 503, 504, 506, 507, 508, 510, 515, and 517.

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122. Department of Energy, Mines and Resources, Canada, ""Pit Slope Manual – Waste Embankments" CANMET Report 77-01; Mining Research Laboratories, 1977. {41765}

State and Federal legislation containing similar requirements include:

- (1) 30 USC 801 Section 77.214 ""Refuse piles".
- (2) 30 USC 801 Section 77.215 ""Refuse piles; construction requirements".
- (3) 33 USC 1151-1175 The Federal Water Pollution Control Act.
- (4) Chapter 20 Article 6C, ""West Virginia Code", ""the Refuse Disposal Control Act."
- (5) ""Pennsylvania Clean Streams Law", 35 Pa. Stat. Anno. Section 691.1 et seq.
- (6) ""Solid Waste Management Act", 35 Pa. Stat. Anno., Section 4001 et seq.
- (7) ""Pennsylvania Air Pollution Control Act" 35 Pa. Stat. Anno., Section 4001 et seq.
- (8) Title 25 ""Pennsylvania Code", Chs. 95, 97, 101, 125.
- (9) Ch. 20 Art. 5, ""W.Va. Code", ""Water Pollution Control Act."
- (10) Ch. 63 ""W.Va. Code"; and Amended under Ch. 13, W.Va. Code ""W.Va. Air Pollution Control Act".

Controlled placement requirements reflect the current prudent engineering practices utilized in embankment construction for all types of permanent fills. The requirements of proposed Sections 816.71 816.72, incorporated by reference in these proposed Sections, are discussed in an earlier portion of the Preamble. See also Bonny and Frein, 1973, Bureau of Mines, 1973; Comptroller General of U.S. (acting) 1977; Department of Energy (Canada), 1972; D'Appolonia, 1975; D'Appolonia, 1973; Eliassen, 1969; Greer, 1960; Glouee, 1971; Governor's Ad Hoc Committee of Inquiry – West Virginia, 1972; Moulton, 1973; National Coal Board, 1970; U.S. Department of Commerce, 1976; U.S. Department of Interior, 1973; Wood, et al. 1976; Thomas, et al, 1972; and Department of Energy (Canada), 1977.

Allowances made for waste coming from operations outside the permit area under proposed subsection 816.81(b) conforms to practices currently utilized in the industry, and minimizes the number of disposal areas and the subsequent disturbances resulting therefrom.

Inspections are required under Section 816.82. They assure observance of any physical changes which may occur that are or could be detrimental to the integrity of the site, and potentially hazardous to life, property, or the environment in the vicinity of the site. The inspection frequency was chosen because of the large amounts of refuse being produced at any mine or group of mines which consequently leads to rapidly changing configurations of each disposal area. To effectively monitor these changes frequent inspections are mandatory. The inspection procedure is standard for embankment construction, both in content and frequency. Bonny and Frein, 1973; Clough, 1972; Comptroller General of the U.S. (acting), 1977; Dept. of Energy (Canada), 1972; D'Appolonia, 1975; National Coal Board, 1970; US DOI, 1975; and Wood, et al., 1976.

The proposed procedures for maintaining records of inspection and notification of the regulatory authority in potential or imminent emergency situations would allow for frequent monitoring or formulation of remedial action in a potentially hazardous condition, and for the instituting of emergency action and subsequent safeguarding of life, property and the environment.

Proposed Section 816.83 addresses required water control measures. Subdrain networks allow for control of all groundwater beneath a disposal area. Lack of control can result in groundwater saturating portions of the fill and as a consequence, endangering the structural integrity of the embankment. Alternatives to properly designed subdrains such as randomly dumped, uncontrolled drains, were considered. The need for permanent drains in a permanent fill, designed to function with a minimum probability of failure, overrode the simplistic approach of undesigned drains. America Society of Civil Engineers, 1969; Cedergren, 1967; Coalgate, et al., 1973; Corps of Engineers, 1952; Department of Energy (Canada), 1972; D'Appolonia, 1976; Harr, 1962; Leonards, 1962; US DOI, 1973; and West Virginia Department of National Resources, (no date).

Coal processing waste is to be placed in lifts not to exceed 8 inches and compacted to a dry density no less than 90% of Standard Proctor. All embankment construction projects must utilize standards. The lift thickness required was determined to be the most suitable for use in placement of coal processing waste without compromising the norms of engineering practice.

The 8 inch lift was the accepted alternative over other lift thicknesses because of the type of equipment normally utilized in coal processing waste disposal operation, e.g., bulldozers cannot compact effectively lifts any thicker than 8 inches. The 90 percent Proctor requirement assures prevention of combustion by airflow reduction through the voids.

The Proctor density requirement serves several purposes. It:

- (a) Acts as an easily measured standard throughout the industry;
- (b) Allows for achievement of a density suitable for long-term stability;
- (c) Assists in retarding the movement of airflow, this preventing combustion;
- (d) Achieves a surface resistant to significant erosion; and
- (e) Accommodates a greater amount of waste in a smaller area.

The extra space for disposal gained by controlled placement tends to outweigh any other alternatives, and is in direct agreement with the intent of the Act to limit areas disturbed by mining. ASCE, 1977; ASCE, 1969; ASTM, 1965; Bishop, 1962; Bishop, 1973; DOE (Canada), 1972; D'Appolonia, 1975; D'Appolonia, 1976; D'Appolonia, 1973; Eliassen, 1969; Geer, 1960; Glover, 1971; Havers and Stubbs, 1971; Lambe and Whitman, 1969; Lambe, 1951; Moulton, 1973; Nat. Coal Board, 1970; Pettibone and Vealv, 1971; SCS, 1969-a; Taylor, 1948; Terzaghi & Peck, 1967; Terzaghi, 1943; US DOC, 1976; US DOI, 1973; US DOI, 1976; US DOI, 1974; US DOI, 1975; US DOI, 1968; U.S. Navy, 1963; Wood et al., 1976; Thomson et al., 1972; and DOE (Canada), 1977.

Covering of graded portions of the processing waste disposal area:

- (1) Promotes vegetation;
- (2) Seals the fill from percolation of surface runoff and further retards airflow;
- (3) Keeps reclamation current with construction; and
- (4) Limits runoff of water which may otherwise carry materials not in balance with effluent standards.

Alternative thicknesses to the 4-foot standard selected were considered for suitable material cover, but were not supported from past practices or the literature. A proposal for strict requirement of soil only in the cover was rejected due to

literature identifying other suitable cover types and sites where availability of soil was a problem. Adams et al., 1974; Beundage, 1974; Calhoun, 1968; Capp et al., 1975; Capp and Gillmore, 1974; Coalgate et al., 1973; Czapowskyj and Writer, 1970; Czapowskyj and Sowa, 1973; Davidson, 1974; Dean and Havens, 1972; Dean and Havens, 1971; DOE (Canada), 1972; D'Appolonia, 1975; Eigenbrod, 1971; Glover, 1971; James, 1966; Jones et al., 1973; Leroy, 1972; Nat. Coal Board, 1970; Peerson and Gschwind, 1973; Sorrell, 1974; Spirik, 1973; Thompson and Hutnik, 1971; Welsh and Hutnik, 1972; White et al., 1973; and Wood and Thirgood, 1955.

Proposed Section 816.86 relates to burning waste. Numerous accidents and deaths in operations in and around burning coal waste necessitate extreme caution when dealing with fire control or other operations to safeguard life, property and the environment. Comp., Gen. of U.S. (acting), 1977; DOE (Canada), 1972; D'Appolonia, 1975; Governors Ad Hoc Comm. of Inquiry-West Virginia, 1972; Harrington and East, 1948; Hjeblex, 1950; Hodges, 1963; and McNay, 1971. {41766}

The list of fire-extinguishment methods used in the Section is not intended to be exhaustive. Literature supporting these methods includes references: Andreuzzi, 1970; Barber, 1972; Coalgate et al., 1973; DOE (Canada), 1972; Dixon, 1967; D'Appolonia, 1975; Harrington and East, 1948; Hebley, 1955; Hebley, 1948; Hebley, 1950; Hebley, 1956; Henderson, 1969; McNay, 1971; Magnuson and Baker, 1974; and Russell, 1964.

Proposed Section 816.87 would allow utilization of "reddog" after approval by the regulatory authority of plans submitted by a qualified engineer. Reddog removal operations have historically been plagued by dust explosions, cut high-wall collapses, loss of equipment and personnel into voids resulting from volume change during burning, etc. The intent of this Section is to protect the operator and persons surrounding areas from these hazards, while also requiring reclamation and other operational procedures consistent with the Act.

Prohibition of the use of coal processing waste offsite without the specific approval of the regulatory authority, limits the use of reddog to those areas where it will not affect the health and safety of the public, or degrade the environment, in keeping with Section 102 of the Act.

Proposed Section 816.88 requires that waste disposal underground must be approved by the regulatory authority and conducted in accordance with a proper plan. This allows for some elimination of above-ground areas and potentially from abatement of subsidence related problems. A plan is required to protect the operator from dangerous situations which might arise in placement of waste into old mine workings and also to insure the operation could not affect the environment by creating down-dip discharges into adjacent watersheds or ground water systems. D'Appolonia, 1975; Glover, 1971; and NAS, 1975.

SECTION 816.89 - DISPOSAL OF NONCOAL WASTES.

This proposed Section specifies requirements for the procedures to be followed in disposal of noncoal wastes generated from surface coal mining operations. The utilization of these procedures will minimize environmental degradation caused by improper disposal procedures.

The term "noncoal waste" is used instead of the more general term "residual materials." This was done in an attempt to define more specifically the type of waste described in this Section.

The authority for this proposed Section is found in Sections 102, 201, 501, 503, 504, and 515 of the Act.

Literature used in the preparation of the requirements for the disposal of noncoal wastes include:

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2. Sorg, T.J., and Hickman, H.L., Jr., "Sanitary Landfill Facts," SW-4ts, U.S. Department of Health, Education, and Welfare, 1970.

Many types of noncoal wastes are generated from coal mining operations. Specific attention must be given to these solid wastes in order to minimize surface and ground water pollution. Environmentally acceptable methods for the disposal of noncoal wastes include sanitary landfills and industrial waste disposal procedures. Although unlikely, noncoal waste fills can catch on fire (Sorg and Hickman, 1970, page 24). The need exists to maintain an earthen barrier between the disposal site and any coal to minimize any chance of a fire in the coal.

Several options for the handling and disposal of noncoal wastes were considered. First, the alternative of requiring that all such wastes be disposed of on the minesite was considered and rejected on the grounds that environmentally sound offsite disposal should not be precluded.

Another alternative which was reviewed concerned the utilization of surface mines for approved centrally located sites for disposal of noncoal waste by other mines, other industries, and even municipalities, in areas where suitable physiographic and hydrologic conditions did not provide sufficient alternative disposal sites. The proposed regulations do not specifically address this issue, and public comment is solicited on the appropriateness of opening minesites to outsiders for dumping. Commenters should address both the appropriate regulatory scheme to be established and the kinds of expertise the Office would need to develop and adequately enforce the controls imposed.

SECTIONS 816.91 – 816.93 - COAL PROCESSING WASTE: DAMS AND EMBANKMENTS.

Recent dam failures have sparked a movement nationwide to evaluate the hazard potential presented by dams. The proposed Sections 816.91-816.93 are intended to prevent the instability and failure of coal processing waste dams leading to excessive sedimentation of surface water systems, contamination of ground and surface water with acid-forming or toxic-forming or otherwise harmful substances, or hazards to life and property, such as the Buffalo Creek failure in 1972. As promulgated in 30 CFR, 77.216, MSHA has regulated water, sediment, or slurry impounding structures which fulfilled minimum size and storage volume criteria. Those provisions regulate structures to protect miners on mine property, whereas proposed Sections 816.91-816.93 would augment the protection of, public health, encompassing safety and environmental protection. If adopted the proposed Sections would pertain to dams and embankments that are totally or partially constructed of coal processing waste or that impound coal processing waste. These provisions would not apply to earth, concrete, or other types of dams which may exist in the permit area unless they are intended to impound coal processing waste. Permanent water impoundments however, would be covered under Section 816.49, and sediment control impounding structures would be regulated under Section 816.46.

These proposed regulations would cover all dams and embankments constructed of coal processing wastes whether temporary or permanent and whether or not they meet size or other criteria of Section 77.216 of this Title. The regulations would apply to all stages of design, location, construction, operation, maintenance, enlargement, modification, removal, or abandonment of the structures.

Authority for the proposed regulations is found in the following Sections of the Act 102, 201, 501, 503, 504, 515 and 517.

Literature utilized in preparation of these Sections includes:

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2. American Society of Civil Engineers (ASCE); ""Geotechnical Practice for Disposal of Solid Waste Materials"; A.S.C.E. Symposium – March 1977, Ann Arbor, Michigan.
3. American Society of Civil Engineers (ASCE), ""Inspection, Maintenance and Rehabilitation of Old Dams," Proceedings, Engineering Foundation Conference, September 1973, Published 1974.
4. American Society of Civil Engineers, ""Stability and Performance of Slopes and Embankments," August 1969.
5. American Society of Civil Engineers, Stability of Rock Cuts, Edited by E.J. Cording, 1972.
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26. Corps of Engineers, "Spillway and Freeboard Requirements for Dams", U.S. Dept. Army, 1975.
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28. Davidson, W.H., "Reclaiming Refuse Banks from Underground Bituminous Mines in Pennsylvania," First Symposium on Mine and Preparation Plant Refuse Disposal, Coal and the Environment Technical Conference, National Coal Association, Washington, D.C., October 22 24, 1974, pp. 186 199.
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33. E. D'Appolonia Consulting Engineers, Engineering and Design Manual-Coal Refuse Disposal Facilities, U.S. Dept. of Interior, M.E.S.A., 1975.
34. E. D'Appolonia Consulting Engineers, "Liquefaction Considerations for Fine Coal Refuse"; Ellison, R.D. and Cho, Yo. Y., 1976.
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State and Federal legislation and regulations containing similar requirements include:

1. 30 CFR 77.216 "Water, sediment or slurry impoundments and impounding structures; general."
2. 30 CFR 77.216 1 "Water, sediment or slurry impoundments and impounding structures; identification."
3. 30 CFR 77.216 2 "Water, sediment or slurry impoundments and impounding structures; minimum plan requirements; changes or modifications; certification."
4. 30 CFR 77.216 3 "Water, sediment or slurry impoundments; inspection requirements; correction of hazards; program requirements."
5. 33 USC 1151 75 "The Federal Water Pollution Control Act."
6. Chapter 20 Article 5D of the WV Code, "The Dam Control Act."
7. Chapter 20 Article 6C, West Virginia Code, "The Coal Refuse Disposal Control Act."
8. "Pennsylvania Clean Streams Law," 35 Pa. Stat. Anon., Section 6001 et seq.
9. "Pennsylvania Air Pollution Control Act", 35 Pa. Stat. Anon., Section 4001 et seq.
10. Title 25 Pennsylvania Code, Chs. 95, 97, 101, 125.
11. Ch 20 Art. 5, WV Code, "Water Pollution Control Act."
12. Ch. 63 WV Code ; and Amended under Ch. 13, WV Code, "WV Air Pollution Control Act."

Proposed Section 816.91 would adopt inspection requirements by reference to 30 CFR 77.216-3. An inspection program is necessary to discern any changes which could indicate problems developing with the structure. American Society of Civil Engineers, 1973; Bonny, J. B. and Frein, J. P., 1973; Clough, R. H., 1972; Comptroller General of the U.S. (acting), 1977; E. D'Appolonia, 1975; Sherard, et al, 1963; USBR, 1973; W. Va. Dept. of Nat. Resources (no date).

Maintenance of dams is essential to assure their continued stability and proper performance in accordance with the engineering and environmental standards. ASCE, 1973, E. D'Appolonia, 1975; S. Letard, et al, 1963; USBR 1973; W. Va. Dept of Nat. Resources, (no date); Dept of Energy, Mines and Resources, Canada, 1977.

Certification annually is currently required by many State and Federal dam control agencies. An alternative to annual certification, such as is currently utilized by the Federal Power Commission Reporting requirements, could be promulgated to allow less frequent certification after the performance of the structure has been proven.

This alternative would require positive evidence of continued coal processing waste dam stability before application to a specific structure. The Office has not adopted this alternative in these proposed regulations, and public comment is solicited on the appropriateness of the alternative in particular circumstances and objective criteria to prevent abuse.

ASCE, 1973; Compt. Gen. of the U.S., 1977; D'Appolonia, E. 1975; Sherard, et al 1963; USBR, 1973; USWB, 1963; W. Va. Dept. of Nat. Resources, (no date); DOE, Canada, 1977; WV Code; Pa. Code; 30 CFR 77.216).

Proposed Section 816.92 would require clearing and grubbing, and the removal of organic material and combustibles, a standard construction practice which is required in various regulations, texts and publications pertaining to waste disposal and dam construction. Compt. Gen. of the U.S., 1977; E. D'Appolonia, 1975; R. C. Hirschfield, S. J. Paulous, 1973; Joel D. Justin et al 1945; T. W. Lambe and R. V. Whitman, 1969; G. A. Leonards, 1962; MBMRC, 1972; NCB, 1972; Sherard, et al, 1963; SCS, 1969; USBR, 1973; USDOC, 1966; W. Va. DNR, (no date); L. E. Woods, et al 1976; K. Terzaghi and R. B. Peck, 1967; USBR, 1978, U.S. DOC, 1976; U.S. DOT, 1973; U.S. DOC, 1973; H. H. Russell, 1964; D. Hartington and J. H. East, 1948; L. M. McNay, 1971; M. O. Magnuson and E. C. Baker, 1974;

The diversion of the 100-year 24-hour storm is appropriate for permanent structures or structures which can constitute hazards to people, property and the environment. Diversion of runoff precludes erosion or other structural problems with the embankment. ASCE 1972; Batter, E. F. and King H. W., 1976; BOM, 1973; Cassagrande, A. and MacIver, B. N., Colgate, J. L. et al, 1973; Davis C. V. and Sauerson, FHA 1977; Glover, G. H. 1971; Henderson, F. M., 1969; Hjelmfelt, A. T., Jr. and Cassidy, J. J. 1975; Justin, Joel D. et al, 1945 Linsley, R. K. et al., 1955; Linsley, R. K., et al., 1972; MBMRC Centre, 1972; Morris, H. M., 1972; Natl. Coal Board, 1970; Peterka, A. J., 1963; Rouse, H., 1950; Rouse, H., 1967; Sherard, et al., 1963; SCS, 1968; SCS, 1969; USBR, 1973; U.S. DOC, 1976; U.S. DOI, 1976; U.S. DOT, 1975; USWB, 1973; W. Va. DNR, (no date); Wood, L. E. et al, 1976; DOE, Canada, 1977. Sediment control would be required to meet both effluent limitations under 33 USC 1151-75 and Section 515(b)(10)(B)(i) & (ii) of the Act.

Under the proposed regulation, slope protection, sediment control, and vegetation of all unprotected areas would be accomplished contemporaneously with construction in line with standard operational procedures for permanent structures under construction. ASCE, 1977; Brundage, R. S., 1974; BOM, 1973; Capp, J. P. et al, 1975; Capp, J. P. and Gillmore D. W., 19; Colgate, J. L. et al, 1973; Davidson, W. H., 1974; Dean, D. C. and Havens, R., 1972; Dean, D. C. and Havens, S. R., 1971; D'Appolonia, E. 1975; James, A. L., 1966; Leroy, J. C., 1972; Riley, C. V. and Rinier, J. A., 1972; SCS, 1974; Wood, L. E., et al., 1976; DOE, Canada, 1977; Ramsey, J. P., 1970; Martin, J. F., 1974.

Proposed Section 816.93 would prohibit use of waste in dam construction, unless proven as a suitable fill material, in accordance with standard engineering procedure. In accordance with sound practice, material which fails to exhibit the proper strength parameters necessary to achieve stability would not be allowed for use in dam construction. ASCE, 1977; ASCE, 1969; Bishop, A. W., and Henkel, D. J., 1962; Bishop, A. W., 1973; Cassagrande, A. and MacIver, B. N., 1970; Corps of Engineers, 1960; D'Appolonia, 1975; Hirschfield, R. C., and Paulous, S. J., 1973; Hvorslev, J., 1948; Justin, Joel, D. et al, 1945; Kealy, C. D. and Williams, R. E., 1969; Kealy, C. D., et al, (no date); Lambe, T. W., and Whitman, R. V., 1969; Mines Branch Mining and Research Center, 1972; Moulton, Lyle K., 1973; Natl. Coal Board, 1970; Natl. Coal Board, 1973; National Coal Board, 1972; Pettibone, H. C., and Kealy, C. D., 1971; Taylor, D. W., 1948; Terzaghi, K., and Peck, R. B., 1967; Terzaghi, K., 1943; USBR, 1973; USBR, 1968; U.S. DOI, BOM, 1974; U.S. DOI, BOM 1973; US DOI, 1976; US DOI BOM, 1974; US DOI BOM, 1975; W. Va. DNR (no date); Wood, L. E., et al, 1976; DOE, Canada, 1977.

The Probable Maximum Precipitation (PMP) is the current design standard utilized by numerous State and Federal agencies as the hydrologic criterion for dams. Alternatives for smaller design storms could be considered on a case-by-case basis if the criteria imposed by Section 816.93(b) can be demonstrated as applicable. ASCE, 1977; Chow, V. T., 1964; Corps of Engineers, 1975; D'Appolonia, 1975; Moulton, Lyle, K., 1973; National Coal Board, 1970; SCS, 1968; SCS, 1969; SCS, 1972; USBR, 1973; USCOLD, 1970; US DOI, 1976; USWB, 1963; W. Va. DNR, (no date); DOE, Canada, 1977. {41770}

Properly designed spillways are essential to ensure the hydrologic and subsequently structural adequacy of the structure. Inlet and outlet design allows for safe passage of runoff not stored in the reservoir with a minimum of disturbances and with maximum efficiency. ASCE, 1972; Brater, E. T., and King, H. W., 1976; Chow, V. T., 1964; Chow, V. T., 1959; Corps of Engineers, 1965; Davis, C. V., and Saversol, K. E., 1969; D'Appolonia, 1975; FHA, 1973; FHA, 1977; Henderson, F. M., 1969; Hjelmfelt, A. T., 1975; Hirschfield, R. C., and Paulous, S. J., 1973; Linsley, R. K. et al, 1949; Linsley, R. K., et al 1955; Morris, H. M., 1972; Newmark, N. M., 1965; Sherard, et al, 1963; SCS, 1975; USBPR, 1965; USBPR, 1970; USBR, 1973; US DOI, 1976; US DOT FHA, 1975; W.Va. DNR, (no date); DOE, Canada, 1974.

Three feet is a standard design freeboard utilized between design storm and top of dam elevations. The freeboard is intended to prevent overtopping by waves and also to counter frost action. Corps of Engineers, 1975; D'Appolonia, E., 1975; Hirschfield, R. C., and Poulos, S. J., 1973; USCOLD, 1970; SCS, 1972; U.S. DOA, 1976; US DOI, 1976; W. Va. DNR, (no date). Alternatives for smaller freeboard allowances were considered but rejected because of perceived need for prudence in designing a structure with so great a potential for harm. Dam design factors 100% PMP vs. 80% PMP and respectively 1 and 3 feet of freeboard, are virtually identical.

Factors of safety contained in proposed Subsection 816.93(e) are taken from standards currently used by various State and Federal agencies for construction and long term analyses. Dynamic requirements parallel the works of Algermissen for application of horizontal "g" loads. Algermissen, 1969; Bishop, 1955; Cassagrande and MacIver, 1970; Cassagrande, 1937; Cedergren, 1967; U.S. Corps of Engineers, 1952; U.S. Corps of Engineers, 1960; D'Appolonia, 1975; D'Appolonia, 1976; Griffiths and King, 1965; Harv, 1962; Hirschfield and Poulos, 1973; Kealy and Soderberg, 1969; Kealy and Williams, 1971; Kealy and Williams, 1970; Kealy, et al., (no date); Lambe, and Whitman, 1969; Lambe, 1952; Marks, 1975; Mines Branch Mining Research Center, 1972; Morgenstern and Price, 1965; Nat. Coal Board, 1970; Newmark, 1965; Sherard, et al., 1963; SCS, 1973; Taylor, 1948; Terzaghi and Peck, 1967; Terzaghi, 1943; Tolman, 1937, USBR, 1973; US DOI, 1973; US DOI, 1976; US DOI, 1974; US DOI, 1975; West Virginia Dept. of Natural Resources, (no date); Wood, et al., 1976; U.S. Navy, 1963; and DOE (Canada), 1977.

Foundation design is an integral part of any dam or embankment design. Lack of proper foundation information could lead to several types of physical failure of the structure. ASCE, 1977; ASCE, 1974; Bishop, 1973; Cassagrande and MacIver, 1970; U.S. Corps of Engineers, 1960; D'Appolonia, 1975; Forrester and Whittaker, 1976; Forrester and Whittaker, 1976; General Analytics, Inc., 1969; Hanna, 1973; Hirschfield and Poulos, 1973; Holland, 1965; Hvorslev, 1948; Justin, et al., 1945; Lambe and Whitman, 1969; Leonards, 1962; Taylor, 1948; Terzaghi and Peck, 1967; USBR, 1968; US DOI,

1976; US DOI, 1977; West Virginia Department of Natural Resources, (no date); DOE (Canada), 1977; and U.S. Navy, 1963.

Placing additional fill to allow for settlement during and after construction is a common engineering practice. This would give a final crest elevation of the embankment as designed, allowing for individual settlement after construction. Proper techniques for estimating settlement can be found in any standard text or state-of-the-art publication on dam design. D'Appolonia, 1975; Hirschfield and Poulos, 1973; Justin, et al., 1945; Lambe and Whitman, 1969; Mines Branch Mining Research Centre, 1972; Sherard, et al., 1963; SCS, 1969-a; Taylor, 1948; Terzaghi and Peck, 1967; USBR, 1973; USBR, 1968; West Virginia Dept. of Natural Resources, (no date); Wood, et al., 1976; U.S. Navy, 1963; and DOE (Canada), 1977.

The requirement for 90 percent drawdown of the storm water volume within 10 days is a standard engineering requirement for high-risk dams. This provision allows for evacuation of the storm water held in the reservoir during the design rainfall event, and satisfies two major design functions:

(a) Allows for "back-to-back" design storms. If the storm runoff was to be stored for any period of time, the occurrence of a second design rainfall, or even lesser storm, could overtop the dam embankment and subsequently initiate breaching and failure of the structure.

(b) Drawdown of the storm water precludes the upper portions of the embankment and surrounding natural slopes from achieving steady-state seepage. Therefore, the embankment's phreatic surface remains stable. Raising the phreatic surface increases the hydraulic gradient through the structure, potentially leading to internal erosion and saturation, thus greatly increasing the chances of failure. (D'Appolonia-M.E.S.A.; 1975; Bureau of Reclamation, 1973; Corps of Engineers 1971, 1952; Harr, 1962; USDA, SCS, 1972 US DI, BOM, 1976;

The requirement for signs and markers would be compatible with 30 CFR 77-215 with the standards of Section 816.11 of these regulations, and with 515(b) of the Act.

SECTION 816.95 - AIR RESOURCES PROTECTION.

Proposed Section 816.95 specifies some of the fugitive dust control measures available to coal operators and State regulatory authorities to achieve and maintain national ambient air quality standards and other applicable Federal and State air quality standards. This Section, in conjunction with Section 780.14, is proposed to implement, in particular, Sections 515(b)(4) and 508(a)(9) of the Act. Through the proposals of Sections 780.14 (a), (b), and (c) the operator would be given the flexibility to select appropriate fugitive dust control measures for its proposed surface coal mining operation. If the operator fails to submit an adequate fugitive dust control plan, the regulatory authority would be required to specify necessary fugitive dust control measures including but not limited to measures listed in Section 816.95. In requiring control measures, the regulatory authority would have to consider applicable air quality standards, climate, existing air quality, size and type of operation.

Statutory authority for this Section of the regulations is contained in Sections 102, 201, 501, 503, 507, 508, and 515 of the Act. Technical literature, State laws and regulations, and other materials which support this Section of the regulations are listed in the Preamble discussion to Section 780.14 of the regulations.

Fugitive dust control measure for the critical fugitive dust sources are listed in proposed Section 816.95.

Proposed paragraphs 816.95 (b)(1)-(9) would specify measures to reduce fugitive dust emitted as a result of wind action and vehicle traffic over haul and access roads. (See T1Mann, Compilation of Air Pollutant Emission Factors EPA AP 42 Part B. Section 11.2 Fugitive Sources (1975)). Proposed paragraphs 816.95(b)(10)-(20) address other appropriate air pollution control measures.

These proposed Sections find support in the following technical literature and regulations:

1. Report of the National Coal Policy Project, Where We Agree 206-207 (1978).
2. PEDCO Environmental, Inc., Evaluation of Fugitive Dust Emissions From Mining, 104 115, June 1976.
3. PEDCO Environmental Inc., Identification of A Feasible Regulation for Controlling Localized Fugitive Dust Emissions, AP 42 Table 1.1, (undated). {41771}
4. PEDCO Environmental Specialists, Inc., A Review of State Regulations for Controlling Dust Emissions, August 1976.

5. 40 CFR Section 51 Appendix B.
6. EPA Table of Typical Fugitive Dust Control Measures Observed at Western Coal Mines.
7. FEA PB 253, 254 Impact of Significant Deterioration Proposals Upon West Surface Coal Mining Operations, 13 May 1976.

Alternatives considered to the proposed fugitive dust controls included opacity limitations, mandatory performance standards and required buffer zones. Opacity limitations have not been specified for fugitive dust control because they have not been shown to correlate well with air quality impact from fugitive dust emissions. Mandatory performance standards may not be sufficient to achieve all ambient air quality standards. Buffer zones need not be required if mining operations are properly oriented and controlled. Therefore, the proposed rule gives the operator and ultimately the regulatory authority the flexibility to select from a mix of measures to achieve and maintain air quality standards.

Behind the proposed performance standard is the philosophy that operators should be provided with a wide variety of effective control techniques and should be given the option of selecting the ones that most closely coincide with their operations. Under this proposed regulation the regulatory authority reserves the right to review and supplement control techniques to assure that all Federal and State air quality standards are met. Fugitive dust from surface coal mining operations can be controlled by the mix of specified techniques to attain and maintain all applicable Federal and State air quality standards if this regulation is adopted.

Assessment of compliance should be based upon whether or not the operator is performing those easily observable actions that it has said in writing that it will do. If required ambient air quality monitoring demonstrates that additional control measures are necessary then it is expected that the operator or, if necessary, the regulatory authority, will immediately institute those measures. Surface coal mining operations are to be permitted only if public health and welfare are not jeopardized.

SECTION 816.97 - PROTECTION OF FISH AND WILDLIFE.

Proposed Section 816.97 deals with the potential negative impacts of surface mining activities on fish and wildlife and sets forth measures for prevention of those impacts, or mitigation or restoration of their habitats to ensure restoration, maintenance or enhancement of fish and wildlife resources.

The Section would place the responsibility on the person engaged in surface mining activities to apply the best technology currently available for compliance with relevant permit provisions, and divulgence to the regulatory authority of information pertaining to natural values of particular concern in the mine plan area. Those values of particular concern are the presence or habitat of threatened or endangered species listed by the State or Secretary, and bald and golden eagles and species otherwise protected by State or Federal law.

The authority for the proposed Section is found in the Act in Sections 102, 201, 501, 503, 504, and 515. Support for the requirements of the Section is found in the Endangered Species Act (16 U.S.C. 1531 et seq.), Conservation Programs on Public Lands (16 U.S.C. 670 g, h), the Bald Eagle Act (16 U.S.C. 668 et seq.), and the Migratory Bird Treaty Act (U.S.C. 703 et seq.).

The following literature was used in drafting this proposed Section:

1. "Environmental Criteria for Electric Transmission Systems (USDI, USDA, 1970).
2. "Powerline Contacts by Eagles and other Large Birds," REA Bulletin 60 10.
3. "An Environmental Guide to Western Surface Mining Part II: Impact, Mitigation and Monitoring," FWS/OBS 78/05 Draft made for the US FWS. Western Energy and Land Use Team (WELUT), Federal Building; Ft. Collins, Colo. 80521.
4. U.S. Department of the Interior, Fish and Wildlife Service, "Methods for the Assessment and Prediction of Mineral Mining Impacts on Aquatic Communities: A Review and Analysis" FWS/OBS 78/30 (1978) and other works cited therein.

OSM recognizes that the phrase "minimize disturbance and adverse impact . . . on fish and wildlife and related environmental values" is a subjective term, broad in application and open to interpretation. Therefore the public is invited to offer suggestion for applying specificity. As a point of departure we are proposing that it means.

(1) The operator must satisfy the regulatory authority that an adequate assessment has been made of the array of the major bird, reptile, amphibian and fish species in the area, as well as the significant components of the habitat. These components may include lesser forms of invertebrates, insects, arachnids, etc., if they are critical to the existence of a higher form in a given area;

(2) The operation should proceed swiftly and conclude in the shortest feasible time in order to shorten the period of adverse impacts; and

(3) The operator would be required to restore the habitat as near as possible to the premining condition so as to provide that after a reasonable period of time the restored habitat will support a comparable array and abundance of fish and wildlife species as before mining.

Consideration was given to a requirement that a person conducting mining activities, in addition to threatened or endangered species and eagles, also report migratory birds and animals not previously reported to the regulatory authority. Since there are so many migratory species, and since those of special significance would probably have already been identified in the wildlife plan, it was felt that this represented an unreasonable burden on the operator to go beyond the requirement as stipulated.

Since sedimentation is the most serious detriment to aquatic life and since road construction is one of the most serious contributors to sedimentation, access roads have been singled out for consideration in proposed subsection (d). While OSM is not suggesting that all roadways would be fenced, where roads and other artificial barriers may impede the migrations of such large game animals as elk and mule deer moving to or from winter range, special consideration would be given to measures that will facilitate uninterrupted passage. If comment is solicited as to whether it would be advisable to clarify proposed paragraph (d)(3), or leave the specifics up to the regulatory authorities and the State or Federal program regulations. Not all wildlife can be effectively excluded from ponds unless unreasonable measures are applied; i.e., frogs, snakes and the like cannot be enclosed by fencing. The drafters have in mind open mesh fencing or other deflectors to exclude such animals as waterfowl or deer from water covered with oil, or other toxic materials

Consideration was given to a requirement for paving intermittent streams to secure the banks and retard erosion. This alternative was discarded as unreasonable.

Subsection (c) proposes to incorporate by reference two works on transmission lines. OSM solicits comment as to whether these works are appropriate for incorporation in these National permanent program regulations. If not, the choice of appropriate guidelines for construction of power lines, as with other facilities, could in all cases be up to the regulatory authority. {41772}

SECTION 816.99 - SLIDES AND OTHER DAMAGE.

This Section proposes requirements necessary to prevent damage caused by slides and erosion. It further specifies those steps that must be taken any time a slide occurs which may have a potential adverse effect on life, property, health, safety, or the environment in the permit area.

The authority for these provisions is found in the Act in Sections 102, 201, 501, 503, 504, and 515.

Literature used in the preparation of these sections includes:

1. Grim, E.C., and Hill, R.D. 1974, Environmental Protection in Surface Mining of Coal: U.S. Environmental Protection Agency Report EPA 670/2 74 093.

OSM solicits comments with respect to special regional, geologic, climatologic, or other objective circumstances which, if identified as being present in the permit area, should lead the regulatory authority to impose special conditions to prevent slides. The technical basis for any suggestions should be provided, if possible, together with proposed requirements on the operator.

SECTION 816.100 - CONTEMPORANEOUS RECLAMATION.

This proposed Section sets forth a requirement applicable to all phases of reclamation activity.

Authority for this Section is found in the Act in Sections 102, 201, 501, 503, 504, 509, 510, and 515.

OSM considered an alternative approach of attempting to quantify contemporaneousness for all activities and enumerate maximum delay periods after which, if an activity had not been undertaken, this standard would be deemed breached. This alternative approach was rejected in favor of the proposed general language. The alternative selected should allow the regulatory authority needed flexibility to approve mine plans with varying timetables based on specific site conditions. OSM

recognizes however, that absence of an objective time measure may make citizen complaints of unjustified delay less effective than perhaps they should be.

SECTIONS 816.101 – 816.105 - BACKFILLING AND GRADING.

Sections 816.101- 816.105 are proposed regulations for backfilling and grading of areas disturbed by surface coal mining operations. Disturbed areas are to be reshaped to approximate original contour in a manner that minimizes erosion and water pollution and prevents slides. A level of production equal to that attained prior to mining and under proper management is to be achieved on the restored area.

Authority for these proposed Sections is found in the Act in Sections 102, 201, 501, 503, 504, and 515.

Literature used in writing these proposed Sections includes the works cited in the foregoing sections of this Preamble relating to disposal of excess spoil (proposed Sections 816.71– 816.73), topsoil (proposed Sections 816.21 816.25), hydrologic balance (proposed Sections 816.41 816.57) and the following:

House Committee on Interior and Insular Affairs House Report No. 99 45 (March 6, 1975), p. 151.

Senate Committee on Energy and Natural Resources Senate Report No. 95 128 (May 10, 1977), p. 83. State regulations from all States regulating surface mining.

The proposed contemporaneous backfilling and grading regulations are minimum standards based on State regulations thought to be reasonable and valid for contour mining, open pit mining, and area strip mining.

For contour mining, the operator would be required to rough backfill and grade the area within 60 days of disturbance. The time frame proposed is more stringent than the time frame set forth in the regulations of several States (i.e., Kansas, Montana, Ohio, Pennsylvania, and Tennessee) and less stringent than several others (i.e., Illinois, Kentucky, and Missouri). It is thought to a reasonable prescribed time limit for reshaping the area and minimizing environmental degradation.

The size of the ungraded area would be restricted by the 1,000 linear feet requirement. This proposed regulation is similar to that imposed by the Kentucky regulations and exceeds the distance requirements set forth in the Wyoming regulations. The standard is proposed to minimize water degradation and expedite rehabilitation of the disturbed area.

For open pit mining with thin overburden, OSM believes that the site specific needs of these operations necessitate that the regulatory authority approve a site-specific time frame for rough backfilling and grading that compliments the practical operation needs. The regulatory authority, when approving a time schedule, would be specifically mindful of the environmental significance of establishing time frames that would exceed the amount of time required for practical operation of the mining activities prior to backfilling and regrading.

For area strip mining, the operator would be expected to rough backfill and grade the strip mined area within 90 days of disturbance and at no time shall more than four spoil ridges exist.

The Act and the legislative history indicate that no highwalls are to be left after mining is completed. Highwall elimination is mandated in Section 515(b)(3) of the Act as is attainment of the "'lowest practicable grade" in cases of inadequate overburden to fully grade to "'approximate original contour" to "'cover completely the highwall" as required in Section 515(d) of the Act for steep slope areas.

The proposed regulations also reflect the fact that premining slope measurements would be required to take into account natural variations in slopes. In many cases it would be appropriate for the permittee to develop accurate topographic maps for an area prior to any mining and to develop an overlay of the proposed postmining topography where that topography

blends in with the surrounding terrain, reestablishes the surface drainage system, and serves the approved postmining land use. Then the final graded slopes would be specifically defined on the approved postmining topographic contour maps, where they may be reviewed as a whole.

The use of topographic maps, aerial photography and other photogrammetric methods of measuring premining and postmining slopes are appropriate only when topographic maps and photographically-produced maps are of sufficient accuracy to ensure adequate measurements. Thus, while maps and photographs might be used in addition to or in place of field measurements, the maps and photographs must be established as accurate by the permittee. Commonly used professional engineering practices are suitable for slope measurements and surveys could still be required by the regulatory authority.

The definition of approximate original contour of the Act supports the use of terraces so long as the terrace is not used as an inappropriate substitute for construction of lower grades. The need to restrict terraces to those situations where such level breaks in the terrain are truly necessary must be emphasized. Smaller diversion ditches are often more suitable than terraces. Further, the terraces discussed in the regulations are those to be left after mining and regrading are completed.

Terraces are often viewed as a means of access rather than for temporary control of erosion. It is the intent of this proposed Section to require that disturbed watersheds be reclaimed to conditions that approximate premining hydrologic conditions with minimal change in water flow and water quality. Such measures as the use of terraces would be permitted when approved by the regulatory authority. Hence, operators would be free to propose terraces as often or in any manner that they see fit. The definition of approximate original contour in the Act looks to the drainage pattern of the area and the general surface configuration and indicates that the reclaimed area and any terraces used, must conform to these criteria. Proposed terraces should have a well-defined role in supporting the approved postmining land use.

Although the practice of constructing diversion ditches in the form of small terraces on moderate slopes it is not uncommon, it would not be appropriate to leave wide terraces on any slopes unless the access afforded by such terraces is supportive of the approved postmining land use. {41773}

The purpose of the proposed dimensional limits on terraces was to create a reasonably accessible land form that supported postmining land uses and to provide erosion stability. Terraces are often used on valley fills and head-of-hollow fills to break up otherwise uninterrupted slopes. Nonetheless, terraces, and other types of fills addressed in this Section, would be reviewed for suitability by the regulatory authority and must be constructed in a manner compatible with the postmining land use.

The static safety factor of 1.3 is an appropriate measure of mass stability that has been accepted by the Corps of Engineers, MSHA, and other agencies. Greater slopes may be used if the safety factor is achieved and erosional stability is assured. Regulatory authorities may specify higher safety factors when necessary, and permittees will be responsible for design and construction that provides more stability. The proposed absolute limit on terrace faces (the outslope of the terrace bench) allows the alternative use of a stability calculation. However, since stability factors can change according to the method of calculation, all calculations would be based on commonly accepted professional engineering practices. If it becomes necessary to specify methods, the Office would do so under these regulations. Width limitations would be established so that terraces would not serve as access roads unless special consideration is given to retention or construction of roads to support the postmining land use and the roads would be in the approved postmining land use plan.

The definition of approximate original contour in the Act supports the concept of not restricting terraces to steep slopes so long as the terrace would not be used as an inappropriate substitute for construction of lower grades. The need to restrict terraces to those situations where such level breaks in the terrain are truly necessary must be emphasized. Smaller diversion ditches are often more suitable than terraces to achieve these purposes. Further, the terraces discussed in the proposed regulations are those to be left after mining and regrading are completed. During operation of the mine steeper outslopes and wider benches could be temporarily constructed if they are safe and in compliance with the Act and proposed regulations. Cut-and-fill terraces would be permissible when compatible with the approved postmining land use.

The natural angle of repose of certain types of natural materials may be too steep to control erosion and increases in total suspended solids; thus, the postmining slopes are likely to be reduced below the angle of repose in most situations.

The proposed regulations would require that the reclaimed areas must be graded to slopes equal to or less than ""approximate premining slopes," which would be those slopes determined by the regulatory authority to be stable slopes that provide a land surface capable of supporting the approved postmining land use. The term ""approximate premining

slopes" is meant to indicate that such slopes must be selected according to the following criteria:

- (1) They would not appreciably exceed the maximum slopes measured for the premining surface.
- (2) They could be less steep than the natural slopes by that amount necessary to prevent slides, erosion and water pollution, to provide adequate drainage, to cover all acid forming and other toxic materials, and to permit revegetation, and

The "final graded slope," measured after mining and grading, would not necessarily be a uniform slope but is often an overall average slope. Therefore, terraces, roads, and diversion ditches could be included within the slope measurement path provided the overall final graded slope met the criteria set out above. Long, uniform, uninterrupted slopes are not generally desirable since they tend to erode more readily than do rolling, nonuniform slopes.

In order to promote the reclamation of mined areas inadequately reclaimed because much of the previous spoil and waste from the previous mining operation was deposited on the down-slope, leaving insufficient material for grading to approximate original contour, the proposed regulations have been developed to reflect reality. These proposed regulations are intended to encourage the reclaiming of poorly reclaimed areas while ensuring an improvement in land quality and perhaps water quality, over and above that left by the previous mining. One of the purposes of the Act is to promote the reclamation of mined areas left without adequate reclamation. Some previously mined areas lack sufficient available spoil or topsoil to achieve postmining conditions which meet all the land configuration and revegetative requirements. Such operations would be required to retain all overburden and spoil material on the bench and to grade completely to eliminate the highwall and maintain a stable slope. The entire mining area would be stabilized and revegetated.

Review of State requirements indicates that 4 feet is usually considered adequate to cover toxic-forming or acid-forming materials. There is limited research which shows 4 feet to be inadequate to prevent upward migration of salts in the semi-arid to arid climates or to protect deep rooting plants which are part of the revegetation plan. The proposed regulation in Section 816.103 specifies 4 feet. A qualifying phrase has been placed in the proposed regulation to address thicker amounts where necessary to guard against salt migration and against exposure by erosion and to provide an adequate plant growth substrata.

The proposed requirements to analyze, and treat or bury coal processing wastes or coal conversion facility waste is believed to be appropriate to the problem. It is necessary to ensure that waste disposal in mine areas are handled in a manner that does not adversely affect the hydrologic balance, especially as the balance relates to water quality.

Before waste materials from a coal processing or conversion facility outside the permit area or from other offsite activities such as municipal wastes, are used for fill material, it would need to be demonstrated to the regulatory authority by hydrological means and chemical and physical analyses that use of these materials will not adversely affect water quality, water flow, and vegetation; would not present hazards to public health and safety; and would not cause instability in the backfilled area. Public comment is solicited as to whether these Sections should include more specific regulation, or prohibitions, against dumping of offsite solid waste. See Preamble discussion of 816.89, Noncoal wastes.

The intent of proposed subsection 816.103(b) is to provide the regulatory authority with a basis for establishing site-specific requirements that would assure stability of backfilled material, selective placement and stability of backfilled material, and selective placement and compaction of backfill material when necessary to prevent erosion and leaching of toxic substances into surface and subsurface water. {41774}

SECTION 816.106 - REGARDING OR STABILIZING RILLS OR GULLIES

This proposed regulation is intended to minimize soil loss and reduce sedimentation by requiring stabilization of rills and gullies that are more than 9 inches deep.

Authority for this proposed Section is found in Sections 102, 201, 501, 503, 504, 507, 508, and 515 of the Act.

The literature used in preparing this Section includes: T3Soil Survey Manual: Agriculture Handbook No. 18, U.S. Department of Agriculture, SCS, 1951, pp 503.

Rills and gullies concentrate the runoff water into tiny rivulets and small channels and accelerate erosion. To distinguish between a natural rill or shallow channel through which overland flow is conducted, a maximum acceptable depth of 9 inches is established so as to preclude the formation of large gullies that severely degrade the area. However, the regulatory authority may reduce the size criteria where shallower gullies are disruptive to the post-mining land use or if they cause excessive erosion or sedimentation.

The intent of this proposed provision is to allow stabilization through means other than regarding if such methods produce equal or better results. Thus, the use of straw or the use of small equipment to fill and regrade in a manner that disturbs little additional area may be permissible. Rills and gullies formed along disturbed and reclaimed drainageways would be permitted if adequate stabilizing vegetation has been established.

The soil losses and destruction resulting from rill and gully erosion are illustrated in Figure 48, Soil Survey Manual, page 263.

As an alternative to the 9-inch requirement of this proposed Section, 6-inch and 12-inch depths were considered as well as deletion of the requirement entirely. The 6-inch depth would make it difficult, in some locations, to distinguish between those erosional features requiring repair and features that approximate natural drainage channels in highland (divide) areas. To delete the requirement entirely or increase the depth to 12 inches would in all probability result in excessive loss of plant growth media by erosion. The 9-inch depth is selected because it is the maximum depth that can be stabilized by most grasses, since a large portion of their roots occur in this surface layer (p. 250, Soil Survey Manual).

Comment is solicited on the stabilization of rills and gullies after topsoil has been replaced. Specifically, the Office would like comments to suggest at what point, if any, in the revegetation process a 9-inch rill or gully should no longer be considered to present a sufficient risk of erosion to require elimination, in light of the damage likely to be done by required earthmoving equipment, if any.

SECTIONS 816.111 – 816.117 - REVEGETATION.

These proposed Sections are intended to prevent land disturbance during mining operations which can result in landslides and cause erosion and water pollution, which deteriorate the environment, and which can be detrimental to the health and well-being of the occupants of the affected area. These proposed revegetation regulations are intended to minimize erosion, reduce toxic runoff, restore the land to its premining productivity or potential, and establish a vegetative cover on disturbed areas.

Authority for these proposed sections is found in 102, 201, 501, 503, 504, 507, 508, 515 and 519 of the Act.

The literature used in preparing the regulations is as follows:

1. Aldon, E.F., "Techniques for establishing native plants on coal mine spoils in New Mexico," in Third Symposium on Surface Mining and Reclamation, Volume I (1975) pp. 21, 26.
2. Aldon, Earl F., "Reclamation of Coal-mined land in the Southwest," Journal of Soil and Water Cons., Vol. 33, No. 2, 1978, pp. 75-79.
3. Aldon, Earl F. and H.W. Springfield, "Reclaiming Coal Mine Spoils in the Four Corners," Reclamation and Use of Disturbed Land in the Southwest, University of Arizona Press, 1977, p. 234.
4. Armiger, W.H. et al, "Revegetation of land disturbed by strip mining of coal in Appalachia," Department of Agriculture, Agricultural Research Service, (1976), p. 8.
5. Environmental Protection Agency, "Processes, procedures, and methods to control pollution from mining activities," (1973) EPA 430/9 73 011, p. 151.
6. Environmental Protection Agency, "Erosion and sediment control: surface mining in the eastern United States," (1976) pp. 81 87.
7. Grandt, Alton F., "Mined-land Reclamation in the Interior Coal Province," Journal of Soil and Water Conservation, Volume 33, No. 2, pp. 62 68.
8. Grim, E.C., and Hill, R.D., "Environmental protection in surface mining of coal," Environmental Protection Agency, 1974, pp. 189 190.
9. "Guidelines for Reclamation of Surface Mined Areas in Utah" U.S. Dept. of Agriculture, SCS, Nov. 1972, p. 6.
10. Handbook for Making Resource Inventories, "Methods of Applying Land and Grass Management Principles" USDI, BIA, Chap. III, p. 14, 1961.
11. Heady, Harold F., "Rangeland Management" McGraw-Hill, 1975, p. 350 351.
12. Holton, H.N., 1972, "A concept for disfiltration estimates in watershed engineering" USDA; ARS 41 51, Figures 6, 7, and 8, p. 23, 24 and 25.
- 12a. House Report No. 95 218, 95th Congress, 1st Session (1977) p. 93.
13. Indiana, General Procedures Respecting the Administration of Chapter 344 Acts of 1967, Effective Jan. 1, 1968, pp. 1 6.

- 13a. Iowa, State of, ""Recommendations for Establishment of Vegetation on Surface Mined Areas" Item 10, Time of Seeding, Land Rehabilitation Advisory Board.
14. ""Kentucky Guidelines for Classification, Use and Vegetative Treatment of Surface Mine Spoil" U.S. Dept. of Agri., S CS, Lexington, Ky., 1973, p. 12.
15. Kranz, B. W., ""Benefits in cost and effectiveness of liquid materials use in hydroseeding operations," in Second Research and Applied Technology Symposium on Mined Land Reclamation (1974) p. 163.
16. Merkel, D. L., ""Revegetation in the Southwest – its hazards and successes," Department of Agriculture, Soil Conservation Service, 1974, pp. 189 190.
17. Montana Administrative Code, Adopted Rules and Regulations, Pursuant to Title 50, Chap. 10, R.C.M., 1947, pp. 26 48.21 to 26 48.38.
18. ""Critical Area Stabilization in New Mexico," New Mexico Inter Agency Range Committee Report for the Critical Area Stabilization Workshop, January 1973, p. 11.
- 18a. New York, Mined Land Reclamation Mine Operator Handbook, P. III 1 43.
19. Ohio Revised Code, Chapter 1513, Strip Mining and Reclamation of Mined Land, Section 1513.16, p. 24.
20. Packer, P. E. and Christensen, G. F., Department of Agriculture Forest Service ""Guides for controlling sediment from secondary logging roads" (undated) p. 28.
21. ""A Guide for Revegetating Bituminous Strip Mine Spoil in Pennsylvania" Research Committee on Coal Mine Spoil Revegetation in Pennsylvania, p. 21, and Appendices I, II, III and IV.
22. Plass, William T., ""Reclamation of Coal-mined Land in Appalachia, Jour. of Soil & Water Cons.," Vol. 33, No. 2, 1978, pp. 56 61.
23. Power, J. F., R. E. Rices, and F.M. Sandoval, ""Reclamation of coal-mined land in the Northern Great Plains" Jour. of Soil and Water Cons., Vol. 33, No. 2, 1978, pp. 69 74.
24. Sampson, Arthur W., ""Range Management, Principles and Practices" John Wiley & Sons, Inc., 1952, pp. 226, 229 and 232.
25. Stoddart, Laurence A., Arthur D. Smith, and Ihadis W. Box, ""Range Management" Third Edition, 1943, 1955 (1975) McGraw-Hill, p. 483. {41775}
26. Vallentine, John F., ""Range Development and Improvements" Brigham-Young Univ. Press, Provo, Utah, 1971, p. 279.
27. Vogel, Willis G., ""The effect of herbaceous vegetation on survival and growth of trees planted on coal-mined spoils" In Proc. Res. & Appl. Technical Symposium on Mined Land Reclamation, March 1978, Pittsburgh, Pa., pp. 197 207. Bituminous Coal Research, Inc., Monroeville, Pa. 1973. Table 1.
28. Vogel, W. G., ""All seasons seeding of herbaceous vegetation for cover on Appalachian Strip Mine Spoils." In II Proc. Research and Appl. Technology Symposium on Mined Land Reclamation, Louisville, Kentucky, pp. 175 178. Bituminous Coal Research, Inc., Monroeville, Pa., October 1974, Tables 1, 3, 4, 5.
29. Vogel, W. G., ""Requirements and use of fertilizer, lime, and mulch for vegetating acid mine spoils" United States Department of Agriculture, Forest Service Report ARC 71 66 T4, 1974, pp. 260 281.
30. Vogel, W. G., ""Use and requirements of lime, fertilizer, and mulch in acid strip mine spoils." In III Proc. Research and Appl. Technology Symposium on Mined Land Reclamation, Louisville, Kentucky, Bituminous Coal Research, Inc., Monroeville, Pa., October 1975, Tables 1, 2, 7.
31. Vogel, Willis G., and Berg, William A., ""Fertilizer and herbaceous cover influence establishment of direct-seeded black locust in coal mine spoils" In R.S. Hutnik and Grant Davis (ed.). ""Ecology and Reclamation of Devastated Land" Volume 2. Gordon & Breach, NY, pp. 189 198, 1973. Table 1.
32. Wahlquist, B. T., et al., ""Mined-land revegetation without supplemental irrigation in the arid Southwest" pp. 29, 31, 32;
33. Woodward, Lowell, W., 1943. ""Infiltration capacities of some plant soil complexes of Utah Range Watershed Lands." American Geophysical Union Transactions, pt. II, p. 468 473.
34. Z'Berg-Nejedly Forest Practice Act of 1973 (California Forest Practice Act), Div. 4, Chap. 8, Pub. Res. Code, Article 2. pp. 1 18.

Proposed Section 816.111 would require that the operator, in accordance with the revegetation plan discussed in proposed Subsection 780.19(d), promptly seed or plant all disturbed areas except water areas, road surfaces, and intensive agriculture areas, and achieve a vegetative cover that stabilizes the area from erosion and is similar to the native species of the disturbed area.

One of the principal effects of vegetation is to stabilize the soil surface with respect to erosion. This regulation would require stabilization of the soil with respect to erosion, not prevention of erosion where it would otherwise be a natural process.

The permittee would be required to use technical publications or the results of laboratory and field tests that are approved by the regulatory authority to determine the varieties, species, seeding rates, seeding dates, and planting plans and soil amendment practices essential for establishment and self-regeneration of vegetation.

Under proposed Section 816.112 the requirement for appropriate field trials should be interpreted broadly to include successful experience with species in the area mined or a similar area. Naturalized species that have been in common usage, such as the tree species in the Great Plains, will generally have been demonstrated to be acceptable. However, the operator and the regulatory authority must be mindful of the geographic adaptation of each species since species become established only under conditions similar to those under which it evolved (Sampson, p. 226) and of the many plant species, both introduced and native, which have been used to improve and stabilize the soil (Sampson, p. 229).

In order to avoid the spreading and subsequent propagation of undesirable, noxious and toxic, species the seed or seedlings used in revegetating disturbed areas would be required to meet Federal and applicable State requirements for purity.

These proposed regulations are adapted to meet the need for rapidly establishing vegetative growth and substituting introduced species for native species. Many introduced species, annual and biannual, become established more quickly and provide more abundant growth than perennials and may in some instances be used to advantage in controlling erosion while permanent perennial species become established. Establishment of native species normally occurs over too long a period of time, often requiring 1 to 3 years for establishment, to effectively protect the soil and hydrology (Sampson, Arthur W., 1952, p. 232; Vallentine, John F., 1971, p. 279, and Heady, Harold F., 1975, p. 350-351.) Introduced species, especially annuals, can be used as a "nurse crop" to ameliorate severe conditions such as intense isolation, high surface temperature, and rapid evaporation that make establishment of permanent vegetation difficult on many sites (Plass, 1978). The advantage of using introduced species when reclaiming mined lands is supported by Aldon, p. 76; Grandt, Aldon, p. 64; Plass, p. 58 59; and Power, p. 70.

The requirements of proposed Section 816.113 are intended to assure that there will be no major time lag between completion of regrading and revegetation to the area to be seeded. As stated by Sampson, p. 245, the time of seeding depends upon the method of land preparation and the forage species used. Some severe sites may require the use of annuals such as small grains, grasses or legumes to stabilize the area while perennials become established (Plass, William T., 1978, p. 58). In many locations, suitable species are available and climatic conditions are favorable for establishing seedling, that provide ground cover for erosion control, for a major portion of the year.

This segment of the proposed regulation is required in several state reclamation regulations. (Indiana, p. 5; Montana, p. 47; New York, p. III 37; and Ohio, p. 24). Also, seeding time benefits are recognized in the following State guidelines: Iowa, Item 10; Kentucky, p. 12; New Mexico, p. 11; Pennsylvania p. 21 and appendices I, II, III and IV; and Utah, p. 6.

Under proposed Section 816.114, the mulch requirement is flexible and its necessity, type, benefits, and uses in revegetating a disturbed area would be at the discretion of the regulatory authority. In addition to the use of vegetation residue such as bark, straw, hay and wood fibers the regulatory authority could determine that establishment of annual species provides an in-situ mulch that will protect the site and aid in the establishment of permanent perennial species. Plass, 1978, states that the use of annuals can be beneficial in establishing perennial species. The moisture saving, soil stabilizing and, consequently, seeding establishment benefits of mulching are documented by Vogel, 1974.

Literature recognizing the benefits of mulch are: Grim and Hill, 1974, pp. 189 190; Environmental Protection Agency, 1976, pp. 81 87; Armiger, 1976, p. 8; Aldon, 1975, pp. 21, 26; Wahlquist, undated, pp. 19, 31, 32; Kranz, 1974, p. 163; Merkel, 1974, pp. 189, 190; Packer and Christensen, undated, p. 28; and EPA, 1973, p. 151.

As an alternative to this proposed Section, fixed minimum amounts, as specified by regulation, of mulch were considered but determined inappropriate in view of the varied site needs, and benefits derived from the use of mulch when revegetating and establishing permanent vegetation on a disturbed area. This determination was based in part on the varied mulching requirements of States. Those mulching requirements range from use at the discretion of the State agency to mandatory use on all disturbed lands. See Colorado: Proposed Rules and Regulations of the Land Reclamation Board, Section (V)(D)(5) and (7); Montana: Department of State Lands, Reclamation Division Regulations, Section 26 2.10(10)-S10350; Ohio: Department of Natural Resources, Division of Reclamation Strip Mining Regulations, Section 1501; 13-15-02; Tennessee; Department of Conservation, Division of Surface Mining Regulations, Section 0400-3-7-.04; West Virginia: Department of Natural Resources Surface Mining Reclamation Regulations, Chapter 20-6, Section 9D; Wyoming: Department of Environmental Quality, Land Quality Rules and Regulations, Chapter II, Section 5. {41776}

Proposed Section 816.115 relates to grazing on recently vegetated areas. The purpose of this proposed Section is to incorporate practical livestock control essential to establishment and growth of new seedlings. The need is supported by the work of Aldon and Springfield; Grandt, p. 65; Sampson, p. 232; Vallentine, p. 279; Heady, pp. 350-351; and Stoddart et al., p. 483 and USDI, Bureau of Indian Affairs, Chap. III, p. 14.

Proposed Section 816.116 would be a highly localized and site-specific proposal taking into account geography, climate, soil, and hydrology of the particular area where the mine is located. This Section is structured to_

- (1) Incorporate site-specific variations within the permit area;
- (2) Evaluate a permanent vegetative cover capable of regeneration and plant success;
- (3) Consider site conditions of previously mined areas;
- (4) Insure a ground cover for controlling erosion; and
- (5) Utilize reference areas.

This regulation is proposed to allow for the flexibility required, as a result of the diverse climatic and soil conditions, to properly measure the different vegetative types that are found in the mining areas.

Reference areas are to be used to obtain a description of the premined vegetative resource both within the permit area and in similar areas adjacent to the area that will be disturbed. The reference areas must be similar to and representative of the geology, soils, slope, and vegetation in the permit area. The areas would be used to measure ground cover, productivity and species diversity that are produced naturally. Any one of a number of vegetation measuring techniques may be authorized by the regulatory authority. When permit areas contain more than one site, as determined by the above factors, it may be necessary to use additional reference areas to assure that vegetative and soil data will be representative of and similar to the area to be restored. The measurements taken from the reference areas will be used to estimate normal vegetation, productivity, plant cover, plant succession and plant self-generation and these measurements would be used, by the regulatory authority, to determine when the disturbed area has been adequately revegetated.

In response to public comment on earlier alternative drafts, the current language emphasizes that species diversity, distribution, seasonal variety, and vigor be evaluated.

These proposed regulations should not be construed as attempting to absolutely prevent soil erosion. Such a goal would be difficult to achieve. They would require that revegetation control erosion which would not otherwise be natural for a properly managed area.

Under these proposed regulations the success of the revegetation pursuant to this scheme would be measured on the basis of reference areas as proposed and approved under proposed Subsection 780.19(2)(d). Thus, if the reference area for a particular mine in the West was properly managed and yet was characterized by sparse vegetation and natural erosion, that is the condition to which the mined area must be reclaimed. If the mined area had been improperly managed, i.e., overgrazed prior to the mining, the operator may not return the area to its mismanaged conditions which would be characterized by sparse ground cover and greater erosion. Rather, the operator must reclaim such an area in reference to a properly managed area approved by the regulatory authority which may require a vegetation cover with less exposure of bare soil and greater capacity to retard erosion than that which the area had prior to mining. This requirement would not mean that land which has irreversibly lost its productivity capacity must be revegetated with reference to a properly managed area, but the irreversibility of damage caused by overgrazing or soil erosion is a determination that would be made by the regulatory authority.

The Act's legislative history makes clear that Congress did not intend for the postmining use of land which had been improperly managed to be limited to its most recent premining use. The legislative history of Section 508(a) of the Act, which sets forth the requirements for a reclamation plan, contains the following explanation regarding the contents of a plan (S. Report No. 95-128, 95th Cong., 1st Session (1977) pp. 76 77):

""The description of the land which will be affected by the proposed mining operation must also include an evaluation of the capability of the site to support a variety of uses prior to any mining disturbance. This description should give consideration to soil and foundation characteristics, topography, and vegetative cover.

""The description is to serve as a benchmark against which the adequacy of reclamation and the degradation resulting from the proposed mining must be measured. It is important that the potential utility which the land had for a variety of uses be the

benchmark rather than any single, possibly low value, use which by circumstances may have existed at the time the mining began."

Thus, the Senate Report indicates that Congress intended the postmining use of land to be based on its ""potential utility" for a number of uses before mining, not some low use that may have resulted from mismanagement.

The benefits of a 90 percent reclamation of the ground cover of the reference area are well supported by the concept illustrated by Woodward, pp. 468 473, and Holton, Figures 6, 7, and 8, pp. 23 25. The 90 percent statistical confidence level, reduced to 80 percent for shrublands, is based on handbooks in the Directive System of the U.S. Department of Agriculture, Forest Service.

In response to public comments related to the problems associated with the use of reference areas by the small operator, it was considered by the Office that certain small operators might, upon approval of the regulatory authority, be exempt from the use of reference areas when measuring success of revegetation of the disturbed area. To be eligible the small operator would have had to have had a permit for 40 acres or less in an area that receives 26 or more inches of precipitation annually. The final determination of the method to be used when measuring the success of revegetation would have rested under this proposal with the regulatory authority. The regulatory authority might require a more stringent standard than set forth in proposed Subsection 816.116(c) when deemed necessary to prevent pollution, protect quality of the environment and health, safety and general welfare of the public. This alternative was not adopted by OSM, since it was considered that the reference area requirement is not excessive and leads to achievement of important environmental goals.

The proposed Section 816.117 is based on the California Forest Practices Act and similar Acts in Washington and Oregon.

SECTIONS 816.131 – 816.132 - CESSATION OF OPERATIONS

These proposed Sections would require persons conducting surface mining who cease operations on either a temporary or permanent basis to eliminate safety hazards and assure environmental protection, including erosion control and visual degradation. {41777}

Authority for these Sections is found in the Act in Sections 102, 201, 501, 503, 504, 509, 510 and 515.

Under the proposed Sections the operator would be required to advise the regulatory authority of his intentions to cease operations. The Office proposes that the operator include in his cessation plans the total acres within the permit area, reclamation completed, and the revegetation to be completed. The operator would be required to eliminate or remove all safety hazards and structures and equipment not involved in the post-mining land use.

SECTION 816.133 - POSTMINING LAND USE

Section 816.133 if adopted would set out minimum requirements for establishment of postmining land use for the permit area. The goal of Section 816.133 is to ensure:

- (a) Compatibility with adjacent land use and/or local planning and zoning;
- (b) Feasibility of postmining land use as related to local and regional needs;
- (c) Adequate planning of public facilities;
- (d) Financial feasibility of the postmining land use;
- (e) The development of a postmining land-use plan that conforms to accepted planning standards, the premining land capability, and that reflects information contained in the resource inventory; and
- (f) That postmining land use does not present hazards to public health and safety.

The following Sections of the Act authorize proposed Section 816.133: 102, 201, 501, 503, 504, 508, 515.

The following technical literature was considered in developing this section:

1. Cleckner, E. K. Highest Land Use as a Planning Tool. Appraisal Journal, 215 223, 1969.
2. Rowson, J. F. Zoning vs Alternative Value. Appraisal Journal, 513 517, 1963.
3. U.S. Dept. of Commerce. Zoning for Small towns and Rural Counties. U.S. Government Printing Office, Washington, D.C. 1970.

4. Barlowe, R. Land Resource Economics: The Political Economy of Rural and Urban Land Resource Use. Prentice-Hall, Inc. Englewood Cliffs, N.J. 1958.
5. Steinbach, S. E. Aesthetic Zoning: Property Values and the Judicial Decision Process. Missouri Law Review, 35, 176-186. 1970.
6. Frye, J. C. Geological Information for Managing the Environment. Illinois Geological Survey, Environmental Geology Notes 18, 1967.
7. Yelverton, C. A. The Role of Local Governments in Urban Geology. In Environmental Planning and Geology in the Urban Environment, ed. by Donald R. Nichols and Catherine C. Campbell. U.S. Government Printing Office, Washington, D.C. 1971.
8. Kusler, J. A. Open Space Zoning: Valid Regulation or Invalid Taking. Minnesota Law Review, 57:1, November 1972.
9. Heyman, I. M. Innovative Land Regulation and Comprehensive Planning. Santa Clara Lawyer 13, 1972.
10. Tourbier, J. and Westmacott, R. Water Resources Protection Measures in Land Development: A Handbook. Water Resources Center, University of Delaware, Newark, Delaware. 1974.
11. Leopold, L. B. Hydrology for Urban Land Planning: A Guidebook on the Hydrologic Effects of Urban Land Use. USGS Circular 554. U.S. Government Printing Office, Washington, D.C. 1968.
12. Detwyler, T. R. and Marcus, M. G. Urbanization and the Environment. Duxbury Press. Belmont, Cal. 1972.
13. Livingston and Blayney, Inc. Public Costs are Expensive in Hillside areas. Foothills Environmental Design Study, Report No. 3 to the City of Palo Alto, Calif. Palo Alto Planning Department. Palo Alto, Calif. 1970.
14. Flawn, P. T. Environmental Geology: Conservation, Land-Use Planning, and Resource Management. Harper and Row. New York, NY 1970.
15. Coughlin, R. E. and Hammer, T. R. Stream Quality Preservation Through Planned Urban Development. U.S. Government Printing Office, Washington, D.C. 1973.
16. McComas, M. R., Hinkley, K. C. and Kempton, J. P. Coordinated Mapping of Geology and Soils for Land Use Planning. Illinois Geological Survey. Environmental Geology Notes 29. 1969.
17. Moore, G. T. Emerging Methods in Environmental Design and Planning. M.I.T. Press. Cambridge, Mass. 1968.
18. Johnson, A. H., Berger, J., and McHarg, I. L. Landscape Analysis for Ecologically Sound Land Use Planning. Department of Landscape Architecture and Regional Planning. University of Penna., Phila. PA 1978.
19. Thurrow, C., Toner, W. and Erley, D. Performance Controls for Sensitive Lands. American Society of Planning Officials Planning Advisory Service. Report Nos. 307, 308. Am. Soc. of Planning Officials, Chicago, Ill. 1975.
20. Toth, R. Criteria in Land Planning and Design. Landscape Architecture 62(1), 1971.
21. Bartelli, L. J., Klingebiel, A. D., Baird, J. V. Heddlson, M.R. Soil Surveys and Land Use Planning. Soil Science Society of America and American Society of Agronomy, Madison, Wis. 1966.
22. McHarg, I. L. Design with Nature, Natural History Press. Garden City, New York. 1969.
23. Spicer, R. B. Increasing State and Regional Power in the Development Process. ASPO Planning Advisory Service Report No. 255. American Society of Planning Officials, Chicago, Ill. 1970.

In order to minimize the adverse economic and environmental impacts on adjacent lands or the community, postmining land uses should be compatible with adjacent land. Compatibility is and has been traditionally determined through planning, zoning and subdivision ordinances at the local and State level. Alternatively these proposed regulations could include no requirements for compatible land use, leaving that function entirely to existing State or local government controls or to market pressures.

Incorporating development of postmining land uses compatible with adjacent land uses through State and local planning institutions has the advantage of providing flexibility to account for local variation in environmental, economic and social conditions and needs. The proposed rule, by requiring the written statement of the authority responsible for land-use planning increases the likelihood of compliance with the governmental aspects of land-use determination. The compatibility requirement is non-specific as this is deemed to be a prerogative of the responsible land-use planning authority. Specific requirements for adjoining or adjacent land use could also have been written into these proposed regulations, but this alternative was rejected as too much of an interference with State and local governments. {41778}

Postmining land use plans must be financially feasible and related to local or regional economic needs. Without such attributes there is no assurance of the long term viability of the postmining land use. If there is clearly no trend or market need for a particular land use in the local or regional area, a proposal for that use would not be reflecting local or regional needs. Alternatives considered for establishing the need for a particular land use range from consideration of all Federal, State and local needs through completely ignoring the local or regional economic conditions.

Requiring that the proposed postmining land use reflect the local and regional needs will assist in assuring__

- (a) Long term economic stability for the postmining land use; and
- (b) That the postmining land use will add to the economic vitality of the existing local community.

Postmining land use plans must contain the provision for any public service needed for the proposed postmining land use. For example, where the proposed postmining land use will require additional public services the plan should explain who will be responsible for providing these services. Letters of commitment from local or State parties responsible for planning and maintaining these services will help assure that communities realize the financial implications of these commitments. A schedule of plan implementation is required so that timely development of the proposed land use is assured. Alternatives considered were placing complete responsibility for additional services on the permittee, and elimination of any requirement of determining or identifying additional public services required to assure achievement of the postmining land use. These alternatives were rejected as inconsistent with accepted landuse planning practices.

The provision of requiring letters of commitment from the parties responsible for public services helps assure__

- (a) That consideration has been given to public service requirements during development of plans;
- (b) There is local understanding of future public service needs of the proposed postmining land use; and
- (c) That specific service requirements of the postmining land use can be met within the proposed schedule.

No requirement for financial plans might result in an unsupportable land use. Additional specific detailed requirements and contractual commitments could have been required by the proposed regulations but this might have unduly restricted land use planning with no corresponding environmental or other benefits. Requiring a financial plan for postmining land use has the advantage of:

- (a) Helping assure economic soundness of the proposed postmining land use; and
- (b) Providing valuable planning information to local and State governments responsible for overall planning and integration of postmining land uses with present and future land uses of the community.

The postmining land use plan must be the result of analysis synthesis and of economic, social and environmental information. The inventory and land use capability synthesis must support the specific proposed postmining land use.

Utilizing professional expertise in plan preparation will help operators speed up the approval process and reduce overall cost because professional planners are familiar with the local planning processes.

By identifying the responsibility for hazard and pollution control early in the planning process, the professional engineer, landscape architect or land use planner can effectively design the lowest possible cost solutions to these technical and site specific problems.

Completion of reclamation activities in a timely manner will minimize the adverse environmental effects of mining and will reduce offsite damage as well as damage that may result from natural environmental conditions that occur in the interim between mining and complete reclamation.

Through early review of the plan by State and Federal fish and wildlife agencies and the specific requirement for addressing fish and wildlife concerns in the postmining land use plan, the objectives of preventing impacts to fish and wildlife while minimizing cost and delay to the operator, are achieved. The alternative of no coordination of activities with State agencies would be contrary to policies established by the Act. By specifically addressing this requirement in the planning stage, it will be possible to expedite the review process and ensure effective consideration for fish and wildlife resources.

The plan proposing new postmining land uses that will require continuous or long term maintenance would have to contain written commitments of the mine operator or land owner to provide the maintenance specified in the plan that will be applicable after the release of performance bonds under the proposed rules. The plan would show evidence that the site conditions are capable of supporting the long term use proposed with the management specified. This part of the proposed rules is basically a restatement of the reclamation plan requirements at the performance standards level. Through specification for maintenance in the plan accompanied by the written commitment, the mine operators and/or land owner will have carefully evaluated the feasibility of the proposed postmining land use. This will assure:

- (a) Adjoining landowners and local communities that the land is capable of supporting the postmining land use; and
- (b) Feasibility of continued maintenance of the postmining land use.

Public comment is solicited with respect to the appropriate manner for determining ""higher or better"" uses, as set forth in Section 515(b)(2) of the Act and proposed paragraph 816.133(b)(2) of these regulations. While criteria for alternative uses

are proposed in Subsection 816.133(c), the Office is interested to know what the public believes would be an appropriate role for the Office in defining the hierarchy of land uses which will ensure that ""higher or better" land uses do, in fact, result when operators propose not to restore land to its pre-mining capability. {41778}

PART 817 – PERMANENT PROGRAM PERFORMANCE STANDARDS – UNDERGROUND MINING

SECTION 817.1 - SCOPE AND OBJECTIVES

Part 817 proposes the minimum performance standards which would be applicable under a State or Federal program for underground coal mining activities. The organization of this Part parallels that of Part 816, the standards for surface mining, although some modifications were needed to reflect the distinct difference between surface and underground coal mining, including entirely new sections for subsidence (proposed Sections 817.121- 817.126).

An alternative drafting organization would have been to propose all the regulations that apply to both surface and underground coal mining in a single Part, regulations applying only to surface mining in a second part, and regulations applying only to underground coal mining in a third part. This alternative was rejected even though it would have resulted in a shorter set of regulations because the office believes that the users of these regulations would rather find everything that applies to them in a single place. Comment is requested on the proposed organization and the alternative.

SECTION 817.11 - SIGNS AND MARKERS

This proposed Section is substantially identical to the corresponding Section of Part 816. The reader is referred to the appropriate portions of this Preamble which discuss Part 816 for information concerning the technical basis, alternatives considered and statutory authority for this Section. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While the Office considers the appropriate signs and markers requirements to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be further reflected in the regulations. The reader's attention is directed to proposed Subsection 817.11(c)(1), where the language varies somewhat from the parallel requirement in proposed Section 816.11. In addition, it should be noted that one commenter to the prepublication draft of this Section, suggested that the requirement for blasting signs in Subsection 817.11(f)(1) be limited to areas where surface blasting will occur. Further public comment is solicited as to the need for signs in areas where underground blasting will occur. The office at this time is inclined to modify this Section in accordance with the commenter's proposal. {41779}

SECTIONS 817.13 – 817.15 - CASING AND SEALING OF DRILLED HOLES

These proposed Sections are intended to ensure that boreholes, shafts, wells, and other accesses to underground mines are sealed, filled, cased, lined, or protected so as to ensure and protect: the health, safety, and general welfare of the public, the quality of the environment, and potential land uses.

Authority for these proposed Sections is found in Sections 102, 201, 501, 503, 504, 507, 508, 516, 517, 701, and 717 of the Act.

Following is a list of the technical literature that supports these performance standards:

1. Ciolkosz, E. J. and L. T. Kardos, Soil as a Medium for the Renovation of Acid Mine Drainage, Office of Water Resources Research, December 1973.
2. Doyle, William S., Mine Sealing, Deep Coal Mining Waste Disposal Technology, Noyes Data Corporation, Park Ridge, N. J., 1976.
3. Garrett, W. S., and Campbell, L. T., Design & Construction of Underground Bulkheads and Water Barriers, 7th. Commonwealth Mining & Metallurgical Congress, Johnesburg, Vol. 3, 1283 1301, 1961.
4. Halleburton Company, New Mine Sealing Techniques for Water Pollution Abatement, Federal Water Quality Administration, U.S. Department of the Interior, March 1970.
5. Holuber, I. and Penrose, R. G., Jr., Laboratory Study of Self-Sealing Limestone Plugs for Mine Openings, EPA 43019 73 011, 1973.

6. HRB-Singer, Incorporated, Detection of Abandoned Underground Coal mines by Geophysical Methods, Environmental Protection Agency and the Pennsylvania Department of Environmental Resources, Project 14010EHN, April 1971.
7. Moebs, N. N. & Krickovic, S., Air Sealing Coal Mines to Reduce Water Pollution, BOMRI 7354; 1970.
8. Penrose, R. G., Jr. and I. Holubec, Laboratory Study of Self-Sealing Limestone Plugs for Mine Openings, EPA 67012 73 081, 1973.
9. Stoddart, C. K., Abatement of Mine Drainage Pollution by Underground Precipitation, EPA 67012 73 092, 1973.
10. U.S. Environmental Protection Agency, Processes, Procedures and Methods to Control Pollution From Mining Activities, EPA 43019 73 011, 1973.
11. US EPA, Criteria For Developing Pollution Abatement Programs for Inactive And Abandoned Mine Sites, EPA 440 9 75 008, 1975.

Proposed Section 817.13 would provide for the sealing or managing of openings to prevent people, animals, and machinery from entering the opening. Sealing can also prevent or reduce the discharge of acid mine water. The formation of acid water is a naturally occurring phenomenon which results from the oxidation of iron pyrites in the presence of water. Coal mining operations disturb the soil and rock material containing the pyrites and can greatly enhance the formation of acid drainage. The acid water draining from the coal mine enters streams and greatly reduces the usability of these waters for human or industrial consumption. Sealing of openings is one method of controlling the production of acid water from mines. An abandoned above drainage drift mine can be sealed, flooding the mine and thus stopping the oxidation of pyrite. Sealing also prevents acid water by preventing the entrance of water and air into the mine.

One alternative that was considered was not to seal or manage the holes at all. This was rejected because the openings present a large potential danger to man and the environment. Passage of water often can be prevented by inserting of drill cuttings, concrete plugs, or other material into the borehole to form a seal.

Proposed Section 817.14 would provide that all mine entries which are temporarily inactive but have a projected useful service be barricaded, fenced, and posted to identify the hazardous nature of the opening. Specific standards for barricades and construction materials to protect the mine entries were considered in the formulation of the regulation. However, the Office elected to propose generalized standards for mine entry protection at this time. Public comment on this issue of general standards versus specific standards for mine entry protection is invited.

The proposed regulation also would require that protective devices be periodically inspected and maintained in good operating condition. Various inspection periods were considered in the formulation of the regulations but no set time period (e.g. monthly, weekly basis) was included because the inspection period depends on the hazard of opening, type of protective device, and condition of the opening. The number of inspections must be frequent enough to ensure that the protective devices are in good operating condition and safe.

Many different types of sealing techniques were considered in the development of proposed Section 817.15 but no specific technique was universally acceptable for sealing all underground openings. Mine sealings may involve construction of a physical barrier across a mine opening to prevent passage of air, water, or persons and wildlife. The ultimate water level behind the seal is, however, seldom controlled, and excessive pressure can build up, resulting in a mine seal blow-out. Sudden release of large quantities of water can have devastating downstream effects. See *Commonwealth v. Barnes and Tucker Co.*, 452 Pa. 77 (1974). Mine seals may be designed to retain large quantities of water, but sealing leakage and failures generally occur from natural zones of weakness such as outcrop fractures. The natural rock and mineral surrounding the seal area is usually fractured, fissured, uneven and unstable. If adopted, the regulation would require that the seal must prevent the flow of water from the openings, except as otherwise authorized by the regulatory authority. Regulatory authorities would have the latitude to require the design of sealing and monitoring programs on a mine-by-mine basis so that catastrophic plug failures are prevented. Of course, if drainage from underground working is unavoidable, despite the use of the best available methods of sealing, then the resulting discharge to any surface or groundwater must be controlled so as to achieve the effluent limitation of section 817.42 of this Part.

SECTIONS 817.21 – 817.25 - TOPSOIL

These proposed sections are substantially identical to the corresponding Sections of proposed Part 816. The reader is referred to the preceding portions of this Preamble discussing Part 816 for information concerning the technical basis and statutory authority for these Sections. In addition to the Sections of the Act cited in those portions of the Preamble, these

proposed Sections are based on Section 516 of the Act. While OSM considers the appropriate topsoil requirements to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

SECTIONS 817.31 – 817.38 - ROAD CONSTRUCTION

These Sections are substantially identical to the corresponding Sections of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for these Sections. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections are based on Section 516 of the Act. While OSM considers the appropriate road requirements to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations. {41780}

SECTION 817.39 - SUPPORT FACILITIES AND UTILITY INSTALLATIONS

This proposed Section is substantially identical to the corresponding Section of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the approach and statutory authority of this Section. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While OSM considers the appropriate support facility and utility installation requirements to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

SECTIONS 817.41 – 817.57 - HYDROLOGIC BALANCE

With the exception of Section 817.50 and a possible Section 817.51, all of these proposed Sections are substantially identical to their corresponding Section in Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections of Part 817 are based on Section 516 of the Act. While OSM considers the effects on the hydrologic balance to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

Section 817.50 provides for the protection of the mining area's hydrologic balance by requiring that mining operations be conducted so as to preclude uncontrolled discharge of mine water. Uncontrolled discharges (mine drainage) have been a primary cause of adverse impacts upon water quality and ecology in the past (Biesecker and George, 1966; Braley, 1954; Grubb and Ryder, 1972; Sidio and Mackenthun, 1963; Turner, 1958; and Warner, 1973). However, this problem can be controlled in underground mines through the proper location, design, construction, utilization, and sealing of drifts, adits, and slopes (EPA, 1973). Use of these methods to control drainage during the active mining phase is to be supplemented with collection and conveyance of drainage to treatment facilities as necessary to comply with applicable standards and limitations prior to discharge to receiving streams. The outright prohibition on gravity discharges from certain new drift mines is required under paragraph 516(b)(12) of the Act.

The Office considered requiring all drift mines which are opened after the effective date of this Part to comply with proposed subsection 817.50(c), rather than making the requirements applicable only to mines opening after approval of the State or Federal program. The Office believes that until a regulatory authority is identified and approved by the Secretary and empowered to administer a regulatory program, it will be unfair to the operator to make this provision apply, since determination of whether a coal seam involved is "acid-producing" or "iron-producing" would not have been made. Public comment on this issue is solicited, however.

Section 817.51 was originally established to identify requirements necessary to protect the recharge capacity of aquifers affected by the underground mining activities. However, since the structural integrity of water bearing formations should not be significantly affected by underground mining, the recharge capacity of the formations should be maintained without any special precautions. Consequently, Section 817.51 has been omitted from the draft regulations. Comments are solicited as to

any requirements that may be needed to protect the recharge capacity of water bearing formations from underground mining activities.

SECTION 817.59 - COAL RECOVERY

This proposed Section addresses two persistent problems of coal development: loss of resource when a mining operation does not recover all the available coal at a mining site and recurrent environmental degradation when a land is reentered after one mining operation to recover such coal. The regulation requires the operator to conduct mining operations so as to maximize resource recovery by mining all available coal at a mine site which it is economically feasible to extract.

The Authority for this proposed Section is found in Sections 102, 201, 501, 503, 507, 510, and 516 of the Act.

Alternatives similar to these considered for proposed Section 816.59 were considered by the drafters, and the reader is invited to refer to the Preamble portion on Section 816.59 for further information on issues considered. In addition to those issues, a more fundamental one might be addressed by commenters, and that is the appropriateness of a coal recovery standard for underground mining. In this regard, the reader is referred particularly to Sections 102(k) and 515(b)(1) of the Act.

SECTIONS 817.61 – 817.68 - USE OF EXPLOSIVES

Sections 817.61 – 817.68 are being proposed as regulations to protect the lives and property of the public, underground mines, and ground and surface waters outside of permit areas, from adverse effects of blasting performed on the surface, where surface blasting is required in the development and support of underground mining operations. The interim regulatory program has no provision for regulating surface blasting required for the development and support of underground mining operations. However, surface activities in support of underground mining often require fairly large blasts for facing up at adit entries for leveling ground for surface structures, and initial blast rounds for shafts and adits. These blasts may present damage and injury hazards equivalent to those of surface mine blasting. To protect the public from the adverse effects of these blasts, Sections 817.61 – 817.68 are required.

Several Sections of the proposed regulations for surface blasting in support of underground mining are substantially identical to the proposed regulations for surface mine blasting (Sections 816.61- 816.68). Rather than repeat the discussion of those Sections, the reader is referred to the appropriate Sections of the surface coal mine performance standard Preamble, which contains the rationale for many of the proposed blasting rules and a discussion of alternatives considered.

Sections 817.61- 817.68 are proposed under Sections 102, 201, 501, 503, 504, 516, and 719 of the Act.

Materials used by OSM to develop these regulations include:

1. Ashley, C., and Parkes, D.B., 1976, *Blasting in Urban Areas: Tunnels & Tunnelling* (British Tunnelling Society), Sept. 1976, p. 60 67.
2. Grim, E., and Hill, R., *Environmental Protection in Surface Coal Mining* (U.S. Environmental Protection Agency, No. 1BB040).
3. Barnes, Jack (John B.), 1977, *The Effects of Strip Mine Blasting on Residential Structures – Ayrshire Mine, Warrick and Vanderburgh Counties, Indiana*: Paper presented to the Indiana Academy of Science, Indianapolis, Ind., Oct. 28, 1977, 19 p. (Author is associated with Indiana State University Evansville, Evansville, Ind.)
4. Kentucky Department of Mines and Minerals, 1977, *Laws and regulations governing explosives and blasting*: Lexington, Ky., p. 1.
5. Maryland Geological Survey, Bureau of Mines, 1973, *Blasting restrictions, Regulations governing blasting in Bituminous coal strip mines and auger regulations*; Maryland Department of Natural Resources Rules and Regulations, p. 23.
6. Medearis, Kenneth, 1976, *The Development of Rational Damage Criteria for Low-Rise Structures Subjected to Blasting Vibrations* _a report of the National Crushed Stone Association: Kenneth Medearis Associates, Fort Collins, Colo., and Valley Forge, Pa., 94 p. (duplicated report). {41781 }
7. Miller, P.H., (no date), *Blasting vibrations and air blast*: Park Central, Ill., Atlas Powder Co., 16 p.
8. Nicholas, H.R., Johnson, C.F., and Duvall, W.I., 1971, *Blasting vibrations and their effects on structures*: U.S. Bureau of Mines Bulletin 656, p. 13 29.
9. Old Ben Coal Company, *Comments to Office of Surface Mining* (1978).

10. Pennsylvania Department of Environmental Resources, Rules and Regulations, Title XXV, Pennsylvania Code, Ch. 211.
11. Siskind, D.E., 1977, Structure vibrations from blast produced noise, in 18th International Rock Mechanics Symposium, June 1977, Keystone, Colo.: Proceedings, p. 1A3 1 1A3 5.
12. Siskind, D.E., Stachura, V.J., and Radcliffe, K.S., T3Noise and vibrations in residential structures from quarry production blasting – measurements of six sites in Illinois: U.S. Bureau of Mines Report of Investigation R.I. 8168, p. 17. 1976.
13. Siskind, D.E., and Stachura, V.J., 1977, Recording system for blast noise measurement: Sound and vibrations Journal, p. 20 23.
14. Siskind, D.E., and Summers, C.R., 1974, Blast noise standards and instrumentation: U.S. Bureau of Mines, Environmental Research Program, Technical Progress Report TPR 78, p. 16, table 4.
15. Coal Mine Health and Safety Act of 1977; 75 CFR, Subpart N.
16. An Investigation into Delay Blasting, 1975, NSF Contract APR 75 05171 to the University of Maryland and Subcontract M 218907 to Martin Marietta Laboratories.

The Office considered including a proposed Section 817.63 to require that underground coal mine blasting be conducted in accordance with appropriate MSHA requirements set forth in CFR 75-Subpart N. However, it was considered that such a requirement would not advance the purposes of the Act and that MSHA could adequately enforce its own requirements. Public comments are elicited on the appropriateness of the alternative the office rejected.

Proposed Section 817.65 states that this Section applies only to blasting conducted on the surface. Rather than require a blasting schedule similar to Section 816.64 of the proposed surface coal mine regulation, this section would require a 24-hour notice prior to any surface blasting in support of underground coal mining. Because of the occasional, sporadic nature of surface blasting in support of underground coal mining, the public will be better served by receiving notification the day before any blasting is done. The mine operator will be relieved of the task of publishing and republishing a blasting schedule. The remainder of Section 817.65 is identical to Section 816.65 proposed for surface coal mine blasting. The reader is referred to that Section portion of the Preamble which discusses proposed Section 816.65 for detailed discussion.

Proposed Sections 817.61, 817.62, 817.66, 817.67, and 817.68 are substantially identical to proposed Sections 816.66, 816.67, and 816.68. The reader is referred to the appropriate portions of the Preamble to Part 816 for detailed discussion.

SECTIONS 817.71 – 817.73 - DISPOSAL OF UNDERGROUND DEVELOPMENT WASTE AND EXCESS SPOIL

The Office believes that underground development waste disposal operations should be required to be conducted in the same manner as excess spoil disposal in surface mining. Accordingly these proposed Sections are similar in all significant details to proposed Sections 816.71 816.73. The reader may find a discussion of the technical basis, authority, and alternatives considered in the Preamble.

In addition to the Sections of the Act cited in the discussion of Sections 816.71- 816.73 these proposed Sections 817.71- 817.73 are based on Section 516 of the Act.

The public is requested to comment on any appropriate basis for varying the requirements for underground development waste fills from those proposed for excess spoil in proposed Sections 816.71- 816.73.

SECTIONS 817.81 – 817.88 - COAL PROCESSING WASTE

These proposed Sections are substantially identical to the corresponding Sections of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for these Sections. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections are based on Section 516 of the Act. While the Office considers coal processing waste consideration to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in these types of mining should appropriately be reflected in this portion of the proposed regulations.

SECTION 817.89 - DISPOSAL OF NON-COAL WASTES {41782}

This proposed Section is substantially identical to the corresponding section of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for this Section. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While the Office considers the appropriate disposal of noncoal waste to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in these types of mining should appropriately be reflected in the regulations. In particular, comments are solicited on the appropriateness of the disposal of noncoal waste, both from onsite and from offsite, in abandoned underground workings. Sections 817.91- 817.93

COAL PROCESSING WASTE: DAMS AND EMBANKMENTS

These proposed Sections are substantially identical to the corresponding Sections of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for these Sections. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections are based on Section 516 of the Act. While the Office considers the appropriate coal processing waste dams and embankment considerations to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in these types of mining should appropriately be reflected in the regulations.

SECTION 817.95 - AIR RESOURCES PROTECTION

This proposed Section is substantially identical to the corresponding Section of proposed Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for this Section. The only provision of a substantial nature that was deleted from this Section for underground mining addressed the problem of fugitive dust resulting from wind erosion on spoil piles. This problem is greatly reduced when considering underground mining because less spoil is stored on the surface. As a result, the spoil disposition need not be required to be oriented in the same manner as in surface mining operations. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While the Office considers the effect on air resources to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

SECTION 817.97 - PROTECTION OF FISH AND WILDLIFE

This proposed Section is substantially identical to the corresponding Section of Part 816. The reader is referred to the appropriate portion of the Preamble for Section 816.97 for information concerning the technical basis, alternatives considered, and statutory authority for this Section. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While the Office considers the appropriate fish and wildlife requirements to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations. {41782}

SECTION 817.99 - SLIDES AND OTHER DAMAGE

This proposed Section is substantially identical to the corresponding Section of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning this Section. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While the office considers the risks of slides to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in these types of mining should appropriately be reflected in this portion of the regulations.

SECTION 817.100 - CONTEMPORANEOUS RECLAMATION

This proposed Section is substantially identical to the corresponding Section of Part 816. The reader is referred to the appropriate portions of the Preamble for Section 816.100 for information concerning this Section. In addition to the Sections of the Act cited in those portions of the Preamble this Section is based on Section 516 of the Act. While the Office consider the needs for contemporaneous reclamation to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations. In particular, the office solicits public comment on the possibility of enumerating in this proposed Section those long-term structures and sites for which this requirement may need modification.

SECTIONS 817.101 – 817.103 - BACKFILLING AND GRADING

These proposed Sections are substantially identical to the corresponding Sections of Part 816, except that some of the proposed requirements of Sections 816.101 816.105 have been deleted where the relatively small amount of overburden moved in underground mining has led the Office to conclude that the proposed requirements would be inappropriate (e.g., 816.101(a), 816.104, and 816.105). The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for these Sections of 817. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections are based on Section 516 of the Act. While the Office considers the adverse effects of uncontrolled overburden handling to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, except where indicated, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

SECTION 817.106 - REGRADING OR STABILIZING OF RILLS AND GULLIES

This Section is substantially identical to the corresponding Section of Part 816.106. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for this Section. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While the office considers the needs for correction of gullying to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

SECTIONS 817.111 – 817.117 - REVEGETATION

These proposed Sections are substantially identical to the corresponding Section of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for these Sections. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections are based on Section 516 of the Act. While the office considers the needs for revegetation to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

SECTIONS 817.121 – 817.126 - SUBSIDENCE CONTROL

The proposed regulations on subsidence are intended to ensure that underground mining is conducted so as to protect the health and safety of the public, minimize damage to the environment, and protect the rights of landowners by reducing subsidence-caused material damage to the land surface, by improving mining methods, and by maintaining the value and potential of the land.

These Sections are issued under the authority of Sections 102, 201, 501, 503, 504, 510, 516, 517, and 522 of the Act.

Technical literature relied upon in writing these regulations include:

1. "Acid Mine Drainage and Subsidence – Health and Ecological Effects of Increased Coal Utilization," Hill, Ronald D. and Bates, Edward R., Resource Extraction and Handling Division, Industrial Environmental Research Laboratory-Cincinnati, U.S. Environmental Protection Agency, Cincinnati, Ohio 45278, 1977.

2. "A Comprehensive Program for Dealing with Mine Subsidence," ARC Report 73 163 1559, prepared by Michael Baker, Jr., Inc., Beaver Pennsylvania, and the Institute of State and Regional Affairs. The Pennsylvania State University, Middletown, Pennsylvania, for the Appalachian Regional Commission, Washington, D.C., and the Pennsylvania Department of Environmental Resources, Harrisburg, Pennsylvania, 1976, Chapter 6, pages 49 51.
3. "Subsidence Engineers Handbook", National Coal Board (British), Production Department, London, 1966, 1974.
4. Architectural Measures to Minimize Subsidence Damage, ARC Report 73 111 2551, prepared by Michael Baker, Jr., Inc., Beaver, Pennsylvania, for the Appalachian Regional Commission, Washington D.C., and the Pennsylvania Department of Environmental Resources, Harrisburg, Pennsylvania, 1974.
5. "Overview of Subsidence Potential in Pennsylvania Coal Fields," ARC Report 73 111 2552, prepared by HRB-Singer, Inc., State College, Pennsylvania, for the Appalachian Region Commission, Washington, D.C., and the Pennsylvania Department of Environmental Resources, Harrisburg, Pennsylvania, 1975.
6. Grey, R. E., Gamble, J. C., McLaren, R. J., and Rodgers, D. J., "State of the Art Subsidence Control", ARC Report 73 111 2559 prepared by General Analytics, Inc., Monroeville, Pennsylvania, for the Appalachian Regional Commission, Washington, D.C., and the Department of Environmental Resources, Harrisburg, Pennsylvania, 1974, part 2.
7. "Use of Photo Interpretation and Geological Data in the Identification of Surface Damage and Subsidence," ARC Report 73 111 2554, prepared by Earth Satellite Corporation, Washington, D.C., for the Appalachian Regional Commission, Washington, D.C., and the Pennsylvania Department of Environmental Resources, Harrisburg, Pennsylvania, 1975, pages 35 37.
8. "Local and State Regulatory Powers Dealing with Land Use and Construction in Subsidence Prone Areas," ARC Report 73 163 2557, prepared by Mullin L. Lonergan Associates, Inc., Philadelphia, Pennsylvania for the Appalachian Regional Commission, Washington, D.C., and the Pennsylvania Department of Environmental Resources, Harrisburg, Pennsylvania, 1975, Appendix A.
9. U.S. Congress, 95th, 1st session, House Rept. 95 128, 1977, Surface Mining Control and Reclamation Act of 1977, Report of the Committee on Interior and Insular Affairs, House of Representatives, to accompany H.R. 2, p. 126 10. U.S. Department of Interior, 1976, Final environmental impact statement on surface subsidence control in mining regions: U.S. Bureau of Mines FES 76 58, 90 p. {41783}
10. U.S. Department of Interior, 1976, Final Environmental impact Statement on Surface subsidence control in mining regions: U.S. Bureau of Mines FES 76 58, 90 p.
11. National Coal Board, 1963, Principles of subsidence engineering: Production Department Information Bull 63/240, 21 p., London, UK.
12. Dunrud, C. R. 1976, Some engineering geologic factors controlling coal mine subsidence in Utah and Colorado: U.S. Geological Survey Professional Paper 969, 39 p.
13. Brauner, G., 1973, Subsidence due to underground mining: I. Theory and practices in predicting surface deformation: U.S. Bureau of Mines Info-Circ 8571, 55 p.
14. Battelle Columbus Laboratories, 1975, A systems approach to underground mining: Phase I problem analysis and research recommendations, 282 p.
15. Campbell, J. A. L., Petrovic, L. J., Mallis, W. J., and Schulties, C. W., 1975, How to predict coal mine roof conditions before mining: Mining Engineering, October, pp. 37 40.
16. Vandale, A. E., 1967, Subsidence – a real or imaginary problem: Mining Engineering, September pp. 86 88.
17. Horn, G. H., 1977, Memorandum on subsidence requirements – coal: U.S. Geological Survey memo to mining supervisors.
18. Allen, A. S., 1976, Basic questions concerning coal mine subsidence in the United States: Assn. Engr. Geologists Meeting, April 1976, 19 p.
19. Amuedo and Ivey, "Ground Subsidence and Land use considerations over coal mines in the Boulder-Weld Coal Field, Colorado", Amuedo and Ivey Geological consultants, 1975.
20. "Study and Analysis of Surface Subsidence over the mined Pittsburgh coal bed", report prepared for U.S. Department of Interior, Bureau of Mines under contract No. J0366047 by GAI Consultants Inc. Monroeville, Pennsylvania, July 1977.
21. Wardell, Kenneth, "Ground Subsidence and Control", Mining Congress Journal, January, 1969, pp.36 43.
22. Kratzsch, Helmut, "Reduced Subsidence by Planned Extraction", Bergbau-Archiv (Essen), Vol, 25, No. 5, December 1964, pp. 15 21.
23. Panek, Louis A., "Methods and Equipment for Measuring Subsidence", Third Symposium on Salt, the Northern Ohio Geological Society, Inc., Cleveland, Ohio, 1966.
24. Voight, Barry and Pariseau, William, "State of Predictive Art in Subsidence Engineering", Journal of the Soil Mechanics and Foundation Division, Proceedings of the American Society of Civil Engineers, March, 1970, pp. 721 740.
25. Legget, R. F., "Duesburg Harbour Lowered by Controlled Coal Mining", Canadian Geotechnical Journal, 9, 374, 1972, pp. 874 382.

26. Brauner, Gerhard, ""Subsidence Due to Underground Mining_2. Ground Movements and Mining Damage", U.S. Bureau of Mines Information Circular 8572, 1973 a.

27. ""Bituminous Mine Subsidence and Land Conservation Act of 1966", Commonwealth of Pennsylvania (Department of Environmental Resources), Harrisburg, Pa.

28. Curtis, S.E., Talk Presented at the Roof Control Committee Meeting of the American Mining Congress Pittsburgh, Pa., September 18, 1968.

29. Dunrud, C.R., and Osterwald, F.W., 1978, Effects of coal mine subsidence in the western Powder River Basin, Wyoming: U.S. Geol. Survey Open-File Report 78 473, 71 p.

30. Osterwald, F.W., 1961, Deformation and stress around coal mine workings in Sunnyside No. 1 mine, Utah: U.S. Geol. Survey Prof. Paper 424 C, p. C348 353.

31. USGS, 1962, USGS relates geologic structures to bumps and deformation in coal mine workings: Mining Engineering, v. 14, no. 4, p. 63 68.

Section 516(b)(1) of the Act requires underground mine operators to ""adopt measures consistent with known technology in order to prevent subsidence caused material damage to the extent technologically and economically feasible, provided that room and pillar mining shall not be prohibited." If no subsidence control measures are adopted there is the possibility of material damage to private dwellings (National Coal Board, 1974; Baker, 1974; Amuedo and Ivey, 1975; Voight and Pariseau, 1970; and Brauner, 1973), public facilities such as schools, bridges (National Coal Board, 1974), gas and electrical utilities (GAI, 1977, sewers (National Coal Board, 1974), water resources such as springs and farmland (Dunrud and Osterwald, 1978).

Clearly, it is desirable to conduct underground mining in a manner such that the time and extent of subsidence can be defined. Damage due to subsidence can occur as much as 100 years after mining (GAI, 1977) due to long term instability of mine pillars indicating the need for proper subsidence control measures in order to ""maximize mine stability."

Subsidence effects can extend off the mining site (National Coal Board, 1974; Baker, 1974; HRB Singer, 1975; and Grey, et al., 1974) at angles (Measured horizontally from the edge of mining) varying from 35b 70b (Brauner, 1973) resulting in damage to structures not directly situated over the mining site. Determination of on and off-site subsidence requires consideration of coal thickness mined, mining geometry and dimensions, and the nature of over and underlying strata (National Coal Board, 1974; Brauner, 1973; GAI 1977; and Voight, 1970). Determination of the effects of subsidence on structures and other facilities requires consideration of subsidence caused ground strains and deflections and the nature of the structures themselves (National Coal Board, 1974; Brauner, 1973 Voight, 1970; Brauner, 1973 a; and Pennsylvania DER, (no date). Therefore, adequate definition of the time and extent of subsidence and the prevention of material damage requires careful consideration of the value and use of the land surface, detailed knowledge of the geologic and mining characteristics of the site (Osterwald, 1961, 1962), and proper attention to geotechnical design principles.

Technology is available to minimize and reduce subsidence-caused material damage for both the standard room and pillar mining method and other methods such as longwall mining which are currently used in this country. Excellent protection of sensitive surface features such as urbanized areas and important historic cultural features, or farmland can be achieved by refraining from mining underneath and adjacent to these features, as, for example, provided for with respect to perennial or intermittent streams in Section 817.57. Such protection is currently required in Pennsylvania for protected structures consisting of public buildings, dwellings, and cemeteries when the mine operator cannot post bond or does not have approved financial statements. Similar protection is required by MSHA for oil and gas wells.

Subsidence control can be achieved for other structures by limitations on coal extraction when using the room and pillar method (Curtis, 1968). Protection of the surface can be achieved when using longwall mining by a variety of techniques. Coal extraction as high as 60 70% has been achieved using longwall panel and pillar systems while significantly limiting subsidence damage (Wardell, 1969). A large portion of a major harbor in Germany was lowered more than 1 meter with minimal damage due to subsidence, by careful control of mining (Legget, 1972). Simultaneous harmonic extraction of superimposed coal seams and special arrangements of the mine workings and overlying structures can be used to limit damage (Brauner, 1973; Kratzsch, 1964; Osterwald, 1961, 1962). Generally longwall mining results in predictable and controlled subsidence that is 90 95% completed by the termination of mining (National Coal Board, 1974; Brauner, 1973; Wardell, 1969; Voight, 1970; and Brauner, 1973 a) whereas room-and-pillar mining, especially at shallow depths, may result in subsidence at a much later date (Amuedo and Ivey, 1975; GAI, 1977; Dunrud and Osterwald, 1978).

A preventative measure to reduce material damage from subsidence is to reinforce or design surface structures to resist the stresses imposed on them by subsidence caused ground movements (National Coal Board, 1974; Pennsylvania DER, 1974; Voight, 1970; and Brauner, 1973 a). Placement of fill either hydraulically or pneumatically behind a longwall face can

significantly reduce subsidence (Brauner, 1973) and backfilling through surface bore holes has been used by the U.S. Bureau of Mines in an attempt to limit subsidence over abandoned room and pillar mines (DOI, 1976). {41784}

Section 817.123 would require mine operators to inform landowners and other persons, whose property may be affected by subsidence, of the location, dates, probable effects on structures of subsidence, and of the subsidence control measures to be effected by the operator, every 6 months during mining. Provision is made for landowners to request and receive a premining survey of their property. The intent of proposed Section 817.123 is to protect the rights of landowners by providing them with advance information necessary to enable them to protect their property. Persons who may be affected adversely by subsidence and must be informed under the requirements of proposed Section 817.123 include private landowners, tenants, municipalities, public and private utilities, and persons with a legal interest or appurtenance that could be affected adversely by subsidence.

The 6 month notification is provided so that the landowner will be informed of the potential for subsidence damage to his property prior to its being undermined. The 6 month requirement allows a reasonable length of time prior to the likely onset of subsidence so that damage-control measures can be implemented, and adverse effects of subsidence can be mitigated.

Notification of the landowner by the advent of subsidence itself poses a danger to the life and property of the landowner since subsidence may break gas, electrical, and water lines (GAI, 1977), and is clearly unacceptable. Utilities, municipalities, and industries must be advised as to when disruptions are imminent and must be allowed adequate time to protect against loss of power, gas, or water services. If landowners are to assure their rights by means such as insisting that proposed subsidence controls be modified or petitioning to have their land declared unsuitable for underground mining as allowed by Section 522(c) of the Act, then they must be informed of the possibility of subsidence affecting their land prior to its occurrence.

Dwellings or other buildings already constructed may be partially protected against subsidence by reinforcement of sensitive parts such as windows or doors and by isolating the structure from lateral ground movement by ditching around its periphery (National Coal Board, 1974; Pennsylvania DER, 1974; and Voight, 1970). New structures can be designed to resist subsidence by incorporating flexible superstructures, flexible pipelines with telescopic joints, special sliding or rigid raft type foundations and by locating the long axis of the building properly with respect to mining (National Coal Board, 1974; Pennsylvania DER, 1974; Voight, 1970; and Pennsylvania DER, (no date). The requirement to identify mining areas, dates and probable effects of surface subsidence (subsections (a), (b) and (c) of proposed Section 817.123) is necessary for advisement of the landowner so as to enable him to implement precautionary measures.

Proposed Section 817.125, is intended to protect the rights of landowners, by providing for a valid comparison of surface conditions before and after subsidence. If requested by the landowner, a survey shall be conducted of the surface of the landowner's property and a report of the survey prepared by persons approved by the regulatory authority.

To accurately determine whether subsidence has caused material damage to property, to the hydrologic balance, to agricultural productivity, to aquifers, or to fish, wildlife and related environmental values it is necessary to make a valid comparison of conditions existing before and after the land surface has subsided. Premining baseline information and postmining information are necessary in order that a valid assessment of the effects of mining can be made.

Schools, hospitals, public utilities and other public structures also must be surveyed for premining conditions and the report filed with the regulatory authority so as to permit evaluation of damage to public property. Since the public is the landowner of public land, the regulatory agency as a recipient and keeper of all survey reports will maintain a file of reports on public structures.

Specialized geotechnical and architectural skills may be required to assess accurately the condition of structures, springs, wells and other features before mining and to distinguish such damage as may be caused by subsidence and damage caused by natural and other man-made processes. For instance, masonry structures can be cracked by differential stressing, uneven settlement caused by loss of bearing capacity of the foundation, or by tension or compression caused by subsidence (National Coal Board, 1974; Voight, 1970). Springs may go dry from natural fluctuations in rainfall or by subsidence destruction of the aquifer. In order to assure accurate assessment of subsidence damage, accurate record keeping, proper interpretation of premining conditions, and generally reliable results, the persons conducting the premining survey and preparing the survey report should be well versed in the appropriate fields of civil engineering, hydrology, architecture, and geotechnical engineering. For this reason, regulatory authority approval is proposed.

Special attention should be given to springs, wells, reservoirs and other water systems used for human or animal consumption or agriculture in order to accurately assess disturbances to the hydrologic balance, disturbances to fish, wildlife, and related environmental values and, of potential agricultural productivity. Underground mining can disrupt springs (Dunrud, 1976), and subsidence can divert surface water flow and groundwater into mine openings. The addition of moisture to some coals enhances the possibility of spontaneous combustion, giving rise to coal mine fires (Dunrud and Osterwald, 1978).

Section 817.126 would require underground mine operators to consult with surface landowners.

The drafters considered and rejected alternative language which would have required the operator to assume liability for subsidence damage, purchase a non-cancellable property damage insurance policy in favor of the surface owner or offer the landowner the right to purchase the coal underlying his property, in order to preserve the existing natural support for the surface.

Precedent exists for the requirement to offer the right to purchase subsurface support in the Pennsylvania Bituminous Mine Subsidence and Land Conservation Act (Curtis, 1968). However, the option of offering the surface owner an opportunity to purchase adequate coal in place to support his surface structures is not always a viable option; especially in the case of a coal seam several hundred feet below the surface and considering an angle of draw of 30 35 , the value of coal that must be left in place can easily exceed the market value of the surface structure. Accordingly, this alternative was rejected.

The requirement for a subsidence monitoring plan is justified earlier in this Preamble in the discussion of Section 784 as it relates to the subsidence monitoring plan. If the plan is not adhered to there is no assurance that material damage will be prevented.

Under Section 517(b)(1)(c) of the Act the regulatory authority can require the mine operator to "install, use, and maintain any necessary monitoring equipments or methods". Special subsidence monuments and increased precision of subsidence measurement may be required in order to adequately understand the nature of subsidence, and institute measures to prevent material damage to fragile or historic lands, to sites with unique cultural, esthetic, or environmental values, or to lands where there is a dispute or doubt as to likely subsidence. The number and location of subsidence monuments and the degree of precision of monitoring is dependent on the sensitivity of the surface feature to subsidence ground movements. Some land (e.g. grassland or pasture) may be able to withstand significant lowering in elevation and even surface crackings if the cracks fill in quickly and a high precision of monitoring might not be necessary. Structures may be lowered appreciably without damage in some cases, but extension of only 0.1 foot (National Coal Board, 1974; Pennsylvania DER, 1974, Voight, 1970; and Brauner, 1973 a) can cause cracking of plaster which would be sufficient to materially damage historic buildings or sensitive archeological sites. Lowering the land surface only slightly may flood and destroy vegetation in wildlife refuges or other areas preserved in a natural state when the water table is close to the surface. Thus, unusual monitoring requirements may be necessary at some sites to ensure close control of subsidence or the value and use of these sites might be irreparably damaged. {41785}

An initial subsidence report would be submitted within 3 months of the effective date of the State or Federal program for existing underground mines and proposed mines pending permit approval. Documentation of the initial condition of the land surface to include elevation and horizontal location of subsidence monuments and the presence and condition of fish, wildlife or other environmental resources, springs, streams, aquifers or other elements of the hydrologic balance, agricultural resources, and urban areas is necessary to determine the effects of subsidence and thus prevent material damage. If no requirement is made to determine initial surface conditions then the effectiveness of any subsidence control measure adopted would be highly dubious and mine operators would not be meeting the requirement to prevent subsidence causing material damage to the extent technologically and economically feasible because:

- (1) determination of the surface condition before subsidence is a requirement of existing subsidence control technology; and
- (2) operators would not be able to tell whether they were causing material damage or not.

The 3-month period proposed for determining initial surface conditions may not allow adequate time if regulations are issued in the winter and snow covers areas affected by subsidence, or if the areas are numerous and large. The short period also would tend to result in inaccurate measurements of elevation, etc., and correspondingly poor subsidence control. It might be more logical to require documentation of initial surface condition to be submitted anytime before a mine permit issues. The phrase "comprehensive documentation of horizontal and vertical changes of monuments" may be too vague to be of much use. Public comment on these questions would be welcomed by OSM.

Sections 817.121- 817.126 are proposed because subsidence is capable of causing large cracks or sink holes (GAI, 1977; Brauner, 1973 a) which could absorb or deflect streams or substantially increase erosion and suspended particulates (Section 516(b)(9) of the Act) if they formed in the stream bed. Diversion or disruption of stream flow or an increase in suspended particulates could severely damage fish, wildlife, and related environmental values (Section 516(b)(11) of the Act) and infringe on the rights of offsite waters users (Sections 102(b) and 516(b)(7) of the Act). Mining under major impoundments of water could create danger to inhabitants of downstream communities if the stability of impoundment dams were affected. Diversion or loss of water in small impoundments could severely damage fish, wildlife, and related environmental values and users of impoundment water. Drainage of impoundment water into mine workings through cracks or sinkholes could flood mine workings and drown underground miners. It should be noted that mining is safely and routinely done under large bodies of water including impoundments and the ocean, for example, in Nova Scotia.

Subsidence is capable of disrupting spring flow (Dunrud, 1976) and the aquifers feeding springs. Subsidence-caused cracking of underground rock strata could potentially allow exchange of aquifer water and lower quality water from other underground water sources, or contamination of aquifer water by polluted surface sources. Disruption of aquifers supplying water to communities damages the rights of community landowners, and disturbs the hydrologic balance and should be prevented.

Precedent for protecting public buildings is provided by the Pennsylvania Bituminous Mine Subsidence and Land Conservation Act of 1966 (Curtis, 1968). Subsidence is capable of creating danger to inhabitants of urbanized areas and public buildings (Section 516(c) of the Act) by the breaking of gas and electrical lines. Additional dangers are that sinkholes may open up overnight under roads, and they may constitute attractive nuisances in the vicinity of homes, schools, or public playgrounds. Subsidence is capable of severely damaging buildings, load bearing walls, tall chimneys or other ancillary structures of public buildings (National Coal Board, 1974; Pennsylvania DER, 1974; Voight, 1970; and Brauner, 1973 a).

Subsidence may severely damage areas adjacent to the mine site as well as directly above the mine workings since subsidence effects extend upwards from the edge of the mine workings at angles of draw from 35 70 and horizontal ground movements are often greatest at the edge of subsided areas (National Coal Board, 1974; Brauner, 1973; Voight, 1970; and Brauner, 1973 a). Thus mining is prohibited in close proximity to public buildings as well as directly underneath, unless it can be shown the buildings will not be damaged or a hazard created. If undermining of public buildings is not prohibited or closely controlled, severe material damage to public buildings will not be prevented, inhabitants of public buildings may be placed in danger and the rights of public land owners will not be assured.

SECTIONS 817.131 – 817.132 - CESSATION OF OPERATIONS

These Sections are substantially identical to the corresponding Sections of Part 816. The reader is referred to the appropriate portions of the Preamble for Sections 817.131 817.132 for information concerning the basis and for these Sections. In addition to the Sections of the Act cited in those portions of the Preamble, these Sections are based on Section 516 of the Act. While the Office considers the needs related to cessation of operations to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in the effects of these types of mining should appropriately be reflected in the regulations.

SECTION 817.133 - POSTMINING LAND USE

This Section is substantially identical to the corresponding Section of Part 816. The reader is referred to the appropriate portions of the Preamble for Part 816 for information concerning the technical basis, alternatives considered, and statutory authority for this Section. In addition to the Sections of the Act cited in those portions of the Preamble, this Section is based on Section 516 of the Act. While the Office considers the needs for postmining land use controls to be sufficiently similar in surface and underground mining to warrant substantially identical performance standards, public comment is invited on how the differences in these types of mining should appropriately be reflected in the regulations. {41786}

PART 818 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – CONCURRENT SURFACE AND UNDERGROUND MINING

The proposed performance standards in Part 818 are applicable during the permanent regulatory program. They are based on standards in Section 515(b)(16) of the Act which provides for issuance of a variance for specific areas within the

reclamation plan from the requirements that reclamation efforts proceed contemporaneously as practical in order to permit underground mining operations to be conducted prior to reclamation. Any person who conducts or proposes to conduct a combined surface mining and with underground mining operation which cannot conform with the requirement for contemporaneous reclamation must obtain a variance as specified in this Part. Under proposed rule 785.18(f), each permit for which a variance is granted shall be reviewed within 3 years of issuance of the permit and within each 3 year period following a review. The regulatory authority may modify a variance if more stringent measures are necessary to ensure compliance with the objectives set forth in proposed subsection 818.12.

Public comment is solicited on the need, if any, for further guidance to regulatory authorities as to the circumstances under which these variances should be available. {41786}

PART 819 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – AUGER MINING

Section 819.11 proposes performance standards for of auger mining. These standards are established to minimize the adverse environmental effects of auger mining such as, degradation of backfilled areas, surface subsidence and excess erosion of reclaimed lands and to ensure maximum recovery of the coal resource.

The following technical literature was used in preparing this proposed Part:

1. Technology of Auger Mining, USBM Report on contract No. S0241050. October 1975, 78 pages.
2. Operating Practice Changes and Control Modifications to Improve the Safety of Coal Auger Operations, USBM Report on contract No. H0230010. May 1975.
3. The Use of Auger In Surface Mining of Bituminous Coal, USBM Report of Investigations 5325, March 1957.

Auger mining is a specialized method of mining underground from the surface and has been so designated by the Act. The laws of all States treat auger mining as a surface mining method.

Auger mining has had an unfortunate history of being a high-grading operation with little concern for resource recovery. The Act insists that resource recovery be maximized in the auger operation.

The Act requires that access be available to the reserve left after augering. The 250-foot width was determined to be a reasonable estimate of the width of unmined coal necessary to properly support the entries required for underground mining. This width is a minimum, since common practice would be to place three to four twenty-foot wide entries in the 250 foot section.

The 2,500-foot spacing provides frequent intervals where access for underground mining may be developed, although most operations would use only a few of the 250-foot unmined sections for access.

The increase of 50 feet in the width requirement of the unmined Section for each additional seam worked provides an extra margin of safety for future entries that might be developed. The requirement for locating unmined sections in different seams directly above each other protects the entry support in one seam from the structural degradation that would occur if the seam under an unmined Section were to be augered.

The purpose of limiting surface mining to a minimum of 500 feet from underground operations is to prevent the surface operations from endangering the underground miners through such hazards as degradation of roof support or ventilation, flooding, and equipment breakthrough. This required distance is set forth in the Act at Section 515(b)(12). The surface miner could be exposed to such hazards as explosions, highwall collapse, falls into underground openings, flooding and black damp. The environment could suffer damage from release of toxic water, erosion, hydrologic imbalance and fire.

Auger mining is often done to recover reserves not mineable by other means and often occurs after other surface and underground methods reach their limits. If there is an adequate knowledge of the conditions to be encountered the location of underground workings augering should be capable of recovering coal close to the underground areas. In a sample of eight auger operations, four operations regularly penetrated underground workings (USBM, 1957). On the other hand, the Office is aware that augering into underground workings may, in some instances, improve airflow and, hydrologic balance, and reduce water problems or pollution.

Augering operations may produce water drainage or shifts in the ground water flow. Also, the presence of oxygen could encourage the ignition of the coal within the seam.

Much of the water discharged by auger holes is toxic, and its discharge into the environment must be of a very limited duration to prevent damage to the environment. To prevent future problems the seal must be made watertight and permanent. Auger holes not emitting water do not pose an immediate environmental hazard. Therefore, a 30 day period is allowed for sealing the holes.

The Office considered a provision which would have stated that in all those cases where the water quality is acceptable, the hydrologic balance will not be negatively influenced, and the water has a stable drainage area, the plugging requirement would be waived if the hole was backfilled with a porous material that would not contribute to water contamination and a permanent path was established to the stable drainage area to protect the backfill from failing due to excessive amounts of water. This proposal was rejected on the grounds that it violates the requirement for an "impervious" seal, as stated in Section 515(b)(9) of the Act, in all cases except where plugging may create a hazard.

At times it is not possible to protect the environment adequately from the effects of auger mining. In these cases, auger mining cannot be allowed.

Auger mining may disrupt the water flows such that a water-tight seal or porous would be incapable of adequately restoring the water flow or quality or stabilizing the backfill.

Auger mining has been generally considered a secondary recovery method because it is used to "high-grade" reserves, a practice that results in low recovery. Recoveries of 25-35% are common. (USBM, 1975 at page 2). Properly planned and conducted auger mining operations can approach underground recovery levels of around 50% recovery. (USBM, 1975 at page 3). Where auger mining might preclude the future use of higher recovery mining methods by either reducing reserves or degrading the structural integrity of the overburden, its use must be prevented.

Since auger mining is a form of surface mining, it must be conducted according to all applicable regulations, including the performance standards in Part 816. {41786}

PART 820 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – ANTHRACITE

This proposed Part 820 sets forth specific performance standards for anthracite coal mines as an exemption to the performance standards proposed in Parts 816 and 817 of this Subchapter. {41787}

The Act requires that State environmental protection standards for anthracite surface coal mines in effect on August 3, 1977, the date of enactment of the Act, be adopted through the issuance of special regulations. The Office believes that Pennsylvania was the only State to have standards in effect on August 3, 1977.

At least 14 laws and regulations have been enacted in Pennsylvania which govern mining and reclamation practices at anthracite coal mines. These laws and regulations appear in Subsection 820.11(a).

In drafting this Part, several different approaches were considered. The existing structure of the proposed standards lists legislation which directly governs the conduct of anthracite surface coal operations. It was proposed by some that these 14 statutes and regulations should be annotated to provide a guide to specific performance standards instead of requiring interested persons to be knowledgeable of all 14 laws. Alternatively, the Office might promulgate minimum Federal environmental performance standards incorporating the minimum regulations required by the State. The unannotated listing contained in the proposed draft of this Part was considered acceptable because it will not result in addition of a long, complex set of provisions of limited applicability and because the majority of anthracite is produced in a State which already has specific protection standards in effect.

An issue not explicitly addressed in these proposed regulations is how to regulate anthracite surface coal mining in States which are currently mining or may in the future mine anthracite, but which did not have special performance standards when the Act was enacted. The most straightforward approach would be to impose the minimum performance standards of this Subchapter. The two alternatives are:

(1) To impose environmental protection standards similar to those in Pennsylvania; or

(2) To develop special Federal standards to take into account the unique characteristics of other anthracite deposits.

At this time OSM has made a decision not to promulgate additional anthracite regulations.

The Secretary must issue additional regulations as necessary when a State regulating anthracite amends any law or regulations for anthracite mining. If the regulations existing as of August 3, 1977, are made less stringent in any manner, the Secretary may elect to develop specific Federal performance standards to supplement the amended State regulation or, if considered desirable, the Secretary may apply the proposed performance standards for surface mining and underground coal mining. {41787}

PART 821 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – CERTAIN MINES IN ALASKA

This Part specifies those variances that are available from the requirements of this Subchapter for certain coal mines in Alaska.

Literature cited for the preparation of the requirements for the variances from the permanent performance standards available for certain mines in Alaska include:

1. Senate Report No. 28; 94th Congress 1st Session; March 5, 1975.
2. ""State Surface Mining Laws: A survey, a comparison with the proposed Federal legislation, and background information"; June 1977 95th Congress 1st Session.
3. Congressional Record ""Surface Mining Control and Reclamation Act of 1975"; 121 Congress Record 7044; March 18, 1975.
4. House of Representatives Report No. 94-1445; 94th Congress 2nd Session.

There are many special physical, hydrological and climatic conditions that exist in Alaska that are not commonly encountered in other States. Much of the area of the State is tundra, permafrost is abundant, topsoil is often thin or nonexistent, the coal seams often dip 30 degrees or greater. In addition, Alaska has significant coal reserves.

It may be necessary to make minor modifications in the permanent performance standards for certain mines in Alaska. In no manner shall these modifications lower the environmental standards for Alaskan coal mines.

In order to ascertain if, in fact, modifications are needed for Alaskan coal mines, Section 708 of the Act specifies that the Secretary direct a study of surface coal mining operations in Alaska. Within three years after the date of enactment of the Act, the Secretary, based on the findings of the study, is authorized to modify the applicability of any environmental protection provision of the Act, or any regulation issued pursuant thereto, to any surface coal mining operation in Alaska from which coal has been mined during the year preceding enactment of the Act if he determines that it is necessary to ensure the continued operation of such surface coal mining operation.

During that period of time prior to the issuance of any modifications to the regulations, it may be necessary to issue variances to the performance standards of the Act as necessary to ensure continuance of the mining operation. Only those surface coal mining operations that are located in Alaska and from which coal was mined between August 3, 1976, and August 2, 1977 are eligible for variances. {41787}

PART 822 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – OPERATIONS IN ALLUVIAL VALLEY FLOORS

Proposed Part 822 contains performance standards for alluvial valley floors that implement the requirements of the Act. The operator would be required to reestablish those geologic, hydrologic, and biologic characteristics that are necessary to support the essential hydrologic functions. It is not intended that all of the characteristics need be reestablished in every case. Rather, only those important to farming or those that control the quality and quantity of water need be reestablished. The Part proposes that the operator monitor the effects of mining and reclamation operations to:

- (1) Identify or further describe important geologic, hydrologic, and biologic characteristics; and
- (2) Detect conditions signifying interruption, discontinuance, or preclusion of farming or material damage to water.

The procedural requirements developed under Section 822.12, if adopted, would allow the regulatory authority to oversee mining practices that are being employed in alluvial valley floors and to require modification of practices adversely affecting farming or water quality or quantity.

With respect to application procedures and environmental performance standards for alluvial valley floors, OSM considered adding detailed review procedures that would be followed if a "higher or better use" were proposed for alluvial valley floors. These procedures would address the role of State and local planning in reclamation of alluvial valley floors to higher and better uses in accord with Section 515(b)(2) of the act. The Office decided not to propose detailed procedures at this time but invites public comment. The intent of the Act is to avoid interruption, discontinuance, or preclusion of farming on alluvial valley floors large enough to be significant to farming. Section 510(b) (5) is accompanied by the further requirement to preserve and reestablish the essential hydrologic functions of all alluvial valley floors in Section 515(b)(10)(f). Study of the legislative history of the Act leads the Office to conclude that Congress did not intend to promote major changes in land use of alluvial valley floors and that Congress intended the Office's position to be to guide reclamation of mined alluvial valley floors in a manner that preserves the essential hydrologic functions of the alluvial valley floor. Regulatory authorities may choose to be more explicit in defining post-mining land uses of mined and reclaimed alluvial valley floors, but compliance with Public Law 95-87 must be ensured. {41788}

The Office is considering the addition of a paragraph to Part 785.19 that would provide further guidance to surface coal mining operations that were in production in the year preceding August 3, 1977, were located within or adjacent to an alluvial valley floor, produced coal in commercial quantities during the year preceding August 3, 1977, and had specific permit approval by the State regulatory authority before August 3, 1977, to conduct surface coal mining operations within an alluvial valley floor. This guidance would implement the requirements of Section 506(d)(2) of the Act by requiring that:

""(a) Applications for a renewal of a valid permit which propose to extend surface coal mining operations beyond the boundaries identified in the reclamation plan approved prior to August 3, 1977, and which propose to extend operations that were excluded from compliance with the criteria of Section 786.13 by virtue of compliance with exclusion of Subparagraph 786.13(k)(1), must comply with all the provisions of Section 786.13 for all new areas located outside the previously identified and approved boundaries; and

(b) All existing surface coal mining operations conducted in or adjacent to alluvial valley floors must comply with the requirements of Part 822 on the effective date of these regulations with respect to those lands subject to these regulations. In order to show compliance, the applications for permits would have to satisfy the application requirements of Section 785.19."

The Office is also considering the necessity of adding a paragraph to Section 805.13 which would allow the regulatory authority to extend the period of liability under a reclamation bond when the cumulative effects of mining and reclamation on a stream, stream channel, flood plain, and associated low terraces cannot be determined in the initial 5 or 10 years because major elements of the watershed are still affected by surface coal mining and reclamation operations. The paragraph could read:

""The regulatory authority may determine, based on the magnitude of the disturbance caused by surface coal mining and reclamation operations over time to a surface drainage watershed that a bond shall be held for a longer period and in an amount adequate to regrade and revegetate the watershed to comply with Parts 816 through 826 of this Title.

Such a statement could be appropriate in the case of an alluvial valley floor in which the surface flow was diverted for the life of the mine and vegetation was reestablished, but stream bank instability, progressive compaction and resulting subsidence of regraded soils, and other problems did not occur until after the entire hydrologic system was evaluated at the termination of mining. This might occur if most runoff was diverted from the reclaimed stream channel until the last area was revegetated. The provisions would provide incentives to complete remedial reclamation. Comments addressing this consideration are invited.

The Office considered adding to proposed Section 822.13 a requirement that ground cover and productivity on reclaimed and other affected areas must be 100 percent of ground cover and productivity. While this proposal has not been included in the proposed rule, public comment is invited as to the desirability of such a requirement in furthering the purposes of this Part. {41788}

PART 823 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – OPERATIONS ON PRIME FARMLAND

Proposed Part 823 contains regulations for achieving the requirement of Section 515(b)(7) of the Act and would require that persons conducting surface mining activities on prime farmland, as defined in Section 701.5q, to return such land to

equal or better productivity than its pre-mining condition. These sections outline procedures for the systematic removal of soil horizons, stockpiling, site preparation prior to restoration, and systematic replacement of soil horizons.

Technical literature relied upon for the proposed prime farmland regulation in 823.1 – 823.14 is:

1. Aldon, E. F. 1978. Reclamation of coal-mined land in the Southwest. *Soil and Water Conservation*, Vol. 33 No. 2. pp. 75-79.
2. Aldon, Earl F., and H. W. Springfield. 1973. Revegetating coal mine spoils in New Mexico: a laboratory study USDA For. Serv. Res. Note RM-245. 4 p. Rocky Mt. For. and Range Exp. Stn., Fort Collins, Colo.
3. Argonne National Laboratory. 1978. Land reclamation program. Annual Report. July 1976_October 1977. Argonne, Ill. pp. 78-83.
4. Bennett, O. L. 1971. Grasses and legumes for vegetation of strip-mined areas. W. Va. Univ., Reveg. and Econ. Use of Surface-Mined Land and Mine Refuse Symp. Proc. 1971: 23-25.
5. Bennett, O. L. 1978. Reclamation of lands disturbed by surface mining. 11th Congress, International Society of Soil Science. Symposia Papers. Volume 3. pp. 249-259. Edmonton.
6. Chapman, A. G. 1967. How strip-land grading affects tree survival and growth. Pub. No. 29. School Agr., S. Ill. University, Carbondale.
7. Grandt, A. F. and Lang, A. L. 1958. Reclaiming Illinois strip coal and with legumes and grasses. Univ. of Ill. Agr. Exp. Sta. Bul. 628, 64 pp., illus.
8. Grandt, A. F. 1978. Mined-land reclamation in the interior coal province. 1978. *J. Soil and Water Cons.* Vol. 33. No. 2 pp. 62-28.
9. Martin, John, H. 1976. *Principals of field crop production*, 3rd Ed. McMillan Pub. Co., N.Y., N.Y.
10. Medvick, C. 1969. Selecting plant species for revegetating surface coal mined lands in Indiana – a forty year record. IN: *Ecol. and Reclam. of Devastated Land*, v. 2. R. J. Hutnik and G. Davis, eds. Gordon and Breach, New York. pp. 65-80.
11. Olson, T. C. 1977. Restoring the productivity of a glacial till soil after topsoil removal. *J. of Soil and Water Cons.* Vol. 32. No. 3. pp. 130-132.
12. Plass, W. T. 1975. An evaluation of trees and shrubs for planting surface-mine spoils. U.S. Dep. Agr., N.E. For. Exp. Sta. Res. Note NE 317, 8 pp.
13. Plass, W. T. 1972. Chemical soil stabilizers for surface mine reclamation. Northeastern Forest Experiment Station, Forest Products Marketing Laboratory, Princeton, West Virginia.
14. Plass, W. T. 1978. Reclamation of coal-mined land in Appalachia. *J. Soil and Water Cons.* Vol. 33. No. 2. pp. 56-61.
15. Power, J. F., R. E. Ries, and F. M. Sandoval. 1978. Reclamation of coal-mined land in the Northern Great Plains. *J. Soil and Water Cons.* Vol. 33. No. 2. pp. 69-74.
16. Ruffner, J. D., and Steiner, W. W. 1969. Evaluation of plants for use on critical sites. In: *Ecol. and Reclam. of Devastated Lands*, v. 2. R. J. Hutnik and G. Davis, eds. Gordon and Breach, New York. pp. 3-12.
17. Ruffner, Joseph D. 1978. Plant Performance: a Surface Coal Mine Spoil in Eastern United States. USDA, SCS TP 155.
18. Sandoval, F. M., J. J. Bond, J. F. Power, and W. O. Willis. 1973. Lignite mine spoils in the Northern Great Plains – characteristics and potential for reclamation. In *Proc., Res. and Applied Tech. Symposium on Mined-land Reclamation*. National Coal Assn., Washington, D.C. pp. 117-133.
19. Vogel, W. G., and Berg, W. A. 1968. Grasses and legumes for cover on acid strip-mine spoils. *J. Soil and Water Conserv.* 23(3): 89-91.

Proposed Section 823.11 establishes specifications for soil removal, storage, replacement, and reconstruction using minimum standards as set forth in the Act.

Subsection 823.11(b) would require that removal of soil horizons be done prior to any drilling, blasting, or mining. Few, if any, of the mining operations can be done without the risk of contamination of the soil horizons. The overburden should be protected from erosion. The method of protection will vary by geographic location and the nature of the overburden. Ample data exist to permit the development of adequate vegetative erosion control. (Ruffner, 1978), (Bennett, 1971), (Grandt, 1958), (Medvick, 1969), (Plass, 1975), (Ruffner, 1969), (Vogel, 1969), and (Aldon, 1973). {41789}

Proposed Sections 823.12 and 823.14 would deal with the removal and replacement of the various horizons. Since prime farmland soils are defined as those having the best combination of physical and chemical properties for plant growth, there will be few circumstances where it will be more desirable to substitute selected overburden material for A and B horizons in

soil reconstruction. Where substitute material could be shown to be equal or more favorable for plant growth than the A and B horizons, its use may result in less costly soil reconstruction and possibly a more productive soil.

Removal and replacement of A and B horizons in their original sequence offers the highest potential for creation of a final root zone of depth and quality comparable to that which existed in the natural soil. Power and others (1978) have shown that reconstruction of Williams silt loam, by replacing topsoil and subsoil in separate layers, was superior to mixing the two materials and achieved wheat yields comparable to those on unmined land during the first growing season. Bennett (1978) has concluded that coal can be removed without destroying the potential productivity of the soil and seriously damaging the environment, through adequate guidelines and specific controls. There is conclusive evidence that topsoil (A horizon) replacement can vastly improve plant survival and growth (Sandoval and others, 1973, Alson, 1978; Grandt, 1978; Argonne National Laboratory, 1978). Olson (1977) found that the most rapid means of restoring soil productivity was to replace all or part of the topsoil and concluded that soil productivity is not likely to decline if such procedures are allowed. Plass (1978) concludes that proper topsoiling involves the removal and storage of the A, B, and C horizons.

In accordance with Section 515(b)(7) of the Act, proposed Subsection 823.11(c) seeks to ensure that steps are taken to avoid the mixing of soil horizons if stockpiled. This is best accomplished by total and complete separation. The area for stockpiling needs to be selected carefully to assure it is not in a drainageway where water containing acids and other toxic materials may cause contamination. The surface of stockpiled materials will be unstable and subject to wind and water erosion. Short-lived vegetative cover or mulches can be effective in controlling erosion (Plass, 1972), Ruffner, 1978; Vogel, 1968. The treatment selected should be based on the length of time between stockpiling and replacement.

Compaction resulting from grading spoil and handling topsoil can be detrimental by adversely affecting root penetration (Chapman, 1976) and rate of water movement in the soil, and proposed Subsections 823.14(b) and (c) attempt to address this problem in a flexible manner. Use of suitable equipment and careful handling of soil material at proper moisture content is essential if excess compaction of the soil rooting zone is to be avoided.

A mulch of hay, straw, wood fiber, or chemical mulch, properly applied, can have a significantly beneficial effect on preventing water or wind erosion of the unstable soil materials (Plass, 1972), and accordingly would be encouraged under proposed subparagraph (c)(2).

As would be required under proposed Subsection 823.14(d), whether the reconstructed soil profile is planted directly to a productive crop, or planted for erosion control, the proper plant nutrients are needed. (Aldon, 1978; Bennett, 1971; 1978; Grandt, 1958; Plass, 1978; Power, 1978; Ruffner, 1978; Vogel, 1968; and Martin, 1976).

Site specific recommendations would be determined by having the soil tested. This can be done through local county agriculture agents. Recommendations on appropriate crops for production or erosion control are available from the county agent or the U.S. Soil Conservation Service.

The Office considered the alternative of exempting underground coal mining from the proposed regulation. The Office believes there would be sufficient environmental impact from the underground coal mining operation to warrant coverage in the proposed regulations. Public comment is solicited on the need for further guidance to regulatory authorities as to the circumstances, under which variances should be available. {41789}

PART 824 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – MOUNTAINTOP REMOVAL

Part 824 provides the conditions under which persons engaged in the surface mining method known as mountaintop removal could be exempted from the requirement to restore affected areas to their approximate original contour.

The purpose of allowing this variance is to allow extraction of entire coal seams on mountaintops where it would be feasible to develop alternative land uses, such as industrial, commercial, agricultural, residential, or public facility. Following appropriate land use planning standards, this exemption may provide needed development land in some areas while minimizing long-term effects of disturbance from both mining operations and post-mining land use.

During the drafting of this Part, the Office considered an alternative which would have allowed the regulatory authority to grant a variance to persons who intend to remove only portions of the coal seam along a mountain ridge, leaving several isolated knobs or plateaus in the process. The decision was made, however, to propose that a variance be allowed only in

those instances where the person intends to remove the entire coal seam and create one level plateau or a gently rolling contour, in accordance with the clear intention of the Act.

Additionally, the Office decided not to propose this alternative because it would not support the objective of maximum coal recovery and would not assure a contour suitable for the development of the required alternative land uses.

The Office solicits comments and suggestions on how regulatory authorities should treat persons who are currently engaged in a mountaintop removal operation that does not meet the conditions for getting a variance and for whom meeting those conditions through a change in operations would not be economically feasible.

The Office would appreciate public comment on appropriate definitions and restrictions on the meanings of the following terms as used in this Part: ""mountain," ""ridge," ""hill," ""agricultural" and ""public facility use." {41789}

PART 825 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – SPECIAL BITUMINOUS COAL MINES IN WYOMING

Part 825 proposes regulations for special bituminous coal mines west of the 100th meridian located in the State of Wyoming. These proposed regulations are intended to minimize, as far as practical, any adverse environmental or other effects of these special mines by proposing practicable standards for on-site handling of spoil, elimination of depressions capable of collecting water, creation of impoundments, regrading, and allowing for retention of certain highwalls.

The literature used to draft these proposed regulations includes:

1. Land Quality Rules and Regulations (Wyoming) Land Quality Division, Department of Environmental Quality, 1975. {41790}

Two classes of special bituminous coal mines are regarded separately by these proposed regulations – those operating prior to January 1, 1972, and those developed after August 3, 1977. Only those parts of the mine within the mine pit would be regulated by Part 825. All other parts of the permit area would meet the standards set by the remainder of this subchapter.

For mines operating prior to January 1, 1972, which meet the conditions of Section 527(a) there is no practicable alternative means of mining the coal or of reclaiming the lands as required by the Act. Therefore highwalls would be allowed to remain if found to be stable by the regulatory authority, benches would be allowed, the mine pit floor would remain and be graded, topsoiled, and seeded, or be part of an approved impoundment. Any on-site spoil piles would have to be graded and contoured to less than 17 unless the regulatory authority determines that steeper slopes would accomplish the desired reclamation. Terraces would be approved by the regulatory authority if it is demonstrated that desired reclamation results would be achieved by their use.

The Office recognizes that the deep open pit type of coal mining has specific areas where adjustments to the general performance standards are warranted. These areas have been specifically identified as backfilling and grading, since it is not possible to completely backfill and return to approximate original contour or blend the pit with the topography in these cases.

The extreme highwalls involved in deep pit mining of coal cannot be adequately backfilled. However, they can be maintained with proper geological engineering techniques. Part of the stabilization may require benching the highwall to catch small rockfalls, control runoff, and maintain the face heights below the critical height for the material. Since highwall stability is a critical part of the reclamation and this is a very non-typical situation the Office has made provision for special reviews and controls at these sites.

The pit floor would probably be incapable of supporting significant plant growth. To reestablish vegetative cover and allow access for equipment, people, and animals, backfilling, topsoiling, and grading are required. Access must be provided to allow the revegetation equipment to operate and provide for future productive use of the land. The water movement in and around the pit must be controlled. Some impoundments can be expected to be of sufficient size to necessitate the use of riprap to control water damage to impoundment structures.

The slope of spoil piles should be maintained at a low angle (17 maximum) to minimize runoff damage and provide safe side slopes for revegetation equipment. If terraces do not interfere with the reclamation they could be used. High slopes could be used with adequate reclamation and an approved post-mining land use.

For mines on lands adjacent to those operating before January 1, 1972, and developed after August 3, 1977, operations within the mine pit would be required to conform to all requirements of Wyoming law. Slope specifications in this Part are taken from the Wyoming Land Quality Rules and Regulations, Chapter II, Section 1(a), as authorized by Section 201(c)(2), except that the regulatory authority would be designated as the deciding authority rather than the administrator of the Wyoming Land Quality Division.

To blend the mined site with its surroundings, the slopes would be cut to no more than the maximum average slope of the surrounding topography if these Sections were adopted. If this practice would disturb a significant amount of land that would not otherwise be disturbed the regulatory authority could allow steeper slopes. The regulatory authority could independently establish the average slope. The operator's determination of average slope must be reviewed and approved or disapproved by the regulatory authority.

For these recently opened special mines, the regulatory authority would retain the right to decide how backfilling, grading, and contouring will be done to meet the future use of the land, since these are special cases and need to be dealt with on an individual basis. The method chosen must be designed to prevent degradation of the hydrologic balance, reduce water pollution, prevent adverse effects from water build up, control erosion, and control water flow to the original drainage system or an approved substitute would have to be developed.

Terraces or benches, check dams and other erosion control techniques may be required to control water damage to reclaimed slopes where long unbroken contouring cannot control the volume generated or handled seepage or stream flow. These structures may need special engineering; therefore, under the proposed regulations, the regulatory authority would examine and evaluate the detailed plans for all such construction.

The object of regulating reclamation is to produce a usable piece of land after mining. To allow indiscriminate filling of depressions with water would produce small intermittent ponds, bogs, and might create overflow situations eroding slopes possibly endangering people. Depressions therefore, would not be allowed by the proposed regulations without proper planning and design.

If permanent water impoundments were authorized under these proposed regulations, the land would be sloped, graded, and contoured to blend topographically with its surroundings. Access would be provided to allow for corrections to be made, revegetation, future access for new land uses and maintenance of the water control structures. It may be very difficult to reclaim all of the highwall in these pits. Therefore one-half of the shoreline would be allowed to remain as stabilized highwall. The stabilization technique would have to be independently verified and approved by the regulatory authority. Since the pit would impound substantial amounts of water, it would probably have an approved post-mining use which would blend with the surroundings, and part of the pit shoreline would have to be reclaimed for these purposes.

Since the State of Wyoming could change its regulations and programs on special bituminous coal mines, leaving some areas without coverage by regulations, the Secretary will provide the necessary additions to meet the Act. {41790}

PART 826 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – OPERATIONS ON STEEP SLOPES

A significant portion of the strippable coal reserves, particularly in the Appalachian region, lies under terrain that is dominated by steep slopes. Surface coal mining operations in this type of terrain are particularly subject to the effects of erosion that result in the formation of deep gullies, excessive runoff, mass movement, and sedimentation of the receiving streams. Part 826 proposes regulations for the minimum standards an operator must meet to control the adverse environmental aspects of steep slope mining.

Proposed Section 826.12 provides performance standards similar to those in the interim program regulations at 30 CFR 716.2 (42 Fed. Reg. 62692, December 13, 1977), except that additional drainage channel requirements are provided and minimum slope stability is specified. The drainage channel addition derives from needs perceived by Office inspectors in the field during the interim program. The static safety factor addition comes from further development of thinking on stability since promulgation of the interim program regulations, as reflected in various proposed Sections published today data, including Sections 816.32, 816.46, 816.85, 816.102, and 824. A minimum safety factor of 1.3 is an appropriate measure of stability that has been accepted by the Corps of Engineers, MSHA, and other agencies. This slope stability for backfilled spoil material is required for all portions of the reclaimed land. {41791}

Section 826.13 proposes to implement the variance from the requirement of return to approximate original contour, which is contained in Section 515(e) of the Act. Some commenters have indicated they feel this variance should not be limited to steep slope mining. However, it is clear in Section 515(e)(2) of the Act that the variance applies only to Section 515(d)(2) requirements, which are those applicable to steep slopes. {41791}

PART 827 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – COAL PROCESSING PLANTS AND SUPPORT FACILITIES NOT LOCATED AT OR NEAR THE MINESITE OR NOT WITHIN THE PERMIT AREA FOR A MINE

Coal processing plants are usually located at the mine mouth but frequently one central preparation plant may serve several mines as a focal point for coal preparation and shipment to market. The coal is transported to this central plant without removal of the rock and other impurities contained in the run-of-mine coal. Coal may also be shipped by barge, rail, or truck to a site far removed from the mine-site and processed there prior to use. After shipment to the point of use, additional processing may take place. Associated with coal processing plants are coal wastes, waste piles and disposal sites, and other features which can seriously damage the environment and property and are intended to be regulated by the Act. In order to ensure proper protection of the environment and public property in compliance with Section 102 of the Act, the same requirements for permits, bonding, reclamation, performance standards and enforcement apply to coal processing plants and support facilities not located within the permit area for a specific mine.

Public comment is solicited on the structure of this separate Part. The Office considered establishing minimum performance standards for coal processing plants within Part 816, but has determined that separate regulations are probably appropriate. One issue is the extent to which loading facilities near the coal processing plants should be required to be within the permit area. {41791}

PART 828 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – IN-SITU PROCESSING

The proposed rules for in-situ processing are intended to provide environmental protection performance standards for operations which use coal in place or recover coal by means of processing fluids injected into the coal-bearing strata.

Technical literature used in preparing this Part includes:

- (1) Edgar et al. Support Research on chemical, mechanical, and environmental factors in Underground Gasification Quarterly Report. July 1, 1978, Univ. of Texas at Austin;
- (2) Permit Regulations for Process Discharges/In-Situ Mining, Land Quality Department, Department of Environmental Quality, Cheyenne, Wyoming;
- (3) Meade, S. W., Ganow, H. C. and Whang T. T., "'Groundwater and Subsidence Investigation of the LLL In Site Coal Gasification Experiment", Lawrence Livermore Laboratory, Proceedings of 4th Annual Coal Conversion Symposium, Steamboat Springs, Colorado, July 17 20, 1978, U.S. Dept. of Energy;
- (4) McKee, D. D., Fischer, R. Jacob, Jacobsen, T., Weh, and Drever, J, 1978, "'Ground water Problems Associated with Licensing of In Situ Uranium and Coal Gasification Operations," LLL Proc. of 4th Annual Coal Conversion Symposium, Steamboat Springs, Colorado, July 17 20, 1978, U.S. Dept. of Energy.

In-situ processing of coal, an underground method of extracting fluids from coal in place, has many similarities to underground mining, and it is proposed that in-situ processing meet the general performance standards for conventional underground mining.

The Office might separately define each type of processing and promulgate a set of regulations for each. It is the opinion of the Office that in-situ processing is so diverse and developing so rapidly that the development of individual regulations would not now be appropriate considering that the technical expertise in this area is still developing.

A potential major environmental impact from in-situ processing is the contamination of water systems by the processing fluids (Edgar, p. 44). The proposed rules would alleviate this problem by imposing general restrictions on the discharge of processing fluids (Subsection 828.11(a)).

An alternative method to the proposed general restrictions on discharging processing fluids outside the rising zone would be to set the maximum levels for various contaminants in natural water systems. This alternative was not proposed because

of the number and variety of potential contaminants. The proposed regulations would allow the regulatory authority to control the discharge of solid, liquid, or gaseous contaminants which may pose some threat to public health, public safety, or to the environment even though no national standards for levels of these contaminants would be promulgated. The surface activities accompanying in situ mining are quite similar to those of underground mining, though often reduced in scale. Drill pads, roads, pipeline corridors, gathering and pumping facilities, offices, processing facilities, equipment and supply facilities have the potential to disturb the vegetation and soil. Thus, topsoil protection, stabilization of disturbed areas, and revegetation performance standards are required. Further, the potential for subsidence to be caused by in situ processing also appears similar to that posed by conventional, underground mining, Meade, 1978. Therefore, the need for subsidence control, to the extent available technology allows, is likewise necessary.

It is likely that a few of the performance standards contained in the proposed Part 817 would not be used for current types of in situ mining. These would include those for disposal of underground development wastes and excess spoil, disposal of coal processing waste, blasting (surface activities) and perhaps other categories. There is a future potential for use of modified in situ processing, a process that combines underground mining of access drifts, fracturing of pillars of coal, and in situ extraction. This process could result in the creation of waste rock or underground development waste and the application of the performance standards for "underground development wastes." The Office believes that deletion of these performance standards, which might have little use at present, would not be appropriate at this time since a need for their use might arise in the near future.

An alternative approach would be to limit compliance of in situ activities to a select few of the performance standards such as control of subsidence and protection of water quality. The Office does not believe that the requirements of the Act are adequately met if the remainder of the provisions of the performance standards applicable to conventional underground mining are designated as not applicable.

Part 828 proposes additional performance standards tailored to in situ processing. These are tailored in large part after regulations scheduled to be promulgated in Wyoming ("Permit Regulations for Special Process Discharges/In Situ Mining" Land Quality Department, Department of Environmental Quality, Cheyenne, Wyoming). Wyoming has obtained input from the Texas Railroad Commission in developing these regulations. The performance standards principally address and specify protective measures for control of fluids injected into and removed from the coal. The fluids may be gaseous or liquid. It is important that these fluids are largely contained within the production interval or strata. These fluids will contain hydrocarbons (principally phenols). They may also contain nitrogen compounds, and relatively high concentrations of soluble salts. Thus, the performance standards would require the development of a contingency plan to be followed in the event of excursions of fluids beyond the production zone. It is envisioned that this plan would require the installation and operation of surface and subsurface monitors to reliably measure or warn of increases in concentrations of substances that could be toxic or acid or would otherwise pose a danger to public health or safety in order that corrective measures could be employed. The plan should also describe the corrective measures. In situ processing is somewhat different from conventional underground mining in that when injected fluids are detected to have moved beyond the production zone, it may be possible (depending on the reactivity of the fluid) to "retrieve" much of the fluid by pumping or to neutralize the fluid by flushing out to a surface treatment facility. {41792}

The performance standards would require the quality of groundwater both within and adjacent to the mine plan area to be returned to the approximate pre-mining quality. This is appropriate in view of the potential for toxic fluids to be created and the need to minimize disturbance to the hydrologic balance, Meade, 1978 and McKee, 1978).

The performance standards propose a more complex monitoring program for air and water quality if there are changes in the ambient levels of phenols, nitrogen compounds, or oxides of carbon caused by the in situ processing. These are likely contaminants produced by in situ operations (Edgar, pp 47-79).

An alternative to the special performance standards would be reliance on the underground mining activities performance standards (Part 817). This alternative could be accomplished by specifically incorporating the term "in situ processing" in the term "underground mining". The Office did not believe that adequate standards were available in Part 817 to fulfill the requirements of the Act to provide environmental protection performance standards for all phases of coal mining.

Another alternative was to expand the permit application requirements to specifically include identification of waste residues, detailed hydrologic data describing "reservoir" characteristics, specifying distances from the production area for environmental monitoring activities, completion data for all existing wells in the area, and similar details that would ensure that adequate data were provided for planning. It was determined that the permit requirements would not be expanded since individual states could develop more detailed requirements suited to specific needs.

Other alternatives would be to specify a method by which the restoration would be accomplished or to specify the degree to which the restoration must be taken considering the rapid developments in the technology for this area. Both these alternatives were considered premature at this time.

The monitoring procedures proposed would provide the regulatory authority with information and indications of any contamination from in-situ processing. The specific groups of compounds mentioned in the proposal reflect common contaminants in processing fluids (Edgar, pp. 47-49).

* * *

{Regulations: 43 FR 41873}

SUBCHAPTER K – PERMANENT PROGRAM PERFORMANCE STANDARDS

PART 810 – PERMANENT PROGRAM PERFORMANCE STANDARDS – GENERAL PROVISIONS

Section

810.1	Scope.
810.2	Objectives.
810.3	Authority.
810.4	Responsibility.

Authority: Sections 102, 201, 501(b), 503, 504, 512, 515, 516 and 517 of Pub. L. 95 87, 91 Stat. 448, 449, 468, 470, 471, 483, 486, 495, and 498 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1262, 1265, 1266, and 1267).

SECTION 810.1 - SCOPE.

- (a) This Subchapter sets forth the minimum performance standards to be implemented under a regulatory program before it will be approved by the Secretary; and
- (b) This Subchapter sets forth requirements to be used in developing regulatory programs for coal exploration operations and surface coal mining and reclamation operations.

SECTION 810.2 - Objectives.

The objective of this Subchapter is to ensure that coal exploration operations and surface coal mining and reclamation operations are conducted in a manner which is compatible with the environmental, social, and esthetic needs of the Nation. This requires:

- (a) Protection of the health, safety, and general welfare of mine workers and the public;
- (b) Maximum use and conservation of the solid fuel resource being recovered so that reffecting the land through future surface coal mining operations can be minimized;
- (c) Prompt reclamation of all disturbed areas to conditions that are capable of supporting the premining land uses or higher or better land uses;
- (d) Reclamation of land disturbed by surface coal mining operations as contemporaneously as practicable with mining operations;
- (e) Minimizing, to the extent possible using the best technology currently available, of disturbances and adverse impacts on fish, wildlife and other related environmental values, and enhancement of such resources where practicable;
- (f) Revegetation which achieves a prompt vegetative cover and recovery of productivity levels compatible with approved land uses;

- (g) Minimum disturbance to the prevailing hydrologic balance at the mine-site and in associated off-site areas, and to the quality and quantity of water in surface and groundwater systems;
- (h) Protection of fragile and historic lands where surface coal mining operations could result in significant damage to important historic, cultural, scientific, or esthetic values; and
- (i) Confinement of surface coal mining and reclamation operations and spoil disposal areas within the permit area.

SECTION 810.3 - AUTHORITY.

The Secretary shall promulgate minimum coal exploration and surface mining and reclamation operations performance standards applicable under a State or Federal program.

SECTION 810.4 - RESPONSIBILITY.

- (a) Under the general direction of the Assistant Secretary, Energy and Minerals, the Director shall ensure that performance standards at least as stringent as the standards established by the Secretary are implemented and enforced under every State and Federal program.
- (b) Each regulatory authority under an approved State program is responsible for implementing and enforcing performance standards which are at least as stringent as the standards in this Subchapter.
- (c) Each person conducting surface coal mining and reclamation operations is responsible for complying with performance standards which are at least as stringent as the standards in this Subchapter. {41873}

PART 811 – PERMANENT PROGRAM PERFORMANCE STANDARDS – APPLICABILITY TO STATE AND FEDERAL PROGRAMS

Section	
811.1	Scope.
811.2	Objective.
811.10	Applicability to State programs.
811.11	Applicability to Federal Programs.

Authority: Sections 102, 201, 501(b), 503, 504, 505, 512, 515, 516 and 517 of Pub. L. 95 87, 91 Stat. 448, 449, 468, 470, 471, 473, 483, 486, 495, and 498 (30 USC 1202, 1211, 1251, 1253, 1254, 1255, 1262, 1265, 1266, and 1267).

SECTION 811.1 - SCOPE.

This Part sets forth how the performance standards of this Subchapter are to be used in the development of every regulatory program.

SECTION 811.2 - OBJECTIVE.

The objective of this Part is to explain the manner in which the performance standards contained in this Subchapter are to be used as the basis for developing the performance standards applicable under each regulatory program.

SECTION 811.10 - APPLICABILITY TO STATE PROGRAMS.

To be eligible for approval by the Secretary, a State program must contain performance standards at least as stringent as the performance standards of this Subchapter and must comply with all the requirements of 30 CFR 730 734.

SECTION 811.11- APPLICABILITY TO FEDERAL PROGRAMS.

(a) If a State fails to submit a program for approval or to implement or maintain an approved State program, the Secretary shall implement a Federal program which shall include performance standards at least as stringent as the minimum performance standards of this Subchapter. {41874}

(b) A Federal program for a State shall take into consideration the nature of that State's terrain, climate, biological, chemical, and other relevant physical conditions and shall be promulgated in accordance with Part 736 of this Title.

(c) If a Federal program is implemented for a State which has existing statutes or regulations that interfere with the achievement of the purposes and requirements of the Act and the Federal program, those statutes or regulations shall, so far as they interfere with the achievement of the purposes and requirements of the Act and Federal program, be preempted and superceded by the Federal program. The Secretary shall set forth those State statutes or regulations in accordance with 30 CFR 736.23. {41874}

PART 812 – PERMANENT PROGRAM PERFORMANCE STANDARDS – INDEX

Section

812.1	Scope.
812.2	Objectives.
812.11	Parts containing performance standards.
812.12	Alphabetic index to performance standards.

Authority: Sections 102, 201, 501(b), 515 and 516 of Pub. L. 95 87, 91 Stat. 448, 449, 468, 486, and 495 (30 USC 1202, 1211, 1251, 1265 and 1266).

SECTION 812.1 - SCOPE.

This Part contains an index to the minimum performance standards of this Subchapter.

SECTION 812.2 - OBJECTIVES.

The objectives of this Part are to:

- (a) Assist any person who conducts or intends to conduct coal exploration or surface coal mining and reclamation operations in determining which performance standards apply to the operations.
- (b) Improve the understanding of these minimum performance standards to increase compliance; and
- (c) Provide interested parties with a simple reference system to this Subchapter.

SECTION 812.11 - PARTS CONTAINING PERFORMANCE STANDARDS.

- (a) Coal exploration – Part 815
- (b) General extraction methods:
 - (1) Surface – Part 816
 - (2) Underground – Part 817
- (c) Geographical locations:
 - (1) Alaska – Part 821
 - (2) Alluvial valley floors – Part 822

(3) Special bituminous coal mines in Wyoming – Part 825

(d) Chemical properties of coal: Anthracite mines – Part 820

(e) Combination of general extraction methods: Concurrent surface and underground – Part 818

(f) Special surface mining methods:

(1) Auger mining – Part 819

(2) Mountaintop removal – Part 824

(3) Steep slope mining – Part 826

(g) Soil quality: Prime farmland – Part 823

(h) Other activities:

(1) Coal processing off the mine permit area – Part 827

(2) In situ processing – Part 828

SECTION 812.12 - ALPHABETIC INDEX TO PERFORMANCES.

The subjects addressed in the minimum performance standards of this Subchapter are discussed in the Parts or Sections indicated in the following index. {41875}

Index (See Table in Original) {41876}

Index (See Table in original) {41877}

Index (See Table in Original) {41878}

PART 815 – PERMANENT PROGRAM PERFORMANCE STANDARDS – COAL EXPLORATION

Section

815.1 Scope.

815.2 Objectives.

815.4 Responsibility of persons conducting coal exploration.

815.11 Required documents.

815.12 Performance standards for coal exploration operations.

815.13 Requirement for a permit.

Authority: Sections 102, 201, 503, 504, 506, 512, 515, 516 and 517 of Pub. L. 95 87, 91 Stat. 448, 449, 468, 470, 471, 473, 483, 486, 495 and 498 (30 USC 1202, 1211, 1251, 1253, 1254, 1256, 1262, 1265, 1266, 1267).

SECTION 815.1 - SCOPE.

This Part sets forth minimum performance standards required for coal exploration operations which are not conducted within an area covered by a permit issued for surface coal mining and reclamation operations.

SECTION 815.2 - OBJECTIVES.

The objectives of this Part are to:

(a) Provide any person who conducts or intends to conduct coal exploration with the minimum performance standards under a State or Federal program; and

(b) Prevent degradation of the environmental quality during and following the conduct of coal exploration operations.

SECTION 815.4 - RESPONSIBILITY OF PERSONS CONDUCTING COAL EXPLORATION.

At least 30 days prior to commencing exploration, each person who conducts or intends to conduct coal exploration operations shall file with the regulatory authority a notice of intention to explore. If more than 250 tons of coal are to be removed during exploration, the person engaged in the coal exploration shall obtain the written approval from the regulatory authority for the notice of intention to explore. Each person who conducts exploration activities shall comply with the reclamation procedures described in the notice of intention.

SECTION 815.11 - REQUIRED DOCUMENTS.

- (a) Each person who conducts any coal exploration operation shall, while in the exploration area, possess the following:
- (1) If 250 or less tons of coal are removed during exploration, a receipt from the regulatory authority as evidence of the filing of a notice of intention to explore as required by CFR 776.11(a); or
 - (2) If more than 250 tons are to be removed during exploration, written approval of the regulatory authority for the activities granted under 30 CFR 776.11.
- (b) Upon the request of any agent or employee of the regulatory authority, each person who conducts coal exploration operations shall immediately present the receipt or necessary written approval to the agent or employee so that the agent or employee may read and copy the contents of the receipt or approval.

SECTION 815.12 - PERFORMANCE STANDARDS FOR COAL EXPLORATION OPERATIONS.

Any exploration activity shall comply at a minimum with the performance standards of this Subchapter.

- (a) The person who conducts exploration shall record the cumulative amount of coal removed during coal exploration by drilling, coring, trenching, mining or other techniques. This record shall be kept up to date and available to the regulatory authority at the exploration site.
- (b) The person who conducts exploration shall not remove more than 250 tons of coal during exploration without the specific written approval of the regulatory authority.
- (c) Vehicular travel on other than established public or private graded and surfaced roads shall be limited by the person who conducts coal exploration to that absolutely necessary to conduct the exploration. Travel shall be confined to graded and surfaced roads during and following periods of precipitation when vehicles would cause excessive damage to vegetation or rutting of the land surface, or when vehicles could become immobilized in soft earth materials and cause excessive disturbance.
- (d) Any new road in the exploration area shall be constructed, utilized, maintained and restored in accordance with the following requirements:
- (1) Roads shall be located, so far as possible, on the flattest and most stable available slopes to minimize erosion.
 - (2) Vehicles shall not enter an active stream channel unless specific crossing locations are first approved by the regulatory authority as temporary routes across small streams and they do not adversely affect sedimentation. All other stream crossings shall be made using bridges, culverts, or other structures designed, constructed, and maintained to minimize disturbance to water quality and quantity.
 - (3) Topsoil shall be removed, under paragraph (e) of this section, before use of a surface area as a road if that use may cause substantial damage to fish, wildlife and related environmental values or to site productivity.
 - (4) Each new road shall be designed, constructed, and maintained to prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow or runoff outside the permit area. Permanent roads constructed or modified during exploration and remaining after exploration activities are completed shall be designed, constructed, and maintained in accordance with 30 CFR 816.31 816.38.
 - (5) Each existing road affected by exploration shall be used and maintained by the person who conducts exploration only in compliance with applicable Federal, State and local requirements.

(e)(1) The entire "'A" horizon of the soil and as much other subsoil and unconsolidated earth materials as are necessary to meet the revegetation requirement of paragraph (m) of this section shall be removed before:

(i) Disturbance of an area by off-road travel which may cause substantial damage to fish, wildlife and related environmental values or to site productivity:

(ii) Construction of roads;

(iii) Any drilling that involves construction of a drill pad or flat surface and disposal of large amounts of drilling fluid or cuttings; and

(iv) Establishment of office facilities, storage facilities, repair facilities, or testing facilities.

(2) Removed topsoil shall be stored under the requirements of Section 816.23 and shall be redistributed under the requirements of 30 CFR 816.24, as soon as the coal exploration is complete. If the person engaged in exploration submits a permit application under 30 CFR 778 791, topsoil redistribution may be deferred until action is taken on the application by the regulatory authority.

(f) With the exception of small and temporary diversions of overland flow of water around new roads, drill pads, and support facilities, no ephemeral, intermittent or perennial streams shall be diverted during coal exploration. Overland flow of water shall be diverted in a manner that prevents, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow or runoff outside the permit area and which causes no violations of applicable State or Federal requirements.

(g) Each drill hole, borehole, well, or other drilled excavation created during the exploration shall either be plugged and capped with at least 10 feet of cement or shall be managed to prevent water pollution and mixing of ground and surface waters and to ensure the safety of people, livestock, wildlife, and machinery in each area where these openings could be a hazard. If a mining permit that requires compliance with 30 CFR 816.13 and 816.14 has not been approved the person who conducts coal exploration shall not leave any open holes. Each excavation encountering ground water shall be filled, plugged, or otherwise closed to prevent adverse changes in water quality or quantity, in accordance with a plan approved by the regulatory authority before the exploration operation begins. {41879}

(h) The person who conducts coal exploration shall, to the maximum extent practicable, measure important environmental characteristics of the exploration area during coal exploration so as to minimize environmental damage and to provide adequate information for a mining permit application if the person submits an application under 30 CFR 778 791. The measurements to be considered include, but are not limited to, overburden characteristics that could affect water quality and revegetation, soils characteristics, vegetation, hydrogeologic conditions, aquifer characteristics, important hydrologic, biologic and geologic characteristics of stream valleys west of the 100th meridian west longitude, air quality, meteorological data where necessary, surface water flow data, and biological data.

(i) The person who conducts exploration shall make available to the regulatory authority all environmental monitoring data collected during coal exploration.

(j) No habitats of unique value for fish, wildlife and other related environmental values shall be disturbed during exploration activities.

(k) All water discharged or affected by coal exploration shall use treatment facilities approved by the regulatory authority and shall meet the effluent limitations of 30 CFR 816.42(a) upon leaving the exploration site.

(l) All facilities and equipment shall be removed from the exploration area promptly after they are no longer needed for exploration activities with the exception of those facilities and equipment that the regulatory authority determines shall remain to:

(1) Provide additional environmental quality data;

(2) Reduce or control the on- and off-site effects of the exploration activities;

(3) Facilitate future mining under an approved mining and reclamation plan and permit.

(m) Revegetation of areas disturbed by coal exploration operations shall be performed by the person who conducts exploration in accordance with 30 CFR 816.111- 816.115.

SECTION 815.13 - REQUIREMENT FOR A PERMIT.

If coal extracted during exploration is sold commercially, the person who conducts in the operation must have obtained a permit for the operation under 30 CFR 778 791 unless the person who conducts the exploration has demonstrated, and the regulatory authority has determined, that the sale is to test coal properties necessary for the development of operations for which a permit application may be submitted. {41879}

PART 816 – PERMANENT PROGRAM ENVIRONMENTAL PERFORMANCE STANDARDS – SURFACE MINING ACTIVITIES

Section

816.1	Scope.
816.2	Objectives.
816.11	Signs and markers.
816.13	Casing and sealing of drilled holes: General requirements.
816.14	Casing and sealing of drilled holes: Temporary.
816.15	Casing and sealing of drilled holes: Permanent
816.21	Topsoil: General requirements.
816.22	Topsoil: Removal.
816.23	Topsoil: Storage.
816.24	Topsoil: Redistribution.
816.25	Topsoil: Nutrients and soil amendments.
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816.32	Road construction: Location.
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816.35	Road construction: Surfacing.
816.36	Other transportation facilities.
816.38	Restoration of roads.
816.39	Support facilities and utility installation.
816.41	Hydrologic balance: General requirements.
816.42	Hydrologic balance: Water quality standards and effluent limitations.
816.43	Hydrologic balance: Diversion and conveyance of overland flow and shallow ground water flow.
816.44	Hydrologic balance: Stream channel diversions.
816.45	Hydrologic balance: Sediment control measures.
816.46	Hydrologic balance: Sedimentation ponds.
816.47	Hydrologic balance: Discharge structures.
816.48	Hydrologic balance: Acid-forming and toxic-forming spoil.
816.49	Hydrologic balance: Permanent and temporary impoundments.
816.50	Hydrologic balance: Ground water protection.
816.51	Hydrologic balance: Protection of ground water recharge capacity.
816.52	Hydrologic balance: Surface and ground water monitoring.
816.53	Hydrologic balance: Transfer of wells.
816.54	Hydrologic balance: Water rights and replacement.
816.55	Hydrologic balance: Discharge of water into underground mines.
816.56	Hydrologic balance: Postmining rehabilitation of sedimentation ponds, diversions, impoundments, and treatment facilities.
816.57	Hydrologic balance: Stream buffer zones.
816.59	Coal recovery.
816.61	Use of explosives: General requirements.
816.62	Use of explosives: Preblasting survey.
816.64	Use of explosives: Public notice of blasting schedule.
816.65	Use of explosives: Surface blasting requirements.
816.67	Use of explosives: Seismograph measurements.
816.68	Use of explosives: Records of blasting operations.
816.71	Disposal of excess spoil: General requirements.
816.72	Disposal of excess spoil: Valley fills.

816.73	Disposal of excess spoil: Head-of-hollow fills.
816.79	Protection of underground mining.
816.81	Coal processing waste: General requirements.
816.82	Coal processing waste banks: Site inspection.
816.83	Coal processing waste banks: Water control measures.
816.85	Coal processing waste banks: Construction requirements.
816.86	Coal processing waste: Burning.
816.87	Coal processing waste: Burned waste utilization. I26816.88 Coal processing waste: Return to underground workings.
816.89	Disposal of non-coal wastes.
816.91	Coal processing waste: Dams and embankments: General requirements.
816.92	Coal processing waste: Dams and embankments: Site preparation.
816.93	Coal processing waste: Dams and embankments: Construction.
816.95	Air resources protection.
816.97	Protection of fish, wildlife and related environmental values.
816.99	Slides and other damage.
816.100	Contemporaneous reclamation.
816.101	Backfilling and grading: General requirements.
816.102	Backfilling and grading: General grading requirements.
816.103	Backfilling and grading: Covering coal and acid- and toxic-forming materials.
816.104	Backfilling and grading: Thin overburden.
816.105	Backfilling and grading: Thick overburden.
816.106	Regrading or stabilizing rills and gullies.
816.111	Revegetation: General requirements.
816.112	Revegetation: Use of introduced species.
816.113	Revegetation: Timing.
816.114	Revegetation: Mulching.
816.115	Revegetation: Grading.
816.116	Revegetation: Standards for success.
816.117	Revegetation: Tree stocking for forest land.
816.131	Cessation of operations: Temporary.
816.132	Cessation of operations: Permanent.
816.133	Post-mining land use.

Authority: Sections 102, 201, 501, 503, 504, 508, 515, 517, 519, 701, 717, and 719 of Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 471, 478, 486, 498, 501, 516, 526 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1258, 1265, 1267, 1269, 1291, 1307, 1309).

SECTION 816.1 - SCOPE.

This Part sets forth the minimum performance standards for surface mining activities. Performance standards for other mining activities are set forth in Parts 817 828 of this Subchapter. {41880}

SECTION 816.2 - OBJECTIVES.

This Part is intended to ensure that all surface mining activities are conducted in a manner which preserves and enhances environmental and other values in accordance with the Act.

SECTION 816.11 - SIGNS AND MARKERS.

(a) Specifications. Each sign and marker required to be posted under this Part shall:

- (1) Be of a uniform design throughout the operation that can be seen and read easily;
- (2) Be made of durable material; and
- (3) Conform to each local ordinance and code.

(b) Duration of maintenance. Each person who conducts surface mining activities shall maintain each sign and marker during all activities to which they pertain.

(c) Mine and permit identification signs:

(1) Each person who conducts surface mining activities shall display identification signs at each point of access to the permit area from public roads.

(2) The signs shall show the name, business address, and telephone number of the person who conducts the surface mining activities and the identification number of each current permit authorizing surface mining activities.

(3) Each sign shall not be removed until after the release of all bonds.

(d) Perimeter markers. Each person who conducts surface mining activities shall clearly mark the perimeter of the permit area before submitting a permit application.

(e) Buffer zone markers. Each person who conducts surface mining activities shall mark each buffer zone, as required by Section 816.57 of this Part. Each buffer zone marker shall be designed and placed in the same manner as the perimeter markers. Each buffer zone marker shall be located along the boundary of the buffer zone.

(f) Blasting signs. If blasting is conducted incident to surface mining activities, the person who conducts these activities shall conspicuously display:

(1) Signs reading "'Blasting Area" at the edge of blasting areas along roads within the permit area; and

(2) Signs clearly explaining the blasting warning and all-clear signals at all entrances to the permit area from a public road or highway.

(g) Topsoil markers. Where topsoil or other vegetation-supporting material is required to be segregated and stockpiled under Section 816.23, the person who conducts the surface mining activities shall clearly mark the stockpiled material.

SECTION 816.13 - CASING AND SEALING OF DRILLED HOLES: GENERAL REQUIREMENTS.

Each exploration hole, other borehole, well, or other exposed underground opening shall be cased, sealed, or otherwise managed to prevent pollution and mixing of surface or ground water, and to ensure the safety of people, livestock, wildlife, and machinery in the area where these openings could be a hazard. Each exploration hole, borehole, well, or other underground opening that is uncovered or exposed by mining activities within the permit area shall be permanently closed, in a manner approved by the regulatory authority, unless the opening is approved for monitoring. This Section does not apply to holes drilled and used for blasting.

SECTION 816.14 - CASING AND SEALING OF DRILLED HOLES: TEMPORARY.

Each exploration hole, other borehole, well and other exposed underground opening which has been identified in the approved mining and reclamation plan to be used for return of coal processing waste or water to underground workings or to be used to monitor ground water conditions shall be temporarily sealed before use and shall be protected during use by barricades or fences or other protective devices approved by the regulatory authority. Any barricade, fence, or other protective device shall be periodically inspected and maintained in good operating condition by the person who conducts the surface mining activities.

SECTION 816.15 - CASING AND SEALING OF DRILLED HOLES: PERMANENT.

Each exploration hole, other borehole, well, and other exposed underground opening to the surface shall be capped, sealed, or backfilled, as required by the regulatory authority consistent with 30 CFR 75.1711. Closure measures shall be of a permanent design to prevent access to the mine workings by people and animals and to prevent the flow of water.

SECTION 816.21 - TOPSOIL: GENERAL REQUIREMENTS.

(a) Before disturbance of an area, topsoil and subsoils to be saved under Section 816.22 shall be removed from the area as a separate operation and segregated from other material.

(b) After removal, topsoil shall either be immediately redistributed in accordance with Section 816.24 or stockpiled pending redistribution, if permissible under Section 816.23.

SECTION 816.22 - TOPSOIL: REMOVAL.

(a) Timing. Topsoil shall be removed after the vegetative cover that would interfere with the use of the topsoil is cleared from all areas to be affected but before any drilling, blasting, mining, or other surface disturbance of the areas.

(b) Materials to be removed. All topsoil shall be removed unless use of alternative materials is approved by the regulatory authority to be segregated in accordance with paragraph (e) of this Section. If use of alternative materials is approved, all materials to be redistributed shall be removed.

(c) Additional material to be removed in thin topsoil situations. If the topsoil is less than 6 inches, a 6 inch layer that includes the A horizon and the unconsolidated materials immediately below the A horizon, or the A horizon and all unconsolidated material if the total available is less than 6 inches, shall be removed and the mixture segregated and replaced as the surface soil layer.

(d) Subsoil segregation. The B horizon and portions of the C horizon or other underlying layers demonstrated to have qualities for root development comparable to the B or C horizons shall be segregated and replaced as subsoil if the regulatory authority determines that this segregation and replacement is necessary or desirable to ensure soil productivity consistent with the approved post-mining land use.

(e) Topsoil substitutes and supplements. Selected overburden materials may be substituted for, or used as a supplement to, topsoil where the resulting soil medium is equal to or more suitable for vegetation, and if all the following requirements have been met:

(1) It is demonstrated to the regulatory authority by the results of chemical and physical analyses of overburden and topsoil that the selected overburden materials or an overburden and topsoil mixture is more suitable for restoring land capability and productivity and that it is the best available material to support and sustain the approved vegetation. These analyses shall include determinations of pH, sulfide content that when oxidized will lower the pH, percent organic material, nitrogen, phosphorus, potassium, texture class, water-holding capacity, and such other analyses as required by the regulatory authority. The regulatory authority may also require that results of field-site trials or greenhouse tests be used to demonstrate the feasibility of using such overburden materials.

(2) The chemical and physical analyses and the results of field-site trials and greenhouse tests submitted to the regulatory authority shall be accompanied by a certification from a qualified soil scientist or agronomist, stating, on the basis of the test results, that the proposed substitute material is equal to or more suitable for sustaining the vegetation than is the available topsoil, that the substitute material is the best available material to support the vegetation, and that the tests and analyses were conducted under his or her supervision and used standard testing procedures. {41881}

(3) The tests and analyses shall be conducted by a laboratory approved by the regulatory authority.

(4) The alternative material shall be removed, segregated, and replaced in compliance with the requirements for topsoil under this Section.

(f) Limits on topsoil removal area. Where the removal of vegetative material, topsoil or other materials may result in erosion which may cause air or water pollution, the person who conducts surface mining activities shall:

(1) Limit the size of the area from which topsoil is removed at any one time;

(2) Redistribute the surface soil layer at a time when the physical and chemical properties of topsoil can be protected and erosion can be minimized; and

(3) Take such other measures as the regulatory authority may approve or require to control erosion.

SECTION 816.23 - TOPSOIL: STORAGE. {41881}

(a) The topsoil and other materials removed under Section 816.22 shall be stockpiled only when it is impractical to promptly redistribute such materials on regraded areas.

(b) The stockpiled materials shall be placed on a stable area within the permit area where the materials shall not be disturbed or exposed to excessive water or wind erosion, or to contaminants which lessen the capability to support vegetation before they can be redistributed:

(1) Stockpiles shall be selectively placed and protected from wind and water erosion, unnecessary compaction, and contamination by undesirable materials either by:

(i) An effective cover of nonnoxious, quick-growing annual and perennial plants, seeded or planted during the first normal period for favorable planting conditions; or

(ii) Other methods demonstrated to and approved by the regulatory authority to provide equal protection.

(2) Unless approved by the regulatory authority, stockpiled topsoil and other materials shall not be moved until required for redistribution on a regraded area.

SECTION 816.24 - TOPSOIL: REDISTRIBUTION.

(a) After final grading and before the replacement of topsoil and other materials segregated in accordance with Section 816.23, regraded land shall be scarified or otherwise treated to eliminate slippage surfaces and to promote root penetration. If the person who conducts the surface mining activities shows, through appropriate tests, and the regulatory authority approves, that no harm will be caused to the topsoil and vegetation, the scarification may be conducted after topsoiling.

(b) Topsoil and other materials shall be redistributed in a manner that:

(1) Achieves an approximate uniform, stable thickness consistent with the post-mining land uses, slopes, agricultural aspects and surface drainage system;

(2) Prevents excess compaction of the topsoil; and

(3) Protects the topsoil from wind and water erosion before and after it is seeded and planted.

SECTION 816.25 - TOPSOIL: NUTRIENTS AND SOIL AMENDMENTS.

Nutrients and soil amendments in the amounts determined by soil tests shall be applied to the redistributed surface soil layer so that it supports the post-mining land use approved by the regulatory authority, and meets the revegetation requirements of Sections 816.111 816.117. All soil tests shall be conducted by a laboratory approved by the regulatory authority and certified by a qualified agronomist or soil scientist.

SECTION 816.31 - ROADS AND ASSOCIATED STRUCTURES: GENERAL REQUIREMENTS.

(a) Each person who conducts surface mining activities shall design, construct, utilize, maintain, and reclaim all roads, road rights-of-way, and associated structures to meet the requirements of Sections 816.32 816.35, 816.38, and 816.95 to control or prevent erosion and siltation, air and water pollution, and damage to public or private property:

(1) To the extent possible using the best technology currently available, roads, road rights-of-way, associated structures, and other transportation facilities shall not cause damage to fish, wildlife, and related environmental values and shall not cause additional contributions of suspended solids to streamflow, or to runoff outside the permit area. In no event shall contributions of suspended solids be in excess of limitations set by applicable State or Federal law.

(2) All roads shall be removed and the land affected regraded and revegetated in accordance with the requirements of Section 816.38 unless:

(i) Retention of the road is approved as part of the approved post-mining land use or as being necessary to control erosion adequately;

(ii) The necessary maintenance is assured; and

(iii) All drainage shall be controlled according to Section 816.34.

SECTION 816.32 - ROAD CONSTRUCTION: LOCATION.

(a) All roads shall be located insofar as possible on ridges or on the flattest and most stable available slopes to minimize erosion. Except as otherwise specifically authorized in this Section, no part of any road shall be located in the channel of a perennial stream. Stream fords are prohibited unless they are specifically approved by the regulatory authority as temporary routes across non-flowing streams that will not adversely affect sedimentation or fish, wildlife and related environmental values and that will not be used for coal haulage. All other stream crossings shall be made using bridges, culverts, or other structures designed, constructed, and maintained to meet the requirements of this Section. Roads shall not be constructed in a manner that increases erosion or causes additional downstream sedimentation or flooding.

SECTION 816.33 - ROAD CONSTRUCTION: EROSION CONTROL.

In order to control erosion and subsequent disturbance of the hydrologic balance, roads shall be designed, constructed, and maintained in compliance with the following:

(a) Vertical alinement. Except where the regulatory authority requires lesser grades to control erosion, road grades shall be as follows:

- (1) The overall grade shall not exceed 1 v :10 h (10 percent).
- (2) The maximum grade shall not exceed 1 v :6.5 h (15 percent).
- (3) There shall not be more than 300 feet of grade exceeding 10 percent within any consecutive 1,000 feet of road constructed.
- (4) The road surface shall be sloped toward the ditch line at the minimum rate of one-half inch per foot of surface width or crowned at the minimum rate of one-half inch per foot of surface width as measured from the centerline of the road.

(b) Road cuts. This paragraph applies to roads that are to remain in place and be used for more than 5 years or that are to remain as part of the approved post-mining land use. Cut slopes shall not be steeper than specifically authorized by the regulatory authority. The regulatory authority shall not authorize slopes steeper than 1 v :1.5 h in unconsolidated materials or 1 v :0.25 h in rock except that steeper slopes may be specifically authorized by the regulatory authority if geotechnical analysis demonstrates that a minimum safety factor of 1.5 can be maintained.

(c) Road embankments. This paragraph applies to roads that are to remain in place and be used for more than 5 years or that are to remain as part of the approved post-mining land use. Embankment sections shall be constructed in accordance with the following provisions: {41882}

(1) All vegetative materials and topsoil shall be removed from the embankment foundation to ensure stability and no vegetative materials or topsoil shall be placed beneath or in any road embankment.

(2) When an embankment is to be placed on side slopes exceeding 1 v :5 h (20 percent) the existing ground shall be plowed, stepped, and keyed in a manner which ensures the stability of the fill. The minimum dimensions of the keyway shall be 10 feet wide and 2 feet deep below the toe of fill. No material shall be placed, or allowed to slide, below the toe.

(3) Material containing by volume less than 25 percent of rock larger than 6 inches in greatest dimension shall be spread in successive horizontal layers not exceeding 12 inches in thickness before compaction.

(4) Where the material for an embankment consists of rock, broken stone, or fragmented material of a size that makes placing in 12-inch layers impossible under paragraph (c)(3) of this section, the embankment shall be constructed in layers less than 24 inches in thickness, provided the individual pieces are placed so that there is no nesting and all the voids are filled with finer material.

(5) Each layer of the embankment shall be completed, leveled, and compacted before the succeeding layer is placed. Loads of material shall be leveled as placed and kept smooth. The successive layers shall be compacted evenly by routing the hauling and leveling equipment over the layers already in place and by distributing the travel over the entire width of the embankment. This routine shall be continued until no visual horizontal movement of the embankment material is apparent.

(6) Successive lifts shall not be placed until the previous layer is compacted to achieve a density throughout the preceding lift of at least 90 percent of the maximum dry density determined in accordance with the American Association of State Highway and Traffic Officers (AASHTO) T 99. The AASHTO technical specification T 99 mentioned in this paragraph is hereby incorporated by reference. This work is incorporated as it exists on the date of adoption of this Part and notices of changes made in these materials will periodically be published in the Federal Register. AASHTO technical specification T 99 is available for inspection at OSM's office in OSM regional offices and in OSM's office in the Department of the Interior, 18th and C Streets, NW., Washington, D.C. 20240.

(7) Material shall be placed in an embankment only when its moisture content is within 4 percent of the optimum moisture content determined in accordance with AASHTO T 99.

(8) Embankment slopes shall not be steeper than 1 v :2 h (50 percent).

(9) The minimum safety factor for all embankments shall be 1.25, or such higher safety factor as the regulatory authority may specify.

(d) Natural drainage. Natural drainways shall not be altered or relocated for the purposes of road construction without the prior approval of the regulatory authority. The regulatory authority may approve alterations and relocations only if:

- (1) The natural drainage is not blocked;
- (2) No damage occurs to the hydrologic balance; and
- (3) There is no adverse impact on adjoining landowners.

SECTION 816.34 - ROAD CONSTRUCTION: DRAINAGE.

(a) General.

(1) Each road shall be designed, constructed, and maintained to have adequate drainage using structures such as, but not limited to, ditches, cross drains, and ditch relief drains. For roads that are to be maintained for more than 1 year, the water-control system shall be designed to safely pass the peak runoff from a 10-year 24-hour precipitation event or greater if required by the regulatory authority. Drainage pipes and culverts shall be constructed to avoid plugging or collapse and erosion at inlets and outlets. Drainage ditches shall be placed at the toe of all cut slopes formed by construction of roads. Trash racks and debris basins shall be installed in the drainage ditches wherever debris from the drainage area could impair the functions of drainage and sediment control structures.

(2) All drainage from roads and associated drainage structures shall pass through sediment control devices such as sediment ponds, sediment traps, vegetation filter strips, vegetated drains, straw dikes, mulches, check dams, and dugout ponds.

(b) Ditches. A ditch shall be provided on both sides of a through-cut and on the inside shoulder of a cut-fill section, with ditch relief cross-drains being spaced according to grade. Water shall be intercepted before reaching a switchback or large fill and drained safely away in accordance with this Section. Water on a fill or switchback shall be released below the fill, using conduit or riprapped channels, and shall not be discharged onto the fill.

(c) Culverts. Ditch relief culverts shall be installed according to the following provisions:

(1) Road grade:

In percent	Spacing of culverts, in ft, not more than:
2 to 5	800
6 to 10	300
11 to 15	200

(2) Each culvert shall be adequate to safely pass the peak runoff from a 10-year 24-hour precipitation event and shall cross the road at not less than a 30 angle downgrade. The culvert may be designed to carry less than the peak runoff if the ditch will remain stable.

(3) The inlet end shall be protected by a rock headwall or other material approved by the regulatory authority and the outlet end shall be placed below the toe of the fill with an apron of rock riprap or other approved material.

(4) The culvert shall be covered by compacted fill to a minimum depth of 1 foot or half the culvert diameter, whichever is greater.

(5) The culvert shall be capable of sustaining design loads.

(d) Stream crossings. Drainage structures are required for stream channel crossings. Drainage structures shall not affect the normal flow or gradient of the stream. In designing drainage structures consideration shall be given to the time of year the stream is crossed and the length of time the structure is used. Embankments constructed across streams shall not exceed 15 feet in height, measured on the upstream side, unless approved by the regulatory authority. Stream crossings which have drainage areas greater than 100 acres shall be designed to safely pass the 100-year storm or larger event as specified by the regulatory authority.

SECTION 816.35 - ROAD CONSTRUCTION: SURFACING.

Roads shall be surfaced with rock or other material approved by the regulatory authority as sufficiently durable. Toxic or acid-forming substances shall not be used. Vegetation shall not be cleared for more than the width necessary for road and associated ditch construction, to serve traffic needs and for utilities.

SECTION 816.36 - OTHER TRANSPORTATION FACILITIES.

Railroad loops, spurs, sidings, or other transport facilities shall be designed, constructed, maintained, and reclaimed to:

- (a) Prevent, to the extent possible using the best technology currently available:
 - (1) Damage to fish, wildlife and related environmental values; and
 - (2) Additional contributions of suspended solids to streamflow or runoff outside the permit area. In no event shall contributions be in excess of limitations set by applicable State or Federal law. {41883}
- (b) Control and minimize diminution or degradation of water quality and quantity.
- (c) Control and minimize erosion and siltation.
- (d) Control and minimize air pollution.
- (e) Prevent damage to public or private property.

SECTION 816.38 - RESTORATION OF ROADS.

- (a) Unless the regulatory authority approves retention of the road as suitable for the approved post-mining land use, immediately after a road becomes no longer needed for operations, reclamation, or monitoring_
 - (1) The road shall be closed to vehicular traffic;
 - (2) All bridges and culverts shall be removed;
 - (3) Cross drains, dikes, and water bars shall be constructed to prevent erosion;
 - (4) Road surfaces shall be scarified and covered with topsoil; and
 - (5) The area affected shall be returned to approximate original contour and revegetated in accordance with Sections 816.111 – 816.117.
- (b) Unless otherwise authorized by the regulatory authority, all road surfacing materials shall be removed and handled or conveyed and disposed of in accordance with Section 816.89.

SECTION 816.39 - SUPPORT FACILITIES AND UTILITY INSTALLATIONS.

- (a) The support facilities required for or used incidental to the operation of the mine, including but not limited to mine buildings, coal loading facilities at or near the mine site, coal storage facilities, equipment storage facilities, sheds, shops, and other buildings, shall be designed, constructed, and located to prevent or control erosion and siltation, water pollution, or damage to public or private property and shall comply with all the environmental and other performance standards of this Part. Support facilities shall be designed, constructed, maintained, and used in a manner which prevents, to the extent possible using the best technology currently available:
 - (1) Damage to fish, wildlife and related environmental values;
 - (2) Additional contributions of suspended solids to streamflow or runoff outside the permit area. In no event shall such contributions be in excess of limitations set by applicable State or Federal law.
- (b) All surface mining activities shall be conducted in a manner which prevents damage, destruction, or disruption of services provided by oil, gas, and water wells; oil, gas, and coal-slurry pipelines; railroads; and electric and telephone lines which pass over, under, or through the permit area, unless otherwise approved by the owner and the regulatory authority.

SECTION 816.41 - HYDROLOGIC BALANCE: GENERAL REQUIREMENTS.

- (a) Surface mining activities shall be planned and conducted to minimize disturbance to the prevailing hydrologic balance in order to prevent long-term adverse changes in the hydrologic balance that could result from those activities, on both the mine plan and affected areas.
- (b) Changes in water quality and quantity, in the depth to ground water, and in the location of surface water drainage channels shall be minimized so that the approved post-mining land use of the disturbed land is not adversely affected.

(c) In no case shall applicable Federal and State water quality statutes, regulations, standards, or effluent limitations be violated.

(d) Operations shall be conducted to minimize water pollution and, where necessary, treatment methods shall be used to control water pollution:

(1) A person who conducts surface mining activities shall emphasize mining and reclamation practices that will prevent or minimize water pollution and changes in flow in preference to the use of water treatment facilities.

(2) Practices to control and minimize pollution include, but are not limited to:

- (i) Stabilizing disturbed areas through land shaping;
- (ii) Diverting runoff;
- (iii) Achieving quickly germinating and growing stands of temporary vegetation;
- (iv) Regulating channel velocity of water;
- (v) Lining drainage channels with rock or vegetation;
- (vi) Mulching;
- (vii) Selectively placing and sealing acid-forming and toxic-forming materials; and
- (viii) Selectively placing waste materials in backfill areas.

(3) If these practices are not adequate to meet the hydrologic requirements of this Part, the person who conducts the surface mining activities shall operate and maintain the necessary water treatment facilities for as long as treatment is required.

SECTION 816.42 - HYDROLOGIC BALANCE: WATER QUALITY STANDARDS AND EFFLUENT LIMITATIONS.

(a) All surface drainage from the disturbed area, including disturbed areas that have been graded, seeded, or planted, shall be passed through a sedimentation pond or a series of sedimentation ponds before leaving the permit area. Sedimentation ponds and other treatment facilities shall be maintained until drainage from the disturbed area has met the ambient surface water quality requirements of Section 816.52 and the revegetation requirements of Sections 816.111– 816.117. The regulatory authority may grant exemptions from this requirement only when the disturbed drainage area within the total disturbed area is small and if the person who conducts the surface mining activities demonstrates to the regulatory authority that sedimentation ponds and treatment facilities are not necessary to meet the effluent limitations of this Section and maintain water quality in downstream receiving waters. For the purposes of this Section, disturbed area shall not include those areas in which only diversion ditches, sedimentation ponds, or roads are installed in accordance with this Part and the upstream area is not otherwise disturbed by the person who conducts the surface mining activities. Sedimentation ponds required by this Section shall be constructed in accordance with Section 816.46 in appropriate locations before beginning any surface mining activities in the affected drainage area. Discharges from areas disturbed by surface mining activities shall comply with all applicable Federal and State laws and regulations and, at a minimum, the following numerical effluent limitations:

Effluent limitations, in milligrams per liter (mg/l) except for pH 017

Effluent characteristics	Maximum allowable	Average of daily values for 30 consecutive discharge days
+++1	2	
Iron, total	7.0	3.5
Manganese, total		
+++3	4.0	2.0
Total suspended solids 4	70.0	35.0
pH	Within range f 6.0 to 9.0 5	

1 – To be determined according to collection and analytical procedures adopted by the Environmental Protection Agency's regulations for wastewater analyses (40 CFR 136).

2 – Based on representative sampling.

3 – The manganese limitations shall not apply to untreated discharges which are alkaline as defined by the Environmental Protection Agency (40 CFR 434).

4 – In Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming, total suspended solids limitations will be determined on a case-by-case basis, but they must not be greater than 45 mg/l (maximum allowable) and 30 mg/l (average of daily value for 30 consecutive discharge days) based on a representative sampling.

5 – Where the application of neutralization and sedimentation treatment technology results in inability to comply with the manganese limitations set forth, the regulatory authority may allow the pH level in the discharge to exceed to a small extent the upper limit of 9.0 in order that the manganese limitations will be achieved.

(b) A discharge from the disturbed areas is not subject to the effluent limitations of this Section if:

(1) The discharge is demonstrated by the discharger to have resulted from a precipitation event larger than a 10-year 24-hour precipitation event or from a snowmelt of equivalent volume; and

(2) The discharge is from facilities designed, constructed, and maintained in accordance with the requirements of this Part.

(c) Adequate facilities shall be installed, operated, and maintained to treat any water discharged from the disturbed area so that it complies with applicable Federal and State laws or regulations and the limitations of this Section. If the pH of water to be discharged from the disturbed area is less than 6.0, an automatic lime feeder or other automatic neutralization process approved by the regulatory authority shall be installed, operated, and maintained. The regulatory authority may authorize the use of a manual system if it finds that:

(1) Small and infrequent treatment requirements to meet applicable standards do not require use of an automatic neutralization process;

(2) The mine normally produces less than 500 tons of run-of-mine coal per day; and

(3) Timely and consistent treatment is ensured.

SECTION 816.43 - HYDROLOGIC BALANCE: DIVERSIONS AND CONVEYANCE OF OVERLAND FLOW AND SHALLOW GROUND WATER FLOW.

Overland flow including flow through litter, and shallow ground water flow from undisturbed areas may be diverted away from disturbed areas by means of temporary or permanent diversions if required or approved by the regulatory authority as necessary to minimize erosion and to prevent or remove water from contact with acid-forming or toxic-forming materials. The following requirements shall be met for all diversions and for all collection drains that are used to transport water into water-treatment facilities.

(a) Temporary diversions shall be constructed to pass safely the peak runoff from a precipitation event with a 3-year recurrence interval, or a larger event if specified by the regulatory authority.

(b) To protect fills and property and to avoid danger to public health and safety, permanent diversions shall be constructed to pass safely the peak runoff from a precipitation event with a 10-year recurrence interval, or a larger event if specified by the regulatory authority. Permanent diversions shall be constructed with gently sloping banks that are stabilized by vegetation. Asphalt, concrete, or other similar linings shall not be used unless specifically required by the regulatory authority to prevent seepage or to provide stability.

(c) Diversions shall be designed, constructed, and maintained in a manner which prevents additional contributions of suspended solids to streamflow and to runoff outside the permit area, to the extent possible using the best technology currently available. Appropriate sediment control measures for these diversions shall include, but not be limited to, maintenance of appropriate gradients, channel lining, revegetation, roughness structures, and detention basins.

(d) No diversion shall be constructed on or pass through existing slides or located so as to increase the potential for slides.

(e) When no longer needed, each temporary diversion shall be removed and the affected land regraded, topsoiled, and revegetated in accordance with Sections 816.24, 816.25, 816.101, and 816.111- 816.117.

(f) Diversion design shall incorporate the following:

(1) Any channel lining shall be designed using standard engineering practices to safely pass the design velocities.

Riprap shall comply with the requirements of Section 816.72(b)(5).

(2) The design freeboard shall be no less than calculated using the following equation:

$$f = 1 (0.025 v d)$$

Where f = freeboard, in feet, v = design velocity, in feet per second, and d = depth of flow, in feet. Additional freeboard protection shall be provided for transition of flows and for critical areas such as swales and curves.

(3) Energy dissipators shall be installed at discharge points where diversions intersect with natural streams.

(4) Excess excavated material not necessary for diversion channel geometry or regrading of the channel shall be disposed of in accordance with 30 CFR 816.71 – 816.73.

(5) Topsoil shall be handled in compliance with 30 CFR 816.21 – 816.25.

SECTION 816.44 - HYDROLOGIC BALANCE: STREAM CHANNEL DIVERSIONS.

(a) Flow from perennial and intermittent streams within the permit area may be diverted if:

(1) The diversions are approved by the regulatory authority as necessary to comply with other performance standards in this Subchapter; and

(2) The diversions comply with local, State, and Federal statutes and regulations.

(b) When streamflow is allowed to be diverted, the new stream channel shall be designed, constructed, and removed in accordance with the following requirements:

(1) The longitudinal profile of the stream, the channel and the flood plain shall be designed and constructed to remain stable and to prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow or to runoff outside the permit area. In no event shall the contributions be in excess of requirements set by applicable State or Federal law. Erosion control structures such as channel lining structures, retention basins, and artificial channel roughness structures shall be used in diversions only when approved by the regulatory authority as being necessary to control erosion. These structures shall be approved for permanent diversions only where they are stable and will require infrequent maintenance.

(2) Channel, bank, and flood-plain configurations shall be adequate to pass safely the peak runoff of a 24-hour precipitation event with a 10-year recurrence interval for temporary diversions and a 100-year recurrence interval for permanent diversions, or larger events as specified by the regulatory authority.

(c) When no longer needed to achieve the purpose for which they were authorized, all temporary stream channel diversions shall be removed and the affected land regraded and revegetated in accordance with the requirements of Sections 816.24, 816.25, 816.101, and 816.111- 816.117. At the time diversions are removed, downstream water treatment facilities previously protected by the diversion shall be modified or removed to prevent overtopping or failure of the facilities. In no case shall this requirement relieve the person who conducts the surface mining activities from maintenance of the treatment facility if otherwise required under this Part or the permit.

SECTION 816.45 - HYDROLOGIC BALANCE: SEDIMENT CONTROL MEASURES.

Appropriate sediment control measures shall be designed, constructed, and maintained to prevent additional contributions of sediment to streamflow or to runoff outside the permit area and to minimize erosion to the extent possible using the best technology currently available. Sediment control measures include practices carried out within and adjacent to the disturbed area. The sedimentation storage capacity of practices in and downstream from the disturbed area shall reflect the degree to which successful mining and reclamation techniques are applied to reduce erosion and control sediment. Sediment control measures consist of the utilization of proper mining and reclamation methods and sediment control practices, singly or in combination. Sediment control methods include but are not limited to: {41885}

(a) Disturbing the smallest practicable area at any one time during the mining operation through progressive backfilling, grading, and timely revegetation;

(b) Shaping the backfill material to promote a reduction in the rate and volume of runoff, in accordance with the requirements of Section 816.101;

- (c) Retaining sediment within disturbed areas;
- (d) Diverting runoff away from disturbed areas;
- (e) Diverting runoff using protected channels or pipes through disturbed areas so as not to cause additional erosion;
- (f) Using straw dikes, riprap, check dams, mulches, vegetative sediment filters, dugout ponds, and other measures that reduce overland flow velocity, reduce runoff volume, or trap sediment;
- (g) Building and maintaining sedimentation ponds; and
- (h) Treating with chemicals.

SECTION 816.46 - HYDROLOGIC BALANCE: SEDIMENTATION PONDS.

- (a) General requirements. Sedimentation ponds shall be used individually or in series and shall:
 - (1) Be constructed before any disturbance of the disturbed area to be drained into the pond;
 - (2) Be located as near as possible to the disturbed area and out of perennial streams; and
 - (3) Meet all the criteria of this Section.
- (b) Sediment storage volume. Sedimentation ponds shall provide a sediment storage volume equal to:
 - (1) The accumulated sediment volume from the drainage area to the pond for a minimum of 3 years. Sediment storage volume shall be determined using the Universal Soil Loss Equation, gully erosion rates, and sediment delivery ratio converted to sediment volume using the sediment density, or other empirical methods established by the regulatory authority and based upon actual sedimentation pond studies; or
 - (2) 0.1 acre-foot for each acre of disturbed area within the upstream drainage area or a greater amount based upon sediment yield to the pond if required by the regulatory authority. The regulatory authority may approve a sediment storage volume of no less than .035 acre-foot for each acre of disturbed area within the upstream drainage area if the person who conducts the surface mining activities demonstrates that sediment removed by other sediment control measures is equal to the reduction in sediment storage volume.
- (c) Detention time. Sedimentation ponds shall provide a 24 hour theoretical detention time for the water inflow or runoff entering the pond from a 10 year 24-hour precipitation event. Runoff diverted in accordance with Sections 816.43 and 816.44, away from the disturbed drainage areas and not passed through the sedimentation pond need not be considered in sedimentation pond design. In determining the runoff volume, the characteristics of the mine site, reclamation procedures, and onsite sediment control practices shall be considered:
 - (1) The regulatory authority may approve a theoretical detention time of not less than 10 hours, when the person who conducts the surface mining activities demonstrates that:
 - (i) The improvement in sediment removal efficiency is equivalent to the reduction in detention time as a result of pond design. Improvements in pond design may include but are not limited to pond configuration, in-flow and out-flow facility locations, baffles to decrease in-flow velocity and short-circuiting, and surface areas; and
 - (ii) The pond effluent is shown to achieve and maintain applicable effluent limitations.
 - (2) The regulatory authority may approve a theoretical detention time of not less than 10 hours when the person who conducts the surface mining activities demonstrates that the size distribution or the specific gravity of the suspended matter is such that applicable effluent limitations are achieved and maintained.
 - (3) The regulatory authority may approve a theoretical detention time of less than 24 hours to any level of detention time when the person who conducts the surface mining activities demonstrates to the regulatory authority that the chemical treatment process to be used:
 - (i) Will achieve and maintain the effluent limitations;
 - (ii) Is harmless to fish, wildlife and related environmental values;
 - (iii) Is planned under the supervision of a registered professional engineer; and
 - (iv) Shall be operated by a qualified person approved by the regulatory authority.
 - (4) The calculated theoretical detention time and all supporting documentation and drawings used to establish the required detention times under paragraphs (c)(1) (3) of this section shall be included in the permit application.
- (d) Dewatering. The water storage resulting from inflow shall be removed by a nonclogging dewatering device or a spillway approved by the regulatory authority, and shall have a discharge rate to achieve and maintain the required

theoretical detention time. The dewatering device shall not be located at a lower elevation than the maximum elevation of the design sedimentation storage volume.

(e) Each person who conducts surface mining activities shall design, construct, and maintain sedimentation ponds to prevent short-circuiting.

(f) The design, construction, and maintenance of a sedimentation pond or other sediment control measures in accordance with this Section shall not relieve the person from compliance with applicable effluent limitations.

(g) There shall be no out-flow through the emergency spillway during the passage of the runoff resulting from the 10 year 24-hour precipitation event through the sedimentation pond.

(h) Sediment shall be removed from sedimentation ponds when the volume of sediment accumulates to 60 percent of the required sediment storage volume. With the approval of the regulatory authority, additional permanent water storage may be provided above that required for sediment storage if the person who conducts the surface mining activities demonstrates that applicable effluent limitations will be achieved and maintained. Upon the approval of the regulatory authority for those cases where additional permanent water storage is provided above that required for sediment under paragraph (b) of this Section, sediment removal may be delayed until the remaining volume of permanent storage has decreased to 40 percent of the required sediment storage provided the theoretical detention time is maintained.

(i) An appropriate combination of principal and emergency spillways shall be provided to discharge safely the runoff from a 25-year 24-hour precipitation event, or larger event as specified by the regulatory authority. The elevation of the crest of the emergency spillway shall be a minimum of 1.0 foot above the crest of the principal spillway. Emergency spillway grades and allowable velocities shall be as specified by the regulatory authority.

(j) The minimum elevation at the top of the settled embankment shall be 1.0 foot above the water surface in the reservoir with the emergency spillway flowing at design depth.

(k) The constructed height of the dam shall be increased a minimum of 5 percent over the design height to allow for settlement unless it has been demonstrated to the regulatory authority that the material used and the design will ensure against all settlement.

(l) The minimum top width of the embankment shall not be less than the quotient of $(H/35)^2$ where H is the height of the embankment as measured from the upstream toe of the embankment. {41886}

(m) The upstream and downstream side slopes of the settled embankment shall not be less than 1 v : 5 h with neither slope steeper than 1 v : 2 h . Slopes shall be designed to be stable in all cases, even if flatter side slopes are required.

(n) The embankment foundation area shall be cleared of all organic matter, all surfaces sloped to no steeper than 1 v : 1 h , and the entire foundation surface scarified.

(o) The fill material shall be free of sod, large roots, other large vegetative matter, and frozen soil, and in no case shall coal-processing waste be used.

(p) The placing and spreading of fill material shall be started at the lowest point of the foundation and the fill brought up in horizontal layers of such thickness as required by the regulatory authority to facilitate compaction. Compaction shall be conducted as specified by the regulatory authority in order to achieve stability.

(q) If a sedimentation pond has an embankment that is more than 20 feet in height, as measured from the upstream toe of the embankment to the crest of the emergency spillway, or has a storage volume of 20 acre-feet or more, the following additional requirements shall be met:

(1) An appropriate combination of principal and emergency spillways shall be provided to safely discharge the runoff resulting from a 100-year 24-hour precipitation event, or a larger event if specified by the regulatory authority.

(2) The embankment shall be designed and constructed with a static safety factor of at least 1.5 or such higher safety factor as designated by the regulatory authority to ensure stability.

(3) Appropriate barriers shall be provided to control seepage along conduits that extend through the embankment.

(r) Each pond shall be designed and inspected during construction under the supervision of, and certified after construction by, a registered professional engineer.

(s) The entire embankment including the surrounding areas disturbed by construction shall be graded, fertilized, seeded, and mulched in accordance with Sections 816.111 – 816.117 immediately after the embankment is completed, provided that the active, upstream face of the embankment where water will be impounded may be riprapped or otherwise stabilized. Areas in which the vegetation is not successful or where rills and gullies develop shall be repaired and revegetated in accordance with Sections 816.106 and 816.111 – 816.117.

(t) All ponds, including those not meeting the size or other criteria of 30 CFR 77.216(a), shall be examined for structural weakness, erosion, and other hazardous conditions in accordance with the inspection requirements contained in 30 CFR 77.216 3. Each person who conducts surface mining activities shall deliver to the regulatory authority any report or notification required under 30 CFR 77.216 3 whether or not the pond meets the criteria of 30 CFR 77.216(a).

(u) Each sedimentation pond shall be removed and the affected land regraded and revegetated in accordance with Sections 816.101, 816.102, and 816.111 – 816.117, unless approved by the regulatory authority for retention as being compatible with the approved postmining land use. If the regulatory authority approves retention, the sedimentation pond shall meet all the requirements for permanent impoundments in Section 816.49.

SECTION 816.47 - HYDROLOGIC BALANCE: DISCHARGE STRUCTURES.

Discharges from sedimentation ponds and diversions shall be controlled, using energy dissipators, surge ponds, riprap channels, and other devices where necessary, to reduce erosion and prevent deepening or enlargement of stream channels and to minimize disturbances to the hydrologic balance. Discharge structures shall be designed according to standard engineering design procedures.

SECTION 816.48 - HYDROLOGIC BALANCE: ACID-FORMING AND TOXIC-FORMING SPOIL.

Drainage from acid-forming and toxic-forming spoil into ground and surface water shall be avoided by_

(a) Identifying, burying, and treating where necessary, spoil which, in the judgment of the regulatory authority, may be detrimental to vegetation or that may adversely affect water quality if not treated or buried. This material shall be buried, treated, or disposed of in accordance with the provisions of paragraph (c) of this Section;

(b) Preventing water from coming into contact with acid-forming and toxic-forming spoil in accordance with Section 816.103, or such other measures as the regulatory authority may require; and

(c) Burying or otherwise treating all acid-forming or toxic-forming spoil within 30 days after it is first exposed on the mine site, or within a lesser period if required by the regulatory authority. Temporary storage of the spoil may be approved by the regulatory authority upon a finding that burial or treatment within 30 days is not feasible and that storage will not result in any material risk of water pollution or other environmental damage. If storage is approved it shall be limited to the period until burial or treatment first becomes feasible. Stored acid-forming or toxic-forming spoil shall be placed on impermeable material and protected from erosion and contact with surface water.

SECTION 816.49 - HYDROLOGIC BALANCE: PERMANENT AND TEMPORARY IMPOUNDMENTS.

(a) Permanent impoundments are prohibited unless authorized by the regulatory authority. Each person who conducts surface mining activities shall demonstrate to the regulatory authority that each permanent impoundment meets the following requirements:

(1) The quality of the impounded water is suitable on a permanent basis for its intended use and discharges from the impoundment will not degrade the quality of receiving waters below the water quality standards under applicable State and Federal law.

(2) The level of water will be adequately stable so as to support the intended use.

(3) Adequate safety and access to the impounded water will be provided for proposed water users.

(4) Water impoundments will not result in the diminution of the quality or quantity of water used by adjacent or surrounding landowners for agricultural, industrial, recreational or domestic uses.

(5) The impoundment dam construction plan and maintenance program shall be designed to achieve stability with an adequate factor of safety compatible with that of structures constructed and maintained under 16 U.S.C. 1006 Pub. L. 83-566 Standards for structures built under this law are contained in the Soil Conservation Service Practice Standard 378, ""Ponds," and Technical Release No. 60, ""Earth Dams and Reservoirs," and are hereby incorporated by reference. These standards are available in all OSM offices. These materials are incorporated as they exist on the adoption of this Part, and notices of changes in these materials will be published periodically in the Federal Register .

(6) The size of the impoundment is adequate for its intended purposes.

(7) The impoundment will be suitable for the approved post-mining land use.

(b) Temporary impoundments of water in which the water is impounded by a dam shall meet the requirements of Section 816.46 (e) (u). {41887}

SECTION 816.50 - HYDROLOGIC BALANCE: GROUND WATER PROTECTION.

(a) Backfilled materials shall be placed so as to minimize contamination of ground water systems with acid, toxic, or otherwise harmful mine drainage, to minimize adverse off-site, effects of mining on ground water systems, and to support approved post-mining land uses.

(b) To control the effects of mine drainage, pits, cuts, and other mine excavation or disturbances shall be located, designed, constructed, and utilized in such manner as to prevent or control discharge of acid, toxic, or otherwise harmful mine drainage waters into ground water systems and to prevent adverse impacts on such ground water systems or on approved post-mining land uses.

(c) The regulatory authority may require physical, chemical and mineralogical and chemical analyses of proposed backfill materials, spoil, aquifers, overburden, mine waters, surface waters, ground waters, or other materials.

SECTION 816.51 - HYDROLOGIC BALANCE: PROTECTION OF GROUND WATER RECHARGE CAPACITY.

Surface mining activities shall be conducted in a manner that facilitates reclamation which will restore approximate pre-mining recharge capacity through restoration of the capability of the reclaimed areas as a whole, excluding coal processing waste and refuse disposal areas and fills, to transmit water to the ground water system. The recharge capacity shall be restored to a condition which:

(a) Supports the approved post-mining land use;

(b) Minimizes disturbances to the prevailing hydrologic balance in the permit area and in adjacent areas; and

(c) Provides a rate of recharge at least equal to the pre-mining recharge rate.

SECTION 816.52 - HYDROLOGIC BALANCE: SURFACE AND GROUND WATER MONITORING.

(a) Ground water.

(1) Ground water levels, infiltration rates, subsurface flow and storage characteristics, and the quality of ground water shall be monitored in the manner required by the regulatory authority to determine the effects of surface mining activities on the recharge capacity of reclaimed lands and on the quantity and quality of water in ground water systems at the mine-site and in adjacent areas.

(2) When operations may affect the ground water system, ground water levels and ground water quality shall be periodically monitored using measurements from a sufficient number of wells and mineralogical and chemical analyses of aquifer, overburden, and spoil material adequate to reflect changes in ground water quantity and quality resulting from these operations. The monitoring shall be adequate to plan for modification of surface mining activities if necessary to minimize disturbance of the hydrologic balance.

(3) As specified and approved by the regulatory authority, the person who conducts surface mining activities shall conduct additional hydrologic tests, including drilling, infiltration tests, and aquifer tests and the results shall be submitted to the regulatory authority to demonstrate compliance with Section 816.51.

(b) Surface water.

(1) Surface water monitoring shall be conducted in accordance with the monitoring program submitted under 30 CFR 780.21 (b)(4) and approved by the regulatory authority. Monitoring shall:

(i) Be adequate to measure accurately and record water quantity and quality of the discharges from the permit area;

(ii) In all cases in which analytical results of the sample collections indicate a violation of a permit condition or applicable standard has occurred, result in the operator notifying the regulatory authority immediately. Where a National Pollutant Discharge Elimination System (NPDES) permit effluent limitation has been violated, the person who conducts the surface mining activities shall forward a copy of the Discharge Monitoring Report, EPA Form 3320 1, concurrently with notification of the violation;

(iii) Result in regular reports of all samples to the regulatory authority within 60 days of the end of each 60 day sample collection period; or

(iv) If the discharge for which water monitoring reports are required, is subject to regulation by a National Pollutant Discharge Elimination System (NPDES) permit issued under the Clean Water Act of 1977 (30 U.S.C. 1251 1378) which includes equivalent reporting requirements and requires filing of the water monitoring reports within 90 days or less of sample collection, the person who conducts the surface mining activities shall submit to the regulatory authority on the same time schedule as required by the NPDES permit or within 90 days following sample collection, whichever is earlier, either:

(A) A copy of the completed reporting form filed to meet NPDES permit requirements; or

(B) A letter identifying the State or Federal government official with whom the reporting form was filed to meet NPDES permit requirements and the date of filing.

(2) After disturbed areas have been regraded and stabilized according to this Part, the person who conducts surface mining activities shall monitor surface water flow and quality. Data from this monitoring shall be used to demonstrate that the quality and quantity of runoff without treatment is consistent with the requirement of this Section to minimize disturbance to the prevailing hydrologic balance and with the requirements of this Part to attain the approved post-mining land use. These data shall provide a basis for approval by the regulatory authority for removal of water quality or flow control systems and for determining when the requirements of this Section are met. The regulatory authority shall determine the nature of data, frequency of collection, and reporting requirements.

(3) Equipment, structures, and other devices necessary to measure and sample accurately the quality and quantity of surface water discharges from the affected area shall be properly installed, maintained, and operated and shall be removed when no longer required.

SECTION 816.53 - HYDROLOGIC BALANCE: TRANSFER OF WELLS.

(a) An exploratory or monitoring well may only be transferred for further use as a water well with the prior approval of the regulatory authority. The surface owner shall submit a written request to the regulatory authority for approval of any well transfer.

(b) Upon an approved transfer of a well, the transferee shall:

(1) Assume primary liability for damages to persons or property from the well;

(2) Plug the well when necessary, but in no case later than abandonment of the well; and

(3) Assume primary responsibility for compliance with Sections 816.13-816.15 with respect to the well.

(c) Upon an approved transfer of a well, the transferor shall:

(1) Be secondarily liable for damages;

(2) Be secondarily liable for plugging the well; and

(3) Be secondarily liable for compliance with Section 816.13-816.15 with respect to the well.

(d) Nothing in this Section shall be deemed to supersede or affect the applicability of any State law requirements with respect to a well transfer.

SECTION 816.54 - HYDROLOGIC BALANCE: WATER RIGHTS AND REPLACEMENT.

Any person who conducts surface mining activities shall replace the water supply of an owner of interest in real property who obtains all or part of his supply of water for domestic, agricultural, industrial, or other legitimate use from an underground or surface source where the water supply has been affected by contamination, diminution, or interruption resulting from the surface coal mining activities. {41888}

SECTION 816.55 - HYDROLOGIC BALANCE: DISCHARGE OF WATER INTO AN UNDERGROUND MINE.

Surface water shall not be diverted into underground mine workings unless the person who conducts the surface mining activities demonstrates to the satisfaction of the regulatory authority that the diversion will:

- (a) Abate water pollution or otherwise eliminate public hazards resulting from underground mining; and
- (b) Be discharged as a controlled flow meeting the water quality requirements of Section 816.52 for pH and total suspended solids except that the total suspended solid concentrations may be exceeded only if the suspended material is approved by the regulatory authority or is limited to:
 - (1) Coal processing waste;
 - (2) Fly ash from a coal-fired facility;
 - (3) Sludge from acid drainage treatment facility;
 - (4) Flue gas desulfurization sludge;
 - (5) Inert materials used for stabilizing underground mines or;
 - (6) Underground mine development wastes; and
- (c) The discharge will not cause, result in or contribute to a violation of applicable water quality standards;
- (d) Minimize disturbance to the hydrologic balance.

SECTION 816.56 - HYDROLOGIC BALANCE: POST-MINING REHABILITATION OF SEDIMENTATION PONDS, DIVERSIONS, IMPOUNDMENTS, AND TREATMENT FACILITIES.

Before abandoning the permit area, the person who conducts the surface mining activities shall restore all permanent sedimentation ponds, diversions, impoundments, and treatment facilities to meet the original design criteria for the permanent structures and impoundments.

SECTION 816.57 - HYDROLOGIC BALANCE: STREAM BUFFER ZONES.

- (a) No land within 100 feet of a perennial stream or a stream with a macro-invertebrate biological community shall be disturbed by surface mining activities except in accordance with Section 816.44 unless the regulatory authority specifically authorizes surface mining activities closer to or through such a stream upon finding:
 - (1) That the original stream channel will be restored; and
 - (2) During and after the mining, the water quantity and quality from the stream section within 100 feet of the surface mining activities shall not be adversely affected.
- (b) The area not to be disturbed shall be designated a buffer zone and marked as specified in Section 816.11.

SECTION 816.59 - COAL RECOVERY.

Surface mining activities shall be conducted so as to maximize the utilization and conservation of the coal so that reaffected the land in the future through surface coal mining operations is minimized.

SECTION 816.61 - USE OF EXPLOSIVES: GENERAL REQUIREMENTS.

(a) Each person who conducts surface mining activities shall comply with all applicable local, State, and Federal laws and regulations and the requirements of Sections 816.61-816.68 in the storage, handling, preparation, and use of explosives.

(b) Blasting operations that use more than the equivalent of 5 pounds of TNT shall be conducted according to a time schedule approved by the regulatory authority.

(c) All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved. Each person responsible for blasting operations shall:

(1) Have demonstrated a knowledge of, and shall comply with, MSHA safety requirements and U.S. Department of Treasury security requirements;

(2) Be capable of using mature judgment in all situations;

(3) Be in good physical condition and not addicted to intoxicants, narcotics, or other similar types of drugs;

(4) Possess current knowledge of the local, State, and Federal laws and regulations applicable to the work; and

(5) Possess a valid certificate of completion of training and qualification as required by 30 CFR 850 and 851.

SECTION 816.62 - USE OF EXPLOSIVES: PRE-BLASTING SURVEY.

(a) On the request to the regulatory authority by a resident or owner of a man-made dwelling or structure that is located within one-half mile of any part of the permit area, the person who conducts the surface mining activities shall conduct a pre-blasting survey of the dwelling or structure and submit a report of the survey to the regulatory authority and to the person requesting the survey.

(b) Each person who conducts surface mining activities shall utilize personnel approved by the regulatory authority to conduct the survey to determine the condition of the dwelling or structure and to document any pre-blasting damage and other physical factors that could reasonably be affected by the blasting. Assessments of structures such as pipes, cables, transmission lines, and wells and other water systems shall be limited to surface condition and readily available data. Special attention shall be given to the pre-blasting condition of wells and other water systems used for human, animal, or agricultural purposes and to the quantity and quality of the water.

(c) A written report of the survey shall be prepared and signed by the person who conducted the survey. The report shall include recommendations of any special conditions or proposed adjustments to the blasting procedure which should be incorporated into the blasting plan to prevent damage. Copies of the report shall be provided to the person requesting the survey and to the regulatory authority.

SECTION 816.64 - USE OF EXPLOSIVES: PUBLIC NOTICE OF BLASTING SCHEDULE.

(a) Blasting schedule publication.

(1) Each person who conducts surface mining activities shall publish a blasting schedule at least 10 days, but not more than 20 days, before beginning a blasting program in which explosives that use more than the equivalent of 5 pounds of TNT are detonated. The blasting schedule shall be published in a newspaper of general circulation in the locality of the blasting site.

(2) Copies of the schedule shall be distributed by mail to local governments and public utilities and by mail or delivered to each residence within one-half mile of the permit area described in the schedule. Copies sent to residences shall be accompanied by information advising the owner or resident how to request a pre-blasting survey.

(3) The person who conducts the surface mining activities shall republish and redistribute the schedule by mail at least every 3 months.

(b) Blasting schedule contents.

(1) A blasting schedule shall not be so general as to cover all working hours but shall identify as accurately as possible the location of the blasting sites and the time periods when blasting will occur.

(2) The blasting schedule shall contain at a minimum:

(i) Identification of the specific areas in which blasting will take place. Each specific blasting area described shall be reasonably compact and not larger than 300 acres;

- (ii) Dates and time periods when explosives are to be detonated. That such periods shall not exceed an aggregate of 4 hours in any one day;
- (iii) Methods to be used to control access to the blasting area;
- (iv) Types of audible warnings and all-clear signals to be used before and after blasting; and
- (v) A description of emergency situations referred to in Section 816.65(a)(2) which have been approved by the regulatory authority for blasting at times other than those described in the schedule. {41889}

(c) Public notice of changes to blasting schedules. Before blasting in areas or at times not in a previous schedule, the person who conducts the surface mining activities shall prepare a revised blasting schedule according to the procedures in paragraphs (a) and (b) of this Section.

SECTION 816.65 - USE OF EXPLOSIVES: SURFACE BLASTING REQUIREMENTS.

(a) All blasting shall be conducted between sunrise and sunset. The regulatory authority may specify more restrictive time periods based on public requests or other considerations including the proximity to residential areas.

(b) Blasting shall be conducted at times announced in the blasting schedule, except in those emergency situations approved by the regulatory authority where rain, lightning, other atmospheric conditions, or operator or public safety require unscheduled detonation.

(c) Warning and all-clear signals of different character that are audible within a range of one-half mile from the point of the blast shall be given. Each person within the permit area and each person who resides or regularly works within one-half mile of the permit area shall be notified of the meaning of the signals through appropriate instructions. These instructions shall be periodically delivered or otherwise communicated in a manner which can be reasonably expected to inform such persons of the meaning of the signals. Each person who conducts surface mining activities shall maintain signs in accordance with Section 816.11(f).

(d) Access to the blasting area shall be regulated to protect the public and livestock from the effects of blasting. Access to the blasting area shall be controlled to prevent unauthorized entry at least 10 minutes before each blast and until an authorized representative of the person who conducts the surface mining activities has reasonably determined:

- (1) That no unusual circumstances, such as imminent slides or undetonated charges, exist; and
- (2) That access to and travel in or through the area can safely resume.

(e) Areas in which charged holes are awaiting firing shall be guarded, barricaded and either posted or flagged against unauthorized entry.

(f)(1) Airblast shall be controlled so that it does not exceed the values specified below at any dwelling, public building, school, church, or commercial or institutional building, unless such building is owned by the person who conducts the surface mining activities, is not leased to any other person and is located within the permit area: 072

Lower frequency limit of measuring system, Hz (3dB)	Maximum level in dB
0.1 Hz or lower – flat response	135peak.
2 Hz or lower – flat response	132 peak.
6Hz or lower – flat response	130 peak.
C=weighted, slow response	109 C.

(2) In all cases except the C-weighted slow, the systems used shall have a flat frequency response of at least 500 Hz at the upper end. The C-weighted shall meet the standard American National Standards Institute (ANSI) S1.4 1971 specifications. The ANSI S1.4 1971 is hereby incorporated by reference. This work is incorporated as it exists on the date of adoption of this Part, and notice of changes made in these materials will periodically be published in the Federal Register . ANSI S1.4 1971 is available for inspection in OSM regional offices and in OSM's office in the Department of Interior, 18th and C Streets, N.W., Washington, D.C. 20240.

(3) The person who conducts blasting may satisfy the provisions of this Section by meeting any of the four specifications in the chart in paragraph (f)(1) of this Section.

(g) Except where lesser distances are approved by the regulatory authority, based upon a pre-blasting survey or other appropriate investigation, blasting shall not be conducted within:

- (1) 1,000 feet of any building used as a dwelling, school, church, hospital, or nursing facility;
- (2) 500 feet of facilities including, but not limited to, disposal wells, petroleum or gas-storage facilities, municipal water-storage facilities, fluid-transmission pipelines, gas or oil-collection lines, or water and sewage lines; and
- (3) 500 feet of the active workings of an underground mine except with the concurrence of the Mine Safety and Health Administration.

(h) Flyrock from blasting shall be restricted as follows:

- (1) No flyrock shall be cast beyond the line of property owned or leased by the person who conducts the surface mining activities without the consent of the landowners of adjacent areas.
- (2) No flyrock shall be cast more than half the distance from the blast to the nearest dwelling, public building, school, church, commercial or institutional building, road or railroad. This shall not apply to any structure or right-of-way on land owned by the person who conducts the surface mining activities and not leased to any other person.
- (3) No flyrock shall be cast beyond the area of regulated access required under paragraph (d) of this Section.
- (4) These restrictions shall apply to material which travels along the ground surface as well as that which travels through the air.

(i) Blasting shall be conducted to prevent injury to persons, damage to public or private property outside the permit area, adverse impacts on any underground mine, and change in the course, channel, or availability of ground or surface waters outside the permit area.

(j) In all blasting operations, except as otherwise authorized in this Section, the maximum peak particle velocity shall not exceed 1 inch per second at the location of any dwelling, public building, school, church, or commercial or institutional building. The regulatory authority may reduce the maximum peak particle velocity allowed if it determines that a lower standard is required because of density of population or land use, age or type of structure, geology or hydrology of the area, frequency of blasts, or other factors.

(k) The maximum peak particle velocity does not apply to property within the permit area that is owned by the person who conducts the surface mining activities and is not leased to any other person.

(l) An equation for determining the maximum weight of explosives that can be detonated within any 8-millisecond period is in paragraph (m) of this Section. If the blasting is conducted in accordance with this equation, the velocity is deemed to be within the 1-inch-per-second limit.

(m) (1) The maximum weight of explosives to be detonated within any 8 millisecond period may be determined by the formula $W = (D/60)^2$ where W = the maximum weight of explosives, in pounds, that can be detonated in any 8-millisecond period, and D = the distance, in feet, to the nearest dwelling, school, church, or commercial or institutional building.

(2) For distances between 300 and 5,000 feet, solution of the equation results in the following maximum weight:

075

Distance, in feet (D)	Maximum weight in pounds (W)
300	25
350	34
400	44
500	69
600	100
700	136
800	178
900	225
1,000	278
1,100	336
1,200	400
1,300	469
1,400	544
1,500	625

1,600	711
1,700	803
1,800	900
1,900	1,002
2,000	1,111

{41890}

Distance, in feet (D)	Maximum weight in pounds (W)
2,500	1,736
3,000	2,500
3,500	3,403
4,000	4,444
4,500	5,625
5,000	6,944

(n) If on a particular site the peak particle velocity exceeds one-half inch per second after a period of 1 second following the maximum ground particle velocity, the blasting procedures shall be revised to limit the ground motion.

(o) Electric or non-electric delay systems combining surface delays with in-hole delays may be used to reduce vibrations if approved by the regulatory authority. Requests to use such systems shall be accompanied by blasting reports and seismograph records of test blasting on the site showing that the delay pattern does not produce peak particle velocities in violation of this Section.

SECTION 816.67 - USE OF EXPLOSIVES: SEISMOGRAPHIC MEASUREMENTS.

(a) Where a seismograph is used to monitor the velocity of ground motion and the peak particle velocity limit of 1 inch per second is not exceeded, the equation in Section 816.66(m) need not be used. If the equation is not being used, a seismograph record shall be obtained for each shot.

(b) The use of a modified equation to determine maximum weight of explosives for blasting operations at a particular site may be approved by the regulatory authority on receipt of a petition accompanied by reports including seismograph records of test blasting on the site. In no case shall the regulatory authority approve the use of a modified equation where the peak particle velocity of 1 inch per second required in Section 816.66(j) would be exceeded.

(c) The regulatory authority may require a seismograph record of any or all blasts.

SECTION 816.68 - USE OF EXPLOSIVES: RECORDS OF BLASTING OPERATIONS.

A record of each blast, including seismograph reports, shall be retained for at least 3 years and shall be available for inspection by the regulatory authority and the public on request. The record shall contain the following data:

(a) Name of the person conducting the blast.

(b) Location, date, and time of blast.

(c) Name, signature, and license number of blaster-in-charge.

(d) Direction and distance, in feet, to the nearest dwelling, school, church, or commercial or institutional building either:

(1) Not located in the permit area; or

(2) Not owned nor leased by the person who conducts the surface mining activities.

- (e) Weather conditions.
- (f) Type of material blasted.
- (g) Number of holes, burden, and spacing.
- (h) Diameter and depth of holes.
- (i) Types of explosives used.
- (j) Total weight of explosives used.
- (k) Maximum weight of explosives detonated within any 8 millisecond period.
- (l) Maximum number of holes detonated within any 8 millisecond period.
- (m) Methods of firing and type of circuit.
- (n) Type and length of stemming.
- (o) Mats or other protections used.
- (p) Type of delay detonator and delay periods used.
- (q) Seismographic records, where required, including the calibration signal of the gain setting and:
 - (1) Seismographic reading, including exact location of seismograph and its distance from the blast;
 - (2) Name of the person taking the seismograph reading; and
 - (3) Name of the person and firm analyzing the seismographic record.

SECTION 816.71 - DISPOSAL OF EXCESS SPOIL: GENERAL REQUIREMENTS.

- (a) Spoil not required to achieve the approximate original contour shall be hauled or conveyed to and placed in designated disposal areas within a permit area other than mine working or excavations, only if the disposal areas are authorized for such purposes in the approved mining and reclamation permit and only in accordance with Sections 816.71-816.73. The spoil shall be placed in a controlled manner to ensure:
 - (1) That leachate and surface runoff will not degrade surface or ground waters or exceed the effluent limitations of Section 816.42;
 - (2) Stability of the fill; and
 - (3) That the land mass is suitable for reclamation and revegetation compatible with the natural surroundings.
- (b) The fill shall be designed using recognized professional standards, certified by a registered professional engineer, and approved by the regulatory authority.
- (c) All vegetative and organic materials shall be removed from the disposal area and the topsoil shall be removed, segregated, and replaced under Sections 816.21 816.23 before spoil is placed in the disposal area. If approved by the regulatory authority, organic material may be used as mulch or may be included in the topsoil to control erosion, to promote growth of vegetation, or to increase the moisture retention of the soil.
- (d) Slope protection shall be provided to minimize surface erosion at the site. All disturbed areas including diversion ditches that are not rip- rapped shall be vegetated upon completion of construction.
- (e) The disposal areas shall be located on the most moderately sloping and naturally stable areas available as approved by the regulatory authority. If such placement provides additional stability and prevents mass movement, fill materials suitable for disposal shall be placed upon or above a natural terrace, bench, or berm.

(f) The spoil shall be hauled or conveyed and placed in a controlled manner, concurrently compacted as necessary to ensure mass stability and prevent mass movement, covered, and graded to allow surface and subsurface drainage to be compatible with the natural surroundings, to ensure long-term stability.

(g) The final configuration of the fill must be suitable for postmining land uses approved in accordance with Section 816.124 except that no depressions or impoundments shall be allowed on the completed fill.

(h) Terraces shall not be constructed unless approved by the regulatory authority.

(i) Where the slope in the disposal area exceeds 1 v :2.8 h (36 percent), or such lesser slope as may be designated by the regulatory authority based on local conditions, keyway cuts (excavations to stable bedrock), or rock toe buttresses shall be constructed to stabilize the fill. The slope of original ground at the toe of the fill shall not exceed 1 v :5 h (20 percent).

(j) The fill shall be inspected for stability by a registered engineer or other professional specialist approved by the regulatory authority during critical construction periods and at least quarterly throughout construction to ensure removal of all organic material and topsoil, placement of underdrainage systems, proper installation of surface drainage systems, proper placement and compaction of fill materials, and proper revegetation. The registered engineer or other qualified professional specialist shall provide to the regulatory authority a certified report within 2 weeks after each inspection that the fill has been constructed as specified in the design approved by the regulatory authority, and a copy of the report shall be retained at the minesite by the person who conducts the surface mining activities.

(k) (1) Coal processing wastes shall not be disposed of in head-of-hollow fills, and may only be disposed of in other excess spoil fills if such waste is:

- (i) Placed in accordance with section 816.85;
- (ii) Demonstrated to be nontoxic and nonacid forming; and {41891 }
- (iii) Demonstrated to be consistent with the design stability of the fill.

(2) Wastes other than coal processing wastes shall be disposed of in accordance with section 816.89.

(l) The disposal area shall not contain springs, natural watercourses, or wet-weather seeps unless lateral drains are constructed from the wet areas to the underdrains in a manner that prevents infiltration of the water into the spoil pile.

(m) If any portion of the fill interrupts, obstructs, or encroaches upon any natural drainage channel, the entire fill is classified as a valley or head-of-hollow fill and must be designed and constructed in accordance with the requirements of sections 816.72 and 816.73, respectively.

(n) The foundation and abutments of the fill shall be stable under all conditions of construction and operation. Sufficient foundation investigation and laboratory testing of foundation materials shall be performed in order to determine the design requirements for stability of the foundation. Analyses of foundation conditions shall include the effect of underground mine workings, if any, upon the stability of the structure.

* * * * *

(q) Excess spoil may be returned to underground workings only in accordance with a spoil disposal program approved by the regulatory authority under 30 CFR 784.14.

SECTION 816.72 - DISPOSAL OF EXCESS SPOIL: VALLEY FILLS.

Valley fills shall meet all of the requirements of section 816.71 and the additional requirements of this section.

(a) The fill shall be designed to attain a long-term static factor of safety of 1.5 based upon data obtained from subsurface exploration, geotechnical testing, foundation design, and accepted engineering analyses.

(b) A subdrainage system for the fill shall be constructed in accordance with the following:

- (1) A system of underdrains constructed of durable rock shall:
 - (i) Be installed along the natural drainage system;
 - (ii) Extend from the toe to the head of the fill; and
 - (iii) Contain lateral drains to each area of potential drainage or seepage.

(2) A filter system to insure the proper functioning of the rock underdrain system shall be designed and constructed using standard geotechnical engineering.

(3) In constructing the underdrains, no more than 10 percent of the rock may be less than 12 inches in size and no single rock may be larger than 25 percent of the width of the drain. Rock used in underdrains shall meet the requirements of paragraph (a)(5) of this section. The minimum size of the main underdrain shall be: 072

Total amount of fill material	Predominant type of fill material	Minimum size of drain, in feet	
		Width	Height
Less than 1,000,000 yd ³	Sandstone	10	4
Do	Shale	16	8
More than 1,000,000 yd ³	Sandstone	16	8
Do	Shale	16	

(5) Rock used shall not have less than 50 percent wear in 500 revolutions in the Los Angeles Rattler Test (AASHTO T 96 70), shall not have less than 15-percent weight loss in 5 cycles of the Sodium Sulfate Test (ASTM C088, AASHTO T 1 4), and shall not contain less than 30 percent by volume of clay or clay minerals as determined by standard petrologic analytical tests, and shall not be acid-forming or toxic-forming.

(c) (1) Spoil shall be hauled or conveyed and placed in a controlled manner and concurrently compacted as specified by the regulatory authority in lifts no thicker than 18 inches in order to:

- (i) Achieve the densities designed to ensure mass stability;
- (ii) Prevent mass movement;
- (iii) Avoid contamination of the rock underdrain or rock core; and
- (iv) Prevent formation of voids.

(2) The person who conducts the surface mining activities may use lifts of greater thickness than required under paragraph (c)(1) of this section if he has demonstrated to the regulatory authority by density monitoring tests that the density throughout the thickness of the lift is equal to or greater than the density specified in the design referred to in paragraph (a) of this section, except that in no event shall lift thickness exceed 4 feet.

(d) Surface water runoff from the area above the fill shall be diverted away from the fill and into stabilized diversion channels designed to pass safely the runoff from the 24-hour duration 100-year frequency storm or larger event specified by the regulatory authority. Sediment control structures shall be provided at the discharge of the diversion ditch before entry into the natural watercourse in accordance with section 816.46. Surface runoff from the fill surface shall be diverted to stabilized channels off the fill which will safely pass runoff from a 24-hour duration, 100-year frequency storm. Diversion design shall comply with the requirements of section 816.43(f).

(e) The tops of the fill and any terrace constructed to stabilize the face shall be graded no steeper than 1 v :20 h (5 percent). The vertical distance between terraces shall not exceed 50 feet.

(f) Drainage shall not be directed over the outslope of the fill.

(g) The outslope of the fill shall not exceed 1 v :2 T3h (50 percent). The regulatory authority may require a flatter slope.

SECTION 816.73 - DISPOSAL OF EXCESS SPOIL: HEAD-OF-HOLLOW FILLS.

Disposal of spoil in the head-of-hollow fill shall meet all standards set forth in sections 816.71 and 816.72 and the additional requirements of this section.

(a) The fill shall be designed to completely fill the disposal site approved by the regulatory authority to the approximate elevation of the ridgeline. A rock-core chimney drain may be utilized instead of the subdrain and surface diversion system required for valley fills. If the crest of the fill is not approximately at the same elevation as the low point of the adjacent ridgeline, the fill must be designed as specified in section 816.72, with diversion of runoff around the fill.

(b) The alternative rock-core chimney drain system shall be designed and incorporated into the construction of head-of-hollow fills as follows:

(1) The fill shall have along the vertical projection of the main buried stream channel or rill a vertical core of durable rock at least 16 feet thick which shall extend from the toe of the fill to the head of the fill and from the base of the fill to the surface of the fill. A system of lateral rock underdrains shall connect this rock core to each area of potential drainage or seepage in the disposal area. Rocks used in the rock core and underdrains shall meet the requirements of section 816.72(b).

(2) A filter system to ensure the proper functioning of the rock core shall be designed and constructed using standard geotechnical engineering methods.

(3) The grading may drain surface water away from the outslope of the fill and toward the rock core. The maximum slope of the top of the fill shall be 1 v :33 h (3 percent). Instead of the requirements of section 816.71(g), a drainage pocket may be maintained at the head of the fill during and after construction to intercept surface runoff and discharge the runoff through or over the rock drain if stability of the fill is not impaired. In no case shall this pocket or sump have a potential for impounding more than 10,000 cubic feet of water. Terraces on the fill shall be graded with a 3- to 5-percent grade toward the fill and a 1-percent slope toward the rock core. {41892}

(c) The drainage control system shall be capable of safely passing the runoff from a 24-hour 100-year storm, or larger event, as specified by the regulatory authority.

SECTION 816.79 - PROTECTION OF UNDERGROUND MINING.

(a) No surface coal mining activities shall be conducted within 500 feet of active or abandoned underground mines except to the extent that:

(1) The nature, timing, and sequence of the operations are jointly approved by the regulatory authority and the Mine Safety and Health Administration and the State agency, if any, responsible for the safety of mine workers; and

(2) The activities result in improved resource recovery, abatement of water pollution, or elimination of hazards to the health and safety of the public.

(b) The vertical distance between surface and underground mines working separate seams shall be sufficient to protect the health and safety of the workers and to prevent surface water from entering the underground workings.

(c) All mines plans shall be designed to protect the disturbed surface areas, including spoil disposal sites so as not to endanger any present or future operations of either surface or underground mines.

SECTION 816.81 - COAL PROCESSING WASTE: GENERAL REQUIREMENTS.

(a) All coal processing waste shall be hauled or conveyed and placed in new and existing disposal areas which shall be within the permit area and which are approved by the regulatory authority for this purpose. The coal processing waste disposal area shall be designed, constructed, and maintained:

(1) In accordance with sections 816.71 and 816.72, the provisions of this section and sections 816.82 816.88; and

(2) To prevent combustion.

(b) Coal processing waste materials from activities outside the permit area such as other mines or abandoned mine waste piles may be disposed of in permit areas only if approved by the regulatory authority. The approval shall be based on a showing by the person who conducts surface mining activities, using hydrologic, geologic physical, and chemical analysis, that disposal of these materials does not:

(1) Adversely affect water quality, water flow, or vegetation;

(2) Create public health hazards; or

(3) Cause instability in the disposal areas.

SECTION 816.82 - COAL PROCESSING WASTE BANKS: SITE INSPECTION.

(a) All coal processing waste disposal sites shall be inspected by an engineer or other person approved by the regulatory authority:

(1) The inspection shall occur at least once each week beginning within 7 days after preparation of the disposal area begins and terminating when the coal processing waste bank has been graded, covered in accordance with section 816.85 and topsoil has been distributed on the bank in accordance with section 816.24 or for such longer period as the regulatory authority may require.

(2) The inspections shall include such observations and tests as may be necessary to evaluate the potential hazard to human life and property, and to ensure that all organic material and topsoil have been removed and that proper construction and maintenance are occurring in accordance with the plan submitted under 30 CFR 780.35 and approved by the regulatory authority.

(3) The engineer or other approved inspector shall consider steepness of slopes, seepage, and other visible factors which could indicate potential failure and shall consider the results of failure with respect to the threat to human life and property.

(4) Copies of the inspection findings shall be maintained at the mine site.

(b) If any inspection discloses that a potential hazard exists, the regulatory authority shall be informed promptly of the finding and of the procedures formulated for public protection and remedial action in the event of an emergency. If adequate emergency procedures cannot, for any reason, be formulated or implemented, the regulatory authority shall be notified immediately. The regulatory authority shall then notify the appropriate emergency agencies that emergency procedures are required for the coal processing waste area.

SECTION 816.83 - COAL PROCESSING WASTE BANKS: WATER CONTROL MEASURES.

(a) A properly designed subdrainage system shall be provided and shall:

(1) Comply with the provisions of sections 816.71 and 816.72; and

(2) Be covered so as to protect against the entrance of surface water or leachate from the coal processing waste.

(b) All surface drainage from the area above the coal processing waste bank and from the crest and face of the waste disposal area shall be diverted in accordance with section 816.72(d).

(c) Slope protection shall be provided to minimize surface erosion at the site. All disturbed areas including diversion ditches that are not rip-rapped shall be vegetated upon completion of construction.

(d) All water discharged from a coal processing waste bank shall comply with section 816.42.

SECTION 816.85 - COAL PROCESSING WASTE BANKS: CONSTRUCTION REQUIREMENTS.

(a) The coal processing waste banks shall be constructed in compliance with sections 816.71 and 816.72 and this section.

(b) Coal processing waste banks shall have a minimum static factor of safety of 1.5.

(c) Compaction requirements during construction or modification of all coal processing waste banks shall meet the requirements of this paragraph, instead of those specified in section 816.72(c). The coal processing waste shall be:

(1) Spread in layers no more than 8 inches in thickness; and

(2) Compacted to attain 90 percent of the maximum dry density to prevent spontaneous combustion and to provide the strength required for stability of the coal processing waste bank. Dry densities shall be determined in accordance with AASHTO T 99, or equivalent.

(d) Following grading of the coal processing waste bank, the site shall be covered with a minimum of 4 feet of the best available non toxic and non combustible material in accordance with section 816.22(e) and in a manner that does not impede flow from subdrainage systems.

SECTION 816.86 - COAL PROCESSING WASTE: BURNING.

(a) Coal processing waste fires shall be extinguished by the person who conducts the surface mining activities in accordance with a plan approved by the regulatory authority.

(b) Extreme caution shall be taken in all attempts to extinguish burning wastes to insure that no hazards will exist to equipment operators or other persons working or living in the vicinity of the site.

(c) Acceptable techniques for extinguishing burning wastes, include, but are not limited, to the following:

- (1) Quenching with surface applications of water;
- (2) Isolation of burning wastes by excavation;
- (3) Exclusion of oxygen by blanketing or sealing with water, foam or other materials; and
- (4) Injecting water or slurry to isolate and quench the wastes.

SECTION 816.87 - COAL PROCESSING WASTE: BURNED WASTE UTILIZATION.

(a) Before the person who conducts the surface mining activities may remove burned coal processing waste or other materials from a disposal area, approval shall be obtained from the regulatory authority. A plan regarding the method of removal, with maps and appropriate drawings to illustrate the proposed sequence of the operation and method of compliance with this part, shall be submitted to the regulatory authority. Consideration shall be given in the plan to potential hazards which may be created to persons working or living in the vicinity of the structure. The plan shall be certified by a qualified engineer. {41893}

(b) Burned coal processing waste may be utilized for off-site construction purposes with the approval of the regulatory authority.

SECTION 816.88 - COAL PROCESSING WASTE: RETURN TO UNDERGROUND WORKINGS.

Coal processing waste may be returned to underground mine workings only in accordance with the waste disposal program approved by the regulatory authority under 30 CFR 780.35.

SECTION 816.89 - DISPOSAL OF NONCOAL WASTES.

(a) Noncoal wastes including, but not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, timber and other combustibles generated during surface mining activities shall be placed and stored in a controlled manner in a designated area to insure that leachate and surface runoff do not degrade surface or ground water, fires are prevented, and the area remains stable and is suitable for reclamation and revegetation compatible with the natural surroundings.

(b) The final disposal of noncoal wastes shall be in a designated disposal site. The solid waste disposal site shall be designed and constructed with appropriate water barriers on the bottom and sides of the designated site. The wastes shall be routinely compacted and covered to prevent combustion and wind born waste. When the disposal is completed or when the surface mining activities are completed, a minimum of 2 feet of soil cover shall be placed over the site. The operation of the disposal site shall be conducted in accordance with all local, State, and Federal requirements.

(c) At no time shall the person who conducts the surface mining activities allow any solid waste material to be deposited at refuse embankments or impoundment sites nor shall the person who conducts surface mining activities allow any excavation for solid waste disposal to be located within 8 feet of any coal outcrop or coal storage area.

SECTION 816.91 - COAL PROCESSING WASTE: DAMS AND EMBANKMENTS: GENERAL REQUIREMENTS.

Sections 816.91– 816.93 apply to existing and proposed dams and embankments constructed of coal processing waste or intended to impound coal processing waste.

(a) All dams and embankments including those not meeting the size or other criteria of 30 CFR 77.216(a), shall be routinely inspected by a registered professional engineer, or someone under the supervision of a registered professional engineer, in accordance with Mine Safety and Health Review Commission regulations in 30 CFR 77.316 3.

(b) All dams and embankments subject to this section shall be routinely maintained. Vegetative growth shall be cut where necessary to facilitate inspection and repairs. Ditches and spillways shall be cleaned. Any combustible materials present on the surface, other than that used for surface stability such as mulch or dry vegetation, shall be removed and any other appropriate maintenance procedures followed.

(c) All dams and embankments subject to this section shall be inspected and certified annually as having been constructed and modified in accordance with current prudent engineering practices to minimize the possibility of failures. Any changes in the geometry of the dam or embankment shall be highlighted and included in the annual certification report. These certifications shall include a report on:

- (1) Existing and required monitoring procedures and instrumentation;
- (2) The average and maximum depths and elevations of any impounded waters over the past year;
- (3) Existing storage capacity of the dam or embankment;
- (4) Any fires occurring in the material over the past year; and
- (5) Any other aspects of the dam or embankment affecting stability.

(d) A person who conducts surface mining activities shall submit to the regulatory authority plans for any enlargements, reductions in size, reconstruction, or other modification of impounding structures. The regulatory authority shall have approved the plans before alterations begin.

SECTION 816.92 - COAL PROCESSING WASTE: DAMS AND EMBANKMENTS: SITE PREPARATION.

Before coal processing waste is placed at a dam or embankment:

(a) Clearing and grubbing of all trees, shrubs, grasses, and other organic material shall be performed and all combustibles shall be removed and stockpiled in accordance with the requirements of this part.

(b) All surface drainage shall be diverted away from the crest and downstream face of the dam or embankment. Diversion ditches shall be designed, constructed, utilized, and maintained to prevent blockage and to pass the peak runoff from a 24-hour precipitation event with a 100-year recurrence interval unless greater event is specified by the regulatory authority. Sediment control structures shall be provided at each discharge of each diversion ditch before entry into natural watercourses in accordance with sections 816.41 – 816.55.

(c) Slope protection shall be provided to minimize surface erosion at the site and sediment control structures shall be required. All disturbed areas including diversion ditches that are not riprapped shall be vegetated upon completion of construction.

SECTION 816.93 - COAL PROCESSING WASTE: DAMS AND EMBANKMENTS: CONSTRUCTION.

(a) Waste shall not be used in the construction of dams and embankments unless demonstrated through appropriate engineering analysis to have no adverse effect on stability, and approved by the regulatory authority.

(b) The design of the dam or embankment shall be based on the flood from the probable maximum precipitation event unless the person who conducts the surface mining activities shows that the failure of the dam or embankment would not cause loss of life or severely damage property or the environment, in which case and depending on site conditions, a design to safely pass the flow from a 100-year precipitation event may be specified by the regulatory authority.

(c) One or more spillways shall be provided for the dam or embankment to pass that portion of the design storm that cannot be safely stored. Spillways and outlet works shall be designed to provide adequate protection against erosion. Inlets shall be protected against blockage.

(d) The design freeboard distance between the lowest point on the embankment crest and the maximum water elevations shall be at least 3 feet.

(e) Dams and embankments shall have minimum safety factors as follows: 075

Case	Loading condition	Minimum safety factor
I	End of construction	1.3
II	Partial pool with steady seepage saturation	1.5
III	Steady seepage from spillway or decant crest	1.5
IV	Earthquake (cases II and III with seismic loading)	1.0

(f) The dam or embankment foundation and abutments shall be stable under all conditions of construction and operation of the impoundment. Sufficient foundation investigations and laboratory testing shall be performed to determine the factors of

safety of the dam or embankment for all loading conditions in paragraph (e) of this section and for all increments of construction. {41894}

(g) Allowances shall be made for settlement of the dam or embankment and the foundation so that the freeboard will be maintained.

(h) Dams or embankments created for impounding waste materials shall be subject to a minimum drawdown criteria that allows the facility to be evacuated by spillways or decants of 90 percent of the volume of water stored during the designed precipitation event within 10 days.

(i) For each dam and embankment a permanent identification sign, at least 6 feet high shall:

- (1) Show the permit number for the surface coal mining and reclamation operations;
- (2) Show the name of the person operating or controlling the dam; and
- (3) Be located on or immediately adjacent to each dam.

SECTION 816.95 - AIR RESOURCES PROTECTION.

(a) Fugitive dust. Each person who conducts surface mining activities shall plan and employ fugitive dust control measures as an integral part of site preparation, coal mining, and reclamation operations. The regulatory authority shall specify the control measures appropriate for use in planning, according to applicable Federal and State air quality standards, climate, existing air quality in the area affected by mining, and the available control technology.

(b) Control measures. The fugitive dust control measures to be used, depending on applicable Federal and State air quality standards, the climate, existing air quality, size of the operation, and type of operation shall include, but not be limited to:

- (1) Periodic watering of unpaved roads with the minimum frequency of watering specified according to quantitative standard approved by the regulatory authority;
- (2) Chemical stabilization of unpaved roads with nontoxic soil cement or dust palliatives mixed into the upper 1 or 2 inches or more of the road surface;
- (3) Paving of roads;
- (4) Prompt removal of coal, rock, soil, and other dust-forming debris from roads and frequent scraping and compaction of unpaved roads to stabilize the road surface;
- (5) Restricting the speed of vehicles to reduce the length and size of any fugitive dust caused by travel;
- (6) Revegetating, mulching, or otherwise stabilizing the surface of all areas adjoining roads that are sources of fugitive dust;
- (7) Restricting the travel of vehicles on other than established roads;
- (8) Enclosing, covering, watering or otherwise treating loaded haul trucks and railroad cars to reduce loss of material to wind and spillage;
- (9) Substituting of conveyor systems for haul trucks and covering of conveyor systems when conveyed loads are subjected to wind erosion;
- (10) Minimizing the area of disturbed land;
- (11) Prompt revegetation of regraded lands;
- (12) Use of alternatives for coal-handling methods, restriction of dumping procedures, wetting of disturbed materials during handling, and compaction of disturbed areas;

- (13) Orienting mining operations so as to place temporary spoil piles or ridges perpendicular to prevailing winds to reduce wind erosion;
 - (14) Planting of special windbreak vegetation at critical points in the permit area;
 - (15) Control of dust from drilling using water sprays, hoods, dust collectors, or other controls;
 - (16) Restricting the areas to be blasted at any one time to reduce fugitive dust;
 - (17) Restricting activities causing fugitive dust during periods of air stagnation;
 - (18) Extinguishing any areas of burning or smoldering coal and periodically inspecting for burning areas whenever the potential for spontaneous combustion is high;
 - (19) Reducing the period of time between initially disturbing the soil and revegetating or other surface stabilization;
- and
- (20) Restricting fugitive dust at spoil and coal transfer and loading points with water sprays, negative pressure systems and baghouse filters, chemicals, or other practices.

(c) Additional measures. Where the regulatory authority determines that application of fugitive dust control measures listed in paragraph (b) of this section is insufficient to achieve and maintain applicable Federal and State air-quality standards, the regulatory authority may require additional measures and practices as necessary to insure compliance with all applicable air-quality standards. {41894}

(d) Monitoring. Air monitoring equipment shall be installed and monitoring shall be conducted in accordance with the air quality monitoring program submitted under 30 CFR 780.14(a)(2) and as approved by the regulatory authority.

SECTION 816.97 - PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES.

(a) Any person conducting surface mining activities shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the operation on fish, wildlife, and related environmental values, and achieve enhancement of such resources where practicable.

(b) A person who conducts surface mining activities shall promptly report to the regulatory authority the presence in the permit area of any critical habitat of a threatened or endangered species listed by the Secretary, any plant or animal listed as threatened or endangered by the State, or any bald or golden eagle, of which the person engaged in surface mining activities becomes aware and which was not previously reported to the regulatory authority.

(c) A person who conducts surface mining activities shall insure that the design and construction of telephone lines, electric power lines, distribution lines, and other transmission facilities on the permit area are in accordance with the guideline set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)) or in such alternative guidance manuals as may be approved by the regulatory authority. Distribution lines shall be designed and constructed in accordance with REA Bulletin 61 10 "Powerline Contracts by Eagles and Other Large Birds" or in such alternative guidance manuals as may be approved by the regulatory authority. The two works named in this paragraph are hereby incorporated by reference. These materials are incorporated as they exist on the date of adoption of this part, and notices of changes in these materials will periodically be published in the Federal Register. These two works are available at all OSM regional offices and at the OSM office in Washington, D.C. and on file at the Office of the Federal Register.

(d) Each person who conducts surface mining activities shall to the extent possible using the best technology currently available:

- (1) Locate and operate haul and access roads so as to avoid or minimize impacts to important fauna species or other species protected by State or Federal law;
 - (2) Fence roadways where specified by the regulatory authority to guide locally important wildlife to roadway underpasses or overpasses and construct the necessary passages. No new barrier shall be created in known and important fauna migration routes;
 - (3) Fence, cover, or use other appropriate methods to exclude fauna from ponds which contain hazardous concentrations of toxic-forming materials;
 - (4) Restore, enhance, or avoid habitats of unique value for fauna;
 - (5) Restore, enhance, or maintain natural riparian vegetation on the banks of streams, lakes, and other wetland areas;
 - (6) Avoid intermittent stream channels or restore them to natural, meandering shapes of the same gradient;
- {41895}

- (7) Avoid perennial stream channels or restore them to their former longitudinal profile and cross section considering fauna habitats (usually a pattern of riffles, pools, and drops rather than a uniform depth);
- (8) Advise all permanent and contractual personnel of pertinent State and Federal laws and regulations pertaining to fauna resources;
- (9) Not use persistent pesticides on the area during surface mining and reclamation activities;
- (10) Make every effort to prevent, control, and suppress range, forest, and coal fires;
- (11) If fauna habitat is to be a primary or secondary postmining land use, the operator shall in addition to the requirements of 30 CFR 816.111– 816.117:
- (i) Select plant species to be used on reclaimed areas based on the following criteria:
 - (A) Their proven nutritional value for fauna,
 - (B) Their uses as cover for fauna, and
 - (C) Their ability to support and enhance fauna habitat after release of bonds; and
 - (ii) Distribute flora groupings to maximize benefit to fauna. Flora should be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits for fauna;
- (12) Where row crops are to be the primary land use, surround fields with rows of trees or hedges suitable for reducing wind, retaining moisture, and providing habitat for birds and other small animals and where desirable, intersperse trees, other vegetation types, and fence rows, throughout the harvested area to break up large blocks of monoculture and to diversify habitat types to make them more suitable for small animals. Wetlands shall be preserved or created rather than drained or otherwise permanently abolished; and
- (13) Where the primary land use is to be residential, public service, or industrial land use, intersperse reclaimed lands with greenbelts utilizing species of grass, shrubs and trees useful as food and cover for birds and small animals.

SECTION 816.99 - SLIDES AND OTHER DAMAGE.

- (a) An undisturbed natural barrier shall be provided beginning at the elevation of the lowest coal seam to be mined and extending from the out- slope for such distance as determined by the regulatory authority to assure stability. The barrier shall be retained in place to prevent slides and erosion.
- (b) At any time a slide occurs which may have a potential adverse affect on life, property, health, safety, or the environment in the permit area, the person who conducts the surface mining activities shall notify the regulatory authority by the fastest available means and shall comply with any remedial measures required by the regulatory authority.

SECTION 816.100 - CONTEMPORANEOUS RECLAMATION.

Reclamation efforts including backfilling, grading, topsoil replacement and revegetation, on all land that is disturbed by surface mining activities shall occur as contemporaneously as practicable with mining operations.

SECTION 816.101 - BACKFILLING AND GRADING: GENERAL REQUIREMENTS.

- (a) Timing of backfilling and grading:
- (1) Contour mining. Rough backfilling and grading shall follow coal removal by not more than 60 days or 1,000 linear feet.
 - (2) Open pit mining with thin overburden. Rough backfilling and grading shall occur in accordance with the time schedule approved by the regulatory authority.
 - (3) Area strip mining. Rough backfilling and grading shall be completed within 90 days and shall not be more than four spoil ridges behind the pit being worked, the spoil from the active pit being considered the first ridge.
- (b) Method for backfilling and grading:
- (1) Except as specifically exempted in this subchapter, all disturbed areas shall be returned to approximate original contour. Each person who conducts surface mining activities shall haul or convey, backfill, compact (where advisable to insure stability or to prevent leaching) and grade all spoil to eliminate all highwalls, spoil piles, and depressions.
 - (2) Backfilled material shall be placed to minimize adverse effects on ground water, to minimize off-site effects and to support the approved postmining land use.

- (3) The postmining graded slope need not be of uniform slope.
- (4) Cut-and-fill terraces may be used only in those situations expressly identified in section 816.102.

SECTION 816.102 - BACKFILLING AND GRADING: GRADING REQUIREMENTS.

(a) The final graded slopes shall not exceed in grade either the approximate premining slopes or any lesser slopes approved by the regulatory authority based on consideration of soil, climate, or other characteristics of the surrounding area. Postmining final graded slopes need not be uniform but shall approximate the general nature of the premining topography. The requirements of this section may be modified by the regulatory authority where the surface mining activities are re-affecting previously mined lands that have not been restored to the standards of this part and sufficient spoil is not available. The person who conducts surface mining activities shall, at a minimum:

- (1) Retain all overburden and spoil on the solid portion of existing or new benches; and
- (2) Backfill and grade to the most moderate slope possible to eliminate the highwall which does not exceed the angle of repose or such lesser slope as is necessary to achieve a minimum static safety factor of 1.3. In all cases the highwall shall be eliminated.

(b) On approval by the regulatory authority in order to conserve soil moisture, ensure stability, and control erosion on final graded slopes, cut-and-fill terraces may be allowed if the terraces are compatible with the approved postmining land use and are appropriate substitutes for construction of lower grades on the reclaimed lands. The terraces shall meet the following requirements:

- (1) The width of the individual terrace bench shall not exceed 20 feet unless specifically approved by the regulatory authority as necessary for stability, erosion control, or roads included in the approved post-mining land use plan.
- (2) The vertical distance between terraces shall be as specified by the regulatory authority to prevent excessive erosion and to provide long-term stability.
- (3) The slope of the terrace outslope shall not exceed 1 T3v : 2 h (50 percent). Outslopes which exceed 1 v : 2 h (50 percent) may be approved if they have a minimum static safety factor of more than 1.3 and provide adequate control over erosion and closely resemble the surface configuration of the land prior to mining. In no case may highwalls be left as part of terraces.
- (4) Culverts and underground rock drains shall be used on the terrace only when approved by the regulatory authority.

(c) Small depressions may be constructed if they:

- (1) Are approved by the regulatory authority to minimize erosion, conserve soil moisture, or promote vegetation;
- (2) Do not restrict normal access; and
- (3) Are not inappropriate substitutes for lower grades on the reclaimed lands.

(d) All operations on slopes above 20 or on lesser slopes that the regulatory authority defines as steep slopes shall meet the provisions of 30 CFR Part 826.

(e) All final grading, preparation of overburden before replacement of topsoil, and placement of topsoil, in accordance with section 816.24, shall be done along the contour to minimize subsequent erosion and instability. If such grading, preparation, or placement along the contour is hazardous to equipment operators, then grading, preparation, or placement in a direction other than generally parallel to the contour may be used. In all cases, grading, preparation, or placement shall be conducted in a manner which minimizes erosion and provides a surface for replacement of topsoil which will minimize slippage.

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SECTION 816.103 - BACKFILLING AND GRADING: COVERING COAL AND ACID- AND TOXIC-FORMING MATERIALS.

(a) Cover:

- (1) A person who conducts surface mining activities shall cover, with a minimum of 4 feet of the best available nontoxic and noncombustible material, all exposed coal seams remaining after mining and any acid forming or toxic forming combustible materials, or any other materials identified by the regulatory authority, that are exposed, used, or produced during mining;
- (2) If necessary, these materials shall be treated to neutralize toxicity in order to prevent water pollution and sustained combustion, and to minimize adverse effects on plant growth and land uses;

(3) Where necessary to protect against upward migration of salts, exposure by erosion, to provide an adequate depth for plant growth, or otherwise to meet local conditions, the regulatory authority shall specify thicker amounts of cover using non-toxic material; or

(4) Acid-forming or toxic-forming material shall not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution.

(b) Stabilization. Backfilled materials shall be selectively hauled or conveyed and compacted wherever necessary to prevent leaching of acid-forming and toxic-forming materials into surface or ground waters and wherever necessary to insure the stability of the backfilled materials. The method of compacting material and the design specifications shall be approved by the regulatory authority before the acid-forming or toxic-forming materials are covered.

SECTION 816.104 - BACKFILLING AND GRADING: THIN OVERBURDEN.

(a) The provisions of this section apply only where the final thickness is less than 0.8 of the initial thickness. Initial thickness is the sum of the overburden thickness and coal thickness. Final thickness is the product of the overburden thickness times the bulking factor to be determined for each mine area. The provisions of this section apply only when operations cannot be carried out to comply with the requirements of section 816.101 to achieve the approximate original contour.

(b) In surface mining activities carried out continuously in the same limited pit area for more than 1 year from the day coal-removal operations begin and where the volume of all available spoil and suitable waste materials over the mine plan area is demonstrated to be insufficient to achieve approximate original contour, surface mining activities shall be conducted to meet, at a minimum, the following standards:

(1) Haul or convey, backfill, and grade, using all available spoil and suitable waste materials from the entire mine area, to attain the lowest practicable stable grade, to achieve a static safety factor of 1.3, and to provide adequate drainage and long-term stability of the regraded areas and to cover all acid-forming and toxic-forming materials.

(2) Eliminate highwalls by grading or backfilling to stable slopes not exceeding 1 v : 2 h (50 percent), or such lesser slopes as the regulatory authority may specify to reduce erosion, maintain the hydrologic balance, or allow the approved postmining land use.

(3) Haul or convey, backfill, grade, and revegetate in accordance with sections 816.111– 816.117 to achieve an ecologically sound land use compatible with the prevailing land use in unmined areas surrounding the permit area; and

(4) Haul or convey, backfill, and grade to ensure the impoundments are constructed only where:

(i) It has been demonstrated to the regulatory authority's satisfaction that all requirements of sections 816.41- 816.56 have been met; and

(ii) The impoundments have been approved by the regulatory authority as suitable for the approved post-mining land use and as meeting the requirements of this part and all other applicable Federal and State laws and regulations.

SECTION 816.105 - BACKFILLING AND GRADING: THICK OVERBURDEN.

(a) The provisions of this section apply only where the final thickness is greater than 1.2 of the initial thickness. Initial thickness is the sum of the overburden thickness and coal thickness. Final thickness is the product of the overburden thickness times the bulking factor to be determined for each mine area. The provisions of this section apply only when operations cannot be carried out to comply with the requirements of section 816.101 to achieve the approximate original contour.

(b) In surface mining activities where the volume of spoil over the mine plan area is demonstrated to be more than sufficient to achieve the approximate original contour surface coal mining operations shall be conducted to meet at a minimum the following standards:

(1) Haul or convey, backfill, and grade all spoil and wastes not required to achieve approximate original contour in the permit area to the lowest practicable grade but not more than the angle of repose and to cover all acid-forming and other toxic materials;

(2) Haul or convey, backfill, and grade excess spoil and wastes only within the permit area and dispose of such materials in conformance with sections 816.71- 816.73;

(3) Haul or convey, backfill, and grade excess spoil and wastes to maintain the hydrologic balance in accordance with sections 816.41- 816.57 and to provide long-term stability by preventing slides, erosion and water pollution.

(4) Haul or convey, backfill, grade, and revegetate wastes and excess spoil to achieve an ecologically sound land use approved by the regulatory authority as compatible with the prevailing land uses in unmined areas surrounding the permit area.

(5) Eliminate all highwalls and depressions by backfilling with spoil and suitable waste materials; and

(6) Meet the revegetation requirements of sections 816.111– 816.117 for all disturbed areas.

SECTION 816.106 - REGRADING OR STABILIZING RILLS AND GULLIES.

When rills or gullies deeper than 9 inches form in areas that have been regraded and topsoiled, the rills and gullies shall be filled, graded, or otherwise stabilized and the area reseeded or replanted according to sections 816.111 – 816.117. The regulatory authority shall specify that rills or gullies of lesser size be stabilized if the rills or gullies are disruptive to the approved postmining land use or may result in additional erosion and sedimentation.

SECTION 816.111 - REVEGETATION: GENERAL REQUIREMENTS.

(a) Each person who conducts surface mining activities shall establish on all affected land a diverse, effective, and permanent vegetative cover of species native to the area of disturbed land or species that supports the approved postmining land use. For areas designated as prime farmland, the reclamation requirements of 30 CFR Part 823 shall apply.

(b) All revegetation shall be in compliance with the plan approved by the regulatory authority and shall be carried out in a manner that encourages a prompt vegetative cover and recovery of productivity levels compatible with the approved postmining land use: {41897}

(1) All disturbed land, except water areas and surface areas of roads that are approved as a part of the post-mining land use, shall be seeded or planted to achieve a vegetative cover of the same seasonal variety native to the area of disturbed land.

(2) The vegetative cover shall be capable of stabilizing the soil surface with respect to erosion.

(3) Vegetative cover shall be considered of the same seasonal variety when it consists of a mixture of species of equal or superior utility for the intended land use when compared with the utility of naturally occurring vegetation during each season of the year.

(4) If both the premining and postmining land use is intensive agriculture, planting of the crops normally grown will meet the requirement of paragraph (b)(1) of this section.

SECTION 816.112 - REVEGETATION: USE OF INTRODUCED SPECIES.

Introduced species may be substituted for native species only if approved by the regulatory authority after appropriate field trials have demonstrated that the introduced species are of equal or superior utility for the approved postmining land use, or are necessary to achieve a quick, temporary, and stabilizing cover. Introduced species shall meet the requirements of applicable State and Federal seed or introduced species statutes, and shall not include poisonous or toxic species.

SECTION 816.113 - REVEGETATION: TIMING.

Seeding and planting of disturbed areas shall be conducted during the first normal period for favorable planting conditions after final preparation. The normal period for favorable planting shall be that planting time generally accepted locally for the type of plant materials selected. Any disturbed areas, except water areas and surface areas of roads approved for the post-mining land use, which have been final graded and topsoiled shall be mulched as required by section 816.114 and seeded, if required by the regulatory authority, with a temporary cover of small grains, grasses, or legumes to control erosion until an adequate permanent cover is established.

SECTION 816.114 - REVEGETATION: MULCHING.

(a) Suitable mulch shall be used on all regraded and topsoiled areas to control erosion, to promote germination of seeds, and to increase the moisture retention of the soil. Mulch shall be anchored to the soil surface to ensure effective protection of the soil and vegetation.

(b) Annual grasses and grains such as oats, rye, and wheat may be used instead of mulch when the regulatory authority determines that they will provide adequate stability and that they will later be replaced by species approved for the post-mining land use.

SECTION 816.115 - REVEGETATION: GRAZING.

When the approved post-mining land use is range or pasture land, the reclaimed land shall be used for livestock grazing at a stocking rate equal to or less than approved by the regulatory authority for at least the last two full years of liability required under section 816.116 (b).

SECTION 816.116 - REVEGETATION: STANDARDS FOR SUCCESS.

(a) Success of revegetation shall be measured by techniques approved by the regulatory authority on the basis of reference areas approved by the regulatory authority. This is to adjust for natural differences between the pre-mining years and post-mining years. Management of the reference area shall be comparable to that which is required for the approved post-mining land use of the mine plan area.

(b) (1) The ground cover and productivity of living plants on the revegetated area shall be equal to the ground cover and productivity of living plants on the same approved reference area before mining for:

- (i) Each year of a period of 5 full consecutive years after the last year of augmented seeding, fertilizing, irrigation, or other major work that ensures success in areas of more than 26.0 inches average annual precipitation; or
- (ii) Each year of a period of 10 full consecutive years after the last year of augmented seeding, fertilizing, irrigation, or other major work that ensures success in areas of less than or equal to 26.0 inches average annual precipitation.

(2) For purposes of paragraph (b)(1)(i) and (ii) of this section, the average annual precipitation shall be determined either:

(i) By interpolation, using standard interpolation techniques, from "Mean Annual Precipitations," Map, p. 97, The National Atlas of the United States, U.S. Department of the Interior, Geological Survey, 1970. This work is hereby incorporated by reference as it exists on the date of adoption of this Subchapter. Notices of changes in this Atlas will periodically be published in the Federal Register. The Atlas is available at all OSM offices and is on file in the Office of the Federal Register; or

(ii) Based on 10 years of continuous and reliable precipitation records from stations located in or adjacent to the permit area.

(3) The ground cover or productivity shall be considered equal if it is at least 90 percent of the ground cover or productivity of the reference area with 90 percent statistical confidence and with 80 percent statistical confidence on shrublands for any significant portion of the mined area. A lower percentage of ground cover and productivity may be authorized by the regulatory authority under the following standards:

- (i) For previously mined areas that are not reclaimed to the performance standards in this Subchapter, the ground cover of living plants for the areas shall not be less than can be supported by the best available topsoil and overburden in the mine plan area and in no case less than that existing before redisturbance;
- (ii) For areas to be developed for industrial or residential use less than 2 years after regrading is completed the ground cover of living plants shall not be less than required to control erosion; and

(iii) Success in revegetation of cropland shall be determined on the basis of crop production from the mined area compared to the reference area. Crop production from the mined area shall be equal to that of the approved reference area for a minimum of two growing seasons. Production shall not be considered equal if it is less than 90 percent of the production of the reference area for any significant portion of the mined area.

(c) The person who conducts surface mining activities shall:

- (1) Maintain any necessary fences and proper management practices; and
- (2) Conduct periodic measurements of vegetation, soils, and water prescribed or approved by the regulatory authority to identify conditions during the applicable period of liability specified in paragraph (b) of this section.

(d) For permit areas 40 acres or less in size in locations with an average annual precipitation of more than 26 inches, the following performance standards, when approved by the regulatory authority, may be used instead of reference areas to

measure success of revegetation on sites that are disturbed. These standards shall be met for a minimum of 5 full consecutive years:

(1) Areas planted only in herbaceous species shall sustain a vegetative ground cover of 70 percent for 5 full consecutive years.

(2) Areas planted with a mixture of herbaceous and woody species shall sustain a herbaceous vegetative ground cover of 50 percent for 5 full consecutive years and 400 woody plants per acre after 5 years. On steep slopes, the minimum number of woody plants shall be 600 per acre. {41898}

(3) For purposes of this section, herbaceous species means grasses, legumes, and nonleguminous forbes; woody plants means woody shrubs, trees and vines; and ground cover means the area of ground covered by the combined aerial parts of vegetation and the litter that is produced naturally onsite, expressed as a percentage of the total area of measurement.

SECTION 816.117 - REVEGETATION: TREE STOCKING FOR FOREST LAND.

This section sets forth forest resource conservation standards for reforested operations to ensure that a cover of trees of commercial species, sufficient to adequately use the available growing space, is established after surface mining activities.

(a) The following are the minimum acceptable stocking standards for areas east of the 100th meridian west longitude as measured 5 years after planting:

(1) The area shall contain an average point count of 600 trees per acre, to be computed as follows:

(i) 600 established trees of commercial species per acre at least 3 years of age each one to count as one toward meeting the stocking requirement; and

(ii) Root crown or root sprouts over 1 foot in height shall count as one toward meeting the stocking requirement.

(2) Rock areas, permanent roads, and surface water drainage ways in forest land shall not require stocking.

(3) A "countable tree" means a tree that can be used in calculating the degree of stocking under the following criteria:

(i) The tree shall be in place at least 3 growing seasons.

(ii) The tree shall be alive and healthy.

(iii) The tree shall have at least one-third of its length in live crown.

(iv) The tree shall be a commercial species which the regulatory authority determines will produce commercial trees physiologically suited for the area.

(4) Stocking means a measure of the degree to which space is occupied by well-distributed countable trees.

(b) The following are the minimum performance standards for areas west of the 100th meridian west longitude where shelterbelts, wildlife habitat, commercial forest land, or other forest land are the approved post-mining land use:

(1) A pre-mining and post-mining vegetation inventory of trees, shrubs, and half-shrubs shall be conducted on established reference areas according to methods approved by the regulatory authority. This inventory shall contain, but not be limited to:

(i) Site quality;

(ii) Stand size;

(iii) Stand condition;

(iv) Site and species relations; and

(v) Appropriate forest land utilization considerations.

(2) Appropriate trees, shrubs, and half-shrubs on the revegetated area shall be measured using the approved methods after the vegetation has been established according to the approved mining and reclamation plan. The density, number per unit area, of live woody plants which have been in place at least 3 years on the rehabilitated area shall be equal to or greater than 90 percent of the density of live woody plants of the same life form (trees vs. shrubs and half-shrubs) on the reference area with 90 percent statistical confidence. When this ground cover requirement is met, the 5 or 10 year responsibility period required in section 816.116 shall begin.

(3) Upon expiration of the 5 or 10 year responsibility period and at the time of request for bond release, each person who conducts surface mining activities shall provide documentation required in paragraph (b)(2) of this section showing that the woody plants established on the rehabilitated site meet the requirements of the approved mining and reclamation plan. Species diversity, distribution, seasonal variety, vigor, and regenerative capacity of the vegetation of the revegetated area shall be evaluated on the basis of the results which could reasonably be expected using the methods of revegetation in the approved mining and reclamation plan.

SECTION 816.131 - CESSATION OF OPERATIONS: TEMPORARY.

(a) Each person who conducts surface mining activities shall, in areas in which there are no current operations, but in which operations are to be resumed under an approved plan, effectively support and close all surface access openings to underground operations, and secure surface facilities. Temporary abandonment shall not relieve a person of his obligation to comply with provisions of the approved mining and reclamation operations permit.

(b) Before temporary cessation of operations and reclamation, each person who conducts surface mining activities shall submit to the regulatory authority a notice of intention to cease or abandon operations and reclamation. This notice shall include a statement of the exact number of acres affected in the permit area, the extent and kind of reclamation accomplished, and identification of the regrading, revegetation, environmental monitoring, and water treatment activities that will continue during the temporary cessation.

SECTION 816.132 - CESSATION OF OPERATIONS: PERMANENT.

(a) Each person who intends to permanently cease surface mining activities shall close or backfill or otherwise permanently reclaim all affected areas in accordance with this Chapter and the plan approved by the regulatory authority.

(b) All equipment, structures, or other facilities not required for continued surface mining activities and monitoring unless approved as suitable for the post-mining land use, shall be removed and the affected land reclaimed.

SECTION 816.133 - POST-MINING LAND USE.

(a) General. All affected areas shall be restored in a timely manner:

(1) To conditions that are capable of supporting the uses which they were capable of supporting before any mining;

or

(2) To higher or better uses achievable under criteria and procedures of this section.

(b) Determining pre-mining use of land. The pre-mining uses of land to which the post-mining land use is compared shall be those uses which the land previously supported if the land had not been previously mined and had been properly managed:

(1) The post-mining land use for land that has been previously mined and not reclaimed shall be judged on the basis of the highest and best use that can be achieved and is compatible with surrounding areas.

(2) The post-mining land use for land that has received improper management shall be judged on the basis of the pre-mining use of surrounding lands that have received proper management.

(3) If the premining use of the land was changed within 5 years of the beginning of mining, the comparison of post-mining use to pre-mining use shall include a comparison with the historic use of the land as well as its use immediately preceding mining.

(c) Before permanent abandonment, the permit area shall be restored, in a timely manner, either to conditions capable of supporting the uses they were capable of supporting before any mining or to conditions capable of supporting approved alternative land uses. Alternative land uses may be approved by the regulatory authority after consultation with the landowner or the land-management agency having jurisdiction over the lands, if the following criteria are met:

(1) The proposed post-mining land use is compatible with adjacent land use and, where applicable, with existing local, State, or Federal land use policies and plans; a written statement of the views of the authorities with statutory responsibilities for land use policies and plans is submitted to the regulatory authority before surface mining activities began; any required approval of local, State, or Federal land management agencies, including any necessary zoning or other changes required for the land use, is obtained and remains valid throughout the surface mining activities; {41899}

(2) Specific plans are prepared and submitted to the regulatory authority which show the feasibility of the postmining land use as related to needs, projected land use trends, and markets and that include a schedule showing how the proposed use will be developed and achieved within a reasonable time after mining and be sustained. The regulatory authority may require appropriate demonstrations to show that the planned procedures are feasible, reasonable, and integrated with mining and reclamation, and that the plans will result in successful reclamation;

(3) Provision of any necessary public facilities is ensured as evidenced by letters of commitment from parties other than the person who conducts surface mining activities, as appropriate, to provide the public facilities in a manner compatible

with the plans submitted under 30 CFR 780.23. The letters shall be submitted to the regulatory authority before surface mining activities begin;

(4) Specific and feasible plans are submitted to the regulatory authority which show that financing and attainment and maintenance of the post-mining land use are feasible and are supported by letters of commitment from parties other than the person who conducts the surface mining activities;

(5) Plans for the post-mining land use are designed under the general supervision of a registered professional engineer, or other appropriate professional, who will ensure that the plans conform to applicable accepted standards for adequate land stability, drainage, and vegetative cover, and esthetic design appropriate for the post-mining use of the site;

(6) The proposed use will neither present actual or probable hazard to public health or safety nor will it pose any actual or probable threat of water flow diminution or pollution;

(7) The use will not involve unreasonable delays in reclamation;

(8) Necessary approval of measures to prevent or mitigate adverse effects on fish, wildlife and related environmental values is obtained from the regulatory authority and appropriate State and Federal fish and wildlife management agencies before surface mining activities begin; and

(9) Proposals to change pre-mining land uses of range, fish and wildlife forest land, hayland, or pasture to a post-mining cropland use, where the cropland would require continuous maintenance such as seeding, plowing, cultivation, fertilization, or other similar practices to be practicable or to comply with applicable Federal, State, and local laws, are reviewed by the regulatory authority to ensure that:

(i) There is a firm written commitment by the person who conducts surface mining activities or by the landowner or land manager to provide sufficient crop management after release of applicable performance bonds to assure that the proposed post-mining cropland use remains practical and reasonable;

(ii) There is sufficient water available and committed to maintain crop production; and

(iii) Topsoil quality and depth are sufficient to support the proposed use. {41899}

PART 817 – PERMANENT PROGRAM PERFORMANCE STANDARDS – UNDERGROUND MINING ACTIVITIES

Section

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Authority : Sections 102, 201, 501, 503, 504, 507, 508, 516, 517, 519, 701, 717 and 719, Pub. L. 95-87, 91 Stat. 448, 449, 467, 470, 471, 474, 478, 495, 498, 501, 516, 526 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1257, 1258, 1266, 1267, 1269, 1291, 1307, 1309).

SECTION 817.1 - SCOPE.

This Part sets forth the minimum performance standards for underground mining activities.

SECTION 817.2 - OBJECTIVES.

This part is intended to ensure that all underground mining activities are conducted in a manner which preserves and enhances environmental and other values in accordance with the Act.

SECTION 817.11 - SIGNS AND MARKERS.

(a) Specifications. Each sign and marker required to be posted under this Part shall:

- (1) Be of a uniform design throughout the operation that can be seen and read easily;
- (2) Be made of durable material; and
- (3) Conform to each local ordinance and code.

(b) Duration of maintenance. Each person who conducts underground mining activities shall maintain signs and markers during all activities to which they pertain.

(c) Mine and permit identification signs:

(1) Each person who conducts underground mining activities shall display identification signs at all points of access from each public road and highway to surface areas associated with underground mining activities.

(2) The signs shall show the name, business address, and telephone number of the person who conducts underground mining activities and the identification number of each current permit authorizing underground mining activities.

(3) Each sign shall not be removed until after the release of all bonds.

(d) Perimeter markers. Each person who conducts underground mining activities shall clearly mark the perimeters of all areas affected by surface operations or facilities before submitting a permit application.

(e) Buffer zone markers. Each person who conducts underground mining activities shall mark all buffer zones, as required by section 817.57. Each buffer zone marker shall be designed and placed in the same manner as the perimeter markers. Each buffer zone marker shall be located along the boundary of the buffer zone.

(f) Blasting signs. If blasting is conducted incident to underground mining activities, the person who conducts those activities shall conspicuously display:

(1) Signs reading "Blasting Area" at the edge of blasting areas along roads within the permit area; and

(2) Signs clearly explaining the blasting warning and all-clear signals at all entrances to the permit area from each public road or highway.

(g) Topsoil markers. Where topsoil or other vegetation-supporting material is required to be segregated and stockpiled under section 817.23, the person who conducts the underground mining activities shall clearly mark the stockpiled material.

SECTION 817.13 - CASING AND SEALING OF UNDERGROUND OPENINGS: GENERAL REQUIREMENTS.

Each borehole, shaft, well, or other underground opening shall be cased, lined, or otherwise managed to prevent pollution and mixing of surface or ground water, and to ensure the safety of people, livestock, wildlife, and machinery in the area where these openings could be a hazard. Each borehole and well that is within the permit area shall be permanently closed, in a manner approved by the regulatory authority unless the opening is approved for monitoring. This section does not apply to holes drilled and used for blasting, in the area affected by surface operations.

SECTION 817.14 - CASING AND SEALING OF UNDERGROUND OPENINGS: TEMPORARY.

(a) Each mine entry which is temporarily inactive but has a projected useful service under the approved mine plan shall be protected by barricades or other covering devices, shall be fenced, and signs shall be posted to prevent access into the entries and to identify the hazardous nature of the opening. Any barricade, fence, or other protective device shall be periodically inspected and maintained in good operating condition by the person who conducts the underground mining activities.

(b) Each borehole, shaft, or well which has been identified in the approved mining and reclamation plan to be used for the return of underground development waste, coal processing waste or water to the underground workings or to be used to monitor ground water conditions shall be temporarily sealed prior to use.

SECTION 817.15 - CASING AND SEALING OF UNDERGROUND OPENINGS: PERMANENT.

When no longer needed for mining, each shaft, drift, adit, tunnel, exploratory hole, entryway, or other opening to the surface shall be capped, sealed or backfilled, as required by the regulatory authority consistent with 30 CFR 75.1711 except as otherwise approved by the regulatory authority. Closure measures shall be of a permanent design to prevent access to the mine workings by people and animals and to prevent the flow of water except as otherwise approved by the regulatory authority.

SECTION 817.21 - TOPSOIL: GENERAL REQUIREMENTS.

(a) Before disturbance of areas affected by surface operations or facilities, topsoil and subsoils to be saved under section 817.22 shall be removed from the area as a separate operation and segregated from other material.

(b) After removal, topsoil shall either be immediately redistributed in accordance with section 817.24 or stockpiled pending redistribution, if permissible under section 817.23.

SECTION 817.22 - TOPSOIL: REMOVAL.

(a) Timing. Topsoil shall be removed from areas to be affected by surface operations after the vegetative cover that would interfere with the use of the topsoil is cleared but before any drilling for blasting, mining, or other surface disturbance of areas designated for mine entries, superstructures, coal processing facilities, roads, storage areas, and other major structures incident to underground mining.

(b) Materials to be removed. All topsoil shall be removed unless use of alternative materials is approved by the regulatory authority to be segregated in accordance with paragraph (e) of this section. If use of alternative material is approved, all materials to be redistributed shall be removed.

(c) Additional material to be removed in thin topsoil situations. If the topsoil is less than 6 inches, a 6 inch layer that includes the A horizon and the unconsolidated materials immediately below the A horizon, or the A horizon and all unconsolidated material if the total available is less than 6 inches, shall be removed and the mixture segregated and replaced as the surface soil layer.

(d) Subsoil segregation. The B horizon and portions of the C horizon or other underlying layers demonstrated to have qualities for root development comparable to the B or C horizons shall be segregated and replaced as subsoil if the regulatory authority determines that the segregation and replacement is necessary or desirable to ensure soil productivity consistent with the approved post-mining land use.

(e) Topsoil substitutes and supplements. Selected overburden materials may be substituted for, or used as a supplement to, topsoil where the resulting soil medium is equal to or more suitable for vegetation, and if all the following requirements have been met: {41901 }

(1) It is demonstrated to the regulatory authority (by the results of chemical and physical analyses of overburden and topsoil that the selected overburden materials or an overburden and topsoil mixture is more suitable for restoring land capability and productivity and that it is the best available material to support and sustain the approved vegetation. These analyses shall include determinations of pH, sulfide content that when oxidized will lower the pH, percent organic material,

nitrogen, phosphorus, potassium, texture class, and water-holding capacity, and such other analyses as required by the regulatory authority. The regulatory authority may also require that results of field-site trials or greenhouse tests be used to demonstrate the feasibility of using such overburden materials.

(2) The chemical and physical analyses and the results of field-site trials and greenhouse tests submitted to the regulatory authority shall be accompanied by a certification from a qualified soil scientist or agronomist stating, on the basis of the test results, that the proposed substitute material is equal to or more suitable for sustaining the vegetation than is the available topsoil, that the substitute material is the best available material to support the vegetation, and that the tests and analyses were conducted under his or her supervision and used standard testing procedures.

(3) The tests and analyses shall be conducted by a laboratory approved by the regulatory authority.

(4) The alternative material shall be removed, segregated, and replaced in compliance with the requirements for topsoil under this section.

(f) Limits on topsoil removal area. Where the removal of vegetative material, topsoil, or other materials may result in erosion which may cause air or water pollution, the person who conducts underground mining activities shall:

(1) Limit the size of the area from which topsoil is removed at any one time;

(2) Redistribute the surface soil layer at a time when the physical and chemical properties of topsoil can be protected and erosion can be minimized; and

(3) Take such other measures as the regulatory authority may approve or require.

SECTION 817.23 - TOPSOIL: STORAGE.

(a) The topsoil and other materials removed under section 817.22 shall be stockpiled only when it is impractical to promptly redistribute such materials on regraded areas.

(b) The stockpiled materials shall be placed on a stable area within the permit area where the materials shall not be disturbed or exposed to excessive water or wind erosion, or contaminants which lessen their capability to support vegetation before they can be redistributed:

(1) Stockpiles shall be selectively placed and protected from wind and water erosion, unnecessary compaction, and contamination by undesirable materials either by:

(i) An effective cover of nonnoxious, quick-growing annual and perennial plants, seeded or planted during the first normal period for favorable planting conditions; or

(ii) By other methods demonstrated to and approved by the regulatory authority to provide equal protection.

(2) Unless approved by the regulatory authority, stockpiled topsoil and other materials shall not be moved until required for redistribution on a disturbed area.

SECTION 817.24 - TOPSOIL: REDISTRIBUTION.

(a) After final grading and before the replacement of topsoil and other materials segregated in accordance with section 817.23, regraded land shall be scarified or otherwise treated to eliminate slippage surfaces and to promote root penetration. If the person who conducts underground mining activities shows, through appropriate tests, and the regulatory authority approves that no harm will be caused to the topsoil and vegetation, the scarification may be conducted after topsoiling.

(b) Topsoil and other materials shall be redistributed in a manner that:

(1) Achieves an approximate uniform, stable thickness consistent with the post-mining land uses, slopes, aspects, and surface drainage system.

(2) Prevents excess compaction of the topsoil; and

(3) Protects the topsoil from wind and water erosion before and after it is seeded and planted.

SECTION 817.25 - TOPSOIL: NUTRIENTS AND SOIL AMENDMENTS.

Nutrients and soil amendments in the amounts determined by soil tests shall be applied to the redistributed surface soil layer so that it supports the post-mining land use approved by the regulatory authority and meets the revegetation requirements of sections 817.11- 817.17. All soil tests shall be performed by a laboratory approved by the regulatory authority and certified by a qualified agronomist or soil scientist.

SECTION 817.31 - ROADS AND ASSOCIATED STRUCTURES: GENERAL REQUIREMENTS.

(a) Each person who conducts underground mining activities shall design, construct, utilize, maintain, and reclaim all roads, road rights-of-way, and associated structures to meet the requirements of sections 817.32 817.35, 817.38, and 817.95 to control or prevent erosion and siltation, air and water pollution, and damage to public or private property:

(1) To the extent possible using the best technology currently available, roads, road rights-of-way, associated structures, and other transportation facilities shall not cause damage to fish, wildlife and related environmental values and shall not cause additional contributions of suspended solids to streamflow, or to runoff outside the permit area. In no event shall contributions of suspended solids be in excess of limitations set by applicable State or Federal law.

(2) All roads shall be removed and the land affected regraded and revegetated in accordance with the requirements of section 817.38 unless:

(i) Retention of the road is approved as part of the approved post-mining land use or as being necessary to control erosion adequately;

(ii) The necessary maintenance is assured; and

(iii) All drainage shall be controlled according to section 817.34.

SECTION 817.32 - ROAD CONSTRUCTION: LOCATION.

(a) All surface roads shall be located insofar as possible on ridges or on the flattest and most stable available slopes to minimize erosion. Except as otherwise specifically authorized in this section, no part of any road shall be located in the channel of a perennial stream. Stream fords are prohibited unless they are specifically approved by the regulatory authority as temporary routes across non-flowing streams that will not adversely affect sedimentation or fish, wildlife and related environmental values and that will not be used for coal haulage. All other stream crossings shall be made using bridges, culverts, or other structures designed, constructed, and maintained to meet the requirements of this section. Roads shall not be constructed in a manner that increases erosion or causes additional downstream sedimentation or flooding.

SECTION 817.33 - ROAD CONSTRUCTION: EROSION CONTROL.

In order to control erosion and subsequent disturbance of the hydrologic balance, roads shall be designed, constructed, and maintained in compliance with the following:

(a) Vertical alignment. Except where the regulatory authority requires lesser grades to control erosion, road grades shall be as follows:

(1) The overall grade shall not exceed 1 v : 10 h T1 (10 percent).

(2) The maximum grade shall not exceed 1 v : 6.5 h (15 percent).

(3) There shall not be more than 300 feet of grade exceeding 10 percent within any consecutive 1,000 feet of road constructed. {41902}

(4) The road surface shall be sloped toward the ditch line at the minimum rate of one-half inch per foot of surface width or crowned at the minimum rate of one-half inch per foot of surface width as measured from the centerline of the road.

(b) Road cuts. This paragraph applies to roads that are to remain in place and in use for more than 5 years or that are to remain as part of the approved post-mining land use. Cut slopes shall not be steeper than specifically authorized by the regulatory authority. The regulatory authority shall not authorize slopes steeper than 1 v : 1.5 h in unconsolidated materials or 1 v : 0.25 h in rock, except that steeper slopes may be specifically authorized by the regulatory authority if geotechnical analysis demonstrates that a minimum safety factor of 1.5 can be maintained.

(c) Road embankments. This paragraph applies to roads that are to remain in place and in use for more than 5 years or that are to remain as part of the approved post-mining land use. Embankment sections shall be constructed in accordance with the following provisions:

(1) All vegetative materials and topsoil shall be removed from the embankment foundation to ensure stability, and no vegetative materials or topsoil shall be placed beneath or in any road embankment.

(2) When an embankment is to be placed on side slopes exceeding 1 v : 5 h (20 percent) the existing ground shall be plowed, stepped, and keyed in a manner which ensures the stability of the fill. The minimum dimensions of the keyway shall be 10 feet wide and 2 feet deep below the toe of fill. No material shall be placed, or allowed to slide, below the toe.

(3) Material containing by volume less than 25 percent of rock larger than 6 inches in greatest dimension shall be spread in successive horizontal layers not exceeding 12 inches in thickness before compaction.

(4) Where the material for an embankment consists of rock, broken stone, or fragmented material of a size that makes placing in 12-inch layers impossible under paragraph (c)(3) of this section, the embankment shall be constructed in layers less than 24 inches in thickness, provided the individual pieces are placed so that there is no nesting and all the voids are filled with finer material.

(5) Each layer of the embankment shall be completed, leveled, and compacted before the succeeding layer is placed. Loads of material shall be leveled as placed and kept smooth. The successive layers shall be compacted evenly by routing the hauling and leveling equipment over the layers already in place and by distributing the travel over the entire width of the embankment. This routine shall be continued until no visual horizontal movement of the embankment material is apparent.

(6) Successive lifts shall not be placed until the previous layer is compacted to achieve a density throughout the preceding lift thickness of at least 90 percent of the maximum dry density determined in accordance with American Association of State Highway and Traffic Officers (AASHTO) T 99. The AASHTO technical specification T 99 mentioned in this paragraph is hereby incorporated by reference. This work is incorporated as it exists on the date of adoption of this Part and notices of changes made in these materials will periodically be published in the Federal Register. AASHTO technical specification T 99 is available for inspection at OSM's Offices in OSM regional offices and in OSM's Office in the Department of the Interior, 18th and C Streets, N.W., Washington, D.C. 20240.

(7) Material shall be placed in an embankment only when its moisture content is within 4 percent of the optimum moisture content determined in accordance with AASHTO T 99.

(8) Embankment slopes shall not be steeper than 1 v : 2 h .

(9) The minimum safety factor for all embankments shall be 1.25, or such higher safety factor as the regulatory authority may specify.

(d) Natural drainage. Natural drainways shall not be altered or relocated for the purposes of road construction without the prior approval of the regulatory authority. The regulatory authority may approve alterations and relocations only if:

- (1) The natural drainage is not blocked;
- (2) No damage occurs to the hydrologic balance; and
- (3) There is no adverse impact on adjoining landowners.

SECTION 817.34 - ROAD CONSTRUCTION: DRAINAGE

(a) General. (1) Each road shall be designed, constructed, and maintained to have adequate drainage using structures such as, but not limited to, ditches, cross drains, and ditch relief drains. For roads that are to be maintained for more than 1 year, the water-control system shall be designed to safely pass the peak runoff from a 10-year 24-hour precipitation event or greater if required by the regulatory authority. Drainage pipe and culverts shall be constructed to avoid plugging or collapse and erosion at inlets and outlets. Drainage ditches shall be placed at the toe of all cut slopes formed by construction or roads. Trash racks and debris basins shall be installed in the drainage ditches wherever debris from the drainage area could impair the functions of drainage and sediment control structures.

(2) All drainage from roads and associated drainage structures shall pass through sediment control devices such as sedimentation ponds, sediment traps, vegetation filter strips, vegetated drains, straw dikes, mulches, check drains, and dugout ponds.

(b) Ditches. A ditch shall be provided on both sides of a through-cut and on the inside shoulder of a cut-fill section, with ditch relief cross-drains being spaced according to grade. Water shall be intercepted before reaching a switchback or large fill and drained safely away in accordance with this section. Water on a fill or switchback shall be released below the fill, using conduit or rippapped channels, and shall not be discharged onto the fill.

(c) Culverts. Ditch relief culverts shall be installed according to the following provisions:

- (1) Road grade: 075

Grade percent	Spacing of culverts, in feet, not more than-
2 to 5	800
6 to 10	300
11 to 15	200

(2) Each culvert shall be adequate to safely pass the peak runoff from a 10-year 24-hour precipitation event and shall cross the road at not less than a 30 degree angle downgrade. The culvert may be designed to carry less than the peak runoff if the ditch will remain stable.

(3) The inlet end shall be protected by a rock headwall or other material approved by the regulatory authority and the outlet end shall be placed below the toe of the fill with an apron of rock riprap or other approved material.

(4) The culvert shall be covered by compacted fill to a minimum depth of 1 foot or half the culvert diameter, whichever is greater.

(5) The culvert shall be capable of sustaining design loads.

(d) Stream crossings. Drainage structures are required for stream channel crossings. Drainage structures shall not affect the normal flow or gradient of the stream. In designing drainage structures, consideration will be given to the time of year the stream is crossed and the length of time the structure is used. Embankments constructed across streams shall not exceed 15 feet in height, measured on the upstream side, unless approved by the regulatory authority. Stream crossings which have drainage areas greater than 100 acres shall be designed to safely pass the 100-year storm or larger event as specified by the regulatory authority. {41903}

SECTION 817.35 - ROAD CONSTRUCTION: SURFACING.

Roads shall be surfaced with rock or other material approved by the regulatory authority as sufficiently durable. Toxic or acid-forming substances shall not be used. Vegetation shall not be cleared for more than the width necessary for road and associated ditch construction, to serve traffic needs, and for utilities.

SECTION 817.36 - OTHER TRANSPORTATION FACILITIES.

Railroad loops, spurs, sidings, or other transport facilities shall be designed, constructed, maintained, and reclaimed to:

(a) Prevent, to the extent possible using the best technology currently available:

(1) Damage to fish, wildlife and related environmental values; and

(2) Additional contributions of suspended solids to streamflow or runoff outside the permit area. In no event shall contributions be in excess of limitations set by applicable State or Federal law.

(b) Control and minimize diminution or degradation of water quality and quantity.

(c) Control and minimize erosion and siltation.

(d) Control and minimize air pollution.

(e) Prevent damage to public or private property.

SECTION 817.38 - RESTORATION OF ROADS.

(a) Unless the regulatory authority approves retention of the road as suitable for the approved post-mining land use immediately after a road becomes no longer needed for operations, reclamation, or monitoring:

(1) The road shall be closed to vehicular traffic;

(2) All bridges and culverts shall be removed;

(3) Cross drains, dikes, and water bars shall be constructed to prevent erosion;

(4) Road surfaces shall be scarified and covered with topsoil; and

(5) The area affected shall be returned to approximate original contour and revegetated in accordance with sections 817.111 – 817.117.

(b) Unless otherwise authorized by the regulatory authority, all road surfacing materials shall be removed and handled or conveyed and disposed of in accordance with section 817.89.

SECTION 817.39 - SUPPORT FACILITIES AND UTILITY INSTALLATIONS.

(a) The support facilities required for or used incidentally to the operation of the mine, including but not limited to mine buildings, coal loading facilities at or near the mine site, coal storage facilities, equipment storage facilities, sheds, shops, and other buildings, shall be designed, constructed, and located to prevent or control erosion and siltation, water pollution, or damage to public or private property and shall comply with all the environmental and other performance standards of this Part. Support facilities shall be designed, constructed, maintained, and used in a manner which prevents, to the extent possible using the best technology currently available:

(1) Damage to fish, wildlife and related environmental values;

(2) Additional contributions of suspended solids to streamflow or runoff outside the permit area. In no event shall such contributions be in excess of limitations set by applicable State or Federal law.

(b) All underground mining activities shall be conducted in a manner which prevents damage, destruction, or disruption of services provided by oil, gas, and water wells; oil, gas, and coal-slurry pipelines; railroads; and electric and telephone lines which pass over, under, or through the permit area, unless otherwise approved by the owner and the regulatory authority.

SECTION 817.41 - HYDROLOGIC BALANCE: GENERAL REQUIREMENTS.

(a) Underground mining activities shall be planned and conducted to minimize disturbance to the prevailing hydrologic balance in order to prevent long-term adverse changes in the hydrologic balance that could result from those activities, on both the mine plan and affected areas.

(b) Changes in water quality and quantity, in the depth to ground water, and in the location of surface water drainage channels shall be minimized so that the approved post-mining land use of the disturbed land is not adversely affected.

(c) In no case shall applicable Federal and State water-quality statutes, regulations, standards or effluent limitations be violated.

(d) Operations shall be conducted to minimize water pollution and, where necessary, treatment methods shall be used to control water pollution:

(1) Each person who conducts underground mining activities shall emphasize mining and reclamation practices that will prevent or minimize water pollution and changes in flow in preference to the use of water treatment facilities.

(2) Practices to control and minimize pollution include, but are not limited to:

- (i) Stabilizing disturbed areas through land shaping;
- (ii) Diverting runoff;
- (iii) Achieving quickly germinating and growing stands of temporary vegetation;
- (iv) Regulating channel velocity of water;
- (v) Lining drainage channels with rock or vegetation;
- (vi) Mulching;
- (vii) Selectively placing and sealing acid-forming and toxic-forming materials;
- (viii) Designing mines to prevent gravity drainage of acid waters;
- (ix) Sealing;
- (x) Controlling subsidence; and
- (xi) Preventing acid mine drainage.

(3) If these practices are not fully adequate to meet the hydrologic requirements of this Part, the person who conducts the underground mining activities shall operate and maintain the necessary water treatment facilities for as long as treatment is required.

SECTION 817.42 - HYDROLOGIC BALANCE: WATER QUALITY STANDARDS AND EFFLUENT LIMITATIONS.

(a) All drainage from the disturbed area, including disturbed areas that have been graded, seeded, or planted, shall be passed through a sedimentation pond, a series of sedimentation ponds, or a treatment facility before leaving the permit area. Any discharge from underground workings to surface waters shall also be passed through a sedimentation pond, a series of sedimentation ponds, or a treatment facility. Sedimentation ponds and treatment facilities for the disturbed area before being discharged into an underground working shall be maintained until drainage from the disturbed area has met the ambient

surface water quality requirements of section 816.52 and the revegetation requirements of sections 817.111 – 817.117. Sedimentation ponds and treatment facilities for discharges from the underground mine shall be maintained until the discharge meets the effluent limitations of this section without treatment or until the discharge has ceased. The regulatory authority may grant exemptions from this requirement only when the disturbed drainage area within the total disturbed area is small, if there is no discharge from the underground mine, and if the person who conducts the underground mining activities demonstrates to the regulatory authority that sedimentation ponds and treatment facilities are not necessary to meet the effluent limitations of this section and maintain water quality in downstream receiving waters. For the purposes of this section, disturbed area shall not include those areas affected by surface operations in which only diversion ditches, sedimentation ponds, or roads are installed in accordance with this Part, and the upstream area is not otherwise disturbed by the person who conducts the underground mining activities. Disturbed areas shall not include the area affected by underground operations unless those areas are also affected by fills, support facilities, or other major activities incident to underground mining activities. Sedimentation ponds required by this section shall be constructed in accordance with section 817.46 in appropriate locations before beginning any underground mining activities in the affected drainage area. Area in order to control sedimentation or otherwise treat discharges from areas disturbed by underground mining activities shall comply with all applicable Federal and State laws and regulations and, at a minimum, the following numerical effluent limitations:

Effluent limitations, in milligrams per liter (mg/l), except for pH 015 {41904}

Effluent characteristics 1	Maximum allowable 2	Average of daily values for 30 consecutive discharge days 3
Iron, total	7.0	3.5
Manganese, total	4.0	2.0
Total suspended solids 4	70.0	35.0
pH 5	Within the range 6.0 to 9.0	

1 – To be determined according to collection and analytical procedures adopted by the United States Environmental Protection Agency's regulations for waste water analyses 40 CFR 136.

2 – Based on representative sampling.

3 – The manganese limitation shall not apply to untreated discharges which are alkaline as defined by the Environmental Protection Agency (40 CFR 434).

4 – In Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming, total suspended solids limitations will be determined on a case-by-case basis, but they must not be greater than 45 mg/l (maximum allowable) and 30 mg/l (average of daily value for 30 consecutive discharge days) based on a representative sampling.

5 – Where the application of neutralization and sedimentation treatment technology results in inability to comply with the manganese limitations set forth, the regulatory authority may allow the pH level in the discharge to exceed to a small extent the upper limit of 9.0 in order that the manganese limitations will be achieved.

(b) A discharge from the disturbed area is not subject to the effluent limitations of this section if:

(1) The discharge is demonstrated by the discharger to have resulted from a precipitation event larger than a 10-year 24-hour precipitation event or from a snowmelt of equivalent volume; and

(2) The discharge is from facilities designed, constructed, and maintained in accordance with the applicable requirements of this Part.

(c) Adequate facilities shall be installed, operated, and maintained to treat any water discharged from the disturbed area or discharged from the underground mine so that it complies with applicable Federal and State laws or regulations or the limitations of this section. If the pH of water to be discharged from the disturbed area or mine is less than 6.0, an automatic lime feeder or other automatic neutralization process approved by the regulatory authority shall be installed, operated, and

maintained. The regulatory authority may authorize the use of a manual system if it finds that:

- (1) Small and infrequent treatment requirements to meet applicable standards do not require use of an automatic neutralization process;
- (2) The mine normally produces less than 500 tons of run-of-mine coal per day; and
- (3) Timely and consistent treatment is ensured.

SECTION 817.43 - HYDROLOGIC BALANCE: DIVERSIONS AND CONVEYANCE OF OVERLAND FLOW AND SHALLOW GROUND WATER FLOW.

Overland flow including flow through litter, and shallow ground water flow from undisturbed areas may be diverted away from disturbed areas by means of temporary or permanent diversions if required or approved by the regulatory authority as necessary to minimize erosion and to prevent or remove water from contact with acid-forming and toxic-forming materials. The following requirements shall be met for all diversions and for all collection drains that are used to transport waters into water-treatment facilities.

- (a) Temporary diversions shall be constructed to pass safely the peak runoff from a precipitation event with a 3-year recurrence interval, or a larger event is specified by the regulatory authority.
- (b) To protect fills and property and to avoid danger to public health and safety, permanent diversions shall be constructed to pass safely the peak runoff from a precipitation event with a 10-year recurrence interval, or a larger event if specified by the regulatory authority. Permanent diversions shall be constructed with gently sloping banks that are stabilized by vegetation. Asphalt, concrete, or other similar linings shall not be used unless specifically required by the regulatory authority to prevent seepage or to provide stability.
- (c) Diversions shall be designed, constructed, and maintained in a manner which prevents additional contributions of suspended solids to streamflow and to runoff outside the permit area, to the extent possible using the best technology currently available. Appropriate sediment control measures for these diversions shall include, but not be limited to, maintenance of appropriate gradients, channel lining, revegetation, roughness structures, and detention basins.
- (d) No diversion shall be constructed on or pass through existing slides or located so as to increase the potential for slides.
- (e) When no longer needed, each temporary diversion shall be removed and the affected land regraded, topsoiled, and revegetated in accordance with sections 817.24, 817.25, 817.101, and 817.111 – 817.117.
- (f) Diversion design shall incorporate the following:
 - (1) Any channel lining shall be designed using standard engineering practices to safely pass the design velocities. Riprap shall comply with the requirements of paragraph 817.72(b)(5).
 - (2) The design freeboard shall be no less than calculated using the following equation $f = 1.025 v d$. Where f = freeboard in feet; v = design velocity, in feet per second; and d = depth of flow, in feet. Additional freeboard protection shall be provided for transition of flows and for critical areas such as swales and curves.
 - (3) Energy dissipators shall be installed at discharge points where diversions intersect with natural streams.
 - (4) Excess excavated material not necessary for diversion channel geometry or regrading of the channel shall be disposed of in accordance with 30 CFR 817.71 – 817.73.
 - (5) Topsoil shall be handled in accordance with 30 CFR 817.21 – 817.25.
- (g) Diversions shall not be constructed or operated to divert water into underground mines without the approval of the regulatory authority under section 817.55.

SECTION 817.44 - HYDROLOGIC BALANCE: STREAM CHANNEL DIVERSIONS.

- (a) Flow from perennial and intermittent streams within the permit area may be diverted if:
 - (1) The diversions are approved by the regulatory authority as necessary to comply with other performance standards in this Subchapter; and
 - (2) The diversions are in compliance with local, State, and Federal statutes and regulations.

(b) When streamflow is allowed to be diverted, the new stream channel shall be designed, constructed, and removed in accordance with the following requirements:

(1) The longitudinal profile of the stream, the channel, and the flood plain shall be designed and constructed to remain stable and to prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow or to runoff outside the permit area. In no event shall the contributions be in excess of requirements set by applicable State or Federal law. Erosion control structures such as channel lining structures, retention basins, and artificial channel roughness structures shall be used in diversions only when approved by the regulatory authority as being necessary to control erosion. These structures shall be approved for permanent diversions only where they are stable and will require infrequent maintenance. {41905}

(2) Channel, bank, and flood-plain configurations shall be adequate to pass safely the peak runoff of a 24-hour precipitation event with a 10-year recurrence interval for temporary diversions and a 100-year recurrence interval for permanent diversions, or larger events as specified by the regulatory authority.

(c) When no longer needed to achieve the purpose for which they are authorized, all temporary stream channel diversions shall be removed and the affected land regraded and revegetated in accordance with the requirements of Sections 817.24, 817.25, 817.101, and 817.111 – 817.117. At the time diversions are removed, downstream water treatment facilities previously protected by the diversion shall be modified or removed to prevent overtopping or failure of the facilities. In no case shall this requirement relieve the person who conducts the underground mining activities from maintenance of the treatment facility if otherwise required under this Part or the permit.

SECTION 817.45 - HYDROLOGIC BALANCE: SEDIMENT CONTROL MEASURES.

Appropriate sediment control measures shall be designed, constructed, and maintained to prevent additional contributions of sediment to streamflow or to runoff outside the permit area, to minimize erosion areas, to the extent possible using the best technology currently available. Sediment control measures include practices carried out within and adjacent to the disturbed area. The sedimentation storage capacity of practices in and downstream from the disturbed areas shall reflect the degree to which successful mining and reclamation techniques are applied to reduce erosion and control sediment. Sediment control measures consist of the utilization of proper mining and reclamation methods and sediment control practices, singly or in combination. Sediment control methods include but are not limited to:

(a) Disturbing the smallest practicable area at any one time during the mining operation through progressive backfilling, grading, and timely revegetation;

(b) Shaping the backfilled material to promote a reduction of the rate and volume of runoff in accordance with the requirements of Section 817.101.

(c) Retaining sediment within disturbed areas;

(d) Diverting runoff away from disturbed areas;

(e) Diverting runoff using protected channels or pipes through disturbed areas so as not to cause additional erosion;

(f) Using straw dikes, riprap, check dams, mulches, vegetative sediment filters, dugout ponds, and other measures that reduce overland flow velocity, reduce runoff volume, or trap sediment;

(g) Building and maintaining sedimentation ponds;

(h) Treating with chemicals; and

(i) Treating mine drainage in underground sumps.

SECTION 817.46 - HYDROLOGIC BALANCE: SEDIMENTATION PONDS.

(a) General requirements. Sedimentation ponds shall be used individually or in series and shall:

(1) Be constructed before any disturbance of the disturbed area to be drained into the pond;

(2) Be located as near as possible to the disturbed area and out of perennial streams wherever possible;

- (3) Be constructed prior to any discharge from the underground mine; and
- (4) Meet all the criteria in this Section.

(b) Sediment storage volume. Sedimentation ponds shall provide a sediment storage volume equal to:

(1) The accumulated sediment volume from the drainage area to the pond for a minimum of 3 years or the life of the pond, whichever is greater. Sediment storage volume shall be determined using the Universal Soil Loss Equation, gully

erosion rates, and sediment delivery ratio converted to sediment volume using the sediment density or other empirical methods established by the regulatory authority and based upon actual sedimentation pond studies; or

(2) 0.1 acre-foot for each acre of disturbed area within the upstream drainage area or a greater amount if required by the regulatory authority. The regulatory authority may approve a sediment storage volume of not less than 0.035 acre-foot for each acre of disturbed area within the upstream drainage area if the person who conducts the underground mining activities has demonstrated that sediment removed by other sediment control measures is equal to the reduction in sediment storage volume; and

(3) The accumulated sediment volume necessary to retain sediment for 1 year in any discharge from the underground mine passing through the pond.

(c) Detention time. Sedimentation ponds shall provide a 24 hour theoretical detention time for the water inflow or runoff entering the pond from a 10-year 24-hour precipitation event plus the average inflow from the underground mine. Runoff diverted in accordance with Sections 817.43 and 817.44 away from the disturbed drainage areas and not passed through the sedimentation pond, need not be considered in sedimentation pond design. In determining the runoff volume, the characteristics of the mine site, reclamation procedures, and on-site sediment control practices shall be considered:

(1) The regulatory authority may approve a theoretical detention time of not less than 10 hours, when the person who conducts the underground mining activities demonstrates that:

(i) The improvement in sediment removal efficiency is equivalent to the reduction in detention time as a result of pond design. Improvements in pond design may include but are not limited to pond configuration, in-flow and out-flow facility locations, baffles to decrease in-flow velocity, and short-circuiting, and surface areas; and

(ii) The pond effluent is shown to achieve and maintain applicable effluent limitations.

(2) The regulatory authority may approve a theoretical detention time of not less than 10 hours when the person who conducts the underground mining activities demonstrates that the size distribution or the specific gravity of the suspended matter is such that applicable effluent limitations are achieved and maintained.

(3) The regulatory authority may approve a theoretical detention time of less than 24 hours to any level of detention time when the person who conducts the underground mining activities demonstrates to the regulatory authority that the chemical treatment process to be used:

(i) Will achieve and maintain the effluent limitations;

(ii) Is harmless to fish, wildlife and related environmental values;

(iii) Is planned under the supervision of a registered professional engineer; and

(iv) Shall be operated by a qualified person approved by the regulatory authority.

(4) The calculated theoretical detention time and all supporting documentation and drawings used to establish the required detention times under paragraphs (c) (1) (3) of this section shall be included in the permit application.

(d) Dewatering. The water storage resulting from inflow shall be removed by a nonclogging dewatering device or a spillway approved by the regulatory authority, and shall have a discharge rate to achieve and maintain the required theoretical detention time. The dewatering device shall not be located at a lower elevation than the maximum elevation of the design sedimentation storage volume. {41906}

(e) Each person who conducts underground mining activities shall design, construct, and maintain sedimentation ponds to prevent short-circuiting.

(f) The design, construction, and maintenance of a sedimentation pond or other sediment control measures in accordance with this Section shall not relieve the person from compliance with applicable effluent limitations.

(g) There shall be no out-flow through the emergency spillway during the passage of the runoff resulting from 10-year 24-hour precipitation event through the sedimentation pond regardless of the volume of water and sediment present from the underground mine during the runoff.

(h) Sediment shall be removed from sedimentation ponds when the volume of sediment accumulates to 60 percent of the required sediment storage volume. With the approval of the regulatory authority, additional permanent sediment storage may

be provided above that required for storage if the person who conducts the underground coal mine operations demonstrates that applicable effluent limitations will be achieved and maintained. Upon the approval of the regulatory authority for those cases where additional permanent storage is provided above that required for sediment under paragraph (b) of this section, sediment removal may be delayed until the remaining volume of permanent storage has decreased to 40 percent of the required sediment storage.

(i) An appropriate combination of principal and emergency spillways shall be provided to discharge safely the runoff from a 25-year 24-hour precipitation event, or larger event as specified by the regulatory authority, plus any inflow from the underground mine. The elevation of the crest of the emergency spillway shall be a minimum of 1.0 foot above the crest of the principal spillway. Emergency spillway grades and allowable velocities shall be as specified by the regulatory authority.

(j) The minimum elevation of the top of the settled embankment shall be 1.0 foot above the water surface in the reservoir with the emergency spillway flowing at design depth. For embankments subject to settlement, this 1.0 foot minimum elevation requirement shall apply at all times including the period after settlement.

(k) The constructed height of the dam shall be increased a minimum of 5 percent over the design height to allow for settlement unless it has been demonstrated to the regulatory authority that the material used and the design will ensure against all settlement.

(l) The minimum top width of the embankment shall not be less than the quotient of $(H/35)^{1/5}$ where H is the height of the embankment as measured from the upstream toe of the embankment.

(m) The upstream and downstream side slopes of the settled embankment shall not be less than 1 v : 5 H with neither slope steeper than 1 v : 2 h . Slopes shall be designed to be stable in all cases, even if flatter side slopes are required.

(n) The embankment foundation area shall be cleared of all organic matter, all surfaces sloped to no steeper than 1 v : 1 h , and the entire foundation surface scarified.

(o) The fill material shall be free of sod, large roots and other large vegetative matter, and frozen soil, and in no case shall coal processing waste be used.

(p) The placing and spreading of fill material shall be started at the lowest point of the foundation and the fill brought up in horizontal layers of such thickness as required by the regulatory authority to facilitate compaction. Compaction shall be conducted as specified by the regulatory authority in order to achieve stability.

(q) If a sedimentation pond has an embankment that is more than 20 feet in height, as measured from the upstream toe of the embankment to the crest of the emergency spillway, or has a storage volume of 20 acre-feet or more, the following additional requirements shall be met:

(1) An appropriate combination of principal and emergency spillways shall be provided to safely discharge the runoff resulting from a 100-year 24-hour precipitation event, or a larger event if specified by the regulatory authority plus any in-flow from the underground mine.

(2) The embankment shall be designed and constructed with an acceptable static safety factor of at least 1.5 or such a higher safety factor as designated by the regulatory authority to ensure stability.

(3) Appropriate barriers shall be provided to control seepage along conduits that extend through the embankment.

(r) Each pond shall be designed and inspected during construction under the supervision of, and certified after construction by, a registered professional engineer.

(s) The entire embankment including the surrounding areas disturbed by construction shall be graded, fertilized, seeded, and mulched in accordance with Sections 817.111 – 817.117 immediately after the embankment is completed, provided that the active upstream face of the embankment where water is being impounded may be riprapped or otherwise stabilized. Areas in which the vegetation is not successful or where rills and gullies develop shall be repaired and revegetated in accordance with Sections 817.106 and 817.111 – 817.117.

(t) All ponds, including those not meeting the size or other criteria of 30 CFR 77.216(a), shall be examined for structural weakness, erosion, and other hazardous conditions in accordance with the inspection requirements contained in 30 CFR

77.216 3. Each person who conducts underground mining activities shall deliver to the regulatory authority any report or notification required under 30 CFR 77.216 3 whether or not the pond meets the criteria of 30 CFR 77.216(a).

(u) Each sedimentation pond shall be removed and the affected land regraded and revegetated in accordance with Sections 817.101, 817.102 and 817.111– 817.117, unless approved by the regulatory authority for retention as compatible with the approved post-mining land use. If the regulatory authority approves retention, the sedimentation pond shall meet all the requirements for permanent impoundments in Section 816.49.

SECTION 817.47 - HYDROLOGIC BALANCE: DISCHARGE STRUCTURES.

Discharges from sedimentation ponds and diversions shall be controlled, using energy dissipators, surge ponds, riprap channels, and other devices where necessary to reduce erosion and prevent deepening or enlargement of stream channels and to minimize disturbances to the hydrologic balance. Discharge structures shall be designed according to standard engineering design procedures.

SECTION 817.48 - HYDROLOGIC BALANCE: ACID-FORMING AND TOXIC-FORMING MATERIALS. {41906}

(a) Drainage from acid-forming and toxic-forming underground development waste and spoil, if any, into ground and surface water shall be avoided by:

(1) Identifying, burying, and treating, where necessary, such materials which, in the judgment of the regulatory authority, may be detrimental to vegetation or that may adversely affect water quality if not treated or buried. This material shall be buried, treated or disposed of in accordance with the provisions of paragraph (c) of this Section;

(b) Preventing water from coming into contact with acid-forming and toxic-forming materials in accordance with Section 817.103, or other measures as the regulatory authority may require; and

(c) Burying or otherwise treating all acid- or toxic-forming underground development waste and spoil within 30 days after they are first exposed on the mine site, or within a lesser period if required by the regulatory authority. Temporary storage of such materials may be approved by the regulatory authority upon a finding that burial or treatment within 30 days is not feasible and that storage will not result in any material risk of water pollution or other environmental damage. If storage is approved it shall be limited to the period until burial or treatment first becomes feasible. Stored acid- and toxic-forming underground development waste and spoil materials shall be placed on impermeable material and protected from erosion and contact with surface water. {41907}

SECTION 817.49 - HYDROLOGIC BALANCE: PERMANENT AND TEMPORARY IMPOUNDMENTS.

(a) Permanent impoundments are prohibited unless authorized by the regulatory authority. Each person who conducts underground mining activities shall demonstrate to the regulatory authority that each permanent impoundment meets the following requirements:

(1) The quality of the impounded water is suitable on a permanent basis for its intended use and discharges from the impoundment will not degrade the quality of receiving waters below water quality standards under applicable State and Federal law.

(2) The level of water will be adequately stable so as to support the intended use.

(3) Adequate safety and access to the impounded water will be provided for proposed water users.

(4) Water impoundments will not result in the diminution of the quality or quantity of water used by adjacent or surrounding landowners for agricultural, industrial, recreational, or domestic uses.

(5) The impoundment dam construction and maintenance program shall be designed to achieve stability with an adequate factor of safety compatible with structures constructed and maintained under 16 U.S.C. 1006 Pub. L. 83-566. Standards for structures built under this law are contained in the Soil Conservation Service Practice Standard 378, "Pond," and Technical Release No. 60, "Earth Dams and Reservoirs," and are hereby incorporated by reference. These standards are available in all OSM offices. These materials are incorporated as they exist on the date of adoption of this Part, and notices of changes in these materials will be published periodically in the Federal Register .

(6) The size of the impoundment is adequate for its intended purposes.

(7) The impoundment will be suitable for the approved post-mining land use.

(b) Temporary impoundments of water in which the water is impounded in a dam shall meet the requirements of Section 817.46(e) (q).

SECTION 817.50 - HYDROLOGIC BALANCE: GROUND WATER PROTECTION.

(a) To control mine drainage, surface entries, and accesses to underground workings, including adits and slopes, shall be located, designed, constructed, and utilized in such a manner as to prevent or control gravity discharge of water from the mine.

(b) Gravity discharge of water from an underground mine, other than a drift mine subject to paragraph (c) of this Section, may be allowed by the regulatory authority if:

(1) The discharge satisfies the water effluent limitations of 30 CFR 817.42 and all applicable State and Federal water quality standards;

(2) The person who conducts the underground mining activities demonstrates to the regulatory authority that changes in the hydrologic balance are minimal and post-mining land uses will not be adversely affected; and

(3) The discharge conveys mine wastes to a treatment facility in the permit area and the following conditions are met:

(i) All water discharged from the treatment facility meets the effluent limitations established in Section 817.42 and all applicable State and Federal water quality standards; and

(ii) Consistent maintenance of the treatment facility is ensured for the anticipated period of gravity discharge.

(c) Notwithstanding anything to the contrary in paragraphs (a) and (b) of this section, all openings for drift mines first used after the implementation of a State or Federal program and which are located in acid-producing or iron-producing coal seams, shall be located in such a manner as to prevent any gravity discharge from the mine.

(d) The regulatory authority may require physical, chemical and mineralogical analyses of coal bearing strata, aquifers, underground development wastes, spoil, mine wastes or other materials.

SECTION 817.52 - HYDROLOGIC BALANCE: SURFACE AND GROUND WATER MONITORING.

(a)(1) Ground water. Ground water levels, infiltration rates, subsurface flow and storage characteristics, and the quality of ground water shall be monitored in the manner required by the regulatory authority to determine the effects of underground mining activities on the recharge capacity of reclaimed lands and on the quantity and quality of water in ground water systems at the mine site and in adjacent areas.

(2) When operations may affect the ground water system, ground water levels and ground water quality shall be periodically monitored using measurements from a sufficient number of wells and mineralogical and chemical analyses of aquifer, overburden, and spoil material adequately to reflect changes in ground water quantity and quality resulting from these operations. The monitoring shall be adequate to plan for modification of the underground mining activities if necessary to minimize disturbance to the hydrologic balance.

(3) As specified and approved by the regulatory authority, the person who conducts the underground mining activities shall conduct additional hydrologic tests, including drilling, infiltration tests and aquifer tests, and the results shall be submitted to the regulatory authority to demonstrate compliance with Section 817.51.

(b) Surface water.

(1) Surface water monitoring shall be conducted in accordance with the monitoring program submitted under 30 CFR 784.13(b)(4) and approved by the regulatory authority. Monitoring shall:

(i) Be adequate to measure accurately and record water quantity and quality of discharges from the permit area;

(ii) In all cases in which analytical results of the sample collections indicate a violation of a permit condition or applicable standard has occurred, result in the operator notifying the regulatory authority immediately. Where a National Pollution Discharge Elimination System (NPDES) permit effluent limitation has been violated, the person who conducts the underground mining activities shall forward a copy of the Discharge Monitoring Report, EPA Form 3320 1, concurrently with notification of the violation;

(iii) Result in regular reports to the regulatory authority within 60 days of the end of each 60 day sample collection period; or

(iv) If the discharge for which water monitoring reports are required, is subject to regulation by a National Pollutant Discharge Elimination System (NPDES) permit issued under the Clean Water Act of 1977 (30 U.S.C. 1251 1378) which includes equivalent reporting requirements and requires filing of the water monitoring reports within 90 days or less of sample collection, the person who conducts the underground mining activities shall submit to the regulatory authority on the same time schedule as required by the NPDES permit or within 90 days following sample collection, whichever is earlier, either:

(A) A copy of the completed reporting form filed to meet NPDES permit requirements; or
{41908}

(B) A letter identifying the State or Federal Government official with whom the reporting form was filed to meet NPDES permit requirements and the date of filing.

(2) After disturbed areas have been regraded and stabilized according to this Part, the person who conducts underground mining activities shall monitor surface water flow and quality. Data from this monitoring shall be used to demonstrate that the quality and quantity of runoff without treatment is consistent with the requirement of this Section to minimize disturbance to the prevailing hydrologic balance and with the requirements of this Part to attain the approved post-mining land use. These data shall provide a basis for approval by the regulatory authority for removal of water quality or flow control systems and for determining when the requirements of this Section are met. The regulatory authority shall determine the nature of data, frequency of collection, and reporting requirements.

(3) Equipment, structures, and other devices necessary to measure and sample accurately the quality and quantity of surface water discharges from the affected area, shall be properly installed, maintained, and operated and shall be removed when no longer required.

SECTION 817.53 - HYDROLOGIC BALANCE: TRANSFER OF WELLS.

(a) An exploratory or monitoring well may only be transferred for use as a water well with the prior approval of the regulatory authority. The surface owner shall submit a written request to the regulatory authority for approval of any well transfer.

(b) Upon an approved transfer of a well, the transferee shall:

- (1) Assume primary liability for damages to persons or property from the well;
- (2) Plug the well when necessary, but in no case later than abandonment of the well; and
- (3) Assume primary responsibility for compliance with Sections 817.13- 817.15 with respect to the well.

(c) Upon transfer of a well, the transferor shall:

- (1) Be secondarily liable for damages;
- (2) Be secondarily liable for plugging the well; and
- (3) Be secondarily liable for compliance with Section 816.13- 816.15 with respect to the well.

(d) Nothing in this Section shall be deemed to supersede or affect the applicability of any State law requirements with respect to a well transfer.

SECTION 817.54 - HYDROLOGIC BALANCE: WATER RIGHTS AND REPLACEMENT.

Any person who conducts in underground mining activities shall replace the water supply of an owner of interest in real property who obtains all or part of his supply of water for domestic, agricultural, industrial, or other legitimate use from an underground or surface source where the water supply has been affected by contamination, diminution, or interruption resulting from the underground mining activities.

SECTION 817.55 - HYDROLOGIC BALANCE: DISCHARGE OF WATER INTO AN UNDERGROUND MINE.

Water from an underground mine shall not be discharged into other underground mine workings unless the person who conducts the underground mining activities demonstrates to the satisfaction of the regulatory authority that the discharge_

- (a) Abates water pollution or otherwise eliminates public hazards resulting from underground mining activities;
- (b) Is conveyed as a controlled flow; and
- (c) Meets the water quality requirements of 817.42 for pH and total suspended solids except that the total suspended solid concentrations may be exceeded if the suspended material is approved by the regulatory authority or is limited to:
 - (1) Coal processing waste;
 - (2) Underground mine development waste;
 - (3) Fly ash from a coal-fired facility;
 - (4) Acid mine drainage sludge;
 - (5) Flue gas desulfurization sludge; or
 - (6) Inert materials used for stabilizing underground mines; and
- (d) The discharge will not cause, result in, or contribute to a violation of applicable water quality standards.
- (e) Minimizes disturbance to the hydrologic balance.

SECTION 817.56 - HYDROLOGIC BALANCE: POST-MINING REHABILITATION OF SEDIMENTATION PONDS, DIVERSIONS, IMPOUNDMENTS AND TREATMENT FACILITIES.

Before abandoning the permit area, the person who conducts the underground mining activities shall restore all permanent sedimentation ponds, diversions, impoundments and treatment facilities to meet the original design criteria for permanent structures or impoundments.

SECTION 817.57 - HYDROLOGIC BALANCE: STREAM BUFFER ZONES.

(a) No surface or underground area within 100 feet of a perennial stream or a stream with a macro-invertebrate biological community shall be disturbed by underground mining activities except in accordance with Section 817.44 unless the regulatory authority specifically authorizes underground mining activities closer to or through such a stream upon finding:

- (1) That the original stream channel will be restored; and
- (2) During and after the mining, the water quantity and quality from the stream section within 100 feet of the underground mining activities shall not be adversely affected.

(b) The area not to be disturbed shall be designated a buffer zone and marked as specified in Section 817.11.

SECTION 817.59 - COAL RECOVERY.

Underground mining activities shall be conducted so as to maximize the utilization and conservation of the coal so that re-affecting the land in the future through surface coal mining operations is minimized.

SECTION 817.61 - USE OF EXPLOSIVES: GENERAL REQUIREMENTS.

(a) Each person who conducts underground mining activities shall comply with all applicable local, State, and Federal laws and regulations and the requirements of Sections 816.61 816.68, in the storage, handling, preparation, and use of explosives.

(b) Blasting operations at areas affected by surface operations and facilities that use more than the equivalent of 5 pounds of TNT shall be conducted according to a time schedule approved by the regulatory authority.

(c) All blasting operations shall be conducted by experienced, trained, and competent persons who understand the hazards involved. Each person responsible for blasting operations shall:

- (1) Have demonstrated a knowledge of, and shall comply with, MSHA safety requirements and U.S. Department of Treasury security requirements;
- (2) Be capable of using mature judgment in all situations;
- (3) Be in good physical condition and not addicted to intoxicants, narcotics, or other similar types of drugs;

- (4) Possess current knowledge of the local, State, and Federal laws and regulations applicable to the work; and
- (5) Possess a valid certificate of completion of training and qualification as required by 30 CFR 850 and 851.

SECTION 817.62 - USE OF EXPLOSIVES: PRE-BLASTING SURVEY.

(a) On the request to the regulatory authority by a resident or owner of a man-made dwelling or structure that is located within one-half mile of any part of the permit area, the person who conducts the underground mining activities shall conduct a pre-blasting survey of the dwelling or structure and submit a report of the survey to the regulatory authority and to the person requesting the survey. {41909}

(b) Each person who conducts underground mining activities shall utilize personnel approved by the regulatory authority to conduct the survey to determine the condition of the dwelling or structure and to document any pre-blasting damage and other physical factors that could reasonably be affected by the blasting. Assessments of structures such as pipes, cables, transmission lines, and wells and other water systems shall be limited to surface condition and readily available data. Special attention shall be given to the pre-blasting condition of wells and other water systems used for human, animal, or agricultural purposes and to the quantity and quality of the water.

(c) A written report of the survey shall be prepared and signed by the person who conducted the survey. The report shall include recommendations of any special conditions or proposed adjustments to the blasting procedure which should be incorporated into the blasting plan to prevent damage. Copies of the report shall be provided to the person requesting the survey and to the regulatory authority.

SECTION 817.65 - USE OF EXPLOSIVES: SURFACE BLASTING REQUIREMENTS.

(a) The provisions of this Section apply only to blasting conducted on the surface.

(b) A resident or owner of a man-made dwelling or structure that is located within one-half mile of any area affected by surface operations or facilities shall be notified 24 hours prior to any blasting event required for facing-up operations.

(c) All blasting shall be conducted between sunrise and sunset. The regulatory authority may specify more restrictive time periods based on public requests or other considerations including the proximity to residential areas.

(d) Warning and all-clear signals of different character that are audible within a range of one-half mile from the point of the blast shall be given. Each person within the permit area and each person who resides or regularly works within one-half mile of the permit area shall be notified of the meaning of the signals through appropriate instructions. These instructions shall be periodically delivered or otherwise communicated in a manner which can reasonably be expected to inform such persons of the meaning of the signals. Each person who conducts underground mining activities shall maintain signs in accordance with Section 817.11(f).

(e) Access to the blasting area shall be regulated to protect the public and livestock from the effects of blasting. Access to the blasting area shall be controlled to prevent unauthorized entry at least 10 minutes before each blast and until an authorized representative of the person who conducts the underground mining activities has reasonably determined:

- (1) That no unusual circumstances, such as imminent slides or undetonated charges, exist; and
- (2) That access to and travel in or through the area can safely resume.

(f) Areas in which explosives are awaiting firing shall be guarded, barricaded and either posted or flagged against unauthorized entry.

(g) (1) Airblast shall be controlled so that it does not exceed the values specified below at any dwelling, public building, school, church, or commercial or institutional building, unless such building is owned or leased by the person who conducts the underground mining activities and is located within the permit area: 072

Lower Frequency Limit of Measuring System, Hz (3dB)	Maximum Level in dB
0.1 Hz or lower – flat response	135 peak.
2 Hz or lower – flat response	132 peak.
6 Hz or lower – flat response	130 peak.
C-weighted, slow response	109C.

(2) In all cases except the C-weighted slow, the systems used must have a flat frequency response of at least 500 Hz at the upper end. The C-weighted must meet the standard ANSI S1.4-1971 specifications. The ANSI S1.4-1971 is hereby incorporated by reference. This work is incorporated as it exists on the date of adoption of this Part, and notice of changes made in these materials will periodically be published in the Federal Register. ANSI S1.4 1971 is available for inspection in

OSM regional offices and in OSM's office in the Department of the Interior, 18th and C Streets NW., Washington, D.C. 20240.

(3) The person who conducts blasting may satisfy the provisions of this section by meeting any one of the four specifications in the chart in paragraph (g)(1) of this Section.

(h) Except where lesser distances are approved by the regulatory authority based upon a pre-blasting survey or other appropriate investigations, blasting shall not be conducted within:

- (1) 1,000 feet of any building used as a dwelling, school, church, hospital, or nursing facility;
- (2) 500 feet of facilities including, but not limited to, disposal wells, petroleum or gas-storage facilities, municipal water-storage facilities, fluid-transmission pipelines, gas or oil-collection lines, or water and sewage lines; and
- (3) 500 feet of the active workings of an underground mine except with the concurrence of the Mine Safety and Health Administration:

(i) Flyrock from blasting shall be restricted as follows:

- (1) No flyrock shall be cast beyond the line of property owned or leased by the person who conducts the underground mining activities without the consent of the landowners of adjacent areas.
- (2) No flyrock shall be cast more than half the distance from the blast to the nearest dwelling, public building, school, church, commercial or institutional building, road, or railroad. This shall not apply to any structure or right-of-way on land owned by the person who conducts the underground mining activities and not leased to any other person;
- (3) No flyrock shall be cast beyond the area of regulated access required under paragraph (e) of this Section; and
- (4) These restrictions shall apply to material which travels along the ground surface as well as that which travels through the air.

(j) Blasting shall be conducted to prevent injury to persons, damage to public or private property outside the permit area, adverse impacts on any underground mine, and change in the course, channel, or availability of ground or surface waters outside the permit area.

(k) In all blasting operations, except as otherwise authorized in this Section, the maximum peak particle velocity shall not exceed 1 inch per second at the location of any dwelling, public building, school, church, or commercial or institutional building. The regulatory authority may reduce the maximum peak particle velocity allowed if it determines that a lower standard is required because of density of population or land use, age or type of structure, geology or hydrology of the area, frequency of blasts, or other factors.

(l) The maximum peak particle velocity does not apply to property within the permit area that is owned by the person who conducts the underground mining activities and is not leased to any other person.

(m) An equation for determining the maximum weight of explosives that can be detonated within any 8-millisecond period is in paragraph (n) of this Section. If the blasting is conducted in accordance with this equation, the velocity is deemed to be within the 1 inch per second limit.

(n) (1) The maximum weight of explosives to be detonated within any 8 millisecond period may be determined by the formula $W = (D / 60)^2$ where W =the maximum weight of explosives, in pounds, that can be detonated in any 8-millisecond period, and D =the distance, in feet, to the nearest dwelling, school, church, or commercial or institutional building. {41910}

(2) For distances between 300 and 5,000 feet, solution of the equation results in the following maximum weight:

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Distance in feet (D):	Max weight in pounds (W)
300	25
350	34
400	44
500	69
600	100
700	136
800	178
900	225
1,000	278
1,100	336
1,200	400
1,300	469
1,400	544
1,500	625
1,600	711
1,700	803
1,800	900
1,900	1,002
2,000	1,111
2,500	1,736
3,000	2,500
3,500	3,403
4,000	4,444
4,500	5,625
5,000	6,944

(o) If on a particular site the peak particle velocity exceeds one-half inch per second after a period of 1 second following the maximum ground particle velocity, the blasting procedures shall be revised to limit the ground motion.

(p) Electric or electric delay systems combining surface delays with in-hole delays may be used to reduce vibrations of approved by the regulatory authority. Requests to use such systems shall be accompanied by blasting reports and seismograph records of test blasting on the site showing that the delay pattern does not produce peak particle velocities in violation of this Section.

SECTION 817.67 - USE OF EXPLOSIVES: SEISMOGRAPHIC MEASUREMENTS.

(a) Where a seismograph is used to monitor the velocity of ground motion and the peak particle velocity limit of 1 inch per second is not exceeded, the equation in Section 817.65(n) need not be used. If the equation is not being used, a seismographic record shall be obtained for each shot.

(b) The use of a modified equation to determine maximum weight of explosives for blasting operations at a particular site may be approved by the regulatory authority on receipt of a petition accompanied by reports including seismograph records of test blasting on the site. In no case shall the regulatory authority approve the use of a modified equation where the peak particle velocity of 1 inch per second required in Section 817.65(k) would be exceeded.

(c) The regulatory authority may require a seismograph record of any or all blasts.

SECTION 817.68 - USE OF EXPLOSIVES: RECORDS OF BLASTING OPERATIONS.

A record of each blast, including seismograph reports, shall be retained for at least 3 years and shall be available for inspection by the regulatory authority and the public on request. The record shall contain the following data:

- (a) Name of the person conducting the blast.
- (b) Location, date, and time of blast.
- (c) Name, signature, and license number of blaster-in-charge.
- (d) Direction and distance, in feet, to the nearest dwelling, school, church, or commercial or institutional building either:
 - (1) Not located in the permit area; or
 - (2) Not owned nor leased by the person who conducts the underground mining activities.
- (e) Weather conditions.
- (f) Type of material blasted.
- (g) Number of holes, burden, and spacing.
- (h) Diameter and depth of holes.
- (i) Types of explosives used.
- (j) Total weight of explosives used.
- (k) Maximum weight of explosives detonated within any 8 millisecond period.
- (l) Maximum number of holes detonated within any 8 millisecond period.
- (m) Methods of firing and type of circuit.
- (n) Type and length of stemming.
- (o) Mats or other protections used.
- (p) Type of delay detonator and delay periods used.
- (q) Seismographic records, where required, including the calibration signal of the gain setting and:
 - (1) Seismograph reading, including exact location of seismograph and its distance from the blast;
 - (2) Name of the person taking the seismograph reading; and
 - (3) Name of person and firm analyzing the seismograph record.

SECTION 817.71 - DISPOSAL OF UNDERGROUND DEVELOPMENT WASTE AND EXCESS SPOIL: GENERAL REQUIREMENTS.

(a) Underground development waste and spoil not required to achieve the approximate original contour and which cannot be used as backfill in the underground mine shall be hauled or conveyed to and placed in designated disposal areas within a permit area other than mine working or excavations, only if the disposal areas are authorized for such purposes in the approved mining and reclamation permit and only in accordance with Sections 817.71 – 817.73. The material shall be placed in a controlled manner to ensure:

- (1) That leachate and surface runoff will not degrade surface or ground waters or exceed the effluent limitations of Section 817.42;
- (2) Stability of the fill; and
- (3) The land mass is suitable for reclamation and revegetation compatible with the natural surroundings.

- (b) The fill shall be designed using recognized professional standards, certified by a registered professional engineer, and approved by the regulatory authority.
- (c) All vegetative and organic materials shall be removed from the disposal area and the topsoil shall be removed, segregated and replaced under Sections 817.21 817.23 before spoil is placed in the disposal area. If approved by the regulatory authority, organic material may be used as mulch or may be included in the topsoil to control erosion, to promote growth of vegetation or to increase the moisture retention of the soil.
- (d) Slope protection shall be provided to minimize surface erosion at the site. All disturbed areas including diversion ditches that are not rip- rapped shall be vegetated upon completion of construction.
- (e) The disposal areas shall be located on the most moderate sloping and naturally stable areas available as approved by the regulatory authority. If such placement provides additional stability and prevents mass movement, fill materials suitable for disposal shall be placed upon or above a natural terrace, bench, or berm.
- (f) The fill materials shall be hauled or conveyed and placed in a controlled manner, concurrently compacted as necessary to ensure mass stability and prevent mass movement, covered, and graded to allow surface and sub-surface drainage to be compatible with the natural surroundings, to ensure long-term stability.
- (g) The final configuration of the fill must be suitable for post-mining land uses approved in accordance with Section 816.124 except that no depressions or impoundments shall be allowed on the completed fill.
- (h) Terraces shall not be constructed unless approved by the regulatory authority.
- (i) Where the slope in the disposal area exceeds 1v:2.8h (36 percent), or such lesser slope as may be designed by the regulatory authority based on local conditions, keyway cuts (excavations to stable bedrock), or rock toe buttresses shall be constructed to stabilize the fill. The slope of original ground at the toe of the fill shall not exceed 1v:5h (20 percent).
- (j) The fill shall be inspected for stability by a registered engineer or other professional specialist approved by the regulatory authority during critical construction periods and at least quarterly throughout construction to ensure removal of all organic material and topsoil, placement of underdrainage systems, proper installation of surface drainage systems, proper placement and compaction of fill materials, and proper revegetation. The registered engineer or other qualified professional specialist shall provide to the regulatory authority a certified report within 2 weeks after each inspection that the fill has been constructed as specified in the design approved by the regulatory authority, and a copy of the report shall be retained at the minesite by the person who conducts the underground mining activities. {41911}
- (k)(1) Coal processing waste shall not be disposed of in head of hollow fills and may be disposed of in underground development waste or excess spoil fills if such waste is:
- (i) Placed in accordance with Section 817.85;
 - (ii) Demonstrated to be non-toxic and non-acid forming; and
 - (iii) Demonstrated to be consistent with the design stability of the fill.
- (2) Wastes other than coal processing wastes shall be disposed of in accordance with Section 817.89.
- (l) The disposal area shall not contain springs, natural water courses, or wet weather seeps unless lateral drains are constructed from the wet areas to the underdrains in a manner that prevents infiltration of the water into the spoil pile.
- (m) If any portion of the fill interrupts, obstructs, or encroaches upon any natural drainage channel, the entire fill is classified as a valley or head-of-hollow fill and must be designed and constructed in accordance with the requirements of Sections 817.72 and 817.73, respectively.
- (n) The foundation and abutments of the fill shall be stable under all conditions of construction and operation. Sufficient foundation investigations and laboratory testing of foundation materials shall be performed in order to determine the design requirements for stability of the foundation. Analyses of foundation conditions shall include the effect of underground mine workings, if any, upon the stability of the structure.
- (o) The regulatory authority shall direct the person who conducts the underground mining activities to modify the fill to mitigate potential harm, if the regulatory authority determines that:

- (1) The fill construction does not meet the requirements set out in this or following Sections, if applicable;
- (2) The fill is not constructed in accordance with satisfactory engineering standards;
- (3) The fill poses an imminent threat of failure; or
- (4) Scientific or engineering studies demonstrate that the fill poses an unreasonable threat of failure.

(p) Modification required under paragraph (o) of this Section may include regrading, change of construction technique, abandonment, or removal of the fill.

(q) Underground development waste and excess spoil may be returned to underground workings only in accordance with the program submitted to and approved by the regulatory authority under 30 CFR 784.18.

SECTION 817.72 DISPOSAL OF UNDERGROUND DEVELOPMENT WASTE AND EXCESS SPOIL: VALLEY FILLS.

Valley fills shall meet all of the requirements of Section 817.71 and the additional requirements of this Section.

(a) The fill shall be designed to attain a long-term static factor of safety of 1.5, based upon data obtained from subsurface exploration, geotechnical testing, foundation design, and accepted engineering analyses.

(b) A sub-drainage system for the fill shall be constructed in accordance with the following:

(1) A system of underdrains constructed of durable rock shall:

- (i) Be installed along the natural drainage system;
- (ii) Extend from the toe to the head of the fill; and
- (iii) Contain lateral drains to each area of potential drainage or seepage.

(2) A filter system to ensure the proper functioning of the rock underdrain system shall be designed and constructed using standard geotechnical engineering.

(3) In constructing the underdrains, no more than 10 percent of the rock may be less than 12 inches in size and no single rock may be larger than 25 percent of the width of the drain. Rock used in underdrains shall meet the requirements of paragraph (a) (5) of this Section.

(4) The minimum size of the main underdrain shall be: 075

Total amount of fill material	Predominant type of fill material	Minimum size of drain, in feet	
		Width	Height
Less than 1 million cubic yards	Sandstone	10	4
Do	Shale	16	8
More than 1 million cubic yards	Sandstone	16	8
Do	Shale	16	16

(5) Rock used shall not have less than 50 percent wear in 500 revolutions in the Los Angeles Rattler Test (AASHTO T 96 70), shall not have less than 15 percent by weight loss in 5 cycles of the Sodium Sulfate Test (ASTM C 88, AASHTO T 104), and shall not contain less than 30 percent by volume of clay or clay minerals as determined by standard petrologic analytical tests, and shall not be acid-forming or toxic-forming.

(c)(1) Underground development waste and excess spoil shall be hauled or conveyed and placed in a controlled manner and concurrently compacted as specified by the regulatory authority in lifts no thicker than 18 inches in order to:

- (i) Achieve the densities designed to ensure mass stability;
- (ii) Prevent mass movement;
- (iii) Avoid contamination of the rock underdrain or rock core; and
- (iv) Prevent formation of voids.

(2) The person who conducts the underground mining activities may use lifts of greater thickness than required under paragraph (c) (1) of this Section if he has demonstrated to the regulatory authority by density monitoring tests that the density throughout the thickness of the lift is equal to or greater than the density specified in the design referred to in paragraph (a) of this Section, except that in no event shall lift thickness exceed 4 feet.

(d) Surface water runoff from the area above the fill shall be diverted away from the fill and into stabilized diversion channels designed to pass safely the runoff from the 24-hour duration 100-year frequency storm or larger event specified by the regulatory authority. Sediment control structures shall be provided at the discharge of the diversion ditch before entry into the natural water course in accordance with Section 817.46. Surface runoff from the fill surface shall be diverted to stabilized channels off the fill which will safely pass runoff from a 24-hour duration, 100-year frequency storm. Diversion design shall comply with the requirements of Section 817.43(f).

(e) The tops of the fill and any terrace constructed to stabilize the face, shall be graded no steeper than 1v:20h (5 percent). The vertical distance between terrace shall not exceed 50 feet.

(f) Drainage shall not be directed over the outslope of the fill.

(g) The outslope of the fill shall not exceed 1v:2h (50 percent). The regulatory authority may require a flatter slope.

SECTION 817.73 - DISPOSAL OF UNDERGROUND DEVELOPMENT WASTE AND EXCESS SPOIL: HEAD-OF-HOLLOW FILLS.

Disposal of underground development waste and excess spoil in the head-of-hollow fill shall meet all standards set forth in Sections 817.71 and 817.72 and the additional requirements of this Section.

(a) The fill shall be designed to completely fill the disposal site approved by the regulatory authority to the approximate elevation of the ridgeline. A rock-core chimney drain may be utilized instead of the subdrain and surface diversion system required for valley fills. If the crest of the fill is not approximately at the same elevation as the low point of the adjacent ridgeline, the fill must be designed as specified in Section 817.72, with diversion of runoff around the fill. {41912}

(b) The alternative rock-core chimney drain system shall be designed and incorporated into the construction of head-of-hollow fills as follows:

(1) The fill shall have along the vertical projection of the main buried stream channel or rill, a vertical core of durable rock at least 16 feet thick which shall extend from the toe of the fill to the head of the fill and from the base of the fill to the surface of the fill. A system of lateral rock underdrains shall connect this rock core to each area of potential drainage or seepage in the disposal area. Rocks used in the rock core and underdrains shall meet the requirements of Section 817.72(b).

(2) A filter system to insure the proper functioning of the rock core shall be designed and constructed using standard geotechnical engineering methods.

(3) The grading may drain surface water away from the outslope of the fill and toward the rock core. The maximum slope of the top of the fill shall be 1v:33h (3 percent). Instead of the requirements of Section 817.71(g), a drainage pocket may be maintained at the head of the fill during and after construction to intercept surface runoff and discharge the runoff through or over the rock drain if stability of the fill is not impaired. In no case shall this pocket or sump have a potential for impounding more than 10,000 cubic feet of water. Terraces on the fill shall be graded with a 3- to 5-percent grade toward the fill and a 1-percent slope toward the rock core.

(c) The drainage control system shall be capable of safely passing the runoff from a 24-hour 100-year frequency storm, or larger event, as specified by the regulatory authority.

SECTION 817.81 - COAL PROCESSING WASTE BANKS: GENERAL REQUIREMENTS.

(a) All coal processing waste shall be hauled or conveyed and placed in new and existing disposal areas which shall be within the permit area and which are approved by the regulatory authority for this purpose. The coal processing waste disposal area shall be designed, constructed and maintained:

- (1) In accordance with Sections 817.71 and 817.72, the provisions of this Section and Sections 817.82 817.88; and
- (2) To prevent combustion.

(b) Coal processing waste materials from activities outside the permit area such as other mines or abandoned mine waste piles may be disposed of in permit areas only if approved by the regulatory authority. The approval shall be based on a

showing by the person who conducts underground mining activities, using hydrologic, geologic, physical, and chemical analyses, that disposal of these materials does not:

- (1) Adversely affect water quality, water flow, or vegetation;
- (2) Create public health hazards; and
- (3) Cause instability in the disposal areas.

SECTION 817.82 - COAL PROCESSING WASTE BANKS: SITE INSPECTION.

(a) All coal processing waste disposal sites shall be inspected by an engineer or other person approved by the regulatory authority:

(1) The inspections shall occur at least once each week beginning within 7 days after preparation of the disposal area begins and terminating when the coal processing waste bank has been graded, covered in accordance with Section 817.85 and topsoil has been distributed on the bank in accordance with Section 817.24 or for such longer period as the regulatory authority may require.

(2) The inspections shall include such observations and tests as may be necessary to evaluate the potential hazard to human life and property, to ensure that all organic material and topsoil have been removed and that proper construction and maintenance are occurring in accordance with the plan submitted under 30 CFR 780.35 and approved by the regulatory authority.

(3) The engineer or other approved inspector shall consider steepness of slopes, seepage, and other visible factors which could indicate potential failure and shall consider the results of failure with respect to the threat to human life and property.

(4) Copies of the inspection findings shall be maintained at the mine site.

(b) If any inspection discloses that a potential hazard exists, the regulatory authority shall be informed promptly of the finding and of the action procedures formulated for public protection and remedial action in the event of an emergency. If adequate emergency procedures cannot, for any reason, be formulated or implemented then the regulatory authority shall be notified immediately. The regulatory authority shall then notify the appropriate emergency agencies that emergency procedures are required for the coal processing waste area.

SECTION 817.83 - COAL PROCESSING WASTE BANKS: WATER CONTROL MEASURES.

(a) A properly designed sub-drainage system shall be provided and shall:

- (1) Comply with the provisions of Sections 817.71 and 817.72.
- (2) Be covered so as to protect against the entrance of surface water or leachate from the coal processing waste.

(b) All surface drainage from the area above the coal processing waste bank and from the crest and face of the waste disposal area shall be diverted in accordance with Section 817.72(d).

(c) Slope protection shall be provided to minimize surface erosion at the site. All disturbed areas including diversion ditches that are not rip-rapped shall be vegetated upon completion of construction.

(d) All water discharged from a coal processing waste bank shall comply with the regulations of Section 817.42.

SECTION 817.85 - COAL PROCESSING WASTE BANKS: CONSTRUCTION REQUIREMENTS.

(a) The coal processing waste banks shall be constructed in compliance with Sections 817.71 and 817.72 and this Section.

(b) Coal processing waste banks shall have a minimum static factor of safety of 1.5.

(c) Compaction requirements during construction or modification of all coal processing waste banks shall meet the requirements of this paragraph, instead of those specified in Section 817.72(c). The coal processing waste shall be:

- (1) Spread in layers no more than 8 inches in thickness; and
- (2) Compacted to attain 90 percent of the maximum dry density in order to prevent spontaneous combustion and to provide the strength required for stability of the coal processing waste bank. Dry densities shall be determined in accordance with ASSHTO T 99, or equivalent.

(d) Following grading of the coal processing waste bank, the site shall be covered with a minimum of 4 feet of the best available non-toxic and non-combustible material in accordance with Section 817.22(e) and in a manner that does not impede flow from sub-drainage systems.

SECTION 817.86 - COAL PROCESSING WASTE: BURNING.

(a) Coal processing waste fires shall be extinguished by the person who conducts the underground mining activities, in accordance with a plan approved by the regulatory authority.

(b) Extreme caution shall be taken in all attempts to extinguish burning wastes to ensure that no hazards will exist to equipment operators or other persons working or living in the vicinity of the site. {41913}

(c) Acceptable techniques for extinguishing burning wastes may include, but are not limited to the following:

- (1) Quenching with surface applications of water;
- (2) Isolation of burning wastes by excavation;
- (3) Exclusion of oxygen by blanketing or sealing with water, foam or other materials; and
- (4) Injecting water or slurry to isolate and quench the wastes.

SECTION 817.87 - COAL PROCESSING WASTE: BURNED WASTE UTILIZATION.

(a) Before the person who conducts the underground mining activities may remove burned coal processing waste or other materials or refuse from a disposal area, approval shall be obtained from the regulatory authority. A plan regarding the method of removal, with maps and appropriate drawings to illustrate the proposed sequence of the operation and methods of compliance with this Part, shall be submitted to the regulatory authority. Consideration shall be given in the plan to potential hazards which may be created to persons working or living in the vicinity of the structure. The plan shall be certified by a qualified engineer.

(b) Burned coal processing waste may be utilized for offsite construction purposes with the approval of the regulatory authority.

SECTION 817.88 - COAL PROCESSING WASTE: RETURN TO UNDERGROUND WORKINGS.

Coal processing waste may be returned to underground mine workings only in accordance with the waste disposal program approved by the regulatory authority under 30 CFR 780.35.

SECTION 817.89 - DISPOSAL OF NON-COAL WASTES.

(a) Non-coal wastes including, but not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, timber and other combustibles generated during underground mining activities shall be placed and stored in a controlled manner in a designated area to ensure that leachate and surface runoff do not degrade surface or ground water, fires are prevented, and the area remains stable and is suitable for reclamation and revegetation compatible with the natural surroundings.

(b) The final disposal of non-coal wastes shall be in a designated disposal site. The solid waste disposal site shall be designed and constructed with appropriate barriers on the bottom and sides of the designated site. The wastes shall be routinely compacted and covered to prevent combustion and wind born waste. When the disposal is completed or when the underground mining activities are completed, a minimum of 2 feet of soil cover shall be placed over the site. The operation of the disposal site shall be conducted in accordance with all local, State, and Federal requirements.

(c) At no time shall the person who conducts allow any solid waste material to be deposited at refuse embankments or impoundment sites nor shall the person who conducts the underground mining activities allow any solid waste disposal excavation to be placed within 8 feet of any coal outcrop or coal storage area.

SECTION 817.91 - COAL PROCESSING WASTE: DAMS AND EMBANKMENTS: GENERAL REQUIREMENTS.

Sections 817.91 – 817.93 apply to existing and proposed dams and embankments constructed of coal processing waste or intended to impound coal processing wastes.

- (a) All dams and embankments including those not meeting the size or other criteria of 30 CFR 77.216(a), shall be routinely inspected by a registered professional engineer, or someone under the supervision of a registered professional engineer, in accordance with Mine Safety and Health Review Commission regulations in 30 CFR Section 77.316 3.
- (b) All dams and embankments subject to this section shall be routinely maintained. Vegetative growth shall be cut where necessary to facilitate inspection and repairs. Ditches and spillways shall be cleaned. Any combustible materials present on the surface, other than that used for surface stability such as mulch or dry vegetation, shall be removed and any other appropriate maintenance procedures followed.
- (c) All dams and embankments subject to this section shall be inspected and certified annually as having been constructed and modified in accordance with current prudent engineering practices to minimize the possibility of failures. Any changes in the geometry of the dam or embankment shall be highlighted and included in the annual certification report. These certifications shall include a report on:
 - (1) Existing and required monitoring procedures and instrumentation;
 - (2) The average and maximum depths and elevations of any impounded waters over the past year;
 - (3) Existing storage capacity of the dam or embankment;
 - (4) Any fires occurring in the material over the past year; and
 - (5) Any other aspects of the dam or embankment affecting stability.
- (d) A person who conducts underground mining activities shall submit to the regulatory authority plans for any enlargements, reductions in size, re-construction or other modification of impounding structures. Except where change is required to eliminate an emergency condition, the regulatory authority shall have approved the plans before alterations begin.

SECTION 817.92 - COAL PROCESSING WASTE: DAMS AND EMBANKMENTS: SITE PREPARATION.

Before coal processing waste is placed at a dam or embankment:

- (a) Clearing and grubbing of all trees, shrubs, grasses, and other organic material shall be performed and all combustibles shall be removed and stockpiled in accordance with the requirements of this Part.
- 41913 (b) All surface drainage shall be diverted away from the crest and downstream face of the dam or embankment. Diversion ditches shall be designed and constructed, utilized, and maintained to prevent blockage and to pass the peak runoff from a 24-hour precipitation event with a 100-year recurrence interval unless greater event is specified by the regulatory authority. Sediment control structures shall be provided at the discharge of each diversion ditch before entry into natural water courses in accordance with Sections 817.4 – 817.55.
- (c) Slope protection shall be provided to minimize surface erosion at the site and sediment control structures shall be required. All disturbed areas including diversion ditches that are not riprapped shall be vegetated upon completion of construction.

SECTION 817.93 - COAL PROCESSING WASTE: DAMS AND EMBANKMENTS: CONSTRUCTION.

- (a) Waste shall not be used in the construction of dams and embankments unless demonstrated through appropriate engineering analysis to have no adverse effect on stability, and approved by the regulatory authority.
- (b) The design of the dam or embankment shall be based on the flood from the probable maximum precipitation event unless the person who conducts the underground mining activities shows that the failure of the dam or embankment would not cause loss of life or severely damage property or the environment, in which case and depending on site conditions, a design to safely pass the flow from a 100-year precipitation event may be specified by the regulatory authority.

(c) One or more spillways shall be provided for the dam or embankment to pass that portion of the design storm that cannot be safely stored. Spillways and outlet works shall be designed to provide adequate protection against erosion. Inlets shall be protected against blockage.

(d) The design freeboard distance between the lowest point on the embankment crest and the maximum water elevations shall be at least 3 feet. {41914}

(e) Dams and embankments shall have minimum safety factors as follows: 071

Case	Loading condition	Minimum safety factor
I	End of construction	1.3
II	Partial pool with steady seepage saturation	1.5
III	Steady seepage from spillway or decant crest	1.5
IV	Earthquake (cases II and III with seismic loading)	1.0

(f) The dam or embankment foundation and abutments shall be stable under all conditions of construction and operation of the impoundment. Sufficient foundation investigations and laboratory testing shall be performed to determine the factors of safety of the dam or embankment for all loading conditions in paragraph (e) of this Section and for all increments of construction.

(g) Allowances shall be made for settlement of the dam or embankment and the foundation so that the freeboard will be maintained.

(h) Dams or embankments created for impounding waste materials shall be subject to a minimum drawdown criteria that allows the facility to be evacuated by spillways or decants of 90 percent of the volume of water stored during the designed precipitation event within 10 days.

(i) For each dam and embankment a permanent identification number, at least 6 feet high shall:

- (1) Show the permit number for the underground coal mining and reclamation operations;
- (2) Show the name of the person operating or controlling the dam; and
- (3) Be located on or immediately adjacent to each dam.

SECTION 817.95 - AIR RESOURCES PROTECTION.

(a) Fugitive dust. Each person who conducts underground mining activities shall plan and employ fugitive dust control measures as an integral part of site preparation, coal mining, and reclamation operations. The regulatory authority shall specify the control measures appropriate for use in planning, according to applicable Federal and State air quality standards, climate, existing air quality in the area affected by mining, and the available control technology.

(b) Control measures. The fugitive dust control measures to be used, depending on applicable Federal and State air quality standards, the climate, existing air quality, size of the operation, and type of operation shall include, but not be limited to:

- (1) Periodic watering of unpaved roads with the minimum frequency of watering specified according to a quantitative standard approved by the regulatory authority;
- (2) Chemical stabilization of unpaved roads with nontoxic soil cements or dust palliatives mixed into the upper 1 or 2 inches or more of the road surface;
- (3) Paving of roads;
- (4) Prompt removal of coal, rock, soil, and other dust-forming debris from roads and frequent scraping and compaction of unpaved roads to stabilize the road surface;
- (5) Restricting the speed of vehicles to reduce the length and size of any fugitive dust caused by travel;
- (6) Revegetating, mulching, or otherwise stabilizing all areas adjoining roads that are sources of fugitive dust;
- (7) Restricting the travel of vehicles on other than established roads;

- (8) Enclosing, covering, watering or otherwise treating loaded haul trucks and railroad cars to reduce loss of material to wind and spillage;
- (9) Substituting of conveyor systems for haul trucks and covering of conveyor systems when conveyed loads are subjected to wind erosion;
- (10) Minimizing the area of disturbed land;
- (11) Prompt revegetation of regraded lands;
- (12) Use of alternatives for coal-handling methods, restriction of dumping procedures, wetting of disturbed materials during handling, and compaction of disturbed areas;
- (13) Planting of special windbreak vegetation at critical points in the permit area.
- (14) Control of dust from drilling using water sprays, hoods, dust collectors, or other controls;
- (15) Restricting the areas to be blasted at any one time to reduce fugitive dust;
- (16) Restricting activities causing fugitive dust during periods of air stagnation;
- (17) Extinguishing any areas of burning or smoldering coal and periodically inspecting for burning areas whenever the potential for spontaneous combustion is high; and
- (18) Reducing the period of time between initially disturbing the soil and revegetating or other surface stabilization.
- (19) Restricting fugitive dust at spoil and coal transfer and loading points with water sprays, negative pressure systems and baghouse filters, chemicals, or other practices.

(c) Additional measures. Where the regulatory authority determines the application of fugitive-dust control measures listed in paragraph (b) of this Section is insufficient to achieve and maintain applicable Federal and State air quality standards, the regulatory authority may require additional measures and practices as may be necessary to ensure compliance with all applicable air quality standards.

(d) Monitoring. Air-monitoring equipment shall be installed and monitoring shall be conducted in accordance with the air-quality monitoring program submitted to and as approved by the regulatory authority.

SECTION 817.97 - PROTECTION OF FISH, WILDLIFE AND RELATED ENVIRONMENTAL VALUES.

(a) Any person conducting underground mining activities shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the operation on fish, wildlife and related environmental values, and achieve enhancement of such resources where practicable.

(b) A person who conducts underground mining activities shall promptly report to the regulatory authority the presence in the permit area of any critical habitat of a threatened or endangered species listed by the Secretary, any plant or animal listed as threatened or endangered by the State, or any bald or golden eagle, of which the person conducting underground mining activities becomes aware and which was not previously reported to the regulatory authority.

(c) A person who conducts underground mining activities shall ensure that the design and construction of telephone lines, electric power lines, distribution lines, and other transmission facilities on the permit area are in accordance with the guideline set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)) or in such alternative guidance manuals as may be approved by the regulatory authority. Distribution lines shall be designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds" or in such alternative guidance manuals as may be approved by the regulatory authority. The two works named in this paragraph are hereby incorporated by reference. These materials are incorporated as they exist on the date of adoption of this Part, and notices of changes in these materials will periodically be published in the Federal Register. These two works are available at all OSM Regional Offices and at the OSM Office in Washington, D.C. and on file at the Office of the Federal Register.

(d) Each person who conducts underground mining activities shall to the extent possible using the best technology currently available:

- (1) Locate and operate haul and access roads so as to avoid or minimize impacts to important fauna species or other species protected by State or Federal law; {41915}
- (2) Fence roadways where specified by the regulatory authority to guide locally important wildlife to roadway underpasses or overpasses and construct the necessary passages. No new barrier shall be created in known and important fauna migration routes;
- (3) Fence, cover, or use other appropriate methods to exclude fauna from ponds which contain hazardous concentrations of toxic-forming materials;
- (4) Restore, enhance, or avoid habitats of unique value for fauna;

- (5) Restore, enhance, or maintain natural riparian vegetation on the banks of streams, lakes, and other wetland areas;
- (6) Avoid intermittent stream channels undisturbed or restore them to natural, meandering shapes of the same gradient;
- (7) Avoid perennial stream channels undisturbed or restore them to their former longitudinal profile and cross section including fauna habitat (usually a pattern of riffles, pools, and drops rather than a uniform depth).
- (8) Advise all permanent and contractual personnel of pertinent State and Federal laws and regulations pertaining to fauna resources;
- (9) Not use persistent pesticides on the area during underground mining and reclamation activities;
- (10) Make every effort to prevent, control, and suppress range forest and coal fires;
- (11) If fauna habitat is to be a primary or secondary post-mining land use, the operator shall, in addition to the requirements of 30 CFR 316.111 – 316.117:
- (i) Select plant species to be used on reclaimed areas based on the following criteria:
 - (A) Their proven nutritional value for fauna;
 - (B) Their uses as cover for fauna; and
 - (C) Their ability to support and enhance fauna habitat after release of bonds; and
 - (ii) Distribute flora groupings to maximize benefit to fauna. Flora should be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits for fauna;
- (12) Where row crops are to be the primary land use, surround fields with rows of trees or hedges suitable for reducing wind, retaining moisture and providing habitat for birds and other small animals and where desirable intersperse trees, wetlands, other vegetation types, and fence rows, throughout the harvested area to break up large blocks of monoculture and to diversify habitat types to make them more suitable for small animals. Wetlands shall be preserved or created rather than drained or otherwise permanently abolished; and
- (13) Where the primary land use is to be residential, public service, or industrial land use, intersperse reclaimed lands with greenbelts utilizing species of grass, shrubs and trees useful as food and cover for birds and small animals.

SECTION 817.99 - SLIDES AND OTHER DAMAGE.

At any time a slide occurs which may have a potential adverse effect on life, property, health, safety, or the environment in the permit area, the person who conducts the underground mining activities shall notify the regulatory authority by the fastest available means and shall comply with any remedial measures required by the regulatory authority.

SECTION 817.100 - CONTEMPORANEOUS RECLAMATION.

Reclamation efforts including backfilling, grading, topsoil replacement and revegetation or all areas affected by surface operations shall occur as contemporaneously as practicable with mining operations.

SECTION 817.101 - BACKFILLING AND GRADING: GENERAL REQUIREMENTS.

(a) Surface areas disturbed incident to underground mining activities shall be backfilled and graded in accordance with the time schedule approved by the regulatory authority.

(b) Backfilling and grading. (1) All areas affected by surface operations shall be returned to approximate original contour. Each person who conducts underground mining activities shall haul or convey, backfill, and compact (where advisable to ensure stability or to prevent leaching) and grade all spoil to eliminate all highwalls, spoil piles, and depressions.

(2) Backfilled material shall be placed to minimize adverse effects on ground water to minimize offsite effects and to support the approved post-mining land use.

(3) The post-mining graded slope need not be uniform.

(4) Cut-and-fill terraces may be used only in those situations expressly identified in Section 817.102.

SECTION 817.102 - BACKFILLING AND GRADING: GENERAL GRADING REQUIREMENTS.

(a) The final graded slopes shall not exceed in grade either the approximate pre-mining slope or any lesser slopes approved by the regulatory authority based on consideration of soil, climate, or other characteristics of the surrounding area. Post-mining final graded slopes need not be uniform but shall approximate the general nature of the pre-mining topography. The requirements of this Section may be modified by the regulatory authority where the underground mining activities are re-affecting previously mined lands that have not been restored to the standards of this Part and sufficient spoil is not available. The person who conducts underground mining activities shall, at a minimum:

- (1) Retain all overburden and spoil on the solid portion of existing or new benches; and
- (2) Backfill and grade to the most moderate slope possible to eliminate the highwall which does not exceed the angle of repose or such lesser slopes as is necessary to achieve a minimum static safety factor of 1.3. In all cases the highwall shall be eliminated.

(b) On approval by the regulatory authority and in order to conserve soil moisture, ensure stability, and control erosion on final graded slopes, cut-and-fill terraces may be allowed if the terraces are compatible with the approved post-mining land use and are appropriate substitutes for construction of lower grades on the reclaimed lands. The terraces shall meet the following requirements:

- (1) The width of the individual terrace bench shall not exceed 20 feet unless specifically approved by the regulatory authority as necessary for stability, erosion control, or roads included in the approved post-mining land use plan.

- (2) The vertical distance between terraces shall be as specified by the regulatory authority to prevent excessive erosion and to provide long-term stability.

- (3) The slope of the terrace outslope shall not exceed 1 T3v :2 h (50 percent). Outslopes which exceed 1 v :2 h (50 percent) may be approved if they have a minimum static safety factor of more than 1.3 and provide adequate control over erosion and closely resemble the surface configuration of the land prior to mining. In no case may highwalls be left as part of terraces.

- (4) Culverts and underground rock drains shall be used on the terrace only when approved by the regulatory authority.

(c) Small depressions may be constructed if they:

- (1) Are approved by the regulatory authority to minimize erosion, conserve soil moisture or promote vegetation;

- (2) Do not restrict normal access; and

- (3) Are not inappropriate substitutes for lower grades on the reclaimed lands.

(d) All operations on slopes above 20 or on lesser slopes that the regulatory authority defines as a steep slope shall meet the provisions of 30 CFR Part 826.

(e) All final grading, preparation of overburden before replacement of topsoil, and placement of topsoil, in accordance with Section 817.24, shall be done along the contour to minimize subsequent erosion and instability. If such grading, preparation or placement along the contour is hazardous to equipment operators then grading, preparation or placement in a direction other than generally parallel to the contour may be used. In all cases, grading, preparation, or placement shall be conducted in a manner which minimizes erosion and provides a surface for replacement of topsoil which will minimize slippage.

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SECTION 817.103 - BACKFILLING AND GRADING: COVERING COAL AND ACID- AND TOXIC-FORMING MATERIALS.

(a) Cover. (1) A person who conducts underground mining activities shall cover, with a minimum of 4 feet of the best available non-toxic and non-combustible material all exposed coal seams remaining after mining and any acid-forming, or toxic-forming, combustible materials, or any other materials identified by the regulatory authority, that are exposed, used, or produced during mining.

- (2) If necessary, these materials shall be treated to neutralize toxicity in order to prevent water pollution and sustained combustion, and to minimize adverse effects on plant growth and land uses.

- (3) Where necessary to protect against upward migration of salts, exposure by erosion, to provide an adequate depth for plant growth, or to otherwise meet local conditions, the regulatory authority shall specify thicker amounts of cover using non-toxic material.

- (4) Acid-forming or toxic-forming material shall not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution.

(b) Stabilization. Backfilled materials shall be selectively hauled or conveyed and compacted wherever necessary to prevent leaching of acid-forming and toxic-forming materials into surface or ground waters and wherever necessary to ensure the stability of the backfilled materials. The method of compacting material and the design specifications shall be approved by the regulatory authority before the acid-forming and toxic-forming materials are covered.

SECTION 817.106 - REGRADING OR STABILIZING RILLS AND GULLIES.

When rills or gullies deeper than 9 inches form in areas that have been regraded and topsoiled the rills and gullies shall be filled, graded, or otherwise stabilized and the area reseeded or replanted the areas according to Sections 817.111 – 817.117. The regulatory authority shall specify that rills or gullies of lesser size be stabilized if the rills or gullies are disruptive to the approved post-mining land use or may result in additional erosion and sedimentation.

SECTION 817.111 - REVEGETATION: GENERAL REQUIREMENTS.

(a) Each person who conducts underground mining activities shall establish on all areas affected by surface operations and facilities diverse, effective, and permanent vegetative cover of species native to the area of affected land or species that supports the approved post-mining land uses. For areas designated as prime farmlands, the reclamation requirements of 30 CFR Part 823 shall apply.

(b) All revegetation shall be in compliance with the plan approved by the regulatory authority and shall be carried out in a manner that encourages a prompt vegetative cover and recovery of productivity levels compatible with the approved post-mining land use.

(1) All disturbed lands, except water areas and surface areas of roads that are approved as a part of the post-mining land use, shall be seeded or planted to achieve a vegetative cover of the same seasonal variety native to the area of disturbed land.

(2) The vegetative cover shall be capable of stabilizing the soil surface with respect to erosion.

(3) Vegetative cover shall be considered of the same seasonal variety when it consists of a mixture of species of equal or superior utility for the intended land use when compared with the utility of naturally occurring vegetation during each season of the year.

(4) If both the pre-mining and the post-mining land use is intensive, agriculture, planting of the crops and normally grown will meet the requirement of paragraph (b)(1) of this Section.

SECTION 817.112 - REVEGETATION: USE OF INTRODUCED SPECIES.

Introduced species may be substituted for native species only if approved by the regulatory authority after appropriate field trials have demonstrated that the introduced species are of equal or superior utility for the approved post-mining land use, or are necessary to achieve a quick, temporary, and stabilizing cover. Introduced species shall meet applicable State and Federal seed or introduced species statutes, and shall not include poisonous or toxic species.

SECTION 817.113 - REVEGETATION: TIMING.

Seeding and planting of disturbed areas shall be conducted during the first normal period for favorable planting conditions after final preparation. The normal period for favorable planting shall be that planting time generally accepted locally for the type of plant materials selected. Any disturbed areas, except water areas and surface areas of roads approved for the post-mining land use, which have been final graded and topsoiled shall be mulched as required by Section 817.114 and seeded, if required by the regulatory authority, with a temporary cover of small grains, grasses, or legumes to control erosion until an adequate permanent cover is established.

SECTION 817.114 - REVEGETATION: MULCHING.

(a) Suitable mulch shall be used on all regraded and topsoiled areas to control erosion, to promote germination of seeds, and to increase the moisture retention of the soil. Mulch shall be anchored to the soil surfaces to ensure effective protection of

the soil and vegetation.

(b) Annual grasses and grains such as oats, rye, and wheat may be used instead of mulch when the regulatory authority determines that they will provide adequate stability and that they will later be replaced by species approved for the post-mining land use.

SECTION 817.115 - REVEGETATION: GRAZING.

When the approved post-mining land use is rangeland or pastureland, the reclaimed land shall be used for livestock grazing at a stocking rate equal to or less than approved by the regulatory authority for at least the last two full years of liability required under Section 817.116(b).

SECTION 817.116 - REVEGETATION: STANDARDS FOR SUCCESS.

(a) Success of revegetation shall be measured by the techniques approved by the regulatory authority on the basis of the reference areas approved by the regulatory authority. This is to adjust for natural differences between the pre-mining years and post-mining years. Management of the reference area shall be comparable to that which is required for the approved post-mining land use of the mine plan area.

(b) The ground cover and productivity of living plants on the revegetated area shall be equal to the ground cover and productivity of living plants on the same approved reference area before mining for:

(1)(i) Each year of a period of 5 full consecutive years after the last year of augmented seeding, fertilizing, irrigation, or other major work that ensures success in areas of more than 26.0 inches average annual precipitation; or
(ii) Each year of a period of 10 full consecutive years after the last year of augmented seeding, fertilizing, irrigation, or other major work that ensures success in areas of less than or equal to 26.0 inches average annual precipitation. {41917}

(2) For purposes of paragraphs (b)(1)(i) and (ii) of this section, the average annual precipitation shall be determined either:

(i) By interpolation, using standard interpolation techniques, from "Mean Annual Precipitations," Map, p. 97, The National Atlas of the United States, U.S. Department of the Interior, Geological Survey, 1970. This work is hereby incorporated by reference as it exists on the date of adoption of this Subchapter. Notices of changes in this atlas will periodically be published in the Federal Register. The atlas is available at all OSM offices and is on file in the Office of the Federal Register; or

(ii) Based on 10 years of continuous and reliable precipitation records from stations located in or adjacent to the permit area.

(3) The ground cover shall be considered equal if it is at least 90 percent of the ground cover or productivity of the reference area with 90 percent statistical confidence and with 80 percent statistical confidence on shrublands for any significant portion of the mined area. A lower percentage of ground cover and productivity may be authorized by the regulatory authority under the following standards:

(i) For previously mined areas that are not reclaimed to the performance standards in this subchapter, the ground cover of living plants for the areas shall not be less than can be supported by the best available topsoil and overburden in the mine plan area and in no case less than that existing before redisturbance;

(ii) For areas to be developed for industrial or residential use less than 2 years after regrading is completed the ground cover of living plants shall not be less than required to control erosion; and

(iii) Success in revegetation of cropland shall be determined on the basis of crop production from the mined area compared to the reference area. Crop production from the mined area shall be equal to that of the approved reference area for a minimum of two growing seasons. Production shall not be considered equal if it is less than 90 percent of the production of the reference area for any significant portion of the mined area.

(c) The person who conducts underground mining activities shall:

(1) Maintain any necessary fences and proper management practices; and

(2) Conduct periodic measurements of vegetation, soils, and water prescribed or approved by the regulatory authority to identify conditions during the applicable period of liability specified in paragraph (b) of this Section.

SECTION 817.117 - REVEGETATION: TREE STOCKING FOR FOREST LAND.

This Section sets forth forest resource conservation standards for reforested operations to ensure that a cover of trees of commercial species, sufficient to adequately use the available growing space, is established after underground mining activities.

(a) The following are the minimum acceptable stocking standards for areas east of the 100th meridian west longitude as measured 5 years after planting:

(1) The area contains an average point count of six hundred trees per acre, to be computed as follows:

(i) 600 established trees of commercial species per acre at least 3 years of age each, each one to count as one toward meeting the stocking requirements; and

(ii) Root crown or root sprouts over one foot in height shall count as one toward meeting the stocking requirement.

(2) Rock areas, permanent roads, and surface water drainage ways in forest land shall not require stocking.

(3) A "countable tree" means a tree that can be used in calculating the degree of stocking under the following criteria:

(i) The tree shall be in place at least three growing seasons;

(ii) The tree shall be alive and healthy;

(iii) The tree shall have at least one-third of its length in live crown;

(iv) The tree shall be a commercial species which the regulatory authority determines will produce commercial trees physiologically suited for the area.

(4) Stocking means a measure of the degree to which space is occupied by well-distributed countable trees.

(b) The following are the minimum standards for areas west of the 100th meridian west longitudes where shelterbelts, fauna habitat, commercial forestland, or other forestlands are to be used for post-mining land use.

(1) A pre-mining and post-mining vegetation inventory of trees, shrubs and half-shrubs shall be conducted on established reference areas according to methods approved by the regulatory authority. This inventory shall contain, but not be limited to:

(i) Site quality;

(ii) Stand size;

(iii) Stand condition;

(iv) Site and species relations; and

(v) Appropriate forest/land utilization considerations.

(2) Appropriate trees, shrubs and half-shrubs on the revegetated area shall be measured using the approved methods after the vegetation has been established according to the approved mining and reclamation plan. The density, number per unit area, of live woody plants which have been in place at least 3 years on the rehabilitated area shall be equal to or greater than 90 percent of the density of live woody plants of the same life form (trees vs. shrubs and half-shrubs) on the reference area with ninety (90) percent statistical confidence. When this ground cover requirement is met, the five or ten year responsibility period required in Section 817.116 shall begin

(3) Upon expiration of the five or ten year responsibility period and at the time of request for bond release, each person who conducts underground mining activities shall provide documentation required in paragraph (a) of this section showing that the woody plants established on the rehabilitated site meet the requirements of the approved mining and reclamation plan. Species diversity, distribution, seasonal variety, vigor and regenerative capacity of the vegetation of the revegetated area shall be evaluated on the basis of the results which could reasonably be expected using the methods of revegetation in the approved mining and reclamation plan.

SECTION 817.121 - SUBSIDENCE CONTROL: GENERAL REQUIREMENTS.

Underground mining activities shall be planned and conducted so as to prevent subsidence from causing material damage to the surface, to the extent technologically and economically feasible, and so as to maintain the value and foreseeable use of surface lands. This may be accomplished by leaving adequate coal in place, backfilling, or other measures to support the surface or by mining in such a manner that provides for planned and controlled subsidence.

SECTION 817.122 - SUBSIDENCE CONTROL: PUBLIC NOTICE.

The mining schedule shall be published in a newspaper of general circulation in the area of the mine and distributed by mail to all owners of property or residents within the affected and adjacent areas at least every 6 months during active mining operations. The mining schedule shall contain at a minimum:

- (a) Identification of specific areas in which mining will take place;
- (b) Dates of mining activities that could cause subsidence and affect specific structures;
- (c) The probable surface effects on structures;
- (d) Measures to be taken to prevent or control adverse surface effects; and
- (e) The opportunity for surface owners to request a pre-mining survey of dwellings and structures. {41918}

SECTION 817.123 - SUBSIDENCE CONTROL: PRE-MINING SURVEY.

(a) On a request to the regulatory authority by an owner of any dwelling or structure within the mine plan area and adjacent area likely to be affected by subsidence, the operator shall conduct a pre-mining survey of the dwelling or structure and shall submit a report of the survey to the regulatory authority. A pre-mining survey shall be conducted of all public buildings including but not limited to churches, schools, hospitals, and public utilities or municipal public service operations including highways, dams, and cemeteries.

(b) Personnel approved by the regulatory authority shall be used to conduct the survey to determine the condition of the dwelling or structure and to document any pre-mining damage and determine other physical factors that could reasonably be affected by subsidence resulting from mining. Assessments of structures such as roads, dams, pipelines, cables, transmission lines, and wells, ditches, and other water systems shall be limited to surface condition and other readily available data. Special attention shall be given to the pre-mining condition of springs, wells, reservoirs, and other water systems used for human, animal, or agricultural purposes and to quantity and quality of the water.

(c) A written report of the survey shall be prepared and signed by the person who conducted the survey and prepared the written report. The report shall include recommendations of any special conditions or proposed adjustments to the subsidence control procedures outlined in Section 817.122 which should be adopted to prevent material damage. Copies of the report shall be provided to the surface owner requesting the survey and to the regulatory authority.

SECTION 817.124 - SUBSIDENCE CONTROL: SURFACE OWNER PROTECTION.

Each person who conducts underground mining activities, unless that person is the owner of overlying surface and adjacent lands subject to subsidence damage or holds a valid and specific waiver of surface damage for such lands from the present owner, shall consult with the owner of any dwelling or structure on such lands before conducting any underground mining activities.

SECTION 817.125 - SUBSIDENCE CONTROL: MONITORING.

(a) Each person who conducts underground mining activities shall comply with the subsidence monitoring plan approved by the regulatory agency under 30 CFR 784.19.

(b) The regulatory authority may require the establishment of special monuments near sensitive structures and may require special measurements at different time and precision limits.

(c) An initial subsidence report shall be submitted to the regulatory authority with the permit application, and for mines in existence on the date of implementation of a State or Federal program no later than 8 months after the date of such implementation. The report shall describe the condition of the surface overlying each mine and nearby lands subject to

subsidence due to underground mining activities at the time of the initial survey. This report shall be updated annually on the basis of additional surveys and shall contain comprehensive documentation of horizontal and vertical changes of monuments. (d) If reasonable access for surveying is denied by the surface owner of lands subject to subsidence, the regulatory authority may modify the requirements of this Section as appropriate.

(e) If, on the basis of a detailed study of subsurface conditions, the regulatory authority determines that subsidence will be negligible, the monitoring requirements may be modified but shall, in any event, require detailed surveys before and after mining, or as specified in paragraph (c) of this Section.

SECTION 817.126 - SUBSIDENCE CONTROL: BUFFER ZONES.

(a) Underground mining activities shall not be conducted beneath or adjacent to any intermittent or perennial stream, or impoundment having a storage volume of 20 acre-feet or more, unless the regulatory authority on the basis of detailed subsurface information determines that subsidence will not cause material damage to the water body and associated structures. If subsidence exceeds the limitations approved in the mining permit, additional support or backfill material shall be placed to prevent additional subsidence from occurring.

(b) Underground mining activities beneath any aquifer that serves as the sole source of water supply to any municipal water system shall be conducted so as to avoid disruption of the aquifer and consequent exchange of ground water between the aquifer and other strata. The regulatory authority may prohibit mining in the vicinity of such aquifers or may limit the percentage of coal extraction in the interest of protecting water supplies.

(c) Underground mining activities shall not be conducted beneath or in close proximity to any public buildings including but not limited to churches, schools, hospitals, courthouses and government offices unless the regulatory authority on the basis of detailed subsurface information determines that subsidence will not cause material damage to these structures and specifically authorizes the mining.

SECTION 817.131 - CESSATION OF OPERATIONS: TEMPORARY.

(a) Each person who conducts underground mining activities shall in areas in which there are no current operations, but operations are to be resumed under an approved plan, effectively support and close all surface access openings to underground operations, and secure surface facilities. Temporary abandonment shall not relieve a person of his obligation to comply with provisions of his approved mining and reclamation operations permit.

(b) Before temporary cessation of operations and reclamation, each person who conducts underground mining activities shall submit to the regulatory authority a notice of intention to cease or abandon operations and reclamation. This notice shall include a statement of the exact number of acres affected in the permit area, the extent and kind of reclamation accomplished, and identification of the regrading, revegetation, environmental monitoring, and water treatment activities that will continue during the temporary cessation.

SECTION 817.132 - CESSATION OF OPERATIONS: PERMANENT.

(a) The person who conducts underground mining activities shall close or backfill or otherwise permanently reclaim all affected areas in accordance with this Chapter and according to the plan approved by the regulatory authority.

(b) All equipment, structures, or other facilities not required for continued underground mining activities and monitoring unless approved as suitable for the post-mining land use, shall be removed and the affected lands reclaimed.

SECTION 817.133 - POST-MINING LAND USE.

(a) General. All affected areas shall be restored in a timely manner:

- (1) To conditions that are capable of supporting the use which they were capable of supporting before any mining;
- (2) To higher or better uses achievable under criteria and procedures of this Section.

(b) Determining pre-mining use of land. The pre-mining uses of land to which the post-mining land use is compared shall be those uses which the land previously supported if the land had not been previously mined and had been properly managed:

- (1) The post-mining land use for land that has been previously mined and not reclaimed shall be judged on the basis of the highest and best use that can be achieved and is compatible with surrounding areas. {41919}
- (2) The post-mining land use for land that has received improper management shall be judged on the basis of the pre-mining use of surrounding lands that have received proper management.
- (3) If the pre-mining use of the land was changed within 5 years of the beginning of mining, the comparison of post-mining use to pre-mining use shall include a comparison with the historic use of the land as well as its use immediately preceding mining.

(c) Before permanent abandonment, the permit area shall be restored, in a timely manner, either to conditions capable of supporting the uses they were capable of supporting before any mining or to conditions capable of supporting approved alternative land uses. Alternative land uses may be approved by the regulatory authority after consultation with the landowner or the land-management agency having jurisdiction over the lands, if the following criteria are met:

(1) The proposed post-mining land use is compatible with adjacent land use and, where applicable, with existing local, State, or Federal land use policies and plans. A written statement of the views of the authorities with statutory responsibilities for land use policies and plans shall have been submitted to the regulatory authority before underground mining activities began. Any required approval of local, State, or Federal land management agencies, including any necessary zoning or other changes required for the land use, shall have been obtained and shall remain valid throughout the underground mining activities.

(2) Specific plans shall be prepared and submitted to the regulatory authority which show the feasibility of the post-mining land use as related to needs, projected land use trends, and markets and that include a schedule showing how the proposed use will be developed and achieved within a reasonable time after mining and be sustained. The regulatory

authority may require appropriate demonstrations to show that the planned procedures are feasible, reasonable, and integrated with mining and reclamation, and that the plans will result in successful reclamation.

(3) Provision of any necessary public facilities shall be ensured as evidenced by letters of commitment from parties other than the person who conducts underground mining activities, as appropriate, to provide them in a manner compatible with the plans submitted under 30 CFR 780.15. The letters shall be submitted to the regulatory authority before surface mining activities begin.

(4) Specific and feasible plans are submitted to the regulatory authority which show that financing and attainment and maintenance of the post-mining land use are feasible and are supported by letters of commitment from parties other than the person who conducts the underground mining activities.

(5) Plans for the post-mining land use shall have been designed under the general supervision of a registered professional engineer, or other appropriate professional, who will ensure that the plans conform to applicable accepted standards for adequate land stability, drainage, and vegetative cover, and esthetic design appropriate for the post-mining use of the site.

(6) The proposed use or uses will neither present actual or probable hazard to public health or safety nor will they pose any actual or probable threat of water flow diminution or pollution.

(7) The use or uses will not involve unreasonable delays in reclamation.

(8) Necessary approval of measures to prevent or mitigate adverse effects on fish, wildlife and related environmental values shall have been obtained from the regulatory authority and appropriate State and Federal fish and wildlife management agencies before surface mining activities begin.

(9) Proposals to change pre-mining land uses of range, fish and wildlife habitat, forestland, hayland, or pasture to a post-mining cropland use, where the cropland would require continuous maintenance such as seeding, plowing, cultivation, fertilization, or other similar practices to be practicable or to comply with applicable Federal, State, and local laws, have been reviewed by the regulatory authority to ensure that:

(i) There is a firm written commitment by the person who conducts underground mining activities or by the landowner or land manager to provide sufficient crop management after release of applicable performance bonds to ensure that the proposed post-mining cropland use remains practical and reasonable;

(ii) There is sufficient water available and committed to maintain crop production; and

(iii) Topsoil quality and depth are sufficient to support the proposed use. {41919}

PART 818 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – CONCURRENT SURFACE AND UNDERGROUND MINING

Section

818.1	Scope.
818.2	Objective.
818.4	Responsibility of regulatory authority.
818.11	Applicability.
818.12	Criteria for a variance to remain valid.
818.13	Review of variance.
818.15	Compliance with variance terms.
818.16	Additional performance standards.
818.18	Limits of variance.

Authority: Sections 102, 201, 501, 503, 504, 506, 508, 515, 516, Pub. L. 95 87, 91 stat. 448, 449, 467, 470, 471, 473, 478, 486, 495 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1256, 1258, 1565, 1266).

SECTION 818.1 - SCOPE.

This Part sets forth the minimum performance standards each person who combines surface mining activities with underground mining activities shall comply with under a variance from the requirement that reclamation efforts proceed as contemporaneously as practicable for specific areas within the reclamation plan.

SECTION 818.2 - OBJECTIVE.

The objective of this Part is to ensure the maximum practicable recovery of mineral resources and to avoid multiple disturbances of the surface areas.

SECTION 818.4 - RESPONSIBILITY OF REGULATORY AUTHORITY.

The regulatory authority shall review and grant or deny requests for variances from the requirement that reclamation efforts proceed as contemporaneously as practicable in accordance with 30 CFR 785.18.

SECTION 818.11 -APPLICABILITY.

A variance applies only to those specific areas within the reclamation plan that the applicant shows to be necessary for implementing the proposed concurrent operations and that the regulatory authority approves. The variance is effective for any area only for the time necessary to facilitate the underground mining authorized.

SECTION 818.12 - CRITERIA FOR A VARIANCE TO REMAIN VALID.

A variance from the requirement that reclamation proceed as contemporaneously as practicable for specific areas within the permit area is valid for combined surface mining and underground mining activities if the following criteria are met:

- (a) Each person who conducts these activities submits to the regulatory authority specific, feasible plans for the proposed underground mining activities.
- (b) The underground mining activities are necessary or desirable to ensure maximum practical recovery of the mineral resource and avoid multiple disturbance of the surface areas.

- (c) The plan for the underground mining activities conforms to the requirements for underground mining in 30 CFR 817 and the permits necessary for the underground mining activities have been issued by the regulatory authority. {41920}
- (d) The specific areas within the reclamation plan which are proposed to be included in the variance are necessary for the proposed underground mining activities.
- (e) No substantial adverse environmental damage, either on-site or off-site, results from the delay in completion of reclamation otherwise required in 30 CFR 816 and 817; and
- (f) Provisions for the off-site storage of spoil will comply with 30 CFR 816.71 – 816.73.

SECTION 818.13 - REVIEW OF VARIANCE.

The regulatory authority shall review each variance granted under this Part not more than three years from the date the permit is issued. The regulatory authority shall decide whether to renew, revise, or revoke the variance, based on the permittee's compliance with the terms of the variance.

SECTION 818.15 - COMPLIANCE WITH VARIANCE TERMS.

(a) Each person who conducts operations under a variance issued under 30 CFR 785.18 shall comply with all applicable performance standards in this Subchapter and any State or Federal program in effect, except to the extent that:

- (1) Non-compliance is specifically authorized in the permit variance; and
- (2) Non-compliance is necessary to achieve the purposes for which the variance is granted.

(b) Each person who conducts operations under a variance issued under 30 CFR 785.18 shall comply with each term and condition of the variance as set forth in the permit.

SECTION 818.16 - ADDITIONAL PERFORMANCE STANDARDS.

In addition to the performance standards of 30 CFR 816 and 817, each person who conducts combined operations shall comply with the following performance standards:

(a) A 500-foot barrier pillar of coal shall be maintained between the surface and underground operations in any one seam. The regulatory authority and the Mine Safety and Health Administration may approve a lesser distance after a finding by the regulatory authority that the approved operations result in:

- (1) Improved resources recovery;
- (2) Abatement of water pollution; or
- (3) Elimination of hazards to the health and safety of the public.

(b) The vertical distance between surface and underground mines working separate seams shall be sufficient to provide for the health and safety of the workers and to prevent surface water from entering the underground workings.

(c) No operations under a variance granted under 30 CFR 785.18 shall reduce the protection provided public health and safety below the level of protection required for surface coal mining and reclamation operations conducted without a variance.

SECTION 818.18 - LIMITS OF VARIANCE. {41920}

A variance under this Part shall apply only to those portions of the permit area identified in the permit variance terms.

PART 819 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – AUGER MINING

Section

819.1	Scope.
819.2	Objectives.
819.11	Auger mining: Additional performance standards.

Authority : Sections 102, 201, 501, 503, 504, 510, 515, 517, 701 Pub. L. 95 87, 91 stat, 448, 449, 467, 470, 471, 480, 486, 498, 516 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1260, 1265, 1267, 1291).

SECTION 819.1 - SCOPE.

41920 This Part sets forth additional performance standards for auger mining, which is a surface mining extraction method under the Act and performance standards of this Subchapter.

SECTION 819.2 - OBJECTIVES.

The objectives of this Part are to:

- (a) Prevent the additional adverse environmental effects of auger mining; and
- (b) Prevent any unnecessary loss of coal reserves.

SECTION 819.11 - AUGER MINING: ADDITIONAL PERFORMANCE STANDARDS.

(a) Any auger mining associated with a surface coal mining operation shall be conducted to maximize recoverability of mineral reserves remaining after mining and reclamation operations are complete. Each person who conducts auger mining activities shall leave areas of undisturbed coal to provide access for future underground mining unless the regulatory authority determines that it is not practicable to recover the remaining coal reserves. Unmined sections shall be:

- (1) A minimum of 250 feet wide at any point between the auger openings to the full depth of the auger holes;
- (2) No more than 2,500 feet apart measured from the center of one unmined section to the center of the next unmined section unless a greater distance is set forth in the reclamation plan approved by the regulatory authority;
- (3) In multiple seam mining, the unmined section shall be increased in width by 50 feet for each subjacent workable seam and the centers of all unmined sections shall be aligned vertically; and
- (4) No auger hole shall be closer than 500 feet in horizontal distance to any abandoned or active underground mine except as approved by the regulatory authority and the Mine Safety and Health Administration after a finding by the regulatory authority that the approved operation results in improved resources recovery, abatement of water pollution, or elimination of hazards to the health and safety of the public.

(b) In order to prevent pollution of surface and ground water and to reduce fire hazards, each auger hole, except as provided by paragraph (c) of this section, shall be plugged so as to prevent discharge of water and access of air to the coal as follows:

- (1) Each auger hole discharging water containing toxic or acid-forming material shall be plugged within 72 hours after completion by backfilling and compacting noncombustible and impervious material into the hole to a depth sufficient to form a water-tight seal.
- (2) Each auger hole not discharging water shall be sealed as in paragraph (b) (1) of this Section to close the opening within 30 days following completion.

(c)(1) An auger hole need not be plugged if the regulatory authority finds:

- (i) the impoundment of the water which would result from plugging the hole may create a hazard to the environment or public health or safety;
- (ii) that drainage from the auger hole will not pose a threat of pollution to surface water; and
- (iii) The requirements of paragraph (c)(2) of this section are met.

(2) For every hole meeting the requirements of paragraph (c)(1) of this section, an internal drainage system of durable non-degradable rock shall be installed from the auger hole through the backfill and exit into a stable channel approved by the regulatory authority to allow dissipation of water pressure and to prevent saturation of the backfill.

(d) The regulatory authority shall prohibit auger mining in the permit area if it determines that:

- (1) Sealing auger holes will not eliminate water pollution or instability of fills;
- (2) The prohibition is necessary to maximize the utilization and conservation of the solid fuel resources; or
- (3) Subsidence resulting from auger mining may disturb or damage powerlines, pipelines, buildings, or other facilities.

(e) In addition to meeting the requirements of this Part, each person who conducts auger mining activities shall meet each requirement of Part 816 including, but not limited to, the requirement to return the disturbed areas to approximate original contour and to maintain the hydrologic balance and water quality. {41921}

PART 820 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – ANTHRACITE MINES IN PENNSYLVANIA

Section

820.1	Scope.
820.2	Objective.
820.11	Performance standards: Anthracite mines in Pennsylvania.

Authority : Sections 102, 201, 501, 503, 504, 529, Pub. L. 95 97, 91 Stat. 448, 449, 467, 470, 471, 514 30 (U.S.C. 1202, 1211, 1251, 1253, 1254, 1279).

SECTION 820.1 - SCOPE.

This Part contains performance standards for surface coal mining and reclamation operations conducted at anthracite coal mines located in Pennsylvania.

SECTION 820.2 - OBJECTIVE.

This Part implements Subsection 529(a) of the Act, which requires the Secretary to adopt special performance standards for anthracite mines regulated by environmental protection standards of a State.

SECTION 820.11 - PERFORMANCE STANDARDS: ANTHRACITE MINES IN PENNSYLVANIA.

(a) Anthracite surface coal mining and reclamation operations in Pennsylvania shall comply with all the Pennsylvania environmental protection provisions for anthracite coal mining in effect on August 3, 1977, instead of the provisions of this Subchapter. These Pennsylvania provisions include, but are not limited, to:

- (1) The Pennsylvania Anthracite Strip Mining and Conservation Act, June 27, 1947, P.L. 1095, as amended through August 3, 1977, 52 P.S. Section 681.1 et seq (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;
- (2) The Pennsylvania Coal Refuse Disposal Control Act, September 24, 1968, P.L. 1040, No. 318, as amended through August 3, 1977, 52 P.S. Section 30.51 et seq. (Purdons 1966, 1978 Supp.)
- (3) The Pennsylvania Surface Mining Conservation and Reclamation Act, May 31, 1945, P.L. 1198, as amended through August 3, 1977, 52 P.S. 1396.1 et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;
- (4) The Pennsylvania Anthracite Coal Mine Act of 1965, P.L. No 346, as amended through August 3, 1977, 52 P.S. Section 70.101 et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;
- (5) The Pennsylvania Clean Streams Law, as amended through August 3, 1977, 35 P.S. Sections 691.1 et. seq. and regulations adopted thereunder;
- (6) The Pennsylvania Gas Operations, Well-Drilling, Petroleum and Coal Mining Act, P.L. 756, Nov. 30, 1965, as amended through August 3, 1977, 52 P.S. Section 2101 et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;
- (7) Provisions regulating the discharge of coal, culm or refuse into streams under P.L. 640, June 27, 1913, as amended through August 3, 1978 52 P.S. Section 631 et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;
- (8) Regulation of coal stripping under P.L. 133, June 18, 1941, as amended through August 3, 1978, 52 P.S. Section 1471 et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;

(9) Regulation of subsidence under P.L. 1198, May 22, 1921, as amended through August 3, 1977, 52 P.S. Section 661 et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;

(10) Regulation of subsidence under Pub. L. 1538, Sept. 20, 1961, as amended through August 3, 1977 (52 P.S. Section et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder;

(11) The establishment of mine safety zones under P.L. 1994, Dec. 22, 1959, as amended through August 3, 1978, 52 P.S. Section 3101 et seq. (Purdons 1966, 1978 Supp.) and regulations adopted thereunder; and

(12) All Pennsylvania statutes and regulations relating to the prevention or control of air pollution in effect on August 3, 1978.

(b) If Pennsylvania's regulatory program or regulations for anthracite coal mining and reclamation operations in effect on August 3, 1977, are amended, the Secretary, upon receipt of a notice of amendment, shall issue additional regulations as necessary to meet the purposes of this Act.

(c) Anthracite coal mines in Pennsylvania shall comply with all the requirements of this Chapter except:

- (1) The performance standards in Subchapter K; and
- (2) Where specifically exempted within the regulations. {41921}

PART SECTION 821 – VARIANCES FROM PERMANENT PROGRAM PERFORMANCE STANDARDS – CERTAIN MINES IN ALASKA

Section

821.1	Scope.
821.2	Objective.
821.11	Alaska: Operations eligible for a variance.
821.12	Alaska: Expiration of variance.
821.13	Alaska: Procedure for obtaining variance.
821.14	Alaska: Scope of variance.

Authority : Sections 102, 201, 501, 503, 504, 512, 515, 516, 701, 708, 716 Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 471, 482, 486, 495, 516, 521, 526 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1562, 1265, 1266, 1291, 1298, 1306).

SECTION 821.1 - SCOPE.

This Part sets forth the variances from the performance standards of Subchapter K for certain mines in Alaska.

SECTION 821.2 - OBJECTIVE.

This Part is intended to ensure that during the time period set forth in 30 CFR 821.12, enforcement of the performance standards of this Subchapter need not cause cessation of the operation of Alaska mines which were in operation during the year prior to August 3, 1977.

SECTION 821.11 - ALASKA: OPERATIONS ELIGIBLE FOR A VARIANCE.

Variances from the performance standards of this Subchapter may be granted to a person who conducts surface coal mining and reclamations operations:

- (a) Which are located in Alaska;
- (b) From which coal was mined between August 3, 1976, and August 2, 1977; and
- (c) For which the Secretary determines that the variance is necessary to ensure continued operation.

SECTION 821.12 - ALASKA: EXPIRATION OF VARIANCE.

Each variance granted under this Part shall expire on the earlier of the following:

- (a) One year after the Secretary makes the report on the findings of the Alaska Coal Mine Study to the President and Congress as required under Section 708 of the Act; or
- (b) August 3, 1980.

SECTION 821.13 - ALASKA: PROCEDURE FOR OBTAINING VARIANCE.

(a) Any person who conducts a surface coal mining and reclamation operation in Alaska may petition the Secretary to modify the applicability of a performance standard to that operation. The petition shall be in writing and shall clearly identify:

- (1) The performance standard involved;
- (2) The alternative methods to be used to protect the environment and the public health and safety;
- (3) The reasons for the request for modification, with full descriptions of:
 - (i) The effect that continued compliance with the performance standard would have on mining and reclamation; and
 - (ii) The effect that the proposed modification would have on the environment and the public health and safety. {41922}
- (4) The location of the mine;

(b) If the Secretary determines that the petition presents reasonable justification for modifying the performance standard, he shall publish a notice of intent to modify the applicability of the performance standard and to hold a hearing in accordance with paragraph (c) of this Section. The notice shall be published in the Federal Register and in a newspaper of general circulation in the area of Alaska where the coal mine is located.

(c) The Secretary shall hold a public hearing on the petition in Alaska and any person may testify for or against the proposed modification.

(d) The Secretary shall publish his decision in the Federal Register and in the same newspaper in which the original notice was published, after the Secretary:

- (1) Considers public comment;
- (2) Obtains the concurrence of the Administrator of the United States Environmental Protection Agency; and
- (3) Consults with the Governor of Alaska.

SECTION 821.14 - ALASKA: SCOPE OF VARIANCE.

No variance shall waive the applicability of the performance standards of this Subchapter more than is necessary to insure continuation of the mining operation. Except as specifically modified by a variance granted under this Part, each performance standard of this Subchapter shall apply to each surface coal mining and reclamation operation in Alaska. {41922}

PART 822 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – OPERATIONS IN ALLUVIAL VALLEY FLOORS

Section

- 822.1 Scope.
- 822.2 Objectives.
- 822.11 Alluvial valley floors: Hydrologic functions.
- 822.12 Alluvial valley floors: Farming and water quality.
- 822.13 Alluvial valley floors: Maintenance of agricultural uses.
- 822.14 Alluvial valley floors: Monitoring.

Authority : Sections 162, 201, 501, 503, 504, 506, 508, 510, 515, 516, 517 and 701 Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 471, 473, 478, 480, 486, 495, 498, 516 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1256, 1258, 1260, 1265, 1266, 1267, 1291).

SECTION 822.1 - SCOPE.

This Part governs surface coal mining and reclamation operations on or which affect alluvial valley floors in the arid and semi-arid areas located west of the 100th meridian west longitude.

SECTION 822.2 - OBJECTIVES.

This Part establishes the minimum performance and reclamation standards to preserve either the existing or potential agricultural uses and productivity of alluvial valley floors during and after mining.

SECTION 822.11 - ALLUVIAL VALLEY FLOORS: HYDROLOGIC FUNCTIONS.

(a) Each person who conducts, surface coal mining and reclamation operations in or adjacent to alluvial valley floors shall plan and conduct the operations to preserve the essential hydrologic functions of the alluvial valley floors throughout the mining and reclamation process.

(b) During mining, the essential hydrologic functions of alluvial valley floors shall be preserved along reaches of alluvial valley floors not disturbed. These functions shall be preserved by maintaining those geologic, hydrologic, and biologic characteristics of the alluvial valley floor that support the functions.

(c) After mining, the essential hydrologic functions of alluvial valley floors shall be preserved in affected and adjacent areas of alluvial valley floors by reestablishing those geologic, hydrologic, and biologic characteristics of the alluvial valley floor that are necessary to support these functions.

(d) The characteristics that support the essential hydrologic functions of alluvial valley floors are those in 30 CFR 785.19 and those other geologic, hydrologic, or biologic characteristics identified during pre-mining investigations or monitoring conducted during the surface coal mining and reclamation operation.

SECTION 822.12 - ALLUVIAL VALLEY FLOORS: FARMING AND WATER QUALITY.

(a) Surface coal mining and reclamation operations shall not interrupt, discontinue, or preclude farming on alluvial valley floors, unless:

(1) The pre-mining land use is undeveloped rangeland which is not significant to farming; or

(2) The area of affected alluvial valley floor is small and provides or may provide negligible support for production from one or more farms.

(b) If environmental monitoring shows that a surface coal mining operation is interrupting, discontinuing, or precluding farming on alluvial valley floors, the operation shall cease until remedial measures are taken by the person who conducts the operation. The remedial measures shall be approved by the regulatory authority.

(c) Each person who conducts surface coal mining and reclamation operations shall plan and conduct the operations so that no material damage is caused to the quality or quantity of water in surface or underground water systems that supply alluvial valley floors. If environmental monitoring shows that the surface coal mining operation is causing material damage to water that supplies alluvial valley floors, the operation shall cease until remedial measures are taken by the person who conducts the operation. The remedial measures shall be approved by the regulatory authority.

(d) This section does not apply to a surface coal mining operation under an initial permit issued under a State or Federal program which satisfies paragraph (e) of this Section, or to those portions of a surface coal mining operation under a renewal

permit under a State or Federal program which were previously identified in a reclamation plan under the State or Federal program and which satisfy paragraph (e) of this Section.

(e) This section shall not apply to an operation that:

(1) Was in production in the year preceding August 3, 1977, was located in or adjacent to an alluvial valley floor, and produced coal in commercial quantities during the year preceding August 3, 1977; or

(2) Had obtained specific permit approval by the State regulatory authority before August 3, 1977, to conduct surface coal mining operations for an area within an alluvial valley floor.

SECTION 822.13 - ALLUVIAL VALLEY FLOORS: MAINTENANCE OF AGRICULTURAL USES.

The person who conducts surface coal mining and reclamation operations shall ensure that the agricultural utility and the level of productivity of alluvial valley floors is reestablished and maintained after mining.

SECTION 822.14 - ALLUVIAL VALLEY FLOORS: MONITORING.

(a) The person who conducts surface coal mining and reclamation operations shall install, maintain, and operate an environmental monitoring system on all alluvial valley floors affected by the operations in order to show that the agricultural utility and production and the potential for agricultural utility and production are being maintained.

(b) The monitoring system shall result in sufficient numbers of hydrologic and biologic measurements to demonstrate that the important characteristics have been identified so that the essential hydrologic functions may be reestablished.

(c) The monitoring shall include ground water and surface water quantity and quality, vegetation measurements, and soil analyses.

(d) The monitoring shall be performed at a frequency which is adequate to indicate longer term trends that could affect agricultural use of the alluvial valley floors. {41923}

(e) Monitoring shall be performed during operations to identify characteristics of the alluvial valley floor not identified in the permit application and to evaluate the importance of all characteristics.

(f) All monitoring data collected shall routinely be made available to the regulatory authority. {41923}

PART 823 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – OPERATIONS ON PRIME FARMLAND

Section

823.1	Scope.
823.2	Objective.
823.11	Prime farmland: Special requirements.
823.12	Prime farmland: Soil removal.
823.13	Prime farmland: Soil stockpiling.
823.14	Prime farmland: Soil replacement.

Authority : Sections 102, 201, 501, 503, 504, 506, 508, 510, 515, 516, 517, 701 Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 471, 473, 478, 480, 486, 495, 498, 516 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1256, 1258, 1260, 1266, 1267, 1291).

SECTION 823.1 - SCOPE.

This Part sets forth special performance standards for surface coal mining and reclamation operations on prime farmland.

SECTION 823.2 - OBJECTIVE.

The objective of this Part is to minimize the effects of mining upon prime farmland so that the land will have equal productivity after mining and is not lost as a resource.

SECTION 823.11 - PRIME FARMLAND: SPECIAL REQUIREMENTS.

Each person who conducts surface coal mining and reclamation operations on prime farmland shall meet the following requirements:

(a) A permit shall be obtained under 30 CFR 785.17.

(b) Each soil horizon to be used in the reconstruction of the soil shall be removed before drilling, blasting, or mining in a manner that prevents mixing or contaminating the soil horizon with undesirable material. Where removal of soil horizons results in erosion that may cause air and water pollution, the regulatory authority shall specify methods of treatment to control erosion of exposed overburden.

SECTION 823.12 - PRIME FARMLAND: SOIL REMOVAL.

(a) Each person who conducts surface coal mining and reclamation operations on prime farmland shall:

(1) Separately remove the entire A horizon or other suitable soil materials which will create a final soil having an equal or greater productive capacity than that which existed prior to mining.

(2) Separately remove the B horizon of the soil or a combination of B horizon and underlying C horizon or other suitable soil material that will create a reconstructed root zone of equal or greater productive capacity than that which existed before mining.

(3) Separately remove the underlying C horizons or other strata, or a combination of horizons or other strata, to be used instead of the B horizon. These combinations shall be of equal or greater thickness and equal to or more favorable for plant growth than the B horizon. When replaced these combinations shall create in the reconstructed soil a final root zone of comparable depth and quality to that which existed in the natural soil.

(b) The minimum depth of soil and soil material to be reconstructed shall be 48 inches unless the regulatory authority specifies a greater depth because of uniquely favorable soil horizons at greater depths.

SECTION 823.13 - PRIME FARMLAND: SOIL STOCKPILING.

If stockpiling of soil horizons is allowed by the regulatory authority instead of immediate replacement, the A horizon and B horizon shall be stored separately. These stockpiles shall be placed within the permit area where they are not disturbed or exposed to excessive water or wind erosion before the stockpiled horizons can be redistributed. Stockpiles in place for more than 30 days shall meet the requirements of Section 816.23.

SECTION 823.14 - PRIME FARMLAND: SOIL REPLACEMENT.

Each person who conducts surface coal mining and reclamation operations on prime farmland shall meet the following requirements when replacing soil:

(a) Replace the soil material on land graded to the final contour;

(b) Scarify the final graded land before the soil material is replaced;

(c) Replace the B horizon or other suitable soil material specified in Sections 823.12(a)(2) and (a)(3), in a manner that avoids excessive compaction of overburden and to a thickness comparable to the root zone that existed in the soil before mining.

(d) Replace the A horizon or other suitable soil materials, specified in Section 823.12(a)(1) as the final surface soil layer. This surface soil layer shall equal the thickness of the original soil as determined in 30 CFR 785.17(e)(1) and be replaced in a

manner that:

- (1) Prevents excessive compaction of both the surface layer and underlying material and reduction of permeability to less than 0.06 inch per hour in the upper 20 inches of the reconstructed soil profile; and
- (2) Protects the surface layer from wind and water erosion before it is seeded or planted.

(e) Apply nutrients and soil amendments as needed to establish quick vegetative growth. {41923}

PART 824 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – MOUNTAINTOP REMOVAL

Section

- | | |
|--------|---|
| 824.1 | Scope. |
| 824.2 | Objectives. |
| 824.11 | Mountaintop removal: Performance standards. |

Authority : Sections 102, 201, 501, 503, 504, 506, 508, 510, 515, 517, 701 Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 471, 474, 478, 480, 486, 498, 516 (30 U.S.C. 1202, 1211, 1251, 1253, 1354, 1256, 1258, 1260, 1265, 1267, 1291).

SECTION 824.1 - SCOPE

This Part sets forth an alternate method of surface mining that grants an exception to the approximate original contour performance standard requirement.

SECTION 824.2 - OBJECTIVES.

The objectives of this Part are to:

- (a) Enhance coal recovery;
- (b) Reclaim the land to equal or higher economic post-mining use; and
- (c) Protect and enhance environmental and other values under the Act.

SECTION 824.11 - MOUNTAINTOP REMOVAL: PERFORMANCE STANDARDS.

- (a) Under an approved State program or under a Federal program, surface coal mining and reclamation operations may be granted a variance from the requirements of this Subchapter for restoring affected areas to approximate original contour, if:
 - (1) The regulatory authority grants an exemption from the requirement to restore to approximate original contour in accordance with 30 CFR 785.15;
 - (2) The entire coal seam running through the upper fraction of a mountain, ridge, or hill is removed by removing all of the overburden and creating a level plateau or gently rolling contour with no highwalls remaining;
 - (3) An industrial, commercial, agricultural, residential, or public facility (including recreational facilities) use is proposed and approved for the affected land;
 - (4) The alternative land use criteria of Section 816.33 are met; and
 - (5) All applicable performance standards other than the requirement to restore to approximate original contour are met.
- (b) Surface coal mining and reclamation operations conducted under this variance shall comply with the following standards: {41924}
 - (1) An outcrop barrier of sufficient width, consisting of the toe of the lowest coal seam, and its associated overburden, shall be retained to prevent slides and erosion.
 - (2) The final graded top plateau slopes on the mined area shall be less than 1 v :5 h so as to create a level plateau or gently rolling configuration and the outslopes of the plateau shall not exceed 1 v :2 h , except where engineering data substantiates and the regulatory authority finds that a minimum static safety factor of 1.5 will be attained.

(3) The resulting level or gently rolling contour shall be graded to drain inward from the outslope except at specific points where it drains over the outslope in stable protected channels.

(4) Natural watercourses shall not be damaged.

(5) All waste and acid-forming or toxic-forming materials, including the strata immediately below the coal seam shall be covered with non-toxic spoil to prevent pollution and achieve the post-mining land use.

(6) Spoil shall be placed on the mountaintop bench as is necessary to achieve the post-mining land use approved under paragraphs (a)(3) and (a)(4) of this Section. All excess spoil material not retained on the mountaintop shall be placed in accordance with the standards of 30 CFR 816.71 816.73 and 816.52.

(c)(1) Each permit which grants approval for mountaintop removal shall be reviewed not more than 3 years from the date the permit was issued, unless the person who conducts the operation affirmatively demonstrates and the regulatory authority finds that all operations are proceeding in accordance with the terms of the permit and applicable requirements of the Act and this Part.

(2) Each permit which grants approval for mountaintop removal may be modified by the regulatory authority if it determines that more stringent measures are necessary to:

- (i) Prevent or control slides or erosion;
- (ii) Prevent damage to natural water courses;
- (iii) Avoid water pollution; or
- (iv) Ensure successful revegetation. {41924}

PART 825 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – SPECIAL BITUMINOUS COAL MINES IN WYOMING

Section

825.1	Scope.
825.2	Objective.
825.11	Performance standards: Special bituminous coal mines operating prior to January 1, 1972.
825.12	Performance standards: Special bituminous coal mines developed after August 3, 1977.
825.13	Changes in Wyoming program.

Authority : Sections 102, 201, 501, 503, 504, 508, 510, 515, 527, 701 Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 471, 478, 480, 486, 513, 516 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1258, 1260, 1277, 1291).

SECTION 825.1 - SCOPE.

(a) This Part sets forth special requirements for certain bituminous coal surface mines located west of the 100th meridian west longitude, which existed on January 1, 1972, or are immediately adjacent thereto and for which development began after August 3, 1977, in accordance with Section 527 of the Act.

(b) Unless specifically modified by this Part, each performance standard of this Subchapter applies to these mines.

SECTION 825.2 - OBJECTIVE.

The objective of this Part is to minimize any adverse environmental effect of special bituminous coal mines located west of the 100th meridian west longitude by providing:

- (a) Special standards for on-site handling of spoil;
- (b) Elimination of depressions capable of collecting water;
- (c) Creation of improvements and regrading to approximate original contour; and
- (d) Allowing for retention of certain stable highwalls.

SECTION 825.11 - PERFORMANCE STANDARDS: SPECIAL BITUMINOUS COAL MINES OPERATING BEFORE JANUARY 1, 1972.

(a) This Section contains special performance standards for those portions of special bituminous coal mines, as defined in 30 CFR 701.5, which:

- (1) Were approved for operation before January 1, 1972, including the orderly expansion of such a mine pit to the extent authorized by State law;
- (2) Have actually been producing coal since January 1, 1972;
- (3) Because of past duration of mining are committed to a mode of operation that warrants an exception to some of the provisions of this Subchapter; and
- (4) Involve the mining of more than one seam and mining has been initiated on the deepest coal seam contemplated to be mined in the current operation.

(b) Operations subject to this Section shall at a minimum meet the general performance standards of this Subchapter for all operations conducted on the permit area outside the mine pit and for those operations associated with spoil storage areas. All the standards of this Subchapter apply to the mine pit for requirements for backfilling and grading. Special requirements for backfilling and grading the mine pit area are as follows:

- (1) In the final mine area, highwalls shall be allowed to remain if found to be stable by the regulatory authority;
- (2) Benches may be constructed if approved by the regulatory authority in the approved mining plan;
- (3) The exposed pit floors shall be sloped and graded to provide access to the area;
- (4) Topsoil shall be replaced in accordance with 30 CFR 816.24;
- (5) The floor of the pit shall be seeded according to the requirements of 30 CFR 816.111 816.117 and 816.102;
- (6) Where water impoundments are included as part of the mine plan, riprap may be used if necessary to prevent erosion; and
- (7) Spoil piles shall be graded and contoured with no more than the overall slope of 17 degrees allowed, and terraces may be used to break the slope when it can be shown that terraces will accomplish the required reclamation. For the post-mining land use, steeper slopes may be permitted upon approval of the regulatory authority, if it can be demonstrated that this method provides the required results.

SECTION 825.12 - PERFORMANCE STANDARDS: SPECIAL BITUMINOUS COAL MINES DEVELOPED AFTER AUGUST 3, 1977.

(a) This Section applies to those special bituminous coal mines, as defined in 30 CFR 701.5, which are developed after August 3, 1977, on lands immediately adjacent to portions of mines subject to Section 825.11.

(b) Operations subject to this section shall comply with all requirements of Wyoming law.

(c) Operations subject to this section shall, at a minimum, meet the general performance standards of this Subchapter for all operations conducted on the permit area outside the mine pit and for the operations associated with spoil storage areas. The standards of 30 CFR Part 816 apply to the mine pit except for the requirements for backfilling and grading.

(d) Special requirements for backfilling and grading the mine pit area are as follows:

(1) Slope specifications. Slope specifications for the post-mining land use shall be based on an average of the natural slopes measured in the immediate area of the mine-site. The maximum inclination of the slopes in the reclaimed area shall not be greater than this average slope:

- (i) Slopes steeper than the average of the natural slopes may be approved by the regulatory authority if it can be demonstrated that returning the affected area to a slope equal to or less than the average natural slope would greatly increase the amount of disturbed land. {41925}
- (ii) Measurements of individual slopes, locations at which measurements are made, and the average natural slope as determined from the individual slope measurements shall be submitted for approval to the regulatory authority.

(2) Post-mining land uses that do not include permanent water impoundments:

- (i) The final mine area shall be backfilled, graded, and contoured to the extent necessary to return the land to the use approved by the regulatory authority.
- (ii) All backfilling, grading, and contouring shall preserve the original drainage system or provide substitute drainage systems approved by the regulatory authority.

(iii) Terraces or benches may be used only if it can be demonstrated that contouring methods do not provide the required results. Detailed plans of dimensions and design of the terraces or benches, check dams, erosion prevention techniques, and slopes of the terraces or benches and their intervals shall be submitted to the regulatory authority for approval before construction.

(iv) Depressions that will accumulate water shall not be allowed unless they are approved under paragraph (d)(3) of this Section.

(3) Post-mining land uses that include permanent water impoundments:

(i) The exposed mine pit area shall be sloped, graded, and contoured to blend with the topography of the surrounding terrain and to provide access to the area. Where necessary to prevent erosion, riprap shall be used.

(ii) If the person who conducts the surface mining activities demonstrates that the pitwall can be stabilized by terracing or other techniques, the regulatory authority may approve leaving the stabilized pitwall along one-half of the proposed shoreline, as measured along the circumference. The remaining part of the shoreline shall be graded and contoured to blend with the topography of the surrounding terrain and to provide access to the area. Detailed explanations of the techniques to be used to stabilize the pitwall shall be submitted for approval to the regulatory authority.

SECTION 825.13 - CHANGES IN WYOMING PROGRAM.

In the event of an amendment or revision to the State of Wyoming's regulatory program, regulations, or decisions made thereunder governing special bituminous coal mines, the Secretary shall issue additional regulations as necessary to meet the purposes of the Act. {41925}

PART 826 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – OPERATIONS ON STEEP SLOPES

Section

826.1	Scope.
826.2	Objective.
826.11	Applicability.
826.12	Steep slopes: Performance standards.
826.13	Steep slopes: Limited variances.

Authority : Sections 102, 201, 501, 503, 504, 508, 510, 515, 701 Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 478, 480, 486, 467, 470, 478, 480, 486, 516 (U.S.C. 1202, 1211, 1251, 1253, 1258, 1260, 1265, 1291).

SECTION 826.1 - SCOPE.

This Part provides special environmental performance standards for operations on steep slopes.

SECTION 826.2 - OBJECTIVE.

The objective of this Part is to ensure adequate environmental protection during surface coal mining and reclamation operations on steep slopes.

SECTION 826.11 - APPLICABILITY.

(a) Any surface coal mining and reclamation operations on steep slopes shall meet the performance standards of this Part.

(b) The standards of this Part do not apply to:

(1) Mining conducted on a flat or gently rolling terrain with an occasional steep slope through which the mining proceeds and leaves a plain or predominantly flat area; or

(2) That part of operations granted a variance under Section 515(e) of the Act and Section 826.13.

SECTION 826.12 - STEEP SLOPES: PERFORMANCE STANDARDS.

- (a) Spoil, waste materials, or debris, including that from clearing and grubbing or haul road construction, and abandoned or disabled equipment, shall not be placed or allowed to remain on the downslope.
- (b) The highwall shall be completely covered with compacted spoil and the disturbed area graded to comply with the provisions of 30 CFR 816.101 816.106 including, but not limited to, the return of the site to approximate original contour. The person who conducts the surface coal mining and reclamation operation must demonstrate to the regulatory authority, using standard geotechnical analysis, that the minimum static factor of safety for the stability of all portions of the reclaimed land is at least 1.3.
- (c) Land above the highwall shall not be disturbed unless the regulatory authority finds that the disturbance facilitates compliance with the requirements of this Part such as for construction of diversions.
- (d) Material in excess of that required by the grading provisions of this Part shall be disposed of in accordance with the requirements of 30 CFR Sections 816.71 – 816.73.
- (e) Woody materials shall not be buried in the backfilled area. Woody materials may be chipped and distributed over the surface of the backfill as mulch if special provision is made for their use and when approved by the regulatory authority.
- (f) Unlined or unprotected drainage channels shall not be constructed on backfills constructed under this Part unless approved by the regulatory authority as stable and not subject to erosion.

SECTION 826.13 - STEEP SLOPES: LIMITED VARIANCES.

- (a) Conditions for approval. Under every Federal program or any approved State program which includes appropriate procedures, persons may be granted variances from the approximate original contour requirements of Section 826.12(b) if the following standards are met:
 - (1) The highwall shall be completely backfilled with spoil material, which has a static factor of safety of at least 1.3 using standard geotechnical analyses.
 - (2) The watershed control of the area within which the mining occurs shall be improved by reducing the peak flow from a precipitation or thaw and reducing the total suspended solids or other pollutants in the surface water discharge during a precipitation or thaw. The total volume of flow during every season of the year shall not vary in a way that adversely affects the ecology of any surface water or any existing or planned public or private use of surface or ground water.
 - (3) Land above the highwall may be disturbed for a horizontal distance which is not greater than one-half the highwall height if the regulatory authority finds that the disturbance is necessary to:
 - (i) Blend the solid highwall and the backfilled material;
 - (ii) Control surface runoff; or
 - (iii) Provide access to the area above the highwall.
 - (4) The landowner shall have requested in writing, as part of the permit application, that the variance be granted.
 - (5) The regulatory authority shall make a finding that the approved post-mining land use constitutes an equal or better economic or public use. The post-mining land use shall consist only of one of the following land uses:
 - (i) Industrial.
 - (ii) Commercial.
 - (iii) Residential.
 - (iv) Public use, including recreational facilities. {41926}
 - (6) The backfilling, grading, and placement of spoil shall be designed and certified by a qualified registered professional engineer in conformance with professional standards established to ensure the stability, drainage, and surface configuration necessary for the intended use of the site.
 - (7) Only the amount of spoil as is necessary to achieve the post-mining land use, ensure the stability of spoil retained on the bench, and meet all other requirements of the Act and this Chapter shall be placed off the mine bench. All spoil not retained on the bench shall be placed in accordance with Section 816.71 816.73 and Section 816.101 102.

(b) Review of variances. (1) Within the six months before the third anniversary of the issuance of the permit, the person who conducts the surface coal mining and reclamation operation shall demonstrate to the regulatory authority that the proposed development is proceeding in accordance with the terms of the reclamation plan.

(2) If the person who conducts the surface coal mining and reclamation operation fails to comply with paragraph (b)(1) of this Section, the regulatory authority shall, not later than 3 years after the date of issuance of the permit, review the variance to determine whether it should be revoked, revised, or renewed. {41926}

PART 827 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – COAL PROCESSING PLANTS AND SUPPORT FACILITIES NOT LOCATED AT OR NEAR THE MINESITE OR NOT WITHIN THE PERMIT AREA FOR A MINE

Section

827.1 Scope.
827.11 Applicability.
827.12 Coal processing plants: Performance standards.

Authority : Sections 102, 201, 501, 503, 504, 508, 510, 515, 517, 701 Pub. L. 95 87, 91 Stat. 448, 449, 467, 479, 471, 480, 486, 498, 516 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1260, 1265, 1267, 1291).

SECTION 827.1 - SCOPE.

This Part sets forth requirements for coal processing plants and their support facilities not located at or near the mine site or not within the permit area for a mine, to ensure the protection of public property and the environment, in accordance with the Act.

SECTION 827.11 - APPLICABILITY.

Each person who conducts surface operations consisting of operation of a coal processing plant or support facility which is not located within the permit area for a specific mine shall obtain a permit to conduct the operation.

SECTION 827.12 - COAL PROCESSING PLANTS: PERFORMANCE STANDARDS.

Construction, operation, maintenance, modification, reclamation, and removal activities at coal processing plants and associated facilities not located within the permit area for a specific mine shall comply with the following performance standards:

(a) Signs and markers for the coal processing plant, coal processing waste disposal area, and water treatment facilities shall comply with Section 816.11 of this Part, and with all State, Federal, local, or other ordinances and codes.

(b) Roads, transport, and associated structures shall be constructed, maintained, and reclaimed in accordance with Sections 816.31 – 816.36.

(c) Any stream or channel realignment shall comply with Section 816.44.

(d) Any disturbed area related to the coal processing plant or associated facilities shall have sediment control structures in compliance with Sections 816.45 and 816.46, and all discharges from these structures shall meet the effluent limitations of Section 816.42 and any other State or Federal law applicable to water quality.

(e) Permanent impoundments associated with coal processing plants shall meet the standards of Section 816.49. Dams constructed of or impounding coal processing waste shall comply with Sections 816.91 – 816.93.

(f) Use of wells and the preservation of water rights shall comply with Sections 816.53 and 816.54.

- (g) Disposal of coal processing waste, solid waste, and any excavated materials shall comply with Sections 816.81- 816.88, 816.89, and 816.71- 816.73, respectively.
- (h) Discharge structures for diversions and sediment control structures shall comply with Section 816.47.
- (i) Air pollution control measures associated with fugitive dust emissions shall comply with Section 816.95 and all other applicable State or Federal air pollution control requirements and limitations.
- (j) Fish, wildlife and related environmental values shall be protected in accordance with Section 816.97.
- (k) Slide areas and other surface stabilization shall comply with Section 816.99.
- (l) Each person who operates coal processing plants and associated structures shall comply with Section 816.79, to minimize adverse effects upon or resulting from nearby underground operations.
- (m) Reclamation operations shall contain provisions for proper topsoil, revegetation, and abandonment in accordance with Sections 816.111 – 816.117, 816.121 – 816.124, and 816.56.
- (n) Conveyors, buildings, storage bins or stockpiles, water treatment facilities, water storage facilities, and any structure or system related to the coal processing plant shall comply with 30 CFR 816.
- (o) Any coal processing plant or associated structures located on prime farmland shall meet the requirements of 30 CFR 823. {41926}

PART 828 – SPECIAL PERMANENT PROGRAM PERFORMANCE STANDARDS – IN-SITU PROCESSING

Section

- 828.1 Scope.
- 828.2 Objectives.
- 828.11 In-situ processing: Performance standards.
- 828.12 In-situ processing: Monitoring.

Authority : Sections 102, 201, 501, 503, 504, 510, 515, 517, 701; Pub. L. 95 87, 91 Stat. 448, 449, 467, 470, 471, 480, 486, 498, 516 (30 U.S.C. 1202, 1211, 1251, 1253, 1254, 1260, 1265, 1267, 1291).

SECTION 828.1 - SCOPE.

This Part sets forth special environmental performance standards for in situ processing activities.

SECTION 828.2 - OBJECTIVES.

This Part is intended to ensure that all in-situ processing activities are conducted in a manner which preserves and enhances environmental values in accordance with the Act. This Part provides additional performance standards to reflect the nature of in-situ processing.

SECTION 828.11 - IN-SITU PROCESSING: PERFORMANCE STANDARDS.

- (a) The person who conducts in-situ processing activities shall comply with 30 CFR Part 817 and this Section.
- (b) In situ processing activities shall be planned and conducted to minimize disturbance to the prevailing hydro-logic balance by:
 - (1) Avoiding discharge of fluids into holes or wells other than as approved by the regulatory authority;
 - (2) Injecting process recovery fluids only into geologic zones or intervals approved as production zones by the regulatory authority;

- (3) Avoiding annular injection between the wall of the drill hole and the casing; and
- (4) Preventing discharge of process fluid into surface waters.

(c) Each person who conducts in-situ processing activities shall submit for approval, and follow after approval, a plan that ensures that all acid-forming, toxic-forming, or radioactive gases, solids, or liquids constituting a fire, health, safety, or environmental hazard and caused by the mining and recovery process are promptly treated, confined, or disposed of in a manner that prevents contamination of ground and surface waters, damage to fish, wildlife and related environmental values, and threats to the public health and safety. {41927}

- (d) Each person who conducts in-situ processing activities shall prevent flow of the process recovery fluid:
- (1) Horizontally beyond the affected area identified in the permit; and
 - (2) Vertically into overlying or underlying aquifers.

(e) Each person who conducts in-situ processing activities shall restore the quality of affected ground water in the mine plan and adjacent area, including ground water above and below the production zone, to the approximate pre-mining levels or better to ensure that the potential for use of the ground water is not diminished.

SECTION 828.12 - IN-SITU PROCESSING: MONITORING.

(a) Each person who conducts in-situ processing activities shall monitor the quality and quantity of surface and ground water and the subsurface flow and storage characteristics, in a manner approved by the regulatory authority to measure changes in the quantity and quality of water in surface and ground water systems in the mine plan area and in adjacent areas.

(b) Air quality monitoring shall be conducted in accordance with the air quality monitoring program approved by the regulatory authority and shall include periodic measurement of windspeed, direction, and temperature and of those air quality indicators specified by the regulatory authority in consultation with the appropriate air quality control authority.

(c) Environmental monitoring shall measure, at a minimum, any increases in ambient levels of phenols, nitrogen compounds, and carbon compounds.

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