DEPARTMENT OF THE INTERIOR
Office of Surface Mining Reclamation and Enforcement

SURFACE COAL MINING AND RECLAMATION OPERATIONS
Proposed Rules for Permanent Regulatory Program
§ 780.11 Operation plan: General requirements.

Authority for this Section is Sections 102; 201(b); 503; 507(b); 508(a); 510(b); and 515(b) of the Act. This Section would require that each application contain a description of the proposed mining operations, including a narrative of mining methods and procedures proposed to be used in the operation of the mine. Paragraph (2) of this Section would require the narrative to explain the construction, modification, use and maintenance and removal of certain mine operation facilities.

The requirements of this Section are designed to aid the regulatory authority in determining whether the applicant can meet the following performance standards of Subchapter K:

Sec. 780.11(a)(1) Sec. 816.62
Sec. 780.11(a)(2) Sec. 816.39
Sec. 780.11(a)(3) Sec. 816.46, 816.48 and 816.96
Sec. 780.11(a)(4) Sec. 816.21-816.24, 816.71-816.73, 816.100 and 816.109
Sec. 780.11(a)(5) Sec. 816.32-816.36 and 816.59
Sec. 780.11(a)(6) Sec. 816.81-816.88 and 816.91-816.93
Sec. 780.11(a)(7) Sec. 816.39
Sec. 780.11(a)(8) Sec. 816.41-816.46, 816.50 and 816.56

§ 780.12 Operations plan: Blasting.

Authority for this Section is Sections 507(g) and 508(a)(13) of the Act. This Section requires that each application for a surface mining permit provide a narrative description of the blasting operations to be used in the proposed mining operations. Specific information about the types and amounts of explosives, their handling and use are required in paragraphs (a)-(g). This is necessary for the proper evaluation by the regulatory authority of the possible environmental and public safety consequences of the use of explosives during the proposed mining operation and are needed to determine whether the applicant can meet the performance standards found in Sections 816.41, 816.60 and 816.61-816.68 of subchapter K.

§ 780.13 Operations plan: Maps and plans.

Authority for this Section is Sections 102; 201(b); 503; 504; 507(b); 507(g); 508(a); 517; and 522(e)(4) of the Act. In addition to the narrative plans to be required by the preceding Sections, this Section of Part 780 would require each application to include maps and plans relevant to the proposed operation. Some of these maps and plans would have to be prepared by specified professionals as required under Sections 507 and 508 of the Act. Accurate maps and plans are needed by the regulatory authority to properly determine whether the planned operation should be approved, modified, or disapproved.

The requirements of this Section are designed to aid the regulatory authority in determining whether the applicant can meet numerous performance standards. The Subsection of 780.13 and the performance standards are designed to provide information as follows:

Sec. 780.13(a) Sec. 816.21-816.24, 816.31-816.32, 816.36, 816.38-816.39, 816.41, 816.43-816.46, 816.55, 816.59, 816.71-816.73, 816.75, 816.79, 816.81, 816.85, 816.89, 816.91-816.93, 816.101, 816.121-816.124, and 816.132.
Sec. 780.13(b) Sec. 816.124.
Sec. 780.13(c)(1) Sec. 816.39.
Sec. 780.13(c)(2) Sec. 816.21-816.24, 816.21-816.24, 816.31-816.32, 816.43-816.46, 816.55, 816.59, 816.71-816.73, 816.81, 816.85, 816.89, 816.91-816.93, 816.101, and 816.125.
Sec. 780.13(c)(3) Sec. 816.36, 816.39, 816.89, 816.91-816.93, and 816.95.
Sec. 780.13(c)(4) Sec. 816.21-816.24, 816.71-816.73, 816.81-816.88, and 816.101.
Sec. 780.13(c)(5) Sec. 816.61-816.50, 816.55, 816.83, and 816.91.
Sec. 780.13(c)(6) Sec. 816.95.
Sec. 780.13(c)(7) Sec. 816.39, 816.81, 816.82, 816.86, and 816.91.
Sec. 780.13(c)(8) Sec. 816.97.
Sec. 780.13(c)(9) Sec. 816.61, 816.68.
Sec. 780.13(c)(10) Sec. 816.46, 816.49, 816.51-816.63.
Sec. 780.13(c)(11) Sec. 816.56, 816.73-816.76, 816.81, 816.91, 816.100-816.106, and 816.133.
Sec. 780.13(c)(12) Sec. 816.41-816.42, 816.42, 816.44, 816.45, 816.52, 816.55, 816.58, 816.66, 816.69, 816.70, 816.72, 816.74, 816.81, 816.82, 816.86, 816.91, 816.92, 816.97, 816.125, and 816.133.

§ 780.14 Air pollution control plan.

Section 780.14 of the proposed regulations would establish the permit application requirements, so that the regulatory authority is provided with comprehensive and reliable information on the air quality impact of the proposed surface coal mining operation. This Section is intended to assure that proposed surface coal mining operations meet all national ambient air quality standards and any other applicable Federal or State air quality standards.

In general, the proposed regulations are structured on both a regional and a projected production level basis. This is proposed, in part, because of the current status of technical literature and air quality regulations in the field. The regulations also recognize the potential variations in air quality impact depending upon climate, geology and operating characteristics of surface coal mining operations in different parts of the country.

Legal authority: Permit application regulations for air quality are supported by Sections 102, 201(c), 501(b), 503(a) and (b), 507(b), 508(a)(9), 515(b)(4), and 515(b)(24) of the Act. Specifically, Congress in Section 515(b)(4) of the Act provides that all operators shall:

(S)establish and protect all surface areas including spoil piles affected by the surface coal mining and reclamation operation to effectively control erosion and attendant air and water pollution. (Emphasis added)

Thus, if a surface area is affected by surface coal mining and reclamation operations, the operator must effectively control attendant air pollution. The phrase "surface coal mining and reclamation" operation is broadly defined in the Act to mean surface mining operations and all operations necessary and incident to reclamation. Section 701(28), 30 U.S.C. Section 1291. The office believes that haul roads and access roads must be controlled because the definition of the phrase "surface coal mining" includes not only activities conducted on the surface of lands in connection with the surface mine, but also haul roads and access roads.

To implement this performance standard Congress has required that each permit application contain the steps to be taken to comply with applicable air quality laws and regulations. Section 508(a)(9), 30 U.S.C. 1258. The surface mining permit cannot be approved unless the regulatory authority finds in writing that the permit application meets requirements of the Act including the requirement to effectively control air pollution from all surface areas. Sections 518(b)(1)-(2), 30 U.S.C. Sections 1260(b)(1)-(2).

Some permit application requirements listed in Subsections 780.14(a), (b) and (c) are the first critical steps in the process of assuring that all surface coal mining operations effectively control air pollution from all surface areas.
strength of rock and geometry of failure of rock and soil when subjected to tensile or compressive stress prior to mining. These tests allow characterization of bedrock and unconsolidated material (Dunrud and Osterwald, 1978, p. 22; Bureau of Reclamation, 1973, p. 800).

SLaking tests, properly called slaking index tests, are designed to simulate, in an accelerated way, failures due to wetting, drying, and abrasion of rocks subjected to atmospheric stresses (Franklin and Chandra, 1972, p. 337).

The Office requests comment and will work with MSHA to determine whether information already required by MSHA on roof stability would satisfy this requirement in whole or in part.

Technical references used were:


(v) For the area overlying underground mine workings, chemical analysis of the coal seam and lower part of the overburden will be needed to determine whether the coal seam will be held or iron-bearing, so that appropriate mine drainage controls can be planned as part of the proposed operations. This information would be obtained through chemical analysis of the coal samples and strata immediately around the seam. The principal elements to be analyzed, initially, include the various combinations of iron sulfide and associated elements. See U.S. Department of Agriculture Handbook No. 523: U.S. E.P.A. Manual for Testing Overburden and Mine Spills 1978.

PROPOSED RULES

§ 784.12 General requirements for reclamation and operations plan.

3. The authority, basis and purpose of this section are the same as those for section 780.19 of this Subchapter.

§ 784.13 Protection of hydrologic balance.

4. The authority, basis and purpose of this section are the same as those for section 780.21. In addition, this section provides for long-term control of permanent seals of waters inundating abandoned underground mine operations, by requiring appropriate plans as part of the application.

These plans would contain the information needed by the regulatory authority to determine if the proposed operations can be conducted during and after mining, to meet the requirements of sections 817.13–817.15 of this Subchapter K.

First, for new mines in acid or iron-bearing coalseams, locations of entries must be specified to preclude gravity discharges. See section 516(b) of the Act. Particularly important for the regulatory authority, will be sufficient soils, geologic and hydrology data to assess whether mine entries can be reasonably expected to hold seals for the long-term period after cessation of mining, in view of the historic experience with the difficulties in maintaining those seals without leakage or collapse.

If these plans cannot establish that drainage will be held within the underground workings, then the applicant would, of course, be required to propose adequate plans for the use of necessary treatment facilities to ensure that mine drainage is discharged out of the underground workings in accordance with section 817.42 of Subchapter K.

The following technical literature supports this requirement:


(6) Moebus, N. N. and Krickovic, S., 1970 Air-Sealing Coal Mines to Reduce Water Pollution, BOM RI 7354;

(7) USEPA, 1975, Criteria for Developing Pollution Abatement Programs for Inactive and Abandoned Mine Sites, EPA-440/9-75-008;

(8) USEPA, 1973, Processes, Procedures, and Methods to Control Pollution from Mining Activities, EPA-430/3-73;

§ 784.14 Reclamation and operations plan: Post-mining land uses.

5. The authority, basis and purpose of this section are the same as for section 780.33 of this Subchapter.

§ 784.15 Operations and reclamation plan: Ponds, impoundments, banks and dams and embankments.

6. The authority, basis and purpose of this section are the same as for section 780.25 of this Subchapter.

§ 784.16 Protection of public parks and historic places.

The authority, basis and purpose for this section are the same as for section 780.31 of this Subchapter.

§ 784.17 Relocation or use of public roads.

The authority, basis and purpose for this section are the same as for section 780.33 of this Subchapter.

§ 784.18 Underground Development Waste.

The authority, basis and purpose for this section are the same as for section 780.35 of this Subchapter.
PROPOSED RULES

The cumulative effects of the damage inflicted upon the victims of mine blasting have been enormous. Federal 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 purchases 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:
6. Maryland Geological Survey, Bureau of Mines, 1973, Blasting restrictions (08.06.05.09) and Regulations governing blasting, 07.19.06.05., in Bituminous coal strip mines and auger regulations, Maryland Department of Natural Resources Rules and Regulations, 78-13.
11. Pennsylvania Department of Environmental Resources Rules and Regulations, Title XXV, Pennsylvania Code, Ch. 211.


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 training 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.

PROPOSED RULES

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 delay for mining. Therefore, this requirement 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 the 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 preblasting 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 above may not be available 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 included 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 the right to a preblasting survey and schedule. Temporary blasting operations will be conducted under this 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 type of explosives to be used. However, because there 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 may arise during 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 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).
PROPOSED RULES

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. The most common units are 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 erosion and internal plaster to crack and can damage windows. The most common effects of air blast are: (1) disturbances created by the rattle of windows, panels and doors which gives 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. 42 Fed. Reg. 62658 (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.

Airblast frequency is measured in Hertz (Hz) which is equivalent to cycles per second. "Airblast level and appropriate measurements instrumentation specifications are presented in the table. The values were derived from structure response data collected by two ongoing Bureau of Mines research projects 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 structural walls and corners have equipment. which has flat 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 proposed values.

The use of the C-slow scale has been recommended by the Committee on Hearing and Bioacoustics Working Group 69 to the U.S.E.P.A.. 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 reduce the annoyance factors 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 dBC 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 re-
viewed show that significant adverse effects still continue to occur to persons and property at distances both within and beyond those limits being proposed in the bill, the Office proposes to establish distance limits to protect public health and safety.

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. Sections 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 achievement of pre-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 Office believes that these 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 property, or (iii) blasting damage 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 reduce the effects 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 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, a group testifying on 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. Hearing 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. Congresswoman Stewart, who was at the hearings, this provision should be implemented by way of regulation, rather than amendment of the Act. Id., at 293.

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 a house, say, 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 by the Office have shown that the proposed limits of 1000 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 2½ mile radius of the Ayrshire Mine in Warrick County, Ind.: John Barnes, 1977. See 123 Cong. Rec. Res. 8133 (May 29, 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. (Grinnell and Hill, 1974, p. 92.) 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 Office 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 Office is required 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 regulations. 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 and the National Coal Mine Safety and Health Management Science Associates, identifies flyrock as the major cause of 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 inhabited structure, on a 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 destruction 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 41 inch per second at the immediate location of those structures.
PROPOSED RULES

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 the surface and are described 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 toward the surface 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 (milleimeters) 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(c). 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 that surface vibrations due to blasting are important in 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 shock wave 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

Blasting 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 vibration of structures may be an important factor in determining damage caused by blasting. Medearis, 1976, p. 1. Where the frequency of the ground vibrations versus 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 blasting in 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 damage. 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, 1977 is a study of proposed mountaintop removal 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 companies 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.

In general, the Office believes that the 1-inch per second limit is more protective of the public health and welfare. 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 equation 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.

The weight of 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.

The regulation in proposed subsection 816.67 was provided to prevent 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 charges in adjacent holes 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 very short time period and 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 formula in 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 specific factors such as in any 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 the spread of vibration to persons being subjected to 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 much 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 produces particle velocities greater than 1 inch per second.

As 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 816.57, 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 containing the standard setting, 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.

§ 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 the interim program and 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 and is highly faulted in practice by operators who 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:

The outright prohibition on gravity discharges from a 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 structure and 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.

§ 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 those considered for proposed Section 816.59 were considered by the drafters, and the reader is invited to refer to the Preamble to 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.
PROPOSED RULES

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 818 for detailed discussion.

§§ 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 disposal from those proposed for excess spoil in proposed Sections 816.71–816.73.

§§ 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 816 of the Act. While the Office considers the appropriate coal processing waste disposals in the surface 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.

§ 817.89 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. Public comment is requested on how the differences in these types of mining 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 the regulations.

§ 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 portions of the Preamble for Part 816 for information concerning the technical basis, al-
eral surface water, streams, drainways, or irrigation ditches within the proposed mine plan area or adjacent areas;
(f) Location and elevation of discharge of industrial wastes to surface or ground-waters within the proposed mine plan area, or at points in adjacent areas to surface waters which flow into the proposed mine plan area;
(g) Boundaries and elevations of existing or previously surfaced-mined areas within the proposed mine plan area;
(h) Location, elevation and dimensions of existing areas of spoil, waste, refuse and topsoil preservation, dams, other impoundments, and water treatment or air pollution control facilities within the proposed permit area;
(i) Location and depth of water, gas or oil wells within the proposed permit area; and
(j) Sufficient slopes to adequately represent the existing land surface configuration of the mine plan area, measured and recorded according to the following:
(1) Each measurement shall consist of an angle of inclination along the prevailing slope extending 100 linear feet above and below or beyond the coal outcrop or the area to be disturbed; or, where this is impractical, at locations specified by the regulatory authority.
(2) Where the area has been previously mined, the measurements shall extend at least 100 feet beyond the limits of mining disturbances, or any other distance determined by the regulatory authority to be representative of the premining configuration of the land.
(3) Slope measurements shall take into account natural variations in slope so as to provide accurate representation of the range of natural slopes and shall reflect geomorphic differences of the area to be disturbed.
(4) Slope measurements may be made from existing topographic maps showing contour lines, having sufficient detail and accuracy consistent with the submitted mining and reclamation plan.
(5) Contour lines shall be based on intervals of a maximum of 5 feet where the slope of the land is twenty (20) degrees or less and a maximum of ten feet where slopes are greater than 20 degrees.
§ 779.26 Soil resources description.
(a) A soil map shall be prepared that delineates those portions of the mine plan area of different soil morphology and soil environment. The soil map shall provide adequate information to establish present and potential productivity levels of the land and to aid in the classification, stockpiling, and use of soil materials during mining and reclamation operations. The soil resources description shall also provide adequate information to predict the potential for reestablishing vegetation and the proposed postmining use.
(b) The applicant shall supply such other information as required by the regulatory authority.

PART 780—SURFACE MINING PERMIT APPLICATION—MINIMUM REQUIREMENT FOR RECLAMATION AND OPERATIONAL PLAN

Sec. 780.1 Scope.
780.2 Objectives.
780.4 Responsibilities.
780.11 Operation plan: General requirements.
780.12 Operation plan: Blasting.
780.13 Operation plan: Maps and plans.
780.14 Air pollution control plan.
780.15 Fish and wildlife plan.
780.17 Reclamation plan: Introduction.
780.19 Reclamation plan: General requirements.
780.21 Reclamation plan: Protection of hydrologic balance.
780.23 Reclamation plan: Post-mining land uses.
780.25 Reclamation plan: Ponds, impoundments, banks, and dams and embankments.
780.27 Reclamation plan: Surface mining near underground mining.
780.29 Diversion.
780.31 Protection of public parks and historic places.
780.33 Relocation or use of public roads.
780.35 Disposal of excess spoil.
780.37 Transportation facilities.


§ 780.1 Scope.
This part provides the minimum requirements for the Secretary's approval of provisions of regulatory programs for the mining operations and reclamation plan portions of applications for surface coal mining activities permits, except to the extent that different requirements for those plans are established under part 785 of this subchapter.

§ 780.2 Objectives.
The objectives of this part are to establish the minimum requirements for regulatory programs for the contents of mining and reclamation plan portions of applications for permits, so that the regulatory authority is provided with comprehensive and reliable information on proposed surface coal mining and reclamation operations, and to ensure that such operations are allowed to be conducted only in compliance with the Act, this chapter, and the regulatory program.

§ 780.4 Responsibilities.
(a) It is the responsibility of the applicant to provide to the regulatory authority all of the information required by this part, except where specifically exempted in this part.
(b) It is the responsibility of State and Federal governmental agencies to provide information to the regulatory authority where specifically required in this part.

§ 780.11 Operation plan: General requirements.
Each application shall contain a description of the proposed mining operations within the mine plan area, including, at a minimum, the following:
(a) A narrative description of the type and method of coal mining procedures and proposed engineering techniques, anticipated annual and total production of coal, by tonnage, and the major equipment used or proposed to be used for all aspects of such operations.
(b) A narrative explaining the construction, modification, use, maintenance, and removal of the following facilities within the proposed mine plan area:
(1) Major buildings and other facilities.
(2) Utilities services.
(3) Dams and impoundments.
(4) Overburden and topsoil handling and storage areas and structures.
(5) Coal removal, handling, storage, cleaning, and transportation areas and structures.
(6) Waste and refuse removal, handling, storage, transportation, and disposal areas and structures.
(7) Mine facilities and layout; and
(8) Water and air pollution control facilities.

§ 780.12 Operations plan: Blasting.
Each application shall contain a blasting plan for the affected area, explaining how the applicant intends to comply with the requirements of 30 CFR sections 816.61 through 816.68 and including the following information:
(a) Types and approximate amounts of explosives to be used for each type of blasting operation to be conducted;
(b) Description of procedures and plans for recording and reporting to the regulatory authority blasting information to be collected during the operation. The plan shall contain the following information—
(1) Drilling patterns, including size, numbers, depths, spacing, and configuration of holes;
(2) Charge and packing, placement of holes;
(3) Types of fuses and detonation controls; and
(4) Sequence and timing of firing holes.

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§ 780.13 Operations plan: Maps and plans.

Each map, plan, and cross-section shall delineate the location on the permit area where the performance standards in 30 CFR 816 apply. Areas that were mined under the initial regulatory program or that were mined before February 3, 1978 shall also be delineated on the map. Each application shall contain maps, plans, and cross-sections of the permit area in accordance with the following provisions:

(a) Maps and plans shall have a scale of 1:25,000 or larger. Cross-sections shall have a scale prescribed by the regulatory authority. The maps, plans, and cross-sections shall show the mining operations to be conducted and the lands to be affected throughout the operation.

(b) Any change in a facility or feature caused by the proposed mining operation shall be described if the facility or feature was shown on the map and plan required by 30 CFR 779.24 and 779.25.

(c) The following shall be shown and, for subparagraphs 5, 6, 10, and 13 of this paragraph the maps and plans shall be prepared by, or under the direction of, and certified by a qualified professional geologist, with assistance from experts in related fields such as land surveying and landscape architecture:

(1) Buildings, utility corridors and facilities to be used within the mine plan area;

(2) The area of land to be affected within the permit area, according to the sequence of mining and reclamation;

(3) Each coal storage, cleaning and loading area;

(4) Each topsoil, overburden, refuse, spoil, and waste storage area;

(5) Each water diversion, collection, conveyance, treatment, storage, and discharge facility to be used;

(6) Each air pollution collection and control facility;

(7) Each source of and facility relating to coal processing and pollution control waste disposal;

(8) Each facility to be used to protect and enhance fish and wildlife and related environmental values;

(9) Each explosive storage and handling facility;

(10) Locations, design, and construction specifications of each sedimentation pond, permanent water impoundment, coal processing waste bank, and coal processing waste dam and embankments in accordance with 30 CFR 780.25 and disposal of excess spoil in 30 CFR 780.35.

(11) Each profile, at cross-sections specified by the regulatory authority, of the anticipated final surface configuration to be achieved for the affected areas;

(12) Location of each water and air quality, and wildlife monitoring point; and

(13) Location and specifications for each facility that will remain on the mine plan area as a permanent feature, after the completion of surface coal mining and reclamation operations.

§ 780.14 Air pollution control plan.

(a) For those operations with projected production rates exceeding 1,000,000 tons of coal per year and located west of the 100th meridian west longitude, the application shall contain an air pollution control plan which includes the following:

(1) An air quality review demonstrating that total suspended particulate matter emissions from the proposed surface coal mining operation, in conjunction with all other applicable particulate matter emission increases or reductions, would not cause or contribute to exceedances of any national ambient air quality standard in any air quality control region or subregion, may:

(i) Cause or contribute to exceedances of any other applicable Federal or State air quality standards;

(ii) Cause or contribute to exceedances of any other applicable Federal or State air quality standards;

(2) An ambient air quality monitoring program to provide adequate annual and 24 hour total suspended particulate matter sampling data to evaluate the ambient air quality impact of the surface coal mining operation. (See 40 CFR 50.7).

(b) A plan for fugitive dust control practices as required under section 816.95 of subchapter K and necessary to achieve and maintain National Ambient Air Quality Standards and other applicable Federal and State air quality standards.

(1) Cause or contribute to exceedances of any other applicable Federal or State air quality standards;

(2) Cause or contribute to exceedances of any other applicable Federal or State air quality standards;

(3) Cause or contribute to exceedances of any other applicable Federal or State air quality standards.

§ 780.15 Fish and wildlife plan.

Each application shall contain a fish and wildlife plan, which provides:

(a) A statement of how the applicant proposes to use the best technology currently available for the site so that affected areas are reclaimed to a condition which will enhance fish, wildlife, and related environmental values.

(b) If the applicant determines that it will not be practicable to achieve a condition which clearly shows a trend toward enhancement of fish and wildlife resources at the time revegetation has been successfully accomplished under 30 CFR 816.111 through 816.117, the applicant shall state—

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diminution, or interruption resulting from the surface coal mining activities.

§ 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 and total suspended solids requirements of applicable regulations applicable to the permanent structures and impoundments.

§ 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.

§ 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.

PROPOSED RULES

§ 816.59 Coal recovery.

Surface mining activities shall be conducted so as to maximize the utilization and conservation of the coal so that reclamation of the land in the future through surface coal mining operations is minimized.

§ 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.

§ 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 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.

§ 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 government and public utilities and by mail or delivered to each resident 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.

(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(c)(2) which have been approved by the regulatory authority for blasting at times other than those described in the schedule.
PROPOSED RULES

(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.

§ 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:

<table>
<thead>
<tr>
<th>Lower frequency limit of measuring system, Hz (±3dB)</th>
<th>Maximum level in dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 Hz or lower—flat response</td>
<td>115 peak.</td>
</tr>
<tr>
<td>0.5 Hz or lower—flat response</td>
<td>125 peak.</td>
</tr>
<tr>
<td>6 Hz or lower—flat response</td>
<td>135 peak.</td>
</tr>
<tr>
<td>C-weighted, slow response</td>
<td>109 C.</td>
</tr>
</tbody>
</table>

(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.

(1) 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 \( W = \left( \frac{D}{60} \right)^2 \) 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:

<table>
<thead>
<tr>
<th>Distance, in feet (D)</th>
<th>Maximum weight in pounds (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>25</td>
</tr>
<tr>
<td>350</td>
<td>34</td>
</tr>
<tr>
<td>400</td>
<td>44</td>
</tr>
<tr>
<td>450</td>
<td>60</td>
</tr>
<tr>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>600</td>
<td>138</td>
</tr>
<tr>
<td>700</td>
<td>178</td>
</tr>
<tr>
<td>800</td>
<td>225</td>
</tr>
<tr>
<td>900</td>
<td>278</td>
</tr>
<tr>
<td>1,000</td>
<td>330</td>
</tr>
<tr>
<td>1,100</td>
<td>400</td>
</tr>
<tr>
<td>1,200</td>
<td>450</td>
</tr>
<tr>
<td>1,300</td>
<td>544</td>
</tr>
<tr>
<td>1,400</td>
<td>625</td>
</tr>
<tr>
<td>1,500</td>
<td>711</td>
</tr>
<tr>
<td>1,600</td>
<td>803</td>
</tr>
<tr>
<td>1,700</td>
<td>900</td>
</tr>
<tr>
<td>1,800</td>
<td>1,002</td>
</tr>
<tr>
<td>1,900</td>
<td>1,111</td>
</tr>
<tr>
<td>2,000</td>
<td>1,225</td>
</tr>
</tbody>
</table>
PROPOSED RULES

(2) Not owned or 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 seismographic reading; and

(3) Name of the person and firm analyzing the seismographic record.

§ 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 816.66 to 816.67. 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 to 816.23 before spoil is placed in the disposal area. If approved by the regulatory authority, organic material 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 sections 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 1:1:2.8 (%) 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 1:1:5 (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 such manner if excess spoil fills if such waste is-

(i) Placed in accordance with section 816.85;

(ii) Demonstrated to be nontoxic and nonacid forming; and
PROPOSED RULES

§ 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.

§ 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 solids concentration 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;

(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.

§ 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.

§ 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.

§ 817.59 Coal recovery.

Underground mining activities shall be conducted so as to maximize the utilization and conservation of the coal so that reaffecting the land in the future through surface coal mining operations is minimized.

§ 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 T.N.T. 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 550 and 551.

§ 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.

(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. Assessment of pre-existing conditions 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.

§ 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 the 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:

<table>
<thead>
<tr>
<th>Lower Frequency Limit of Maximum Measuring System, Hz (±3 dB)</th>
<th>Level in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hz or lower—flat response</td>
<td>135 peak</td>
</tr>
<tr>
<td>2 Hz or lower—flat response</td>
<td>133 peak</td>
</tr>
<tr>
<td>6 Hz or lower—flat response</td>
<td>130 peak</td>
</tr>
<tr>
<td>C-weighted, slow response</td>
<td>100°C</td>
</tr>
</tbody>
</table>

(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 exits 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 S1.4-1972 is applicable 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.

(h) 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.

(i) Except where lesser distances are approved by the regulatory authority based upon a pre-blasting survey or other appropriate considerations, 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.

(j) Flyrock from blasting shall be restricted as follows:

(1) No flyrock shall be cast beyond 1,000 feet 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 one-half of 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.

(k) 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.

(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 \( W \) is the maximum weight of explosives, in pounds, that can be detonated in any 8-millisecond period, and \( D \) is the distance, in feet, to the nearest...
PROPOSED RULES

§ 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.

(2) Weather conditions.

(3) Type of material blasted.

(4) 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.

§ 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 to promote growth of vegetation or to increase the moisture retention of the soil.

(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:1.5h (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 quar-