

Results of this equation render values of peak-particle-velocity of 1.0 inch per second at $Ds=55$ and 0.50 inch per second at a square-root scaled-distance factor $Ds=90$.

To fully implement a program using square-root scaled-distance criteria, vibration levels must be identified which may produce damage. The Bureau of Mines recorded threshold damage at levels as low as 0.72 inch per second for a plaster-on-lath structure and in evaluating all study points recommends a 0.75-inch-per-second standard as a conservative value to eliminate the chance of blast damage. OSM, in evaluating the most recent damage data in Figure 46 of the Bureau of Mines Report RI8507, finds only 5 of 32 damage points fell below the existing 1.0-inch-per-second standard, while the recommended value of 0.75 inch per second for the lowest particle velocity chosen by the Bureau of Mines is the value below which no evidence of damage was reported in the most recent data. All three options include the opportunity for an operator to use a scaled distance and not seismic monitoring.

Option 1 for § 818.67(d) (Amendment 13)

Under this option the regulatory authority would establish a particle velocity for each permit based on site-specific conditions. The allowable ground vibration would be limited either by the type of structure to be protected or by the frequency of the blast. (See also Amendments 1 and 24.)

Paragraph (1) of the proposed rule would require that the regulatory authority set ground vibration peak-particle-velocity for each permit area based on actual site condition. The applicant would be required to submit information with regard to structure type and probable frequencies along with the permit application such that the limit could be properly established. Where an operator would proceed pursuant to Paragraph (5) (that is, substitute a scaled-distance equation) no additional information would be required in the application.

Paragraph (2) would apply that standard to the operator. The limit would not be permitted to be exceeded at any structure.

In Paragraph (3) OSM proposes maximum limits for peak-particle-velocity. Because these standards are maximum limits, the regulatory authority may find it appropriate to set

lower limits. The levels presented are considered to prevent damage when applying the following rationale:

Particle-velocity values selected in this option reflect the record of threshold damage. Frequencies below 5 Hz were recorded at less than 2 percent of the coal mine blasts. These are discussed briefly above and more completely in the Bureau of Mines Report RI8507. Very few shots produce frequencies below 10 Hz. If the probability of threshold damage at 1.0 inch per second is about 18 percent and minor damage at about zero percent, it is believed that 1.0 inch per second as an upper limit provides reasonable protection when monitoring of all shots is required. (See Figure 39 in RI8507.) Historically, OSM has found that under the initial program practice of using a 1.0-inch-per-second standard, few blasts actually reached or exceeded that limit. Therefore, the probability of damage would be substantially less than if the limit were continuously met. Additionally, in order to achieve a 1.0-inch-per-second performance level, operators will generally design for a much lower limit, such as 0.75 or 0.5 inch per second. The design level compensates for typical scatter of recorded velocities using various scaled-distance values.

Paragraph (4) presents a scaled-distance equation which would be permissible with regulatory authority approval without seismic monitoring. The equation would allow the operator to figure a charge-weight which can be used to insure that the allowable peak-particle-velocity is less than would otherwise be permissible. This equation would insure a greater level of safety than that required when seismic monitoring is provided, because seismic monitoring insures that operators and the regulatory authority are aware of what levels of vibration are actually being achieved. The correlation of particle velocity with the scaled distance is designed to give a 95-percent confidence level.

Paragraph (5) would provide an equation for determining allowable blast vibration without detailed site information. This equation assumes a safe particle velocity of 0.75 inch per second and applies the scaled distance equation with a distance factor of 70. Use of this limit would not be the most cost effective for the operator, because the generally lower limits may require

smaller blasts which may be less effective.

Paragraph (6) would provide a mechanism requiring a regulatory authority to evaluate blast data whenever necessary to prevent damage resulting from blasting. The reevaluation may lead to reduction of the allowable standard if found to be too lenient to assure the prevention of damage.

Option 2 for § 818.67(d) (Amendment 14)

Under proposed Option 2, OSM would establish maximum allowable ground vibration limits dependent on the distance to the nearest structure. Because the standards set out in the rule would not prevent damage to the most sensitive structure, the regulatory authority would set more stringent requirements where sensitive structures are found. As discussed above, the operator could substitute a scaled-distance equation for use without seismic monitoring. (See also Amendments 2 and 25.)

This alternative approach to the square-root scaled-distance equation would adopt the equation presented by Medearis in the 1976 report to the National Crushed Stone Association. This equation was suggested by a commenter. It would allow higher charge-weights where higher blast vibration frequencies exist and more conservative charge-weights (thus less vibration intensity) as blast vibration frequency decreases with distance. This concept has been incorporated by several States, although not for coal operations, but it is believed to provide results similar to those suggested by the Bureau of Mines Report RI8507, to reduce particle-velocity when low frequency blast vibrations occur. The equation is derived from the particle-velocity propagation equation $V=M(D/\sqrt{W})^{-N}$, where V =Peak-particle-velocity, D =distance to monitoring point, W =charges weight per delay interval, and M and N =empirical constants not related to frequency.

The equation $W=D^{1.5}/90$ uses a 90 derived for the empirical value for the constants referred to in the particle-velocity equation. The use of this equation provides a stepped particle-velocity approach easily applied by an operator. Figure B provides a graphic representation of the sliding particle velocity correlation to scaled-distance values.

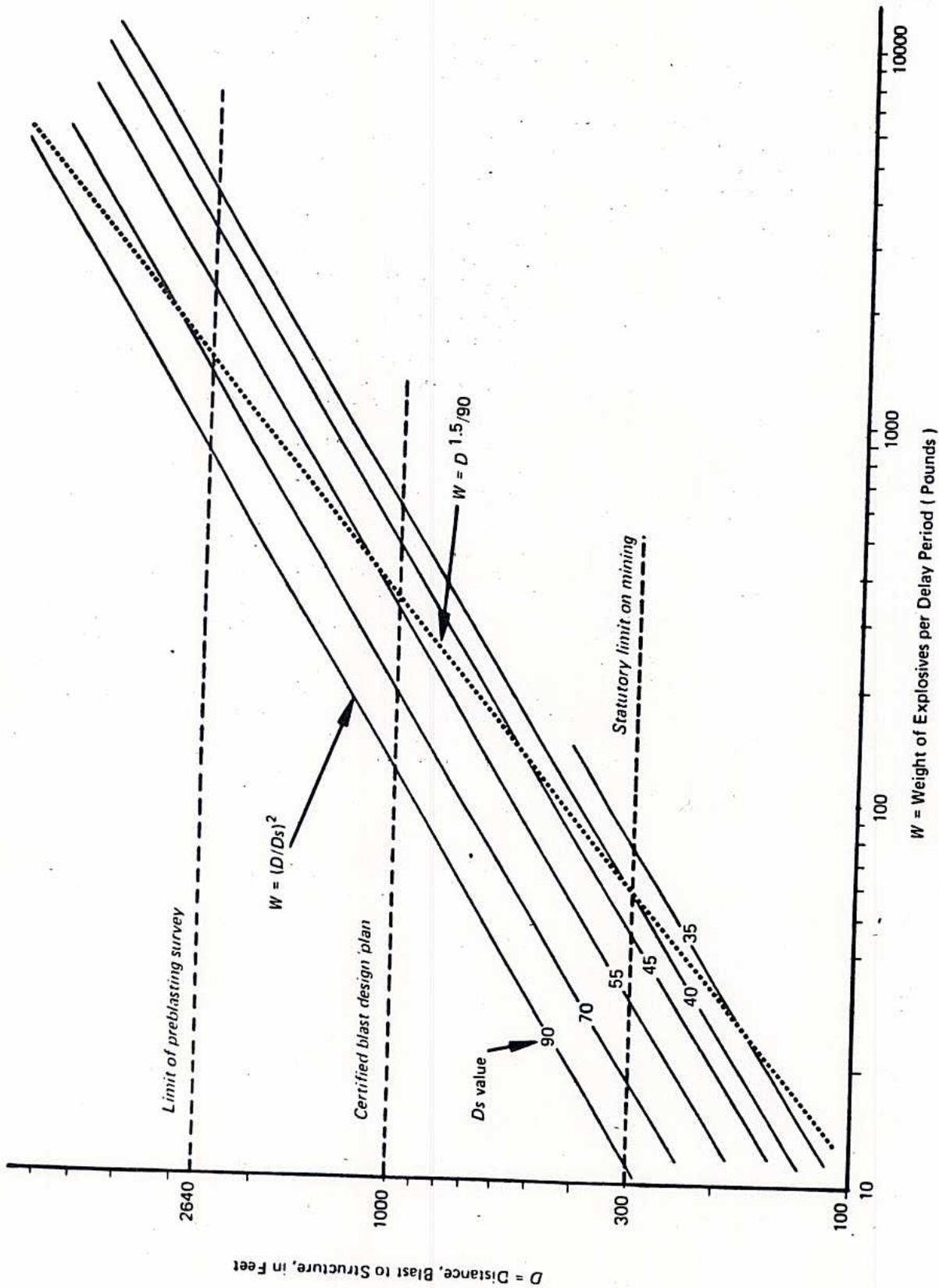


Figure B.-- Correlation of square root scaled-distance equation $W = (D/D_s)^2$ at varying D_s values with proposed equation $W = D \cdot 1.5/90$.

As offered in the proposed rule, the equation $W = D^{1.5}/90$ correlates with a square root scaled-distance of $Ds = 55$ at 1,100 feet. This would provide a peak-particle-velocity standard of approximately 1.0 inch per second at 1,000 feet comparable to the result intended in the 1.0-inch-per-second standard issued March 13, 1979. This similarity also correlates with the requirement proposed in § 780.13(c) requiring a blast design within 1,000 feet of inhabited residences. This facet of the proposed rules would provide for potentially larger charges and particle-velocities within 1,000 feet, than with the 1-inch-per-second rule, but would require blaster awareness and demonstrated knowledge of the design criteria when blasting within this zone.

Paragraph (3) of this option would require the regulatory authority to evaluate new blasting data if requested in writing by the owner or resident of a structure in the vicinity of the blast site to determine if a lower peak-particle-velocity standard or lower scaled-distance equation is necessary to protect the site. Factors which would require a lower standard are blast vibration frequency, geologic conditions, structure type and condition, or damage associated with blasting.

As with Option 1, paragraph (4) of Option 2 would allow the regulatory authority to require a seismographic record of any blast.

Option 3 for § 816.67(d) (Amendment 15)

Option 3 presents a simpler approach to limitations on peak-particle-velocity. In the option OSM would set a flat limit that is not to be exceeded at any structure outside the permit area. (See also Amendments 3 and 26.)

A maximum peak-particle-velocity of 1.0 inch per second would be set for general use. This would insure the prevention of damage in approximately 90 percent of all structures. The standard would not be applied if the operator demonstrates and the regulatory authority finds that the ground vibration conforms to the limits set out in Appendix B of the Bureau of Mines Report RI8507. Use of this appendix would allow higher peak-particle-velocity when frequency is higher. Generally 2 inches per second is acceptable with frequencies above 40 Hz.

As with Options 1 and 2 a scaled-distance equation would be allowed which would dictate charge-weights based on the distance to the nearest structure when seismic monitoring is not used. In order for seismic monitoring to be waived, the predicted peak-particle-

velocity cannot exceed 1 inch per second.

Paragraph (3) would require the regulatory authority to review, after request from an owner or resident of any structure in the vicinity of the blast site, the available data and would allow the regulatory authority to set more stringent limitations if appropriate, based on new data. Data which would be considered include blast frequency, site information, structure type, or reports of any damage.

Paragraph (4) would allow the regulatory authority to require seismic monitoring and to specify where such monitoring should occur.

Section 816.68 Use of explosives: Records of blasting operations (Amendment 16)

The lead paragraph to existing § 816.68 requiring the operator to maintain blasting records and to make them available for inspection by the regulatory authority and the public on request as required in Section 515(b)(15)(B) of the Act would be editorially amended. No change in effect is intended. No changes are proposed in Paragraphs (a)-(c), (f), (h), (i), and (k). These paragraphs cover the name of the operator; the location, date, and time of the blast; the name, signature, and license number of the blaster in charge; the type of material blasted; the diameter and depth of holes, the type of explosives used, and the maximum weight of explosives detonated within any 8-millisecond period. Revisions to particular items to be included in the records also would be made as follows:

Paragraph (d) would be revised by adding the identification of the nearest structure but not those structures owned or leased by the operator. Such information is necessary for blast design and planning process.

Paragraph (e) would be shortened to read "weather conditions" without specific data to be recorded. This does not lessen the need for temperature, wind direction, and approximate velocity data, but allows each regulatory authority to specify the extent of weather data to be recorded.

Paragraph (g) providing for the number of holes, decks, burden, and spacing would be removed. The new proposed paragraph (g) would require sketches of the blast pattern. The number of holes, decks, burden, spacing and delay pattern must be included in a sketch for it to be useful and acceptable.

Paragraph (j) would be changed to reflect the total weight of explosives per holes, rather than total weight used, because Section 515(b)(15)(B) of the Act specifically cites a per-hole record.

Existing paragraph (l) requires records of the numbers of holes detonated within 8 milliseconds. This provision would be deleted because the information can be established by review of the sketch of the delay pattern required in proposed paragraph (g).

Existing paragraph (m), with regard to initiation systems, would be redesignated as paragraph (l).

Existing paragraph (n), with regard to type and length of stemming, would be redesignated as paragraph (m).

Existing paragraph (o), with regard to mats or other protections used, would be redesignated as paragraph (n).

Existing paragraph (p) would be removed because information with regard to detonators and delay periods would be included in the description of initiation devices required by proposed paragraph (l) and sketches required by proposed paragraph (g).

Existing paragraph (q) would be removed because a sketch of the delay pattern is required by proposed paragraph (g).

Existing paragraph (r), which requires a record of the number of persons in the blasting crew, would be deleted. It is believed that any provision limited crew size can be observed and carried out without recording the number of persons.

Existing paragraph (s) dealing with seismographic records would be modified. Proposed paragraph (o) already would include the same provisions as the existing paragraph (s) plus additional information. A requirement for date and time of reading also would be added. OSM believes that this necessary information is already included on most records and instruments available.

Proposed paragraph (o) would also include addition of airblast records. Airblast records may or may not be part of the seismographic record. Therefore, the term airblast has been added to avoid any doubt that airblast records were included in the records requested by the regulatory authority. This information is necessary for the seismographic record to be of use in analyzing the blast.

Proposed paragraph (p) would be added to insure that regulatory authorities have sufficient information to review use of unscheduled blasts and that they may respond to complaints.

Rules governing use of explosives associated with underground mining (Amendments 17-27)

The performance standards governing the use of explosives associated with underground mining are identical to

those governing the use of explosives associated with surface mining except as noted below. Most offsite impacts, for example, airblast and ground vibration, for surface blasting at underground mines are not substantially different from those for blasting at surface mines, and OSM only regulates surface blasting.

Only one difference exists between the two sets of rules. Rather than require a blasting schedule in § 817.64 similar to the found in § 816.64 of the proposed surface coal mining rules, § 817.64 would require a 24-hour notice prior to any surface blasting in support of underground coal mining. Because of the occasional, sporadic nature of surface blasting in support of underground coal mining, the public would be better served by receiving notification the day before any blasting is done. The mine operator also would be relieved of the task of publishing and republishing a blasting schedule.

Surface mines, however, use more regular, more periodic, and more predictable blasting. Accordingly, the regulation proposes in § 817.64(a) that notice be provided prior to each surface blast where underground mining will occur while proposed § 816.64 would require that schedules be provided where surface mining will occur. This is the only significant difference between the two sets of rules. The requirement that residents or owners be advised how to obtain preblasting surveys would be contained in § 817.62(c), since there would be no § 817.64(b)(2).

Amendment 28—Addition of Figure 1

Figure 1, which is referred to in three places in the proposed rules, is from the Bureau of Mines Report RI8507 (p. 73). It would be added to the text of §§ 715.19(e)(2)(ii)(A), 816.67(d)(1), and 817.67(d)(1).

IV. Procedural Matters

Executive Order 12291

The Department of the Interior (DOI) has examined these proposed rules according to the criteria of Executive Order 12291 (February 17, 1981). OSM has determined that these are not major rules and do not require a regulatory impact analysis because they will impose only minor costs on the coal industry and coal consumers. In addition, the proposed rules emphasize the use of performance standards instead of design criteria and will allow operators to utilize the most cost-effective means of achieving the performance standards.

Regulatory Flexibility Act

The DOI has also determined, pursuant to the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq.*, that these rules will not have a significant economic impact on a substantial number of small entities. The proposed rules will allow small coal operators increased flexibility in meeting performance standards and should especially ease the regulatory burden on small coal operators in Appalachia.

National Environmental Policy Act

OSM has prepared a draft environmental assessment (EA) on this proposed rule and has made an interim finding that it would not significantly affect the quality of the human environment. The draft EA is on file in the OSM Administrative Record at the address listed in the "Addresses" section of this preamble. A final EA will be completed and a final conclusion reached on the significance of any resulting impacts before issuance of the final rule. OSM also is preparing an EA of the cumulative impacts on the human environment of this rulemaking and related rulemakings under the Act. This cumulative EA also will be completed before this rule is made final.

Federal Paperwork Reduction Act

The information collection requirements in existing 30 CFR Parts 715, 780, 816, and 817 were approved by the Office of Management and Budget (OMB) under 44 U.S.C. 3507 and assigned new clearance numbers 1029-0007, 1029-0038, 1029-0047, and 1029-0048 on April 1, 1981. This approval was identified in "Notes" at the introduction to 30 CFR Parts 715, 780, 816, and 817 under the old numbers RO494, RO606, RO618, and RO619 (all under No. B-190462). OSM will delete those "Notes" and codify the OMB approvals under the new §§ 715.10, 780.10, 816.10, and 817.10. OSM is requesting OMB approval of the information collection requirements being proposed for the following sections and will codify the OMB approvals when the final rules are promulgated: §§ 715.19, 780.13, 816.62, 816.64, 816.68, 817.62, and 817.68.

The information required by 30 CFR Part 715 will be used by the regulatory authority in monitoring blasting operations. This information required by 30 CFR Part 715 is mandatory.

The information required by 30 CFR Part 780 will be used by the regulatory authority in determining whether the applicant can meet the environmental protection performance standards of the regulatory program. This information

required by 30 CFR Part 780 is mandatory.

The information required by 30 CFR Parts 816 and 817 will be used by the regulatory authority in monitoring and inspecting surface and underground mining activities to ensure that they are conducted in a manner which preserves and enhances environmental and other values of the Act. This information required by 30 CFR Parts 816 and 817 is mandatory.

Accordingly, 30 CFR Parts 715, 780, 816, and 817 are proposed to be amended as set forth herein.

Dated: March 9, 1982.

Daniel N. Miller, Jr.,
Assistant Secretary, Energy and Minerals.

Part 715—GENERAL PERFORMANCE STANDARDS

Option 1 for § 715.19

1. Section 715.19 is amended by revising paragraphs (e)(2) (ii) through (vi) and adding paragraph (e)(2)(vii) to read as follows:

§ 715.19 Use of explosives.

* * * * *
(e) * * *
(2) *Blasting standards.* (i) * * *

(ii) In all blasting operations, except as otherwise authorized in this § 715.19, the maximum peak-particle-velocity of ground vibration shall not exceed the value established by the regulatory authority at the location of any dwelling, public building, school, church, or community or institutional building. Peak-particle-velocities shall be recorded in three mutually perpendicular directions. The maximum peak-particle-velocity shall be the largest of any of the three measurements.

(iii) The maximum peak-particle-velocity for surface coal mining blasting operations for a specific permit area shall be assigned by the regulatory authority based on an evaluation of the physical site conditions at and surrounding the permit area. Detailed information of the types of structures to be protected, seismic velocity, and other relevant information shall be submitted by the permittee for the regulatory authority to evaluate the allowable ground vibration standard. Permittees not requesting assignment of a site-specific peak-particle-velocity may choose to comply with the equation found in paragraph (e)(2)(vi) of this section.

(iv) The peak-particle-velocity authorized by the regulatory authority for surface blasting operations shall not

exceed the following limits for structure type and predominant frequency of the ground vibration due to blasting operations.

Type of structure*	Maximum peak-particle-velocity in inch/second allowable with seismic monitoring at indicated hertz value		
	< 10 Hz	10 to 40 Hz	> 40 Hz
1.....	0.50	0.50	0.50
2.....	0.75	1.0	2.0
3.....	1.0	1.5	2.0
4.....	2.0	2.0	2.0
5 ^b			

*1. Sensitive or protected structures such as historic buildings, monuments, and residences with construction elements such as plaster interiors and rough stone foundation walls.
 2. Older homes more than 20 years old with construction elements such as plaster-on-lath interiors and deteriorated or rigid, easily fractured construction materials.
 3. Modern homes less than 20 years old with gypsum-board interior, reinforced concrete or concrete-masonry-unit foundations, and other wood-frame and wood-clad structure.
 4. Structures with safety considerations such as water towers, impoundments, tunnels, pipelines, towers, and underground mines.
 5. Buildings or structures designed to resist dynamic loads such as earthquake, wind, traffic, etc.
^bMaximum peak-particle-velocity to be determined by a qualified registered professional engineer.

(v) The regulatory authority may authorize an operator to use the square-root scaled-distance equation $W=D/D_s^2$ without seismic monitoring, where W =the weight of explosive, in pounds, which may be detonated in any 8-millisecond period; D =the distance, in feet, from the blast to the nearest dwelling, school, church, or community or institutional building; and D_s =the scaled-distance factor (denominator of equation). The equation shall initially be approved based on the following correlation criteria:

Peak-particle-velocity (inch/second)	D_s (scaled-distance factor)
2.00.....	35
1.60.....	40
1.35.....	45
1.15.....	50
1.00.....	55
0.70.....	70
0.50.....	90

(vi) All surface coal operators choosing not to submit data for the regulatory authority to assign a site-specific ground-vibration limit shall utilize a scaled-distance equation $W=(D/70)^2$ for determining the maximum charge-weight of explosives that can be detonated within any 8-millisecond period without seismic monitoring, or limit all ground vibrations to a maximum peak-particle-velocity of 0.75 inch per second verified in seismographic records.

(vii) At the request of an owner or occupant of a structure in the vicinity of the mine, the regulatory authority shall evaluate data, including blast vibration frequency, type and condition of structure, or updated site information

and may lower the assigned peak-particle-velocity at any time necessary to prevent damage.

Option 2 for § 715.19

2. Section 715.19 is amended by revising paragraphs (e)(2)(ii) through (v) and removing paragraph (e)(2)(vi) to read as follows:

§ 715.19 Use of explosives.

- (e) * * *
- (2) *Blasting standards.*—(i) * * *
- (ii) In all blasting operations, except as otherwise authorized in this § 715.19, the maximum ground vibration shall not exceed the values listed below at the location of any dwelling, school, church, or community or institutional building outside the permit area:

Distance to structure from blast site (feet)	Maximum ground-vibration limit allowable with seismic monitoring (incht/second) ¹
0-300 ²	1.60
301-500.....	1.35
501-1,000.....	1.20
1,001-3,000.....	1.00
3,001-5,000.....	0.90
beyond 5,001.....	0.75

¹ Ground vibration recorded as the peak-particle-velocity. Particle velocity shall be recorded in three mutually perpendicular directions. The peak-particle-velocity shall be the largest of any of the three measurements.
² Subject to owner approval for dwellings; no mining may occur within 300 feet of public buildings.

(iii) The regulatory authority may approve the use of the equation $W=(D^{1.6})/90$ to determine the maximum allowable charge-weight of explosive to be detonated in any 8-millisecond delay period at distances greater than 300 feet. If blasting is conducted using this equation, the operator need not maintain seismographic records. W =the maximum weight of explosives, in pounds, and D =the distance, in feet, from the blast to the nearest dwelling, school, church, or community or institutional building.

(iv) At the request of an owner or occupant of a structure in the vicinity of the mine, the regulatory authority shall evaluate data, including blast vibration frequency, type and condition of structure, or updated site information and may lower the allowable maximum peak particle velocity at any time necessary to prevent change.

(v) The regulatory authority may require seismographic records of any and all blasts and may specify the location at which such measurements are taken.

Option 3 for § 715.19

3. Section 715.19 is amended by revising paragraph (e)(2)(ii) and removing paragraphs (e)(2)(iii) through (vi) to read as follows:

§ 715.19 Use of explosives.

- (e) * * *
- (2) *Blasting standard.* (i) * * *
- (ii) *Ground vibration.* (A) Ground vibration shall not exceed a 1.0-inch-per-second peak-particle-velocity at the location of any dwelling or public building outside the permit area, unless the recorded ground vibration and frequency conform to the alternative blasting level criteria set forth in Figure 1. Peak-particle-velocity shall be recorded in three mutually perpendicular directions. The maximum particle-velocity shall be the largest of any of the three measurements. A seismographic record shall be provided for each blast.

(B) An operator may use the scaled-distance equation $W=(D/55)^2$ to determine the allowable charge-weight of explosives to be detonated in any 8-millisecond period, without seismic monitoring. W =the maximum weight of explosives, in pounds, and D =the distance, in feet, from the blast to the nearest dwelling, school, church, or community or institutional building.

(C) The use of an equation modified from that specified in § 715.19(e)(2)(ii)(B) to determine maximum weight of explosives per delay for blasting operations at a particular site may be approved by the regulatory authority, on receipt of a written request by the operator accompanied by reports including seismographic records of test blasting on the site. The predicted ground vibration would not exceed a peak-particle-velocity of 1.0 inch per second.

(D) At the request of an owner or occupant of a structure in the vicinity of the mine, the regulatory authority shall evaluate data, including blast vibration frequency, type and condition of structure, or updated site information and may lower the allowable maximum peak-particle-velocity at any time necessary to prevent damage.

(E) The regulatory authority may require a seismographic record including blast-vibration-frequency of any or all blasts and may specify the location at which such measurements are taken.

§ 715.19 [Amended]

4. Section 715.19 is amended by removing paragraph (e)(3) and

redesignating paragraph (e)(4) as paragraph (e)(3).

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

5. Part 780 is amended by revising § 780.13 to read as follows:

§ 780.13 Operation plan: Blasting.

(a) *Blasting plan.* Each application shall contain a blasting plan for the proposed permit area, explaining how the applicant intends to comply with the requirements of 30 CFR 816.61 through 816.68. This plan shall include but is not restricted to descriptions of the limitations the operator will meet with regard to ground vibration and air blast and the methods to be applied in controlling the adverse effects of blasting operations.

(b) *Monitoring system.* Each application shall contain a description of the monitoring system to be used to ensure compliance with standards of § 816.67 including the type, capability, and sensitivity of any blast monitoring equipment and proposed procedures and locations of monitoring.

(c) *Blast design.* (1) A specific blast design shall be submitted if blasting operations will be conducted within—

(i) 1,000 feet of any building used as a dwelling, public building, school, or community or institutional building; or

(ii) 500 feet of underground mines; blasting plans within 500 feet of underground mines require approval by the Mine Safety and Health Administration (MSHA).

(2) The blast design above may be presented as part of a permit application or at a time specified by the regulatory authority.

(3) In the blast design the operator shall provide sketches of the specific drill patterns, delay periods, decking, type and amount of explosives to be used, critical dimensions, and the location and general description of structures to be protected, as well as a discussion of design factors to be used, which protect the public and meet the applicable airblast, ground vibration, and flyrock standards found in § 816.67.

(4) The blast design shall be prepared and signed by a certified blaster.

(5) The regulatory authority may require changes to the design submitted, if deemed necessary.

(6) Owners of property identified in paragraphs (c)(1)(i) or (ii) of this section shall be notified 30 days before blasting begins.

PART 816—PERMANENT PROGRAM PERFORMANCE STANDARDS—SURFACE MINING ACTIVITIES

§ 816.11 [Amended]

6. Section 816.11 is amended by removing paragraph (f) and redesignating paragraph (g) as paragraph (f).

7. Section 816.61 is revised to read as follows:

§ 816.61 Use of explosives: General requirements.

(a) Each operator shall comply with all applicable State and Federal laws in the use of explosives.

(b) Blasts that use more than 5 pounds of explosive or blasting agent shall be conducted according to the schedule required by § 816.64.

(c) A blaster certified under a program adopted pursuant to Subchapter M shall be responsible for all blasting operations including the transportation, storage, and use or destruction of explosives within a permit area.

8. Section 816.62 is revised to read as follows:

§ 816.62 Use of explosives: Preblasting survey.

(a) A resident or owner of a dwelling or structure within one-half mile of any part of the permit area may request a preblasting survey. This request shall be in writing and may be made either to the regulatory authority who will promptly notify the operator or directly to the operator. The operator shall promptly conduct a preblasting survey of the dwelling or structure and promptly prepare a written report of the survey. An updated survey of any additions, modifications, or renovations shall be performed by the operator if requested by the resident or owner.

(b) The operator shall determine the condition of the dwelling or structure and document any preblasting damage and other physical factors that could reasonably be affected by the blasting. Assessments of structures such as pipelines, cables, transmission lines, and wells, cisterns, and other water systems shall be limited to surface condition and readily available data. Special attention shall be given to the preblasting condition of wells, cisterns, and other water systems.

(c) The written report of the survey shall be signed by the person who conducted the survey, the original of the report shall be promptly provided to the regulatory authority, and copies shall be provided to the person requesting the survey. If the person requesting the survey disagrees with the contents and/or recommendations contained therein,

he or she may submit to both the permittee and the regulatory authority a detailed description of the specific areas of disagreement.

9. Section 816.64 is revised to read as follows:

§ 816.64 Use of explosives: Blasting schedules.

(a) *General requirements.* (1) The operator shall conduct blasting operations at times approved by the regulatory authority and announced in the blasting schedule. The regulatory authority may limit blasting, either in hours per day, times per day, or number of blasts per day. These limitations shall be based upon written submissions which demonstrate the necessity of the limitation in order to protect the public.

(2) *Unscheduled blasts may be conducted where public or operator safety so requires, or for road construction or other difficult to schedule blasting actions.* When an operator conducts an unscheduled blast incidental to a surface coal mining operation, the operator shall notify all residents within one-half mile of the blast area and document the reason in accordance with § 816.68(p).

(b) *Blasting schedule publication and distribution.* (1) The operator shall publish the blasting schedule in a newspaper of general circulation in the locality of the blasting site, at least 10 days, but not more than 30 days before beginning a blasting program.

(2) The operator shall distribute copies of the schedule to local governments and public utilities and to each local residence within one-half mile of the proposed blasting site described in the schedule. Copies sent to residences shall be accompanied by information advising the owner or resident how to request a preblasting survey.

(3) The operator shall republish and redistribute the schedule at least every 12 months and revise and republish the schedule at least 10 days, but not more than 30 days, prior to blasting when ever the area covered by the schedule changes or actual time periods for blasting significantly differ from the prior announcement.

(c) *Blasting schedule contents.* The blasting schedule shall contain at a minimum—

(1) Name, address, and telephone number of operator;

(2) Identification of the specific areas in which blasting will take place;

(3) Dates and time periods when explosives are to be detonated;

(4) Methods to be used to control access to the blasting area; and

(5) Type and patterns of audible warning and all-clear signals to be used before and after blasting.

§ 816.65 [Removed]

- 10. Section 816.65 is removed.
- 11. Section 816.66 is added as follows:

§ 816.66 Use of explosives: Blasting signs, warnings, and access control.

- (a) The operator shall—
 - (1) Conspicuously display signs reading "Blasting Area" where a public road or right-of-way occurs within 100 feet of a blasting area or at the point where any other road provides access to the blasting area;
 - (2) Place at all entrances to the permit area from public roads or highways conspicuous signs which state "Warning! Explosives In Use," which clearly explain the blast warning and all-clear signals that are in use, and which explain the marketing of blast areas and charge holes within the permit area; and
 - (3) Prepare all signs to meet the requirements of § 816.11.
- (b) 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 in the blasting schedule.
- (c) Access within the blasting area shall be controlled to prevent presence of livestock or unauthorized personnel during blasting and until an authorized representative of the operator has reasonably determined—
 - (1) That no unusual hazards exist, such as imminent slides or undetonated charges; and
 - (2) That access to and travel within the blasting area can be safely resumed.

12. Section 816.67 is revised to read as follows:

§ 816.67 Use of explosives: Control of adverse effects.

- (a) *General requirements.* 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.
- (b) *Airblast.*—(1) *Limits.* (i) Airblast shall not exceed the maximum limits listed below at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area:

Lower frequency limit of measuring system, Hz (±3 dB)	Maximum level in dB
2 Hz or lower—flat response.....	133 peak
6 Hz or lower—flat response.....	130 peak

(ii) The regulatory authority may reduce the maximum allowable airblast standard if necessary for continued compliance with damage prevention.

(iii) The operator shall minimize airblast so that it does not exceed the limits set by the regulatory authority even under adverse atmospheric conditions.

(2) *Monitoring.* (i) The regulatory authority may require airblast measurement of any or all blasts and may specify the location of such measurement.

(ii) In all cases, the measuring systems used must have an upper-end flat frequency response of at least 200 Hz.

(iii) The regulatory authority may approve the use of alternative measuring systems as long as such systems provide an equivalent monitoring level as listed above.

(c) *Flyrock.* Flyrock travelling in the air or along the ground shall not be cast from the blasting site—

- (1) More than half the distance to the nearest dwelling or other occupied structure;
- (2) Beyond the area of control required under § 816.66(c); nor
- (3) Beyond the permit boundary.

Option 1 for § 816.67

13. Section 816.67 is amended by adding paragraph (d) to read as follows:

§ 816.67 Use of explosives: Control of adverse effects.

* * * * *

(d) *Ground Vibration.* (1) In all blasting operations, except as otherwise authorized in this § 816.67, the maximum peak-particle-velocity of ground vibration shall not exceed the value established by the regulatory authority at the location of any dwelling, public building, school, church, or community or institutional building. Peak-particle-velocities shall be recorded in three mutually perpendicular directions. The maximum peak-particle-velocity shall be the largest of any of the three measurements.

(2) The maximum peak-particle-velocity for surface coal mining blasting operations for a specific permit area shall be assigned by the regulatory authority based on an evaluation of the physical site conditions at and surrounding the permit area. Detailed information of the types of structures to be protected, seismic velocity, and other relevant information shall be submitted by the permittee by which to evaluate

the allowable ground-vibration standard as part of the permit application under 30 CFR 780.13. Permittees not requesting assignment of a site-specific peak-particle-velocity may choose to comply with the equation found in paragraph (d)(5) of this section.

(3) The peak-particle-velocity authorized by the regulatory authority for surface blasting operations shall not exceed the following limits for structure type and predominant frequency of the ground vibration due to blasting operations:

Type of structure *	Maximum peak-particle-velocity in inch/second allowable with seismic monitoring at indicated hertz value		
	<10 Hz	10 to 40 Hz	>40Hz
1.....	0.50	0.50	0.50
2.....	0.75	1.0	2.0
3.....	1.0	1.5	2.0
4.....	2.0	2.0	2.0
5 *			

*1. Sensitive or protected structures such as historic buildings, monuments, and residences with construction elements such as plaster interiors and rough stone foundation walls.
 2. Older homes more than 20 years old with construction elements such as plaster-on-lath interiors and deteriorated or rigid, easily fractured construction materials.
 3. Modern homes less than 20 years old with gypsum-board interior, reinforced concrete or concrete-masonry-unit foundations, and other wood-frame and wood-clad structure.
 4. Structures with safety considerations such as water towers, impoundments, tunnels, pipelines, towers, and underground mines.
 5. Buildings or structures designed to resist dynamic loads such as earthquake, wind, traffic, etc.
 * Maximum peak-particle-velocity to be determined by a qualified registered professional engineer.

(4) The regulatory authority may authorize an operator to use the square-root scaled-distance equation $W=(D/D_s)^2$ without seismic monitoring, where W =the weight of explosive, in pounds, which may be detonated in any 8-millisecond period; D =the distance, in feet, from the blast to the nearest dwelling, school, church, or community or institutional building; and D_s =the scaled-distance factor (denominator of equation). The equation shall initially be approved based on the following correlation criteria:

Peak-particle-velocity (inch/second)	D_s (scaled-distance factor)
2.00.....	35
1.60.....	40
1.35.....	45
1.15.....	50
1.00.....	55
0.70.....	70
0.50.....	90

(5) All surface coal operators choosing not to submit data for the regulatory authority to assign a site-specific ground-vibration limit shall utilize a scaled-distance equation $W=(D/70)^2$ for determining the maximum charge-weight of explosives that can be detonated within any 8-millisecond period without seismic monitoring, or

limit all ground vibrations to a maximum peak-particle-velocity of 0.75 inch per second verified in seismographic records.

(6) At the request of an owner or occupant of a structure in the vicinity of the mine, the regulatory authority shall evaluate data, including blast vibration frequency, type and condition of structure, or updated site information and may lower the assigned peak-particle-velocity at any time necessary to prevent damage.

Option 2 for § 816.67

14. Section 816.67 is amended by adding paragraph (d) to read as follows:

§ 816.67 Use of explosives: Control of adverse effects.

(d) *Ground vibration.* (1) In all blasting operations, except as otherwise authorized in this section, the maximum ground vibration shall not exceed the values listed below at the location of any dwelling, school, church, or community or institutional building outside the permit area:

Distance to structure from blast site (feet)	Maximum ground-vibration limit allowable with seismic monitoring (inch/second) ¹
0-300 *	1.60
301-500.....	1.35
501-1,000.....	1.20
1,001-3,000.....	1.00
3,001-5,000.....	0.90
beyond 5,001.....	0.75

¹ Ground vibration recorded as the peak-particle-velocity. Particle velocity shall be recorded in three mutually perpendicular directions. The peak-particle-velocity shall be the largest of any of the three measurements.
² Subject to owner approval for dwellings; no mining may occur within 300 feet of public buildings.

(2) The regulatory authority may approve the use of the equation $W=(D^{1.5})/90$ to determine the maximum allowable charge-weight of explosive to be detonated in any 8-millisecond delay period at distances greater than 300 feet. If blasting is conducted using this equation, the operator need not maintain seismographic records. W = the maximum weight of explosives, in pounds, and D = the distance, in feet, from the blast to the nearest dwelling, school, church, or community or institutional building.

(3) At the request of an owner or occupant of a structure in the vicinity of the mine, the regulatory authority shall evaluate data, including blast vibration frequency, type and condition of structure, or updated site information and may lower the allowable maximum peak-particle-velocity at any time necessary to prevent damage.

(4) The regulatory authority may require seismographic records of any and all blasts and may specify the

location at which such measurements are taken.

Option 3 for § 816.67

15. Section 816.67 is amended by adding paragraphs (d) and (e) to read as follows:

§ 816.67 Use of explosives: Control of adverse effects.

(d) *Ground vibration.* (1) Ground vibration shall not exceed a 1.0-inch-per-second peak-particle-velocity at the location of any dwelling or public building outside the permit area, unless the recorded ground vibration and frequency conform to the alternative blasting level criteria set forth in Figure 1. Peak-particle-velocity shall be recorded in three mutually perpendicular directions. The maximum particle-velocity shall be the largest of any of the three measurements. A seismographic record shall be provided for each blast.

(2)(i) An operator may use the scaled-distance equation $W=(D/55)^2$ to determine the allowable charge-weight of explosives to be detonated in any 8-millisecond period, without seismic monitoring. W = the maximum weight of explosives, in pounds, and D = the distance, in feet, from the blast to the nearest dwelling, school, church, or community or institutional building.

(ii) The use of an equation modified from that specified in § 816.67(d)(2)(i) to determine maximum weight of explosives per delay for blasting operations at a particular site may be approved by the regulatory authority, on receipt of a written request by the operator accompanied by reports including seismographic records of test blasting on the site. The predicted ground vibration would not exceed a peak-particle-velocity of 1.0 inch per second.

(3) At the request of an owner or occupant of a structure in the vicinity of the mine, the regulatory authority shall evaluate data, including blast vibration frequency, type and condition of structure, or updated site information and may lower the allowable maximum peak-particle-velocity at any time necessary to prevent damage.

(4) The regulatory authority may require a seismographic record, including blast-vibration-frequency of any or all blasts and may specify the location at which such measurements are taken.

(e) If blasting is conducted in accordance with § 816.67(a), the maximum ground vibration and/or airblast standard shall not apply at the following locations:

(1) At structures owned by the person conducting the mining activity and not leased to another party; and

(2) At structures owned by the person conducting the mining activity and leased to another party, if a written waiver by the lessee is submitted to the regulatory authority prior to blasting.

16. Section 816.68 is revised to read as follows:

§ 816.68 Use of explosives: Records of blasting operations.

The operator shall retain a record of all blasts for at least 3 years. Copies of these records shall be made available upon request to the regulatory authority and to the public for inspection; such records shall contain the following data:

(a) Name of the operator conducting the blast.

(b) Location, date, and time of the blast.

(c) Name, signature, and license number of the blaster conducting the blast.

(d) Identification, direction, and distance in feet to the nearest dwelling, school, church, or community or institutional building outside the permit area, except those cited under 30 CFR 816.67(e).

(e) Weather conditions.

(f) Type of material blasted.

(g) Sketches of the blast pattern including number of holes, burden, spacing, decks, and delay pattern.

(h) Diameter and depth of holes.

(i) Types of explosives used.

(j) Total weight of explosives used per hole.

(k) The maximum weight of explosives detonated in an 8-millisecond period.

(l) Initiation system.

(m) Type and length of stemming.

(n) Mats or other protections used.

(o) Seismographic and airblast records, if required, which shall include—

(1) Type of instrument, sensitivity, and calibration signal;

(2) Exact location of instrument and the date, time, and distance from the blast;

(3) Name of the person and/or firm taking the reading;

(4) Name of the person and firm analyzing the seismographic record; and

(5) The vibration and/or airblast level recorded.

(p) Reasons and conditions for each unscheduled blast and a list of persons within one-half mile of the blast area who were orally notified of the unscheduled blast.