

federal register

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March 24, 1982

— Ground Vibrations

ANTICIPATED BLAST DESIGNS

— Blast Plans

Part V

Department of the Interior

Office of Surface Mining Reclamation and
Enforcement

Permanent Regulatory Program; Use of
Explosives and Training, Examination,
and Certification of Blasters; Proposed
Regulations

DEPARTMENT OF THE INTERIOR**Office of Surface Mining Reclamation and Enforcement**

30 CFR Parts 715, 780, 816, and 817

Surface Coal Mining and Reclamation Operations; Permanent Regulatory Program; Use of Explosives**AGENCY:** Office of Surface Mining Reclamation and Enforcement, Interior.**ACTION:** Proposed rule.

SUMMARY: The Office of Surface Mining Reclamation and Enforcement (OSM) proposes to amend existing rules in 30 CFR Chapter VII relating to the use of explosives. The proposed rule would revise the requirements relating to blasting schedules, preblasting surveys, airblast monitoring requirements, and ground vibration.

New rules are proposed governing portions of the permanent program rules remanded by the U.S. District Court for the District of Columbia, and for portions of the initial program rules remanded by the Court of Appeals for the District of Columbia Circuit.

DATES:

Written comments: Accepted until 5 p.m. (eastern time) on April 23, 1982.

Public Hearings: Held on request only, on April 16, 1982, at 9:00 a.m. (local).

Public meeting: Scheduled on request only.

ADDRESSES:

Written comments: Hand-deliver to the Office of Surface Mining, U.S. Department of the Interior, Administrative Record (TSR 14.06), Room 5315, 1100 L Street, NW., Washington, D.C.; or mail to the Office of Surface Mining, U.S. Department of the Interior, Administrative Record (TSR 14.06), Room 5315L, 1951 Constitution Avenue, NW., Washington, DC 20240.

Public hearings: Washington, D.C.—Department of the Interior Auditorium, 18th and C Streets, NW.; Pittsburgh, Pa.—William S. Moorehead Federal Building, Room 2212, 1000 Liberty Avenue; and Denver, Colo.—Brooks Tower, 2d Floor Conference Room, 1020 15th Street.

Public meetings: OSM offices in Washington, D.C.; Charleston, W. Va.; Knoxville, Tenn.; Indianapolis, Ind.; Pittsburgh, Pa.; and Denver, Colo.

FOR FURTHER INFORMATION CONTACT:

Public hearings and information: Jerry R. Ennis, Office of Surface Mining, U.S. Department of the Interior, 1951 Constitution Avenue, NW., Washington, DC 20240; (202) 343-7887.

Public meetings: Jose del Rio, 202-343-4022.

SUPPLEMENTARY INFORMATION:

- I. Public Commenting Procedures.
- II. Background.
- III. Discussion of Proposed Rules.
- IV. Procedural Matters.

I. Public Commenting Procedures*Written Comments*

Written comments should be specific, pertain only to the issues proposed in this rulemaking, and include explanations in support of the commenter's recommendations. Commenters are requested to submit five copies of their comments (see "Addresses"). Comments received after the time indicated under "Dates" or at locations other than Washington, D.C., will not necessarily be considered or be included in the Administrative Record for the final rulemaking.

Public Hearings

Persons wishing to comment at the public hearings should contact the person listed under "For Further Information Contact" by the close of business three working days before the date of the hearing. If no one requests to comment at a public hearing at a particular location by that date, the hearing will not be held. If only one person requests to comment, a public meeting, rather than a public hearing, may be held and the results of the meeting included in the Administrative Record.

Filing of a written statement at the time of the hearing is requested and will greatly assist the transcriber. Submission of written statements in advance of the hearing will allow OSM officials to prepare appropriate questions.

Public hearings will continue on the specified date until all persons scheduled to comment have been heard. Persons in the audience who have not been scheduled to comment and wish to do so will be heard following those scheduled. The hearing will end after all persons scheduled to comment, and persons present in the audience who wish to comment, have been heard.

Public Meetings

Persons wishing to meet with OSM representatives to discuss these proposed rules may request a meeting at any of the OSM offices listed in "Addresses" by contacting the person listed under "For Further Information Contact."

All such meetings are open to the public and, if possible, notices of meetings will be posted in advance in

the Administrative Record room (1100 L St.). A written summary of each public meeting will be made a part of the Administrative Record.

II. Background

The Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. 1201 *et seq.* (the Act), sets forth initial regulatory procedures, permit requirements, and environmental performance standards in Sections 502(c), 507(g), and 515(b)(15), respectively, governing the use of explosives in surface coal mining operations. Section 516 provides performance standards governing the surface effects of underground mining. Rules implementing those sections were published by OSM at 42 FR 62639 (December 13, 1977) under the initial regulatory program (30 CFR 715.19) and at 44 FR 14901 (March 13, 1979) under the permanent regulatory program (30 CFR 780.13, 816.61-816.68, and 817.61-817.68).

In litigation over the initial program rules, the U.S. Court of Appeals for the District of Columbia issued a decision on May 2, 1980. *In re: Surface Mining Regulation Litigation*, 627 F.2d 1346 (D.C. Cir. 1980). That decision addressed two blasting issues: (1) The 1,000-foot limitation on blasting near houses, schools, and other buildings in § 715.19(e)(1)(vii), and (2) the 1.0-inch-per-second limitation on particle velocity produced by blasting in § 715.19(e)(2)(ii). The 1,000-foot limit was found to be an invalid interpretation of § 522(e) (4) and (5) of the Act and the 1.0-inch-per-second vibration limit was ruled as arbitrary and capricious because it lacked technical support.

On May 16, 1980, in litigation over the permanent program rules, the U.S. District Court for the District of Columbia remanded the 1,000-foot limitation on blasting in § 816.65(f). *In re: Permanent Surface Mining Regulation Litigation*, No. 79-1144, (D. D.C. May 16, 1980). The court did not invalidate the 1.0-inch-per-second vibration limit, but at note 19 in its opinion the court recognized that the court of appeals had invalidated a similar provision in § 715.19(e)(2)(ii) in the initial program rules. To implement the court's decision, §§ 816.65(f) and 817.65(f) were suspended by notice at 45 FR 51549 (August 4, 1980).

In response to these decisions, blasting rules were reviewed by OSM and amendments proposed at 46 FR 6982 (January 22, 1981).

On January 28, 1981, the Secretary of the Department of the Interior ordered

→ read instructions

that all regulations which were excessive, burdensome, or counterproductive be identified and asked States and industry to recommend sections to be revised. OSM, in compliance with the administrative mandate to simplify and remove excessive regulatory burdens, withdrew the rules proposed at 46 FR 6982 (January 22, 1981) by notice at 46 FR 32455 (June 23, 1981) in order to allow OSM to undertake a more general review of all the blasting rules under the permanent regulatory program.

OSM today is reproposing certain rules governing the use of explosives under the initial and permanent regulatory programs. Rules governing the use of explosives in surface coal mines are found in 30 CFR Chapter VII at §§ 715.19, 780.13, 816.11, 816.61-816.68, 817.11, and 817.61-817.68. These sections are proposed to be amended by reorganizing several sections and by removing any performance standards believed to be more appropriately left to the discretion of the regulatory authority. Existing § 816.65, containing most of the performance standards, would be modified and those standards would be placed in other sections as follows: (1) Restrictions on timing of blasts would be placed under blasting schedules in § 816.64; (2) access control and warnings would be placed under proposed § 816.66; (3) specific limits regarding prevention of adverse impacts of blasting would be placed under revised § 816.67; and (4) § 816.65(f) would be revised and is proposed as § 780.13. Proposed §§ 816.61, 816.62, and 816.68 would remain similar to the existing rule, except as discussed below.

This present rulemaking proposes changes to the initial regulatory program requirements with regard to the use of explosives (§ 715.19), to the permanent regulatory program requirements for permitting with regard to blasting plans (§ 780.13), for performance standards with regard to the use of explosives for surface mining activities (§§ 816.61-816.68), and for performance standards with regard to the use of explosives for underground mining activities (§§ 817.61-817.68).

III. Discussion of Proposed Rules

The rules, as proposed, would place increased responsibility on the operator to protect the public from injury and public and private property from damage due to the potential adverse effects of blasting operations. Explosives manufacturers, users, universities, and governmental agencies have conducted tests and research in predicting the effects of blasting and are learning new and improved methods to

control blasting energy. OSM expects that the regulatory authority will use technical reference publications and research findings, such as those produced by the Bureau of Mines, in the development of design criteria for use in blasting operations.

These proposed rules would place increased responsibility on design professionals, such as certified blasters and blast vibration experts, in establishing the design standards to meet the regulatory performance goals contained herein. Failure to meet performance criteria would necessitate regulatory authority intervention in specifying more stringent standards and a closer inspection or monitoring program. Those operators staying below the approved limits, complying with approved performance standards, and maintaining a responsible relationship with surrounding residents would be able to operate without additional constraint.

In promulgating the prior permanent program rules governing blasting, OSM analyzed the technical references which were available through the fall of 1978. Those materials formed the basis for a peak-particle-velocity standard of 1.0 inch per second and other permanent program performance standard rules for use of explosives and are listed at 44 FR 15179. OSM also relied upon those references in this rulemaking and recommends that interested parties consider those references as well as the following additional and more recent technical documents considered by OSM in the development of these revised rules:

- Bollinger, G.A., 1971, Blast vibration analysis: Southern Illinois University Press, Carbondale and Edwardsville, 132 pp.
- Hemphill, Gary B., 1981, Blasting operations: McGraw-Hill Book Co., New York City, 258 pp.
- Medearis, Kenneth, 1978, The development of rational damage criteria for low-rise structures subjected to blasting vibrations: National Crushed Stone Association, Washington, D.C., 94 pp.
- Roth, Julius, Britton, K.C., Campbell, R.W., Ketler, W.R., 1977, Evaluation of surface mining blasting procedures: Prepared by Management Science Associates for U.S. Bureau of Mines under contract J0366017, 152 pp.
- Siskind, D.E., Stachura, V.J., Stagg, M.S., and Kopp, J.W., 1980, Structure response and damage produced by airblast from surface mining: U.S. Bureau of Mines Report of Investigations RI8485, 111 pp.
- Siskind, D.E., Stagg, M.S., and Stachura, V.J., 1979, Safe ground vibration and airblast criteria: 51st Annual Meeting, Eastern Section Seismological Society of America, October 1979, Blacksburg, Va.
- Siskind, D.E., Stagg, M.S., Kopp, J.W., Dowding, C.H., 1980, Structure response and

damage produced by ground vibration from surface mine blasting: U.S. Bureau of Mines Report of Investigations RI8507, 74 pp.

Stacura, V.J., Siskind, D.E., and Engler, A.J., 1981, Airblast instrumentation and measurement techniques for surface mine blasting: U.S. Bureau of Mines Report of Investigations RI8508, 53 pp.

Stagg, M.S., and Engler, A.J., 1980, Measurement of blast-induced ground vibration and seismograph calibration: U.S. Bureau of Mines Report of Investigations RI8506, 62 pp.

Swedish Detonic Research Foundation, 1978, Annual Report 1978: 14 pp.

U.S. Bureau of Mines, 1971, Blasting vibrations and their effects on structures: Bulletin 656, 105 pp.

Responses to Comments on Proposed Rule Revision Published at 46 FR 6982, (January 22, 1981)

Several comments were received admonishing OSM for cancelling the public hearings on blasting rules published January 22, 1981. The proposed rulemaking herein revises those proposed rules, and public hearings will be held as listed in this Federal Register notice. There is no intent by OSM to publish these rules without an opportunity for public comment.

Several comments cited the proposed rules as a "cook-book" approach containing excessive design constraints. OSM accepts these comments and through this proposal hopes to reduce or eliminate reliance on "cook-book" rules.

Currently Proposed Rules for 30 CFR Parts 715, 780, 816 and 817

Section 715.19 Use of explosives (Amendments 1 through 4)

Amendments 1 through 3 present three options for amending § 715.19(e)(2) of the initial program governing ground vibration limits. The contents and discussion of this section are the same as those addressed later in this preamble under § 816.67(d), which is the corresponding section of the permanent program rules, and are therefore not repeated here. Amendment 4 would remove Section 719(e)(3), the requirements of which would be incorporated into Paragraph (e)(2) by Amendments 1, 2, or 3. Paragraph (e)(4) would be redesignated as Paragraph (e)(3).

Section 780.13 Operation plan: Blasting (Amendment 5)

Blasting plans outline procedures the applicant intends to follow in conducting blasting operations. Existing § 780.13 requires each application to have a blasting plan, sets standards for blasting plans, and details the

information to be submitted along with the permit application.

OSM recognizes that if the blast design is not implemented properly, any planned safety precaution cannot be assured. However, the mere existence of a certified blast design, rather than a verbal or "back-of-an-envelope" pattern or sketch, will help assure proper implementation. Also, if the individual certifying the blast design is the responsible blaster, he or she will understand the reasons for the design and direct his or her crew appropriately.

OSM proposed to reduce the amount of information required in the blasting plan. The existing rules require detail beyond that necessary to insure compliance with the Act.

OSM proposed to eliminate from § 780.13 the requirement to estimate the type and approximate amount of explosives to be used for each type of blasting operation. OSM believes that this degree of detail during the permitting process is unnecessary to assure compliance with the performance standards in Parts 816 and 817 of the rules.

Proposed § 780.13(a) requires the operator to demonstrate in the blasting plan that the operator has the capacity and intent to achieve the applicable performance standards. In the blasting plan the operator would review what means he intends to apply to achieve the performance set out in § 816.61-816.68. The plan would include information setting out the applicable limits and justifying the use of these limits. The plan would also discuss steps to be taken to control the adverse effects of blasting operations.

Existing § 780.13(b), with regard to recordkeeping, is proposed for deletion, since the recordkeeping requirements of 30 CFR 816.68 are adequate to assure compliance with its requirements. Should recordkeeping be inadequate, a notice of violation could be issued for noncompliance with the requirements of § 816.68.

Existing § 780.13(c) is proposed for deletion. The requirements for information with regard to blasting warning and site access would be contained in proposed paragraph (a), providing information on meeting standards of §§ 816.61 through 816.68.

Existing § 780.13(d) would be rewritten and renumbered as § 780.13(b). It would provide that each application must contain a description of the blasting monitoring system to be used to ensure compliance with the standards of 30 CFR 816.61-816.68, including the type, capability, and sensitivity of any blast monitoring

equipment, and proposed procedures and locations of monitoring.

Existing § 780.13(e) is proposed for deletion. Under proposed §§ 816.62 and 817.62, each preblast survey must be submitted to the regulatory authority. OSM does not believe that it is necessary to provide further information with regard to surveys within the permit application.

Existing § 780.13(f) is proposed for deletion. Hazardous situations cannot be anticipated in the permit application. Often they are caused by weather or other unforeseeable factors. OSM believes that certified blasters will be aware of such situations and proceed with due caution.

A new § 780.13(c) is proposed which would require additional information when blasting would be conducted within 1,000 feet of any building used as a dwelling, public building, school, or community or institutional building or within 500 feet of an underground mine. Distance limits which prohibited blasting within 1,000 feet or 500 feet in the existing permanent program performance standards under §§ 816.65(f) and 817.65(f) and in the initial program rules under § 715.19(e)(1)(vii) were remanded by court action. *In re: Surface Mining Regulation Litigation*, 627 F. 2d 1346 (D.C. Cir. 1980) and *In re: Permanent Surface Mining Regulation Litigation No. 79-1144 (D.D.C. May 16, 1980)*. Proposed § 780.13(c) would not prohibit mining within 1,000 feet of residences and certain other public buildings, nor within 500 feet of underground mines. However, OSM seeks additional information in these sensitive areas. Therefore, proposed § 780.13(c)(3) requires that the operator submit information outlining specific precautions and criteria to be implemented to protect persons and property when blasting within 1,000 feet of certain buildings and 500 feet of underground mines, including sketches of drill patterns, delay periods, decking, type and amount of explosives to be used, critical dimensions, and location and general description of structures to be protected. Thus, where the damage potential is highest, the regulatory authority will have the greatest information to insure adequate protection.

The 1,000-foot and 500-foot criteria are proposed so that the operator is alerted that special precautions are necessary to prevent property damage and personal injury when conducting blasting operations within these distances. Existing § 816.65(f) includes provisions for pipelines, utilities, and other facilities. Because public or

worker safety is not a problem in these specific areas and these facilities are not generally endangered from airblast or ground vibration, no specific provision would be included.

The blast design required when blasting within the 1,000-foot or 500-foot limits would serve three purposes: (1) Provides a record of the blast design (not required of blasts outside these limits), (2) provides notification to the regulatory authority so that monitoring may be scheduled, and (3) requires a certified blaster to sign the design confirming its preparation by a certified blaster. The requirement that a certified blaster prepare the design would impose on the blaster the responsibility for carrying out the blast as designed. It also would assure that a competent professional has designed the blast. Paragraph (c)(5) would insure that the regulatory authority will have the right to amend designs to improve the land of safety, if necessary.

Proposed § 780.13(c)(6) also would provide for notification to owners of structures close to blast sites 30 days before blasting will occur.

Section 816.11 Signs and markers (Amendment 6)

Existing § 816.11(f) is proposed for removal because the requirements of § 816.11(f) (1) and (3) would be included in proposed §§ 816.66 and 817.66 as described below. Section 816.11(f)(2) is proposed for removal because it is duplicative of Mine Safety and Health Administration (MSHA) rule 30 CFR 77.1303(g).

Section 816.61 Use of explosives: General requirements (Amendment 7)

Existing § 816.61(a) is proposed to be revised so that the first sentence reads "operator" rather than "person who conducts surface mining activities." This revision simplifies the language and applies throughout the blasting rules.

Existing § 816.61(b) would be retained in the proposed rule. This paragraph requires a schedule for blasts that use more than 5 pounds of explosives. The requirements of the schedule are set out in § 816.64, discussed below.

Existing § 816.61(c) would be retained in the proposed rule and provides that a blaster certified under a program adopted pursuant to Subchapter M must be responsible for all blasting operations, including the transportation, storage, use, or destruction of explosives. Thus, only qualified professionals would prepare blast designs.

**Section 816.62 Use of explosives:
Preblasting survey (Amendment 8)**

Section 816.62(a) of the existing rules requires the owner or resident of a manmade structure within one-half mile of the permit area to request a preblasting survey only from the regulatory authority. The regulatory authority then requests the person who conducts surface coal mine operations to conduct the survey. OSM believes that in most cases it would be more effective to have the resident or owner contact the operator directly. Accordingly, the proposed rules would allow the resident or owner to either submit their request to the operator or to the regulatory authority. An operator would be required to conduct the survey promptly and to promptly prepare the report. Updated surveys could be requested by the owner or resident at anytime. The requirement in existing § 816.62(a) that copies of the written report of the survey be provided to the regulatory authority and to the person requesting the survey would be moved to proposed § 816.62(c).

One commenter on the January 22, 1981, proposed rule suggested that no blasting in new permit areas should occur until all requested preblasting surveys within one-half mile of the permit area are completed to the satisfaction of the regulatory authority. The commenter cited examples of citizens who had asked for preblasting surveys and did not receive them, but the blasting continued. Because surveys may be requested at any time, it is OSM's view that it is inappropriate to require that they be completed prior to permit issuance, or even the initiation of blasting. The requirement that they be completed promptly is intended to insure that those requests received prior to permitting be completed prior to blasting and that, in any case, surveys be conducted as quickly as practicable after the date of the request.

Another commenter on the January 22, 1981, proposed rules questioned limiting the preblasting survey to structures within one-half mile of the permit area since ground vibrations from blasting may extend beyond the one-half mile limit. Under Section 515(b)(15) of the Act preblasting surveys are only required to be offered within one-half mile of the permit area. OSM believes that the proposed standards, if applied properly, will protect all structures affected by blast vibration including those beyond one-half mile.

The same commenter stated that the cost of the structural inspection should always be borne by the operators. The Act requires that the applicant or

permittee shall conduct the survey. No basis is provided for requiring the costs to be borne by the property owners. OSM agrees with this comment and believes that the costs of preblasting surveys should be required to be provided by the operator.

Two comments stressed the need to publish guidelines as a basis for content of preblasting surveys. The commenters were displeased with the inconsistency among preblasting surveys. OSM acknowledges these comments and hopes to provide additional guidance at some future time on methods of conducting preblasting surveys and typical procedures, formats, and specific items that should generally be given special attention.

Existing § 816.62(b) sets the requirements for the contents of the preblasting survey. Among other information the preblasting survey must give special attention to "the preblasting condition of wells and other water systems used for human, animal, or agricultural purposes and to the quantity and quality of the water." Several States have questioned the application of existing § 816.62(b) and whether water quality and quantity samples were required for each water system under the preblasting survey.

Proposed § 816.62(b) sets out requirements similar to the existing section except that the detail required with regard to water quality would be reduced. Under the proposed rules, preblast surveys would address the condition of the structure and document any preblast damage or structural defects. Assessments of structures such as pipelines, cables, transmission lines, and wells, cisterns, and other water systems would be required, but such assessments need not include extensive analysis. Extensive analysis need not be required on every survey. Rather, the person conducting the survey should give attention to such water systems and should document all available data and determine whether such additional analysis is appropriate, based upon the significance of the water system, its vulnerability, and the availability of data.

Some commenters on the January 22, 1981, proposed rules suggested that preblast surveys should not include merely superficial visual observation, but should also include a detailed study of the capabilities of the structure to experience and resist stress and strain. In addition, it was suggested that the regulatory authority needs more definitive structural information to allow for a determination of whether the blasting plan would prevent damage

given various structural parameters. One group offered the comment that, if the January 22, 1981, approach were adopted, every home within one-half mile of the permit area would qualify for a new blasting survey because the present surveys did not include sufficient information about structural condition to determine the maximum safe particle-velocity or scale-distance factor. OSM believes that the survey should provide a basic description of preblasting damage and any physical factors anticipated to be particularly sensitive to blasting. Analysis of structural capabilities may be carried out as part of the preblasting survey, but it is not specifically required.

Normal settlement and aging of a structure may create stresses which cause threshold damage during the lifetime of a structure. Ground-water level variations, seasonal temperature changes, strong winds, noise, and slamming doors create dynamic forces in a structure which can cause cracks or other damage. Some experts believe that many natural stresses, such as settlement stresses, may be misattributed to blasting.

Experts agree that blast vibration may enhance normal settlement, but as Siskind and others (1980; RI8507) indicate, repetition and fatigue effects are not well known and require further study. OSM acknowledges the difficulty in differentiating between normal stress damage and blast-introduced damage.

With the preblasting survey available, a homeowner can, at a minimum, determine when damage occurred. Damage can, therefore, be attributed to either before or after blasting. If damage does occur after a blast, the owner should notify the regulatory authority immediately. At this time, records can be evaluated, and action between the operator and owner initiated to repair any damage determined to have been caused by blasting.

Existing § 816.62(c) requires that the preblasting survey be signed by the person who conducts the survey. It provides that the survey may contain recommendations for blasting procedures or special conditions to the blasting plan. When completed, copies of the survey are to be sent to the regulatory authority and the person requesting the survey. A mechanism for resolving disagreements with the results of the survey is provided.

Proposed § 816.62(e) would require the person completing the survey to sign it and to provide the original of the report to the regulatory authority and a copy to the person requesting it. It also allows the person who requested the survey to

disagree with its contents by submitting a written, detailed description of the disagreement.

In a preproposed draft circulated to interested parties, OSM had proposed to delete the mechanism for resolving disagreements with the preblasting survey. OSM received comments which opposed this deletion. OSM agrees with this comment and herein proposes to retain the last sentence of paragraph (c) of the existing rule with regard to mechanisms resolving disputes.

~~OSM proposes to delete the discussion in § 816.62(c) with regard to recommendations.~~ OSM believes that this provision is unnecessary. This rule is intended to address the minimum requirements; additional information may, of course, be included. The survey may include recommendations, or other information the person preparing the survey believes appropriate.

Section 816.64 Use of explosives: Public notice of blasting schedule (Amendment 9)

The title of this existing § 816.64 would be shortened to "Use of explosives: Blasting schedules" in proposed § 816.64.

Existing § 816.64(a)(1) requires each person who conducts surface coal mining activities to publish a blasting schedule 10-20 days before blasting. These requirements would be moved to proposed § 816.64(b)(1) and are discussed below.

Existing § 816.65(a) restricts the hours of blasting to daylight hours except if a safety hazard would result. When such a hazard would result, oral notices would be provided to local residents, and a complete written report would be filed with the regulatory authority. It further allows the regulatory authority to restrict blasting to more limited time periods based on public requests or other relevant information to prevent adverse noise.

Such restrictions are not necessarily applicable in all areas. In isolated areas, for example, there may be no reason to limit blasting to daylight hours. And in other areas it may be more appropriate to limit blasting to only a few hours per day.

Proposed § 816.64(a)(1) would allow blasting only at times approved by the regulatory authority and announced in the blasting schedule. No daylight restriction would be automatically applicable. The proposed rule would allow the regulatory authority to restrict scheduled blasts to specific times. The regulatory authority's decision restricting blasts must be justified on the basis of public health and safety,

including the prevention of excessive noise.

In some instances, such as unusual weather conditions or unavoidable delays, public or operator safety may dictate unscheduled detonations. Obviously, where public or operator safety so requires, unscheduled blasting is appropriate. The proposed rule at § 816.64(b)(2) would allow such unscheduled blasts.

The proposed rule would also allow unscheduled blasts in nonemergency situations. Certain blasting activities incidental to surface coal mining, such as blasting for road construction or faceup areas and unanticipated delays due to weather or equipment failure, would be allowed on a nonperiodic basis. These blasts are difficult to schedule in advance and are more appropriately conducted on an unscheduled basis. Existing regulations with regard to unscheduled blasts are contained in § 816.64(c), which OSM proposes to remove. Proposed § 816.64(a)(2) would establish the requirements for unscheduled blasts to the verbal notification of affected residents and to the documentation of conditions, reasons for the unscheduled blast, and names of persons notified as required by § 816.68(p). All blasts must meet the environmental performance standards of § 816.67, discussed below.

The proposed paragraph (b)(1) would require publication of the blasting schedule from 10 to 30 days before blasting is to begin. The existing rule in § 816.64(a) requires publication to occur no more than 20 days before blasting. This longer time frame would allow operators more flexibility and could provide for more effective and earlier notification to local residents of the availability of preblasting surveys.

Proposed paragraphs (b)(2) and (b)(3) contain information on initial schedule distribution, republishing, and availability of preblasting surveys found at existing § 816.64(a)(2) and (3). The distribution and republication requirements of the proposed rule would be essentially the same as those of the existing rule, in which the blasting schedule must be distributed to local governments, public utilities, and each residence within one-half mile of the permit area (excluding haul or access roads, preparation and loading facilities, and transportation facilities between coal excavation areas and preparation or loading facilities where blasting is not conducted). Under both the existing and the proposed rule, when the blasting schedule is distributed to residences, it must be accompanied by information explaining how to request a preblasting survey.

Proposed paragraph (b)(3) would require republication of the schedule every 12 months, whenever the area covered by the schedule changes, 10-30 days before the new schedule takes effect, or when actual blasting times will differ from those previously announced.

Existing § 816.64(b), relating to the contents of the blasting schedule, would be amended and renumbered as proposed § 816.64(c). One commenter on the preproposed draft circulated to interested parties suggested that a requirement for name, address, and telephone number of operator be added. This would allow individuals to contact the operator directly with questions about the blasting schedule and inform the operator of any blasting concerns. OSM has incorporated this provision in proposed § 816.64(c)(1).

Existing § 816.64(b)(1) requires specificity in the blasting schedule, and requires a description "as accurately as possible" of the location and time of the blast. This paragraph would be deleted from the blasting schedule contents of the proposed rule.

Proposed § 816.64(c)(2) and (3) would require the identification of specific areas where blasting will occur and the dates and times when blasting will occur. An operator would be required to provide sufficient specificity that the recipients of the blasting schedule will be able to determine when and where blasts will run, and be aware of potential hazards. Residents would not, in most cases, be advised of the exact time and point where every charge will be detonated.

The provisions of existing paragraph (b)(2)(i) limiting the area covered in the blasting schedule to 300 acres would be deleted. OSM believes that in fulfilling Section 515(b)(15) of the Act the blasting schedule limitations should be defined by the regulatory authority. The regulatory authority may choose to limit blasting to a specific area if appropriate, based upon the site-specific conditions and typical blasting operations within that State.

The 4-hour time limit in existing § 816.64(b)(2)(ii) is not necessarily related to the prevention of damage from blasting, but rather related to local public convenience. As set out in proposed § 816.64(a)(1), time limits on blasting operations would be specified by the regulatory authority if appropriate for the locale. In many cases, limitations on blasting times are contained in existing State blasting laws.

Proposed § 816.64(c)(4) and (5) would require the blasting schedule to contain exploration of the methods to be used to

control access to blasting areas and the meaning of audible warning and all-clear signals to be used. These requirements are currently contained in § 816.64 (b)(2)(iii) and (iv).

Section 81665 (Deletion) (Amendment 10)

Existing § 816.65 would be removed, and its requirements would be incorporated in other sections as discussed below.

The requirements contained in existing § 816.65(a) and (b) are proposed in amended form at § 816.64. Proposed § 816.64 is discussed above.

The requirements contained in existing § 816.65(c) are proposed as § 816.66(b). The periodic notification of meanings of warning and all-clear signals which is currently required would be deleted. OSM believes that these notifications would be adequately provided through blasting signs and the blasting schedule.

Existing § 816.65(d) with regard to access to the permit area would be rewritten and renumbered as § 816.66(c), discussed below.

Existing § 816.65(e), governing airblast, would be proposed as new § 816.67(b). See discussion below of § 816.67.

Existing § 816.65(f) sets specific requirements applicable to blasting within 1,000 feet of inhabited areas. Blasting within 1,000 feet of inhabited areas would be in the safety zone discussed in conjunction with § 780.13 above.

Existing § 816.65(g) with regard to flyrock would be governed by proposed § 816.67(c). Changes are discussed below.

Existing § 816.65(h) with regard to the safe conduct of blasting operations is proposed as the lead-in language of § 816.67(a), discussed below.

Existing § 816.65(i) with regard to ground vibration is proposed as part of § 816.67(d).

Existing § 816.65(j), identifying the circumstances where less stringent performance standards may apply, would be incorporated into proposed § 816.67(e).

Existing § 816.65(k) and (l), presenting scale-distance formulas, would be contained in proposed as § 816.67(d), discussed below.

Proposed new § 816.66 Use of explosives: Signs, warnings, and access control (Amendment 11)

Proposed new § 816.66 would contain provisions for blasting signs and warning procedures throughout the permit area. These requirements currently are found in existing

§ 816.11(f)(1) and (3), and 816.65(c) and (d), but OSM believes it is more advantageous if listed as part of the blasting rules for continuity. Proposed § 816.66 also contains the physical access and control requirements to fulfill the notification provisions of Section 515(b)(15)(A) and the public protection provisions of 515(b)(15)(C) of the Act.

Proposed § 816.16(a) would require conspicuous signs reading "Blasting Area" where the right of way of any public road comes within 100 feet of a blasting area, or any other road provides access to the area. Existing § 816.11(f)(1) contains the same requirements, but requires the signs only when a road comes within 50 feet of a blasting area within the permit area. OSM believes that the proposed provision is equally protective. Notice along any road that provides access to a blasting area will ensure that anyone entering the blasting area is aware that blasting is taking place.

Signs reading "Warning! Explosives in Use" and which clearly explain the blast warning and all-clear signals and the markings of blast areas and charge holes would also be required at all entrances to the permit area from public roads and highways.

All signs used to mark blasting areas would also be required to conform to the sign requirements set out in § 816.11.

Proposed § 816.66(b) includes provisions contained in existing § 816.65 (c). This paragraph would require the use of audible warning and all-clear signals. The revised provision would delete the requirement to periodically deliver notice of meanings of warning and all-clear signals, as both signs and the blasting schedule must contain this notice and both are constantly available. But it would still require notification of the meaning of the signals to those who work in the permit area. The requirement to maintain signs would be removed here but would be covered under § 816.66(a).

Section 816.66(c) is proposed to include the contents of existing § 816.65(d). OSM would delete the first sentence because it is redundant when read with the more specific requirements of the rest of the section. The paragraph would require the restriction of access to the area until hazards no longer exist and access can be safely resumed. Both livestock and persons would be protected.

§ 816.67 Use of explosives: Seismographic measurements (Amendment 12)

The title of § 816.67 would be changed to "Use of explosives: Control of adverse effects" in proposed § 816.67.

Existing § 816.67 sets standards governing seismographic measurements and ground vibration. It allows the substitution, with the approval of the regulatory authority, of a scaled-distance equation (in existing § 816.65(1)) for seismographic measurements where peak-particle-velocities less than 1.0 inch per second are to be assured. The regulatory authority is allowed to require seismographic measurements of these blasts. Seismographic requirements would be incorporated into proposed § 816.67(d), and are discussed below.

Proposed § 816.67 would set limits for airblast, ground vibration, and flyrock and would provide other requirements to prevent damage as a result of blasting. Authority for this section is found in Sections 515(b)(15)(C) and 516 of the Act.

Section 515(b)(15)(C) states that the rules must contain provisions to "limit the type of explosives and detonating equipment, the size, the timing and frequency of blasts based upon the physical conditions of the site so as to prevent (i) injury to persons, (ii) damage to public and private property outside the permit area, (iii) adverse impacts on any underground mine, and (iv) change in the course, channel, or availability of ground or surface water outside the permit area". [Emphasis added.]

Many comments were received regarding damage criteria found in the proposed rules at 46 FR 6982, January 22, 1981. Most were concerned with what level of damage was to be prevented. Some commenters felt that the mandate of the Act was to prevent all damage, while others believed that a prevention of all major and minor damage and avoidance of threshold damage were acceptable.

The Bureau of Mines (Siskind and others, 1980, RI8507) lists three categories of damage: Threshold damage, minor damage, and major damage. Major damage means structural failure and occurs at levels of ground vibration generally beyond those occurring in surface mining blasts. Threshold and minor damage, however, may occur due to ground vibration normally experienced in coal mining operations. Minor damage includes falling plaster and cracks in concrete masonry and in brick and mortar joints. Threshold damage has been described

as lengthening of existing cracks at intersecting construction elements. Since the Acts does not distinguish between threshold and minor damage and requires prevention of damage, the level of damage subject to these rules is considered to be any damage which is not documented in the preblasting survey and which diminishes the value of the structure either to the owner or a prospective buyer.

Proposed § 816.67 would combine existing §§ 816.65(e), (g), (h), (k), and (l), as well as existing § 816.67 as discussed below.

Proposed § 816.67(a) would include the requirements of existing § 816.65(h). This would require that blasting be conducted safely to prevent injury to persons, damage to property, adverse impacts on underground mines, or changes to the course channel, or availability of water.

Proposed § 816.67(b) would amend existing § 816.65(e) with regard to airblast. Under existing practice, when the operator prepares the blast plan required by § 780.13, he identifies one of four maximum airblast levels (depending on the type of measuring system and the expected frequency of the airblast). The proposed rule at § 816.67(b) would operate in a similar manner but has been adjusted to reflect actual problems OSM has encountered with the standards in the existing rule. Because the C-weighted slow-response measuring technique is less accurate and because operators seldom use this type of measuring system, OSM proposes to eliminate this standard. The standard for instruments with accuracy below 0.1 Hz (hertz) is proposed for deletion since the sensitivity of this type instrument is beyond normal field use and generally requires laboratory conditions.

Accordingly, the airblast limitations in proposed § 816.67(b)(1) would set maximum airblast limits for frequencies below 2 Hz and for frequencies below 6 Hz, but the C-weighted slow-response and the 0.1 Hz standards would be eliminated. Under the proposed rule, at the time of permitting, the operator would propose, and the regulatory authority would accept, one of these two standards or another, lower standard if site conditions require. The limit should be consistent with technical reference publications such as Report RI8485 by the Bureau of Mines (Siskind and others, 1980).

Because weather conditions may focus or amplify airblast, paragraph (b)(1)(iii) would require the operator to meet the standards even under adverse atmospheric conditions.

Some commenters felt that airblast limits should be deleted and reference publications used. OSM believes that the limits specified would provide the protection required by the Act and proposed to reissue maximum airblast levels for compliance with protection of property.

A commenter questioned whether a notice of violation should be issued if airblast exceeded the allowable limit if measured at a structure which was not the nearest to the blast site. Monitoring "near or at the nearest structure" may be improper in a program to evaluate airblast compliance. Technical publications indicate that wind direction, atmospheric conditions, and local topography can focus air-blast away from some areas near the blast to other locations. Therefore, the proposed rule would require that airblast standards be met at every location. Allowable airblast limits cited on page 66 of the Bureau of Mines Report RI8485 (Siskind and others, 1980) would be included in § 816.67(b) as allowable performance standards.

Proposed § 816.67(b)(2) would set requirements for monitoring. The operator would be required to monitor airblast when and where required by the regulatory authority. The existing rule at § 816.65(e)(2) requires monitoring equipment to have an upper-end flat frequency response of at least 200 Hz. Some copies of the Code of Federal Regulations incorrectly indicate that the current standard is 1,100 Hz. (See 44 FR 15404.) OSM proposes to retain the requirement that monitoring equipment have an upper-end flat frequency response of at least 200 Hz.

Existing § 816.65(g) defines flyrock as material traveling along the ground. One commenter was concerned that the definition did not include all material that should be considered as flyrock. OSM has also encountered difficulties with this definition because occasionally flyrock is cast fairly high into the air. The definition in proposed § 816.67(c) would include material cast into the air or along the ground.

Changes are also proposed to the description of the area where flyrock may be cast. Both the existing and proposed rules prohibit the casting of flyrock more than one-half the distance to the nearest dwelling or other occupied structure, and beyond the area of regulated access. However, where existing § 816.65(g) prohibits flyrock beyond areas owned or leased by the permittee, proposed § 816.67(c) would prohibit flyrock from being cast off the permit area. This change is proposed to ensure that unregulated areas are not

subject to flyrock, which will ensure safer operation.

§ 816.67(d) Ground vibration
(Amendments 13, 14, or 15)

Provisions governing ground vibration are proposed to be incorporated in the initial program performance standards at 30 CFR 715.19(e)(2), the permanent program surface mining performance standards at 30 CFR 817.67(d). Three options are proposed for all three performance standards. The standard promulgated will be the same for each. Accordingly the discussion here, although keyed to § 816.67(d), will also apply to §§ 817.67(d) and 715.19(e)(2). (See Amendments 1, 2, or 3 and 24, 25, or 26.)

Several factors contribute to the damage potential associated with the ground vibration resulting from a blast. Most important are the type and condition of structures within the area subject to ground vibration. Obviously older structures are more susceptible to blast damage than newer structures; those engineered to withstand heavy loads are more safe still. OSM has identified five structure types having different threshold levels of damage.

1. Sensitive structures such as historic buildings, monuments, and residences with rough stone foundations or plaster interiors have been documented as having low thresholds for damage associated with blasting. These structures should be protected from blast vibration with a peak-particle-velocity in excess of 0.5 inch per second.
2. Older homes (those more than 20 years old or those constructed with plaster-on-lath interiors or those with deteriorated or rigid, brittle, or easily fractured construction materials) can withstand somewhat greater blast associated peak-particle-velocities than those designated as historic or sensitive. These, however are more subject to damage from low frequency blasts than from those with higher frequencies.
3. Modern homes with gypsum-board interiors, reinforced concrete or concrete masonry unit foundation, and wood-frame and wood-clad structures can withstand greater blast vibrations. These structures can generally withstand a vibration of 1.0 inch per second and higher values as frequencies increase.
4. Certain structures are designed to withstand even greater forces. These include water towers, impoundments, tunnels, pipelines, towers, and underground mines. These structures can generally withstand a vibration of 2.0 inches per second.

5. The fifth type of structure can withstand even heavier loads. Those designed to be earthquake, wind, or traffic resistant may be able to withstand even greater vibrations. For these, a professional engineer should be consulted to determine the limit for ground vibration.

For a more complete discussion of structure type and the ability to withstand blast vibration, see Bureau of Mines Report of Investigations RI8507 (Siskind and others, 1980).

The intensity of the ground vibration is another element contributing to damage. Intensity is determined by the peak-component velocity of the particles in the wave of ground vibration generated by the blast. This peak-particle-velocity is the subject of regulation in this portion of the rule.

Peak-particle-velocity is measured by seismographs. While some seismographs provide resultant readings which summarize the peak-particle-velocity in all directions, OSM proposes to adopt the Bureau of Mines recommendation to record vibration in three mutually perpendicular directions. Generally, one of the three components will be of greater magnitude. Because the damage potential of a blast is linked to the greatest vibration in any direction, the component readings are a more accurate predictor of damage potential. Accordingly, it is this measure which should be applied to limit ground vibration and prevent damage.

The frequency of ground vibration is another factor in determining the damage done by a blast. Generally, blasts associated with surface mining are in the low-frequency ranges. Low-frequency blasts are generally associated with the highest incidences of damage; again structure type is an important factor. For discussions of the relationships between blast damage and frequency, see Bureau of Mines Bulletin 656 (1971) and RI8507 (Siskind and others, 1980).

Generally, high frequency blasts (over 40 Hz) only cause damage when associated with peak-particle-velocities in excess of 2 inches per second. Blasts between 10 and 40 HZ can cause damage in historic or older structures at peak-particle-velocities above 0.5 and 1.0 inch per second, respectively, and in modern structures up to 1.5 inches per second. Low frequency blasts (below 10 Hz) may require limits as low as 0.5 inch per second for historic structures, 0.75 inch per second for older structures, and 1.0 inch per second for modern structures.

Blast vibration frequency resulting from any given blast depends on a variety of factors, especially site-specific geology. For a discussion of factors governing ground vibration frequency, see medearis (1976).

Charge-weight is the weight, in pounds, of explosives used in the blast. Because the amount of explosives used determines the intensity of the blast, it is this measure which must be limited to insure safe blasting. The weight of explosives is the weight of the actual explosive material. Each type of explosive has properties producing different explosive characteristics. Thus an operator may use ammonium nitrate based or nitroglycerline based explosives but, if the weights are the same, the blast intensities would be considered equivalent.

The velocity of the sound wave (ground vibration) is determined by the substance through which it travels. Velocity is higher through more dense materials and lower through less dense materials. This variable tends to affect the frequency makeup of the ground vibration wave and becomes directly related to the potential for damage. Low frequency waves and low density materials have a greater potential for damage.

The most common and least expensive method of controlling blast vibration is the application of an

equation to determine the amount of explosives which can safely be detonated within a specific delay period. The Bureau of Mines has determined that blasts occurring at intervals equal to or exceeding 8 milliseconds do not contribute to the cumulative intensity of the ground vibration. Therefore, no more than the amount of explosives calculated by the equation must be detonated per 8-millisecond period. An acceptable equation for limiting vibration is $W = D^2 / (Ds)$, where W = the charge-weight of explosives to be detonated in any 8-millisecond delay period and D = the distance from the point of the blast to the nearest structure to be protected. Ds is a constant developed to relate to specific particle-velocity predictors. Ds is referred to as the square-root scaled-distance factor and is equal to $D\sqrt{W}$.

Both the Bureau of Mines and the Swedish Detonic Research Foundation have conducted research on recorded blast vibration intensities, their probabilities, and occurrences, which correlate well to produce equations predicting ground vibration from scaled-distance values.

The equation derived by the Bureau of Mines for the mean equation of points relating peak-particle-velocity (PPV) to scaled-distance is $PPV = 133 (Ds)^{-1.5}$ and by the Swedish Foundation is $PPV = 102 (Ds)^{-1.45}$. Due to the differing points recorded the mean equation of points is slightly different. In developing an equation for general use, the mean equation must be analyzed to consider the probability of occurrence which produces the maximum limit. Siskind and others (1980, RI8507) developed statistical probability of upper limits by taking two standard deviations about the mean regression curve. The curve representing a 95-percent confidence level is the equation $PPV = 408 (Ds)^{-1.5}$ (See Figure A.)

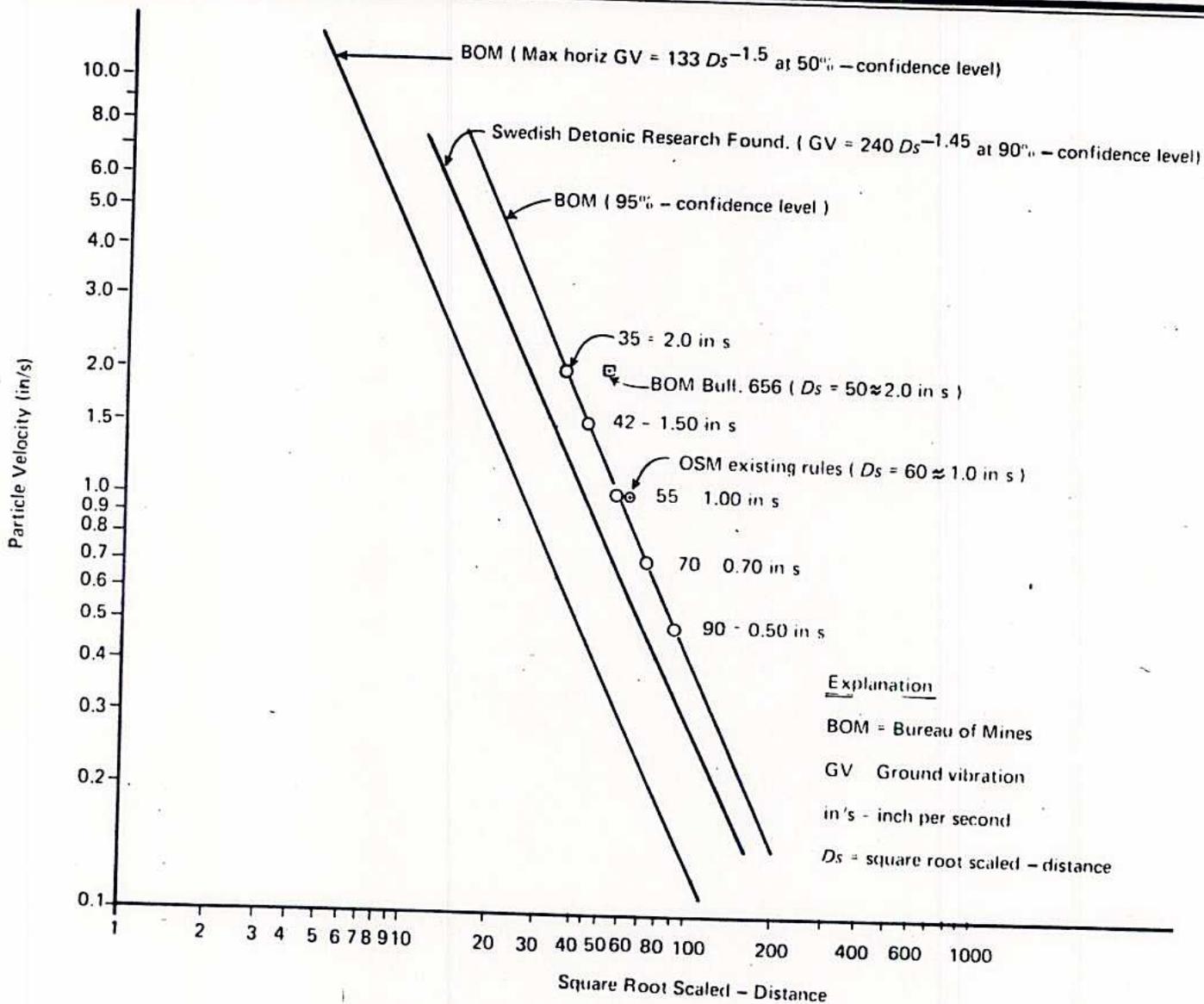


Figure A. - Correlation of square root scaled - distance with particle velocity.
 (Source: Modified from Figure 10 in Bureau of Mines Report R18507.)