

Sunshine Act Meetings

Federal Register

Vol. 53, No. 223

Friday, November 18, 1988

This section of the FEDERAL REGISTER contains notices of meetings published under the "Government in the Sunshine Act" (Pub. L. 94-409) 5 U.S.C. 552b(e)(3).

FEDERAL RESERVE SYSTEM BOARD OF GOVERNORS

TIME AND DATE: 10:00 a.m., Wednesday, November 23, 1988.

PLACE: Marriner S. Eccles Federal Reserve Board Building, C Street entrance between 20th and 21st Streets, NW., Washington, DC 20551.

STATUS: Open.

MATTERS TO BE CONSIDERED:

1. Proposed 1989 Federal Reserve Board budget.
2. Any items carried forward from a previously announced meeting.

Note.—This meeting will be recorded for the benefit of those unable to attend. Cassettes will be available for listening in the Board's Freedom of Information Office, and copies may be ordered for \$5 per cassette by calling (202) 452-3684 or by writing to: Freedom of Information Office, Board of Governors of the Federal Reserve System, Washington, DC 20551.

CONTACT PERSON FOR MORE

INFORMATION: Mr. Joseph R. Coyne, Assistant to the Board; (202) 452-3204.

Date: November 16, 1988.

James McAfee,

Associate Secretary of the Board.

[FR Doc. 88-26842 Filed 11-16-88; 3:40 pm]

BILLING CODE 6210-01-M

FEDERAL RESERVE SYSTEM BOARD OF GOVERNORS

TIME AND DATE: Approximately 10:30 a.m., Wednesday, November 23, 1988,

following a recess at the conclusion of the open meeting.

PLACE: Marriner S. Eccles Federal Reserve Board Building, C Street entrance between 20th and 21st Streets, NW., Washington, DC 20551.

STATUS: Closed.

MATTERS TO BE CONSIDERED:

1. Personnel actions (appointments, promotions, assignments, reassignments, and salary actions) involving individual Federal Reserve System employees.
2. Any items carried forward from a previously announced meeting.

CONTACT PERSON FOR MORE

INFORMATION: Mr. Joseph R. Coyne, Assistant to the Board; (202) 452-3204. You may call (202) 452-3207, beginning at approximately 5 p.m. two business days before this meeting, for a recorded announcement of bank and bank holding company applications scheduled for the meeting.

Date: November 16, 1988.

James McAfee,

Associate Secretary of the Board.

[FR Doc. 88-26843 Filed 11-16-88; 3:40 pm]

BILLING CODE 6210-01-M

SECURITIES AND EXCHANGE COMMISSION Agency Meeting

Notice is hereby given, pursuant to the provisions of the Government in the Sunshine Act, Pub. L. 94-409, that the Securities and Exchange Commission will hold the following meeting during the week of November 21, 1988.

A closed meeting will be held on Wednesday, November 23, 1988, at 10:00 a.m.

The Commissioners, Counsel to the Commissioners, the Secretary of the Commission, and recording secretaries will attend the closed meeting. Certain staff members who are responsible for the calendared matters may also be present.

The General Counsel of the Commission, or his designee, has certified that, in his opinion, one or more of the exemptions set forth in 5 U.S.C. 552b(c)(4), (8), (9)(A) and (10) and 17 CFR 200.402(a)(4), (8), (9)(i) and (10), permit consideration of the scheduled matters at a closed meeting.

Commissioner Fleischman, as duty officer, voted to consider the items listed for the closed meeting in closed session.

The subject matter of the closed meeting scheduled for Wednesday, November 23, 1988, at 10:00 a.m., will be:

- Institution of injunctive actions.
- Settlement of injunctive actions.
- Institution of administrative proceedings of an enforcement nature.
- Settlement of administrative proceedings of an enforcement nature.
- Amend administrative proceeding of an enforcement nature. Opinions.

At times changes in Commission priorities require alterations in the scheduling of meeting items. For further information and to ascertain what, if any, matters have been added, deleted or postponed, please contact: John Kincaid at (202) 272-2300.

Jonathan G. Katz,

Secretary.

November 14, 1988.

[FR Doc. 88-26756 Filed 11-15-88; 4:27 pm]

BILLING CODE 8010-01-M

Corrections

Federal Register

Vol. 53, No. 223

Friday, November 18, 1988

This section of the FEDERAL REGISTER contains editorial corrections of previously published Presidential, Rule, Proposed Rule, and Notice documents and volumes of the Code of Federal Regulations. These corrections are prepared by the Office of the Federal Register. Agency prepared corrections are issued as signed documents and appear in the appropriate document categories elsewhere in the issue.

DEPARTMENT OF AGRICULTURE

7 CFR PART 1c

DEPARTMENT OF ENERGY

10 CFR PART 745

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

14 CFR PART 1230

DEPARTMENT OF COMMERCE

15 CFR PART 27

CONSUMER PRODUCT SAFETY COMMISSION

16 CFR PART 1028

INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Agency for International Development

22 CFR PART 225

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

24 CFR PART 60

DEPARTMENT OF JUSTICE

28 CFR PART 46

DEPARTMENT OF DEFENSE

32 CFR PART 219

DEPARTMENT OF EDUCATION

34 CFR PART 97

VETERANS ADMINISTRATION

38 CFR PART 16

ENVIRONMENTAL PROTECTION AGENCY

40 CFR PART 26

DEPARTMENT OF HEALTH AND HUMAN SERVICES

45 CFR PART 46

NATIONAL SCIENCE FOUNDATION

45 CFR PART 690

DEPARTMENT OF TRANSPORTATION

49 CFR PART 11

Federal Policy for the Protection of Human Subjects

Correction

In proposed rule document 88-25552 beginning on page 45661 in the issue of Thursday, November 10, 1988, make the following corrections:

1. On page 45661, in the first column, in the heading to the document, the CFR citation for the Department of Agriculture and the title for the Veterans Administration should read as set forth above.

2. On the same page, in the second column, in the third line, "Veterans" should read "Veterans".

3. On the same page, in the third column, in the first complete paragraph, in the 18th line, "Veterans" should read "Veterans".

4. On page 45665, in the first column, in the second complete paragraph, in the seventh line, "accepted" was misspelled.

5. On the same page, in the second column, in the sixth line, "mischievous" was misspelled.

6. On page 45669, in the first column, below "INTERNATIONAL DEVELOPMENT COOPERATION AGENCY", and above the CFR cite, add "Agency for International Development".

7. On page 45676, in the third column, in the first complete paragraph, in the first line, "reasonably" was misspelled.

BILLING CODE 1505-01-D

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 658

[Docket No. 80990-8227]

Shrimp Fishery of the Gulf of Mexico

Correction

In rule document 88-25917 beginning on page 45270 in the issue of Wednesday, November 9, 1988, make the following correction:

§ 658.22 [Corrected]

On page 45272, in the first column, in the last line, in § 658.22(b), "24° 46' 7'' N. latitude," should read "24° 46.7' N. latitude,".

BILLING CODE 1505-01-D

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 704

[OPTS-82032A; FRL-3466-5]

EDTMPA and Its Salts; Submission of Notice of Manufacture or Import

Correction

In rule document 88-24396 beginning on page 41335 in the issue of Friday, October 21, 1988, make the following corrections:

1. On page 41336, in the first column, in the table, under "Chemical name", in the 2nd, 3rd, 4th, 5th, 7th, 9th, 11th, 13th, 14th, 16th, 17th, 19th, and 21st entries, in the first line of each entry, "ethanedibyl" should read "ethanediyl".

2. On the same page, in the same column, in the table, under "Chemical name", in the eighth entry, in the fourth line, "O''''''"] should read "O''''''"]-".

BILLING CODE 1505-01-D

**ENVIRONMENTAL PROTECTION
AGENCY****40 CFR Part 716**

[OPTS-84027; FRL-3292-4]

**Preliminary Assessment Information
and Health and Safety Data Reporting;
Addition of Chemicals***Correction*

In rule document 87-26555 beginning on page 44826 in the issue of Friday, November 20, 1987, make the following correction:

§ 716.35 [Corrected]

On page 44828, in the third column, in the heading of § 716.35, "copies" should read "lists".

BILLING CODE 1505-01-D

**DEPARTMENT OF HEALTH AND
HUMAN SERVICES****Food and Drug Administration****21 CFR Parts 50 and 56**

[Docket No. 87N-0032]

**Protection of Human Subjects;
Informed Consent; Standards for
Institutional Review Boards for Clinical
Investigations***Correction*

In proposed rule document 88-25553 beginning on page 45678 in the issue of Thursday, November 10, 1988, make the following corrections:

1. On page 45679, in the second column, in paragraph 3., in the ninth line, "Departmen tof Agriculture" should read "Department of Agriculture"

2. On page 45680, in the first column, in the fourth complete paragraph, in the seventh line, "member ship" should read "membership".

BILLING CODE 1505-01-D

Federal Register

**Friday
November 18, 1988**

Part II

Department of Labor

Mine Safety and Health Administration

30 CFR Part 15

**Requirements for Approval of Explosives
and Sheathed Explosive Units; Final Rule**

DEPARTMENT OF LABOR

Mine Safety and Health Administration

30 CFR Part 15

Requirements for Approval of Explosives and Sheathed Explosive Units

AGENCY: Mine Safety and Health Administration, Labor.

ACTION: Final Rule.

SUMMARY: This rule revises the Mine Safety and Health Administration's (MSHA) existing regulations for approval of explosives and adds new requirements for approval of sheathed explosive units. The revisions upgrade existing provisions consistent with current technology, eliminate duplicative and unnecessary provisions, reorganize the existing requirements, and provide alternative methods of compliance where possible.

EFFECTIVE DATES: This final rule is effective January 17, 1989. However, those manufacturers proceeding under the provisions of the previous rule may file requests for approval or extension of approval of explosives under that rule until November 20, 1989.

FOR FURTHER INFORMATION CONTACT: Patricia W. Silvey, Director, Office of Standards, Regulations and Variances, MSHA, 4015 Wilson Boulevard, Room 613, Arlington, Virginia 22203, (703) 235-1910.

SUPPLEMENTARY INFORMATION:**I. Background**

MSHA is revising the existing requirements for approval of explosives and adding new requirements for approval of sheathed explosive units. These revisions are issued pursuant to section 508 of the Federal Mine Safety and Health Act of 1977.

On July 9, 1982, MSHA published an Advance Notice of proposed Rulemaking (ANPRM) in the *Federal Register* (47 FR 30025) which announced a comprehensive review of the underground coal mining standards in 30 CFR Part 75 and solicited public comments. As part of the review, MSHA specifically sought comment on blasting and explosives standards and related approval regulations.

On June 5, 1984, MSHA published a notice in the *Federal Register* (49 FR 23281) which announced the availability of its preproposal draft of revisions to the approval requirements for explosives, sheathed explosive units, and related blasting equipment, and scheduled a public conference. The public conference was held July 11, 1984,

in Pittsburgh, Pennsylvania and was well attended by representatives of the mining community. MSHA received written comments regarding its preproposal draft from affected manufacturers and other segments of the mining community.

After reviewing the comments received in response to the preproposal draft, MSHA published a proposed rule on November 12, 1986, in the *Federal Register* (51 FR 41046). The proposal set out revisions to the existing regulations for approval of explosives in Part 15 and added new requirements for approval of sheathed explosive units.

On March 26, 1987 (52 FR 9670), MSHA published a notice of public hearing which outlined the major issues raised during the comment period. A public hearing was held April 22, 1987 in Bruceton, Pennsylvania during which further comment on the proposal was received. A transcript of the proceeding was taken and made available for public inspection. Following the public hearings, interested persons were allowed to submit supplementary statements and data until the record closed on May 15, 1987.

MSHA reviewed all written and oral statements submitted in response to the proposed rule and at the public hearing. Comments were received from all segments of the mining community including explosive manufacturers, trade associations and representatives of miners. This final rule was developed after a full evaluation of the entire public record.

The Agency's final rule addresses the comments received and is consistent with Executive Order 12291, the Regulatory Flexibility Act, and the Paperwork Reduction Act.

II. Discussion and Summary of the Final Rule

The use of explosive in underground coal mines and certain underground metal and nonmetal gassy mines continues to present a potentially serious risk of injuries and death to miners. One major hazard associated with the use of explosives is the accidental ignition of mine gases and coal dust.

The use of explosives approved as permissible reduce the potential for igniting flammable mixtures of methane gas or coal dust that may be present in areas where blasting is performed. The flames produced by the detonation of approved explosives are significantly shorter in duration and length than black blasting powder or nonapproved dynamites which were primarily used in blasting operations before approved

explosives were required for use underground.

MSHA's existing regulations governing the approval of explosives have not been revised since 1961. Since that time, technological advances have led to the development of new types of explosives suitable for use in underground mines. Analytical techniques used by the Bureau of Mines in testing and evaluating explosives for MSHA have advanced comparably. This final rule updates the existing regulations to reflect this state-of-the-art technology and deletes obsolete provisions.

The final rule establishes three subparts in this Part 15. Subpart A contains general approval procedures and requirements that are applicable to all subparts. Subpart B revises the technical requirements for the testing and evaluation of explosives and Subpart C establishes new technical requirements for the approval of sheathed explosive units or other units to be fired outside the confines of a borehole.

Subpart B contains a new gallery test which provides for evaluation of explosives under conditions that are more representative of actual conditions in underground mines. Other provisions revise the existing requirements for toxic gases that are produced by detonation of explosives and establish a new method for calculating the equivalent volume of various gases relative to carbon monoxide. This is based on the threshold limit values, time weighted average (TLV-TWA) included for these gases in the chemical substances section of the publication of the American Conference of Governmental Industrial Hygienists (ACGIH) entitled "TLV's, Threshold Limit Values and Biological Exposure Indices for 1988-1989 (TLV Booklet)".

The provisions in Subpart C are new and establish requirements for the approval of sheathed explosive units or other units to be fired outside the confines of a borehole. The sheathed unit, intended for use without being confined in a borehole, is designed so that it will not ignite a flammable mixture of methane and/or coal dust when fired. It has been developed for use in dislodging loose roof slabs and overhangs, rockfall leveling, slab or boulder breaking and in other situations where the unconfined application of explosives is appropriate to improve mine conditions.

In the preamble to the proposed rule for Part 15, MSHA referenced its rulemaking on 30 CFR Part 7. There, the Agency proposed that for approval of

certain products the applicant or a third party selected by the applicant would conduct the required testing according to test procedures set forth by the Agency and require certification of test results by the applicant. MSHA specifically solicited comments as to whether the Agency should continue testing for approval of explosives and sheathed explosive units or if the testing under Part 15 might more appropriately be conducted by applicants or third parties and, therefore, included as a subpart under Part 7. The Agency was especially interested in information concerning the industry's capability with regard to facilities for conducting the required tests for approval of explosives and sheathed explosive units. In responding to this issue commenters stated that explosives and sheathed explosive units should not be included as products under Part 7. They believed that the concept of applicant or third-party testing would not be feasible in the explosives industry at this time since no manufacturer or third-party test facility had the capability to perform all the required tests. Therefore, as recommended by commenters, the final rule provides for continued Agency testing of products addressed by Part 15.

The final rule deletes existing § 15.24 concerning miscellaneous tests as those tests were used for research purposes and were not approval related. It also deletes the existing provisions in Part 15 which describe the blasting practices that must be followed in underground coal mines. These provisions are addressed in revisions to the safety standards in 30 CFR Part 75 which are being published simultaneously with this final rule.

The term "permissible" which is used in the existing standards was replaced in the proposal with the term "approved." Commenters objected to the change. They stated that the term "permissible" has been used for over 75 years and is well recognized throughout the mining industry. MSHA continues to believe that the terminology used to identify products which have been examined by the Agency to determine conformity with regulatory requirements must be standardized. The term which most appropriately reflects MSHA's action in this area is "approved." Therefore, the phrase "approved explosive" will be used in revised Part 15 in lieu of "permissible explosive." However, since explosives approved as permissible under the Part 15 regulations in effect prior to the effective date of this rule may continue to be manufactured and used in underground mines requiring approved explosives,

the safety standard in Part 75 will define the term "permissible explosive" as one approved by MSHA. Further, a definition of "approval" consistent with the definition of this term in this part is added to Subpart N of Part 75.

Tests and evaluations made under this part will be performed for MSHA by the Bureau of Mines, U.S. Department of the Interior (Bureau). The Bureau testing facility is located near Pittsburgh, Pennsylvania.

III. Discussion of the Subparts

The following section-by-section analysis discusses each provision of the subparts of the final rule and addresses the comments received on the proposal.

Subpart A—General Provisions

Section 15.1 Purpose and effective dates.

This provision, derived from existing § 15.1, revises and simplifies the statement of purpose and more accurately reflects the scope of Part 15. It clarifies that the requirements set forth in the final rule are for approval of explosives and sheathed explosives units for use in underground coal mines and certain underground metal and nonmetal gassy mines. It also specifies the effective date applicable to the explosives and sheathed explosive units program. MSHA realizes that applicants need a phase-in or transition period when changing from previous to new revised approval regulations for products and two approaches for handling the transition were delineated in the proposal. The Agency proposed a delay of one year after publication of the final rule for the explosives approval requirements in Subpart B to take effect. However, Subpart A containing general provisions and Subpart C setting approval requirements for sheathed explosive units were to be effective 30 days after publication of the final rule so sheathed units could be made available for use in underground mines as quickly as possible. Alternatively, MSHA indicated it was considering making all subparts of the regulation, including the new revised explosives requirements in Subpart B, take effect 30 days after publication of the final rule. However, manufacturers with explosives applications in process could file requests for approval or extension of approval under the previous regulations until one year after the effective date of the new regulations. During this one-year phase-in period, applicants could submit an approval request for explosives under either the previous regulation or the new revised regulation.

The comments received on this question generally favored the second approach. Commenters stated that it provided manufacturers with greater flexibility since they could complete applications currently in process under the previous regulation while at the same time planning compliance with or even submitting applications under the new regulations immediately. In addition, they favored this approach since it followed the transition procedure set forth in MSHA's Part 7 regulations.

Consistent with the comments as well as with the approach taken on this issue in Part 7, the final rule provides that all subparts of the revised Part 15 regulation take effect 60 days after publication. It also provides that manufacturers proceeding under the provisions of the previous regulation may request approval or extension of approval of explosives under that regulation until one year from the effective date of the revisions. After the one-year period, all applications for approval or extension of approval of explosives or sheathed explosive units will be evaluated under the revised Part 15. The final rule also provides that explosives issued an approval under regulations in place prior to the effective date of these revisions, and in compliance with those regulations, could continue to be manufactured as long as no changes were made. Changes to previously approved explosives must be submitted as new approvals under the revisions to Part 15 set out in this final rule. This provision was added in response to commenters who sought clarification as to how the Agency intended to treat previously approved explosives manufactured in compliance with prior explosives approval regulations. With regard to the question of what standards would be used in auditing these explosives, MSHA will audit explosives based on the technical requirements upon which the approval was issued. Language reflecting this position is incorporated in § 15.10 Post-Approval Product Audit.

Section 15.2 Definitions

The following definitions apply to Part 15 approvals. They are designed to clarify the requirements of Part 15 and respond to the issues identified by commenters.

Applicant. This term, which is derived from the existing standards, identifies the party seeking approval of an explosive or sheathed explosive unit under this part.

Approval. This term replaces the existing phrase "certificate of approval."

It is used to describe a written document issued by MSHA which states that an explosive or explosive unit meets the requirements of this part and which authorizes the use of an approval marking identifying the explosive or explosive unit as approved as permissible.

Explosive. This definition revises the existing definition to more clearly indicate the type of products for which this part is intended. The existing definition's reference to "blasting devices as defined in Part 17 of this subchapter," has not been included in the final rule since these devices are no longer manufactured or used in underground mines.

Extension of approval. This phrase, which is new, is used to describe a written document issued by MSHA that states that a change to a previously approved explosive or sheathed explosive unit meets the requirements of this part. It is based on existing terminology that is used when changes are made on products approved in accordance with 30 CFR, Parts 18 through 36.

Minimum product firing temperature. This term is new and means the lowest product temperature at which an explosive is approved for use. It was not included in the proposal, but was added to the final rule in response to commenters who sought clarification as to whether firing temperature in the air-gap sensitivity test referred to product temperature or ambient temperature.

Post-approval product audit. This term is new and is used to describe MSHA's examination and testing, or both, of approved explosives or explosive units to determine whether those products meet the technical requirements and have been manufactured as approved. Some commenters stated that it was unclear what was meant by the phrase "to determine whether those products meet the requirements of the approval," used in the proposed definition for post-approval product audit. The final rule revises the proposed definition to clarify that the Agency will conduct such audits to determine whether the products meet the technical requirements in Part 15 and have been manufactured as approved.

Some commenters recommended that the term "audit" be replaced with the term "check." They stated that the word "audit" could be interpreted differently in the future and subject manufacturers to extensive audits. The Agency believes that the term "audit" more accurately describes the process that

will be used to determine compliance with these requirements.

Sheath. This term, which is new, is used to describe that portion of a sheathed explosive unit which will be dispersed to form a flame inhibiting cloud upon firing of the explosives contained in the sheathed unit.

Sheathed explosive unit. This term is new and is used to describe an explosive device that can be fired without being confined in a borehole. It is designed so that it will not ignite a flammable mixture of methane or coal dust when fired.

Test detonator. This term has a new definition which identifies the types of detonators that will be used to test explosives submitted for approval under this part. The existing definition which specifies that these detonators contain a base charge of 0.25 ± 0.02 gram of pentaerythritol tetranitrate (PETN) is replaced since this strength detonator is no longer being manufactured for commercial use.

Several commenters recommended that a "test detonator" be defined as an "instantaneous electric detonator with a copper-alloy shell and iron or copper leg wires that is commercially available for use in underground coal mines." They further recommended that a test detonator contain "a base charge of 0.40-0.45 gram of pentaerythritol tetranitrate (PETN) pressed to a specific gravity of 1.4 g/cc and primed with standard weight of primer." These commenters stated that since test detonators are to be used for determining air-gap sensitivity of an explosive, it is imperative that detonators with a standard base charge be specified.

Detonators with a base charge of 0.40-0.45 gram PETN, which is a No. 8 strength detonator, is the minimum strength detonator currently being manufactured in the United States for underground gassy mines. Detonators that have an initiating strength equivalent to that of a detonator with a base charge of 0.40-0.45 gram PETN will be used by the Agency to conduct the appropriate tests under this final rule. Specialized systems using technology other than that identified in this rule will be addressed through the new technology provisions in §§ 15.20(i) and 15.30(g). The safe performance of approved explosives or sheathed units can be significantly affected if the proper strength detonator is not used. Therefore, a provision has been added in § 15.7 on approval marking to require the labeling for explosives and sheathed units to state the test detonator strength

used in the approval testing. This will assist operators in selecting the proper strength detonator to use with explosives and sheathed explosive units and will also assist approval holders by ensuring that the same strength detonator is used by MSHA for approval and audit testing.

During the course of rulemaking on Part 15, a commenter urged that MSHA develop approval regulations for detonators used in the initiation of approved explosives in underground mines. MSHA, after considering the need to establish approval requirements for detonators, will seek to include an approval schedule for detonators in its regulatory program.

The definitions in the existing regulations for "basic specifications," "poisonous gases," "ingredients," "Bureau," "MESA," and "MSHA" are not included in the final rule because they are commonly known throughout the mining community.

Section 15.3 Observers at tests and evaluations.

This standard is derived from existing § 15.9 and is intended to protect proprietary information which could be available to observers at tests and evaluations conducted under this part.

The final rule provides that only MSHA and Bureau of Mines personnel, representatives of the applicant, and such other persons agreed upon by MSHA and the applicant are permitted to be present during the tests and evaluations conducted under Part 15. In response to comments, § 15.3 specifies that "MSHA and Bureau of Mines personnel" instead of "government personnel" may be present during testing and evaluation. This change reflects MSHA's view that only necessary persons be present when the tests and evaluations are performed. This will minimize the possibility of any inadvertent release of proprietary information.

As was indicated in the proposal, existing § 15.8 which addresses consultation between a prospective applicant and personnel at MSHA's Approval and Certification Center has been deleted in the final rule. A commenter raised concerns as to whether MSHA intends to continue providing appropriate consultation services at no cost to the applicant. Manufacturers may consult with MSHA regarding the test procedures and requirements for explosives and sheathed explosive units prior to

submission of an application for approval under Part 15. However, once an application is received for action, costs will be charged pursuant to Part 5, including the time attributable to consultation.

Section 15.4 Application procedures and requirements.

This section, which is derived from existing §§ 15.3 and 15.15, sets forth the procedures and requirements for requesting approval of explosives or sheathed explosive units. It does not contain specific provisions concerning the fees to be charged for approval of explosives and sheathed explosive units. Instead, § 15.4(b) requires that fees calculated pursuant to Part 5, Fees for Testing, Evaluation, and Approval of Mining Products, (52 FR 17506) be submitted with each application for approval or extension of approval.

In a separate rulemaking, MSHA published a new Part 5 (Fees for Testing, Evaluation, and Approval of Mining Products) in the Federal Register on May 8, 1987 (52 FR 17506). That final rule revised the Agency's existing system of charging user fees for the testing, evaluation and approval of products manufactured for use in underground mines. Fees for MSHA processing of an application under Part 15 will be subject to an hourly rate charge for evaluation and flat rate charges for tests. On hourly rate actions, applicants will be billed for the fee when processing of the action is completed. The final fee will include, in addition to the hourly rate and flat test rate charges, actual travel and transportation expenses incurred when testing and evaluation requires the investigator to travel to the manufacturing or installation site. The Agency may consider converting to a flat fee schedule, payable with the application, after reviewing its hourly rate data.

MSHA will charge \$33 per hour and an application fee of \$100 for processing requests for approval or extension of approval for explosives under Subpart B and sheathed units under Subpart C. Flat rate fees for tests are shown in the table below. The test fees for explosives are revised from those listed in the final rule for Part 5 based on the revisions to the approval regulation. Test fees for sheathed units are new rates developed to recover costs of processing and testing. The fee schedule published in May 1987 will apply to applications for approval or extension of approval filed under the previous Part 15 regulations.

Part 15—Fees For Approval of Explosives and Sheathed Explosive Units

APPROVAL OF EXPLOSIVES

Test	Fee
Weigh-in	\$420
Physical examination	295
Chemical analysis	1,797
Air Gap: Minimum product firing temperature	418
Air Gap: Room temperature	320
Pendulum friction	148
Detonation rate	320
Gallery Test 7	4,917
Gallery Test 8	3,537
Toxic gases (large chamber)	732

APPROVAL OF SHEATHED EXPLOSIVE UNITS

Test	Fee
Physical examination	\$128
Chemical analysis	1,044
Gallery Test 9	1,944
Gallery Test 10	1,944
Gallery Test 11	1,944
Gallery Test 12	1,944
Drop Test	648
Temperature Effects/Detonation	672
Toxic Gases	580

The final rule organizes the application procedures into the three kinds of approval actions an applicant may request under Part 15: an original approval, a subsequent approval of a similar product, and extension of approval. In requesting an original (first time) approval for an explosive or sheathed explosive unit, MSHA will require the submission of all information necessary to evaluate all facets of the explosive or sheathed explosive unit as it relates to the approval requirements. If, after receipt of an original approval, the applicant requests subsequent approval of similar product or an extension of approval for the original product, the applicant will not be required to submit documentation duplicative of previously submitted information. Only information related to changes in the previously approved product will be required, avoiding unnecessary paperwork.

The final rule retains the existing requirement that changes in the specifications of a previously approved explosive or sheathed explosive unit must be approved by MSHA. This will avoid changes being made that could affect the safe performance of the explosive or sheathed explosive unit.

Section 15.4(c) (2) of the final rule requires applicants requesting approval of explosives to include "a laboratory number or other suitable designation

identifying the explosive" at the time of application with the brand or trade name provided prior to issuance of approval. This constitutes a change from the proposal which required applicants to submit, at the time of application, the brand or trade name under which the explosive would be marketed if approved. Several commenters objected, however, pointing out that applicants frequently submit several explosive candidates for testing and do not determine the brand or trade name of the candidates until completion of the approval tests. Thus, applicants are no longer required to submit the brand or trade name at the time an application is submitted, but instead can provide it later. However, an approval will not be issued until the brand or trade name has been received by MSHA.

The final rule revises the existing requirement concerning assignment of different brand or trade names for approved explosives which specifies that, when a change in chemical composition is approved, the former composition shall not be used again unless reapproved by MSHA. Under § 15.4(f)(3) MSHA may require that a new or changed explosive or sheathed explosive unit be distinguishable from those associated with the former composition. This change recognizes that methods, other than different brand or trade names, could be used to identify products which perform differently and is based on MSHA's view that reapproval of an explosive or sheathed explosive unit, which otherwise performs safely, is not necessary because of a name change.

The existing requirement that the strength of the explosive be determined by the ballistic mortar test has been deleted in the final rule. MSHA has determined that it is not essential to know the strength of the explosive to determine whether the explosive will perform safely. In addition, of the numerous field samples of approved explosives that have been tested over the last ten years, all were found to be in compliance with the strength requirements. This was true even when the field samples were not in compliance with other specifications of the approval.

Section 15.5 Test samples.

The final rule reviews and updates the provisions of existing §§ 15.5 and 15.6 concerning the shipment, quantity, and quality of explosives and sheathed explosive units to be submitted for testing. The final rule retains, with clarifying changes, provisions from the existing regulations that prohibit

shipment of samples until notification from MSHA, require storage of samples in a magazine for at least 30 days prior to testing and, establish when test samples not be tested because of their chemical composition or condition. New provisions have been added specifying that explosives will not be tested that use aluminum clips to seal explosive cartridges, contain any combination or perchlorate and aluminum, contain more than 5 percent perchlorate, or contain any perchlorate and less than 5 percent water.

Section 15.5(a) requires the applicant, upon request by MSHA, to submit samples of explosives and sheathed explosive units for testing and evaluation by MSHA. The section also sets forth the quantities of these products to be submitted.

Under § 15.5(a)(2), the applicant is required to submit 70 pounds of 1-1/4-inch diameter explosives and additional cartridges according to a formula based on cartridge length. This formula constitutes a change from the proposal which increased the existing requirement of explosives to be submitted for testing from 100 to 150 pounds. Use of the formula method will provide a more accurate number of explosives needed for testing, while at the same time providing the increased quantity of explosives necessary to conduct the new minimum product firing temperature tests included in the final rule. Section 15.5(a)(3) also uses a formula to specify the number of cartridges in diameters less than 1-1/4 inches that must be submitted for testing.

The existing requirement that applicants submit explosive cartridges in 8-inch lengths has been deleted in the final rule. This will allow applicants the flexibility to submit samples that are representative of the cartridge lengths to be manufactured.

Under § 15.5(b), MSHA will not test explosives or sheathed explosive units that: (1) Contain chlorites, chlorates, or substances that react over an extended period and cause degradation of the explosive or sheathed unit; (2) are chemically unstable; (3) show leakage; (4) use aluminum clips to seal the cartridge; (5) contain any combination of perchlorate and aluminum; (6) contain more than 5 percent perchlorate; or (7) contain any perchlorate and less than 5 percent water.

One commenter suggested that explosive cartridges with aluminum clips be permitted, stating that the hazard of incendivity associated with aluminum clips is not sufficient to warrant their exclusion. It is generally recognized by the mining community,

however, that aluminum can present an incendivity hazard, particularly when contacting rusty metal, and should not be used in areas where there is a possibility of igniting methane or coal dust. Therefore, the final rule continues to prohibit testing of explosive cartridges with aluminum clips.

The final rule retains the provision specifying that MSHA will not test an explosive containing more than 5 percent perchlorate. Perchlorate is an ester or salt of perchloric acid which is used in explosives to enhance sensitivity, primarily to improve the low temperature performance of approved explosives. Several commenters objected to this provision stating that it was unduly designed restrictive. They further stated that MSHA should consider approval of explosives that contain more than 5 percent perchlorate providing that the manufacturer can show that such explosives are chemically stable, do not degrade or react over an extended time in storage and meet all the requirements for sensitivity and performance. In addition, one commenter indicated that it had products containing up to 10 percent perchlorate which had good safety stability histories. These products had been DOT classified which included impact and thermal stability testing.

As indicated in the proposal, research conducted by the Bureau of Mines shows that the use of perchlorate in approved explosives does not result in instability of the explosive when the amount of perchlorate does not exceed 5 percent and the explosive contains 5 percent or more of water. However, at that time, neither the Bureau of Mines nor MSHA was aware of any data or information on whether explosives with more than 5 percent perchlorate could be used safely and therefore, specifically requested that information or data be provided on the issue. Although commenters generally objected to the prohibition, sufficient data or information was not received to allow MSHA to establish appropriate tests or criteria for evaluating such explosives. As a result, the final rule retains the prohibition against testing of explosives with more than 5 percent perchlorate.

However, explosives with more than 5 percent perchlorate may be evaluated under the new technology provision in § 15.20(i) of the final rule. Under this provision, consideration would be given to evaluating those products under United Nations Test Series 3 which includes an impact test for sensitivity. The Agency is also considering the need to store these explosives for an extended period prior to performing

tests to determine whether the chemical stability has been affected by the increased proportion of perchlorate and whether the explosive will degrade or react over an extended time. MSHA will expect manufacturers requesting approval of explosives with more than 5 percent perchlorate under § 15.20(i) to address these issues through suggested test criteria and procedures.

Once MSHA approves an explosive with more than 5 percent perchlorate under the new technology provision, the Agency will make the modified tests and requirements used by MSHA to evaluate such explosive available to manufacturers and other interested persons. If over a period of time MSHA receives a number of applications for explosives with more than 5 percent perchlorate, MSHA will revise the explosive approval regulations in Part 15 through the rulemaking process to allow such explosives.

Commenters also raised questions concerning the prohibition of any combination of perchlorate and aluminum in explosives, finding this provision was also design restrictive. Further, one manufacturer stated that it had produced explosives containing aluminum and perchlorate with good safety stability histories. In combining perchlorate and aluminum in explosives, the perchlorate is an oxidizer and the aluminum is a highly efficient fuel source which also acts as the sensitizer. The perchlorate can be sensitive to friction that may result from impact in handling, and in the presence of aluminum for fuel, the resistance to explosion may not provide the assurance of safety necessary to gassy underground mines. Accordingly, the final rule retains the prohibition against testing of explosives composed of a combination of perchlorate and aluminum. However, as with explosives containing more than 5 percent perchlorate, MSHA will evaluate explosives incorporating a combination of perchlorate and aluminum under the new technology provision in § 15.20(i).

Section 15.5(c) requires explosives and sheathed explosive units to be stored prior to testing. It retains the existing requirement for storage in a magazine for at least 30 days before gallery tests are conducted. This storage period is designed to provide an indication of explosive or explosive unit stability so MSHA can determine whether the character of the product has changed.

Section 15.6 Issuance of approval.

This section is derived from existing § 15.13 and specifies the actions to be

taken by MSHA upon review of applications for approval of explosives and sheathed explosive units. The final rule provides that MSHA will issue an approval or a notice denying approval after tests and evaluations have been completed. The approval or notice denying approval will be in writing.

The proposed rule deleted the existing requirement that applicants be provided a written report summarizing the results of the investigation of the application. Commenters objected to this deletion, stating that the report provided useful information to manufacturers concerning their products. This report, however, has proved most useful to applicants when approval of an explosive application was denied by MSHA as it set forth the rationale for denial. MSHA believes that manufacturers should be given the reasons for denial of an approval. Therefore, paragraph (a) of the final rule provides, in lieu of an investigative report, that a notice denying approval must specify the reasons for MSHA's action.

Several commenters also suggested that MSHA be required to complete all approval actions within 90 days. Another commenter strongly disagreed, stating that an approval deadline would only serve to cause shortcuts in testing procedures and could result in products being approved for use in gassy underground mines that do not meet the technical requirements.

The final rule does not establish a time limit for the completion of final actions on requests for approval of explosives and sheathed explosive units due to the complexity and variables involved in the approval process. Variables such as the number of applications received for approval are beyond the control of MSHA. An approval deadline is especially inappropriate given that the final rule allows approval of explosives or sheathed units that incorporate new technology or new applications of existing technology as established in §§ 15.20(i) and 15.30(g). Concerning the timing of the approval process, the Agency is aware that excessive delay could have an adverse effect on the quality and integrity of the product being tested. MSHA has eliminated the performance of nonapproval-related tests and has simplified reports on approval actions to reduce processing time. The total time for processing of approval actions for explosives was decreased by 18 percent in fiscal year 1988 from the previous year. Streamlining internal approval

procedures will continue to be an MSHA priority.

Section 15.6(b) prohibits applicants for approval from advertising or otherwise representing an explosive or sheathed explosive unit as approved until MSHA has issued an approval. This provision, which is new, is consistent with similar prohibitions applicable to applicants for approval under other MSHA approval regulations such as 30 CFR Part 18.

Section 15.7 Approval marking.

This section is derived from existing § 15.14 and provides for labeling of approved explosives and sheathed explosive units. The final rule retains existing requirements that approved explosives be marketed only under the brand or trade name specified in the approval and that the wrapper of each cartridge as well as each case of explosives bear a label indicating that the explosive is approved. These requirements also apply to sheathed explosive units. Added to the approval marking provision in the final rule is the requirement that the explosive and sheathed unit contain the test detonator strength used in the approval testing, and the minimum product firing temperature.

The final rule requires that the wrapper of each cartridge and each case of approved explosives and the outer covering of each sheathed explosive unit and each case of approved sheathed explosive units be labeled with the minimum product firing temperature. The preproposal draft would have required each case of approved explosives and sheathed explosive units to be labeled with the minimum firing temperature. The proposal retained the performance requirement for a minimum firing temperature but the manner of conveying this information was to be determined by explosive manufacturers. As discussed and specified in the new regulations for Part 75, Safety Standards for Explosives and Blasting, explosives or sheathed explosive units must not be fired when the product is below the minimum product firing temperature. One commenter said that explosives labeled with the minimum firing temperature could cause users to confuse outside air temperature with the temperature of the product. The Agency has clarified this issue by defining the minimum firing temperature as the lowest product temperature at which the explosive or sheathed explosive unit is approved for use. The commenter also stated that the labeling requirement would be more effectively accomplished through inserting detailed instructions in each case of explosives as to storage and use

which is current practice and through user education and training. However, the Agency has eliminated the case insert in the final rule and does not believe that the case insert served to effectively provide guidance to the blaster. MSHA accident data shows failure by the blaster to follow safe blasting practices or regulations to be a contributing factor in over 80 percent of the fatal blasting accidents from 1978 through 1984. Upon further consideration of this information, MSHA has determined that blasters require more specific guidance in the safe handling and use of explosives.

The labeling of each explosive cartridge and sheathed unit with the minimum product firing temperature readily provides the blaster with the information on-site without having to read through a case insert which is very difficult to accomplish in the underground mining environment. The inclusion of this provision in the final rule transmits information necessary for user compliance with the explosives and blasting standards in Part 75. Accordingly, explosives and sheathed unit approval labels must provide the minimum firing temperature for the product.

The approval label must also provide the test detonator strength used in the approval testing of the explosive or sheathed unit. The safe performance of approved explosives or sheathed units can be significantly affected if the proper strength detonator is not used when blasting. Section 1310(e) of Part 75 requires that detonators have sufficient strength to initiate the explosives being used. The inclusion of the test detonator strength on the approval label will assist blasters in selecting the proper strength detonator to use with explosives and sheathed units and thus provide important information for user compliance with blasting safety standards. Moreover, it will ensure that the same strength detonator is used for post-approval audit testing as that used during the initial approval testing.

As noted above, the existing requirements for a case insert, warning the user that the explosive is approved only when used in conformance with the requirements of Part 15, is not included in the final rule. Requirements governing the use of explosives are appropriately included in related safety standards and should not be addressed in requirements for approval of explosives.

Section 15.8 Quality assurance.

This section is derived from existing § 15.14, except paragraph (b) which is new. The MSHA approval label is relied

upon in the mining community as an indication that the product is safe for use in mines. Under the final rule, the approval-holder is required to manufacture the product in accordance with the specifications of the approval and report to MSHA any knowledge of explosives or sheathed explosive units distributed that do not comply with the approval.

One commenter objected to the proposal's deletion of a provision requiring applicants to submit detailed quality control plans and quality control inspection and testing instructions for acceptance by MSHA. Any changes to them would also have been subject to MSHA acceptance. MSHA continues to believe that there is a need for quality control in the production of approved explosive products. For this reason, the final rule retains the basic requirement that approved explosives and sheathed explosive units be manufactured in accordance with the approval. The design and implementation of a quality assurance program to accomplish this, however, is the manufacturer's responsibility and, therefore, has not been made subject to review or acceptance by MSHA.

Adherence to the final rule's requirements for quality assurance will provide substantial protection against the distribution of defective explosive products. However, MSHA recognizes that this can occur. In such an event, § 15.8(b) requires the approval-holder to report immediately to the Agency any knowledge that explosives or sheathed explosive units have been distributed which do not meet the requirements upon which the approval is based. This knowledge could come from the results of audits conducted by the approval-holder, reports from users, or other sources. Upon receiving such a report, MSHA will work with the approval-holder to implement appropriate corrective action.

Commenters requested that MSHA provide guidance on how approval-holders would comply with the requirement to report knowledge of distributed explosives or sheathed explosive units which did not meet the technical requirements. Since such explosive products can create a hazard, immediate notification should be by expeditious means, such as by telephone. The notification should include a description of the nature and extent of the problem, the locations where the explosives or sheathed explosive units have been distributed, and the approval-holder's plans for corrective action. Corrective action may include recalling the explosive products

or restricting use of them pending conformance with the approval specifications. MSHA will review all of the information provided, including the approval-holder's program of corrective action. If the program is inadequate, MSHA will work with the manufacturer to develop a more appropriate program. If appropriate corrective action cannot be agreed upon by the approval-holder and MSHA, the Agency may seek revocation of the approval, or other action as necessary.

Section 15.9 Disclosure of information.

This section is derived from existing §§ 5.9 and 15.17 which address the disclosure of information on explosives tested and evaluated under Part 15. MSHA intends to continue the current practice of treating information on product specifications and performance as proprietary information and will protect its disclosure to the fullest extent consistent with The Freedom of Information Act, F.O.I.A. (5 U.S.C. 552). Under the final rule, MSHA will notify the applicant of requests for product information received by the Agency and will provide the manufacturer the opportunity to present its position on disclosure. Information identified by the manufacturer as proprietary will not be disclosed, unless, as provided by F.O.I.A., MSHA determines that disclosure will further the public interest and will not impede the discharge of any of the functions of the Agency. No objections were raised by commenters to this provision.

Provisions from the existing regulation concerning MSHA publication of lists and other information on approved explosives are not included in the final rule. The dissemination of information that is nonconfidential need not be addressed by these regulations. However, MSHA intends to continue to provide the mining community with this information.

Section 15.10 Post-approval product audit.

This section is derived from existing § 15.20 and from provisions on post-approval product audit contained in the Agency's approval rulemaking in 30 CFR Part 7. As was indicated in the preamble to proposed Part 15, it maintains a consistent approach on the issue of product audits with that outlined in Part 7.

The final rule provides that approved explosives and sheathed explosive units be subject to periodic audit by MSHA for the purpose of determining conformity with the technical requirements upon which the approval was based. This aspect of the final rule,

by providing a mechanism for independent evaluation by MSHA of approved products on a random basis, complements the quality assurance provision that requires approval-holders to manufacture their explosive products as approved. Moreover, it is consistent with recommendations from internal reviews of MSHA's approval program.

Approved explosives or sheathed units audited by MSHA will be selected by the Agency as representative of those distributed for use in mines. When an approved explosives product is requested by MSHA for audit from the approval-holder, the Agency will examine and evaluate it and conduct any testing necessary at the Bureau of Mines testing facility. This reflects a change from the proposal which allowed for the audit to occur at a "mutually agreeable site" since manufacturers indicated that they do not have adequate facilities for testing explosives and sheathed units. Approval-holders, however, will be notified by MSHA of the time for any audit-related testing of approved explosives or sheathed explosive units to allow them an opportunity to witness such tests.

In determining which approved explosives or sheathed explosive units will be subject to audit at any particular time, MSHA will consider a variety of factors such as whether the manufacturer has previously produced the approved product or similar products, whether the approved product is new or part of a new product line, or whether the approved product is intended for a unique application or limited distribution. Other considerations may include product complexity, the manufacturer's previous product audit results, product population in the mining community, and the time since the last audit or since the product was first approved.

Several commenters expressed concern over the proposal's requirement that explosives and sheathed explosive units selected from the field for auditing meet the same technical requirements as required for approval. This is a change from existing regulations which test field samples under less stringent criteria and allows for some field degradation such as in air gap sensitivity. It is important for explosive products available for use in underground gassy mine atmospheres to, at all times, be in compliance with the technical requirements on which approval is based without regard to the age of the product or the length of time the explosive or sheathed unit has been stored in the field. This is consistent with the approach taken in all of MSHA's other approval programs where

audited products, including consumable items such as flame-resistant hydraulic fluid, must meet all the technical requirements upon which approval was granted. Commenters have presented no evidence during rulemaking to show that this is technically infeasible. If manufacturers believe that their products degrade sufficiently over time so they cannot continue to meet the technical requirements then they should provide a shelf or storage life for explosives or sheathed units. MSHA will consider explosives with expired shelf dates to be deteriorated and therefore required to be removed by mine operators in accordance with § 75.1328.

Under the final rule, approved products can be obtained for audit from the approval-holder or from sources other than the manufacturer such as mine suppliers or distributors. The approval-holder may, however, only be required to provide one case of explosives or 25 sheathed explosives once a year, at no cost to MSHA, except for cause. MSHA can obtain products for audit from the approval-holder or other sources such as mine suppliers or distributors at any time at MSHA expense.

Based on MSHA's experience, the Agency anticipates few instances in which more than this quantity of approved explosives or sheathed units will be required "for cause" from any one manufacturer in any one year. There are circumstances, however under which an additional audit is appropriate to ascertain compliance with the technical requirements upon which an approval was based. Examples of such circumstances include verified complaints about the safety of an approved product, evidence of product changes that have not been approved, audit test results that warrant further testing to determine compliance, and evaluation of corrective action taken by an approval-holder. Under these circumstances, the approval-holder must provide, at no cost to MSHA, additional approved explosives or sheathed units so the Agency can ensure that the approval-holder is meeting the obligation to manufacture them as approved.

Several commenters indicated that shipping small quantities of explosives would impose unreasonable costs on manufacturers because most major carriers base their tariffs on a 7,500- or 10,000-pound minimum for shipment of Class A explosives. When shipment of explosives or sheathed explosive units is necessary for audit, MSHA believes that most approval-holders will ship

them in the same vehicles as other shipments of explosives to customers, their regional supply magazines, or to the Bureau of Mines.

When discrepancies are found during MSHA audits of approved products, MSHA will require that the manufacturer take all necessary corrective actions. These actions could include, but are not limited to, the approval-holder recalling the lot or batch of explosives or sheathed units or issuing users notices. Revocation of the approval by MSHA may result when discrepancies in approved products are not successfully corrected.

A new paragraph (d) has been added to § 15.10 of the final rule to address commenters' questions regarding the auditing of previously approved explosives. It provides that explosives approved under regulations in effect prior to the effective date of this rule shall conform to the provisions on field samples set forth in those regulations (See 30 CFR Part 15, 1987 Edition).

Section 15.11 Revocation.

This section is derived from existing § 15.16 and from the provision on revocation in 30 CFR Part 7. It is identical to the revocation section in Part 7 as MSHA believes that all approval-holders must be accorded the same rights and subject to the same process regardless of the approval regulations under which the approval was granted.

The final rule provides that MSHA may revoke an approval granted under Part 15 whenever an explosive or sheathed explosive unit fails to meet the applicable technical requirements specified in Subpart B or C or creates a hazard when used in a mine. Commenters recommended that the revocation procedures require MSHA to fully describe the cause or reason for a revocation action, and that the procedures include an appeal process for the approval-holder to challenge the basis for such action. The Agency recognizes that an MSHA approval is important to the marketability of a product used in the mining industry. For this reason it has been MSHA's practice to treat approval-holders as "licensees" under the Administrative Procedure Act (APA). Consistent with this practice, the final rule provides that approval-holders be accorded certain protections prior to revocation of an approval. These include being provided with (1) A written notice of the Agency's intent to revoke a product approval, with an explanation of the reasons for the proposed revocation, (2) an opportunity to demonstrate or achieve compliance with the technical requirements for

approval, and (3) an opportunity for a hearing upon request.

Also in accord with the APA is the final rule provision which permits MSHA to suspend an approval, without prior notification to the approval-holder, if a product poses an imminent hazard to the safety or health of miners. Under such circumstances, an approval may be suspended immediately to protect the safety and health of any affected miners. Upon suspension of an approval, the product involved is no longer approved and MSHA will require mine operators to withdraw the product from use during the course of any suspension. MSHA will also immediately advise approval-holders of any suspension so effective corrective action can be started as soon as possible.

Subpart B—Explosives

Section 15.20 Technical requirements.

This section is derived from existing §§ 15.10, 15.11, 15.12 and 15.21, except for paragraphs (g)(1), and (g)(2), which are new. Section 15.20 of the final rule sets forth the technical requirements for approval of explosives.

Paragraph (a) requires the chemical composition of the explosive, as determined by MSHA analysis, to conform to the composition furnished by the applicant. If in conformance, the applicant's composition description is incorporated into the approval and is the standard to determine compliance with the approval during MSHA audits.

One commenter questioned why two sets of tolerances were necessary and suggested that the chemical composition of explosives be required to meet only the tolerances specified in § 15.21. The tolerances set in § 15.21 represent a baseline standard of variation which all explosives submitted for approval must meet, regardless of their chemical composition. However, the particular mixture of ingredients in an explosive may require tighter tolerances for the explosive to perform safely and for the purpose designed. Based on its data and knowledge of the technical functioning of the explosive involved, the manufacturer is in the best position to provide these mixture-specific tolerances. Therefore, the final rule requires that the chemical composition of an explosive meet the tolerances furnished by the applicant in addition to the tolerances specified in § 15.21.

Paragraph (b) requires the explosive to detonate completely in the rate-of-detonation test. This test is intended to determine whether the explosive has a tendency to misfire or partially detonate. The test is conducted on a 50-

inch column of 1 1/4 inch diameter cartridges and on the same quantity of the smallest diameter cartridge less than 1 1/4 inch submitted by the applicant.

Under the proposal the rate-of-detonation test was to be conducted using a test detonator without a booster to initiate all explosives submitted for approval. The proposed rule eliminated the use of a booster in addition to a test detonator to initiate gelatinous explosives because boosters were not used in the mine environment. However, commenters stated that the use of boosters with gelatinous explosives yields more reproducible results in laboratory testing with regard to detonation velocity and recommended their continued use. Accordingly, the rate-of-detonation test has been modified in the final rule to specify the use of a 60-gram tetryl pellet booster for testing of gelatinous explosives.

Some commenters also suggested that the rate-of-detonation test be performed at the minimum firing temperature of the explosive since explosives tested at temperatures below this level could result in incomplete detonation or erratic rate of detonation. The effect of temperature on explosives is better evaluated under the air-gap sensitivity requirements in § 15.20(c) than in subparagraph (b) on rate of detonation. The air-gap test provides a more stringent measure of the explosive's ability to detonate as it is designed to ensure that a product, at its minimum firing temperature, will propagate the gap or space between explosive cartridges. This is in contrast to the rate-of-detonation test where cartridges are next to each other in a column. Therefore, the final rule continues to provide that the rate-of-detonation test be conducted at an ambient temperature between 68 and 86 °F.

Paragraph (c) requires that the air-gap sensitivity of the explosives be at least 2 inches at the minimum firing temperature and at least 3 inches at a temperature between 68 and 86 °F. This requirement enables MSHA to evaluate whether the explosive will transmit detonation across a small air gap to another explosive cartridge in the column. The air-gap sensitivity is determined in the explosion-by-influence test using the 7-inch cartridge method. The 7-inch cartridge method is conducted with two 8-inch cartridges. One inch is cut off the end of each cartridge. The cartridges are placed in a paper tube, the cut ends facing each other with the appropriate 2-inch or 3-inch air gap between them. Then, one cartridge is fired to test the effect of the detonation on the other. This test

method represents a modification of the existing halved-cartridge method.

A comment from one manufacturer suggested retaining the existing halved-cartridge method of conducting the explosion-by-influence test rather than using the 7-inch cartridge method. MSHA proposed changing to the 7-inch method because use of a nearly whole cartridge better simulates actual conditions that may occur in the mining environment. This was not disputed by the comments and thus, the explosion-by-influence test in the final rule will be performed using the 7-inch cartridge method.

Recommendations were also received from commenters to specify the paper tube used in the test: The weight and type of paper; the length and width of the sheet of paper; and the number of wraps of paper. This additional specification, they stated, would help ensure that tests are conducted uniformly. MSHA disagrees that variations in the paper tube specifications could significantly affect the repeatability of tests and therefore has not included such detailed specifications in the final rule.

The final rule, like the proposal, recognizes different sensitivities in the air-gap test at different temperatures. Under § 15.20(c) an air-gap sensitivity of 2 inches is required at the minimum product firing temperature and 3 inches required at temperatures of 68 to 85 °F. This is consistent with existing §§ 15.12 and 15.21, which require an air-gap sensitivity of 3 inches in the initial approval test, but allows an air-gap sensitivity of 2 inches for field samples of approved explosives. Several commenters recommended specifying a 2-inch air gap at a temperature between 68 and 86 °F to be used in any post-approval product audit of explosives. As was explained in the earlier preamble discussion on this issue in § 15.10 Post Approval Product Audit, it is important for explosives available for use in gassy underground mines to, at all times, be in compliance with the technical requirements on which approval is based regardless of the age of the product or the length of time the explosives or sheathed unit has been stored in the field. As a result, the final rule requires products audited under § 15.10 to meet the same 3 and 2-inch air-gap sensitivity as is required for the original approval testing.

The minimum product firing temperature at which the air-gap sensitivity will be conducted is either that proposed by the applicant or 41 °F, whichever is lower. Thus, under the final rule, explosives will be required to

perform adequately at a temperature as low as 41 °F. If specified by the applicant, the explosives will be tested at a lower temperature. The lowest temperature at which the explosive passes the test will be specified in the approval.

A further comment recommended exempting unit charges or cartridges from the air-gap sensitivity requirement in § 15.20(c). Unit charges or cartridges would be a package configuration designed to require that only one cartridge or continuous charge be loaded in a borehole. With only one cartridge or continuous charge in a borehole, the air-gap sensitivity, cartridge to cartridge would not be a factor in performance. Such unit charges or cartridges could still be used with single cartridges which may present the potential for an air gap to exist when loaded into a borehole. This could also occur with a continuous cartridge depending on its length.

Paragraph (d) specifies the performance required for an explosive in gallery test 7. The test demonstrates whether the explosive will ignite an explosive mixture of methane and air. Gallery test 7 is conducted by firing, one at a time from the borehole of a steel cannon, at least 20 explosive charges of varying weights. The explosives are primed with a test detonator and stemmed and tamped. This test is conducted in air containing 7.7 to 8.3 percent natural gas and at a temperature between 68 and 86 °F.

A commenter suggested that gallery test 7 and other gallery tests be performed on samples of explosives identical to those intended to be marketed for use in underground mines. MSHA agrees and has addressed this concern by specifying that gallery test 7 be conducted on explosives that include wrappers and seals.

The test procedure in both gallery tests 7 and 8 calls for tamping of the explosive prior to firing. Commenters generally objected to the tamping, noting that tamping is not permitted in the mines. In addition, they indicated that tamping can affect the rheology and sensitivity of explosives and suggested two alternatives for revising § 15.20 (d) and (e). One option was to provide larger diameter samples for testing and eliminate tamping altogether. The other alternative was to continue tamping, but permit the applicant to provide larger diameter cartridges for testing explosives where the rheology or sensitivity of the explosive could be adversely affected by tamping. While mine operators are prohibited from tamping the explosives, they need to

tamp the stemming to fill the cross-section of the borehole as required by the Part 75 explosives safety standards. Such tamping of the stemming material has the potential of putting pressure on the column of explosives. Also, Bureau of Mines research shows that crushing explosive cartridges to fill a borehole increases the risk for ignition of methane during blasting as compared to loading cartridges in a continuous train without crushing. The tamping of explosives in the gallery tests provides a factor of safety based on experimental studies. Accordingly, the gallery test has been designed to take this into account and provide the necessary measure of safety should this situation occur.

Paragraph (e) specifies the performance required for an explosive in gallery test 8. The test demonstrates whether the explosive will ignite an explosive mixture of methane and air in which bituminous coal dust has been predispersed. The test is conducted by firing, one at a time from the borehole of a steel cannon, at least 10 unstemmed explosive charges of varying weights. The explosives are primed with a test detonator and tamped. This test is conducted in 640 cubic feet of air containing 3.8 to 4.2 percent natural gas, into which 8 pounds of bituminous coal dust has been predispersed. The air is at a temperature between 68 and 86 °F.

Gallery test 8 in the final rule replaced existing gallery test 4, which provides for coal dust to be placed on shelves in the gallery, rather than being predispersed. The new test conditions facilitate improved quantitative comparisons of explosive incendiarity. The test is also designed to better simulate conditions in the mining environment.

Paragraph (f) establishes the requirements for the performance of an explosive in the pendulum-friction test. The test demonstrates whether the explosive is unduly sensitive to impact and friction. The explosive is required to show "no perceptible reaction" under the conditions of the test. "No perceptible reaction", as used in the final rule, means the explosive does not burn, explode, or exhibit a local crackling. The test apparatus consists of an "A" frame, a weighted pendulum to which a steel or hard fiber-faced shoe is attached, and a steel anvil. The explosive sample is placed on the anvil and the pendulum is adjusted and released from a height of 59 inches.

Paragraph (g) is a revision and update of existing § 15.12(f) and specifies that the total volume equivalent to carbon monoxide (CO) of the toxic gases produced by detonation of the explosive not exceed 2.5 cubic feet per pound of

explosive. In the preproposal, the Agency included this limitation to be determined by the large chamber test in which the explosive shall propagate completely. The large chamber test will be used under this final rule.

The existing requirement in § 15.12(f) that limits the volume of poisonous gases to 2.5 cubic feet per pound of explosive was not retained in the proposal. This was because MSHA believed, at that stage of the rulemaking process, that the hazards associated with toxic gases were appropriately addressed in 30 CFR 75.301-2 which requires that concentrations of noxious or poisonous gases not exceed the current threshold limit values (TLV) as specified by the American Conference of Governmental Industrial Hygienists. However, in the proposal the Agency sought information and data on any benefits to be obtained by retention of this provision.

Commenters opposed the deletion of the poisonous gas limitation stating that they consider the limitation to be a valuable criterion in formulating approved explosives. In addition, they do not believe the limitation duplicates the requirements of 30 CFR 75.301-2, but instead ensures the effectiveness of the protections afforded by the Part 75 provision.

Upon further analysis, MSHA has determined that a toxic gas limitation should be retained. While current ventilation regulations address exposure to a number of toxic gases, including those associated with the detonation of explosives, MSHA's experience indicates that control of such gases produced by explosives is a particularly effective means for limiting the high concentrations of toxic fumes that can be produced by detonation during blasting. That the initial concentrations are particularly hazardous is exemplified by four blasting-related accidents which occurred between 1980 and 1985 and resulted in 9 fatalities from exposure to toxic gases or fumes. Further, retaining a limitation will better enable MSHA to ensure compliance with short-term exposure limits included in MSHA's air quality regulations. These considerations, coupled with strong support from commenters for retaining the existing toxic gas provision, persuaded the Agency that a fume requirement is necessary to minimize hazards. Accordingly, MSHA has included a limitation on toxic gases in the final rule, but has modified the existing provision so that the total volume is determined relative to carbon monoxide. The final rule requirement follows, with minor editorial changes, the language in the provision limiting

toxic gases set out in the preproposal draft of this rulemaking.

Paragraph (g)(1) discusses the large chamber test which is conducted so the gaseous products from the detonation can be collected and analyzed. The large chamber test, which has a volume of approximately 1350 cubic feet, replaces the Bichel and Crawshaw-Jones tests conducted under the existing requirements. The explosive charge is stemmed and fired from a cannon into the large chamber. This chamber test simulates conditions that are more representative of actual conditions of use (stemmed, simulated borehole, large expansion ratio) than the existing tests. The large chamber test also eliminates the use of two test apparatuses that are currently used for toxic gas determinations.

Paragraph (g)(2) specifies the method for determining the effective toxicity of each toxic gas produced by relating the toxic gas to carbon monoxide. The method utilizes the threshold limit value, time weighted average (TLV-TWA) of the ingredient and the TLV-TWA of carbon monoxide. This method is derived from the American Conference of Governmental Industrial Hygienists (ACGIH) following a combined component effect for mixtures. It is based on TLV's included in the Chemical Substances section of the publication of the American Conference of Governmental Industrial Hygienists (ACGIH) entitled "TLV's, Threshold Limit Values for 1988-1989 (TLV Booklet)".

Under the method, the equivalent volume of each toxic gas produced relative to CO is determined by multiplying the measured volume of gas by a conversion factor. The conversion factor is equal to the TLV-TWA in parts-per-million for CO divided by the TLV-TWA for the toxic gas. The TLV-TWA conversion factor for each gas for which MSHA will test is specified in Table I following § 15.20(g)(2). The total volume equivalent to CO of the toxic gases produced by detonation of the explosive is the sum of the equivalent volumes of individual toxic gases.

Paragraph (h) prescribes the tests to be conducted when a change is proposed to an approved explosive. A change involving cartridge diameter or length requires MSHA examination to determine what tests, if any, are necessary to evaluate the proposed change. A change to a cartridge diameter smaller than the smallest diameter cartridge covered by the approval requires that the rate-of-detonation and explosion-by-influence tests be conducted. This testing enables

MSHA to determine whether the approved explosive in the smaller diameter cartridges will continue to perform in accordance with the approval. A commenter suggested that the requirement for the explosion-by-influence test be deleted because testing done for the original approval on 1 1/4 inch diameter cartridges is sufficient to ensure reliable detonation of approved explosives. In MSHA's experience, however, detonation is not always reliable with certain explosive formulations when used in small diameter cartridges and, therefore, the other tests are necessary to ensure the safe performance of the modified explosive.

Paragraph (i) gives MSHA the flexibility to approve an explosive that incorporates new technology or new applications of existing technology for which the tests or performance requirements of the final rule are not appropriate. An approval will be issued under this provision only if it is determined by testing and evaluation that the explosive performs as safely as an explosive that meets the requirements of this rule. MSHA will develop appropriate tests and performance requirements when the explosive is submitted for approval. Variations in the test and evaluation methods will continue to emphasize the critical aspects of approved explosives, including stable chemical formulation and protection against ignition of an explosive atmosphere. This reflects MSHA's primary concern with the safe performance of explosives in the mining environment, rather than with their design.

Once MSHA approves an explosive under this section, the Agency will make the modified tests and requirements used by MSHA to evaluate a particular technology available to manufacturers and other interested persons. If over a period of time MSHA receives a number of applications for the same type of technology or newly adapted technology, MSHA will revise the explosive approval regulations through the rulemaking process to recognize such development.

One commenter objected to inclusion of this provision in the proposed rule because approval of an explosive under tests and criteria not contained in the rule would be improper. The commenter indicated that all approval requirements should be promulgated through rulemaking. The flexibility provided by this provision is necessary to ensure that MSHA's explosives approval program can best serve the needs of safety in a timely manner. MSHA

foresees use of this provision only to accommodate innovation in the formulation of explosives. At the time MSHA issues an approval under this section, the Agency will make the criteria used to test and evaluate the product available to the mining community.

Section 15.21 Tolerances for ingredients.

This section is derived from existing § 15.21 and establishes tolerances for each ingredient in an explosive based on the composition set forth in the approval of an explosive. It revises the existing provisions and adds tolerance requirements for aluminum and physical sensitizing agents. Newer types of explosives often contain these substances which can affect the safe performance of an explosive and, therefore, these tolerances provide a safety limit for variations in the explosive composition.

The preproposal draft provision which would have established a tolerance of ± 0.5 percent for aluminum and physical sensitizing agents was not included in the proposal. However, because aluminum and physical sensitizers can affect the safe performance of an approved explosive, tolerance requirements are necessary for these ingredients. Under the proposal, the applicant was allowed to establish a tolerance for these ingredients, based on its own technical data or experience.

One commenter objected to allowing the applicant to set the tolerances for aluminum and physical sensitizers, stating that it was MSHA's responsibility, as the safety agency involved, to specify the limits of variation for these ingredients. Several commenters stated that physical sensitizers may be in the form of density control agents which are not necessarily added during the manufacturing process as a certain percentage of the explosive formulation. Also, since physical sensitizers combined differently may be based on the chemical formulation of the explosive, the manufacturer is in the best position to set the tolerances appropriate to the explosive composition involved. Therefore, § 15.21(a) specifies the tolerances for physical sensitizers as those set by the applicant. However, small variations in the quantity of aluminum can affect the safe performance of approved explosives and, for this reason, it is important to closely control the allowable tolerance for aluminum. Commenters stated that the analytical methods used to determine the aluminum content in an explosive are subject to greater variations than ± 0.5

percent and that inherent variations in the manufacturing process make adherence to this tolerance unrealistic. Upon further review, MSHA believes that it is technically attainable to achieve a ± 0.7 percent tolerance for aluminum. Bureau of Mines measurements of aluminum in over 100 explosive samples show that less than 6 percent of the samples varied in tolerance by ± 0.7 percent from the amount specified by the individual companies. Additionally, limited data from the Bureau of Mines indicates that a several percent tolerance variation in aluminum may affect the safe performance of an approved explosive. Therefore, MSHA specifies a ± 0.7 percent tolerance for aluminum in the final rule.

The final rule, based on the comments received, retains the tolerances specified in the existing standards for carbonaceous materials, moisture, and other ingredients contained in the explosive formulation. Explosives manufactured within these tolerances have historically proven to be safe for use.

Section 15.22 Tolerance for performance, wrapper and specific gravity.

This section is derived from existing § 15.21 and prescribes the limits of variation for rate-of-detonation and specific gravity of the explosive for the weight of wrapper. The final rule is unchanged from the proposal and explosives are required to be manufactured in accordance with each specified tolerance.

Subpart C—Requirements for Approval of Sheathed Explosive Units or Other Explosive Units Designed To Be Fired Outside the Confines of a Borehole

Section 15.30 Technical requirements.

This section is new and sets forth the technical requirements for approval of sheathed explosive units. The comments received generally favored the concept of sheathed explosive units which are designed to be fired outside the confines of a borehole. One commenter stated that sheathed units will be especially beneficial in roof fall recovery and construction work and will provide a safe alternative to the hazards of firing "open shots." However, explosives manufacturers indicated in their comments that since no company is presently producing such units, they were unable to provide comments on Subpart C. Accordingly, the final requirements for sheathed explosive units in Subpart C are unchanged from

the proposal, except for identical modifications in the drop test in § 15.30(d) and the detonation test in § 15.30(f) to address the use of previously approved explosives in sheathed units.

Paragraph (a) specifies that the sheathed explosive unit contain no more than 1½ pounds of approved explosive. This quantity of explosives is the maximum amount used in the prototype units designed and tested by the Bureau of Mines, which were found to be adequate for all situations where sheathed explosives are likely to be used.

Paragraph (b) requires that the chemical composition of the sheath, as determined by MSHA analysis, conform to the composition furnished by the applicant. If in conformance, the applicant's composition description will be incorporated in the approval and will then be the standard to determine compliance with the approval during MSHA audits.

Paragraph (c) sets forth requirements for the detonator well for the sheathed explosive unit. The detonator well allows the detonator to be securely inserted into the unit in order to provide for reliable detonation.

Paragraph (d) specifies performance requirements for the outer covering of the sheathed explosive unit to ensure that the unit is durable and appropriate for use in underground mines. Units are subjected to a drop test to determine whether the contents are susceptible to shifting or damage under conditions comparable to those likely to be encountered in underground mines. The test is performed with the unit at the minimum product firing temperature established for the explosive in the unit. For units with explosives approved under prior regulations, the drop test is performed at 41 °F.

Paragraph (e) specifies the performance requirements for sheathed explosive units in gallery tests 9, 10, 11, and 12. Under the final rule, sheathed explosive units are subjected to 10 trials of each gallery test and are required to detonate completely without causing any ignition of methane or coal dust.

Gallery test 9 is conducted with 3 sheathed explosive units placed 2 feet apart on a concrete slab in an explosive methane-air atmosphere. The test provides for evaluation under conditions simulating the blasting of fallen rock in an underground mine.

Gallery test 10 is conducted with 3 sheathed explosive units in the same arrangement as in gallery test 9 in an explosive methane-air atmosphere in which bituminous coal dust has been predispersed.

Gallery test 11 is conducted with 3 sheathed explosive units arranged in a triangular pattern in a simulated crevice formed by two concrete slabs. The test is performed in an explosive methane-air atmosphere under conditions simulating blasting of an overhanging roof slab.

Gallery test 12 is conducted with 3 sheathed explosive units arranged in a triangular pattern in a corner formed by three steel plates. The test is performed in an explosive methane-air atmosphere under conditions simulating blasting along a rib where compression and reflection of the explosive shock wave are produced. A commenter suggested that gallery tests 9, 11, and 12 also be conducted in an atmosphere containing predispersed bituminous coal dust. The commenter believed that, because of the possibility of sheathed explosive units used in inadequately rock-dusted areas, the likelihood of a dust ignition should be evaluated in approving the units. However, the methane-air and methane-coal dust air atmosphere specified in the gallery tests are easier to ignite than coal dust alone and provide a more stringent tests of the units incendiarity than the test proposed by the commenter.

Paragraph (f) requires that each of 10 sheathed explosive units detonate completely when fired at the minimum product firing temperature established for the explosive used in the unit or at 41°F for units with previously approved explosives. The test evaluates the effect of temperature on the sensitivity of the explosive and the performance of the flame-inhibiting material in the unit.

Paragraph (g) gives MSHA the flexibility to approve an explosive unit that incorporates new technology or new applications of existing technology for which the tests or performance requirements of the final rule are not appropriate. An approval will be issued under this provision only if it is determined by testing and evaluation that the explosive unit performs as safely as one that meets the requirements of the proposed rule. Under the final rule, MSHA will develop the appropriate tests and performance requirements when the explosive unit is submitted for approval. Variations in the test and evaluation methods will continue to emphasize the critical aspects of sheathed explosive units, including stable chemical formulation, durable construction, and protection against ignition of an explosive atmosphere. This reflects MSHA's concern with the safe performance of explosive units designed to be fired outside the confines of a borehole in the

mining environment, rather than with their design.

Once MSHA approves an explosive unit under this section, the Agency will make the modified tests and requirements used by MSHA to evaluate a particular technology available to manufacturers and other interested persons. If over a period of time MSHA receives a number of applications for the same type of technology or newly adopted technology, MSHA will revise Subpart C through the rulemaking process to recognize such developments.

One commenter objected to inclusion of this provision in the rule because approval of an explosive unit under tests and criteria not contained in the rule would be improper. The commenter indicated that all approval requirements should be promulgated through rulemaking. The flexibility provided by this provision is necessary to ensure that MSHA's explosives approval program best serves the needs of safety in a timely manner. MSHA foresees use of this provision only to accommodate innovation in explosive units designed to be fired outside the confines of a borehole.

Section 15.31 Tolerance of ingredients.

This section is new and prescribes the limits of variation from the composition of the sheath set forth in the approval of the sheathed explosive unit. Under the final rule, the tolerance for each ingredient in the sheath is required to be within the tolerance specified in Table II. The tolerances specified in Table II are derived from the existing requirements for ingredients in explosives. MSHA believes that these tolerances are also appropriate for sheathed explosive units.

Section 15.32 Tolerance for weight of explosive, sheath, wrapper and specific gravity.

This section is new and prescribes the limits of variation for certain characteristics of the sheathed explosive unit. Under the final rule, the sheathed explosive unit is required to be manufactured in accordance with the specified tolerances.

Derivation Table

The following derivation table lists: (1) Each section number of the final rule; and (2) the number of the existing regulation from which the final rule is derived.

DERIVATION TABLE

New Section	Old Section
15.1.....	15.1.
15.2.....	15.2.
15.3.....	15.9.
15.4.....	15.3, 15.4 and 15.15.
15.5.....	15.5 and 15.6.
15.6.....	15.13.
15.7.....	15.14.
15.8(a).....	15.14.
15.8(b).....	New.
15.9.....	15.9 and 15.17.
15.10.....	15.20, 15.21.
15.11.....	15.16 and 15.22.
15.20(a).....	15.11, 15.12(a).
15.20(b), (c), (d), (e), (f), (g), (h)(3).....	15.5(d), 15.10, 15.12 and 15.21.
15.20(h)(1), (h)(2).....	15.5(d).
15.20(j).....	New.
15.21.....	15.21.
15.22.....	15.21.
15.30.....	New.
15.31.....	New.
15.32.....	New.

Distribution Table

The following distribution table lists: (1) Each section number of the existing regulation; and (2) the section number of the final rule which contains provisions derived from the corresponding existing section.

DISTRIBUTION TABLE

Old Section	New Section
15.1.....	15.1.
15.2.....	15.2.
15.3.....	15.4.
15.4.....	Part 5.
15.5.....	15.5.
15.6(a), (b), (c), (d).....	15.5.
15.6(e).....	Removed.
15.7.....	Removed.
15.8.....	Removed.
15.9.....	15.3 and 15.9.
15.10(a)(1), (a)(2), (b)(1), (b)(3), (b)(4), (b)(5), (b)(6), (b)(7).....	15.20.
15.10(b)(2).....	Removed.
15.11.....	15.20(a).
15.12(a), (b), (c), (d), (e), (f), (g), (h).....	15.20.
15.13.....	15.6.
15.14(a), (b), (c).....	15.7.
15.14(d).....	Removed.
15.14(e).....	15.8(a).
15.15.....	15.4.
15.16.....	15.11.
15.17.....	15.9.
15.18.....	Removed.
15.19(a), (b), (c).....	Part 75.
15.19(d), (e).....	Removed.
15.20.....	15.10.
15.21(a)(1), (a)(3), (a)(4), (a)(5), (a)(6), (b)(5).....	15.10.
15.21(a)(2), (b)(4).....	Removed.
15.21(b)(1), (b)(2).....	15.21.
15.21(b)(3), (b)(6), (b)(7).....	15.22.
15.22.....	Removed.
15.23.....	Removed.
15.24.....	Removed.
The Federal Mine Safety Code (as incorporated by section 15.19(e)).	Part 75.

III. Drafting Information

The persons principally responsible for preparing this final rule are: Harry C. Verakis, Technical Support, MSHA; Helen Caraway, Office of Standards, Regulations, and Variances, MSHA; Edward C. Connor, Coal Mine Safety and Health, MSHA; Richard Mainiero, Bureau of Mines, Department of Interior; and Linda B. Fort, Office of the Solicitor, Department of Labor.

IV. Executive Order 12291 and Regulatory Flexibility Act

In accordance with Executive Order 12291, a regulatory flexibility analysis has been developed by the Agency for the purpose of comparing the cost associated with the final rule with the cost of existing requirements for approval of explosives for underground coal mines. In this analysis, summarized below, MSHA has determined that the final rule will not result in major cost increases nor have an effect of \$100,000,000 or more on the economy. Therefore, the rule is not within the criteria for a major rule and a Regulatory Impact Analysis is not required.

The Regulatory Flexibility Act requires that agencies evaluate and include, wherever possible, compliance alternatives that minimize any adverse impact on small businesses when developing regulatory proposals. MSHA revisions to the existing rule update and clarify existing compliance requirements. Clarified compliance requirements which reflect advances in technology should benefit both large and small manufacturers of explosives.

There are only seven companies who have been granted approvals for explosives to be used in underground gassy mines. Three employ over 100 people and one is a multinational corporation. MSHA has determined that the final rule will not have a significant economic impact on a substantial number of small entities. Therefore, a regulatory flexibility analysis is not required. The Agency has, however, prepared an initial regulatory flexibility analysis and estimates that the annual cost for industry compliance with the existing requirements is \$204,125 compared to \$277,170 for Subpart A (General Provisions) of the final rule. This represents a cost increase of 36 percent when compared to the existing rule. Approximately 60 percent of this increase is due to the approval requirements for sheathed explosive units which are new. However, these costs will be offset totally by the projected cost savings of \$261,497 from the use of approved sheathed in

underground coal mines. In addition, allowing the use of sheathed units underground should result in a reduction in blasting injuries. MSHA accident data from 1978 to 1987 reveals that there were 9 incidents which resulted in a total of four fatalities and 14 injuries caused by firing unconfined shots.

No fixed estimates were calculated for Subpart B as requests for such data revealed that costs could range from \$6 to approximately \$500,000 depending upon the ingredients used in explosives to meet the technical requirements of the rule. Further, because Subpart C (Sheathed Explosive Units) represents a new requirement, cost estimates for commercial production of sheathed units were not available.

V. Paperwork Reduction Act

This final rule contains information collection requirements subject to the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.*

Seven companies are listed by MSHA as having a total of about 100 different approved explosives. MSHA receives about 25 applications for some type of explosives approval per year. Approximately 12 approvals are issued each year and about 13 applications are denied approval. MSHA estimates that applications for approval require an average of five hours labor to prepare. The burden per application remains essentially the same under the final rule as under the existing requirement. MSHA estimates that the total annual recordkeeping burden under the final rule may increase slightly, primarily due to the introduction of sheathed explosive units. However, the total burden could be reduced if the total number of applications received remains at present levels.

Paperwork requirements for Part 15 are approved under OMB control number 1219-0066 which covers all of MSHA's equipment testing requirements in 30 CFR Parts 11 through 36. Part 15, which relates to explosives approval, currently specifies that the applicant submit a statement in duplicate explaining the nature and composition of the explosive. The final rule streamlines the process by specifically stating the information required for approval and extensions of approval. Information in duplicate is not required in the final rule. Moreover, the applicant will not be required to resubmit documentation duplicative of previously submitted information when requesting subsequent approval of a similar product or an extension of approval. Only information related to changes in the previously approved explosive or

sheathed explosive unit is required, avoiding unnecessary paperwork.

The final rule retains the existing requirement that the wrapper of each cartridge and each case of explosives be labeled with the brand or trade name and with a statement that the explosive is approved by MSHA. The final rule also extends these requirements to apply to sheathed explosive units. Added to the final rule is a requirement that each wrapper and case of explosives and sheathed units be marked with the test detonator strength and the minimum product firing temperature. Absent a Federal requirement, approval-holders would label explosive cartridges, sheathed explosive units and cases with the brand or trade name and would need to purchase new plates to change the name of new formulations prior to marketing. MSHA estimates that the cost of the wrapper is essentially the same with or without the words "MSHA Approved Explosive", the test detonator strength, and the minimum product firing temperature. MSHA, therefore, has associated no cost with the requirement that the label include these items.

Prior to commercial production, manufacturers conduct exhaustive tests to evaluate the performance of explosives under a variety of field conditions. Manufacturers typically include design aspects in explosive formulations so the products will properly function over the range of temperatures that may be encountered in blasting operations in underground coal mines. Characteristics related to minimum product firing temperature are part of the manufacturer's design parameters for explosives and such data is presently available in product technical information and literature.

The existing requirement for approval holder to provide a case-insert, warning the user that the explosive is approved only when used in conformance with the requirements of Part 15, is not included in the final rule. MSHA believes that requirements governing the use of explosives are appropriately included in related safety standards and should not be addressed in requirements for approval of explosives. Since the final rule deletes this case-insert requirement, the total annual cost savings would be about \$2400.

The final rule adds a new requirement that approval holders report to MSHA any knowledge of the distribution of approved explosives or sheathed explosive units not meeting the specifications of the approval. Few manufactured lots of explosives, which do not meet the specifications of the approval, are distributed inadvertently.

Based on a worst case analysis, MSHA estimates that each approval holder may need to report the distribution of explosives or sheathed units which do not meet specifications once per year. The total cost for these reports would be about \$100.

In accordance with section 3504(h) of the Paperwork Reduction Act of 1980 (Title 44 U.S.C. Chapter 35), the collection of information requirements contained in the final rule have been approved by OMB under control number 1219-0066.

List of Subjects in 30 CFR Part 15

Administrative practice and procedure, Explosives, Mine Safety and health, Underground mining.

Date: November 9, 1988.

David C. O'Neal,

Deputy Assistant Secretary for Mine Safety and Health.

Accordingly, Chapter I of Title 30, Code of Federal Regulation is amended by revising Part 15 to read as follows:

PART 15—REQUIREMENTS FOR APPROVAL OF EXPLOSIVES AND SHEATHED EXPLOSIVE UNITS

Subpart A—General Provisions

Sec.

- 15.1 Purpose and effective dates.
- 15.2 Definitions.
- 15.3 Observers at tests and evaluations.
- 15.4 Application procedures and requirements.
- 15.5 Test samples.
- 15.6 Issuance of approval.
- 15.7 Approval marking.
- 15.8 Quality assurance.
- 15.9 Disclosure of information.
- 15.10 Post-approval product audit.
- 15.11 Revocation.

Subpart B—Requirements for Approval of Explosives

- 15.20 Technical requirements.
- 15.21 Tolerances for ingredients.
- 15.22 Tolerances for performance, wrapper, and specific gravity.

Subpart C—Requirements for Approval of Sheathed Explosive Units or Other Explosive Units Designed to be Fired Outside the Confines of a Borehole

- 15.30 Technical requirements.
- 15.31 Tolerances for ingredients.
- 15.32 Tolerances for weight of explosive, sheath, wrapper, and specific gravity.

Authority: 30 U.S.C. 957.

Subpart A—General Provisions

§ 15.1 Purpose and effective dates.

This part sets forth the requirements for approval of explosives and sheathed explosive units to be used in underground coal mines and certain underground metal and nonmetal gassy mines and is effective January 17, 1989.

Those manufacturers proceeding under the provisions of the previous regulation may file requests for approval or extension of approval of explosives under that regulation until November 20, 1989. After November 20, 1989, all requests for approval or extension of approval of explosives or sheathed explosive units shall be made in accordance with Subpart A and the applicable subpart of this part. Explosives issued an approval under regulations in place prior to January 17, 1989, and in compliance with those regulations, may continue to be manufactured and marked as approved as long as no change to the explosive is made.

§ 15.2 Definitions.

The following definitions apply in this part.

Applicant. An individual or organization that manufactures or controls the production of an explosive or an explosive unit and that applies to MSHA for approval of that explosive or explosive unit.

Approval. A document issued by MSHA which states that an explosive or explosive unit has met the requirements of this part and which authorizes an approval marking identifying the explosive or explosive unit as approved as permissible.

Explosive. A substance, compound, or mixture, the primary purpose of which is to function by explosion.

Extension of approval. A document issued by MSHA which states that the change to an explosive or explosive unit previously approved by MSHA under this part meets the requirements of this part and which authorizes the continued use of the approval marking after the appropriate extension number has been added.

Minimum product firing temperature. The lowest product temperature at which the explosive or explosive unit is approved for use under this part.

Post-approval product audit. Examination, testing, or both, by MSHA of approved explosives or explosive units selected by MSHA to determine whether they meet the technical requirements and have been manufactured as approved.

Sheath. A chemical compound or mixture incorporated in a sheathed explosive unit and which forms a flame inhibiting cloud on detonation of the explosive.

Sheathed explosive unit. A device consisting of an approved or permissible explosive covered by a sheath encased in a sealed covering and designated to

be fired outside the confines of a borehole.

Test detonator. An instantaneous detonator that has a strength equivalent to that of a detonator with a base charge of 0.40-0.45 grams PETN.

§ 15.3 Observers at tests and evaluations.

Only personnel of MSHA and the Bureau of Mines, U.S. Department of the Interior, representatives of the applicant, and such other persons as agreed upon by MSHA and the applicant shall be present during tests and evaluations conducted under this part.

§ 15.4 Application procedures and requirements.

(a) **Application.** Requests for an approval or an extension of approval under this part shall be sent to: U.S. Department of Labor, Mine Safety and Health Administration, Approval and Certification Center, P.O. Box 251, Industrial Park Road, Triadelphia, West Virginia 26059.

(b) **Fees.** Fees calculated in accordance with Part 5 of this Title shall be submitted in accordance with § 5.40.

(c) **Original approval for explosives.** Each application for approval of an explosive shall include—

(1) A technical description of the explosive, including the chemical composition of the explosive with tolerances for each ingredient;

(2) A laboratory number or other suitable designation identifying the explosive. The applicant shall provide the brand or trade name under which the explosive will be marketed prior to issuance of the approval;

(3) The lengths and diameters of explosive cartridges for which approval is requested;

(4) The proposed minimum product firing temperature of the explosive; and

(5) The name, address, and telephone number of the applicant's representative responsible for answering any questions regarding the application.

(d) **Original approval for sheathed explosive units.** Each application for approval of a sheathed explosive unit shall include—

(1) A technical description of the sheathed explosive unit which includes the chemical composition of the sheath, with tolerances for each ingredient, and the types of material used for the outer covering;

(2) The minimum thickness weight, and specific gravity of the sheath and outer covering;

(3) The brand or trade name, weight, specific gravity, and minimum product firing temperature of the approved explosive to be used in the unit;

(4) The ratio of the weight of the sheath to the weight of the explosive; and

(5) The name, address and telephone number of the applicant's representative responsible for answering any questions regarding the application.

(e) **Subsequent approval of a similar explosive or sheathed explosive unit.** Each application for approval of an explosive or sheathed explosive unit similar to one for which the applicant already holds an approval shall include—

(1) The approval number of the explosive or sheathed explosive unit which most closely resembles the new one;

(2) The information specified in paragraphs (c) and (d) of this section for an original approval, as applicable, except that any document which is the same as the one listed by MSHA in the prior approval need not be submitted but shall be noted in the application; and

(3) An explanation of all change from the existing approval.

(f) **Extension of the approval.** Any change in an approved explosive or sheathed explosive unit from the documentation on file at MSHA that affects the technical requirements of this Part shall be submitted for approval prior to implementing the change.

(1) Each application for an extension of approval shall include—

(i) The MSHA-assigned approval number for the explosive or sheathed explosive unit for which the extension is sought;

(ii) A description of the proposed change to the approved explosive or sheathed explosive unit; and

(iii) The name, address, and telephone number of the applicant's representative responsible for answering any questions regarding the application.

(2) MSHA will determine what tests, additional information, samples, or material, if any, are required to evaluate the proposed change.

(3) When a change involves the chemical composition of an approved explosive or sheathed explosive unit which affects the firing characteristics, MSHA may require the explosive or sheathed explosive unit to be distinguished from those associated with the former composition.

(Approved by the Office of Management and Budget under control number 1219-0066)

§ 15.5 Test samples.

(a) **Submission of test samples.** (1) The applicant shall not submit explosives or sheathed explosive units to be tested until requested to do so by MSHA.

(2) The applicant shall submit 70 pounds of 1¼-inch diameter explosives and additional cartridges in the amount of 3200 divided by the length in inches, except for cartridges 12, 20 and greater than 36 inches long. The applicant shall submit 70 pounds and additional cartridges in the amount of 3800 divided by the length in inches for cartridges 12, 20 and greater than 36 inches long.

(3) If approval is requested for cartridges in diameters less than 1¼ inches, the applicant shall submit a number of cartridges equal to 1800 divided by the length in inches, except for cartridges 12, 20 and greater than 36 inches long. The applicant shall submit cartridges in the amount of 2200 divided by the length in inches for cartridges 12, 20 and greater than 36 inches long.

(4) If approval is requested for cartridges in diameters larger than 1¼ inches, the applicant shall submit an additional 10 cartridges of each larger diameter.

(5) If approval is requested for cartridges in more than one length, the applicant shall submit an additional 10 cartridges for each additional length and diameter combination.

(6) Each applicant seeking approval of sheathed explosive units shall submit 140 units.

(b) **Condition and composition.** Explosives and sheathed explosive units will not be tested that—

(1) Contain chlorites, chlorates, or substances that will react over an extended time and cause degradation of the explosive or sheathed explosive unit;

(2) Are chemically unstable;

(3) Show leakage;

(4) Use aluminum clips to seal the cartridge;

(5) Contain any combination of perchlorate and aluminum;

(6) Contain more than 5 percent perchlorate; or

(7) Contain any perchlorate and less than 5 percent water.

(c) **Storage.** Explosives and sheathed explosive units shall be stored in a magazine for at least 30 days before gallery tests are conducted.

§ 15.6 Issuance of approval.

(a) MSHA will issue an approval or a notice of the reasons for denying approval after completing the evaluation and testing provided for by this part.

(b) An applicant shall not advertise or otherwise represent an explosive or sheathed explosive unit as approved until MSHA has issued an approval.

§ 15.7 Approval marking.

(a) An approved explosive or sheathed explosive unit shall be marketed only under the brand or test name specified in the approval.

(b) The wrapper of each cartridge and each case of approved explosives shall be legibly labeled with the following: the brand or trade name, "MSHA Approved Explosive", the test detonator strength, and the minimum product firing temperature.

(c) The other covering of each sheathed explosive unit and each case of approved sheathed explosive units shall be legibly labeled with the following: the brand or trade name, "MSHA Approved Sheathed Explosive Unit", the test detonator strength, and the minimum product firing temperature.

(Approved by the Office of Management and Budget under control number 1219-0066)

§ 15.8 Quality assurance.

(a) Applicants granted an approval or an extension of approval under this part shall manufacture the explosive or sheathed explosive unit as approved.

(b) Applicants shall immediately report to the MSHA Approval and Certification Center, any knowledge of explosives or sheathed explosive units that have been distributed that do not meet the specifications of the approval.

(Approved by the Office of Management and Budget under control number 1219-0066)

§ 15.9 Disclosure of information.

(a) All information concerning product specifications and performance submitted to MSHA by the applicant shall be considered proprietary information.

(b) MSHA will notify the applicants of requests for disclosure of information concerning its explosives or sheathed explosive units and shall give the applicant an opportunity to provide MSHA with a statement of its position prior to any disclosure.

§ 15.10 Post-approval product audit.

(a) Approved explosives and sheathed explosive units shall be subject to periodic audits by MSHA for the purpose of determining conformity with the technical requirements upon which the approval was based. Any approved explosive or sheathed explosive unit which is to be audited shall be selected by MSHA and be representative of those distributed for use in mines. The approval-holder may obtain any final report resulting from such audit.

(b) No more than once a year, except for cause, the approval-holder, at MSHA's request, shall make one case of explosives or 25 sheathed explosive units available at no cost to MSHA for

an audit. The approval-holder may observe any tests conducted during this audit.

(c) An approved explosive or sheathed explosive unit shall be subject to audit for cause at any time MSHA believes that it is not in compliance with the technical requirements upon which the approval was based.

(d) Explosives approved under regulations in effect prior to January 17, 1989, shall conform to the provisions on field samples set out in those regulations (See 30 CFR Part 15, 1987 Edition).

§ 15.11 Revocation.

(a) MSHA may revoke for cause an approval issued under this part if the explosive or sheathed explosive unit—

(1) Fails to meet the applicable technical requirements; or

(2) Creates a hazard when used in a mine.

(b) Prior to revoking an approval, the approval-holder shall be informed in writing of MSHA's intention to revoke. The notice shall—

(1) Explain the specific reasons for the proposed revocation; and

(2) Provide the approval-holder an opportunity to demonstrate or achieve compliance with the product approval requirements.

(c) Upon request, the approval-holder shall be afforded an opportunity for a hearing.

(d) If an explosive or sheathed explosive unit poses an imminent hazard to the safety or health of miners, the approval may be immediately suspended without a written notice of the agency's intention to revoke. The suspension may continue until the revocation proceedings are completed.

Subpart B—Requirements for Approval of Explosives**§ 15.20 Technical requirements.**

(a) *Chemical composition.* The chemical composition of the explosive shall be within the tolerances furnished by the applicant.

(b) *Rate-of-detonation test.* The explosive shall propagate completely in the rate-of-detonation test. The test is conducted at an ambient temperature between 68 and 86 °F. Nongelatinous explosives are initiated with a test detonator only, while gelatinous explosives are initiated with a test detonator and a 60-gram tetryl pellet booster. The test is conducted on—

(1) A 50-inch column of 1 1/4 inch diameter cartridges; and

(2) A 50-inch column of the smallest diameter cartridges less than 1 1/4 inches submitted for testing.

(c) *Air-gap sensitivity.* The air-gap sensitivity of the explosive shall be at least 2 inches at the minimum product firing temperature and 3 inches at a temperature between 68 and 86 °F, and the explosive shall propagate completely.

(1) Air-gap sensitivity of the explosive is determined in the explosion-by-influence test using the 7-inch cartridge method. The air-gap sensitivity is determined for 1 1/4 inch diameter cartridges and each cartridge diameter smaller than 1 1/4 inches. Explosives are initiated with a test detonator.

(2) The 7-inch cartridge method is conducted with two 8-inch cartridges. One inch is cut off the end of each cartridge. The cartridges are placed in a paper tube, the cut ends facing each other, with the appropriate 2-inch or 3-inch air gap between them. The test is conducted at a temperature between 68 and 86 °F and at the minimum product firing temperature proposed by the applicant, or 41 °F, whichever is lower. The test temperature at which the explosive propagates completely will be specified in the approval as the minimum product firing temperature at which the explosive is approved for use.

(d) *Gallery Test 7.* The explosive shall yield a value of at least 450 grams for the lower 95 percent confidence limit (L_{95}) on the weight for 50 percent probability of ignition (W_{50}) in gallery test 7 and shall propagate completely. The L_{95} and W_{50} values for the explosive are determined by using the Bruceton up-and-down method. A minimum of 20 trials are made with explosive charges of varying weights, including wrapper and seals. Each charge is primed with a test detonator, then tamped and stemmed with one pound of dry-milled fire clay into the borehole of a steel cannon. The cannon is fired into air containing 7.7 to 8.3 percent of natural gas. The air temperature is between 68 and 86 °F.

(e) *Gallery Test 8.* The explosive shall yield a value of at least 350 grams for the weight for 50 percent probability of ignition (W_{50}) in gallery test 8 and shall propagate completely. The (W_{50}) value for the explosive is determined using the Bruceton up-and-down method. A minimum of 10 tests are made with explosive charges of varying weights, including wrapper and seals. Each charge is primed with a test detonator, then tamped into the borehole of a steel cannon. The cannon is fired into a mixture of 8 pounds of bituminous coal dust predispersed into 640 cubic feet of air containing 3.8 to 4.2 percent of natural gas. The air temperature is between 68 and 86 °F.

(f) *Pendulum-friction test.* The explosive shall show no perceptible reaction in the pendulum-friction test with the hard fiber-faced shoe. Ten trials of the test are conducted by releasing the steel shoe from a height of 59 inches. If there is evidence of sensitivity, the test is repeated with the hard fiber-faced shoe.

(g) *Toxic gases.* The total volume equivalent to carbon monoxide (CO) of toxic gases produced by detonation of the explosive shall not exceed 2.5 cubic feet per pound of explosive as determined in the large chamber test. The explosive shall propagate completely.

(1) The large chamber test is conducted with a one-pound explosive charge, including wrapper and seal, primed with a test detonator. The explosive charge is loaded into the borehole of a steel cannon, then tamped and stemmed with one pound of dry-milled fire clay. The cannon is fired into the large chamber and the gaseous products resulting from detonation of the explosive are collected and analyzed for toxic gases. At least two trials are conducted.

(2) The equivalent volume of each toxic gas produced, relative to CO, is determined by multiplying the measured volume of the gas by a conversion factor. The conversion factor is equal to the threshold limit value, time weighted average (TLV-TWA) in parts-per-million for CO divided by the TLV-TWA for the toxic gas. The TLV-TWA conversion factor for each gas for which MSHA shall test is specified in Table I of this subpart. The total volume equivalent to CO of the toxic gases produced by detonation of the explosive is the sum of the equivalent volumes of the individual toxic gases.

TABLE I.—CONVERSION FACTORS FOR TOXIC GASES

[For Equivalent Volume Relative to Carbon Monoxide]

	Toxic Gas	
	Conversion Factor	TLV-TWA (PPM)
Ammonia	2	25
Carbon Dioxide	0.01	5000
Carbon Monoxide	1	50
Hydrogen Sulfide	5	10
Nitric Oxide	2	25
Nitrogen Dioxide	17	3
Sulfur Dioxide	25	2

(h) *Cartridge diameter and length changes.* (1) For proposed changes to an

approved explosive involving only cartridge diameter or length, MSHA will determine what tests, if any, will be required.

(2) When a proposed change to an approved explosive involves a smaller diameter than that specified in the approval, the rate-of-detonation and air-gap sensitivity tests will be conducted.

(3) No test will be conducted on cartridges with diameters the same as or smaller than those that previously failed to detonate in the rate-of-detonation test.

(i) *New technology.* MSHA may approve an explosive that incorporates technology for which the requirements of this subpart are not applicable if MSHA determines that the explosive is as safe as those which meet the requirements of this subpart.

§ 15.21 Tolerances for ingredients.

Tolerances for each ingredient in an explosive, which are expressed as a percentage of the total explosive, shall not exceed the following:

- (a) Physical sensitizers: The tolerances established by the applicant;
- (b) Aluminum: ± 0.7 percent;
- (c) Carbonaceous materials: ± 3 percent; and
- (d) Moisture and ingredients other than specified in paragraphs (a), (b), and (c) of this section: The tolerances specified in Table II.

TABLE II.—TOLERANCES FOR MOISTURE AND OTHER INGREDIENTS

Quantity of ingredients (as percent of total explosive or sheath)	Tolerance percent
0 to 5.0	1.2
5.1 to 10.0	1.5
10.1 to 20.0	1.7
20.1 to 30.0	2.0
30.1 to 40.0	2.3
40.1 to 50.0	2.5
50.1 to 55.0	2.8
55.1 to 100.0	3.0

§ 15.22 Tolerances for performance, wrapper and specific gravity.

(a) The rate of detonation of the explosive shall be within ± 15 percent of that specified in the approval.

(b) The weight of wrapper per 100 grams of explosive shall be within ± 2 grams of that specified in the approval.

(c) The apparent specific gravity of the explosive shall be within ± 7.5 percent of that specified in the approval.

Subpart C—Requirements for Approval of Sheathed Explosive Units or Other Explosive Units Designed to be Fired Outside the Confines of a Borehole

§ 15.30 Technical requirements.

(a) *Quantity of explosive.* The sheathed explosive unit shall contain not more than $1\frac{1}{2}$ pounds of an approved or permissible explosive.

(b) *Chemical composition.* The chemical composition of the sheath shall be within the tolerances furnished by the applicant.

(c) *Detonator well.* The sheathed explosive unit shall have a detonator well that—

- (1) Is protected by a sealed covering;
- (2) Permits an instantaneous detonator to be inserted in the unit with the detonator completely embedded in the well;
- (3) Is provided with a means of securing the detonator in the well; and
- (4) Is clearly marked.

(d) *Drop test.* The outer covering of the sheathed explosive unit shall not tear or rupture and the internal components shall not shift position or be damaged in the drop test.

(1) The drop test is conducted on at least 10 sheathed explosive units. Each unit is dropped on its top, bottom, and edge from a height of 6 feet onto a concrete surface. For units with explosives approved with a minimum product firing temperature, the drop test is performed with the unit at the minimum product firing temperature established for the explosive in the unit. For units with explosives approved under regulations in effect prior to [the effective date of this rule], the drop test is performed with the unit at 41 °F.

(2) At least four units which have been drop-tested shall be cut-open and examined.

(3) At least six units which have been drop-tested shall be subjected to gallery tests 9 and 10 as provided in paragraphs (e)(1) and (e)(2) of this section.

(e) *Gallery tests.* No sheathed explosive unit shall cause an ignition in gallery tests 9, 10, 11, or 12. Ten trials in each gallery test shall be conducted and each sheathed explosive unit shall propagate completely in all tests.

(1) Gallery test 9 is conducted in each trial with three sheathed explosive units placed in a row 2 feet apart. One of the trials is conducted with sheathed explosive units which have been subjected to the drop test as provided in paragraph (d)(3) of this section. The units are placed on a concrete slab, primed with test detonators and fired in air containing 7.7 to 8.3 percent natural

gas or 8.7 to 9.3 percent methane. The air temperature is between 41 and 86 °F.

(2) Gallery test 10 is conducted in each trial with three sheathed explosive units placed in a row 2 feet apart. One of the trials is conducted with sheathed explosive units which have been subjected to the drop test as provided in paragraph (d)(3) of this section. The units are placed on a concrete slab, primed with test detonators and fired in air containing 3.8 to 4.2 percent natural gas, or 4.3 to 4.7 percent methane, mixed with 0.2 ounces per cubic foot of predispersed bituminous coal dust. The air temperature is between 41 and 86 °F.

(3) Gallery test 11 is conducted in each trial with three sheathed explosive units arranged in a triangular pattern with the units in contact with each other. The units are placed in a simulated crevice formed between two square concrete slabs, each measuring 24 inches on a side and 2 inches in thickness. The crevice is formed by placing one slab on top of the other and raising the edge of the upper slab at least 4 inches. The sheathed explosive units are primed with test detonators

and fired in air containing 7.7 to 8.3 percent natural gas or 8.7 to 9.3 percent methane. The air temperature is between 41 and 86 °F.

(4) Gallery test 12 is conducted in each trial with three sheathed explosive units arranged in a triangular pattern with the units in contact with each other. The units are placed in a corner formed by three square steel plates, each measuring 24 inches on a side and one inch in thickness. The sheathed explosive units are primed with test detonators and fired in air containing 7.7 to 8.3 percent natural gas or 8.7 to 9.3 percent methane. The air temperature is between 41 and 86 °F.

(f) *Detonation test.* Each of ten sheathed explosive units shall propagate completely when fired at the minimum product firing temperature for the explosive used in the unit or 41 °F for units with explosives approved under regulations in effect prior to [insert the effective date of this rule]. The units are initiated with test detonators.

(g) *New technology.* MSHA may approve an explosive unit designed to be fired outside the confines of a

borehole that incorporates technology for which the requirements of this subpart are not applicable if MSHA determines that such explosive unit is as safe as those which meet the requirements of this subpart.

§ 15.31 Tolerances for ingredients.

Tolerances established by the applicant for each ingredient in the sheath shall not exceed the tolerances specified in Table II § 15.21 of this part.

§ 15.32 Tolerances for weight of explosive, sheath, wrapper, and specific gravity.

(a) The weight of the explosive, the sheath, and the outer covering shall each be within ± 7.5 percent of that specified in the approval.

(b) The ratio of the weight of the sheath to that of the explosive shall be within ± 7.5 percent of that specified in the approval.

(c) The specific gravity of the explosive and sheath shall be within ± 7.5 percent of that specified in the approval.

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FRIDAY
NOVEMBER 18, 1988

Friday
November 18, 1988

Part III

Department of Labor

Mine Safety and Health Administration

30 CFR Part 75

**Safety Standards for Explosives and
Blasting; Final Rule**

DEPARTMENT OF LABOR**Mine Safety and Health Administration
30 CFR Part 75****Safety Standards For Explosives And
Blasting****AGENCY:** Mine Safety and Health Administration, Labor.**ACTION:** Final rule.

SUMMARY: This final rule revises the Mine Safety and Health Administration's (MSHA) existing safety standards for explosives and blasting in underground coal mines. The revisions update existing provisions consistent with current technology, eliminate duplicative and unnecessary standards, reorganize the existing standards and provide alternative methods of compliance where possible.

EFFECTIVE DATE: The final rule is effective January 17, 1989.

FOR FURTHER INFORMATION CONTACT: Patricia W. Silvey, Director, Office of Standards, Regulations and Variances, MSHA, 4015 Wilson Boulevard, Room 627, Arlington, Virginia 22203; phone (703) 235-1910.

SUPPLEMENTARY INFORMATION:**I. Background**

The final rule revises the Mine Safety and Health Administration's existing safety standards for explosives and blasting in underground coal mines. These revisions are promulgated under section 101 of the Federal Mine Safety and Health Act of 1977 (Mine Act).

On May 8, 1984, MSHA published a notice in the *Federal Register* which announced the availability of its preproposal draft of explosive standards and scheduled public conferences to discuss it (49 FR 19601). Public conferences were held June 12, 1984, in Lexington, Kentucky, and June 14, 1984, in Pittsburgh, Pennsylvania. These conferences were well attended and MSHA received written comments from all segments of the coal mining community.

On May 9, 1986, MSHA published a proposed rule in the *Federal Register* (51 FR 17284). The proposal addressed the comments received regarding the preproposal draft. MSHA published a notice of public hearings in the *Federal Register* on October 21, 1986 (51 FR 37376). Hearings were held on November 18, 1986, in Pittsburgh, Pennsylvania, and November 20, 1986, in Lexington, Kentucky.

MSHA published a *Federal Register* notice (58 FR 9670) scheduling another hearing to receive additional testimony from interested parties concerning safety considerations when

instantaneous and short-delay electric detonators are used in the same circuit. This hearing was held in Bruceton, Pennsylvania on April 22, 1987. The record remained open until May 15, 1987, to allow for the submission of post-hearing written comments and data on this issue. The record closed on December 19, 1986 for all other issues.

The Agency's final rule addresses the major comments received and is consistent with the goals of Executive Order 12291, the Regulatory Flexibility Act, the Paperwork Reduction Act and the Mine Act.

II. Discussion of the Final Rule**A. General Discussion**

The use of explosives in underground coal mines presents a potentially serious risk of injury and death to miners. From 1978 through 1987 there were 41 fatalities resulting from the improper use of explosives. Additionally, during this period there were 312 nonfatal injuries in coal mines resulting from the improper use of explosives. Prevention of accidents involving explosives depends to a large extent on the knowledge and experience of persons in the mine responsible for using explosives, and adherence to the standards which guide mine operators and miners in the safe conduct of blasting operations.

The final rule addresses the need for knowledgeable and experienced personnel to perform blasting functions by requiring only "qualified persons" or persons working in the presence of and under the direction of a qualified person to use explosives underground. The final rule also updates MSHA's existing standards for explosives consistent with modern blasting practices and products. The final rule supplements existing standards where they currently do not address important aspects of blasting and deletes obsolete provisions.

Prevention of accidents with explosives is also dependent on the use of components especially designed to operate safely in an underground environment containing coal dust and methane gas. The final rule continues to require that explosives and blasting units used in underground coal mines be approved by MSHA. The regulations governing MSHA approval of explosives and sheathed explosive units are being published, in a separate rulemaking, simultaneously with this final rule. The Agency is also developing revisions to the approval requirements for blasting units. These revisions, which have been proposed as a subpart to 30 CFR Part 7, Product Testing by Applicant or Third Party, were made available for public

comment in the *Federal Register* on June 22, 1988 (53 FR 23506). In addition, MSHA will seek to include in its regulatory program an approval schedule for detonators used in underground coal mines. As part of that rulemaking, changes would be made in this final rule to require the use of such approved detonators.

B. Section-by-Section Discussion**Section 75.1300 Definitions.**

The practice of sequentially lettering general definitions in existing subparts, which was carried forward in the proposed rule, has been eliminated in this final rule. The former method was confusing to many commenters who questioned why the Subpart N revision of definitions began at letter "r". The final rule now contains definitions of terms specifically related to Subpart N arranged in alphabetical order.

Many commenters stated that the term "permissible", which was excluded in the proposed rule, has and continues to have widespread use and should be retained in the final rule. As a result, the final rule includes two definitions from the preproposal, "permissible blasting unit" and "permissible explosive."

The following definitions apply to Subpart N:

Approval. This term describes a written document issued by MSHA which states that an explosive or explosive unit has met the requirements of Part 15 and which authorizes an approval marking identifying the explosive or explosive unit as approved as permissible. This definition has been added to make Part 75, Subpart N consistent with Part 15.

Battery starting. This definition identifies a specific exclusion to the prohibition of firing shots outside a borehole and applies only to anthracite mines. A commenter objected to the use of unconfined shots in battery starting preferring to initiate the flow of coal down a breast or chute by other means, thereby reducing exposure of miners to unnecessary hazards. However, this procedure has been performed in anthracite mines for many years as long as methane was reduced to less than 1 percent. Because anthracite dust is not explosive, it does not present the same hazard as bituminous coal dust and the Agency has therefore retained the definition.

Blasting off the solid. This definition provides an explanation of a blasting technique which occurs without the provision of a kerf or second free face. The final rule is extended to include rock as well as coal blasting in response

to commenters who stated that it is not uncommon to encounter a rock fault across the full working face. While some commenters recommended prohibiting blasting off the solid stating that the practice is outdated and an unsafe method of mining, the Agency defines and regulates this practice under this final rule.

Instantaneous detonator. This definition describes a type of electric detonator that is commercially available for use in underground coal mines and which also has the performance characteristics for use with a sheathed explosive unit.

Laminated partition. This definition specifies the construction of the partition required to separate detonators from explosives when transported or stored. The definition remains unchanged from the proposed rule.

Opener hole. This definition describes the first borehole or holes fired in a ground when blasting off the solid to create an additional free face. This definition is essentially unchanged from the proposed rule.

Permissible blasting unit. This definition specifies a device which has been approved by MSHA for firing electric detonators. MSHA is in the process of revising the approval requirements for blasting units. The term "approved" that was used in the proposed Part 75, Subpart N definition is changed to "permissible" in response to comments. The proposed rule used the term "approved" instead of "permissible" to describe the explosive and blasting equipment required to be used by these provisions. The purpose of this was to standardize MSHA terminology used to describe mining products evaluated for safety by the Agency. Commenters objected, however, stating that this would result in confusion. In support of this, they noted that the term "permissible" has a long history of use in the explosives industry and that it also appears in State mining regulations. MSHA agrees that the term "permissible" is pervasively used in the industry worldwide to describe MSHA-approved explosives and blasting units. Upon reconsideration, MSHA retains the term "permissible blasting unit" in the final rule.

Permissible explosive. This definition specifies an explosive substance approved by MSHA for use in underground coal mines. As indicated above, the term "permissible" was used in the preproposal, but not retained in the proposal. Commenters urged that the term "permissible" be used instead of the term "approved." The final rule

retains the term "permissible explosive."

Round. This definition describes a group of boreholes which are fired or intended to be fired in a continuous sequence by a single application of the firing current. One commenter suggested that the term "shots" in the proposed definition be changed to "holes" because this term is accepted and familiar in the industry. However, in the final rule, the term "shots" is changed to "boreholes." This term is more specific and is in keeping with the Agency's intent that regulations be as unambiguous as possible.

Sheathed explosive unit. This definition, as does the proposed definition, describes the unit as "a permissible explosive covered by a sheath of flame-inhibiting material encased in a sealed covering." Commenters stated that this terminology was too specific and would not provide for new technology. However, provisions are added to § 75.1315 to allow for the introduction of new technology. Accordingly, the definition is retained in the final rule to distinguish the units from other types of explosives.

Short-delay electric detonator. This definition specifies the range of delay periods for short-delay detonators that are commercially available for use in underground coal mines.

One commenter recommended that delay period numbers be included in the definition. However, delay period numbers corresponding to a given delay time may vary from manufacturer to manufacturer and thus not be uniform throughout the industry. Therefore, the Agency has not included delay period numbers in the definition.

Another commenter stated that the extension of the delay period beyond 500 milliseconds is not supported by established or promulgated regulations. However, research conducted by the Bureau of Mines, in conjunction with MSHA, has provided evidence that this time period can be extended to 1,000 milliseconds without increasing the risk of a methane or coal dust explosion. Accordingly, the definition is unchanged from the proposal. Comments concerning approved detonators are further discussed under § 75.1310(e).

Section 75.1301 Qualified person.

This standard revises the existing provision of 30 CFR Part 15 requiring explosives to be fired by "certified shot firers" and sets forth requirements for becoming qualified to perform this work.

MSHA statistics indicate that the persons most frequently injured in accidents with explosives are those firing the explosives. A frequent

contributing factor has been the failure of these persons to follow safe blasting practices.

To address this risk to miner safety, the proposal included alternative qualification requirements for persons using explosives. Under the proposal, persons could have been qualified to use explosives if they were certified or qualified to do so by the State in which the mine was located, or if they had at least 1 year of underground coal mining experience and have demonstrated to an authorized representative of the Secretary the ability to properly use permissible explosives.

The final rule provides two alternatives for achieving qualification under this subpart. First, a person is a "qualified person" when the individual is certified or qualified to use explosives by the State in which the mine is located, provided that the State requires a demonstration of ability to safely use permissible explosives in accordance with Subpart N. This approach continues to recognize State qualification and certification programs for shot firers. However, under the final rule these programs will only be recognized if a demonstration of ability is included in the State program. This change from the proposal and existing standards recognizes evaluation of the individual's skill to safely use explosives to be the objective of the qualification requirement in the final rule.

Second, in States that do not certify or qualify persons to use explosives, a person is a "qualified person" if the individual has at least 1 year experience working underground on a coal-producing section of a mine where explosives are used and demonstrates to an authorized representative of the Secretary the ability to safely use explosives. Upon successful demonstration of this ability, MSHA's authorized representative will make application through the Qualification and Certification Unit in Denver, Colorado and a document indicating Federal qualification will be issued to the applicant. This aspect of the final rule provides for Federal qualification of persons to use explosives in underground coal mines. It addresses the need for a qualification program where none is available from the State in which the mine is located. The requirement is supported by MSHA accident data which shows that failure of the blaster to follow safe blasting practices or regulations was a contributing factor in over 80% of the fatal blasting accidents in underground coal mines from 1980 through 1986. In

addition, a Bureau of Mines evaluation of coal mine blasting accidents between 1978 and 1981 shows that the blaster was the person injured in 65% of the accidents.

The 1-year experience requirement was included in the proposal. However, the final rule specifies that such experience must be acquired while working on a coal-producing section where explosives are used. This change reflects the need for relevant experience that can be expected to provide the prospective qualified person with basic knowledge about the underground coal mining environment where explosives are used and the safety considerations uniquely involved in this work. To protect the safety of himself and others, the blaster must be capable of recognizing hazards associated with methane and roof and rib conditions in the working place. Additionally, the blaster must know the potential dangers from equipment and other mining activities in the immediate face area. He must also be experienced in face area development and mining techniques to ensure the safety of all section personnel during blasting.

One commenter expressed the opinion that State shot firer certification programs are inadequate and noted that training courses and written tests are required in other major mining countries. Other commenters stated that certain State programs such as those in Colorado and Virginia were effective and therefore should not be duplicated by the Federal Government. No comments from any State mining agencies were received on this issue. MSHA recognizes that State requirements for qualification or certification of persons to use explosives are not uniform. These programs, however, can provide appropriate systems for qualifying persons if certain necessary elements are met. The final rule, therefore, continues to recognize them, provided that a demonstration of ability to safely use permissible explosives in accordance with this subpart is included in the State program. The demonstration of ability requirement will provide a means of ensuring that each person is competent to use such explosives.

MSHA is aware that there are States which do not currently require this demonstration of ability in their qualification programs and, therefore, need time to address this issue. For this reason, paragraph (b) provides that persons qualified or certified by a State to use permissible explosives underground prior to May 17, 1989, that is, six months after publication, are

considered qualified under § 75.1301 even though the State program did not contain a demonstration of ability requirement. During this six-month period, those States with programs which do not meet the requirements of this rule can take the necessary steps for a demonstration of ability provision in their programs. After the six months have elapsed, however, State programs without this provision will not be recognized by MSHA and persons qualified or certified under such programs will not be considered "qualified persons" for purpose of this rule.

For purposes of Federal qualification, other commenters suggested deletion of the coal mining experience requirement and retaining only a demonstration of ability requirement. These commenters indicated that if persons can demonstrate their ability, then experience is unnecessary. The commenters went on to note that, in the western United States, miners with extensive underground noncoal mining experience could be precluded from being qualified persons and that, as a result, some western coal mine operators might encounter difficulty finding miners with the required experience.

The conditions and hazards inherent in underground coal mining where explosives are used are different than most noncoal mines. The presence of methane gas and coal dust in the mining atmosphere presents hazards from ignitions and mine explosions not encountered in most other types of mines where explosives are used. For these reasons, the proposed coal mining experience requirement is retained in the final rule.

A commenter also recommended that MSHA continue to recognize State programs for qualifying persons to use explosives in underground coal mines, but not establish a new Federal requirement. This approach, however, was not adopted since it would not address the qualification of persons to work in mines in States with no qualification or certification program.

Section 75.1310 Explosives and blasting equipment.

This section of the final rule is derived from existing §§ 15.19(d), 75.1300 and 75.1303 except paragraph (d) which is new, and prescribes the types of explosives and blasting equipment that are permitted in underground coal mines. In addition, the section prohibits certain types of blasting materials from being taken or used in underground coal mines.

Paragraph (a) allows only permissible explosives, approved sheathed explosive units and permissible blasting units to be taken into or used in the underground areas of coal mines because of the potential explosive atmosphere. The final rule differs from the proposed rule in several respects. The proposal specified that explosives taken underground be approved under 30 CFR Part 15, Requirements for Approval of Explosives and Sheathed Explosive Units. It did not expressly recognize sheathed explosive units nor specify that only approved blasting units be taken underground. For clarity, the final rule identifies approved sheathed explosive units, which will be evaluated for use in mines by MSHA under revised Part 15, as being permitted in underground coal mines. In addition, it specifies that only permissible blasting units are to be taken or used underground.

Paragraph (b) lists those blasting items which are not permitted to be taken into or used in underground areas. These are black blasting powder, aluminum or aluminum-alloy-cased detonators with aluminum leg wires and safety fuses. Black blasting powder and safety fuses involve recognized fire and explosion hazards. Black blasting powder is highly deflagrating and does not have the flame-inhibiting characteristics required for approved explosives. The final rule identifies black blasting powder as a prohibited explosive in underground coal mines. This was not included in the proposal because only approved explosives, which do not include black blasting powder, were to be permitted underground. For clarity, however, the final rule retains the existing prohibition against the use of black blasting powder. A safety fuse, when ignited, produces a jet of flame that will ignite methane or float coal dust. Aluminum also presents a safety hazard because of its high incendiarity. A coating of aluminum oxide can also form on the blasting wires and cause an increase in the electric contact resistance which can be the source of a misfire in a blasting circuit. Because of the mechanical properties of aluminum wire, splices can also loosen and reduce the contact between conductors.

Explosives, sheathed explosive units and blasting units must meet certain design and performance requirements to be approved for use in the potentially explosive atmosphere of underground coal mines. The materials prohibited by paragraph (b) do not meet these safety requirements and are known to present

a hazard if used in underground coal mines.

Some commenters requested that the proposed prohibition of nonelectric initiating systems be removed. While the final rule does not retain the proposed prohibition against nonelectric initiating devices, the definitions of instantaneous and short-delay detonators address only electric initiation systems. Commenters presented information which shows that new developments in explosive initiating systems indicate that alternate systems safe for use in underground coal mines may be developed in the foreseeable future. Presently MSHA has no criteria with which to evaluate nonelectric initiating systems. Until such time as standards are developed, the present petition for modification procedures are available to the mining industry. This process would require a case-by-case evaluation of nonelectric initiating systems to determine whether they perform as safely as the present performance of electric initiating devices.

Paragraph (c) requires that explosives be fired only with a permissible blasting unit used in a manner consistent with the blasting unit approval. This provision of the final rule replaces the proposed provision that explosives be fired only with an approved blasting unit that has sufficient capacity and is appropriate for the blasting operation.

MSHA recognizes that firing rounds containing a large number of boreholes is necessary under certain circumstances, such as when large amounts of rock need to be blasted. To address these conditions, blasting units designed to fire more than 20 boreholes, sometimes called large-capacity blasting units, have been tested and evaluated by the Agency under interim criteria and specifications and have been permitted to be used. The Agency's existing approval regulations for blasting units, 30 CFR Part 25, do not include specifications for the approval of such units. However, through the separate rulemaking of 30 CFR Part 7, Subpart D Blasting Units, MSHA has proposed new approval specifications that would recognize blasting units with the capacity to fire more than 20 boreholes in a round. Until these new approval regulations for blasting units are completed, blasting units evaluated under interim criteria by MSHA for safe use in underground coal mine atmospheres are considered to be approved for purposes of this regulation. Paragraph (c), therefore, requires that explosives be fired only with a

permissible blasting unit used in a manner consistent with its approval.

Those blasting units that are approved by MSHA to fire only short-delay electric detonators will still continue to be permissible under this final rule. The Agency intends to allow these units to be used when firing instantaneous and short-delay detonators up to 1,000 milliseconds in bituminous mines, and also long period delay detonators in anthracite mines since there is no safety hazard apparent in using blasting units with either of these detonators. Research conducted by the Bureau of Mines in developing criteria for sheathed units and evaluating delay periods for detonators has demonstrated that permissible blasting units approved under Part 25 can be used safely with instantaneous, short- and long-delay detonators.

The primary purpose of using approved blasting units is to minimize the risk of igniting methane gas released by blasting or igniting coal dust placed into suspension by the forces created by the detonation of explosives. While this hazard is greater in the face area and in return air courses, it is also present in other areas of the mine when explosives are fired. As noted in the proposal, in 1970 a coal dust explosion occurred in an area outby the face and 38 miners were killed. While this accident may not have been caused by the failure to use an approved blasting unit, it does demonstrate that the potential exists for an ignition of coal dust or methane in areas of the mine other than inby the last open crosscut or in return air courses. For this reason, the final rule retains the principle of the existing standards that only blasting units approved as permissible are permitted in underground coal mines.

A commenter questioned the proposed requirement that the blasting unit used be "appropriate for the blasting operation". The purpose of this provision was to require that the capacity and function of the blasting unit be matched with the blasting to be performed. This purpose is addressed by the final rule which requires that a permissible blasting unit be "used in a manner consistent with its approval". Thus, if a blasting unit is approved to initiate up to 20 boreholes per round, it must not be used to initiate more than 20 boreholes in a round.

Paragraph (d) prohibits the use of permissible explosives and sheathed explosive units underground when they are below the minimum product firing temperature specified by the approval. The minimum product firing temperature for permissible explosives and sheathed

explosive units are part of the approval issued for such explosives and sheathed units under Part 15. As explained in the proposal, the product temperature at which an explosive or sheathed unit is used directly affects its safe performance. Additional discussion of this issue can be found in the new explosives approval regulations.

Several commenters noted that the minimum product firing temperatures for approved explosives are not presently available. Previous MSHA regulations for the approval of explosives did not address a minimum product firing temperature. In Part 15, the final rule for the approval of explosives and sheathed explosive units requires the manufacturer to designate and display the minimum product firing temperature on the approval label. Under this final rule, explosives and sheathed units must not be fired when the product is below the temperature appearing on the approval label. MSHA will continue to allow the use of previously approved explosives recommending that they be fired in accordance with the manufacturer's recommended product temperature.

Paragraph (e) requires that electric detonators be compatible with the blasting unit and have sufficient strength to initiate the explosive being used. When operated, permissible blasting units provide a short burst of electric current within certain specifications. Factors that influence the performance of these units in conjunction with permissible explosives include the resistance created by the detonators to be fired and the energy necessary to initiate them. For example, detonators requiring more than 2 amperes to reliably initiate them may result in misfires when used with permissible blasting units. Likewise, some imported detonators of less than No. 8 strength may not reliably fire certain types of permissible explosives. MSHA is aware of detonators, introduced into the U.S. market and advertised as suitable for use in gassy mines, which require an initiating current exceeding the tested capacity of blasting units approved under 30 CFR Part 25. Further, Bureau of Mines tests of other imported detonators entering the U.S. market show reduced minimum no-fire currents. Uncontrolled minimum no-fire currents could lead to detonation of explosives during circuit testing, or greater sensitivity to stray electrical currents. These are examples of detonators which would be incompatible with the blasting unit and therefore not allowed under this provision.

Under the preproposal draft, the issue of detonator compatibility was to be primarily addressed by new MSHA approval regulations for detonators. The proposal did not retain this approach, except that it would have required blasting units to "have sufficient capacity and be appropriate for the blasting operation". Since the proposed rule was published, MSHA has become aware of new detonators on the market which may not have the same characteristics as those previously available. Therefore, MSHA will seek to include an approval schedule for detonators used in underground coal mines in its regulatory program.

Section 75.1311 Transporting explosives and detonators.

This standard is derived from existing §§ 75.1301, 75.1304, 75.1305 and 75.1403-7 except § 75.1311(b)(2). This section specifies the requirements for transporting explosives and detonators underground. The hazards addressed by these standards are damage to explosives and detonators and accidental detonations. The final rule maintains the approach used in the proposal by specifying requirements for particular methods of transportation.

The final rule also adopts the suggestions of a commenter who recommended that the new standards should distinguish between track-mounted and other types of vehicles. The final rule distinguishes requirements for cars or vehicles and trolley locomotives based on the unique hazards which are presented by each mode of transportation. The final rule separately addresses the transportation of explosives and detonators by hand.

Paragraph (a) sets forth general requirements for transporting explosives and detonators underground, regardless of the transportation method. As in the proposal, the final rule requires that explosives and detonators be enclosed in separate, substantially constructed containers made of nonconductive material, with no metal or other conductive material exposed inside. It further clarifies that both Class A and Class C detonators in quantities greater than 1,000 be maintained in the original containers as shipped from the manufacturer to gain additional protection against accidental initiation. This is consistent with Department of Transportation (DOT) requirements for transporting explosives and detonators unless they are transported in separate vehicles. This provision reduces the risk of damage or spillage. Transporting explosives and detonators in separate containers segregates the initiating devices from the explosives, thus

providing protection against accidental detonation of the explosives by the detonators. Substantially constructed, nonconductive containers protect explosives and detonators from electric current and damage or spillage during transportation. Typically, original containers for explosives are heavy grade cardboard with a water-repellant finish. When closed and in good condition, these containers adequately protect the contents. Likewise, the original packaging for detonators is nonconductive and holds the product in a stable, protected fashion suitable for transportation underground.

Paragraph (a) also requires that each container of explosives and detonators be indelibly marked with a readily visible warning identifying the contents. This final rule differs from the proposal which required only that the container be marked with a warning identifying the contents as explosive.

One commenter noted that the proposal might have allowed a person to print a warning with chalk and suggested that reflective lettering at least 6-inches high be required. The final rule provides that the warning must be "readily visible". This means that the warning must be easily seen by those people who work in the vicinity of the containers so as to alert them to the presence and contents of the containers. With this approach, the final rule permits the use of any effective method that informs approaching miners of the presence of explosives and detonators. In the final rule "indelibly" marked is added in response to this comment. "Indelibly marked" does not allow the use of chalk or any writing material which could be smeared, erased, or susceptible to change from the mine environment.

Paragraph (b) of the final rule applies when explosives and detonators are transported by any type of cars or vehicles. The cars or vehicles must be marked with warnings identifying the contents as explosive. The warning must be visible for miners approaching from any direction and be written in indelible letters. This warning can be in the form of removable signs. The final rule remains substantially the same as the proposal. The term "vehicle" is added to the final rule to clarify that these standards apply to any type of explosives and transportation equipment used underground. Because a car or vehicle can change direction or be approached from various sides and directions, the final rule essentially includes the preproposal provision in specifying that the warning be readily

visible to miners approaching from any direction.

Several commenters suggested that the final rule include a new requirement that containers carrying explosives and detonators be situated in vehicles and cars so that they do not extend beyond the profile of the vehicle. While such a provision would limit the possibilities of damage and spillage if a container were to strike the roof or a rib, MSHA has concluded that such a requirement is unnecessary. The Agency's evaluation of explosive-related transportation accidents in underground coal mines did not indicate that any of these accidents were caused by the containers of explosives or detonators extending beyond the profile of the vehicle.

Paragraph (b) also addresses requirements for transporting detonators with explosives. It requires that explosives and detonators be transported in separate cars or vehicles. As an alternative, explosives and detonators may be transported in the same car or vehicle, provided that both Class A and Class C detonators in quantities greater than 1,000 are kept in the original containers as shipped from the manufacturer and separated from explosives by a hardwood partition of at least 4 inches thick, a laminated partition or equivalent. Additional protection must be provided when transporting these types and quantities of detonators with explosives. The experience of the Institute of Makers of Explosives (IME) has also shown that all Class A and Class C electric detonators may be shipped with prescribed packaging requirements and quantities in an IME 22 container. This container provides protection which is consistent with the hardwood or laminated partition prescribed in this rule. The IME publication entitled "Guide for the Use of IME 22 Container", April, 1988, provides information related to packaging and container shipment of detonators. Both Class A and Class C detonators may be transported in quantities of no more than 1,000 in the same vehicle with explosives if separated by 4 inches of hardwood, a laminated partition or equivalent. The principal purpose behind separating explosives and detonators during transportation is to minimize the danger of detonating the explosives in the event the detonators are accidentally initiated. The final rule further clarifies explosives transportation requirements in the proposal by requiring additional protection when certain detonators are transported with explosives. This final rule provision is consistent with IME guidelines and DOT regulations.

In response to several comments to the preproposal, the definition of "laminated partition" was revised in the proposed rule to specify minimum nominal dimensions for a laminated barrier rather than exact dimensions. The definition was derived from the Institute of Makers of Explosives, Pamphlet Number 22, January 1, 1985. The final definition is the same as the proposal.

Paragraph (b)(3) prohibits persons, other than those necessary to operate the equipment or to accompany the explosives and detonators, from being transported with the explosives and detonators. This provision is the same as the proposal and provides for a minimum number of miners to be exposed to a potentially hazardous situation.

Several commenters recommended that the final rule distinguish between track-mounted vehicles used for transportation of explosives and detonators and other types of vehicles used for this purpose. In response to these comments, and recognizing that certain track-mounted vehicles carrying explosives and detonators can involve hazards such as sparks from an arcing trolley wire which are not present with other types of vehicles, the use of trolley locomotives is separately addressed in paragraph (b)(4).

The final rule revises and makes mandatory the existing safeguard criterion in § 75.1403-7(i). It requires that trips carrying explosives and detonators be separated by at least a 5-minute interval from mantrips. Although not included in the proposed rule, a similar provision requiring a 5-minute interval was included in the preproposal draft. One commenter objected that the provision was not in the proposed rule. Based on the Agency's experience with the existing criterion, the 5-minute interval is an effective safety measure. This precaution reduces the chance of any collision with other track haulage equipment when explosives or detonators are being transported. Should a collision occur causing the detonation of transported explosives, the entire mine is in jeopardy of a propagating coal dust explosion. A review of MSHA accident data shows a high frequency of track haulage accidents underground. This information coupled with the hazards of transporting explosives and detonators, has caused MSHA, upon reconsideration, to adopt the 5-minute interval but limits the application to mantrips rather than all trips as specified in the preproposal. No commenters on the preproposal opposed its inclusion. The final rule deletes the

existing criteria provision contained in § 75.1403-7(i) and makes the 5-minute interval mandatory for all mantrips.

The final rule also requires that when trolley locomotives are used, the cars containing explosives and detonators must be separated from the locomotive by at least one car that is either empty or that only contains noncombustible materials. This standard was included in the preproposal, but not in the proposal draft. It addresses the danger of an accident or a sudden stop during which the explosives or detonators could, unless adequately separated from the locomotive, come into contact with the heat or electricity generated by the locomotive, possibly resulting in an explosion.

Paragraph (c) sets forth requirements for transporting explosives and detonators on conveyor belts. These standards require explosives and detonators to be kept separated to avoid an accident with one from involving the other. The final rule also addresses the hazard of damaging and spilling explosives and detonators when using belt conveyors for transportation. One commenter suggested that in mines where there is a means of transporting explosives and detonators other than conveyor belts, the final rule should require the other method to be used. In MSHA's experience, transportation of explosives and detonators by conveyor belt is safe, provided that the precautions prescribed by the rule are followed. When dangerous circumstances have been created during transportation of explosives and detonators by conveyor belt, they have been the result of collisions with obstructions or unsafe handling practices at transfer points or when unloading.

Like the proposal, paragraph (c)(1) provides that at least 6 inches of clearance must be maintained between the top of any container of detonators or explosives and the mine roof, or other obstruction along the conveyor belt. A commenter suggested that a minimum of 18 inches of clearance be required to be maintained between the top of containers of explosives and detonators and the mine roof or other obstruction. The final rule requires 6 inches of clearance instead of 18 inches because the required clearance is both adequate and reasonable to protect against damage to or spillage of explosives and detonators. It also accounts for vertical movement of the containers at uneven locations along a beltline, while recognizing the confined nature of the underground environment.

Except when persons are riding the belt to accompany explosives or detonators, a person must be at each transfer point between belts and the unloading location. This exception has been retained from the proposal recognizing that these persons would be in a position to stop the belts at these transfer and unloading points. Conveyor belts are also required to be stopped before explosives or detonators are loaded or unloaded. This new provision has been added to the final rule in response to a comment and is based on MSHA's assessment of several hazards associated with working around moving conveyor belts. An MSHA study, presented at the Fourteenth Annual Institute on Coal Mining Health and Safety at Blacksburg Virginia in 1983, on transportation and materials handling during the period from 1975 to 1982 showed 50 persons of all accidents associated with handling materials in underground coal mines to be conveyor related. Stopping the belt before loading or unloading allows stable positioning of cartons thereby reducing the potential of explosives and/or detonators from being carried over a belt tailpiece causing damage or detonation. It also protects against the hazard of miners being pulled into the moving belt during the course of handling containers.

Paragraph (d) addresses transportation of explosives and detonators by hand. It requires that they be carried in separate, nonconductive containers to keep explosives from coming in contact with initiating devices and to protect explosives and detonators from external electric sources. The original containers, rubberized bags or other nonconductive containers may be used to comply with this provision. The use of rubberized bags when transporting explosives and detonators by hand has proven to be safe.

The provision addressing hand-carried explosives and detonators was inadvertently left out of the proposal. MSHA recognizes that hand-carrying is likely to be used at some point when transporting explosives and detonators to the place of use. Therefore, this provision has been added to the final rule.

Section 75.1312 Explosives and detonators in underground magazines.

The final rule is derived from existing § 15.19(b) and §§ 75.1301, 75.1306 and 75.1307, except for paragraphs (c), (f) and (g) which are new. The rule establishes basic requirements for explosives and detonators kept in underground magazines and places

limits on the quantity of explosives permitted underground.

Paragraph (a), like the existing rule, limits the quantity of explosives kept in underground magazines to no more than is needed for 48 hours of use. This quantity limit, which remains unchanged from the proposed rule, will vary at each mine according to the amount of explosives used in the operation. Limiting the amount of explosives underground protects against a large quantity of explosives being involved in a mine fire or explosion.

One commenter recommended a limit on both the quantity and time during which explosives may be stored, suggesting that only amounts needed and used within a 24-hour time period be permitted. Other commenters expressed concern that the proposed 48-hour period could lead to enforcement problems since usage may vary at a particular mine for any 48-hour time period, particularly for an operator who does not use explosives for the extraction of coal. One commenter recommended eliminating this requirement and suggested using instead a standard which addresses removal of deteriorated explosives from the mine. This commenter expressed the view that manufacturers have achieved a safe level of product stability and that the 48-hour standard would not address the hazards associated with excessive quantities of explosives stored underground. Another commenter stated that a 48-hour supply rule would be too restrictive, leading to increased handling and miner exposure to hazards transporting explosives. This commenter recommended a 7-day storage supply limitation.

The final rule limits the quantity of explosives kept underground to that amount expected to be used within 48 hours. Some commenters were confused at the public hearing as to the meaning of the quantity limit. MSHA emphasizes that the 48-hour rule is not a time limit for storage underground which requires that explosives be removed after 48 hours. Instead, it is a quantity limit on the volume of explosives stored underground, the quantity being that amount which would normally be used in the operation over 48 hours. To avoid unnecessary handling of explosives, MSHA has interpreted the existing standard in this manner and it has been industry practice for more than 30 years.

Paragraph (b) requires that explosives and detonators taken underground be kept in separate closed magazines at least 5 feet apart, or in the same closed magazine with the explosives and detonators separated by a hardwood partition at least 4 inches thick,

separated by a laminated partition or equivalent. This standard remains basically unchanged from the proposed rule and addresses the need for careful storage of explosives and detonators as a basic precaution against damage and accidental detonation. Keeping explosives and detonators in either separate closed magazines or in the same closed magazine with the explosives and detonators separated by at least a 4-inch hardwood partition, a laminated partition or the equivalent minimizes the potential detonation of explosives in the event that the detonators are accidentally initiated.

Paragraph (c) requires that only explosives and detonators be kept in underground magazines and is substantially unchanged from the proposal. The proposed phrase "stored underground" is revised to read "kept underground" to clarify that explosive and detonator supplies be limited as prescribed by paragraph (a) of this section. Under the final rule, no materials other than explosives and detonators are to be kept in underground magazines. This standard prohibits the accumulation of empty packing material, combustible material and other items which could contribute to a fire or accidental detonation.

Paragraph (d) also remains unchanged from the proposed rule. It requires that magazines be substantially constructed and all interior surfaces be made of nonconductive material with no metal or other conductive material exposed inside. MSHA recognizes that metal exteriors have been effectively used to protect stored explosives and detonators from accidental detonation and damage. This rule permits the use of mobile magazines as well, provided that they meet the requirements of the final rule. A commenter also suggested that a provision be added to the final rule which would require all magazines to be immobilized while containing explosives. The commenter stated that all magazines must be stationary and in a known location outby the face to avoid the potential of equipment accidentally damaging a mobile magazine because of its unknown location. As discussed below, magazine locations are required to be posted with readily visible warnings to provide adequate notice of the location of explosives. These warnings on the magazine alert miners when magazines are moved to a new location. MSHA is not aware of any accidents regarding explosives and detonators in mobile magazines resulting from the magazine being either hit and damaged by mining equipment or by the magazine itself becoming a runaway piece of

equipment. Most magazines are of skid-mounted type and are portable rather than mobile. Therefore, this recommendation is not adopted in the final rule.

Paragraph (e), which is consistent with both the proposal and the existing standard, requires that magazines be at least 25 feet from roadways and any source of electric current. Magazines must also be out of the direct line of the forces from blasting and be kept as dry as practicable.

One commenter suggested that all magazines be located at least 150 feet outby the last open crosscut. This suggestion has not been adopted. In MSHA's experience, the precautions of paragraph (e) provide a necessary and reasonable measure of protection against the hazards of an accidental explosion or other hazards involving explosives and detonators in magazines. Locating the magazine 25 feet from any roadway will keep it out of areas of concentrated mine traffic where the magazine might be struck by equipment. Keeping the magazine out of the direct line of the force of blasting protects the explosives supply from being damaged or accidentally initiated. When the magazine is kept as dry as practicable, damage to or deterioration of the explosives and detonators while they are stored in the magazine is minimized.

Paragraph (f) requires that magazine locations be posted with indelibly marked, readily visible warnings indicating the presence of explosives. One commenter recommended that the warning be made of reflective material with lettering at least 6 inches tall and that these signs be located at all points where persons entering the area would pass. The warnings required by the final rule must be indelible and sufficiently marked in a fashion that is readily visible, indicating the location of a magazine. This will require warnings that alert persons entering the area of the contents in the magazine, which is the purpose of this standard. The particular method by which this is accomplished, however is not specified in the final rule. Instead, the mine operator can determine how to appropriately label the warning signs.

Paragraph (g) specifies that only materials and equipment used in blasting such as blasting units, blasting cable, and tamping sticks can be stored at magazine locations. This is unchanged from the proposed rule. This provision differs from paragraph (c) in that it limits the items that can be stored in areas surrounding magazine locations while paragraph (c) limits the materials that can be stored inside an

underground magazine. Paragraph (g) does not permit the storage of combustible material or empty packaging at these locations. This will minimize the risk of fire and premature initiation of the explosives and detonators.

One commenter suggested that underground storage of explosives and detonators be prohibited in any mine that does not use explosives to produce coal on a regular basis. The commenter stated that this would eliminate deterioration of explosives and detonators when stored for a long period of time. When explosives and detonators are stored in accordance with the final rule, the incidence of deterioration will be minimized. However, when deterioration of the explosives and detonators does occur, the final rule specifies that they be removed from the mine. In addition, the Agency is not aware of any data which indicates that problems are being encountered in underground coal mines as a result of this practice. For these reasons, this suggestion is not adopted in the final rule.

Section 75.1313 Explosives and detonators outside of magazine.

The standards in this section are derived from existing §§ 75.1301, 75.1304, 75.1306 and 75.1307 except for paragraphs (a) and (c) which are new. They address the handling of explosives and detonators that are removed from magazines for use. These standards are not changed substantially from the proposed rule except for paragraph (a) which, although not in the proposal, was a new provision in the preproposal draft.

Paragraph (a) is a new requirement which limits the quantity of explosives that can be outside a magazine for use in a working section or other area where blasting is to be performed to 100 pounds except when more than 100 pounds of explosives are required to blast one round. In the latter situation, the amount necessary to blast one round may be outside of the magazine. These limitations were in the preproposal draft but were not included in the proposal. At least 10 fatalities have occurred where explosives being stored on mining equipment accidentally detonated when the coal face was blasted. Upon reconsideration of this accident data and in response to a comment urging that a limitation on the amount of explosives outside a magazine be specified, this provision has been added to the final rule.

In addition, when excessive quantities of explosives are outside of a magazine they are subject to being misplaced and

run over by mining equipment. This limitation will protect against accumulation of explosives on a working section or other area of a mine. This will also lessen the severity of an accident involving premature detonation of explosives.

The 100-pound limitation is based on the fact that explosives are normally stored in 50-pound cases. An allowance of 100 pounds of explosives outside of a magazine is more than enough to blast a round of coal. In certain instances, such as when blasting rock overcasts, MSHA recognizes that more than 100 pounds of explosives may be necessary. Paragraph (a)(2) of this section allows an operator the needed flexibility to do blasting under those special circumstances.

Paragraph (b) requires that explosives and detonators outside a magazine that are not being transported or prepared for loading in boreholes be kept in closed separate containers made of nonconductive material with no metal or other conductive material exposed inside. The containers must be at least 15 feet from any source of electrical current, out of the direct line of the forces from blasting, in a location to prevent damage by mobile equipment, and kept as dry as practicable. This paragraph is unchanged from the proposed rule.

One commenter suggested deleting the requirement that explosives and detonators be kept as dry as practicable because virtually all explosives and detonators are water resistant. Water gel and emulsion type explosives are wrapped in plastic and may not be affected by water. However, some granular-type explosives are wrapped in paper cartridges which are subject to water deterioration.

The 15-foot distance which must be maintained between the explosives and detonators and any source of electric current has proven to be an effective distance in preventing accidental initiation. Keeping the detonators and explosives out of the direct line of the forces from blasting normally means keeping these materials out of the section or area where blasting is conducted. When the explosives or detonators are kept in a location to prevent damage by mobile equipment, the possibility of accidental contact which could initiate detonation is lessened.

Paragraph (c) is a new provision which requires that explosives and detonators not used during the shift be returned to a magazine by the end of the shift. This paragraph is unchanged from the proposed rule. One commenter suggested that MSHA clarify that the provision allows storage in a section

magazine at the end of a shift and does not require that explosives and detonators be carried outside of the mine to the main magazine at the end of a shift. MSHA does not believe that any additionally clarification is needed. The regulation permits the operator to use either the section or the main magazine so long as it meets the requirements of these standards.

A commenter recommended that MSHA require only qualified persons to return unused explosives to a magazine at the end of the shift. MSHA has not adopted this recommendation because the primary concern addressed by the qualified person requirement is the safe use of permissible explosives. These type explosives are required to be kept in substantially constructed, enclosed containers until used and pose limited hazards to persons handling these containers. Consequently, a qualified person is not required for transporting explosives into or out of the mine or for removing explosives from a magazine. The Agency believes, that since similar circumstances exist when returning explosives to a magazine, the need for a qualified person to perform this task does not exist.

Section 75.1314 Sheathed explosive units.

This new section sets forth the conditions under which sheathed explosive units may be used in underground coal mines. Other general requirements in the final rule for transportation, storage and handling of explosives also apply to the sheathed explosive units. The sheathed explosive unit, which was developed by the Bureau of Mines, U.S. Department of the Interior, can be fired outside the confines of a borehole without presenting the hazard of igniting any flammable atmosphere which might be present underground. Existing standards currently prohibit the firing of any explosives in bituminous coal mines that are not confined in a borehole. Sections 75.1310 and 75.1315 of the final rule allow the use of sheathed explosive units and § 75.1314 sets forth requirements for their use. Situations where it may be advantageous from a safety standpoint to fire the sheathed explosive unit include dislodging loose roof slabs or coal or rock overhangs, roof fall leveling, and slab or boulder breaking.

One commenter recommended that the use of sheathed explosive units be prohibited. This commenter stated that permitting the use of sheathed units would allow unconfined shots to be fired in underground bituminous coal

mines resulting in a diminution of safety for the miners. Historically, the firing of unconfined shots has been prohibited. The sheathed explosive unit is designed to form a flame-inhibiting cloud upon firing of the unit. This cloud will prevent the flame created by firing of the explosive from igniting any explosive mixtures that may be present. The Bureau of Mines conducted numerous tests on its prototype sheathed explosive units to determine whether they would ignite explosive mixtures of methane or coal dust. During these tests the units were placed in a gallery containing explosive mixtures and fired. The firing of these units did not ignite any of the explosive mixtures. The tests conducted by the Bureau of Mines clearly show that sheathed explosive units can be used safely in underground coal mines, provided that the applicable provisions of this final rule are followed.

In addition, MSHA is issuing, concurrently with this final rule, approval requirements for sheathed explosive units. As previously discussed, sheathed explosive units must be approved by MSHA before they can be used in underground coal mines. These approval requirements are included in the revisions to 30 CFR Part 15.

Paragraph (a) of the final rule specifies that an instantaneous detonator must be used to fire each sheathed explosive unit. This paragraph remains essentially unchanged from the proposal, except the term "each" has been added to clarify that each sheathed explosive unit must be initiated by a separate instantaneous detonator for firing. The exclusive use of instantaneous detonators with sheathed explosive units protects against the hazards associated with sheathed explosive units being damaged by the earlier firing of an adjacent unit.

One commenter stated that short-delay detonators with the same delay periods could be used because the identical delays would ensure that the blast is essentially instantaneous. Tests conducted by the Bureau of Mines on short-delay detonators indicate that firing times for the same delay period can vary significantly. For example, a short-delay detonator with a designated delay period of 100 milliseconds could detonate in a time period ranging from 75 to 125 milliseconds. Therefore, if short-delay detonators are used in sheathed explosive units, one unit could fire before the others, thereby causing damage to the flame-inhibiting sheaths of adjacent units, and resulting in an ignition of coal dust or methane. Because of this potentially hazardous

situation, the final rule specifies that instantaneous detonators be used when firing sheathed explosive units.

Paragraph (b) requires that a qualified person or a person working in the presence of and under the direction of a qualified person must prime and place the sheathed explosive units into position for firing. This paragraph also specifies that when priming a sheathed explosive unit the entire detonator must be inserted into the detonator well of the unit and be secured in place. Correct priming and placement of sheathed explosive units, like all other explosives, are crucial to safe performance. The final rule clarifies the proposal which specified that a person be under the immediate supervision of a qualified person. Under the final rule, when the sheathed explosive units are primed and placed by other than a qualified person, it must be done in the immediate presence of and under the direction of a qualified person.

The requirement in paragraph (b) regarding the method for priming the sheathed explosive unit appeared in the preproposal draft but not the proposed rule. Upon reconsideration, MSHA believes that because the sheathed explosive unit is relatively new, a requirement for how it is to be primed is necessary to reduce the hazards associated with improper detonator placement. Placing the detonator in the detonator well of the sheathed explosive unit initiates the explosive in the unit without damaging the sheath. Detonators improperly placed, could only partially detonate the explosive and damage the flame-inhibiting sheath. Damage to the flame-inhibiting sheath might then allow the explosive to ignite gas or dust in the mine atmosphere. The final rule also requires detonators to be secured in place to prevent movement of the detonator prior to initiation.

Paragraph (c) requires that sheathed explosive units not be primed until immediately before the units are placed where they will be fired. This paragraph is unchanged from the proposal. It addresses the hazard of prime sheathed explosive units being exposed in the underground mine environment for extended periods of time without being used, increasing the likelihood of accidental detonation. The priming of the sheathed explosive units is the last step in preparation of the explosives before the units are placed where they will be fired. The final rule minimizes the amount of time an explosive remains primed prior to firing.

Paragraph (c) requires that a sheathed explosive unit not be primed if it is damaged or deteriorated. The final rule

revises the proposal which specified that a sheathed explosive unit not be fired if it is damaged or deteriorated. The final rule does not permit damaged or deteriorated sheathed explosive units to be primed. A qualified person will be able to visually inspect the sheathed explosive units before preparing them for detonation to determine if a sheathed explosive unit is damaged or deteriorated. Damaged or deteriorated sheathed units increase the potential for a misfire.

Paragraph (d) requires that rock dust be applied to the roof, ribs and floor within a 40-foot radius of the location where the sheathed explosive units are to be fired except in anthracite mines. This paragraph appeared in the preproposal draft but not the proposed rule. This application of rock dust helps protect against the hazards of float coal dust and coal dust being placed into suspension when the sheathed explosive unit is fired. In addition, it ensures that rock dust is applied in areas which are not covered by the MSHA requirement that generally addresses rock dust applications (30 CFR 75.402).

Paragraph (e) of the final rule provides that no more than three sheathed explosive units be fired at one time. This paragraph remains unchanged from the proposal. The use of three sheathed explosive units at one time should be adequate for application in underground coal mines. The simultaneous firing of three units is the maximum number of units that have been tested by the Bureau of Mines in an explosive atmosphere. These tests have shown that the proper firing of three units does not create an ignition hazard. One commenter, who had observed testing of sheathed explosive units by the Bureau of Mines, stated that in his opinion, three units provided ample rock breaking capacity to break the strongest strata associated with roof falls and excavation.

Paragraph (f) requires, as did the proposal, that sheathed explosive units not be fired if they are in contact with another sheathed explosive unit. This is in accordance with the test procedures used by the Bureau of Mines to determine the safety of firing sheathed explosive units. In addition, this will minimize the possibility that the concussion created by the firing of a unit will damage the flame inhibiting sheath of an adjacent unit and adversely affect the safety aspects of its performance.

Several commenters suggested that the term "sheathed explosive unit" be replaced with the phrase "explosives approved for unconfined blasting". They stated that the term "sheathed explosive

unit" may limit technological advances and prevent the use of devices that are as safe as sheathed explosive units. The term "sheathed explosive units" is used in the final rule primarily to distinguish them from other types of explosives and should not be interpreted as limiting the introduction of other devices designed to be fired outside of boreholes. The approval provisions in Part 15 and the requirements of § 75.1315 allow for the future introduction of other such explosive units approved by MSHA.

Section 75.1315 Boreholes for explosives.

This standard is derived from existing §§ 75.1300, 75.1302, and Part 15 except for paragraphs (d), (e), and (f) which are new. It addresses unconfined shots and the use, spacing and maintenance of boreholes. These requirements will minimize the occurrence of gas and coal dust explosions and misfires.

Paragraph (a) requires that all explosives fired in underground coal mines be confined in boreholes except sheathed explosive units and other explosive units approved by MSHA for firing outside the confines of a borehole and shots fired in anthracite mines for battery starting or blasting coal overhangs. The final rule revises the existing requirement by allowing the use of sheathed units and deleting the terms "mud caps and adobes". Unconfined shots continue to be prohibited by the requirement that explosives fired underground be confined in boreholes, except when firing sheathed explosive units or other explosive units approved by MSHA under Part 15.

When explosives are fired, they create sufficient flames to ignite coal dust and methane. However, if the explosives are stemmed in a borehole, the flame is confined in the borehole and cannot ignite any coal dust or methane that may be present. This same principle is true for sheathed explosive units which upon firing create a cloud of flame-inhibiting material and prevent the flames from causing an ignition.

One commenter recommended that battery starting in anthracite mines be accomplished with means other than the use of unconfined blasting to prevent exposing miners to unnecessary hazards. The final rule allows unconfined shots to be fired in underground anthracite mines for battery starting and when taking down coal overhangs. These practices have been performed in anthracite mines for many years. Unlike bituminous coal dust, anthracite coal dust is not explosive and therefore does not present the same hazard as bituminous coal dust. However, as with all blasting,

§ 75.1324 prohibits any round from being fired unless the methane concentration in the area is less than 1 percent volume.

The final rule also prohibits persons from going inside a battery to start the flow of material. This requirement, which is an existing provision, was inadvertently omitted from the proposed rule. The Agency believes that due to the severe hazard of being struck and or crushed by falling material which is associated with this practice, it must be specifically prohibited.

Paragraph (b) requires boreholes for explosives in coal to have a distance of at least 24 inches between the boreholes and between each borehole and any free face, unless the height of the coal seam does not permit such spacing. This revises the existing standard which requires a burden of 18 inches in all directions. MSHA's experience, as well as that of several commenters, has shown that this language is subject to a variety of interpretations and leads to confusion. Therefore, the phrase "burden * * * in all directions", as used in existing Part 15, is deleted in the final rule.

Research conducted by the Bureau of Mines has indicated that, in order to minimize the potential for desensitization of explosives being fired in coal, a minimum spacing of 24 inches is necessary. The shockwaves created by the firing of explosives in a borehole can compress the explosives in an adjacent borehole if the spacing is less than 24 inches. When explosives are compressed, their density is changed and the likelihood of a misfire is significantly increased. Results of research conducted by the Bureau of Mines indicates that misfires occur approximately 50 percent of the time when the separation between boreholes is only 18 inches. The occurrence of misfires was significantly reduced when the spacing between the boreholes was increased to 24 inches.

Several commenters stated that a 24-inch spacing of boreholes would be too great a distance when blasting rock in combination with coal (middle man). They stated that such spacings would result in oversized rocks and reduce the overall effectiveness of the shot. Some of these commenters recommended that the existing 18-inch spacing be retained, while others recommended that a provision be added which would allow District Managers to permit distances less than 24 inches.

Paragraph (c) has been added to the final rule to address the concerns of these commenters. It requires boreholes in rock to be at least 18 inches from any other borehole in rock, at least 24 inches from any borehole in coal, and at least

18 inches from any free face. This recognizes that rock is a harder material than coal and the distance between boreholes necessary to prevent desensitization of explosives is less. However, when a combination of rock and coal are blasted simultaneously, any borehole in rock must be at least 24 inches from any borehole in coal.

Paragraph (d) prohibits a borehole that has at any time contained explosives from being used to start any other hole. This provision addresses the hazard of accidentally drilling into undetonated explosives or detonators remaining in a previously loaded borehole. Miners have been fatally injured while drilling into holes that contained misfired explosives.

Paragraph (e) requires that when blasting slab rounds off the solid, the opener holes not be drilled beyond the rib line. Boreholes drilled beyond the rib line can result in overburdened shots which contribute to the occurrence of blown-out shots and an increased risk of methane and dust ignitions.

Paragraph (f) provides that when coal is cut for blasting, the coal must be supported if necessary to maintain the stability of each borehole to be loaded with explosives. This provision appeared in the preproposal draft, but was not in the proposal. A commenter objected to this deletion because boreholes may collapse after being loaded. Boreholes which collapse or are otherwise affected by sagging or collapsing of cut coal can result in unconfined or blown-out shots. For example, if explosives are loaded into boreholes in a working place which has been undercut to a depth of 10 feet and the first 3-foot distance of the cut then sags or collapses, the explosives may be separated from the stemming material allowing the shots to be fired unconfined. A common practice for supporting the coal in such situations is placing a few blocks of wood in the undercut area of the face. Therefore, MSHA has revised the final rule to include this requirement.

Section 75.1316 Preparation before blasting.

This final rule is derived from existing § 75.1307 and Part 15, except paragraph (d) which is new. This section sets forth the requirements for deenergizing or removing electric equipment and determining the depth and direction of boreholes. It also identifies situations when explosives are not permitted to be loaded in boreholes. It addresses the hazards of premature detonation of the explosives being placed in boreholes.

Paragraph (a) requires that before priming explosives, all mobile electric equipment be removed to a distance of 50 feet from the working place or any other area where blasting is to be performed. This paragraph also requires that stationary electric equipment within 50 feet of these areas be deenergized. Failure to deenergize these sources increases the risk of accidental initiation of detonators and explosives by stray electric current.

The 50-foot distance for mobile and stationary electric equipment was added to the final rule in response to a commenter who stated that some clarification was necessary to provide guidance to the mining industry as to what equipment should be removed or deenergized. This commenter was concerned that the proposal would be open to a variety of interpretations including the complete deenergization of all electric equipment on a producing section and that such a procedure is not necessary to maintain safe blasting practices. The 50-foot distance, which is an accepted minimum distance used in the coal and metal and nonmetal mining industries, minimizes the potential of premature detonation.

Paragraph (b) specifies that before loading boreholes with explosives, each borehole must be cleared and its depth and direction determined. This provision addresses two primary concerns. First, coal dust created during drilling of the boreholes must be removed from the hole. Otherwise the coal dust can get between the explosive cartridges and prevent the entire explosive train from detonating. The second concern is that the qualified person know the amount of explosives in each borehole based on its depth and that adequate space is provided between each borehole. Determining the depth and direction of each borehole provides sufficient information for making these determinations. Boreholes with excessive amounts of explosive or inadequate spacing of boreholes has resulted in numerous blown-out shots and misfires.

One commenter suggested that a wooden tamping pole or other nonconductive tool be used to clear boreholes and to determine their depth and direction. This commenter stated that only nonsparking tools should be used in preparing boreholes or at any other stage of the blasting process. While a wooden tamping pole is normally used in determining these factors, the use of metallic tools does not present a hazard when clearing boreholes prior to loading explosives and should not be prohibited. At this

initial state of the blasting process, there is no danger involved with the borehole because it has not yet been loaded with explosives. However, § 75.1318(g) of the final rule requires that only a nonconductive, nonsparking pole be used when loading explosives into the boreholes and when tamping the stemming material.

Paragraph (c) prohibits loading of explosives into boreholes that are drilled beyond the depth of cut coal unless the portion of the borehole deeper than the cut is filled with noncombustible material. Cut coal provides a second free face for the explosives to break the coal down. Firing explosives in boreholes drilled beyond the depth of cut coal increases the risk of blown-out shots and methane or dust ignitions.

One commenter suggested that only clay dummies or water stemming bags be used to fill the portion of a borehole that has been drilled beyond the limits of a cut. This commenter stated that clay or water would be compatible with the boreholes, while other noncombustible materials possibly would not. The purpose of filling the space beyond cut coal is to prevent explosives from being loaded into that portion of the borehole. Therefore, noncombustible materials other than clay or water could also serve this purpose.

Paragraph (d) requires that when two working faces are approaching each other, cutting, drilling or blasting be done at only one working face at a time if the two faces are within 25 feet of each other. Therefore, if a developing crosscut is being mined from both sides, mining operations must be conducted on only one side at a time when the distance between the two working faces is 25 feet or less. This requirement protects against accidental initiation of explosives by preventing cutting or drilling in an approaching working face from coming into contact with boreholes containing explosives on the opposite side. It also guards against blasting breaking through to another area where people are working.

One commenter recommended that this provision apply only during preparation for blasting to avoid possible misinterpretation of the provision. The intent of the provision is to limit any activity related to cutting, drilling, or blasting to only one side when two approaching faces are within 25 feet of each other. This requirement minimizes the potential of premature detonation and also minimizes the number of persons subject to such hazard.

A provision which appeared as paragraph (c) in this section of the proposed rule that addressed the type of work that could be performed when loading boreholes has been moved to § 75.1318 in the final rule.

Section 75.1317 Primer cartridges.

This new standard sets forth requirements for primer cartridges. A primer cartridge is an explosive cartridge with a detonator inserted in one end. Improper makeup of the primer cartridge can adversely affect the reliable detonation of explosives and contribute to the occurrence of misfires, creating safety hazards.

Paragraph (a) requires that primer cartridges be primed and loaded only by a qualified person or a person working in the presence of and under the direction of a qualified person. This requires the qualified person to be in the immediate presence of the person priming explosive cartridges at all times that this work is being performed. Since the hazards associated with explosives and detonators are greatly increased when the two are joined together, a person who is competent and knowledgeable must be present to ensure that proper procedures and precautions are followed.

Paragraph (b) prohibits the priming of cartridges until immediately before they are loaded in boreholes. An explosive cartridge primed with a detonator is very sensitive and subject to accidental detonation. Therefore, the time in which an explosive is allowed to remain primed prior to firing must be minimized.

The proposed rule did not contain certain requirements that were in the preproposal for priming explosive cartridges since they would be prepared by a qualified person proficient in the proper techniques for the performance of these tasks. However, MSHA accident data shows that failure of the blaster to follow safe blasting practices or regulations was a contributing factor in over 80 percent of the fatal blasting accidents from 1978 through 1984. Upon further consideration of this information, MSHA has determined that blasters require more specific guidance in the safe handling and use of explosives. Moreover, commenters did not object to the inclusion of specific instruction on priming in the preproposal. Therefore, paragraphs (c) and (d) have been added to the final rule.

Paragraph (c) specifies that only a nonsparking punch be used when priming explosive cartridges. This specification, appearing in the preproposal draft as nonferrous, was not

in the proposal. The use of a sparking-type punch could create a spark sufficient to cause premature detonation of an explosive. Therefore, only nonsparking punches are permitted.

Paragraph (d) requires detonators to be completely within and parallel to the length of the explosive cartridge and to be secured by half-hitching the leg wires around the cartridge or by an equally effective method. This provision, which was in the preproposal draft, was not in the proposal. Because placement and alignment of detonators in the explosive cartridge is necessary for safe and effective blasting, the Agency addresses these factors in the final rule. Detonators not properly inserted into the explosive cartridge can cause misfires. If a detonator protrudes through the explosive cartridge wrapping and is initiated, the full energy from the fired detonator will not be transmitted to the explosive cartridge and a misfire can occur. Securing the detonator by half-hitching the leg wires around the cartridge keeps the detonator in position while the cartridge is being loaded into the borehole. The use of the half-hitch knot or loop around the cartridge is standard industry practice for securing the detonator. However, the final rule permits other equally effective means of securing the detonators.

Section 75.1318 Loading boreholes.

This section is derived from existing provisions in Part 15, except for paragraphs (a), (c), (d), and (e) which are new. These standards address the procedures for loading boreholes which directly affect the performance of the explosive. Improper loading can contribute to misfires and blown-out shots.

Paragraph (a) provides that explosives must be loaded in boreholes only by qualified persons or persons working in the presence of and under the direction of a qualified person. This requirement addresses the risk of explosives being mishandled at this important phase of the blasting process by untrained persons.

Paragraph (b) requires that when boreholes are being loaded no other work except that necessary to protect persons be done in the working place or other area where blasting is to be performed. This practice reduces the risk of accidental detonations and the number of persons exposed to this hazard in the blasting area. This standard appeared in § 75.1316 in the proposal.

Paragraph (c) addresses procedures for loading boreholes drilled upward in solid rock or long holes drilled upward in anthracite mines. A commenter

suggested that pushing all the cartridges to the back of the borehole in a continuous column be restricted to holes that are inclined at an angle of less than 45 degrees from the horizontal. This commenter stated that when loading vertical holes overhead in rock, it would be impossible to load all cartridges in a continuous column. MSHA recognizes that alternative means are necessary to maintain contact between cartridges of explosives in certain circumstances such as vertical boreholes in rock and when drilling long holes upward in anthracite mining. In these cases, some slitting and tamping may be necessary to ensure contact between cartridges and to prevent gaps or separations in the column which could result in misfires. Such slitting and taping will not be considered as damaging the explosives as prohibited by paragraph (e) below. Therefore, the final rule includes alternative means to provide a continuous column of explosives under these circumstances.

Paragraph (d) requires that when loading boreholes the primer cartridge be the first cartridge loaded in the borehole, that the end of the cartridge containing the detonator face the back of the borehole and that the primer cartridge and other explosives be pushed to the back of the borehole in a continuous column with no cartridge deliberately crushed or deformed. Inserting the primer cartridge into the borehole first with the detonator toward the back of the borehole places initiation of the explosives at the point of greatest burden which decreases the potential for blown-out shots. Pushing the explosives to the back of a borehole in a continuous column minimizes gaps and voids between cartridges and damage to them which can interrupt detonation of the column of explosives and result in misfires.

In response to the proposed rule, one commenter suggested that the continuous column be accomplished with no explosive cartridge being crushed. The Agency agrees that explosive cartridges should not be crushed when loading boreholes for blasting coal in bituminous coal mines. Bureau of Mines research conducted in 1949 (Technical Paper 716) shows that crushing explosive cartridges to fill a borehole increases the risk for ignition of methane during blasting as compared to loading cartridges in a continuous train without crushing. In a bituminous coal mine the coal dust is explosive and methane face ignitions have a potential for initiating an ensuing mine-wide coal dust explosion. On the other hand, the risk of a methane or coal dust ignition is greatly reduced when blasting rock.

Moreover, anthracite coal dust is not explosive and will not propagate an explosion.

Paragraph (e) prohibits an explosive from being loaded into a borehole if it is damaged, deteriorated or incompletely filled. Using explosives that are not in their approved condition increases the risk of misfires and inadequate performance of explosives.

One commenter suggested that the words "incompletely filled" be deleted. This commenter stated that it is impossible to know if a cartridge is incompletely filled without cutting open the cartridge and examining the contents and thereby damaging, deforming or changing the specifications of the cartridge before firing it. The commenter further stated that it is the explosive manufacturer who has the responsibility for ensuring that a cartridge is completely filled, not the qualified person. MSHA agrees that the manufacturer is primarily responsible for ensuring that the explosives are manufactured as approved, which includes completely filling each explosive cartridge. However, should some incompletely filled products be inadvertently distributed by the manufacturer, those cartridges must not be used.

Incompletely filled cartridges are easily identifiable by visual inspection and by feeling the cartridge in the hands while loading. When an incompletely filled cartridge is squeezed, there is too much play in the material. Also, water gels and some emulsion explosives are in flexible plastic cartridges, and the qualified person can see the amount of material in these types of explosives, as well as feel it. Therefore, this suggestion has not been adopted in the final rule.

Paragraph (f), derived from Part 15, prohibits explosives of different brands, types or cartridge diameters from being loaded in the same borehole. Because of the sensitivity variations of different types of explosives, the use of different types or sizes of explosives in the same borehole can contribute to the occurrence of misfires.

Several commenters recommended that this paragraph be deleted. These commenters stated that all explosives must pass approval tests so that a mixing of products should not cause problems which would not otherwise occur. During the approval process for explosives, tests are conducted to ensure that cartridges of the same diameter and from the same manufacturer will propagate a detonation properly. Propagation is concerned with the rate at which detonation proceeds down a cartridge.

Different cartridge brands and size have different individual characteristics. When cartridges of the same brand are used together, a predictable result can be obtained which ensures continuous and uninterrupted propagation. No test research has been done to determine whether a mix of cartridge types and diameters can also propagate a detonation properly. Therefore, to ensure a continuous rate of detonation, explosive products must not be mixed.

Paragraph (g) requires that only nonconductive, nonsparking tamping poles be used for loading and tamping boreholes. This requirement, which is derived from existing Part 15, was not in the proposed rule. Commenters recommended that the existing term "nonmetallic" be changed to "nonferrous". The final rule uses the terms "nonconductive" and "nonsparking". The use of these types of tamping poles eliminates the potential for creating sparks that could cause premature detonation. The use of nonsparking connecting devices for extendable tamping poles is permitted by this standard.

In the proposed rule, this section also addressed the use of explosives that are below the approved minimum product firing temperature. Under the final rule, the minimum product firing temperature of explosives is addressed in § 75.1310.

Section 75.1319 Weight of explosives permitted in boreholes in bituminous and lignite mines.

This standard is derived from existing Part 15 and addresses the amount of explosives permitted when blasting coal, coal with rock partings, or fallen rock in bituminous or lignite mines. The use of explosives in excess of the stated limitations can result in excessive flame, coal dust, and methane being released into the mine atmosphere, creating the hazard of a methane or coal dust ignition. Excessive amounts of explosives can also contribute to the occurrence of cut-off shots in adjacent holes.

Paragraph (a) retains the existing 3-pound limit on explosives used in boreholes to blast coal, including coal with rock partings and fallen rock. Several commenters recommended that these requirements not be applicable when blasting fallen materials composed of rock and its surrounding coal strata outby the last open crosscut. While the hazards associated with blasting fallen material outby the last open crosscut may not be as great as in the face area, they still exist. For example, if coal dust and float coal dust present in these blasting areas are placed into suspension by the

concussion from the blast, these materials can be ignited by flames caused by the use of excessive explosives. The Agency anticipates that sheathed explosive units will be used in the future to blast the vast majority of fallen material.

As in the existing standard, the final rule does not apply when blasting solid rock in its natural deposit. Blasting solid rock in its natural deposit can require explosives in excess of 3 pounds per borehole to properly blast the rock. Blasting solid rock with an insufficient amount of explosives can result in rock overhangs and loose roof which increase the hazards associated with cleaning up and supporting the area that has been blasted. In addition, the potential for an ignition of coal dust or methane is significantly less than when blasting coal. The proper amount of explosives per borehole depends on the specific circumstances involved. A commenter recommended that the proposed phrase "solid rock in its natural deposit" be replaced with the phrase "rock without mineable coal". This commenter stated that the proposed phrase could be misinterpreted to include sulfur balls and middle man in the coal face. The final rule is consistent with the existing regulation. MSHA is unaware of this provision being misinterpreted in the past.

Paragraph (b) requires a reduction in the weight of explosives by $\frac{1}{2}$ pound for each foot of borehole less than 6 feet.

Section 75.1320 Multiple-shot blasting.

This standard is new, except for paragraph (a) which is derived from § 75.1303, and addresses requirements for detonator use and placement in multiple-shot blasting. Improperly fired multiple-shot blasts can result in blown-out and cut-off shots, both of which have resulted in the ignition of coal dust or methane.

Paragraph (a) prohibits mine operators from firing rounds containing more than 20 boreholes unless permitted in writing by the District Manager under § 75.1321. This provision addresses the hazard of firing more than 20 boreholes in a round which can release additional methane, generate more float coal dust and fumes, and create an increased potential for an explosion. MSHA received no objections to a specific 20-shot limitation in the preproposal draft. On the proposed rule, which was less specific, one commenter stated that 60 shots should be the limit for a round while other commenters stated that a 20-shot limitation should be specified for blasting coal. Most coal production blasting is done with 8-12 shots, with

the number of shots varying according to the height or width of the coal. The need for blasting more than 20 boreholes more frequently occurs in development or construction work in rock, which would be permitted under § 75.1321.

Paragraph (b) prohibits instantaneous detonators and delay detonators from being used in the same blasting circuit in any underground coal mine. This practice, which would not have been specifically prohibited by the proposal, was added to the final rule in response to the recommendation of numerous commenters. These commenters pointed out, and MSHA agrees, that because of the different firing characteristics and firing times of instantaneous and short-delay detonators, the likelihood of misfires and the potential for blown-out shots is significantly increased when they are used in the same circuit.

Paragraph (c) is applicable to bituminous and lignite mines and specifies that only detonators with delay periods of 1,000 milliseconds or less be used when blasting in these mines. This constitutes an editorial change to conform to the definition of short-delay detonators and permits the use of instantaneous detonators. These are the only types of detonators that have been used in recent years and have proven to be safe and effective. They control the total elapsed blasting time of a round while minimizing the possibility of a methane or coal dust explosion.

A commenter suggested that the use of instantaneous detonators be prohibited. This commenter stated that short-delay detonators should be required in all mines and if exceptions are needed, a variance could be granted by the District Manager. The vast majority of detonators that will be used underground will be short-delay. However, as previously discussed, instantaneous detonators are required to be used when firing sheathed explosive units. They may also have some application when blasting rock. Instantaneous detonators can be safely used in these situations and to require that the use of instantaneous detonators be approved by the District Manager will create an unnecessary paperwork burden on the mining industry.

Consistent with this approach, the proposed requirement that short-delay detonators be used for multiple-shot blasting in anthracite mines when required by the District Manager is not included in the final rule. Upon further review, the Agency has determined that short-delay detonators are not typically used in anthracite mines and the need for their use in the foreseeable future is limited. Because of the different

characteristics of the coal seams, mining methods, and blasting techniques used in anthracite mines, long-delay detonators and instantaneous detonators are more appropriate for multiple-shot blasting. MSHA has no data or information to indicate that this practice is unsafe. However, as discussed above, instantaneous and delay detonators cannot be used in the same blasting circuit.

Currently, the total elapsed blasting time for short-delay electric detonators used in underground coal mines is limited to 500 milliseconds. However, research conducted by the Bureau of Mines, in conjunction with MSHA, has provided evidence that this time period can be extended to 1,000 milliseconds without increasing the risk of a methane or coal dust explosion. Accordingly, the final rule defines "short-delay detonator" as a detonator with a designated delay period of 25 to 1,000 milliseconds.

Paragraph (d) requires that each borehole in a round be initiated in sequence from the opener hole or holes in anthracite mines. The provision was in the preproposal draft and not in the proposal. Upon reconsideration, the Agency has determined that this is an important factor for blasting in anthracite mines and thus, it is addressed in the final rule. Since an opener hole is the first hole fired, it creates a second free face to provide additional relief for the remaining boreholes. This requirement provides for an orderly, controlled blast and prevents blown-out shots, cut-off shots and structural damage to the rib, roof, or ventilation system on steeply pitching seams.

Paragraph (e) addresses arrangement of detonator delay periods when blasting in bituminous and lignite mines. For blasting cut coal, this provision requires the first shot fired in the round to be initiated in the row nearest the kerf or shear. A kerf is a horizontal cut that is created by removing the coal near the bottom of the coal face with a cutting machine. On the other hand, a shear is a vertical cut that is created by removing a portion of the coal near the middle of the coal face or along each side. Both kerfs and shears provide a second free face for relief of the coal when the explosives are fired.

Paragraph (e)(1)(ii) addresses the interval between the designated delay periods of successive shots when blasting cut coal. The provision requires the interval to be at least 50 milliseconds, but not more than 100 milliseconds. The proposed requirement did not establish a range for the interval

although the preproposal did specify such a range for sequential firing.

The interval between the designated delay periods of successive shots is an outgrowth of previous experimental research work conducted by the Bureau of Mines on multiple shot short-delay blasting. The interval established in this section of the rule is also supported by research performed in Great Britain and Western Europe and is a published recommendation of the Institute of Makers of Explosives. The research work has been published in International Conferences of Directors of Safety in Mines Research and in formal Bureau of Mines publications which are in the public domain. Establishing an upper limit of 100 milliseconds during sequential firing reduces the potential for ignition of gas or dust liberated during the firing of each successive shot. It also minimizes the potential for ignition from cut-off shots. The absence of an upper limit increases the probability of an explosion caused by explosives not being properly confined in a borehole and thus firing in a flammable atmosphere. Based on this technical data, MSHA has added this requirement to the final rule.

Paragraph (e)(2) addresses the arrangement of detonators and the interval between the designated delay periods of successive shots when blasting coal off the solid. When blasting coal off the solid, the provision requires each shot in the round to be initiated in sequence from the opener hole or holes. The firing of shots in sequence establishes a free face for successive shots, thereby reducing the potential for a blown-out shot. The required interval between successive shots when blasting coal off the solid is also based on experimental work by the Bureau of Mines in short-delay blasting.

Several commenters recommended the prohibition of blasting coal off the solid. Two multiple fatal blasting accidents were cited as justification for the prohibition. These commenters stated that blasting off the solid is a known hazard which is not economically justified. However, the Agency does not prohibit blasting off the solid in the final rule. Requirements in the final rule are directed to conducting blasting off the solid in a safe manner. The requirements control the amount of explosive used, provide for proper stemming and tamping, address placement of boreholes, regulate the sequence of firing, specify intervals between shots, and place a limitation on total elapsed blasting time not to exceed 1,000 milliseconds. In addition, the final rule contains more stringent

requirements for the qualified persons who handle and use explosives. The Agency's investigation of the Adkins Coal Company explosives accident on December 7, 1981, and the FHR Coal Company explosives accident on January 20, 1982, which together resulted in 15 fatalities, revealed that although the technique of blasting coal off the solid was employed at these two mines, multiple violations of MSHA standards relative to the safe use of permissible explosives were cited as the cause of these accidents.

Section 75.1321 Permits for firing more than 20 boreholes and the use of nonpermissible blasting units.

This provision clarifies existing § 75.1303-1 which allows District Manager approval for firing more than 20 boreholes in a round and the use of nonpermissible blasting units. MSHA's experience has shown that mine operators have utilized it to obtain permits to use nonpermissible blasting units to fire large numbers of boreholes during construction blasting in rock. The removal of this provision from the proposal was based primarily upon the belief that permissible blasting units would be available to meet the mining industry's needs. However, MSHA has determined that, at this time, permissible blasting units do not have sufficient capacity to perform all development and construction blasting required by the industry. Therefore, the provision in the existing rule that permits the District Manager to authorize the firing of more than 20 boreholes per round and to use nonpermissible blasting units has been retained with minor editorial revisions, in the final rule.

Section 75.1322 Stemming boreholes.

This proposal is derived from existing § 75.1303 and Part 15, except paragraphs (b), (c), (f), (g), and (h) which are new. It sets forth procedures and requirements for stemming boreholes. Stemming in boreholes acts to suppress the flames during blasting. Failure to properly stem boreholes can result in blown-out shots.

Paragraph (a) requires only noncombustible material to be used for stemming boreholes. A commenter recommended deletion of the word "noncombustible" stating that the terminology would have allowed rock dust and wet sand bags to be used as stemming. It was also recommended, that stemming materials be restricted to clay and water. The final rule, like the existing provision, requires noncombustible material for stemming. Restricting use to clay and water would

limit the type of stemming material and not permit use of materials that could be as equally effective.

Paragraph (b) specifies that stemming material, except water bags, must be tamped to fill the entire cross-sectional area of the borehole. This requirement was not contained in the proposed rule but was included in the preproposal draft. Upon further review by the Agency, specific language is included in the final rule to require the tamping of stemming materials to fill the entire cross-sectional area of the borehole. Stemming material must be tamped to prevent flames from escaping when a borehole is fired.

Paragraph (c) requires that the stemming materials in each borehole contact the explosive cartridge nearest the collar of the borehole. Space or gaps between the stemming material and the explosives can significantly reduce the effectiveness of stemming in confining the flames generated by the initiation of explosives.

Paragraphs (d) and (e) specify the minimum amounts of stemming material to be used based on the depth of the borehole. Experience has shown these minimum amounts to be adequate for confining the flame generated by the initiation of explosives. When clay dummies, moist sand, loose clay, or other noncombustible materials are used for stemming, the specified depth of stemming in the borehole must be the depth after tamping.

Paragraph (f) specifies that only pliable clay dummies be used for stemming when blasting off the solid in bituminous and lignite mines. The preproposal provision would have prohibited the use of water stemming bags when blasting coal off the solid. This requirement was not in the proposal. In lieu of only allowing blasting off the solid where permitted by the District Manager, as required in the preproposal, the final rule instead provides stringent requirements for controlling this practice. One of these is the requirement that only pliable clay dummies be used as stemming when blasting off the solid which has been included as recommended by commenters. The use of pliable clay dummies provides additional resistance against blown-out holes which may result in a methane or coal dust ignition.

Paragraph (g) requires that the diameter of a water stemming bag and the diameter of the drill bit used to drill the borehole be within $\frac{1}{4}$ of an inch. The primary purpose of a water stemming bag is to provide a wall of water within the borehole to confine flames generated by the initiation of the explosives. The Bureau of Mines and MSHA have

determined through tests that a spacing of not more than $\frac{1}{4}$ of an inch between the water stemming bag and the walls of a borehole allows the water to form a complete wall within the borehole and prohibits the flames from escaping into the mine atmosphere. However, tests have not been conducted on spacings greater than $\frac{1}{4}$ of an inch and therefore the rule limits the spacing to a known safe value.

Paragraph (h) sets forth those performance characteristics for tear- and flame-resistance of water stemming bags which are commercially available for use in underground coal mines. The preproposal specified that water stemming bags be approved by MSHA, but this provision was not included in the proposal. In the absence of approval requirements, the Agency added the performance characteristics of flame resistance and tear resistance in the final rule so that safe water stemming bags will be provided for use when blasting cut coal. The flame resistant property reduces the fire hazard of a water stemming bag that is shot out of a borehole into a flammable atmosphere during blasting. The tear resistant property minimizes the potential for a water bag to rip or lose its water holding capability while used to stem a borehole. The inclusion of these performance characteristics in the final rule is in response to comments which stated that the proposed rule would have permitted the use of untested systems.

Section 75.1323 Blasting circuits.

The final rule is derived from existing Part 15, except for paragraphs (b), (f), (g), (h), (i) and (j), which are new. The final rule establishes the requirements for the use and protection of blasting circuits, including the blasting cable. To ensure reliable detonation of explosives and to reduce the risk of misfires and premature or unplanned detonation, devices used in the blasting circuit must be appropriate for their intended purpose and properly maintained.

Paragraph (a) requires blasting circuits to be protected from stray electric current. Blasting circuits can become energized by extraneous sources of electricity and protection is necessary to prevent premature initiation of the explosives.

One commenter stated that static electricity is a form of extraneous electricity and should be added to the rule. MSHA agrees that static electricity is a form of stray electricity. However, the Agency has not specifically added "static electricity" to the rule because it is considered to be only one form of

stray electricity and is covered by the provisions of the final rule.

Paragraph (b) prohibits the use of detonators made by different manufacturers in the same blasting circuit. Due to sensitivity variations and firing characteristics among detonators, the combining of detonators made by different manufacturers can result in misfires. No objections were raised by commenters to this provision.

Paragraph (c) requires detonator leg wires to be kept shunted until connected to the blasting circuit. As suggested by commenters, the wording of this paragraph has been modified for clarity. When leg wires are not shunted, the detonator is subject to initiation by extraneous electricity. Detonator leg wires are shunted when received from the manufacturer and must remain so until connected into the blasting circuit.

Paragraph (d) requires blasting cables to be well-insulated copper wire of a diameter size not smaller than 18-gauge and long enough to permit the round to be fired from a safe location. In response to a comment seeking clarification concerning the size limitation of the wire gauge, the final rule specifies that the wire diameter be not smaller than 18-gauge. The final rule sets a minimum standard for blasting cable compatibility with the size of capacity of permissible blasting units. Blasting cable lengths must permit the firing of the blast from a safe location that is around at least one corner from the blasting area.

One commenter recommended that the blasting cable be at least 125 feet in length. The commenter objected to the proposed rule because it did not designate a minimum length of blasting cable and, as a result, thought shot firers would be encouraged to shoot from an unsafe location. In response to the commenter, the final rule specifies that the cable be of a sufficient length to reach around one corner from the blasting area. This provides a physical barrier between the blasting area and the shot firer.

Paragraph (e) requires blasting cables to be shunted until immediately before the blast is fired, except when testing for circuit continuity. The connection of the blasting cable to the blasting unit before the round is ready to be fired significantly increases the risk of accidental initiation.

Paragraph (f) requires that wire used between the blasting cable and the detonator circuitry be well-insulated, have a resistance no greater than 20-gauge copper wire, and be not more than 30 feet long. These requirements prohibit the use of wire that is damaged or has a

resistance that may be inconsistent with the capabilities of the blasting unit.

One commenter recommended that the proposed rule increase the resistance from that of 20-gauge copper wire to 18-gauge copper wire based on a calculation that the increased resistance would reduce the current flow adversely affecting the result of the blast. In the final rule, the Agency has specified the wire between the blasting cable and detonator circuitry be not more than 30 feet long and have a resistance no greater than 20-gauge copper wire. The difference in the resistance of 18- and 20-gauge copper wire is insignificant (less than $\frac{1}{4}$ ohm) for a wire length of 30 feet and therefore the current flow would not be reduced sufficiently to adversely affect the result of the blast.

Paragraph (g) requires that all connections in the blasting circuit be properly spliced and sufficiently separated from other connections to prevent accidental contact or arcing. Poor connections increase the resistance of the blasting circuit. Connections that are too close together or contact each other can result in arcing and or short circuiting and increase the potential for a misfire.

Paragraph (h) requires that uninsulated connections be kept out of water and away from the coal, roof, ribs and floor. The term "bare" has been changed to "uninsulated" for clarity. Failure to protect uninsulated connections can result in loss of electric current through grounding, increasing the potential for misfires. A commenter suggested that these connections also be required to be kept "clean and shiny". The Agency has not adopted the commenter's suggestion since the rule also requires that all blasting circuits be tested for continuity, which will indicate the presence of proper circuit connections and continuity.

Paragraph (i) requires blasting circuits to be wired in a single series when 20 or fewer boreholes are to be fired in a round. This ensures that the resistance of the blasting circuit is compatible with permissible blasting units. One commenter suggested the wording be changed to "all holes to be wired in a 20 or fewer shot series" as opposed to "when 20 or fewer shots are fired in a round". This comment is not adopted in the final rule in order to maintain consistency with the definition of "round".

Paragraph (j) requires that blasting circuits be checked for circuit continuity and resistance using a blasting galvanometer or other instrument specifically designed for testing blasting circuits. This provision differs from the proposal which did not require that

blasting circuits be checked for continuity and resistance but only required that certain instruments be utilized if checks for continuity were made. Two of the known causes of misfires are the lack of continuity or excessive electrical resistance in the blasting circuit. MSHA's field experience and assessment of factors and causes of blasting accidents are indicative of the need to check continuity and resistance to prevent misfires during blasting. Review of published recommendations from the Bureau of Mines and British research, recommendations published by the Institute of Makers of Explosives and industry-wide comments regarding the absence of this requirement in the proposed rule support this provision. MSHA has, therefore, modified this rule to require that blasting circuits be tested with a proper instrument for continuity and resistance. This provision minimizes the potential for misfires and eliminates the possibility of accidental initiation of explosives through use of improper checking devices which can carry excessive current capacity. This provision is consistent with circuit testing requirements for metal and nonmetal mines in 30 CFR 56.6121 and 57.6121.

Section 75.1324 Methane concentration and tests.

This standard was in the proposed rule and is derived from existing §§ 75.320 and 75.1302. It addresses methane concentrations and tests in areas where explosives are to be fired. Blasting in areas which contain explosive concentrations of methane can cause mine explosions.

Paragraph (a) prohibits blasting in any area that contains 1.0 volume percent or more of methane. While a one percent concentration of methane in air is not explosive, it is recognized throughout the coal mining community as the level at which steps must be taken to remove the methane.

Paragraph (b) requires that tests for methane be made immediately before shots are fired and that these tests be made by a person qualified to conduct such tests. Methane tests made immediately before the shots are fired provide a warning of methane concentrations at or above 1.0 volume percent.

One commenter recommended the addition of a new provision that would require rock dust to be applied to all surfaces from the face for at least 40 feet in all directions. The commenter stated that the existing standards do not require rock dusting to the face but would permit rock dusting to stop 39 feet

from the face. The commenter added that the area surrounding the blast is the critical area that needs the rock dust. The Agency's current regulations in § 75.402 specify that all underground areas of a coal mine be rock dusted to within 40 feet of all working faces. Also, § 75.401 specifies that in working places, particularly in distances less than 40 feet from the face, water, with or without a wetting agent, or other no less effective method must be applied to coal dust on the ribs, roof, and floor to reduce dispersibility and to minimize the explosion hazard. The Agency has not found these safety requirements to be inadequate and, therefore, has not adopted the commenter's recommendation to require application of rock dust to all surfaces from the face for at least 40 feet in all directions.

Section 75.1325 Firing procedure.

This standard sets forth the procedures to be followed when firing explosives. It is derived from existing Part 15 except for paragraph (b) which is new.

Paragraph (a) requires that shots be fired only by a qualified person or a person working in the presence of and under the direction of a qualified person.

Paragraph (b) limits blasting in a working place to one face at a time. One commenter recommended deleting the proposed exception which would have permitted blasting up to three faces in a single working place. The final rule does not allow blasting more than one face at a time. Simultaneous firing of more than one face at a time can release additional methane, generate more dust and fumes, and create a greater potential for an explosion hazard. Another commenter stated the proposal, should limit the numbers of boreholes fired in a round to no more than 20. The final rule in § 75.1320(a) provides that no more than 20 boreholes can be fired in a round unless a permit is granted by the District Manager.

Paragraph (c) requires certain steps to be taken before a blast is fired, including the evacuation of persons from areas where a hazard would be created by the blast, a determination by the qualified person that all persons are a safe distance from the blasting area, and an issuance of warnings that a blast is to be fired. These precautions minimize the exposure of miners to the hazards created by the force of the blast.

Several commenters suggested that the proposed requirement specifying the evacuation of persons when blasting be revised to require them to leave the working place and other areas where a hazard would be created. Commenters

also suggested clarifying that only those persons required to leave need to be around one corner from the blast. In response to these comments, the final rule has been reworded to address these concerns.

One commenter suggested that the verbal warning given before blasting be specific and consistent throughout the industry. The Agency has not adopted specific warning language. It is the responsibility of the qualified person to determine that all persons are a safe distance from the blasting area regardless of the warning given.

Paragraph (d) requires all shots to be fired promptly after they are ready to be fired. This practice minimizes the time interval between the warning and firing of the round.

At the request of several commenters, § 75.1324(e) of the proposed rule has been moved and now appears as § 75.1326(c) of the final rule.

Section 75.1326 Examination after blasting.

This standard is derived from existing § 75.1308 and Part 15 and specifies the steps to be taken after blasting. It prohibits entry into the blast area before it is clear of smoke and dust. The concentrations of smoke and dust immediately after the blast can impair the recognition of hazards such as unstable roof and rib conditions. The rule also requires that a qualified person or a person working in the presence of and under the direction of a qualified person examine the area for misfires, methane and other hazardous conditions as soon as the smoke and dust have cleared. An immediate examination after blasting enables prompt action to be taken to correct any hazards resulting from the blast. In addition, the rule requires that if a round has partially detonated the qualified person must leave the area at once and no persons are to reenter the affected area for at least 5 minutes.

Many commenters recommended changing the proposed waiting period of at least 15 minutes found in the proposal at § 75.1324(e), to a waiting period of at least 5 minutes before entering an affected area when a round partially detonates. Commenters stated that the additional waiting period of 10 minutes or more could potentially permit serious problems to develop, particularly in mines where high methane liberation is common. Commenters also stated that partial detonation might result in damage to ventilation equipment in or near the face area and if repairs were not made immediately, dangerous accumulations of methane could occur. Commenters also cited several State

laws which impose a 5-minute waiting period before persons are permitted to enter an affected area where a misfire has occurred. Other commenters favored the 15 minute waiting period. The Agency has adopted the waiting period of 5 minutes in the final rule. Should a fire occur from a partially detonated explosive, a longer waiting period may result in the inability to fight and extinguish the fire. The Agency also considered the increased hazard inherent in the accumulation of methane to explosive levels should damage occur to the ventilation system resulting from a protracted period of time before re-entry to the area containing a partially detonated round.

Section 75.1327 Misfires.

This final rule is derived from Part 15 except paragraph (b) which is new. It specifies general procedures to be followed in the handling of misfires. Misfires that are not found and disposed of promptly and safely can be accidentally detonated during loading or other operations, creating the potential for serious injury. Because of varying product performance characteristics, the rule does not specify a particular procedure for handling misfires, but allows a qualified person and mine management to address these situations on a case-by-case basis.

Paragraph (a) limits the work in the area affected by a misfire to that done by a qualified person to dispose of the misfire and other work to protect persons, such as making necessary roof control adjustments. This measure limits the exposure of persons to the hazard of accidental detonation.

A commenter suggested that the area in which a qualified person is working to dispose of misfires should be "dangered off" until the misfire is disposed of. The rule addresses the substance of this commenter's concern by restricting work permitted in the affected area to only that of a qualified person and other work necessary to protect persons.

Paragraph (b) of the final rule, as did the proposal, addresses to steps to be followed when a misfire cannot be disposed of by a qualified person. The rule requires each accessible entrance to the affected area to be posted with a warning to prohibit entry. The rule also requires immediate reporting of undisposed misfires to mine management so that technical assistance can be arranged to safely dispose of the misfire.

One commenter suggested that the information concerning misfires reported to mine management be recorded and maintained as a record signed by the mine foreman. The

purpose of the rule is to provide information for mine management that will assist in disposing of misfires and in identifying and eliminating the cause of misfires. Requiring the mine operator to keep a record of each misfire adds to the burden of paperwork and provides no reasonable assurance that keeping such records will provide the means to reduce the incidents of misfires that may occur. The Agency considers that the manner in which this information is kept is an appropriate matter for mine management that need not be regulated.

Section 75.1328 Damaged or deteriorated explosives and detonators.

This standard sets forth new requirements for handling and disposing of damaged or deteriorated explosives or detonators. Such explosives and detonators are required by paragraph (a) to be placed in separate containers of nonconductive and nonsparking material and removed from the mine or placed in a magazine for later removal. Several commenters recommended that damaged or deteriorated explosives and detonators be placed in separate containers constructed of nonsparking materials rather than being placed in separate containers with absorbent material as specified in the proposal. Commenters stated that absorbent material could cause an increased hazard if the wrong type of absorbent material, such as coal dust, is used. The use of a container constructed of nonsparking material effectively minimizes the possibility of inadvertent detonation.

The same commenters recommended removal of damaged explosives and detonators at the end of the shift to prevent exposing miners to unnecessary hazards. This suggestion was not adopted because paragraph (c) of this standard requires deteriorated explosives and detonators to be handled and disposed of in accordance with the instructions of the manufacturer.

Paragraph (b) requires damaged detonators to be shunted, if practicable, before either being removed from the mine or placed in a magazine. One commenter recommended that damaged or deteriorated detonators be protected from stray current. The final rule addresses this provision by means of shunting the detonators, when practicable.

Paragraph (c) requires damaged or deteriorated explosives or detonators to be handled and disposed of in accordance with the instructions of the manufacturer and is from the preproposal draft. Commenters

requested inclusion of this provision in the final rule, although it was not in the proposed rule. Because of the variety of explosive formulations and detonator types and characteristics, the instructions provided by manufacturers are relied upon by the mining industry as the authoritative source of information when disposing of damaged or deteriorated explosives. Other commenters recommended that damaged explosives and detonators be disposed of only on the surface. However, the place and method of disposal is addressed in the manufacturer's specific instructions.

Derivation Table

The following derivation table lists the section number of each standard in the final rule and the section number of the existing standard from which it is derived.

New Section	Old Section
75.1300	75.2 and Part 15.2.
75.1301	Part 15 (Article IV).
75.1310	75.1300, 75.1303 and Part 15.19(d).
75.1310(d)	New.
75.1311	75.1301, 75.1304, 75.1305 and 75.1403-7(i).
75.1311(b)(2)	New.
75.1312	75.1301, 75.1306, 75.1307 and Part 15.19(b).
75.1312 (c), (f) and (g)	New.
75.1313 (a) and (c)	New.
75.1313(b)	75.1301, 75.1304, 75.1306 and 75.1307.
75.1314	New.
75.1315	75.1300, 75.1302 and Part 15 (Article IV).
75.1315(d), (e) and (f)	New.
75.1316	75.1307 and Part 15 (Article IV).
75.1316(d)	New.
75.1317	New.
75.1318 (a), (c), (d) and (e)	New.
75.1318 (b), (f), (g)	Part 15 (Article IV).
75.1319	Part 15 (Article IV).
75.1320(a)	75.1303.
75.1320 (b), (c), (d) and (e)	New.
75.1321	75.1303-1.
75.1322(a)	75.1303 and Part 15 (Article IV).
75.1322 (c), (d) and (e)	Part 15 (Article IV).
75.1322 (b), (f), (g) and (h)	New.
75.1323 (a), (b), (c), (d) and (e)	Part 15 (Article IV).
75.1323 (f), (g), (h), (i) and (j)	New.
75.1324	75.320 and 75.1302.
75.1325	Part 15 (Article IV).
75.1325(b)	New.
75.1326	75.1308 and Part 15 (Article IV).
75.1327 (a) and (b)(2)	Part 15 (Article IV).
75.1327(b)(1)	New.
75.1328	New.

Distribution Table

The following distribution table lists the section number of each existing standards in Subpart N and Part 15 and the section number of the final rule that contain revised provisions derived from the corresponding existing section.

Old Section	New Section
75.1300	75.1310 and 75.1315.
75.1301	75.1311, 75.1312 and 75.1313.
75.1302 (a) and (b)	75.1315.
75.1302(c)	75.1324.
75.1303	75.1310, 75.1320(a) and 75.1322.
75.1303-1	75.1321.
75.1304	75.1311 and 75.1313.
75.1305	75.1311.
75.1306	75.1312 and 75.1313.
75.1307	75.1312, 75.1313 and 75.1316(a).
75.1308	75.1326.
Part 15	75.1301, 75.1310, 75.1312, 75.1315, 75.1316, 75.1318, 75.1319, 75.1322, 75.1323, 75.1325, 75.1326 and 75.1327.

III. Drafting Information

The principal persons responsible for preparing this final rule are: Edward C. Connor and A. Keith Watson, Coal Mine Safety and Health, MSHA; Harry C. Verakis, Technical Support, MSHA; Richard J. Mainiero, Bureau of Mines; Helen B. Caraway, Office of Standards, Regulations and Variance, MSHA; and Linda Fort, Office of the Solicitor, Department of Labor.

IV. Executive Order 12291 and Regulatory Flexibility Act

In accordance with Executive Order 12291, MSHA has prepared an analysis to identify potential costs and benefits associated with the final changes to its explosives and blasting standards for underground coal mines. The Agency has incorporated this analysis into the Regulatory Flexibility Analysis required by the Regulatory Flexibility Act. In this analysis, summarized below, MSHA has determined that the final rule would not result in major cost increases nor have an effect of \$100 million or more on the economy. Therefore, the rule is not within the criteria for a major rule and a Regulatory Impact Analysis is not required.

The Regulatory Flexibility Act requires that agencies evaluate and include, wherever possible, compliance alternatives that minimize any adverse impact on small business when developing regulatory proposals. The final rule clarifies compliance responsibilities and adopts

performance-oriented standards which will benefit small mining operations.

In the following summary of the Initial Regulatory Flexibility Analysis, MSHA has compared the costs and benefits associated with the final requirements with the costs of the existing requirements. A copy of the full analysis is available upon request.

MSHA estimates the annual cost for compliance with the existing requirements to be \$2.5 million compared to \$2.9 million for the final rule. The final regulations effect approximately 1700 underground mining operations. MSHA estimates about 975 of these mines are small businesses. The impact on small mines under existing requirements is \$1.5 million compared to \$1.8 million for the final rule representing a 19 percent increase. For purposes of the Regulatory Flexibility Act, MSHA has defined small business entities as mines with fewer than 20 employees.

In developing cost estimates, MSHA has taken into consideration industry-wide practices. Compliance costs are related to labor, supplies, and equipment purchase and maintenance. In calculating the costs of the existing standards and the final rule, the Agency projected capital expenditures and recurring costs.

In the final rule, MSHA has reorganized, updated, and clarified existing provisions and deleted duplicative provisions. MSHA believes that clarification will foster a better understanding of safe blasting practices and that the new final requirements, especially those that address the use of sheathed explosive units, will afford greater protection for the miners.

The primary benefit of the final rule is the enhanced protection that the standards will provide to miners who are exposed to the hazards related to the use of explosives.

V. Paperwork Reduction Act of 1980

The final rule contains two collection of information provisions subject to the Paperwork Reduction Act of 1980 (Pub. L. 96-511). The information collection requirements in existing Part 15 and § 75.1303-1, concerning certification of shot firer qualification and permits for the use of nonpermissible blasting units and to fire more than 20 boreholes, are retained in final §§ 75.1301 and 75.1321.

In accordance with section 3504(h) of the Paperwork Reduction Act of 1980 (Title 44 U.S.C. Chapter 35), the collection of information requirements contained in §§ 75.1301 and 75.1321 of the final rule have been approved by

OMB under control numbers 1219-0106 and 1219-0025.

List of Subjects in 30 CFR Part 75

Mine safety and health, Mandatory safety standards, Underground coal mines, Explosives and blasting.

Date: November 9, 1988.

David C. O'Neal,

Deputy Assistant Secretary for Mine Safety and Health.

Accordingly, pursuant to 30 U.S.C. 811 Part 75 Subchapter N, Chapter I, Title 30 of the Code of Federal Regulations is amended as set forth below:

PART 75—MANDATORY SAFETY STANDARDS—UNDERGROUND COAL MINES

1. The authority citation for Part 75 continues to read as follows:

Authority: 30 U.S.C. 811, 957, 961.

2. Paragraph (c)(2) of § 75.2 is removed and paragraph (c)(3) is redesignated as (c)(2).

3. Newly redesignated § 75.2(c)(2) is revised to read as follows:

§ 75.2 Definitions

* * *

(c) * * *

(2) The manner of use of equipment means the manner of use prescribed by the Secretary.

* * *

Subpart D—Ventilation

§ 75.320 [Removed]

4. Subpart D is amended by removing § 75.320.

Subpart O—Hoisting and Mantrips

§ 75.1403-7 [Amended]

5. Section 75.1403-7 is amended by removing and reserving paragraph (i).

6. Subpart N is revised to read as follows:

Subpart N—Explosives and Blasting

Sec.

- 75.1300 Definitions.
- 75.1301 Qualified person.
- 75.1310 Explosives and blasting equipment.
- 75.1311 Transporting explosives and detonators.
- 75.1312 Explosives and detonators in underground magazines.
- 75.1313 Explosives and detonators outside of magazines.
- 75.1314 Sheathed explosive units.
- 75.1315 Boreholes for explosives.
- 75.1316 Preparation before blasting.
- 75.1317 Primer cartridges.
- 75.1318 Loading boreholes.
- 75.1319 Weight of explosives permitted in boreholes in bituminous and lignite mines.

Sec.

- 75.1320 Multiple-shot blasting.
- 75.1321 Permit for firing more than 20 boreholes and to use nonpermissible blasting units.
- 75.1322 Stemming boreholes.
- 75.1323 Blasting circuits.
- 75.1324 Methane concentration and tests.
- 75.1325 Firing procedure.
- 75.1326 Examination after blasting.
- 75.1327 Misfires.
- 75.1328 Damaged or deteriorated explosives and detonators.

Subpart N—Explosives and Blasting

§ 75.1300 Definitions.

The following definitions apply in this subpart.

Approval. A document issued by MSHA which states that an explosive or explosive unit has met the requirements of this part and which authorizes an approval marking identifying the explosive or explosive unit as approved as permissible.

Battery starting. The use of unconfined explosives to start the flow of coal down a breast or chute in an anthracite mine.

Blasting off the solid. Blasting the working face without providing a second free face by cutting, shearing or other method before blasting.

Instantaneous detonator. An electric detonator that fires within 6 milliseconds after application of the firing current.

Laminated partition. A partition composed of the following material and minimum nominal dimensions: 1/2-inch thick plywood, 1/2-inch thick gypsum wall board, 1/8-inch thick low carbon steel and 1/4-inch thick plywood, bonded together in that order.

Opener hole. The first hole or holes fired in a round blasted off the solid to create an additional free face.

Permissible blasting unit. A device that has been approved by MSHA and that is used for firing electric detonators.

Permissible explosive. Any substance, compound or mixture which is approved by MSHA and whose primary purpose is to function by explosion.

Round. A group of boreholes fired or intended to be fired in a continuous sequence with one application of the firing current.

Sheathed explosive unit. A device consisting of an approved or permissible explosive covered by a sheath encased in a sealed covering and designed to be fired outside the confines of a borehole.

Short-delay electric detonator. An electric detonator with a designated delay period of 25 to 1,000 milliseconds.

§ 75.1301 Qualified person.

(a) A qualified person under this subpart is a person who—

(1) Is certified or qualified to use explosives by the State in which the mine is located provided that the State requires a demonstration of ability to safely use permissible explosives as prescribed by this subpart effective January 17, 1989; or

(2) In States that do not certify or qualify persons to use explosives required by this section, has at least 1 year of experience working underground on a coal producing section of a mine where explosives are used and demonstrates to an authorized representative of the Secretary the ability to safely use permissible explosives.

(b) Persons qualified or certified by a State to use permissible explosives in underground coal mines as of May 17, 1989 are considered qualified under this section even though their State program did not contain a demonstration of ability requirement.

§ 75.1310 Explosives and blasting equipment.

(a) Only permissible explosives, approved sheathed explosive units, and permissible blasting units shall be taken or used underground.

(b) Black blasting powder, aluminum-cased detonators, aluminum-alloy-cased detonators, detonators with aluminum leg wires, and safety fuses shall not be taken or used underground.

(c) Explosives shall be fired only with a permissible blasting unit used in a manner consistent with its approval. Blasting units approved by MSHA that have approval labels specifying use with short-delay detonators with delay periods between 25-500 milliseconds are accepted to fire short-delay detonators up to 1,000 milliseconds, instantaneous detonators and long period delay detonators for anthracite mines.

(d) Permissible explosives and sheathed explosive units shall not be used underground when they are below the minimum product firing temperature specified by the approval. Explosives previously approved which do not specify a minimum firing temperature are permissible for use so long as the present approval is maintained.

(e) Electric detonators shall be compatible with the blasting unit and have sufficient strength to initiate the explosives being used.

§ 75.1311 Transporting explosives and detonators.

(a) When explosives and detonators are to be transported underground—

(1) They shall be enclosed in separate, substantially constructed containers made of nonconductive material, with

no metal or other conductive materials exposed inside, except as specified in paragraph (d) of this section; and

(2) Each container of explosives and of detonators shall be indelibly marked with a readily visible warning identifying the contents.

(b) When explosives and detonators are transported by any cars or vehicles—

(1) The cars or vehicles shall be marked with warnings to identify the contents as explosive. The warnings shall be readily visible to miners approaching from any direction and in indelible letters;

(2) Explosives and detonators shall be transported either in separate cars or vehicles, or if in the same cars or vehicles as follows:

(i) Class A and Class C detonators in quantities greater than 1,000 shall be kept in the original containers as shipped from the manufacturer and separated from explosives by a hardwood partition at least 4 inches thick, a laminated partition or equivalent; and

(ii) Class A and Class C detonators in quantities of no more than 1,000 shall be separated from explosives by a hardwood partition at least 4 inches thick, a laminated partition or equivalent.

(3) No persons, other than those necessary to operate the equipment or to accompany the explosives and detonators, shall be transported with explosives and detonators, and

(4) When explosives and detonators are transported using trolley locomotives—

(i) Trips carrying explosives and detonators shall be separated from all other mantrips by at least a 5-minute interval; and

(ii) Cars containing explosives or detonators shall be separated from the locomotives by at least one car that is empty or that contains noncombustible materials.

(c) When explosives and detonators are transported on conveyor belts—

(1) Containers of explosives shall be separated from containers of detonators by at least 50 feet;

(2) At least 6 inches of clearance shall be maintained between the top of any container of explosives or container of detonators and the mine roof or other obstruction;

(3) Except when persons are riding the belt to accompany explosives or detonators, a person shall be at each transfer point between belts and at the unloading location; and

(4) Conveyor belts shall be stopped before explosives or detonators are loaded or unloaded.

(d) When explosives and detonators are transported by hand they shall be carried in separate, nonconductive, closed containers.

§ 75.1312 Explosives and detonators in underground magazines.

(a) The quantity of explosives kept underground shall not be more than is needed for 48 hours of use.

(b) Except as provided in § 75.1313, explosives and detonators taken underground shall be kept in—

(1) Separate, closed magazines at least 5 feet apart; or

(2) The same closed magazine when—

(i) Separated by a hardwood partition at least 4 inches thick; or

(ii) Separated by a laminated partition; or

(iii) Separated by a device that is equivalent.

(c) Only explosives and detonators shall be kept in underground magazines.

(d) Magazines shall be substantially constructed and all interior surfaces shall be made of nonconductive material, with no metal or other conductive material exposed inside.

(e) All magazines shall be—

(1) Located at least 25 feet from roadways and any source of electric current;

(2) Located out of the direct line of the forces from blasting; and

(3) Kept as dry as practicable.

(f) Magazine locations shall be posted with indelibly marked and readily visible warnings indicating the presence of explosives.

(g) Only materials and equipment to be used in blasting shall be stored at magazine locations.

§ 75.1313 Explosives and detonators outside of magazines.

(a) The quantity of explosives outside a magazine for use in a working section or other area where blasting is to be performed shall—

(1) Not exceed 100 pounds; or

(2) Not exceed the amount necessary to blast one round when more than 100 pounds of explosives is required.

(b) Explosives and detonators outside a magazine that are not being transported or prepared for loading boreholes shall be kept in closed separate containers made of nonconductive material with no metal or other conductive material exposed inside and the containers shall be—

(1) At least 15 feet from any source of electric current;

(2) Out of the direct line of the forces from blasting;

(3) In a location to prevent damage by mobile equipment; and

(4) Kept as dry as practicable.

(c) Explosives and detonators not used during the shift shall be returned to a magazine by the end of the shift.

§ 75.1314 Sheathed explosive units.

(a) A separate instantaneous detonator shall be used to fire each sheathed explosive unit.

(b) Sheathed explosive units shall be primed and placed in position for firing only by a qualified person or a person working in the presence of and under the direction of a qualified person. To prime a sheathed explosive unit, the entire detonator shall be inserted into the detonator well of the unit and be held securely in place.

(c) Sheathed explosive units shall not be primed until immediately before the units are placed where they are to be fired. A sheathed explosive unit shall not be primed if it is damaged or deteriorated.

(d) Except in anthracite mines, rock dust shall be applied to the roof, ribs and floor within a 40-foot radius of the location where the sheathed explosive units are to be fired.

(e) No more than three sheathed explosive units shall be fired at one time.

(f) No sheathed explosive unit shall be fired in contact with another sheathed explosive unit.

§ 75.1315 Boreholes for explosives.

(a) All explosives fired underground shall be confined in boreholes except—

(1) Sheathed explosives units and other explosive units approved by MSHA for firing outside the confines of a borehole; and

(2) Shots fired in anthracite mines for battery starting or for blasting coal overhangs. No person shall go inside a battery to start the flow of material.

(b) Each borehole in coal for explosives shall be at least 24 inches from any other borehole and from any free face, unless prohibited by the thickness of the coal seam.

(c) Each borehole in rock for explosives shall be at least 18 inches from any other borehole in rock, at least 24 inches from any other borehole in coal, and at least 18 inches from any free face.

(d) No borehole that has contained explosives shall be used for starting any other hole.

(e) When blasting slab rounds off the solid, opener holes shall not be drilled beyond the rib line.

(f) When coal is cut for blasting, the coal shall be supported if necessary to maintain the stability of the column of explosives in each borehole.

§ 75.1316 Preparation before blasting.

(a) Before priming any explosives—

(1) All mobile electric equipment shall be removed to a distance of at least 50 feet from the working place or other area where blasting is to be performed; and

(2) All stationary electric equipment within 50 feet of the working place or other area where blasting is to be performed shall be deenergized.

(b) Before loading boreholes with explosives, each borehole shall be cleared and its depth and direction determined.

(c) No borehole drilled beyond the depth of cut coal shall be loaded with explosives unless that portion of the borehole deeper than the cut is tamped with noncombustible material.

(d) When two working faces are approaching each other, cutting, drilling and blasting shall be done at only one working face at a time if the two faces are within 25 feet of each other.

§ 75.1317 Primer cartridges.

(a) Primer cartridges shall be primed and loaded only by a qualified person or a person working in the presence of and under the direction of a qualified person.

(b) Primer cartridges shall not be primed until immediately before loading boreholes.

(c) Only a nonsparking punch shall be used when priming explosive cartridges.

(d) Detonators shall be completely within and parallel to the length of the cartridge and shall be secured by half-hitching the leg wires around the cartridge or secured by an equally effective method.

§ 75.1318 Loading boreholes.

(a) Explosives shall be loaded by a qualified person or a person working in the presence of and under the direction of a qualified person.

(b) When boreholes are being loaded, no other work except that necessary to protect persons shall be done in the working place or other area where blasting is to be performed.

(c) When loading boreholes drilled at an angle of 45 degrees or greater from the horizontal in solid rock or loading long holes drilled upward in anthracite mines—

(1) The first cartridge in each borehole shall be the primer cartridge with the end of the cartridge containing the detonator facing the back of the borehole; and

(2) The explosive cartridges shall be loaded in a manner that provides contact between each cartridge in the borehole.

(d) When loading other boreholes—

(1) The primer cartridge shall be the first cartridge loaded in the borehole;

(2) The end of the cartridge in which the detonator is inserted shall face the back of the borehole; and

(3) The primer cartridge and other explosives shall be pushed to the back of the borehole in a continuous column with no cartridge being deliberately crushed or deformed.

(e) An explosive shall not be loaded into a borehole if it is damaged, deteriorated or if the cartridge is incompletely filled.

(f) Explosives of different brands, types or cartridge diameters shall not be loaded in the same borehole.

(g) Only nonconductive, nonsparking tamping poles shall be used for loading and tamping boreholes. The use of nonsparking connecting devices for extendable tamping poles is permitted.

§ 75.1319 Weight of explosives permitted in boreholes in bituminous and lignite mines.

(a) The total weight of explosives loaded in any borehole in bituminous and lignite mines shall not exceed 3 pounds except when blasting solid rock in its natural deposit.

(b) The total weight of explosives loaded in a borehole less than 6 feet deep in bituminous and lignite mines shall be reduced by ½ pound for each foot of borehole less than 6 feet.

§ 75.1320 Multiple-shot blasting.

(a) No more than 20 boreholes shall be fired in a round unless permitted in writing by the District Manager under § 75.1321.

(b) Instantaneous detonators shall not be used in the same circuit with delay detonators in any underground coal mine.

(c) In bituminous and lignite mines, only detonators with delay periods of 1,000 milliseconds or less shall be used.

(d) When blasting in anthracite mines, each borehole in a round shall be initiated in sequence from the opener hole or holes.

(e) Arrangement of detonator delay periods for bituminous and lignite mines shall be as follows:

(1) When blasting cut coal—

(i) The first shot or shots fired in a round shall be initiated in the row nearest the kerf or the row or rows nearest the shear; and

(ii) After the first shot or shots, the interval between the designated delay periods of successive shots shall be at least 50 milliseconds but not more than 100 milliseconds.

(2) When blasting coal off the solid—

(i) Each shot in the round shall be initiated in sequence from the opener hole or holes; and

(ii) After the first shot or shots, the interval between the designated delay periods of successive shots shall be at least 50 milliseconds but not more than 100 milliseconds.

§ 75.1321 Permits for firing more than 20 boreholes and for use of nonpermissible blasting units.

(a) Applications for permits for firing more than 20 boreholes in a round and for the use of nonpermissible blasting units shall be submitted in writing to the District Manager for the district in which the mine is located and shall contain the following information:

(1) The name and address of the mine;

(2) The active workings in the mine affected by the permit and the approximate number of boreholes to be fired;

(3) The period of time during which the permit will apply;

(4) The nature of the development or construction for which they will be used, e.g., overcasts, undercasts, track grading, roof brushing or boom holes;

(5) A plan, proposed by the operator designed to protect miners in the mine from the hazards of methane and other explosive gases during each multiple shot, e.g., changes in the mine ventilation system, provisions for auxiliary ventilation and any other safeguards necessary to minimize such hazards;

(6) A statement of the specific hazards anticipated by the operator in blasting for overcasts, undercasts, track grading, brushing of roof, boom holes or other unusual blasting situations such as coalbeds of abnormal thickness; and

(7) The method to be employed to avoid the dangers anticipated during development or construction which will ensure the protection of life and the prevention of injuries to the miners exposed to such underground blasting.

(b) The District Manager may permit the firing of more than 20 boreholes of permissible explosives in a round where he has determined that it is necessary to reduce the overall hazard to which miners are exposed during underground blasting. He may also permit the use of nonpermissible blasting units if he finds that a permissible blasting unit does not have adequate blasting capacity and that the use of such permissible units will create any of the following development or construction hazards:

(1) Exposure to disturbed roof in an adjacent cavity while scaling and supporting the remaining roof prior to wiring a new series of boreholes;

(2) Exposure to underburden boreholes where prior rounds have removed the burden adjacent to a remaining borehole;

(3) Exposure to an unsupported roof while redrilling large fragmented rock following the loss of predrilled boreholes during earlier blasting operations; or

(4) Any other hazard created by the use of permissible blasting units during underground development or construction.

(c) Permits shall be issued on a mine-by-mine basis for periods of time to be specified by the District Manager.

(d) Permits issued under this section shall specify and include as a condition of their use, any safeguards, in addition to those proposed by the operator, which the District Manager issuing such permit has determined will be required to ensure the welfare of the miners employed in the mine at the time of the blasting permitted.

(Approved by the Office of Management and Budget under control number 1219-0025)

§ 75.1322 Stemming boreholes

(a) Only noncombustible material shall be used for stemming boreholes.

(b) Stemming materials other than water stemming bags shall be tamped to fill the entire cross sectional area of the borehole.

(c) Stemming material shall contact the explosive cartridge nearest the collar of the borehole.

(d) Each borehole 4 or more feet deep shall be stemmed for at least 24 inches.

(e) Each borehole less than 4 feet deep shall be stemmed for at least half the depth of the borehole.

(f) When blasting off the solid in bituminous and lignite mines, only pliable clay dummies shall be used for stemming.

(g) The diameter of a water stemming bag shall be within $\frac{1}{4}$ of an inch of the diameter of the drill bit used to drill the borehole.

(h) Water stemming bags shall be constructed of tear-resistant and flame-resistant material and be capable of withstanding a 3-foot drop when filled without rupturing or developing leaks.

§ 75.1323 Blasting circuits.

(a) Blasting circuits shall be protected from sources of stray electric current.

(b) Detonators made by different manufacturers shall not be combined in the same blasting circuit.

(c) Detonator leg wires shall be shunted until connected into the blasting circuit.

(d) Blasting cables shall be—

(1) Well insulated, copper wire of a diameter not smaller than 18-gauge; and

(2) Long enough to permit the round to be fired from a safe location that is around at least one corner from the blasting area.

(e) Blasting cables shall be shunted until immediately before firing, except when testing for circuit continuity.

(f) Wire used between the blasting cable and detonator circuitry shall—

(1) Be undamaged;

(2) Be well insulated;

(3) Have a resistance no greater than 20-gauge copper wire; and

(4) Be not more than 30 feet long.

(g) Each wire connection in a blasting circuit shall be—

(1) Properly spliced; and

(2) Separated from other connections in the circuit to prevent accidental contact and arcing.

(h) Uninsulated connections in each blasting circuit shall be kept out of water and shall not contact the coal, roof, ribs, or floor.

(i) When 20 or fewer boreholes are fired in a round the blasting circuit shall be wired in a single series.

(j) Immediately prior to firing, all blasting circuits shall be tested for continuity and resistance using a blasting galvanometer or other instrument specifically designed for testing blasting circuits.

§ 75.1324 Methane concentration and tests.

(a) No shot shall be fired in an area that contains 1.0 volume percent or more of methane.

(b) Immediately before shots are fired, the methane concentration in a working place or any other area where blasting is to be performed, shall be determined by a person qualified to test for methane.

§ 75.1325 Firing procedures.

(a) Shots shall be fired by a qualified person or a person working in the presence of and under the direction of a qualified person.

(b) Only one face in a working place shall be blasted at a time.

(c) Before blasting—

(1) All persons shall leave the blasting area and each immediately adjacent working place where a hazard would be created by the blast, to an area that is

around at least one corner from the blasting area;

(2) The qualified person shall ascertain that all persons are a safe distance from the blasting area; and

(3) A warning shall be given and adequate time allowed for persons to respond.

(d) All shots shall be fired promptly, after all persons have been removed to a safe location.

§ 75.1326 Examination after blasting.

(a) After blasting, the blasting area shall not be entered until it is clear of smoke and dust.

(b) Immediately after the blasting area has cleared, a qualified person or a person working in the presence of and under the direction of a qualified person, shall examine the area for misfires, methane and other hazardous conditions.

(c) If a round has partially detonated, the qualified person shall immediately leave the area and no person shall reenter the affected area for at least 5 minutes.

§ 75.1327 Misfires.

(a) When misfires occur, only work by a qualified person to dispose of misfires and other work necessary to protect persons shall be done in the affected area.

(b) When a misfire cannot be disposed—

(1) A qualified person shall post each accessible entrance to the area affected by the hazard of the misfire with a warning at a conspicuous location to prohibit entry; and

(2) The misfire shall be immediately reported to mine management.

§ 75.1328 Damaged or deteriorated explosives and detonators.

(a) Damaged explosives or detonators shall be—

(1) Placed in separate containers constructed of nonconductive and nonsparking materials; and

(2) Removed from the mine or placed in a magazine and removed when the magazine is resupplied.

(b) Damaged detonators shall be shunted, if practicable, either before being removed from the mine or placed in a magazine.

(c) Deteriorated explosives and detonators shall be handled and disposed of in accordance with the instructions of the manufacturer.

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