DEPARTMENT OF LABOR

Mine Safety and Health Administration

30 CFR Parts 18 and 75

RIN 1219–AB34

High-Voltage Continuous Mining Machines

AGENCY: Mine Safety and Health Administration (MSHA), Labor.

ACTION: Proposed rule.

SUMMARY: The Mine Safety and Health Administration (MSHA/We) are proposing design requirements for approval of high-voltage continuous mining machines operating in face areas of underground mines. We are also proposing to establish new mandatory electrical safety standards for the installation, use, and maintenance of high-voltage continuous mining machines used in underground coal mines. These provisions would enable mines to utilize high-voltage continuous mining machines with enhanced safety protection from fire, explosion, and shock hazards. In addition to providing a mining environment as safe as when using low- and medium-voltage equipment and facilitating the use of advanced equipment designs, the proposed rules would eliminate the need for Petitions for Modification (PFMs) to use high-voltage continuous mining machines. Once promulgated, this rule will supercede existing provisions in granted PFMs.

DATES: Comments on the proposed rule must be received by September 14, 2004. Submit written comments on the information collection requirements by September 14, 2004.

Public hearing dates and locations are listed in the *Public Hearings* section below under **SUPPLEMENTARY INFORMATION**. If individuals or organizations wish to make an oral presentation for the record, we ask that you submit your request at least 5 days prior to the hearing dates. Post-hearing comments and other appropriate data for the record must be received by October 14, 2004.

ADDRESSES: You may submit comments, identified by RIN 1219–AB34, by any of the following methods:

- Federal eRulemaking Portal: *http://www.regulations.gov*.
- E-mail: *comments@MSHA.gov*. Include ''RIN 1219–AB34'' in the subject line of the message.
- Fax: 202–693–9441.
- Mail, Hand Delivery or Courier: MSHA, 1100 Wilson Blvd., Room 2350, Arlington, Virginia 22209–3939.

Instructions: All comments, including any personal information contained therein, will be posted without change to *http://www.msha.gov/currentcomments.htm*.

Docket: The entire rulemaking record may be viewed in MSHA's public reading room at 1100 Wilson Boulevard, Room 2349, Arlington, Virginia.

FOR FURTHER INFORMATION CONTACT: For information concerning the technical content of the rule, contact Elio L. Checca, General Engineer, Office of Technical Support, MSHA, 1100 Wilson Blvd, Room 2332, Arlington, Virginia 22209–3939. Mr. Checca can be reached at *Checca.elio@dol.gov* or 202–693–9471 (facsimile). For information concerning the rulemaking process, contact Marvin W. Nichols, Jr., Director, Office of Standards, Regulations, and Variances, MSHA, 1100 Wilson Boulevard, Room 2350, Arlington, Virginia 22209–3939. Mr. Nichols can be reached at *Nichols.marvin@dol.gov,* 202–693–9440 (telephone), or 202–693–9441 (facsimile).

You may obtain copies of the proposed rule and the Preliminary Regulatory Economic Analysis (PREA) in alternative formats by calling 202–693–9440. The alternative formats available are either a large print version of these documents or electronic files that can be sent to you either on a computer disk or as an attachment to an e-mail. The documents also are available on the Internet at *http://www.msha.gov/REGSINFO.HTM.* We intend to place the public comments on these documents on our Web site shortly after we receive them.

SUPPLEMENTARY INFORMATION:

I. Public Hearings

We will hold four public hearings on the proposed rule. The public hearings will be begin at 9 a.m., and will be held on the following dates and at the locations indicated.

Date	Location	Phone
September 21, 2004	Sheraton Birmingham 2101 Richard Arlington Jr., Blvd. North, Birmingham, AL 35203	(205) 324–5000
September 23, 2004	Sheraton Suites Lexington, 2601 Richmond Rd., Lexington, KY 40509	(859) 268–0060
September 28, 2004	Little America Hotel, 500 S. Main Street, Salt Lake City, UT 84101	(801) 363–6781
September 30, 2004	Hyatt Regency Pittsburgh Intl. Airport, 1111 Airport Blvd., Pittsburgh, PA 15231	(724) 899–1234

If individuals or organizations wish to make an oral presentation for the record, we ask that you submit your request at least 5 days prior to the hearing dates. However, you do not have to make a written request to speak. Any unallotted time will be made available for persons making same-day requests.

The hearings will begin with an opening statement from MSHA, followed by an opportunity for members of the public to make oral presentations to a panel. Speakers will speak in the order that they sign in. At the discretion of the presiding official, the time allocated to speakers for their presentation may be limited. Speakers and other attendees may also present information to the MSHA panel for inclusion in the rulemaking record.

The hearings will be conducted in an informal manner. The hearing panel may ask questions of speakers. Although formal rules of evidence or cross examination will not apply, the presiding official may exercise discretion to ensure the orderly progress of the hearing and may exclude irrelevant or unduly repetitious material and questions.

A verbatim transcript of the proceedings will be included in the rulemaking record. Copies of this transcript will be available to the public, and can be viewed at *http://www.msha.gov.*

MSHA will accept post-hearing written comments and other appropriate data for the record from any interested party, including those not presenting oral statements, up to 14 days after the last public hearing which is scheduled for September 30, 2004.

II. Information Collection Requirements

Comments concerning the information collection requirements must be clearly identified as such and sent to both the Office of Management and Budget (OMB) and MSHA as follows:

(1) To OMB: All comments may be sent by mail addressed to: Office of Information and Regulatory Affairs, Office of Management and Budget, New Executive Office Building, 725 17th Street, NW, Washington, DC 20503, Attn: Desk Officer for MSHA; and

(2) To MSHA: Comments must be clearly identified by RIN Number

[1219–AB34] as comments on the information collection requirements and transmitted by e-mail to *comments@msha.gov,* by internet to *www.Regulations.gov,* by facsimile to (202) 693–9441, or by regular mail or hand delivery to MSHA, Office of Standards, Regulations, and Variances, 1100 Wilson Blvd., Room 2350, Arlington, Virginia 22209–3939.

III. Background

A. Events Leading to Regulatory Action

The energy used by electrical equipment in mines has increased over the years. Voltage to operate this equipment has also increased to accommodate the increased energy demand. Additionally, high-voltage electric equipment design has become safer than in the past, more efficient, and practical. Because of the industry's need for higher voltages and the marked improvement in the design and manufacturing technology of high-voltage components, we promulgated the ''Electric Motor-Driven Mine Equipment and Accessories and High-Voltage Longwall Equipment Standards for Underground Coal Mines,'' 67 FR 10972 (March 11, 2002) (high-voltage longwall rule). These regulations and standards added a number of approval and safety requirements to Title 30 CFR parts 18 and 75 to accommodate advances in technology for high-voltage longwall equipment.

Since we promulgated the high-voltage longwall rule, the mining industry has been moving toward the use of high-voltage continuous mining machines to increase productivity. High-voltage continuous mining machines increase productivity with a minimal increase in machine size. Higher voltages also require less current, resulting in the use of smaller cables. Smaller cables are easier to handle, and can reduce injuries to miners.

Existing safety standard 30 CFR 75.1002, *Installation of electric equipment and conductors; permissibility,* does not allow mines to utilize high-voltage continuous mining machines in or inby the last open crosscut, within 150 feet of pillar workings, or on longwall faces. To allow mines to utilize high-voltage mining machines in the face area of a mine, we grant PFMs. The PFM process allows a mine operator to request modification of a safety standard at a particular mine pursuant to section 101(c) of the Federal Mine Safety and Health Act of 1977 (Mine Act). PFMs may be granted when a mine operator has an alternative method that provides the same measure of safety protection as the existing standard; or when the existing standard would result in diminished safety protection to miners. The PFM process results in safety requirements and procedures that are applicable only to an individual mine. Once a final written decision pertaining to a PFM has been issued, the governing terms and conditions contained in the decision become mandatory for the mine described in the petition. Following issuance of a final decision, we continue to monitor compliance with its terms and conditions.

PFMs granted to date for the use of high-voltage continuous mining machines contain requirements for proper installation, electrical and mechanical protection, cable handling, and disconnecting of circuits and equipment. We granted the first PFM for the use of continuous mining machines incorporating onboard high-voltage switching components in 1997. From 1997 through October 2003, we granted 38 PFMs for the use of high-voltage continuous mining machines, and others are being processed.

B. PFM Requirements in the Proposed Rule

In developing this proposed rule we reviewed the granted PFMs for § 75.1002 to allow the use of high-voltage continuous mining machines. Although the proposed rule includes most requirements that were in the granted PFMs allowing the use of high-voltage continuous mining machines, it does not include all of the requirements. The table below indicates which requirements in the granted petitions are also in the proposed rule.

TABLE 1.—COMPARISON OF REQUIREMENTS IN GRANTED PETITIONS FOR MODIFICATION (PFMS) WITH REQUIREMENTS IN THE PROPOSED RULE

Requirement in PFMs	Number of PFMs including requirement out of 38 PFMs	Requirement included in Proposed Rule
2,400 Volt limit for continuous mining machine	38	No.
120 Volt maximum control voltage	38	Yes.
Ground-fault protection	38	Yes.
Short-circuit protection	38	Yes.
Look ahead circuit	38	Yes.
Undervoltage protection	38	Yes.
Installation of trailing cables	38	Yes—expanded to allow unused entry.
Trailing cable temporary storage	15	Yes.
Guarding	38	Yes.
Guarding locations	38	Yes.
Suspended cables or cable crossovers	18 prohibit the use of crossovers; 19 permit crossovers; 1 does not address the use of crossovers.	Yes.
Cable design	38	Yes.
Maximum number of splices	37	No.
Prohibiting tape-type splices	38	No.
Qualified person to splice	38	Yes.
Trailing cable inspection	38 for daily inspection; 13 for inspection each shift.	Yes.
Main disconnect device in power center	38	Yes.
Trailing cable disconnecting devices	38	Yes.
Caution labels on HV compartments	38	Yes.
Grounding stick for capacitor storage devices	38	Yes.
Design, installation, and maintenance of disconnecting switches	38	Yes.
Main disconnecting devices and control circuit interlocking	38	Yes.
Cover interlocks	38	Yes—two required.

TABLE 1.—COMPARISON OF REQUIREMENTS IN GRANTED PETITIONS FOR MODIFICATION (PFMS) WITH REQUIREMENTS IN THE PROPOSED RULE—Continued

Requirement in PFMs	Number of PFMs including requirement out of 38 PFMs	Requirement included in Proposed Rule
Emergency stop switch	33	Yes.
Barrier and covers	38	Yes.
Troubleshooting and testing limitations	38	Yes.
Qualified person	38	Yes.
Ungrounded power circuits	38	Yes.
Ground-wire monitor test	38	Yes.
Power center lockout and tag procedures	38	Yes.
Trailing cable lockout and tag procedures	38	Yes.
Lockout and tagging responsibilities	38	Yes.
Ground-fault test	38	Yes.
Grounded-phase detector test	37	Yes.
Remove from service if a grounded-phase occurs	38	Yes.
Handling trailing cables	38	Yes.
Personal protective equipment made available by mine operator	34	Yes.
Visual examination of HV insulating gloves	38	Yes.
Air testing of gloves	38	Yes.
Voltage testing of gloves	38	Yes.
Power sources for tramming	15	Yes.
Training	38	No.

Those requirements in the petitions that were omitted from the proposed rule are as follows: limiting the operating voltage of the continuous mining machine; limiting the number of splices in a high-voltage trailing cable; prohibiting permanent tape-type splices; and training requirements for miners on the high-voltage continuous mining machine systems. The proposed rule does not limit the continuous mining machine voltage, originally specified by the manufacturer to 2,400 volts, because existing regulations in Part 18 allow for approval of equipment up to 4,160 volts. The proposed rule, like the high-voltage longwall rule, has technical provisions to test and evaluate equipment containing on-board switching of high-voltage components up to 4,160 volts. Therefore, we believe that limiting the maximum operating voltage of continuous mining machines to 2,400 volts would unnecessarily restrict the design, and have written the proposed rule to allow for approval of equipment with operating voltages up to 4,160 volts.

The proposed rule does not include a limit in the number of splices in a high-voltage trailing cable because we could find no data to support quantifying a maximum number. The design features of the high-voltage cables combined with the sensitive ground-fault protection of the circuit will dictate increased vigilance in the protection and maintenance of the high-voltage cables. Our experience has shown that as a splice is added to a high-voltage trailing cable, leakage current may flow between the phase conductors and the shielding and grounding conductors in the splice. These leakage currents would occur inside the splice, and would not pose a shock hazard to miners. As additional splices are added, the summation of these currents will activate the sensitive ground-fault protection and prevent the continuous mining machine from operating.

Additionally, while we prohibited the use of permanent tape-type splices under the petitions, we do not prohibit such use in this proposed rule. Tape-type splices can be used to make an effective splice when proper procedures are followed. Our concern with allowing them had been that the splice materials were often used improperly, and this allowed moisture to enter the splice. Moisture would then degrade the insulation and ultimately create a shock hazard. Instead of prohibiting all tape-type splices, we are proposing that all splices be made with an MSHA-approved splice kit. The approved kits contain materials and instructions on the proper methods for making a splice. The kit includes tape that is self-vulcanizing so it will exclude moisture when applied as instructed, thereby preventing a shock hazard.

Finally, the PFMs required certain safety training that is already required by 30 CFR part 48, and, therefore was duplicative. Specifically, all miners who perform maintenance on high-voltage continuous mining machines are to be trained in high-voltage safety, testing, and maintenance procedures. Also, all personnel who work in the proximity of the high-voltage continuous mining machine or who move high-voltage equipment or cables are to be trained in high-voltage safety procedures. These requirements are not incorporated into the proposed rule since they are already required under existing 30 CFR part 48.

IV. Discussion of the Proposed Rule

A. General Discussion—Part 18 Electric Motor-Driven Mine Equipment and Accessories

We are proposing to add specific design requirements for high-voltage continuous mining machines used in face areas and pillar workings of underground mines for manufacturers to follow to obtain our approval. The proposed additional requirements would allow high-voltage switchgear with enhanced safety protection from fire, explosion and shock hazards to be used on high-voltage continuous mining machines. The proposed changes would accomplish several purposes. They would improve the design requirements for continuous mining machines consistent with existing requirements in 30 CFR part 18, accommodate new design technology that is practical, and lessen burdens on the mining community while preserving safety and health protection for miners.

The main safety protections addressed in this proposed rule, like the high-voltage longwall rule, are summarized into four areas: (1) Prevention of a high-voltage arc from occurring; (2) prevention of the resulting heat or flame from igniting a methane-air mixture surrounding the machine if an arc or methane explosion occurs within the explosion-proof enclosure; (3) prevention of enclosure failure from an increased pressure rise if an arc or methane explosion occurs within the explosion-proof enclosure; and (4)

personal protection for miners from electrical shock hazards when working with or around the high-voltage equipment.

This proposed rule addresses only those provisions of 30 CFR part 18 for approval of continuous mining machines with onboard high-voltage switching of high-voltage components. Several of these proposed provisions are either new or derived from existing part 18 requirements. However, we are also proposing a number of requirements identical to existing § 18.53 provisions for longwall mining systems that also apply to high-voltage continuous mining machines. We have chosen to organize the rule so that the requirements for approval of continuous mining machine systems remain separate from those of longwall systems. We invite comments on whether we should reorganize §§ 18.53 and 18.54 to combine them or reorganize them in some other way in the final rule.

We are proposing this approval rule (30 CFR part 18) in conjunction with mandatory safety standards for high-voltage continuous mining machines (30 CFR part 75).

B. General Discussion—Part 75 High-Voltage Continuous Mining Machine Safety Standards

We have evaluated the safety of high-voltage continuous mining machines used in underground coal mines for approximately six years. Through the petition process that allows a mine operator to request modification of a safety standard at a particular mine, we have performed specific on-site investigations for all petitions granted for the use of high-voltage continuous mining machines. We have verified that safety concerns of explosion, fire, and shock hazards associated with the use of high-voltage have been sufficiently addressed by advances in the high-voltage technology. For example, we have recognized that high-voltage electric equipment and circuit design improvements in combination with sensitive electrical circuit protections reduce the potential for fire, explosion and shock hazards. We have noted the availability of lighter power cables that reduce back strain and other injury risks to miners often associated with moving, lifting, or hauling the heavier lower voltage cables. Moreover, to our knowledge, there have been no electrical fatalities resulting from using high-voltage equipment under granted petitions. Our evaluation reveals that high-voltage continuous mining machines can be safely used, provided certain conditions are met.

Accordingly, we are proposing to revise the existing 30 CFR part 75 electrical safety standards to permit the use of high-voltage continuous mining machines. We have included new safety provisions, as well as almost all the basic provisions from granted petitions relative to the proper installation, electrical and mechanical protection, handling, and procedures for disconnecting circuits and equipment.

This proposed rule would not reduce the protection afforded by existing 30 CFR part 75 standards. Rather, it would provide increased protection from electrical, fire, and other hazards. We are proposing revisions to part 75 in conjunction with proposed revisions to 30 CFR part 18 that would address approval requirements for high-voltage continuous mining machines.

C. Plain English

We have attempted to write this proposed rule and preamble so that it is clear and understandable. In addition to the specific comments we are requesting throughout this preamble including those above concerning proposed § 18.54, we invite comments on how to make the entire rule easier to understand. For example:

1. Have we organized the material to suit your needs? If not, how could the material be better organized?
2. Do we clearly state the requirements in the rule? If not, how could the rule be more clearly stated?
3. Is the technical language clear? If not, what language requires clarification?
4. Would a different format (grouping or order of sections, use of headings, paragraphing) make the rule easier to understand? If so, what changes to the format would make the rule easier to understand?

D. Section-by-Section Discussion

Part 18 Electric Motor-Driven Mine Equipment and Accessories

Section 18.54 High-Voltage Continuous Mining Machines

(a) Separation of High-Voltage Components From Lower Voltage Components

Proposed paragraph (a) of this section was derived from existing § 18.53(a). The existing requirements for high-voltage longwall equipment are contained in § 18.53, High-voltage longwall mining systems. It would require separation of low- and medium-voltage circuits from those with high-voltage circuits in each motor-starter enclosure, by separate compartments, barriers, or partitions. Barriers and partitions, under this proposed rule, like the high-voltage longwall rule, would have to be constructed of grounded metal or nonconductive insulating board. When designing the barriers or partitions, consideration should be given to possible effects of pressure-piling within the enclosure due to restricted configurations within enclosures. Such restrictions can cause an accelerated rate of burning of a methane-air mixture that can create abnormal pressures within the enclosure. This extreme pressure can cause the enclosure to fail and possibly ignite methane gas or coal dust surrounding the enclosure, thereby putting miners at risk. The proper design of enclosures, including placement of barriers and partitions can limit the damaging effects from pressure piling. Under this proposed rule, barriers, partitions, or separate compartments must be provided between high-voltage and lower-voltage compartments to protect persons from coming into contact with energized high-voltage conductors or parts such as when testing and troubleshooting low- and medium-voltage circuits on the continuous mining machine.

(b) Interlock Switches

Proposed paragraph (b) of § 18.54 would require covers or removable barriers or partitions of motor-starter enclosure compartment(s) containing high-voltage components to be provided with at least 2 interlock switches. Proposed paragraph (b) is derived from existing § 18.53(b) with the addition of the word ''removable'' to clarify that interlock switches would not be required on permanently installed barriers, or partitions. Interlock switches protect miners entering enclosures from shock hazards by de-energizing high-voltage circuits when these barriers, partitions, or covers are removed. Like the high-voltage longwall rule, a minimum of two interlock switches per cover would be required and must be wired into the circuitry so that operating either switch would de-energize the incoming high-voltage circuits to that enclosure.

(c) Circuit-Interrupting Devices

Proposed paragraph (c) of § 18.54 is derived from the requirements in the granted PFMs for the use of high-voltage continuous mining machines and is identical to § 18.53(c). It would require that circuit-interrupting devices be designed and installed to prevent automatic reclosure. This provision would protect against shock, fire, and explosion hazards. For example, if a roof fall or equipment insulation failure

were to result in a short-circuit or ground-fault condition, the automatic reclosing of circuit-interrupting devices would re-energize the circuit and could create a hazard to miners.

(d) Transformers Supplying Control Voltages

Proposed paragraph (d) is primarily derived from existing § 18.53(d), but incorporates changes based on our experience in enforcing that provision. The proposed changes would clarify the grounding requirements of the electrostatic shield for various transformer designs.

Proposed paragraph (d)(1) of this section would require that the nominal control voltage of alternating-current circuits not exceed 120 volts line-to-line. This requirement would allow any appropriate control circuit wiring configuration of 120 volts line-to-line or less to exist, and would be consistent with the high-voltage longwall rule and granted petitions for high-voltage continuous mining machines. Limiting the control voltages to 120 volt, line-to-line will reduce the potential for electrocution hazards to miners.

Proposed paragraph (d)(2) specifies that control transformers with high-voltage primary windings that are located in each high-voltage motor-starter enclosure or that supply control power to multiple motor-starter enclosures, have an electrostatic (Faraday) shield installed between the primary and secondary windings. After the high-voltage longwall rule was promulgated, we became aware of the different control transformer designs which affect how electrostatic shields are grounded. Proposed paragraphs (d)(2)(i) and (ii) address those different grounding methods.

The purpose of the electrostatic shields is to provide isolation between the high-voltage and lower-voltage circuit(s). This isolation would protect miners against high-voltage shock hazards should a fault develop between the primary and secondary windings. Electrostatic shielding would also prevent transients (sudden short term changes in voltage and current) occurring on the primary circuit from being transferred to the secondary circuit. Such transients could cause premature damage to electrical and electronic control equipment and create an economic burden for the mining industry.

Grounding of the electrostatic shield would be dependent on the design of the transformer. If a transformer is designed with an external grounding terminal, proposed paragraph (d)(2)(i) would require the shield to be connected to the equipment ground by a minimum of a No. 12 American Wire Gauge (A.W.G.) grounding conductor extending from the external grounding terminal. This minimum wire size requirement is intended to ensure proper current carrying capacity and mechanical strength of the grounding conductor.

Proposed paragraph (d)(2)(ii) would require that if the transformer is designed without an external terminal, the electrostatic shield would have to be connected to the transformer frame by an internal conductor. This conductor, installed when the transformer was manufactured, would be considered an extension of the shield, and therefore, could be smaller than a No. 12 A.W.G. In this case, bolting of the transformer frame to the equipment enclosure would provide the required path to ground, as long as an effective low impedance electrical connection is maintained.

(e) Onboard Ungrounded, Three-Phase Power Circuit

The provisions of proposed paragraph (e) of this section are derived from the granted PFMs for the use of high-voltage continuous mining machines. Proposed paragraph (e) would require a grounded-phase indicator light when three-phase, ungrounded power circuits are used onboard the continuous mining machine. These circuits include high-voltage transformers on-board the machine to power low- and medium-voltage circuits. The secondary windings of these transformers are connected in an ungrounded configuration. The purpose of requiring an indicator light would be to detect or alert the operator to grounded-phase conditions in the ungrounded circuits. With ungrounded systems, the capacitive coupling between each phase conductor and ground can subject the ungrounded system to dangerous overvoltages resulting from intermittent ground faults. The occurrence of a second grounded-phase would create a short-circuit and possible arcing between components. This could result in a methane-air explosion that could result in catastrophic failure of the enclosure or cause a shock hazard to miners. Therefore, it is important to detect and immediately correct any grounded-phase condition to prevent a hazard. Paragraphs (e)(1) through (e)(3) address these concerns.

Proposed paragraph (e)(1) would require an on-board grounded-phase indicator light to alert the machine operator if a grounded-phase condition were to occur on any ungrounded, three-phase power circuit.

Proposed paragraph (e)(2) would require the indicator light to be installed so that the machine operator could readily observe it from any location where the continuous mining machine is normally operated.

Proposed paragraph (e)(3) would require that the onboard ungrounded, three-phase power circuit contain a test circuit to verify the integrity and proper operation of the grounded-phase detection circuit. Also, the test circuit must be designed so that (1) the designated person would not have to remove the electrical enclosure covers to activate it; and (2) it would not create a double-phase-to-ground fault resulting in a short-circuit condition. We note that such a design already exists, as we have seen equipment where a readily accessible test switch was used to activate the test circuit and not require the removal of electric enclosure covers. This design would minimize hazards to personnel by making the test easier to use and avoid placing personnel in close proximity to exposed, energized conductors, thereby minimizing the potential for shock hazards.

(f) High-Voltage Trailing Cable(s)

Proposed paragraph (f) would address high-voltage trailing cables, and is derived from: the granted PFMs for the use of high-voltage continuous mining machines; proposed § 75.826; existing §§ 18.35 and 18.47; and Insulated Cable Engineer's Standards (ICEA)S–75–381/ National Electrical Manufacturer's Association (NEMA) Standard NEMA WC 58–1997. The proposed rule incorporates by reference the current carrying capacity (ampacity) ratings and outside diameter requirements for trailing cables listed in the ICEA/NEMA Standard. This requirement would standardize the ampacity and outer diameter of cables to prevent overheating and ensure the interchangeability of trailing cables provided by different manufacturers. In accordance with the requirements for incorporating by reference, proposed paragraph (f) details how the public may inspect or purchase a copy of the incorporated standard and notes that according to his/her statutory authorization, the Director of the Federal Register has approved the incorporation by reference.

Existing § 18.35 contains general requirements, such as minimum conductor size, maximum cable length, flame resistance, etc., for trailing cables. Existing § 18.47(d)(5) addressing voltage limitations of trailing cables requires cables to include grounding conductors, a ground check conductor, and grounded metallic shields around each

power conductor. Proposed paragraphs (f)(1), (f)(2), (f)(3), and (f)(4) would specify requirements applicable to trailing cables for high-voltage continuous mining machines.

Specifically, proposed paragraph (f)(1) would require trailing cables to be constructed to include 100 percent semi-conductive tape shielding over each insulated power conductor. Proposed paragraph (f)(2) would require a grounded metallic braid shielding over each power conductor. The 100 percent semi-conductive tape shielding material and grounded metallic shield around each power conductor would protect miners from shock and electrocution hazards. Also, the combination of the tape and shielding requirements would prevent voltage stresses on the conductor insulation. The shielding maintains a symmetrical distribution of voltage stresses. This is critical at higher operating voltages. Shielding also prevents transients on power systems and reduces the hazard of electric shocks.

Proposed paragraph (f)(3) of this section would require that the cable include either a ground check conductor not smaller than a No. 10 A.W.G. or a center ground-check conductor not smaller than a No. 16 A.W.G. stranded conductor. Cables designed with a center ground-check conductor do not need to have the size of the ground-check conductor as large as a ground-check conductor located on an interstice of the cable since the conductor would be exposed to less mechanical stress and damage. Therefore, a No. 16 A.W.G. ground-check conductor would be adequate. Such designs have been used in high-voltage longwall applications for several years, and are currently permitted under existing § 75.822.

Proposed paragraph (f)(4) of this section is based on language contained in granted PFMs for the use of high-voltage continuous mining machines. It would require the use of two reinforced layers of jacket material. Under this construction, the inner-most layer of two-layered protective cable jacket would be required to be a color distinctive from the outer jacket color. This requirement would also complement the inspections required in proposed § 75.832(d) since the purpose would be to allow for easy recognition of damage to the jacket. The provision would not permit the color black to be used for either layer since it would be hard to identify damaged areas.

(g) Safeguards Against Corona

Proposed paragraph (g) of § 18.54 is identical to existing § 18.53(k). Proposed paragraph (g) would require a manufacturer to provide safeguards against corona on all 4,160 volt circuits in explosion-proof enclosures. Corona is a luminous discharge that occurs around electric conductors that are subject to high electric stresses. Corona can cause premature breakdown of insulating materials in explosion-proof enclosures onboard the high-voltage continuous mining machine. This could result in arcing and possibly create an explosion hazard. Although corona usually does not present a hazard until a voltage of 8kV is reached, safeguards should be taken at 4,160 volts. Safeguards would include using cables with a corona resistant insulation such as ethylene propylene to avoid small nicks or cuts in the cable insulation and to minimize high-voltage transients. As with the high-voltage longwall rule, this provision is not intended to require stress cones or similar termination schemes to prevent corona.

(h) Explosion-Proof Enclosure Design

Proposed paragraph (h) of this section is identical to existing § 18.53(l). It would require limiting the maximum explosion pressure rise within an enclosure to 0.83 times the design pressure for any explosion-proof enclosure containing high-voltage switchgear. This requirement would protect against explosion hazards that may arise from the effects of a sustained high-voltage arcing fault. Arcing faults may significantly contribute to a pressure rise in an explosion-proof enclosure during an internal methane-air explosion. A pressure rise above the design limit of the enclosure could cause the explosion-proof enclosure to fail to contain the methane explosion.

(i) Location of High-Voltage Electrical Components Near Flamepaths

Proposed paragraph (i) is identical to existing § 18.53(m). It would require that high-voltage electrical components located in high-voltage explosion-proof enclosures not be coplanar with a single-plane flame-arresting path. This protective measure would prevent the heat or flame (from an arc or methane explosion in an explosion-proof enclosure) from igniting a methane-air mixture surrounding the enclosure. This requirement would prevent the possibility of conductor material particles from being expelled from the enclosure through the flame-arresting path. Particles of molten material are emitted from the conductors whenever an arcing short-circuit occurs in an explosion-proof enclosure. Expulsion of these particles from the enclosure can occur if their source is in the same plane as the flame-arresting path and a pressure rise coincides with the short circuit. Once these particles are expelled from the explosion-proof enclosure, they can ignite an explosive atmosphere should one be present. This possibility would not arise with multi-plane flame-arresting path surfaces because a deflection in the path would prevent ignitions by expelled particles.

(j) Minimum Creepage Distances

Proposed paragraph (j) of § 18.54, including the table for minimum creepage distances, is identical to existing § 18.53(n). Proposed paragraph (j) would require that rigid insulation between high-voltage terminals or between high-voltage terminals and ground be designed with creepage distances in accordance with the minimum creepage distance table proposed in this section. The minimum creepage distances specified would provide adequate insulation to prevent a phase-to-phase or phase-to-ground fault that could cause a possible explosion. The required creepage distances are determined based upon the phase-to-phase use voltage and the Comparative Tracking Index (CTI) of the insulation to be used. An appropriate method of determining the CTI of the electrical insulating material is described in the American Society for Testing and Materials Standard, ASTM D3638 ''Standard Test Method for Comparative Tracking Index of Electrical Insulating Materials.'' The MSHA derived creepage distances in the table are consistent with most commercially available high-voltage components to which this provision would apply.

(k) Minimum Free Distances

Proposed paragraph (k) of § 18.54, including the table discussing Minimum Free Distances (MFDs), is identical to existing § 18.53(o). It would address a requirement for MFDs within an explosion-proof motor-starter enclosure. During development of the high-voltage longwall rule, we determined that if phase-to-phase arcing occurred, there might be sufficient arc energy to heat the walls of the enclosure beyond the safe design temperature. This could cause failure of the enclosure and create an explosion hazard if the MFDs are below what is specified in the table. Consequently, distances between the wall or cover of an enclosure and uninsulated electrical conductors inside the enclosure were established to prevent wall or cover damage that may result from phase-to-phase arcing.

Under proposed paragraph (k)(1), we would allow for values not specified in the MFD table provided they meet the

specific engineering formulas on which the table is based. These formulas are adopted from existing § 18.53. Under proposed paragraph (k)(2), we would require the minimum free distance values in the table or those values calculated using the prescribed formula to be increased by an incremental amount based on the system voltage. The minimum free distance must be increased by 1.5 inches for 4160 volt systems and by 0.7 inches for 2400 volt systems when the adjacent wall area is at the top of the enclosure. This increase in distance is necessary to account for the thermal effects caused from the arc, due to heat rising within the enclosure. Under this proposed paragraph we would also consider the use of steel shields in conjunction with an aluminum wall or cover. Under these circumstances, the thickness of the steel shield would be used to determine the minimum free distance.

Additionally, we would consider the use of alternate techniques and methods, as permitted by § 18.47(d)(6), that preclude the possibility of high-energy arcs that would heat the walls of explosion-proof enclosures beyond safe temperatures. If upon evaluation, equivalent safety were demonstrated, we would accept these technological advances and the results of additional research in this area.

(l) Static Pressure Testing of Explosion-Proof Enclosures Containing High-Voltage Switchgear

Proposed paragraph (l) of this section is derived from existing § 18.53(p). Proposed paragraph (l)(1) would require that prior to performing explosion tests required under existing § 18.62, the manufacturer must perform a static pressure test as detailed in proposed paragraph (l)(1)(i) on each prototype design of explosion-proof enclosure housing high-voltage switchgear and the enclosure meet acceptable performance criteria as specified in proposed paragraph (l)(1)(ii).

Proposed paragraph (l)(1)(i) describes the prototype static test procedure and specifies that the enclosure be internally pressurized to a pressure no less than the design pressure, with the pressure maintained for a minimum of 10 seconds. The pressure is then released and the pressurizing agent removed from the enclosure. We have developed the static pressure test with its acceptable performance criteria to ensure each enclosure design would be capable of withstanding its design pressure. By requiring static pressure testing on each prototype enclosure, we believe that the adequacy of enclosure design would be verified.

Proposed paragraph (l)(1)(ii) specifies the acceptable performance criteria that enclosures undergoing the prototype static pressure test must satisfy. Acceptable performance would be achieved if the enclosure, during pressurization, did not result in the rupture of any part that would affect the integrity of the explosion-proof enclosure or cause leakage through welds or castings. Further, the provision would require that following removal of the pressurizing agents, the enclosure would not exhibit visible cracks in welds, permanent deformation exceeding 0.040 inches per linear foot; or excessive clearances along flame-arresting paths following retightening of fastenings, as necessary. Any of these conditions would constitute unacceptable performance because they would indicate that the explosion-proof integrity of the enclosure has been compromised.

Proposed paragraph (l)(2) would require the manufacturer of every explosion-proof enclosure housing high-voltage switchgear to either conduct the static pressure test for each manufactured unit or follow an MSHA-accepted quality assurance procedure covering the inspection of the enclosure. These procedures are typically required by nationally recognized quality systems certification organizations. The purpose of the quality assurance procedures would be to verify that the manufactured enclosure meets the design specifications of the original enclosure tested.

Part 75—Mandatory Safety Standards—Underground Coal Mines

Section 75.823 Scope

Proposed § 75.823 describes the scope of this proposed rule. Proposed §§ 75.824 through 75.833 are electrical standards that would apply only to the use of high-voltage continuous mining machines. Proposed § 75.823 also specifies that under this rule a ''qualified person'' means a person qualified under existing § 75.153; *Electrical work; qualified person.* This requirement is derived from existing § 75.820(a), and is included in the scope to prevent repetition of this requirement. Consequently, any reference in this proposed rule to electrical work on circuits and equipment associated with high-voltage continuous mining machines would need to be performed by persons qualified in accordance with § 75.153. This electrical work includes all circuits and equipment, not just high-voltage.

Also, this proposed rule is similar to the high-voltage longwall rule in that non-qualified persons working under the direct supervision of a qualified person would not be permitted to do electrical work, even when directly supervised by a qualified person. We believe that when a person is qualified to perform electrical work on low-, medium-, and high-voltage circuits, he is able to identify hazards and follow safe work procedures. Therefore, only qualified persons would be permitted to work on circuits associated with high-voltage continuous mining machines. This requirement is intended to prevent electrical accidents.

Other standards in 30 CFR would also apply to this equipment, where appropriate. For example, safety standards, such as grounding and ground-monitor requirements contained in subparts H and I of part 75 that are currently applicable to high-voltage installations are also applicable to high-voltage continuous mining machines. However, §§ 75.813 through 75.822 apply only to high-voltage longwalls. Additionally, once promulgated, this rule will supercede existing provisions from granted PFMs.

Section 75.824 Electrical Protection

Proposed § 75.824, with the exception of paragraph (a)(2)(ii), is derived from the granted PFMs for the use of high-voltage continuous mining machines. Proposed § 75.824 addresses electrical protection for high-voltage continuous mining machines. The effects of ground faults, overloads, electrical arcing, heating of conductors, and short circuits can have adverse consequences to the safety of miners. Effective electrical protection for continuous mining machines would reduce the potential for ignitions, fires, and miner exposure to energized equipment frames. The proposed rule would provide increased miner protection by incorporating the latest technology when using high-voltage continuous mining machines.

(a) Trailing Cable Protection

Proposed paragraph (a) of § 75.824 would require that a circuit-interrupting device have adequate interrupting capacity and be rated for the maximum voltage of the circuit in which it is used. The device would be part of the short-circuit, overload, ground-fault, and undervoltage protection for the trailing cable and the mining machine.

The purpose of requiring that the circuit-interrupting device be properly rated is to safely interrupt any circuit current in which it is intended to be used without damage to itself. The circuit-interrupting device must have a voltage rating that would ensure that the device would remain undamaged when

subjected to the maximum voltage of the system. Short-circuit and overload protection prevent damage to cables and motors due to arcing and overheating, and, therefore, minimize the risk of ignition and fire hazards to miners. Ground-fault protection minimizes the risk of shock and electrocution hazards to miners. Undervoltage protective devices prevent automatic restarting of equipment following a loss of power. This would prevent the inadvertent movement of machinery that can place miners at risk.

(1) Short-Circuit Protection

Proposed paragraph (a)(1)(i) would specify a current setting for a short-circuit protective device. The device, located in the power center, would be required to be set at the lower value of either the setting specified in approval documentation pertaining to the continuous mining machine or 75 percent of the minimum available phase-to-phase short-circuit current at the continuous mining machine. The short-circuit current settings specified in our approval documentation are based on the design of the continuous mining machine. As equipment is used and moved from one location to another in a mine, changes may take place in the electrical system which require an adjustment to the short-circuit protective device setting.

Proposed paragraph (a)(1)(ii) would allow the short-circuit device protecting the cable extending from the power center to the continuous mining machine to have an intentional time delay. The short-circuit protective device located in the power center would be required to have the lower value of either the time delay setting specified in the approval documentation or up to 0.05 seconds.

The purpose of permitting a time delay is to eliminate nuisance tripping during motor starting. When high-voltage longwalls were introduced to the mining industry, nuisance tripping problems were experienced. This nuisance tripping was caused by motor starting currents. To solve these problems, it was necessary to incorporate time delays into the short-circuit protective devices. Currently, electronic relays that are commonly used to provide short-circuit protection for high-voltage continuous mining machine circuits are designed with inherent time delay to override motor starting currents.

(2) Ground-Fault Protection

Proposed paragraph (a)(2) of § 75.824 would require ground-fault protection for the trailing cable extending from the power center to the continuous mining machine. Proposed paragraph (a)(2)(i) would require ground-fault currents to be limited by a neutral grounding resistor to not more than 0.5 ampere. Neutral grounding resistors are used in resistance grounded systems to limit the level of ground fault current in a circuit. The use of a 0.5 ampere neutral grounding resistor in conjunction with the ground-fault devices specified in the proposed standard would reduce the potential for shock hazards and prevent the neutral grounding resistor from overheating and becoming a fire hazard.

Proposed paragraph (a)(2)(ii) would require the trailing cable extending to the continuous mining machine to be protected by a ground-fault device set at not more than 0.125 ampere. The 0.125 ampere limit is based on the fact that sensitive ground-fault devices are commercially available and have been successfully used to detect ground-fault currents in circuits with extremely large values of motor starting current. The ground-fault device would have to operate within 0.050 second when exposed to 0.125 or more ampere. The purpose of permitting a time-delay is to prevent nuisance tripping during motor starting. The proposed time-delay requirement of paragraph (a)(2)(ii) is new.

The granted PFMs require instantaneous ground-fault protection, and do not allow for any time delay. However, with higher inrush currents, the lower settings of the relay may cause the circuit to open during motor starting.

Proposed paragraph (a)(2)(iii) of § 75.824 would require an impedance-measuring ''look-ahead'' circuit to detect a ground-fault condition and prevent the closing of a circuit-interrupting device when a ground-fault exists in a circuit. The practice of repeatedly closing the circuit-interrupting device with a fault present can cause the circuit-interrupting device insulation to fail and cause the device to explode. This requirement is intended to reduce possible injury to miners from such potential explosion.

Proposed paragraph (a)(2)(iv) of § 75.824 would require that a high-voltage circuit extending from the power center to the continuous mining machine have back-up ground-fault protection to detect an open neutral grounding resistor. The back-up ground-fault protective device can be a combination of a potential transformer and voltage relay, or any other device capable of detecting an open neutral grounding resistor. Once an open neutral grounding resistor is detected, the back-up device must cause the circuit extending from the power center to the continuous mining machine to be de-energized. The 40 percent trip level would provide a safety factor to ensure that unexpected lower levels of ground-fault current would be detected and cause the circuit-interrupting device to open. Additionally, the back-up device must have a time-delay setting of not more than 0.25 second. The time-delay setting would be low enough to ensure quick de-energization of the circuit when the neutral resistor opens and a ground-fault exists, while allowing for selective tripping with the ground-fault protective device of the trailing cable.

Proposed paragraph (a)(2)(v) of § 75.824 would require thermal protection for the high-voltage neutral grounding resistor that would open the ground-wire monitor for the high-voltage circuit supplying the power center if the neutral grounding resistor is subjected to high-temperature resulting from a sustained ground-fault current. Thermal protection could include current transformers and thermal relays or any other devices, such as thermostats that sense overtemperature. The thermal device must not depend on control power because a loss of control power could prevent the detection devices from operating. The overtemperature rating or setting of the device would be the lower value of either 50 percent of the maximum temperature rise of the neutral grounding resistor or 302° F (150° C).

A thermal device is an added safety feature which would cause interruption of the high-voltage circuit supplying the power center by opening the ground-wire monitor circuit before sustained extreme heat causes the neutral grounding resistor to fail in the open mode. Failure of the resistor could leave the circuit unprotected against ground faults and would increase the possibility of fire and shock hazards. The proposed overtemperature setting requirement would ensure that the affected circuit is quickly de-energized under a sustained fault. Our experience has been that the settings specified would be high enough to prevent nuisance tripping.

Proposed paragraph (a)(2)(vi) of § 75.824 would require a single window-type current transformer to encircle the three-phase conductors for ground-fault protection. It would also prohibit the equipment grounding conductors from being passed through the ground-fault current transformer. This configuration would be prohibited because it would defeat ground-fault protection and result in hazardous voltage on equipment frames. Using the single-window type current transformer

in conjunction with a ground-fault relay would ensure sensitive ground-fault protection for circuits extending from the power center to the continuous mining machine.

Proposed paragraph (a)(2)(vii) would require a ground-fault test circuit for each ground-fault device specified in proposed paragraph (a)(2)(ii) of this section. This test circuit would be required to inject a current of 50 percent or less of the current rating of the neutral grounding resistor to verify that a ground-fault condition will cause the corresponding circuit-interrupting device to open. This test procedure would help determine if ground-fault devices function at required current levels. It would also test the sensitivity of each device to ground fault currents.

(3) Undervoltage Protection

Proposed paragraph (a)(3) of this section would require that the undervoltage device operate on a loss of voltage, de-energize the circuit, and prevent the equipment from automatically restarting. This provision is performance oriented. It would permit any undervoltage protective device that operates on loss of voltage and which prevents the automatic closing of the circuit-interrupting device upon restoration of power, to be used. This requirement is intended to reduce the likelihood that miners will be pinned or crushed due to the automatic restarting of the equipment upon restoration of power.

(b) Reclosing

Proposed paragraph (b) of § 75.824 would prohibit the use of circuit-interrupting devices that automatically reclose after opening. Automatic reclosure of the circuit-interrupting device would allow a circuit that has sustained a fault to re-energize. Typically, faults occur in trailing cables as a result of damage from roof falls or equipment. Under such circumstances, the use of automatic reclosing circuit-interrupting devices could create shock and fire hazards if the devices were designed to automatically reclose when a short-circuit or ground-fault condition exists in the circuit.

(c) Onboard Power Circuits

Proposed paragraph (c) of § 75.824 would require a mine operator to implement certain procedures if a grounded-phase indicator light was provided on a high-voltage continuous mining machine, and it indicated a grounded-phase condition.

The purpose of proposed paragraph (c) would be to warn miners of a grounded-phase condition. With ungrounded systems, the capacitive coupling between each phase conductor and ground can subject the ungrounded system to dangerous overvoltages from intermittent ground faults which can lead to insulation failure. Insulation failure can lead to another phase-to-ground failure. When two phases are grounded, a double-phase-to-ground or short-circuit condition will occur. High fault current will travel through the continuous mining machine frame creating possible shock and arcing hazards. The indication of a grounded-phase condition and subsequent repair of the equipment would reduce shock hazards to miners and eliminate any arcing ground-fault which can be an ignition source for methane. Therefore, it is important to detect and correct any grounded-phase condition.

Proposed paragraphs (c)(1) and (2) of this section set out safe procedures to be followed when locating and correcting a grounded-phase condition. Proposed paragraph (c)(1) requires that once the grounded-phase indicator light on the high-voltage continuous mining machine shows that a grounded-phase fault has occurred, the mining machine must be immediately moved to an area where the roof is supported. Proposed paragraph (c)(2) requires that once a grounded-phase fault has occurred, the machine not be placed into operation until the grounded-phase condition is corrected or the machine be taken out of service. The intent of proposed paragraph (c)(1) is to minimize miners' exposure to roof falls while the equipment is being repaired. The intent of proposed paragraph (c)(2) is to protect the miners from shock hazards.

Section 75.825 Power Centers

Except for paragraph (f), each paragraph in this proposed section is derived from granted PFMs for the use of high-voltage continuous mining machines. This section proposes requirements for power centers supplying high-voltage continuous mining machines. The proposed rule addresses disconnecting switches and devices, barriers and covers, interlocks, emergency stop switches, grounding sticks, and caution labels. Compliance with these requirements will prevent shock, fire, and explosion hazards.

(a) Main Disconnecting Switch

Proposed paragraph (a) of this section would require a main disconnecting switch in the power center. The purpose of the main disconnecting switch is to de-energize the primary windings of all power transformers in the power center when the switch is open, except for the control power transformer(s) and feed-through circuit(s). This will provide a safe means of de-energizing power when performing electrical work.

(b) Trailing Cable Disconnecting Devices

Proposed paragraph (b) would require a disconnecting device for each high-voltage output used to power the continuous mining machine. Disconnecting devices in power centers facilitate the de-energization process prior to performing electrical work. Traditionally, we have accepted either a disconnecting switch or cable coupler to satisfy lock-out and tagging requirements. This proposed paragraph would ensure that disconnecting devices are available for lock-out and tagging purposes as required in proposed § 75.831 to avoid exposing miners to electrical shock hazards.

(c) Disconnecting Switches

Paragraphs (c)(1) and (c)(2) of this section would require each disconnecting switch to have voltage and current ratings compatible with the circuits in which they are used. This requirement would prevent insulation failure and overheating resulting from using improperly rated switches. Therefore, this requirement would ensure that these switches would not create a shock or fire hazard to miners.

Paragraph (c)(3) of this section would require that the disconnecting switch be designed and installed so that one could see, without removing any covers, that the contacts of the device are open when the switch is in the ''open'' position. The removal of any cover to verify that the contacts are open could expose personnel to energized high-voltage circuits and could increase the potential for shock hazard.

Proposed paragraph (c)(4) would require the disconnecting switch to ground all power conductors on the ''load'' side of the switch when it is ''open and grounded.'' This requirement would ensure discharging of any existing voltage caused by capacitance between the power conductors and ground. It would also ensure that work can safely be performed on the electric circuits and equipment. Grounding the circuit would prevent shock hazards to miners working on the trailing cable or continuous mining machine.

Proposed paragraph (c)(5) would require that each disconnecting switch be designed so that it can only be locked in the ''open and grounded'' position. The switch must not have the ability to be locked in the closed position because it could delay opening the switch during an emergency. This provision in conjunction with proposed § 75.831

would ensure that the circuit remains de-energized until work is completed.

Proposed paragraph (c)(6) would require a disconnecting switch to be capable of interrupting the full-load current without causing damage to itself and thereby creating hazardous conditions. Using a switch that is not capable of interrupting the full-load current could result in its destruction and in injuries to miners from flash burns or flying parts. If the switch is not designed for full-load current interruption, the proposed rule would require that the switch be designed to cause the circuit-interrupting device to de-energize the incoming power to the ''line'' side of the switch before the disconnecting switch interrupts the circuit.

Proposed paragraph (c)(7) of § 75.825 would require each disconnecting switch to be labeled to identify which circuit it would de-energize. We believe that identifying the correct circuit would assist miners in ensuring that the proper circuit is de-energized protecting them from exposure to electrical hazards.

(d) Barriers and Covers

Proposed paragraph (d) would require all compartments that provide access to high-voltage conductors or parts to have a barrier or cover to prevent miners from contacting high-voltage circuits. Therefore, low- or medium voltage circuits, including control circuits, must be separated by a barrier from high-voltage circuits if they are located in the same compartment. If the barrier was made of conductive material, it would need to be grounded to the power center frame. All control devices, other than those mounted on the high-voltage circuit-interrupting device, would need to be mounted so that they are separated from high-voltage parts. The purpose of this requirement is to minimize miners' exposure to high-voltage conductors or parts while working on or troubleshooting the control circuit. Miners would be protected against shock hazards that could arise from inadvertent contact with energized high-voltage circuits.

(e) Main Disconnecting Switch and Control Circuit Interlocking

Proposed paragraph (e) of this section addresses the interlock requirements of the main disconnecting switch with the control circuit. The proposed interlock would allow the control circuit in the power center to be energized only through an auxiliary switch in the ''test'' mode when the main disconnecting switch is in the ''open and grounded'' position. When the main disconnecting switch is in the ''open and grounded'' position, the power conductors on the load side of the disconnecting switch are grounded. The interlocking feature would ensure that before the auxiliary switch can be placed in the ''test'' position, the main disconnecting switch must be open and grounded. When the main disconnecting switch is ''closed,'' the control circuit can only be powered through the normal position and the control circuit cannot be tested. In the normal position, removal of a cover for testing would cause the cover interlock switches to de-energize incoming power. These interlock requirements are intended to prevent energization of the high-voltage circuits during testing and troubleshooting.

(f) Interlocks

Proposed paragraph (f) of this section is derived from the granted PFMs for the use of high-voltage continuous mining machines. The PFM provisions included the wording ''cover interlock switches,'' but did not specify the number of interlock switches required. Proposed paragraph (f) clarifies this by requiring at least two interlock switches to be installed on the cover or removable barrier of any compartment containing high-voltage conductors or parts. Proposed paragraph (f) would also require that the switches be installed so that removal of a cover or barrier will cause the switches to de-energize high-voltage conductors or parts located behind the removed cover or barrier. Magnetic or whisker-type switches are acceptable. Our experience with inspecting plunger-operated switches has revealed that these switches may stick and not operate effectively after exposure to the mine environment. We believe that at least two switches coupled with required maintenance under 30 CFR 75.512 would provide the necessary protection to any miners (including qualified persons) who mistakenly remove a cover or barrier, by ensuring that the high-voltage circuits are de-energized whenever a cover is removed. This would protect miners from accidental contact with energized high-voltage circuits.

At times, qualified persons may need to remove covers and barriers when testing or troubleshooting *energized* power center control circuits. Proposed § 75.825(f) requires that the interlocks on the covers or barriers isolating *energized* high-voltage conductors or parts de-energize incoming power. The intent of proposed paragraph (f) permits bypassing cover and barrier interlocks that isolate *de-energized* high-voltage conductors or parts. To bypass the cover and barrier interlocks, proposed paragraph (e)(1) of this section requires the qualified person to open the main disconnecting switch and place the control circuit auxiliary switch in the *test* position. This would permit the removal of covers or barriers when testing or troubleshooting the power center control circuits.

For proposed paragraph (f) we are also considering revising the requirement that interlocks de-energize high-voltage circuits when covers and barriers are removed by adding an exception for troubleshooting control circuits. We specifically request your comments on this.

(g) Emergency Stop Switch

Proposed paragraph (g) of § 75.825 requires an emergency stop switch that is located on the outside of the power center and that would de-energize the incoming high-voltage to the power center should an emergency arise. We would require that the switch be hard-wired to a fail-safe ground-wire monitor. In emergency situations, reliability of the stop-switch is critical.

(h) Grounding Stick

Proposed paragraph (h) would require that the power center be equipped with a grounding stick to discharge high-voltage capacitors and circuits. Because capacitors are energy storage devices, they continue to be energized even after the disconnecting switch is opened. Therefore, the use of a grounding stick would ensure that a qualified person would not be exposed to energized high-voltage conductors or parts. While there is no industry definition, we consider a grounding stick to be a live line tool (hot stick) made of either wood or fiberglass. To safely discharge the capacitors and parts, we recommend a hot stick with a No. 1/0 A.W.G. copper conductor bonded to the tool end of the hot stick and to the power center frame. This provision would also require a label that identifies the location of the grounding stick so that a qualified person can easily find it. The grounding stick would be required to be stored in a dry location to maintain its effectiveness.

(i) Caution Labels

Proposed paragraph (i) would require that all compartments providing access to energized high-voltage conductors and parts display a caution label that warns miners against entering the compartment before de-energizing the incoming high-voltage circuits to the compartment. It should remind miners that the line side of a disconnecting switch remains energized when the switch is opened unless the incoming power to the switch is de-energized.

Section 75.826 High-Voltage Trailing Cables

Proposed § 75.826 specifies the requirements for high-voltage trailing cables. The requirements of this section are derived from granted PFMs for the use of continuous mining machines, existing §§ 75.804 and 75.822, and existing and proposed part 18.

Proposed paragraph (a) would require that the high-voltage trailing cables meet the requirements under § 18.35 and proposed § 18.54 of this title. Any high-voltage cable used as a trailing cable and meeting the design requirements of existing § 18.35 and proposed § 18.54, would be permitted to be used with high-voltage continuous mining machines.

Proposed paragraph (b) of this section would provide two options. The first option would permit a cable meeting the requirements of existing § 75.804. Section 75.804 requires, among other things, the use of a ground-check conductor not smaller than a No. 10 A.W.G. The reason it requires this minimum size is because the conductor is located on the periphery of the cable. When the cable is flexed the ground-check conductor is subjected to a larger bending radius that can weaken the ground-check conductor and cause it to break or become damaged. This option permits a ground-check conductor no smaller than the No. 16 A.W.G. to be located in the center of the cable. This design does not subject the ground-check conductor to the same stresses as the first option when the cable is flexed. The main advantage to this design versus the existing design in § 75.804 is the reduction of inter-machine arcing because the cable design contains three grounding conductors placed symmetrically. We have seen this cable design successfully used with high-voltage longwall equipment.

The second option would also eliminate the need to petition § 75.804(a) when the cable is designed with a ground-check conductor smaller than No. 10 A.W.G. but not smaller than a No. 16 A.W.G.

Section 75.827 Installation and Guarding of Trailing Cables

Proposed § 75.827 is partially derived from granted PFMs for the use of high-voltage continuous mining machines and paragraph (a)(3) is new. This section would require that trailing cables be installed and guarded according to the specific standards set forth in the provision. The purpose of this section is to protect high-voltage trailing cables from damage. Cable damage that results in exposed energized conductors would be a shock hazard to miners.

(a) Trailing Cable Installation

Proposed paragraph (a) would require that the trailing cable from the power center to locations specified in (a)(1), (2), or (3) be either supported on insulators or located in an unused entry. If the cable is located in a high seam mine and supported on insulators, it is less likely to be damaged by equipment running into or over it. A damaged cable may expose energized conductors, and thereby present a shock hazard to miners. While supporting the cable on insulators in a high seam mine would protect the cable from damage and the miner from shock hazards, the same would not be true for a low seam mine. Consequently, we are proposing the option of allowing the cable to be located in an unused entry to achieve the same protection. Permitting the cable to be located in an unused entry would provide flexibility for mine operators, while maintaining the same measure of protection for miners. Although this option was not in most earlier granted PFMs for the use of high-voltage continuous mining machines, the option was allowed in recently granted PFMs for use of these machines. We request comments on this provision for other methods of installing and protecting the high-voltage trailing cable.

If the cable is located in an unused entry, the proposed rule would require that barricade tape and warning signs be used to alert miners that high-voltage cables are present. This proposed rule would not preclude foot travel but would warn operators of mobile equipment against traveling into the entry and running over the cable. An acceptable method to comply with both the barricade tape and warning sign requirements would be the use of pre-printed tape that displays a warning such as ''DANGER HIGH-VOLTAGE CABLE.''

Proposed paragraph (a)(1) would require the cable to be supported on insulators or placed in a barricaded, unused entry from the power center to the last open crosscut during advance mining. Proposed paragraph (a)(2) would require the cable to be supported on insulators or placed in a barricaded, unused entry from the power center to within 150 feet from any pillar workings during second mining. Second mining is defined in existing 30 CFR 75.332(b)(1) as ''intentional retreat mining where pillars have been wholly or partially removed, regardless of the amount of recovery obtained.'' Proposed paragraph (a)(3) would require the cable to be supported on insulators or placed in a barricaded, unused entry from the power center to within 150 feet of the continuous mining machine when the machine is used in outby areas. Examples of continuous mining machine usage in outby areas would include, but not be limited to, cutting overcasts, underpasses and sumps, and cleaning rock falls.

A cable extending beyond the locations specified in proposed paragraphs (a)(1), (2), and (3) does not have to be supported on insulators or placed in an unused entry. Furthermore, we believe that supporting the cable beyond the specified locations would be impractical because of the dynamics of the mining process. Consequently, the provision does not require that the cable be supported beyond these locations.

(b) Temporary Storage of Cables

Proposed paragraph (b) would allow the temporary lacing of cable into a sled or crosscut to store the slack cable in those areas specified in paragraphs (a)(1) to (a)(3) of this section. Proposed paragraph (b) is an exception to proposed paragraph (a) which requires that the trailing cable be either supported on insulators or located in a barricaded, unused entry. A sled or crosscut would be required to be barricaded to prevent mobile equipment from running over the cable in those areas specified in paragraphs (a)(1) to (a)(3) of this section. Warning signs would also be required to alert miners to the existence of an energized, high-voltage cable. Barricade tape pre-printed with a warning such as ''DANGER HIGH-VOLTAGE CABLE'' would meet the intent of the proposed rule. The temporary storage requirements of this paragraph are intended to protect the cable from damage and miners from contacting the energized cables.

(c) Guarding

Proposed paragraph (c)(1) of § 75.827 would require that the high-voltage cable be guarded at certain locations. These locations are those sections of the cable where miners are likely to come in contact with the cable and where the cable may be subject to possible damage. All guarding would be required to fully cover the cable in the areas specified in (c)(1)(i)–(iii) to provide a physical barrier between the cable and the miners. While guarding might cover a damaged cable, the damaged cable should be repaired immediately or removed from service as required by existing § 75.512. The purpose for requiring guarding is to protect the miner from shock hazards and protect

the cable from damage rather than for the purpose of repairing the cable.

Proposed paragraph (c)(2) would require that guarding be constructed from grounded metal or nonconductive flame-resistant material. If a marking does not appear on the guarding to indicate that it is flame-resistant, we will request documentation to substantiate the flame-resistance quality. Metal and non-conductive guarding could be either a continuous length or overlapping shorter pieces. Shorter pieces of metal guarding would need to be bonded together to ensure a continuous metallic path. In addition, metal guarding would have to be bonded and grounded.

Additionally, if the cable becomes damaged so that high-voltage conductors become exposed, it can create a shock hazard for miners. If grounded metal guarding is used, it would activate the ground-fault protection and de-energize the cable. If non-conductive guarding is used, it would isolate miners from the exposed, energized conductors. Therefore, the use of these materials would help prevent miners from being exposed to shock hazards if they contact the guarding when energized conductors are exposed.

(d) Suspended Cables and Cable Crossovers

Proposed paragraph (d)(1) offers a mine operator two options for protecting the high-voltage trailing cable in or inby the last open crosscut when equipment must cross any portion of the cable. The option provided by proposed paragraph (d)(1)(i) would require the high-voltage trailing cable to be suspended from the roof in those mines where sufficient clearance exists so that mine equipment will not damage the cable. The option provided by proposed paragraph (d)(1)(ii) would require that the high-voltage trailing cable be protected by a commercially available cable crossover. Where sufficient clearance from the mine equipment to the mine roof does not exist, a mine operator must use the option in proposed paragraph (d)(1)(ii). Cable crossovers are commercially available and have been used throughout the industry to protect cables from being damaged by equipment. These provisions help ensure that the high-voltage trailing cable is protected from damage by moving equipment. If possible, work procedures should be developed to minimize the need for suspending the cable or using cable crossovers.

Proposed paragraph (d)(2) specifies the minimum design requirements for the cable crossovers. These minimum design requirements are intended to ensure that mine operators consider both equipment size and type in use at their mine so that the equipment is able to cross over the cable without damage to the cable. For example, mines that use track mounted equipment should use crossovers capable of preventing damage to the cable from the equipment track cleats. It has been our experience that cable crossovers provide protection to cables when properly used.

Section 75.828 Trailing Cable Handling and Pulling

Proposed § 75.828(a) is derived from granted PFMs for the use of high-voltage continuous mining machines. Proposed paragraph (a) addresses the types of personal protective equipment required to be used when it is necessary to handle energized cables. Proposed § 75.828(b) is new, and is based on our concern that cable damage may result from improper pulling. Paragraph (b) would require de-energizing the cable and following the manufacturer's procedures for pulling the cable by equipment other than the continuous mining machine.

(a) Handling

Proposed paragraph (a) of this section would prohibit handling energized high-voltage trailing cables without wearing properly tested and rated insulating gloves. The provision would require that testing and rating of the insulating gloves be in accordance with proposed § 75.833. In addition, paragraph (a) would require that if mitts, hooks, tongs, slings, aprons, or other personal protective equipment are used to handle the energized cable, insulating gloves must also be used. This would ensure that miners are protected against shock hazards while handling energized cables.

(b) Pulling

Proposed paragraph (b) of § 75.828 would require that the trailing cable be de-energized prior to being pulled by equipment other than the mining machine. The proposed paragraph would also require that the cable manufacturers' pulling procedures be followed. Cable manufacturers' recommendations usually include: The proper application of a rope or sling to pull the cable; pulling procedures that will not exceed the minimum bending diameter; maximum length of trailing cable that can be safely pulled; and the number of corners that it can be pulled around.

The purpose of this requirement would be to prevent damage to the cable. For example, when pulling cables with ropes, if a loop smaller than the minimum bending diameters for the size of the trailing cables being pulled is created, the cable can be damaged. Proper pulling procedures would minimize cable damage and protect miners against shock hazards.

Section 75.829 Tramming Continuous Mining Machines In and Out of the Mine, and From Section to Section

Proposed § 75.829 is partially derived from granted PFMs for the use of high-voltage continuous mining machines, and proposed § 75.901. High-voltage continuous mining machine PFMs include requirements for either using a portable transformer that supplies 995-volts to the hydraulic pump motor and controls, or a temporary onboard step-up transformer to power the 2400-volt hydraulic pump motor and controls on the machine. In addition to these two options, the Agency has granted petitions to modify § 75.901 to allow the use of low-/medium-voltage, three-phase, diesel-powered generator sets to move section equipment. We anticipate the need to use high-voltage diesel-generator sets to move high-voltage continuous mining machines.

In developing this section, we envisioned the use of the following power sources to tram the continuous mining machine: a medium-voltage power source, an onboard step-up transformer, and a high-voltage diesel generator set to energize the hydraulic pump motor and controls of the continuous mining machine.

(a) Conditions of Use

Proposed paragraph (a) of this section sets forth the general requirements when using any of the power sources specified in paragraph (c) of this section for moving continuous mining machines. Proposed paragraph (a)(1) of this section is derived from § 75.500 which prohibits equipment not approved by us as ''permissible'' to be taken into or used in specific areas of the mine. Typically, these power sources are not ''permissible'' and, therefore, must not be permitted in these areas.

Proposed paragraph (a)(2) is new. It would require that the continuous mining machine not be used for mining or cutting while being trammed from section-to-section or in or out of the mine if the mining machine is powered by a medium-voltage power source, an onboard step-up transformer, or a high-voltage diesel-generator set. However, if mining or cutting is required, a power center that meets the requirements of § 75.825 must be used. In granted PFMs, the power sources permitted for tramming the continuous mining

machine included rewiring of the input to use 995 volt for tram and control functions, or an onboard step-up transformer. Typically these sources do not have the capacity to power the continuous mining machine for mining or cutting functions. Proposed paragraphs (c)(1) and (c)(2) are identical to the PFM requirements, while proposed paragraph (c)(3) permits the use of a high-voltage diesel generator. If mining or cutting were attempted while the machine is powered by these power sources, overloading and loss of power could occur. Typically these power sources are not of sufficient size to power all motors on the continuous mining machine for mining or cutting purposes.

Proposed paragraph (a)(3) would require that low-, medium-, and high-voltage cables comply with existing §§ 75.600–1, 75.907, and proposed § 75.826 when using the power sources specified in paragraph (c) of this section for moving continuous mining machines. Existing § 75.600–1 requires flame-resistant cables, existing § 75.907 specifies the design requirements for medium-voltage trailing cables, and proposed § 75.826 specifies the design requirements for high-voltage trailing cables.

Proposed paragraph (a)(4) would require that the high-voltage cable be secured on-board the mining machine. When using an on-board step-up transformer or a diesel-generator set, as permitted in proposed paragraphs (c)(2) and (c)(3), respectively, of this section, the energized high-voltage cable would need to be secured on-board the mining machine. If the trailing cable does not fit on the machine, a shorter length of cable should be substituted to connect the diesel-generator output to the continuous mining machine. The purpose of this requirement is to prevent anyone from handling energized, high-voltage cables and to minimize cable damage while tramming the continuous mining machine.

(b) Testing Prior to Tramming

Proposed paragraph (b) of § 75.829 is derived from granted PFMs to modify § 75.901 to allow the use of low- and medium-voltage diesel generators. Proposed paragraph (b)(1) would require that a qualified person conduct ground-fault and ground-wire monitor tests on the power sources specified in proposed paragraph (c) of this section, and that the circuits pass these tests prior to moving the continuous mining machine. If these tests indicate equipment failure, paragraph (b)(1) would require the mine operator to comply with proposed § 75.832(f), and correct the defect prior to moving the mining machine. Paragraph (b)(1) would also require that the qualified person record the results of the tests, and the mine operator maintain a record of the tests for one year as required by proposed § 75.832(g). The ground-fault test would verify that the circuit will be de-energized when a ground-fault condition exists. Power center manufacturers provide test circuits so ground-fault protection can be tested without subjecting the power system to an actual ground-fault condition. The ground-wire monitor test would verify that the circuit will be de-energized when the ground-check or grounding circuit is opened. Ground-wire monitor manufacturers provide a built-in test switch for this purpose. Ground-wire monitors would be required when low and medium power sources are used as permitted by proposed paragraphs (c)(1)(i) and (c)(2)(i) of this section. Ground-wire monitors would not be required when the provision of this section requires the use of external bonding for high-voltage equipment. A ground-wire monitor would not be required for high-voltage circuits of power sources specified in proposed paragraphs (c)(2) and (c)(3). In these applications, external bonding required by proposed §§ 75.829(c)(2)(iii)(B) and 75.829(c)(3)(ii) would be used to connect the frames of high-voltage equipment together.

Proposed paragraph (b)(2) would require that prior to tramming the continuous mining machine, a responsible person designated by the operator, test the grounded-phase detection circuit on the high-voltage continuous mining machine to ensure that the detection circuit would detect a grounded-phase condition. This is the same requirement as proposed § 75.832(e), except the test needs to be conducted prior to tramming. If these tests indicate equipment failure, the mine operator must comply with proposed § 75.832(f), and correct the defect prior to moving the mining machine.

Proposed paragraph (b) would not require a repeat of the ground-fault, ground-wire monitor, and grounded-phase tests when a continuous mining machine is stopped intermittently while tramming. The purpose of this paragraph is to require that functional tests be performed before the equipment begins its move from the surface to underground, from underground to the surface, or moves from one part of the mine to another. It does not require a functional test after momentary or incidental stoppage during the moving process.

This method of testing enhances safety by preventing miners from being exposed to energized circuits while performing the test. The combination of the ground-fault, ground-wire monitor, and grounded-phase tests would ensure safety devices operate to protect miners from shock hazards should a fault condition occur.

(c) Power Sources

Proposed paragraph (c) would specify power sources, in addition to the power center, that may be used when the mining machine is moved in and out of the mine or from section to section. Power sources specified in this section have been selected to avoid the need to handle energized, high-voltage cables.

(1) Medium-Voltage Power Source

Proposed paragraph (c)(1) of § 75.829 is derived from the granted PFMs for the use of high-voltage continuous mining machines. This option would allow the use of a medium-voltage power source that supplies 995 volts to the continuous mining machine. Figure 1 in this section illustrates a high-voltage continuous mining machine using a 995 volt power source. The power source can be supplied by the mine's power system, or a low- or medium-voltage diesel-generator set. If the power source is a portable transformer, the proposed rule would prohibit moving the transformer while energized. However, if a low- or medium-voltage diesel-generator set is used as a power source, the rule would permit the generator set to be moved while energized. If a diesel generator supplies power to a separate portable transformer, the proposed rule would prohibit the transformer from being moved while energized. To use the option in this paragraph, the machine circuitry would need to be rewired to allow the medium-voltage to energize the tram and hydraulic pump motor circuits. Backfeeding the continuous mining machine power transformer with medium voltage to energize the high-voltage circuit would be prohibited. In addition, the mine operator would have to comply with the applicable provisions in §§ 75.500 through 75.1000, such as overcurrent, ground-fault, undervoltage, and ground-wire monitors.

(2) Onboard Step-Up Transformer

Proposed paragraph (c)(2) of § 75.829 is derived from granted PFMs for the use of high-voltage continuous mining machines. It would allow the use of a temporary onboard step-up transformer. The transformer would convert low- or medium-voltage to high-voltage to power the continuous mining machine.

Figure 2 in this section illustrates this configuration. Proposed paragraph (c)(2)(i) would require low- or medium-voltage to comply with applicable requirements in 30 CFR part 75. For example, overcurrent, ground-fault, and undervoltage protection required in Subpart J are applicable.

Proposed paragraph (c)(2)(ii) would require that the high-voltage output circuit of the transformer comply with proposed § 75.824. For a detailed discussion of these requirements see the section-by-section discussion to proposed § 75.824.

Proposed paragraph (c)(2)(iii) would require that the transformer be securely installed on-board the continuous mining machine to prevent it from falling off the machine and to minimize vibration. Vibration could lead to an internal ground-fault or damage to the transformer. The frame of the on-board temporary transformer would be required to be bonded to the continuous mining machine frame and the metallic shell of each cable coupler by at least a No. 1/0 A.W.G. or larger conductor, and connected to the incoming ground wire of the trailing cable. This would ensure a low impedance grounding path from the onboard transformer to the outby power source should a ground-fault occur. Paragraph (c)(2)(iii)(C) would require that the transformer be equipped with at least two interlock switches for each cover and an external emergency stop switch to de-energize outby power when activated.

(3) Diesel-Generator Set

Proposed paragraph (c)(3) of § 75.829 is new. It contains requirements for using a diesel-generator set to supply high-voltage power for the continuous mining machine in certain circumstances. The first circumstance in which the requirements apply is when moving the continuous mining machine from section-to-section or in and out of the mine. The second circumstance is when the trailing cable to the continuous mining machine is providing high-voltage power from a high-voltage diesel generator set or a combination of a diesel generator set and a transformer.

A diesel-generator set could be either a high-voltage generator or a combination of a low-, medium-, or high-voltage generator and a transformer.

When the trailing cable to the continuous mining machine is providing low- or medium voltage from a diesel generator set or a combination of a diesel generator set and a transformer, proposed paragraph (c)(1) or (c)(2) would apply. If a low- or medium-voltage generator is to be used, it would require a PFM of existing § 75.901, Protection of low- and medium-voltage three-phase circuits used underground. Figures 3 and 4 of this section illustrate the variations when the trailing cable connected to the continuous mining machine is energized with high-voltage from a diesel-generator power source.

Proposed paragraph (c)(3)(i) would require a grounding resistor to satisfy two requirements. First, it would have to be rated for the maximum voltage to which it is subjected. Second, it would have to limit the ground-fault current to no more than 0.5 ampere. Requiring a grounding resistor rated for the maximum voltage would ensure that adequate insulating properties are provided for the grounding resistor. This is especially important when using autotransformers. When using an autotransformer, the grounding resistor would be required to be located between the neutral of the wye connected generator and the generator frame, and it must be rated for the highest output voltage of the autotransformer. A phase-to-ground fault occurring on the secondary side of the autotransformer would subject the grounding resistor to the output voltage of the autotransformer. This is because autotransformers have only one winding-per-phase and do not provide the electrical isolation characteristics necessary to create a separately derived system. A resistor that is subjected to a voltage higher than its rating can potentially explode, causing serious injury or death to persons nearby, or it can open from overcurrent, leaving the system ungrounded. Limiting the ground-fault current to not more than 0.5 ampere, and providing the sensitive ground-fault protection set forth in paragraphs (c)(3)(iv) provides increased protection against explosion, fire, and electrical shock.

If an isolation transformer is used in conjunction with a high-voltage generator, another neutral grounding resistor would need to be connected between the neutral of the transformer and its frame. This provision is intended to limit the voltage on the frame of the generator, transformer, and continuous mining machine to prevent a shock hazard during ground-faults.

Proposed paragraph (c)(3)(ii) would require bonding of the non-current carrying metal parts of the generator, transformer, and all cable couplers to the continuous mining machine using at least a No. 1/0 A.W.G. grounding conductor. This would eliminate any potential differences between equipment frames and provide a low impedance path for ground-fault current. The external No. 1/0 A.W.G. grounding conductor would provide visual evidence of a ground-fault current path and offer mechanical strength and durability. The intent of this provision is to minimize miners' exposure to shock hazards. This provision would satisfy the requirements of existing § 75.803, and eliminate the need for a ground-wire monitor.

Proposed paragraph (c)(3)(iii) would require the generator set to be in close proximity to the continuous mining machine. This provision would eliminate the hazards associated with handling energized high-voltage cables discussed in proposed § 75.828. Close proximity is intended to mean as close as practical using a solid connecting device to prevent free movement. This proposed paragraph would also require that the generator set and the continuous mining machine be securely attached by means of a tow-bar to prevent the generator set from moving freely. Chains, ropes, or slings would not be permitted as a sole means of preventing free movement. Compliance with this provision would limit the cable length between the generator and the continuous mining machine and thereby minimize cable handling and damage.

Proposed paragraph (c)(3)(iv) would require each three-phase output circuit, from the generator and transformer when used, to be equipped with sensitive ground-fault protection. The ground-fault circuit would be required to consist of a single window (zero sequence) current transformer and an instantaneous ground-fault device that would cause the appropriate circuit-interrupting device to open and the diesel engine to shut down. Ground-fault devices must cause the circuit interrupting device to open at no more than 0.125 ampere. Additionally, the proposed rule would prohibit the equipment grounding conductor from passing through the ground-fault current transformer. Passing the equipment grounding conductor through the current transformer would prevent detection of any ground-fault current.

Proposed paragraph (c)(3)(v) would require each three-phase circuit, from the generator and transformer when used, to be equipped with short-circuit and undervoltage protection. The purpose of short-circuit and undervoltage protection is discussed under proposed §§ 75.824(a)(1) and 75.824(a)(3).

Proposed paragraph (c)(3)(vi) would require a test circuit for each ground-fault device. The purpose of a test

circuit is discussed under proposed § 75.824(a)(2)(vii).

Proposed paragraph (c)(3)(vii) would require labels to be mounted next to or on the instantaneous trip unit of each circuit interrupting device. This label would list the maximum circuit interrupting device setting allowed for short-circuit protection of the respective circuit. Since the minimum short circuit current is calculated using the maximum length of cable allowed, the label will assist in ensuring that adequate short circuit protection for each circuit is provided. Proper short-circuit settings will prevent sustained arcing during electrical faults and a subsequent fire hazard from occurring.

Section 75.830 Splicing and Repair of Trailing Cables

(a) Splices and Repairs

Proposed § 75.830(a) is derived from granted PFMs for high-voltage continuous mining machines. This proposed section addresses the training/qualifications and the manner in which the trailing cable is to be spliced to ensure that miners are not exposed to shock and burn hazards while splicing or repairing the cable.

Proposed paragraph (a)(1) would require that cable splicing and repair be performed only by a qualified person who received specific training in cable splicing and repair of high-voltage cables. This training must be accomplished through the annual training under 75.153(g). The intent of this provision is to ensure that the person performing the splicing and repair of cable understands the construction of the cable, the purpose of every component, and the hazards associated with failure to replace each component with a component similar to the original.

Proposed paragraph (a)(2) would require that the spliced or repaired cable provide the same degree of protection to miners as the original cable. The quality of workmanship is vital to maintaining the same level of protection to miners as provided by the original cable.

Proposed paragraph (a)(3) would require that splices and repairs of trailing cables satisfy the requirements in existing § 75.810. Existing § 75.810, among other things, references existing § 75.604 which requires that the spliced or repaired cable be mechanically strong and provide the same flexibility and conductivity as the original cable. It also requires that the cable be effectively insulated and sealed to exclude moisture. Moisture would minimize the insulation quality and could render the splice a potential shock hazard to miners. Further, the splice or repair would be required to have flame-resistant qualities and good bonding to the outer jacket. The trailing cable, which would be required to have shielding around each power conductor and a double jacketed protection, must be repaired using an MSHA-approved splice kit. These kits provide specific material and instructions to be used when splicing or repairing the cable to ensure that it is flame resistant. Using this material and following these instructions is necessary to ensure the flame-resistant quality of the cable, and avoid exposing miners to potential fire and shock hazards.

(b) Permanent Cable Repair

Proposed paragraph (b) is derived from granted PFMs for the use of high-voltage continuous mining machines, and would require that MSHA-approved high-voltage kits be used, which include instructions for outer-jacket repairs and splices. Because the outer jacket protects the cable from damage, it is important to use appropriate materials and follow proper procedures.

The majority of PFMs included a provision to prohibit the use of temporary and/or permanent tape-type splices. The purpose of this prohibition was to prevent the use of non-vulcanizing tape from being used for splices or outer jacket repair. Regular tape repairs to high-voltage trailing cables do not exclude moisture which leads to insulation degradation and subsequent ground-fault conditions. When the materials in the MSHA-approved kits are properly applied, they will create a splice or outer jacket repair that will exclude moisture from the trailing cable. Since this proposed paragraph requires the use of an MSHA-approved high-voltage kit, this prohibition was not required. As explained before, improper high-voltage trailing cable repair can lead to miners' being exposed to shock and fire hazards.

(c) Splicing Limitations

Proposed paragraph (c) is derived from granted PFMs for the use of high-voltage continuous mining machines, and would prohibit splicing of the trailing cable within 35 feet of the continuous mining machine. Our experience with low- and medium-voltage equipment has shown that this portion of the cable is subjected to the most stresses and strains. If this portion of the cable is spliced, electrical connections in the splice can weaken and cause cable damage. This can lead to potential shock hazards to miners. In addition, this portion of the cable is handled by miners more often than the rest of the cable. Therefore, the probability of miners being shocked by an inadequate splice within this portion of cable would be greater.

Section 75.831 Electrical Work; Troubleshooting and Testing

Proposed § 75.831 is derived from granted PFMs for the use of high-voltage continuous mining machines and existing § 75.820. This section would specify safe procedures to be followed when performing electrical work, including troubleshooting and testing.

(a) Trailing Cable and Continuous Mining Machine Electrical Work Procedures

Proposed paragraph (a) would require that a qualified person de-energize the trailing cable circuit and complete one of the lock-out and tagging procedures specified in paragraphs (a)(1) or (a)(2) prior to performing electrical work on the trailing cable or continuous mining machine. De-energization is usually accomplished by opening the circuit-interrupting device. The qualified person must follow these work procedures to prevent inadvertent re-energization. These procedures are important to ensure that miners are not exposed to potential shock, fire, or other hazards when performing electrical work.

Proposed paragraphs (a)(1) and (a)(2) of this section would specify the options available for lock-out and tagging procedures. Depending on the power center design, a disconnecting switch or a cable coupler can be used to lock-out and tag the trailing cable. Proposed requirement (a)(1) specifies work procedures if a disconnecting switch is used on the output circuit of the power center supplying power to the continuous mining machine. If a disconnecting switch is used, proposed paragraph (a)(1)(i) would require the switch to be opened to provide visual evidence that the output is de-energized and grounded. Proposed paragraph (a)(1)(i) would also require that the switch be locked in the open and grounded position and tagged. This would allow the cable coupler plug to remain connected to the power receptacle. Additionally, proposed paragraph (a)(1)(ii) would require the plug and receptacle to be locked together and tagged. The reason for this requirement is that we are concerned that someone may unplug the cable from the locked-out circuit and plug it into the spare circuit. When this option is used, a grounding receptacle would not be needed because opening the disconnecting switch grounds the high-voltage trailing cable.

We are aware that some mine operators prefer not to disconnect the high-voltage couplers since it may lead to problems when re-energizing the circuit. The major problem caused by disconnecting the high-voltage couplers is the risk of contaminating the coupler's insulation system. Using a disconnecting switch to ground and isolate power from the trailing cable and continuous mining machine would eliminate the need to remove the cable coupler plug from the receptacle.

Proposed paragraph (a)(2) would permit using the cable coupler as the disconnecting device instead of a disconnecting switch. After power has been removed, proposed (a)(2)(i) would require the plug to be disconnected from the receptacle and reconnected to a grounding receptacle. The grounding receptacle, which is mounted on the power center, would cause all cable conductors to be grounded to the power center frame. Connecting the plug to the grounding receptacle would ensure that no voltage would be present in the cable conductors.

Proposed paragraph (a)(2)(ii) would require the plug and grounding receptacle to be locked together and tagged. Tagging would alert other miners that work is being done on the circuit, and the lock would prevent the circuit from being re-energized and ungrounded while work is being performed. These requirements would prevent shock hazards to miners while performing electrical work.

Lastly, proposed paragraph (a)(2)(iii) would require placing a dust cover over the power receptacle to protect it from becoming contaminated by dust when the trailing cable is disconnected. Dust is a conducting medium and can create ground faults. Another benefit of using the dust cover is to prevent contact with parts of the receptacle that could be energized.

(b) Trailing Cable Grounding

Proposed paragraph (b) would require that a qualified person de-energize the trailing cable circuit as required in paragraph (a) and complete one of the lock-out and tagging procedures specified in paragraphs (b)(1) or (b)(2) prior to testing and troubleshooting the de-energized trailing cable. As discussed in proposed § 75.831(a), de-energization is usually accomplished by opening the circuit-interrupting device. The qualified person must perform these work procedures to prevent inadvertent re-energization. These procedures are important to ensure that miners are not exposed to potential shock, fire, or other hazards when performing electrical work.

Proposed paragraphs (b)(1) and (b)(2) of § 75.831 would specify the lock-out and tagging options available for troubleshooting and testing the high-voltage trailing cable. As discussed in proposed paragraph (a)(1) of § 75.831, when a disconnecting switch is used, it can open and ground the trailing cable circuit. Proposed paragraphs (a)(1)(i) and (b)(1)(i) would require the disconnecting switch to also be locked and tagged. Proposed paragraph (b)(1)(ii) would require the plug to be disconnected from the power receptacle. Proposed paragraph (b)(1)(iii) would require that a lock and tag be placed on the plug to prevent a miner from inserting the plug into a receptacle. Finally, proposed paragraph (b)(1)(iv) would require that a dust cover be placed over the power receptacle. These provisions would establish proper work procedures prior to testing and troubleshooting of the trailing cable.

Proposed paragraph (b)(2) addresses the design where a switch is not provided. In this case, the cable coupler would be used as the disconnecting device instead of a disconnecting switch, to establish work procedures when troubleshooting and testing high-voltage trailing cables. Proposed paragraphs (a)(2)(i) and (b)(2)(i) of this section would require the plug to be disconnected from the power receptacle and connected to the grounding receptacle to ensure all power conductors are grounded. The plug could then be removed from the grounding receptacle. Proposed paragraph (b)(2)(ii) would require the plug to be locked and tagged to prevent it from being reconnected to any receptacle. Proposed (b)(2)(iii) would require that a dust cover be placed over the power receptacle to prevent insulation contamination. Troubleshooting and testing of the cable could then commence.

(c) Trailing Cable Troubleshooting

Proposed paragraph (c) of § 75.831 would allow the trailing cable to be ungrounded only for the time necessary to locate a problem. Existing § 75.705 requires that all high-voltage lines be de-energized and grounded before work is performed. This proposed rule allows for ungrounding the circuit when troubleshooting and testing. Once the problem is found and prior to repair, the work procedures in proposed paragraph (a) of this section would have to be followed.

(d) Troubleshooting and Testing Limitations

Proposed paragraph (d) of this section is derived from granted PFMs for the use of high-voltage continuous mining machines and existing § 75.820(d), and would require that certain safety procedures be followed when troubleshooting and testing low- and medium-voltage energized circuits. Only qualified persons wearing properly rated gloves would be permitted to perform this work and only for the purpose of determining voltages and currents. We recognize that, in some instances, it is necessary for circuits or equipment to remain energized for troubleshooting and testing. For example, to identify the problems within a circuit, it may be necessary to keep the circuit energized to take voltage and current readings.

Proposed paragraph (d)(1) of this section would limit troubleshooting and testing of energized circuits only to low- and medium voltage systems. Since troubleshooting and testing energized circuits is known to be inherently hazardous work, these activities would be limited to low- and medium-voltage. This requirement is based on lack of availability of equipment that is adequate for testing energized high-voltage circuits and equipment. Insulation ratings for equipment commonly used to troubleshoot and test energized circuits is not adequate for high-voltage circuits.

Paragraph (d)(2) of this section would permit troubleshooting and testing of energized circuits only for the purpose of determining voltages and currents. This requirement would also allow troubleshooting and testing to evaluate waveform or other electrical diagnostic testing.

Proposed paragraph (d)(3) of this section would require that troubleshooting and testing of energized circuits be performed by qualified persons who wear protective gloves when the voltage of the circuit is 40 volts or more. Based on our electrical accident data and experience, 40 volts is the lowest voltage level that is likely to cause electrocution. The requirement for a qualified person would ensure that the person conducting the testing is aware of the hazards associated with these tests. Gloves would be required to provide the protection necessary if a miner inadvertently contacted energized circuits during troubleshooting and testing. The intent of this provision would be to ensure that the tests are conducted in a safe manner and miners would not be exposed to shock hazards.

Dry work gloves, in good condition (free of holes, etc.) would be permitted in lieu of rubber insulating gloves on circuits where the voltage is 40-volts or more but does not exceed 120 volts nominal, and on circuits where the

voltage exceeded 120 volts nominal but are intrinsically safe. Normally the nominal control circuit voltage value is 120 volts for mining equipment. Existing § 75.820(d) allows miners to use dry gloves when working on intrinsically safe circuits up to 1000 volts.

Rubber insulating gloves rated for at least the nominal voltage of the circuit and equipped with leather protectors would be required to be used on circuits where the voltage exceeded 120 volts nominal when the circuit is not intrinsically safe. Mining equipment typically has ratings such as 220-, 480-, 995-volts and higher. Rubber gloves are not commercially rated for each of these voltages. Rubber insulating gloves rated at 1,000 volts are commercially available. Therefore, when testing or troubleshooting low- and medium-voltage circuits, 1,000 volt rated gloves should be used.

(e) Power Center Electrical Work Procedures

Proposed paragraph (e) is derived from granted PFMs for the use of high-voltage continuous mining machines, and existing § 75.820(b). Proposed paragraph (e) would specify the safe procedures to be followed prior to performing electrical work in the power center. These procedures are important to ensure that miners are not exposed to potential shock, fire, or other hazards when performing electrical work. An exception to these procedures would be when troubleshooting and testing low- and medium-voltage circuits.

Proposed paragraph (e)(1) would require that a qualified person de-energize affected circuits within the power center prior to performing work on the affected circuit. De-energization is usually accomplished by opening the appropriate circuit-interrupting device. The qualified person must perform these work procedures to prevent inadvertent re-energization.

Proposed paragraph (e)(2) would require the corresponding disconnecting switch be opened. This switch, if designed and rated as a load-break switch, can be used to satisfy (e)(1). If not, then an outby circuit interrupting device would need to be opened prior to opening the disconnecting switch. Opening the main disconnecting switch would de-energize the primary of all transformers supplying high-voltage power in the power center and ground the load side circuit of the disconnecting switch. Removing high-voltage power and grounding the power conductors would protect the person working on a circuit from exposure to energized high-voltage circuits, and thereby reduce shock and electrocution hazards.

Proposed paragraph (e)(3) would require that the qualified person visually verify that the disconnecting switch contacts are open and grounded. This would be accomplished by viewing the position of the contacts through a window on the disconnecting switch compartment.

Proposed paragraph (e)(4) would require that the disconnecting switch be locked out and tagged. Proposed paragraph (f) of this section contains requirements for using locks. The process of tagging is also discussed in detail in proposed paragraph (f) of this section.

Proposed paragraph (e)(5) would require that all high-voltage capacitors in the power center be discharged prior to performing electrical work. Because capacitors are energy storage devices, they may continue to hold a charge even after the disconnecting switch is opened and the circuit is de-energized. Therefore, a grounding stick, as proposed in paragraph (h) of § 75.825, would be required to discharge these capacitors. This ensures that miners will not be exposed to shock hazards.

(f) Lockout and Tagging Responsibilities

Proposed paragraph (f) is derived from granted PFMs for the use of high-voltage continuous mining machines and existing § 75.820(c). Proposed paragraph (f)(1) would require each qualified person to install a lock and tag on the affected circuit or equipment. Additionally, proposed paragraph (f)(1) would require that when one or more qualified person(s) is working on the same circuit or equipment, each person would have to install their own lock and tag. The proposed rule would also require that only persons who install a lock and tag be permitted to remove them.

An individual lock, removable only by the person who installed it, places responsibility on the person performing the work and ensures personal safety. This requirement is intended to prevent accidental re-energization of equipment or circuits before all persons have completed their work.

Based on our research, we conclude that proposed paragraph (f)(1) would help protect miners against electrocution or electric shock. Our research includes a review of the danger and accident history of re-energization of circuits before work is completed, as well as the recommendation to lock-out and tag disconnecting devices prior to performing maintenance appearing in both the National Safety Council's Data Sheet 237 Revision B, Methods of Locking Out Electrical Switches (1971) and the National Fire Protection Association's NFPA 70E ''Standard for Electrical Safety Requirements for Employee Workplaces'' (2000 Edition). This locking system would afford the necessary safety protection because persons assigned to place and remove their own locks would be more aware of and responsible for their own security, and more likely to take the steps necessary to assure proper de-energization. This would also reduce the risk of error due to lack of communication or inadvertent re-energization.

Proposed paragraph (f)(2) would allow the mine operator to remove a lock and tag under certain conditions. If the person who installed the tag is not available (for example if the person is not at the mine or is in a remote location in the mine) and the repairs have been completed by others, the mine operator can authorize a qualified person to remove that person's lock and tag. The mine operator must notify the person who originally installed the lock and tag of this action.

Section 75.832 Frequency of Examinations; Recordkeeping

Proposed § 75.832 is primarily derived from granted PFMs for the use of high-voltage continuous mining machines and existing §§ 75.512 and 75.821(a). The major difference between the granted PFMs for the use of high-voltage continuous mining machines and this proposed section is that the granted PFMs require some tests to be done weekly, whereas this proposed section requires those tests to be conducted at least every 7 days. Past experience with existing regulations that require weekly examinations and tests revealed situations where the actual frequency between examinations and tests were as long as 13 days. Changing the requirement to testing every seven days would eliminate this long period between tests. To maintain a safe workplace, we would require this frequent examination and testing of the ground-fault and ground-wire monitor test circuits in the power center, the trailing cable, and the high-voltage continuous mining machine. Moving this equipment increases the likelihood of component failure and break down. Therefore, we consider it important that the required examinations and tests be conducted more frequently to identify defects. We believe that the examination schedule required by this section is necessary to prevent electric shock, fire, ignition, and operational hazards to miners.

This section would also require that the qualified person verify by signature and date that the tests and examinations have been completed. Such a record would include any unsafe conditions found and corrective actions taken. The section would further require the records be kept and made available for at least one year.

(a) Continuous Mining Machine Examination

Proposed paragraph (a) of § 75.832 would require that a qualified person examine the high-voltage continuous mining machine at least once every seven days to detect conditions that can expose miners to electrical or operational hazards. This paragraph was derived from existing §§ 75.512 and 75.821. By examining the high-voltage continuous mining machine, a qualified person can determine whether the electrical protection, equipment grounding, permissibility, cable insulation, and control devices are properly installed and maintained. The purpose of the examination is to ensure the safety of miners and to minimize their exposure to fire, electric shock, ignition, or operational hazards.

(b) Ground-Fault Test

Proposed paragraph (b) would require that at least once every 7 days, a qualified person would activate the ground-fault test circuit to ensure that the simulated ground-fault current would cause the circuit-interrupting device to open. In addition, a similar test is required by proposed paragraph § 75.829(b)(1) prior to tramming the continuous mining machine in or out of the mine or from section to section. This paragraph is derived from existing § 75.821 and granted PFMs for low- and medium voltage diesel generators. Activating the ground-fault test circuit would verify that the ground-fault protection operates properly. Existence of a ground-fault can expose miners to energized continuous mining machine frames.

(c) Ground-Wire Monitor Test

Paragraph (c) would require that at least once every 7 days, a qualified person test the ground-wire monitor circuit to verify that it will cause the corresponding circuit-interrupting device to open if the grounding conductor or ground-check conductor is opened. This test, like the ground-fault test in paragraph (b) of this section, is required by proposed paragraph § 75.829(b)(1) prior to tramming the continuous mining machine in or out of the mine or from section to section. This paragraph is based on the granted PFMs for the use of high-voltage continuous mining machines and granted PFMs for low- and medium voltage diesel generators; however, the frequency of testing was changed from ''weekly'' to ''at least every 7 days.'' This procedure would ensure that ground-wire monitors and corresponding circuit-interrupting devices will operate properly to de-energize the circuits they monitor. Testing of a ground-wire monitor would normally require simple activation of a readily available test switch.

(d) Trailing Cable Inspections

Proposed paragraph (d)(1) and (2) require that the high-voltage trailing cable be inspected for damage. The purpose of these provisions would be to identify a damaged cable that can expose miners to high-voltages while handling the cable.

Proposed paragraph (d)(1) would require a qualified person, once each production day, to de-energize the high-voltage trailing cable and examine the entire length of the cable from the power center to the continuous mining machine. We would consider a production day to be when the continuous mining machine is mining coal. The inspection would include examining for damage or deterioration of the outer jacket, splices, and jacket repairs. In addition, the qualified person would need to examine all areas of the cable where guarding is required. Although the trailing cable from the power center to the last open cross-cut is required to either be supported on insulators or placed in an unused entry where miners are not normally working, it is periodically handled during the mining cycle. The cable examination would not require removal of the guarding. When damaged guarding is being replaced, that portion of the cable should be thoroughly inspected. Therefore, a qualified person must examine the entire length of the cable in a timely manner, thereby protecting miners from shock and electrocution hazards. This requirement in the granted PFMs has been effective.

Proposed paragraph (d)(2) would require that at the beginning of each production shift a responsible person designated by the operator de-energize the high-voltage trailing cable and visually examine the portion of the cable that is unsupported. This unsupported portion of the cable to be examined would be as follows: From the continuous mining machine to the last open crosscut; to within 150 feet of the working place during retreat or second mining; or up to 150 feet of the continuous mining machine when the machine is used in outby areas for cutting overcasts, underpasses, sumps, etc. This unsupported trailing cable is more likely to be damaged by mobile equipment and to expose miners to shock hazards when handling the cable. Again, the cable examination would not require removal of the guarding. Therefore, the proposed rule would require that the cable be inspected at the beginning of every production shift to ensure the integrity of the cable. This proposed requirement is consistent with the provision in the granted PFMs for the use of high-voltage continuous mining machines.

(e) Grounded-Phase Detection Test

Proposed paragraph (e) of § 75.832 is derived from the granted PFMs for the use of high-voltage continuous mining machines. This section would require that at the beginning of each production shift, a responsible person designated by the operator, test the grounded-phase detection circuit on the high-voltage continuous mining machine to ensure that the detection circuit would detect a grounded-phase condition. The proposed standard would require that problems which arise during normal use of mining equipment be identified and corrected so miners would not be exposed to hazards. Testing the grounded-phase detection circuit would identify any damage or defects in the detection circuit. If the detection circuit is defective, a grounded-phase condition can remain undetected and miners could be exposed to shock hazards.

(f) Corrective Action

Proposed paragraph (f) of § 75.832 is derived from existing § 75.821(c). Proposed paragraph (f) would require equipment to be removed from service or repaired when any examinations or tests reveal a potential fire, electric shock, ignition, or operational hazard. This provision would assure that equipment that may pose a danger to miners is not used until the hazardous condition is corrected. For example, if examination of a cable reveals an exposed energized conductor, the potential fire, electric shock, and methane gas ignition hazards would put the safety of miners at risk and the cable would be required to be removed from service or repaired immediately. However, tests or examinations may reveal conditions that do not present one of the above potential hazards. In this case, the equipment would not need to be immediately removed from service, but instead could be repaired in a timely manner when material or parts are received. For example, a torn portion of guarding material may not present one of the hazards listed above.

Therefore, in that case a mine operator would not have to immediately remove the machine from service, but the guarding would have to be repaired or replaced in a timely manner.

(g) Record of Tests

Paragraph (g) of proposed § 75.832 is derived from existing § 75.821(d) and is consistent with our other existing recordkeeping standards. Proposed paragraph (g) would require that the person who examines and tests the equipment under paragraphs (a) to (c) of this section, and who is qualified under § 75.153, certify by signature and date that the examination and tests have been conducted. We accept certification only from the person who examines and tests the equipment because the person conducting the test will have knowledge of the results of the examinations and tests.

Another requirement under this proposed paragraph is that the qualified person who conducted the examination and tests record any unsafe condition found and any corrective action taken.

Records and certifications of tests and repairs are valuable tools for mine operators. Records and certifications can be used to point out patterns of equipment failure and design problems. They can also provide information that would be useful when investigating accidents.

Finally, proposed paragraph (g) would require that certifications and records be kept for at least 1 year and be made available at the mine for inspection by authorized representatives of the Secretary and representatives of miners.

Section 75.833 High-Voltage Insulating Gloves Used for Handling High-Voltage Trailing Cables

Proposed § 75.833 is derived from granted PFMs for the use of high-voltage continuous mining machines. The section addresses the ratings, tests required, and frequency of examination and testing of high-voltage insulating gloves. The requirements in proposed § 75.833 would provide miners protection against electric shock hazards associated with handling energized high-voltage trailing cables. Like the existing PFMs, proposed paragraph (a) of § 75.833 would require mine operators to supply high-voltage insulating gloves to miners for handling energized high-voltage trailing cables.

Proposed paragraph (b) of § 75.833 would require high-voltage insulating gloves to have a Class 1 (7,500 maximum use volts) or higher voltage rating in accordance with ASTM F496–02a, a nationally recognized consensus standard that is incorporated by reference. This provision is intended to protect miners against electrical shock hazards when energized high-voltage cables are handled. In accordance with the requirements for incorporating by reference, proposed paragraph (b) details how the public may inspect or purchase a copy of the incorporated standard and notes that according to his/her statutory authorization, the Director of the Federal Register has approved the incorporation by reference.

Proposed paragraph (c) of § 75.833 would require the rubber portion of the insulating gloves to be air-tested at the beginning of each shift. The test is conducted by rolling the cuff tightly toward the palm of the glove in such a manner that air is entrapped inside the glove. Puncture detection may be enhanced by listening for escaping air or feeling escaping air against the face. We would require that the gloves be air-tested to detect damage to the rubber gloves.

Proposed paragraph (d) of this section would require the leather and rubber insulating gloves to be visually examined before each use for signs of damage. The purpose of this paragraph would be to detect any defect or damage to the glove that may compromise the necessary protection to the miner.

Proposed paragraph (e) of § 75.833 would require the damaged rubber gloves to be removed from underground or destroyed. This would prevent a miner from using damaged gloves. Use of damaged gloves could lead to serious or fatal injuries. The proposed paragraph would also require that leather protectors be kept in good condition or replaced. If the leather is not kept in good condition, the safety protection afforded by the rubber gloves will be compromised.

Proposed paragraph (f) would require that rubber insulating gloves be electrically tested every 30 days in accordance with ASTM F496–02a, ''Standard Specification for In-Service Care of Insulating Gloves and Sleeves,'' that is incorporated by reference as in paragraph (b) of this section. The purpose of this formal testing procedure would be to ensure that the glove has the proper dielectric strength needed to provide proper protection to the miners. While the high-voltage longwall rule requires that gloves be tested every six months, we would require that the gloves be tested every 30 days because the cable for the high-voltage continuous mining machine is handled more frequently. The 30 day time period would begin from the first day the glove is given to the miner.

Section 75.1002 Installation of Electric Equipment and Conductors; Permissibility

Existing § 75.1002 addresses requirements for conductors and cables used in or inby the last open crosscut, and electric equipment and conductors and cables used within 150 feet of pillar workings. Existing paragraph (b) limits the types of electric conductors and cables permitted in areas where permissible equipment is required. This paragraph prohibits the installation of conductors such as trolley wires and trolley feeder wires, in areas where permissible equipment is required, and allows mine operators to use shielded high-voltage longwall cables. Permissible equipment is defined under existing § 18.2, and under § 318(c)(1) of the Mine Act. Such equipment is specifically approved by us to minimize the risk of fires and explosions in hazardous areas of underground mines.

Currently, existing § 75.1002 does not allow mines to use high-voltage continuous miners in or inby the last open crosscut. However, high-voltage continuous miners are being used, when approved by us through the petition for modification process under § 101(c) of the Mine Act. Since 1997, we have granted 38 PFMs to use this equipment. To our knowledge, no electrical fatalities have occurred to miners because of the use of high-voltage continuous mining machines in accordance with the granted high-voltage PFMs. Because of the improved high-voltage technology, the designed safety benefits and the proven-in-use experience, we are proposing to revise existing § 75.1002(b) to allow the use of high-voltage continuous mining machines in underground coal mines.

Accordingly, proposed paragraph (b)(5) of § 75.1002 is added to modify the existing requirements of § 75.1002 to allow the use of shielded high-voltage cables supplying power to permissible continuous mining machines. The shielding and design would protect against arcing and other electrical ignition hazards that may occur when the outer jacket material of the cable is damaged. The use of shielded high-voltage cables supplying power to continuous mining machines would reduce the risk of fire or explosion in face areas since these cables have equivalent or superior mechanical and electrical protective characteristics. This equipment offers other improved safety features, such as sensitive ground-fault protection against shock, fire, and explosion hazards. The safety criteria supporting proposed paragraph (b)(5) is based on the safe use of high-voltage

longwalls and high-voltage continuous mining machines.

The proposed standards would maintain or increase the protection currently afforded to miners. They standardize safety provisions appearing in only some petitions and add additional protections.

V. Executive Order 12866 (Regulatory Planning and Review and Regulatory Flexibility Act)

A. Compliance Costs

Executive Order (E.O.) 12866 as amended by E.O. 13258 requires that regulatory agencies assess both the costs and benefits of intended regulations. We have fulfilled this requirement, and have determined that this proposed rule would result in estimated yearly net compliance cost savings of approximately $1.40 million for mine operators.

Therefore, this proposed rule is not an economically significant regulatory action pursuant to section 3(f)(1) of E.O. 12866.

For mine operators with 20 to 500 employees, there would be yearly compliance costs of about $30,500 and yearly compliance cost savings of $1.433 million, which would result in net cost savings of about $1.40 million. The one mine operator with more than 500 employees who is currently using high-voltage continuous mining machines would incur yearly compliance costs of $61. For a complete breakdown of the compliance costs and savings of the proposed rule see Chapter IV of the Preliminary Regulatory Economic Analysis (PREA) associated with this rulemaking.

B. Benefits

The proposed rule would reduce the potential for electrical-related fatalities and injuries for several reasons. This risk reduction is derived from the improved electrical safety requirements when using high-voltage continuous mining machines due to: better design and construction criteria (such as required use of double jacketed cables); improved ground-fault protection; handling of lighter cables; and increased safety requirements for work practices. These design and work practice requirements offer greater protection against electrical shock, cable overheating, fire hazards, unsafe work and repair practices, and back injuries and other sprains caused by handling trailing cables. These benefits are detailed in Chapter III of the PREA associated with this rulemaking.

C. Regulatory Flexibility Act (RFA) and Small Business Regulatory Enforcement Fairness Act (SBREFA)

The Regulatory Flexibility Act (RFA) requires regulatory agencies to consider a rule's economic impact on small entities. Under the RFA, we must use the Small Business Administration's (SBA's) criterion for a small entity in determining a rule's economic impact unless, after consultation with the SBA Office of Advocacy, we establish an alternative definition for a small mine operator and publish that definition in the **Federal Register** for notice and comment. For the mining industry, SBA defines ''small'' as a mine operator with 500 or fewer employees. In addition, we traditionally have considered small mine operators to include those with fewer than 20 employees.

Although the rule does apply to mine operators with fewer than 20 employees that choose to use high-voltage continuous mining machines, our experience has been that no underground coal mine operator with fewer than 20 employees has ever requested a PFM to use high-voltage continuous mining machines. Therefore, we do not expect mine operators having fewer than 20 employees to request PFMs to use high-voltage continuous mining machines. However, we have analyzed the economic impact of the proposed rule on all underground coal mine operators with 500 or fewer employees, which conforms to the requirements of the RFA.

1. Factual Basis for Certification

Using SBA's definition of a small mine operator, the estimated yearly net compliance cost savings of the proposed rule on small underground coal mine operators is approximately $1.40 million. These estimated yearly net compliance cost savings compare with estimated annual revenues of approximately $8.3 million for small underground coal mine operators with 500 or fewer employees.

Based on our analysis, we have determined that the proposed rule would not have a significant economic impact on a substantial number of small underground coal mine operators with 500 or fewer employees. We have so certified these findings to the SBA. The factual basis for this certification is discussed in Chapter V of the PREA associated with this rulemaking.

VI. Paperwork Reduction Act of 1995

As a result of this proposed rule there would be: (1) an elimination of burden hours and related costs approved under OMB control numbers 1219–0065 and 1219–0116 (formerly 1219–0067) and (2) annual burden hours in the Information Collection Request (ICR) that accompanies this rulemaking. The burden hours and related costs for these two items are discussed below. However, for a more detailed explanation of how the burden hours and related costs for the two items were determined, see Chapter VII of the PREA associated with this rulemaking.

The information collection requirements contained in this proposed rule have been submitted to the Office of Management and Budget for review under 44 U.S.C. Sec. 3504(h) of the Paperwork Reduction Act of 1995, as amended. Respondents are not required to respond to any collection of information unless it displays a current valid OMB control number.

Elimination of Burden Hours

Due to this rulemaking, mine operators would no longer need a PFM of existing 30 CFR § 75.1002 to use a high-voltage continuous mining machine. Existing OMB control number 1219–0065 includes annual burden hours and costs related to the time it takes mine operators to prepare and file petitions with us, including PFMs to a high-voltage continuous mining machine. As a result of this rulemaking, the burden hours and costs approved under OMB control number 1219–0065 that relate to the time it takes operators to prepare and file petitions would need to be reduced to reflect the fact that PFMs to use a high-voltage continuous mining machine would no longer be needed. Therefore, the burden hours and costs in OMB control number 1219–0065 should be reduced by 84 hours and approximately $4,950, annually.

In addition, some of the paperwork burden to mine operators in proposed § 75.832 are already being accounted for in existing OMB control number 1219–0116 (formally OMB 1219–0067). When the high-voltage continuous miner rule becomes final, the burden in OMB control number 1219–0116 will be reduced and accounted for in the ICR that accompanies the high-voltage continuous miner rulemaking. Therefore, the burden hours and costs in OMB paperwork package 1219–0116 would be reduced by 16 hours and approximately $464 annually.

Annual Burden Hours

The proposed rule would impose 219 annual burden hours and related costs of about $6,511 on mine operators. Of the 219 annual burden hours, 21 hours and related costs of about $625 are associated with conducting a ground-fault and ground-wire monitor circuit

test prior to tramming the machine under proposed § 75.829, 120 hours and related costs of about $3,570 are associated with tagging requirements under proposed § 75.831, and 78 hours and related costs of about $2,320 are associated with a ground-wire monitor circuit test under proposed § 75.832(c).

The following proposed requirements under this rulemaking do not have associated paperwork burden hours or costs. Paragraph (i) of proposed § 75.825 requires that all compartments providing access to energized high-voltage conductors and parts must display a caution label to warn miners against entering the compartment(s) before de-energizing incoming high-voltage circuits. This is a normal business practice of manufacturers that make such compartments, as they currently place warning labels on the compartments.

Paragraph (b) of proposed § 75.827 concerns the temporary lacing of cables into a sled or crosscut in certain specified areas of the mine. In such areas, warning signs and barricade tape must be placed around the sled or at the entrances to the crosscut to restrict mobile equipment travel. Warning signs and barricade tape that may be purchased from any industrial supply vendor may be used to satisfy this requirement. The costs for such materials are included in the paperwork package that accompanies the proposed rulemaking.

Paragraphs (a) and (b) of proposed § 75.832 requires that exams or tests be conducted at least once every seven days and paragraph (g) requires that a record be made of such exams or tests. Paragraph (a) requires an exam of the high-voltage continuous mining machine. Paragraph (b) requires a test of the ground-fault test circuit. The exams of the high-voltage continuous mining machine required by paragraphs (a) and (b) are already being conducted as part of a larger weekly examination of electrical equipment that is required under existing § 75.512 (electrical equipment; examination, testing and maintenance). Existing § 75.512 also requires that a record be made of all such exams and tests. Thus, the burden associated with exams and records under proposed § 75.832(a) and (b) is already accounted for under existing § 75.512, and is approved under OMB control number 1219–0116. Therefore, such burden does not need to be included in the ICR accompanying this rulemaking.

VII. Other Regulatory Considerations

The Unfunded Mandates Reform Act

This proposed rule does not include any Federal mandate that may result in increased expenditures by State, local, or tribal governments, nor would it increase private sector expenditures by more than $100 million annually, nor would it significantly or uniquely affect small governments. Accordingly, the Unfunded Mandates Reform Act of 1995 requires no further agency action or analysis.

National Environmental Policy Act

MSHA has reviewed this proposed rule in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*) the regulations of the Council on Environmental Quality (40 U.S.C. part 1500), and the Department of Labor's NEPA procedures (29 CFR part 11). Since this proposed rule would impact safety, not health, the rule is categorically excluded from NEPA requirements because it would have no significant impact on the quality of the human environment (29 CFR 11.10(a)(1)). Accordingly, MSHA has not conducted an environmental assessment nor provided an environmental impact statement.

Assessment of Federal Regulations and Policies on Families

This proposed rule would have no effect on family well-being or stability, marital commitment, parental rights or authority, or income or poverty of families and children. Accordingly, Section 654 of the Treasury and General Government Appropriations Act of 1999 requires no further agency action, analysis, or assessment.

Executive Order 12630: Government Actions and Interference With Constitutionally Protected Property Rights

This proposed rule would not implement a policy with takings implications. Accordingly, Executive Order 12630, Governmental Actions and Interference With Constitutionally Protected Property Rights, requires no further agency action or analysis.

Executive Order 12988: Civil Justice Reform

This proposed rule was drafted and reviewed in accordance with Executive Order 12988, Civil Justice Reform. This proposed rule was written to provide a clear legal standard for affected conduct and was carefully reviewed to eliminate drafting errors and ambiguities, so as to minimize litigation and undue burden on the Federal court system. MSHA has determined that this proposed rule would meet the applicable standards provided in Section 3 of Executive Order 12988.

Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

This proposed rule would have no adverse impact on children. Accordingly, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires no further agency action or analysis.

Executive Order 13132: Federalism

This proposed rule would not have ''federalism implications,'' because it would not ''have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Accordingly, Executive Order 13132, Federalism, requires no further agency action or analysis.

Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This proposed rule would not have ''tribal implications,'' because it would not ''have substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes.'' Accordingly, Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, requires no further agency action or analysis.

Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

In accordance with Executive Order 13211, MSHA has reviewed this proposed rule for its impact on the supply, distribution, and use of energy. Because this proposed rule would result in yearly net cost savings to the coal mining industry, this proposed rule would neither reduce the supply of coal nor increase its price.

This proposed rule is not a ''significant energy action,'' because it would not be ''likely to have a significant adverse effect on the supply, distribution, or use of energy'' ''(including a shortfall in supply, price increases, and increased use of foreign supplies).'' Accordingly, Executive

Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, requires no further agency action or analysis.

Executive Order 13272: Proper Consideration of Small Entities in Agency Rulemaking

In accordance with Executive Order 13272, MSHA has thoroughly reviewed this proposed rule to assess and take appropriate account of its potential impact on small businesses, small governmental jurisdictions, and small organizations. As discussed in Chapter V of this PREA, MSHA has determined and certified that this proposed rule would not have a significant economic impact on a substantial number of small entities.

List of Subjects

30 CFR Part 18

Approval regulations, Electric motor-driven mine equipment and accessories, Mine safety and health, Reporting and recordkeeping requirements.

30 CFR Part 75

Electric power, Fire prevention, High-voltage continuous mining machines, Incorporation by reference, Mandatory safety standards, Mine safety and health, Reporting and recordkeeping requirements, Underground coal mines.

Dated: July 6, 2004.

Dave D. Lauriski,

Assistant Secretary of Labor for Mine Safety and Health.

For the reasons discussed in the preamble, the Mine Safety and Health Administration proposes to amend 30 CFR parts 18 and 75 as follows:

PART 18—ELECTRIC MOTOR-DRIVEN MINE EQUIPMENT AND ACCESSORIES

1. The authority citation for part 18 continues to read as follows:

Authority: 30 U.S.C. 957 and 961.

2. Add § 18.54 to subpart b to read as follows:

§ 18.54 High-voltage continuous mining machines.

(a) *Separation of high-voltage components from lower voltage components.* In each motor-starter enclosure, the high-voltage components must be separated from lower voltage components by barriers or partitions, or placed in separate compartments to prevent the exposure of persons to energized high-voltage conductors or parts. Barriers or partitions must be constructed of grounded metal or nonconductive insulating board.

(b) *Interlock switches.* Each removable cover, barrier, or partition of a compartment in the motor-starter enclosure containing high-voltage components must be equipped with at least two interlock switches arranged to automatically de-energize the high-voltage components within that compartment when the cover, barrier or partition is removed.

(c) *Circuit-interrupting devices.* Circuit-interrupting devices must be designed and installed to prevent automatic reclosure.

(d) *Transformers supplying control voltages.* (1) Transformers supplying control voltages must not exceed 120 volts.

(2) Transformers with high-voltage primary windings that supply control voltages must incorporate a grounded electrostatic (Faraday) shield between the primary and secondary windings. Grounding of the shield must be as follows:

(i) Transformers with an external grounding terminal must have the shield grounded by a minimum of No. 12 A.W.G. grounding conductor extending from the grounding terminal to the equipment ground.

(ii) Transformers with no external grounding terminal must have the shield grounded internally through the transformer frame to the equipment ground.

(e) *Onboard ungrounded, three-phase power circuit.* A continuous mining machine designed with an onboard ungrounded, three-phase power circuit must:

(1) Be equipped with a light that will indicate a grounded-phase condition;

(2) Have the indicator light installed so that it can be observed by the operator from any location where the continuous mining machine is normally operated; and

(3) Have a test circuit for the grounded-phase indicator circuit to ensure that the circuit is operating properly. The test circuit must be designed so that when activated, it does not require removal of any electrical enclosure cover or create a double-phase-to-ground fault.

(f) *High-voltage trailing cable(s).* High-voltage trailing cable(s) must conform to the ampacity and outer dimensions in accordance with the Insulated Cable Engineers Association (ICEA) Standard ICEA S–75–381/National Electrical Manufacturer's Association (NEMA) Standard NEMA WC 58–1997. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may inspect a copy at any of the following locations: MSHA Coal Mine Safety and Health District office; the Office of Standards, Regulations, and Variances, 1100 Wilson Boulevard, Arlington, VA; or at the National Archives and Records Administration (NARA). For more information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

You may also purchase a copy from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112. In addition, the cable must be constructed with:

(1) 100 percent semi-conductive tape shielding over each insulated power conductor;

(2) A grounded metallic braid shielding over each insulated power conductor;

(3) A ground-check conductor not smaller than a No. 10 A.W.G.; or if a center ground-check conductor is used, not smaller than a No. 16 A.W.G.; and

(4) Two reinforced layers of jacket; an outer and inner protective layer. The inner layer must be a distinctive color from the outer layer to allow easy recognition of damaged jacket areas. The color black must not be used for either protective layer.

(g) Safeguards against corona must be provided on all 4,160 voltage circuits in explosion-proof enclosures.

(h) The maximum pressure rise within an explosion-proof enclosure containing high-voltage switchgear must be limited to 0.83 times the design pressure.

(i) High-voltage electrical components located in high-voltage explosion-proof enclosures must not be coplanar with a single plane flame-arresting path.

(j) *Minimum creepage distances.* Rigid insulation between high-voltage terminals (Phase-to-Phase or Phase-to-Ground) must be designed with creepage distances in accordance with the following table:

MINIMUM CREEPAGE DISTANCES

Phase to phase voltage	Points of measure	Minimum creepage distances (inches) for comparative tracking index (CTI) range [1]			
		CTI ≥ 500	380 ≤ CTI < 500	175 ≤ CTI < 380	CTI < 175
2,400	Ø-Ø	1.50	1.95	2.40	2.90
	Ø-G	1.00	1.25	1.55	1.85
4,160	Ø-Ø	2.40	3.15	3.90	4.65
	Ø-G	1.50	1.95	2.40	2.90

[1] Assumes that all insulation is rated for the applied voltage or higher.

(k) *Minimum free distances.* Motor-starter enclosures must be designed to establish the minimum free distance (MFD) between the wall or cover of the enclosure and uninsulated electrical conductors inside the enclosure in accordance with the following table:

HIGH-VOLTAGE MINIMUM FREE DISTANCES (MFD)

Wall/cover thickness (in)	Steel MFD (in)			Aluminum MFD (in)		
	A [1]	B [2]	C [3]	A [1]	B [2]	C [3]
1/4	2.8	4.3	5.8	[4] NA	[4] NA	[4] NA
3/8	1.8	2.3	3.9	8.6	12.8	18.1
1/2	*1.2	2.0	2.7	6.5	9.8	13.0
5/8	*0.9	1.5	2.1	5.1	7.7	10.4
3/4	*0.6	*1.1	1.6	4.1	6.3	8.6
1	*	*0.6	*1.0	2.9	4.5	6.2

Note *: The minimum electrical clearances must still be maintained in accordance with the minimum clearance table of § 18.24.

[1] Column A specifies the MFD for enclosures that have available three-phase bolted short-circuit currents of 10,000 amperes rms or less.

[2] Column B specifies the MFD for enclosures that have a maximum available three-phase bolted short-circuit currents greater than 10,000 and less than or equal to 15,000 amperes rms.

[3] Column C specifies the MFD for enclosures that have a maximum available three-phase bolted short-circuit currents greater than 15,000 and less than or equal to 20,000 amperes rms.

[4] Not Applicable—We do not allow aluminum wall or covers to be 1/4 inch or less in thickness (See also, § 18.31).

(1) For values not included in the table, the following formulas on which the table is based may be used to determine the minimum free distance.

(i) Steel Wall/Cover:

$$MFD = 2.296 \times 10^{-6} \frac{(35 + 105\,(C))\,(I_{sc})\,(t)}{(C)\,(d)} - \frac{d}{2}$$

(ii) Aluminum Wall/Cover:

$$MFD = 1.032 \times 10^{-5} \frac{(35 + 105\,(C))\,(I_{sc})\,(t)}{(C)\,(d)} - \frac{d}{2}$$

Where ''C'' is 1.4 for 2,400 volt systems or 3.0 for 4,160 volt systems, ''I_{sc}'' is the three-phase short circuit current in amperes of the system, ''t'' is the clearing time in seconds of the outby circuit-interrupting device and ''d'' is the thickness in inches of the metal wall/cover adjacent to an area of potential arcing.

(2) The minimum free distance must be increased by 1.5 inches for 4,160 volt systems and 0.7 inches for 2,400 volt systems when the adjacent wall area is the top of the enclosure. If a steel shield is mounted in conjunction with an aluminum wall or cover, the thickness of the steel shield is used to determine the minimum free distances.

(l) *Static pressure testing of explosion-proof enclosures containing high-voltage switchgear.* (1) *Prototype enclosures.* The following static pressure test must be performed on each prototype design of explosion-proof enclosure(s) containing high-voltage switchgear prior to the explosion test(s).

(i) *Test procedure.*

(A) The enclosure must be internally pressurized to at least the design pressure, maintaining the pressure for a minimum of 10 seconds.

(B) Following the pressure hold, the pressure must be removed and the pressurizing agent removed from the enclosure.

(ii) *Acceptable performance.*

(A) The enclosure during pressurization must not exhibit—

(*1*) Leakage through welds or casting; or

(*2*) Rupture of any part that affects the explosion-proof integrity of the enclosure.

(B) The enclosure following removal of the pressurizing agents must not exhibit—

(*1*) Visible cracks in welds;

(*2*) Permanent deformation exceeding 0.040 inches per linear foot; or

(*3*) Excessive clearances along flame-arresting paths following retightening of fastenings, as necessary.

(2) *Enclosures for production.* Every explosion-proof enclosure containing high-voltage switchgear manufactured after the prototype was tested must undergo one of the following tests or procedures:

(i) The static pressure test specified in paragraph (l)(1)(i) of this section; or

(ii) An MSHA-accepted quality assurance procedure covering inspection of the enclosure.

(A) The quality assurance procedure must include a detailed check of parts against the drawings to determine that—

(*1*) The parts and the drawings coincide; and

(*2*) The minimum requirements stated in part 18 have been followed with respect to materials, dimensions, configuration and workmanship.

(B) [Reserved]

PART 75—MANDATORY SAFETY STANDARDS—UNDERGROUND COAL MINES

3. The authority citation for part 75 continues to read as follows:

Authority: 30 U.S.C. 811.

4. Add §§ 75.823 through 75.833 to subpart I, Underground High-Voltage Distribution, to read as follows:

§ 75.823 Scope.

Sections 75.823 through 75.833 of this part are electrical safety standards applicable to high-voltage continuous mining machines and circuits. A ''qualified person'' within the meaning of these sections is a person qualified under § 75.153. Other standards in 30 CFR apply to these circuits and equipment where appropriate.

§ 75.824 Electrical protection.

(a) Trailing cable protection. The trailing cable extending to the high-voltage continuous mining machine must be provided with short circuit, overload, ground-fault, and undervoltage protection by a circuit-interrupting device of adequate interrupting capacity and voltage as follows:

(1) Short-circuit protection.

(i) The current setting must be either the setting specified in approval documentation or 75 percent of the minimum available phase-to-phase short-circuit current, whichever is less; and

(ii) The time-delay setting must be either the setting specified in approval documentation or 0.050 second, whichever is less.

(2) Ground-fault protection.

(i) A neutral grounding resistor must limit the ground-fault current to no more than 0.5 ampere.

(ii) A ground-fault device must cause de-energization of the circuit extending to the continuous mining machine at not more than 0.125 ampere. The time-delay of the device must not exceed 0.050 second.

(iii) A look-ahead circuit must detect a ground fault condition and prevent the circuit-interrupting device from closing as long as the ground-fault condition exists.

(iv) A backup ground-fault device must cause de-energization of the circuit extending to the continuous mining machine at not more than 40 percent of the voltage developed across the neutral grounding resistor when a ground fault occurs with the neutral grounding resistor open. The time-delay setting of the backup device must not exceed 0.25 second.

(v) A thermal device must detect a sustained ground fault current in the neutral grounding resistor and must de-energize the incoming power. The device must operate at either 50 percent of the maximum temperature rise of the neutral grounding resistor or 302° F (150° C), whichever is less. Thermal protection must not be dependent upon control power and may consist of a current transformer and overcurrent relay in the neutral grounding resistor circuit.

(vi) A single window-type current transformer that encircles all three-phase conductors must be used to activate the ground-fault device specified in paragraph (a)(2)(ii) of this section. The equipment grounding conductor(s) must not pass through the ground-fault current transformer.

(vii) A test circuit for the ground-fault device specified in paragraph (a)(2)(ii) of this section must be provided. The test circuit must inject no more than 50 percent of the current rating of the neutral grounding resistor through the current transformer. When the test circuit is activated, the circuit-interrupting device must open.

(3) Undervoltage protection. The undervoltage device must operate on a loss of voltage, de-energize the circuit, and prevent the equipment from automatically restarting.

(b) *Reclosing.* Circuit-interrupting devices must not reclose automatically.

(c) *Onboard Power Circuits.* When a grounded-phase indicator light on a high-voltage continuous mining machine indicates a grounded-phase fault, the following procedures must be implemented:

(1) The continuous mining machine must be moved immediately to a location with a properly supported roof; and

(2) The grounded-phase must be located and corrected prior to placing the continuous mining machine back into operation.

§ 75.825 Power centers.

(a) *Main disconnecting switch.* The power center supplying high voltage power to the continuous mining machine must be equipped with a main disconnecting switch that, when in the open position, de-energizes the input to all power transformers.

(b) *Trailing cable disconnecting devices.* In addition to the requirements of paragraph (a) of this section, the power center must be equipped with a disconnecting device for each circuit that can supply power to the high-voltage continuous mining machine.

(c) *Disconnecting switches.* Each disconnecting switch required in paragraphs (a) and (b) of this section must be designed, installed, and perform as follows:

(1) Rated for the maximum phase-to-phase voltage of the circuit;

(2) Rated for the full-load current of the circuit that is supplied power through the device.

(3) Visual observation can be performed to see that the contacts are open without removing any covers;

(4) Grounds all power conductors on the load side when the device is in the ''open and grounded'' position;

(5) Can only be locked in the ''open and grounded'' position;

(6) Safely interrupts the full-load current of the circuit or designed to cause the current to be interrupted automatically prior to opening the disconnecting switch; and

(7) Labeled to clearly identify the circuit it disconnects.

(d) *Barriers and covers.* All compartments that provide access to high-voltage conductors or parts, must have barriers and covers to prevent miners from contacting energized high-voltage conductors or parts.

(e) *Main disconnecting switch and control circuit interlocking.* The power center control circuit must be interlocked with the main disconnecting switch in the power center so that:

(1) When the main disconnecting switch is in the ''open'' position, the control circuit can only be powered through an auxiliary switch in the ''test'' position; and

(2) When the main disconnecting switch is in the ''closed'' position, the control circuit can only be powered through an auxiliary switch in the ''normal'' position.

(f) *Interlocks.* Each cover or removable barrier providing access to high-voltage

conductors or parts must be equipped with at least two interlock switches. Removal of any of these covers or barriers exposing energized high-voltage conductors or parts must cause the interlock switches to automatically de-energize the incoming high-voltage to the power center.

(g) *Emergency stop switch.* The power center must be equipped with an externally accessible emergency stop switch hard-wired into the incoming ground-wire monitor circuit that de-energizes the incoming high-voltage in the event of an emergency.

(h) *Grounding stick.* The power center must be equipped with a grounding stick to discharge the high-voltage capacitors and circuits. The power center must have a label readily identifying the location of the grounding stick. The grounding stick must be stored in a dry location.

(i) *Caution labels.* All compartments providing access to energized high-voltage conductors and parts must display a caution label to warn miners against entering the compartment(s) before de-energizing incoming high-voltage circuits.

§ 75.826 High-voltage trailing cables.

High-voltage trailing cables must—

(a) Comply with § 18.35 and § 18.54 of this title; and

(b) Meet either the requirements of § 75.804 or be a type SHD cable with a center ground-check conductor not smaller than a No. 16 A.W.G. stranded conductor.

§ 75.827 Installation and guarding of trailing cables.

(a) *Trailing cable installation.* The portion of the high-voltage cable from the power center to the following locations must be either supported on insulators, or located in an unused entry that is provided with barricade tape and warning signs to warn mobile equipment operators against traveling into the entry:

(1) To the last open crosscut during advance mining;

(2) To 150 feet outby any pillar workings during second mining; or

(3) To 150 feet of the continuous mining machine when the machine is used in outby areas or trammed in or out of the mine or from section to section.

(b) *Temporary storage of cables.* Temporary lacing of the cable into a sled or crosscut in areas specified in paragraphs (a)(1) to (a)(3) of this section is permitted. Warning signs and barricade tape must be placed around the sled or at the entrances to the crosscut to restrict mobile equipment travel.

(c) *Guarding.* (1) The high-voltage cable must be guarded in the following locations:

(i) Between the power center and the first cable insulator, if supported, or between the power center and where the cable enters into the unused entry;

(ii) From the entrance gland for a minimum distance of 10 feet outby the last strain clamp on the continuous mining machine; and,

(iii) At any location where the cable may be damaged by moving equipment.

(2) Guarding must be constructed using nonconductive flame-resistant material or grounded metal.

(d) *Suspended cables and cable crossovers.* (1) When equipment must cross any portion of the high-voltage trailing cable in or inby the last open crosscut, the cable must be protected from damage by either:

(i) Suspending it from the mine roof; or

(ii) Protecting it by using a commercially available cable crossover.

(2) The crossover must have the following specifications:

(i) A minimum length of 33 inches;

(ii) A minimum width of 17 inches;

(iii) A minimum height of 3 inches;

(iv) A minimum cable placement area of two and one half-inches (2 ½″) high by four and one-quarter inches (4 ¼″) wide;

(v) Made of nonconductive material;

(vi) Made of material with a distinctive color. The color black must not be used; and

(vii) Made of material that has a minimum compressive strength of 6,400 pounds per square inch (psi).

§ 75.828 Trailing cable handling and pulling.

(a) *Handling.* Miners must not handle the energized trailing cable unless they are wearing properly tested and rated insulating gloves as specified in § 75.833. If mitts, hooks, tongs, slings, aprons, or other personal protective equipment are used to handle energized cables, high-voltage insulating gloves must be used in conjunction to provide protection against shock hazards.

(b) *Pulling.* The trailing cable must be de-energized prior to being pulled by any equipment other than the continuous mining machine. Cable manufacturers' recommended pulling procedures must be followed when pulling the trailing cable with such equipment.

§ 75.829 Tramming continuous mining machines in and out of the mine, and from section to section.

(a) *Conditions of use.* When tramming the continuous mining machine in and out of the mine, and from section to section, the following requirements apply:

(1) The power source must not be located in areas where permissible equipment is required;

(2) The continuous mining machine must not be used for mining or cutting purposes. This provision applies when using power sources specified in paragraphs (c)(1), (c)(2), and (c)(3) of this section;

(3) Low-, medium-, and high-voltage cables must comply with §§ 75.600–1, 75.907, and 75.826, respectively; and

(4) The energized high-voltage cable must be mechanically secured on-board the continuous mining machine. This provision applies only when using power sources specified in paragraphs (c)(2) and (c)(3) of this section.

(b) *Testing prior to tramming.* Prior to tramming the continuous mining machine—

(1) A qualified person must activate the ground-fault and ground-wire monitor test circuits of the power sources specified in paragraph (c) of this section to ensure that they pass a functional test. Corrective actions and recordkeeping resulting from these tests must be in accordance with § 75.832(f) and (g), respectively.

(2) Where applicable, a responsible person must activate the test circuit for the grounded-phase detection circuit on the continuous mining machine to ensure that the detection circuit is functioning properly. Corrective actions resulting from this test must be in accordance with § 75.832(f).

(c) *Power sources.* In addition to the power center specified in § 75.825, the following are acceptable power sources that may be used to tram the continuous mining machine.

(1) *Medium-voltage power source.* A medium-voltage power source that supplies 995 volts through a trailing cable (*See* Figure 1 of this section). The medium-voltage power source must—

(i) Not be used to back-feed the high-voltage circuits of the continuous mining machine;

(ii) Comply with all applicable requirements for medium-voltage circuits in 30 CFR part 75; and

(iii) Not be moved when energized if the power source is a portable transformer.

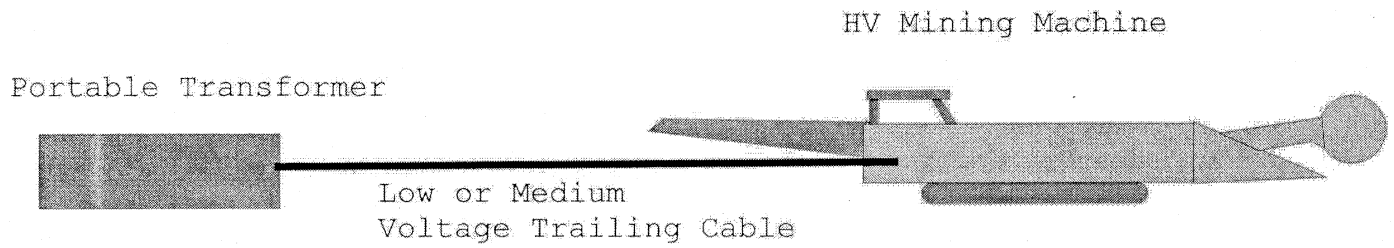

Figure 1-Power Source-75.829(c)(1) 995 volts used for tramming

(2) *Onboard step-up transformer.* A temporary transformer that steps up the low- or medium-voltage to high voltage (*See* Figure 2 in this section). The temporary transformer must comply with the following:

(i) The input trailing cable supplying either low- or medium-voltage to the step-up transformer must comply with the applicable sections of 30 CFR part 75;

(ii) The high-voltage circuit supplying power to the continuous mining machine must comply with § 75.824.

(iii) The step-up transformer enclosure must be—

(A) Securely mounted on-board the continuous mining machine and installed to minimize vibration;

(B) Grounded using all of the following methods:

(*1*) Connected to the incoming ground wire of the low- or medium-voltage trailing cable.

(*2*) Bonded by a No. 1/0 A.W.G. or larger external grounding conductor to the continuous mining machine frame.

(*3*) Bonded by a No. 1/0 A.W.G. or larger external grounding conductor to the metallic shell of cable couplers; and

(C) Equipped with at least two interlock switches on every removable cover and an externally accessible emergency stop switch to remove input power.

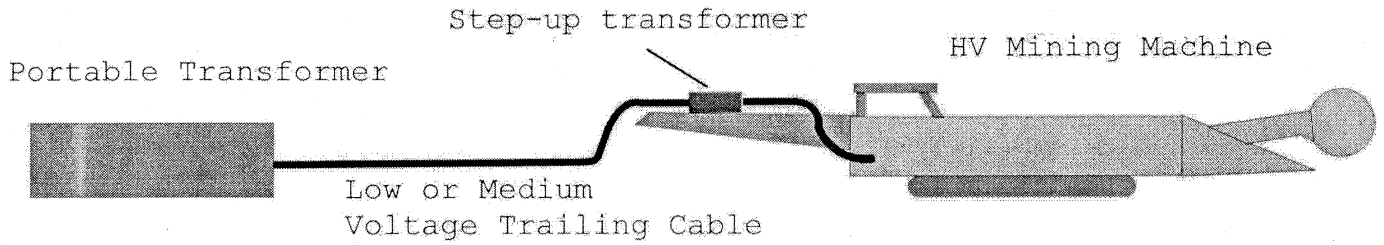

Figure 2-Power Source-75.829(c)(2) 480 or 995 volts to a step-up transformer to 2300 volts for tramming

(3) *Diesel-generator set.* A high-voltage diesel-generator set (*See* Figures 3 or 4 in this section) must comply with the following:

(i) Contain a neutral grounding resistor(s) rated for the maximum voltage created when ground-fault conditions occur and to limit the ground-fault current to no more than 0.5 ampere. Neutral grounding resistor(s) must be located:

(A) Between the wye connected generator neutral and the generator frame; and

(B) Between the wye connected transformer secondary and the transformer frame, when a transformer is used.

(ii) Have a No. 1/0 A.W.G. or larger external grounding conductor to ground the continuous mining machine frame to the following:

(A) The frame of the generator;

(B) The frame of the transformer, when used; and

(C) The metallic shell of each cable coupler.

(iii) Be connected by a tow-bar and in close proximity to the continuous mining machine to prevent free movement of the generator set;

(iv) Have each three-phase output circuit equipped with a device with no intentional time-delay that causes the circuit breaker to trip and to shut-down the diesel engine when a phase-to-frame fault of 0.125 ampere or greater occurs. The ground-fault protection must use a single window-type current transformer that encircles all three phase-conductors. The equipment grounding conductor(s) must not pass through the ground-fault current transformer.

(v) Have each three-phase output circuit provided with short-circuit and undervoltage protection, in accordance with §§ 75.824(a)(1) and 75.824(a)(3), respectively.

(vi) Have a test circuit for the ground-fault device specified in paragraph (c)(3)(v) of this section that injects no more than 50 percent of the current rating of the neutral grounding resistor through the current transformer. When the test circuit is activated, the circuit-interrupting device must open.

(vii) Have a legible label(s) placed on each instantaneous trip unit or near each circuit interrupting device showing the maximum circuit interrupting device setting(s).

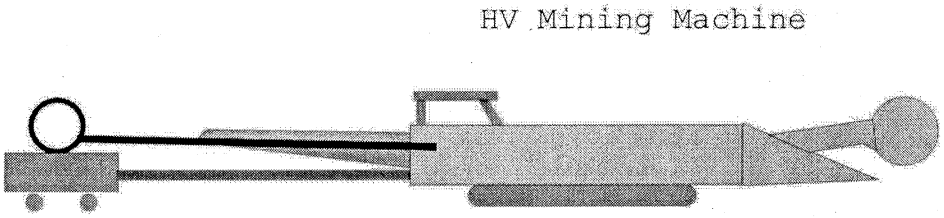

Figure 3-Power Source-75.829(c)(3) Generator used to supply 2300 volts for tramming

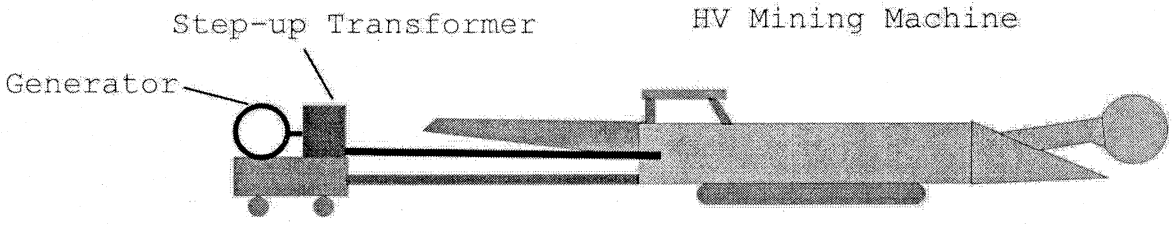

Figure 4-Power Source-75.829(c)(3) Generator Supplies 480/995 volts to step-up transformer for 2300 volts for tramming

§ 75.830 Splicing and repair of trailing cables.

(a) *Splices and repairs.* Splices and repairs to high-voltage trailing cables must comply with the following:

(1) Be made only by a qualified person trained in the proper methods of splicing and repairing high-voltage trailing cables;

(2) Be made in a workman-like manner; and

(3) Be made in accordance with § 75.810.

(b) *Permanent cable repair.* Only MSHA-approved high-voltage kits which include instructions for outer-jacket repairs and splices are acceptable for permanent cable repair.

(c) *Splicing limitations.* Splicing of the high-voltage trailing cable within 35 feet of the continuous mining machine is prohibited.

§ 75.831 Electrical work; troubleshooting and testing.

(a) *Trailing cable and continuous mining machine electrical work procedures.* Prior to performing electrical work on a high-voltage cable or the continuous mining machine, a qualified person must de-energize the power center circuit and comply with paragraph (a)(1) or (2) of this section:

(1) If a trailing cable disconnecting switch is provided:

(i) Open, lock, and tag the disconnecting switch; and

(ii) Lock and tag the plug to the power receptacle.

(2) If a trailing cable disconnecting switch is not provided and a cable coupler is used as a disconnecting device:

(i) Remove the plug from the power receptacle and connect it to the grounding receptacle;

(ii) Lock and tag the plug to the grounding receptacle; and

(iii) Place a dust cover over the power receptacle.

(b) *Trailing cable grounding.* Prior to testing and troubleshooting trailing cables, a qualified person must de-energize the trailing cable circuit as required in paragraph (a) of this section, and comply with either of the following work procedures:

(1) If a trailing cable disconnecting switch is provided:

(i) Open, lock, and tag the disconnecting switch;

(ii) Disconnect the plug from the power receptacle;

(iii) Lock and tag the plug; and

(iv) Place a dust cover over the power receptacle.

(2) If a trailing cable disconnecting switch is not provided and a cable coupler is used as a disconnecting device:

(i) Remove the plug from the power receptacle and connect it to the grounding receptacle;

(ii) Remove the plug from the grounding receptacle, then install a lock and tag to the plug; and

(iii) Place a dust cover over the power receptacle.

(c) *Trailing cable troubleshooting.* During troubleshooting and testing, the de-energized high-voltage cable may be ungrounded only for that period of time necessary to locate the defective condition. Electrical work or repairs to the trailing cable must be made in accordance with paragraph (a) of this section.

(d) *Troubleshooting and testing limitations.* Before troubleshooting or testing a low- or medium-voltage circuit contained in an enclosure with exposed high-voltage conductors or parts, the high-voltage circuit must be de-energized, grounded, locked-out, and tagged in accordance with paragraphs (a) and (e) of this section, whichever is applicable. Troubleshooting and testing energized circuits must be performed only—

(1) On low- and medium-voltage circuits;

(2) When the purpose of troubleshooting and testing is to determine voltages and currents; and

(3) By qualified persons who wear protective gloves on circuits that exceed 40 volts in accordance with the following table:

Circuit voltage	Type of glove required
(i) Greater than 120 volts (nominal) (not intrinsically safe)	Rubber insulating gloves with leather protectors.
(ii) 40 volts to 120 volts (nominal) (both intrinsically safe and non-intrinsically safe).	Either rubber insulating gloves with leather protectors or dry work gloves.
(iii) Greater than 120 volts (nominal) (intrinsically safe)	Either rubber insulating gloves with leather protectors or dry work gloves.

(e) *Power center electrical work procedures.* Before any work is performed inside any compartment of the power center, except for troubleshooting and testing energized circuits as provided for in paragraph (d) of this section, a qualified person must—

(1) De-energize the affected circuit;

(2) Open the corresponding disconnecting switch to ensure the circuit is isolated;

(3) Visually verify that the contacts of the disconnecting switch are open and grounded;

(4) Lockout and tag the disconnecting switch with a lock; and

(5) Discharge all high-voltage capacitors.

(f) *Lockout and tagging responsibilities.* (1) When one or more qualified person(s) is performing work specified in this section, each person must install an individual lock. Locks and tags must be removed only by the persons who installed them.

(2) If the person who installed the lock and tag is unavailable, the lock and tag may be removed by a person authorized by the operator, provided—

(i) The authorized person is a qualified person; and

(ii) The mine operator ensures that the person who installed the lock and tag is aware that the lock has been removed.

§ 75.832 Frequency of examinations; recordkeeping.

(a) *Continuous mining machine examination.* At least once every 7 days, a qualified person must examine high-voltage continuous mining machines to determine that electrical protection, equipment grounding, permissibility, cable insulation, and control devices are properly installed and maintained.

(b) *Ground-fault test.* At least once every 7 days, and prior to tramming the high-voltage continuous mining machine, a qualified person must activate the ground-fault test circuit required in § 75.824(a)(2)(vii) and in § 75.829(b)(1) to verify that it will cause the corresponding circuit-interrupting device to open.

(c) *Ground-wire monitor test.* At least once every 7 days, and prior to tramming the high-voltage continuous mining machine, a qualified person must examine and test each high-voltage continuous mining machine ground-wire monitor circuit to verify that it will cause the corresponding circuit-interrupting device to open.

(d) *Trailing cable inspections.* (1) Once each production day, a qualified person must de-energize and inspect the entire length of the high-voltage trailing cable from the power center to the continuous mining machine. The inspection must include the outer jacket repairs, all splices, and areas where guarding is required.

(2) At the beginning of each production shift, a responsible person designated by the mine operator must de-energize the high-voltage trailing cable and visually inspect for damage to the outer jacket, from the continuous mining machine to the following locations:

(i) The last open crosscut;

(ii) Within 150 feet of the working place during retreat or second mining; or

(iii) Up to 150 feet of the continuous mining machine when the machine is used in outby areas.

(e) *Grounded-phase detection test.* When a grounded-phase test circuit is provided on a high-voltage continuous mining machine, a responsible person designated by the mine operator must activate the test circuit at the beginning of each production shift to ensure that the detection circuit is functioning properly.

(f) *Corrective action.* When examinations or tests of equipment reveal a potential fire, electrical shock, ignition, or operational hazard, the equipment must be immediately removed from service or repaired.

(g) *Record of tests.* At the completion of examinations and tests required under paragraphs (a), (b), and (c) of this section, the person conducting such examinations and tests must certify by signature and date that they have been conducted. Also, a record must be made of any unsafe condition found when conducting the examinations and tests under paragraphs (a), (b), and (c) of this section and any corrective action taken. Certifications and records must be kept for at least 1 year, and must be made available for inspection by authorized representatives of the Secretary and representatives of miners.

§ 75.833 High-voltage insulating gloves used for handling high-voltage trailing cables.

(a) Each mine operator must make high-voltage insulating gloves available to miners handling energized high-voltage trailing cables.

(b) High-voltage insulating gloves must have a voltage rating of at least Class 1 (7,500 volts) that meets or exceeds ASTM F496–02a, ''Standard Specification for In-Service Care of Insulating Gloves and Sleeves'' (2002). The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may inspect a copy at any of the following locations: MSHA Coal Mine Safety and Health District office; at the Office of Standards, Regulations, and Variances, 1100 Wilson Boulevard, Arlington, VA; or at the National Archives and Records Administration (NARA). For more information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* You may also purchase a copy from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428–2959.

(c) The rubber glove portion of the high-voltage glove must be air-tested at the beginning of each shift to ensure its effectiveness.

(d) Both the leather protector and rubber insulating gloves must be visually examined before each use for signs of damage or defects.

(e) Damaged rubber gloves must be removed from the underground area of the mine or destroyed. Leather protectors must be maintained in good condition or replaced.

(f) The high-voltage insulating gloves must be electrically tested every 30 days in accordance with publication ASTM F496–02a, ''Standard Specification for In-Service Care of Insulating Gloves and

Sleeves'' (2002), as incorporated by reference in paragraph (b) of this section.

5. Add § 75.1002(b)(5) to read as follows:

§ 75.1002 Installation of electric equipment and conductors; permissibility.

* * * * *

(b) * * *

(5) Shielded high-voltage cables supplying power to permissible continuous mining machines.

[FR Doc. 04–15841 Filed 7–15–04; 8:45 am]

BILLING CODE 4510–43–P