1.0 PURPOSE

To inform applicants how to apply for Mine Safety and Health Administration (MSHA) approval of mine communication equipment (verbal, text, or data), signaling devices, or systems (and extensions). This document also: specifies the documentation, equipment and components necessary to evaluate and test a product for compliance with MSHA requirements; and identifies the Applicant's responsibilities during the investigation process.

Note: Due to the publishing of the Mine Improvement and New Emergency Response Act of 2006 (Miner Act), systems may need to meet additional requirements that have not been set forth at this time.

2.0 SCOPE

This standard application procedure applies to all applications submitted for approval or extension of approval of mine communication equipment, signaling devices, or systems pursuant to Part 23 of Title 30 of the Code of Federal Regulations (30 CFR Part 23).

3.0 REFERENCES

3.1. 30 CFR Part 6 "Testing and Evaluation by Independent Laboratories and Non-MSHA Product Safety Standards"

3.2. 30 CFR Part 23 "Telephones and Signaling Devices"

3.3. ACRI2001 "Criteria for the Evaluation and Test of Intrinsically Safe Apparatus and Associated Apparatus"

3.4. APOL1009 "Application Cancellation Policy"

3.5. APOL2203 "30 CFR Part 23 Approval Requirements, Line-Powered Components"

3.6. Program Circular PC-4812-0 "Installation and Maintenance of Intrinsically Safe Field Wiring in Gassy Mines"

These documents are available on www.msha.gov or by contacting the Approval and Certification Center at 304-547-0400.

4.0 DEFINITIONS

4.1. *Approval* – Official notification by letter, from MSHA to a responsible organization, stating that the device under consideration has been judged to meet the requirements of this part (30 CFR §23.2).

4.2. *Associated Apparatus* - Apparatus in which the circuits are not themselves intrinsically safe, but which connect to intrinsically safe circuits. An example of an associated apparatus is a power supply, located within a certified explosion-proof enclosure, which charges an intrinsically safe standby power source (ACRI2001 and Part 23).

4.3. *Equivalent Non-MSHA Product Safety Standard* - A non-MSHA product safety standard, or group of standards, that is determined by MSHA to provide at least the same degree of protection as the applicable MSHA product approval requirements… or which in modified form provide at least the same degree of protection. (30 CFR §6.2)

4.4. *Extension of Approval* - A formal document issued by MSHA accepting changes to the design or construction of an approved product or system, which have met the applicable requirements of this part. A suffix will be added to the Approval number to distinguish it from the previously accepted product or system.

4.5. *Hybrid Integrated Circuit* - A miniaturized electronic circuit constructed of individual semiconductor devices, as well as passive components, bonded to a substrate or circuit board.

4.6. *Independent Laboratory* - A laboratory that: (1) has been recognized by a laboratory accrediting organization to test and evaluate products to a product safety standard, and (2) is free from commercial, financial, and other pressures that may influence the results of the testing and evaluation process. (30 CFR §6.2)

4.7. *Product Safety Standard* - A document, or group of documents, that specifies the requirements for the testing and evaluation of a product for use in explosive gas and dust atmospheres, and, when appropriate, includes documents addressing the flammability properties of products. (30 CFR §6.2)

4.8. *30 CFR Part 6* - Regulations that are contained in the Code of Federal Regulations, Title 30 that establish alternate requirements for testing and evaluation of products that MSHA approves for use in gassy underground

mines. It will permit manufacturers of certain products, who seek MSHA approval, to use an independent laboratory to perform, in whole or part, the necessary testing and evaluation for approval. This rule also permits manufacturers to have their products approved based on non-MSHA product safety standards, but only after MSHA has determined that such standards are equivalent to its applicable product approval requirements or can be modified to provide at least the same degree of protection as those MSHA requirements.

5.0 APPLICATION PROCEDURE

The application should include the following:

5.1. Application letter. This letter (Reference Enclosure A or B) should include the following information:

5.1.1. Applicant's name and address;

5.1.2. Application date;

5.1.3. A six digit Company Application Code Number assigned by the Applicant. This number is used to identify the application and should not have been assigned to an application previously submitted by the Applicant;

5.1.4. The name, address, telephone number, FAX number and e-mail address of the person MSHA is to contact regarding the application and billing;

5.1.5. The model number(s) or other designation(s) for the product; and,

5.1.6. A brief description how the product would be used in a gassy underground mine.

5.2. A complete technical description of the operation of each electrical circuit. This should identify components or features of the product that are critical to the safety of the product.

5.3. Adequate instructions for the installation, connection and proper use and maintenance of the product.

5.4. As per Part 6, copies of test reports from other approval agencies, as described in Section 5.11

5.5. A copy of the UL 1642 report and test record for each lithium battery used in the device. A comprehensive report and test record for each battery type tested by a Nationally Recognized Testing Laboratory (NRTL) must be submitted. These must describe the test and evaluation of the cell per the requirements of this UL standard. Complete data for the tests applicable to "technician-replaceable" cells must be included in the report and test record. MSHA does not allow user replaceable lithium cells.

5.6. Drawing List. A complete list of the drawings necessary to fully describe the equipment. The drawing list (Reference Enclosure C) should include the following information:

5.6.1. Drawing title;

5.6.2. Drawing number;

5.6.3. Revision level;

5.6.4. MSHA File Status (NEW, REVISED, or currently ON FILE with MSHA.); and,

5.6.5. Reference to other MSHA approvals, certifications, or intrinsic safety evaluations used in their entirety, including manufacturer, model number, and complete approval, certification, or intrinsic safety evaluation number.

5.7. Drawings, Bills of Material, and Specifications. Each sheet of a drawing shall have a company name, be titled, numbered, dated, in English, and show the latest revision. The drawings shall show the details of the device as intended to be approved. The final MSHA-controlled drawings are used to identify the device in the approval and as a means of checking the future commercial product of the manufacturer. (30 CFR §23.10(b)). The required documentation includes:

5.7.1. An overall system drawing (if the system has more than one component) showing the interconnection of the system components, location of the components with respect to the mine (e.g. surface, inby, or outby the last open crosscut), electrical barriers, standby power sources, cable specifications, and types of enclosures (open type or explosion proof).

5.7.2. An overall assembly drawing of the product or components of the system showing the physical dimensions of the apparatus and identifying the major components. Where parts of the system are housed in explosion-proof enclosures, detailed installation instructions must be provided.

5.7.3. A block diagram showing the major components of the assembly or system.

5.7.4. Subassembly drawings showing the construction of the enclosure(s) and component assemblies.

5.7.5. Wiring diagrams of all internal wiring and connections to external circuits. Distances between intrinsically safe wiring and non-intrinsically safe wiring must be identified and specified.

5.7.6. Schematic diagrams of each electrical circuit.

5.7.7. Layout drawings showing the physical location of each component in the circuit.

5.7.8. Printed circuit board artwork drawings, drawn to scale such that distances between electrical conductors can be determined. If coating of the board is necessary to maintain spacing, then the drawing shall indicate that the coating meets the requirements of ACRI2001, Section 6.

5.7.9. Electrical parts lists that include the following component specifications:

Batteries: Type, voltage, capacity, and manufacturer's name and part number.

Transformers: Either (a) manufacturer's name and part number, inductance (nominal and tolerance or maximum value), method of measuring inductance, and dc resistance (nominal and tolerance or minimum value); or (b) specifications showing the physical construction of the transformer to include: core type, insulation rating, size of wire, number of turns, physical dimensions and spacing (clearances) of terminals and maximum temperature rating of insulation.

Protective and Power Transformers: Manufacturer's name and part number, inductance (nominal and tolerance or maximum value), method of measuring inductance, and dc resistance (nominal and tolerance or minimum value), and specifications showing the physical construction of

the transformer to include: core type, insulation rating, size of wire, number of turns, physical dimensions and spacing (clearances) of terminals and maximum temperature rating of insulation, transformer type (Reference ACRI2001, Section 7.2), voltage and current ratings of each winding, high potential or dielectric strength specifications and spacing between windings.

Inductors: Manufacturer's name and part number; inductance (nominal and tolerance, or maximum value), method of measuring inductance (except for air core inductors), dc coil resistance (nominal and tolerance, or minimum value), or; specifications of the core type, size of wire, insulation, and number of turns.

Mechanical Relays: Manufacturer's name and part number, method of measuring coil inductance (nominal and tolerance or maximum value) or stored energy (nominal and tolerance, or maximum value) at a specified voltage, and coil resistance (nominal and tolerance, or minimum value). If the relays are used as protective components to provide intrinsic safety isolation, the maximum dielectric voltage and physical separation (creepage and clearances) between coil, coil terminals, switching contacts, and contact leads must be specified.

Capacitors: Type, capacitance (nominal and tolerance, or maximum value), and working voltage. If the capacitors are used as protective components to provide intrinsic safety isolation, the maximum dielectric voltage must be specified.

Protective Current Limiting Resistors (requiring testing): Manufacturer's name and part number, resistance value (nominal and tolerance), type of construction (Reference ACRI2001 for acceptable types of construction), and wattage rating.

Protective Current Limiting Resistors (not requiring testing): Resistance value (nominal and tolerance or minimum value), type of construction (Reference ACRI2001 for acceptable types of construction), and wattage rating.

Resistors: Resistance value (nominal and tolerance or minimum value) and wattage rating.

Optical Isolators and Solid State Relays: Manufacturer's name and part number, maximum voltage and current ratings, dielectric strength, and internal and external spacings (clearances) between input and output.

Zener Diodes: Manufacturer's name and part number or JEDEC number; zener voltage (nominal and tolerance, or maximum value), and wattage.

Lamp Bulbs: Manufacturer's name and part number, type, voltage, current and wattage rating.

Solid State Voltage and Current Limiting Devices: Manufacturer's name and part number, input and output voltage (nominal and maximum) and current ratings, and power dissipation rating.

Heat Sinks: Manufacturer's name and part number or details of the physical dimensions and materials used.

Encapsulant: Generic name, specific type designation, voltage rating, and maximum temperature rating.

Piezoelectric Transducers and Devices: Manufacturer's name and part number and crystal capacitance (nominal and tolerance or maximum value).

Fuses and other Thermal Protection Devices: Manufacturer's name and part number, current trip rating, maximum interrupt current, voltage rating and time vs. current characteristic curves.

Cables Carrying Intrinsically Safe (IS) Energy Levels: Maximum length, conductor size, number of conductors, voltage rating, inductance per unit length, resistance per unit length, capacitance per unit length, and a flame resistant jacket or enclosed in flame resistant hose conduit. The L/R ratio may be specified in lieu of the inductance per unit length and resistance per unit length. Note: The minimum acceptable conductor sizes are those specified in PC-4812-0 (Installation and Maintenance of Intrinsically Safe Field Wiring in Gassy Mines).

Cables Carrying Non-IS Energy Levels: Maximum length, conductor size, number of conductors, type of cable, voltage rating, insulation temperature rating, ampacity, and a flame resistant jacket or enclosed in flame resistant hose conduit.

Cables Entering MSHA Approved or Certified Explosion-Proof Enclosures: In addition to the above listed specifications for IS and Non-IS cables, the outer diameter of the cable must also be specified.

Hybrid Integrated Circuits: Manufacturer's name and part number and all applicable documentation required by section 5.7 (e.g. discrete components, artwork drawings, etc.), where applicable.

Explosion Proof Enclosures: Manufacturer, Model/Type number, function, electrical rating (if applicable), and certification or approval number.

Other Components: JEDEC number, generic number of integrated circuits, power rating, electrical values with tolerances, etc., whichever are applicable.

5.8. Recommendations. To assist in simplifying the submitted documentation and future modifications, the following are recommended:

5.8.1. Identify components that have no affect on intrinsic safety or required performance by a generic description rather than the specific manufacturer and manufacturer's part number.

5.8.2. Submit schematics without component values accompanied by a parts list specifying the ranges of values for each non-critical component.

5.8.3. If the application includes changes to drawings previously filed with MSHA, it will simplify the review process if all changes to the revised drawings are clearly identified. Duplicate drawings with explanatory notations should be submitted for this purpose in addition to a "clean" copy to be placed on file.

5.9. Equipment required for inspection and test. In general, the equipment and components will include at least:

Note: If any of these components are normally potted or encapsulated, please submit both encapsulated and unencapsulated samples. Encapsulated units are required if a dielectric strength test is needed to determine the sufficiency of the encapsulating material and for photographs for the final records.

5.9.1. One complete device or system in marketable form. If the application is for a single page phone, two page phones will be required to be submitted for spark ignition testing. A 100 foot sample of each cable carrying intrinsically safe energy levels to be used in the approved system shall also be supplied.

5.9.2. One populated sample of each printed circuit board used in the device or system.

5.9.3. One unpopulated sample of each printed circuit board used in the device or system.

5.9.4. Five of each type inductive component rated over 100 microhenries that may be the source of a spark ignition (e.g., relays, speakers, transformers, inductors, etc.).

5.9.5. Five sets of each type battery or battery pack.

5.9.6. Ten samples of each type current limiting resistor.

Note: Samples of surface mount components should be mounted on a printed circuit board with two-inch test leads connected to each component sample. The test leads must not be connected directly to the component, but rather through printed circuit board traces due to heat sinking effects.

5.9.7. Ten samples of each type lamp bulb for surface temperature testing. If the device includes a bulb crush or disconnect safety device or design, then fifty additional samples shall be submitted.

5.9.8. Five samples of each type piezoelectric transducer device, with output leads connected directly to the crystal, mounted to the apparatus assembly where it is normally located of a quality, design, and construction consistent with that of the final manufactured product.

Note: Mockups of the apparatus assembly may be tested in lieu of the actual assembly if justified.

5.9.9. Ten samples of each type protective fuse or other thermal protection device.

5.9.10. Ten samples of each type protective optical isolator.

5.10. Applications may be submitted that follow the requirements set forth in 30 CFR, Part 6. Under these requirements the applicant may:

5.10.1. Use an independent laboratory to perform, in whole or part, the necessary testing and evaluation for approval. MSHA will accept testing and evaluation performed by an independent laboratory for purposes of MSHA product approval provided that MSHA receives as part of the application:

5.10.1.1. Written evidence of the laboratory's independence and current recognition by a laboratory accrediting organization;

5.10.1.2. Complete technical explanation of how the product complies with each requirement in the applicable MSHA product approval requirements;

5.10.1.3. Identification of components or features of the product that are critical to the safety of the product; and,

5.10.1.4. All documentation, including drawings and specifications, as submitted to the independent laboratory by the applicant and as required by 30 CFR Part 23.

5.10.2. Request to have their product approved based on non-MSHA product safety standards, provided that MSHA has determined that such standards are equivalent to its applicable product approval requirements or can be modified to provide at least the same degree of protection as those MSHA requirements.

5.11. Submit the application to MSHA by one of the following methods:

5.11.1. Mail to: MSHA Approval and Certification Center
Attention: IPSO
RR #1, Box 251 Industrial Park Road
Triadelphia, WV 26059

5.11.2. FAX to: 304-547-2044

5.11.3. Electronically: For information and instructions on setting up an account with MSHA go to www.msha.gov.

5.12. Additional Information. Applicants may contact the Electrical Safety Division at 304-547-0400 for additional information concerning these procedures.

6.0 RESPONSIBILITY

The Applicant is responsible for the following:

6.1. Authorizing the Fee Estimate. MSHA will review the application and send the Applicant a Fee Authorization Form that is to be returned to MSHA. This form will state the estimated maximum fee to process the application and an approximate date the application will be assigned to an investigator. If the Applicant does not authorize the fee estimate or does not return the fee authorization form by the date specified in the fee estimate letter, the investigation of the application will be cancelled.

6.2. Responding to Discrepancy Letters. The MSHA Investigator assigned to evaluate the application will review the application and contact the person designated in the application letter to discuss any discrepancies. The Applicant will receive a discrepancy letter listing additional documentation and components for evaluation and/or test necessary to continue the investigation. If the Applicant does not resolve all of the discrepancies listed in the letter within the time specified in the discrepancy letter, the investigation of the application will be cancelled per A&CC APOL1009 "Application Cancellation Policy."

6.3. Correcting Test Failures. The Applicant will be notified of all test failures and will be given the opportunity to redesign the product to successfully pass a failed test within the time specified in the discrepancy letter.

6.4. Payment. The Applicant will receive an invoice for the cost of the investigation after the investigation is either completed or cancelled.

Enclosure A

New Part 23 Approval Application Letter

Applicant name and address:

Chief, Approval and Certification Center
RR#1 Box 251
Industrial Park Road
Triadelphia, West Virginia 26059

DATE: _____

SUBJECT:

_____
(MODEL AND TYPE OF EQUIPMENT)

Company Assigned Application Code Number: __ __ __ __ __ __ (six digits or less)

Gentlemen:

We request MSHA approval of the subject equipment which consists of the following major components (attach additional sheets as necessary):

Brief description of equipment and its use in mines (attach additional sheets if necessary):

This equipment is similar to the following equipment approved by MSHA (If applicable):

_____
(MODEL AND TYPE OF EQUIPMENT)

Approval No. _____ , Investigation No. _____ as granted by letter to _____ dated _____

Enclosed are all the drawings, a drawing list, and a checklist for this application.

If you have any questions, contact: _____ Telephone: _____
Email: _____ FAX: _____

☐ I wish to have all equipment submitted for inspection and/or tests returned upon completion of the investigation.

Sincerely,

Name: _____

Title: _____

_____

(SIGNATURE)

Enclosure B

Extension of Part 23 Approval Application Letter

Applicant name and address:

Chief, Approval and Certification Center
RR#1 Box 251
Industrial Park Road
Triadelphia, West Virginia 26059

DATE: _____

Company Assigned Application Code Number: __ __ __ __ __ __ (six digits or less)

Gentlemen:

We request an extension of MSHA Part 23 approval to include the following changes made in the design of the

_____
(MODEL AND TYPE OF EQUIPMENT)

MSHA Approval Number _____ as granted in a letter to _____ dated _____

(List all changes. Attach additional sheets as necessary)

List all major components and provide a brief description of the equipment and its use in mines (attach additional sheets as necessary):

List all model(s) of this equipment to be covered by this extension (attach additional sheets as necessary):

☐ This extension does <u>not</u> change the model number or manufacturer's designation for this equipment.
-OR-
☐ This extension adds or changes the model number(s) or manufacturer's designation for this equipment.

Enclosed are all the new and revised drawings, a complete drawing list, and a checklist for this application.

If you have any questions, contact: _____ Telephone: _____

Email: _____ FAX: _____

☐ I wish to have all equipment submitted for inspection and/or tests returned upon completion of the investigation.

Sincerely,

Name: _____

Title: _____

_____

(SIGNATURE)

Enclosure C

INVESTIGATION NO. (leave blank for new approval applications)

"SAMPLE" DRAWING LIST
ABC Company
Model 100 Mine Communication System
Approval Number (leave blank for new approval applications)

TITLE	DRAWING	REV.	MSHA FILE STATUS
Model 100 System Drawing	A-1000	-	New
Model 100 Amplifier Assembly	A-100 (sheet 1 of 2)	B	Revised
Model 100 Amplifier Assembly	A-100 (sheet 2 of 2)	C	Revised
Model 100 Parts List	PL-101	C	Revised
PS 12V Assembly	A-113	-	On file
PS 12V Schematic	B-114	B	On file
T-1 Transformer Specification*	TR3456.7	5	New
PS PC Board Artwork	C-102 (5 sheets)	C	On file
Parts List - PS 12V	PL-114	A	On file
Barrier Assembly	B-123	G	New
Barrier Specifications	B-124	F	New
Warning Label - SOL	L-123	-	New

* Ace Transformer Company Drawing

Enclosure D

CHECKLIST FOR PRODUCT APPROVAL OR EXTENSION OF APPROVAL FOR PART 23

This checklist is available for the applicant to use as a guide to ensure that the application package (drawings and specifications) submitted to MSHA is complete. It should be submitted with the application package. Use N/A to signify when an item is not applicable to your product.

Administrative

_____ 1. Is the appropriate application form properly completed?

_____ 2. Is a drawing list in the proper format included in the application package?

_____ 3. Are the size and position of the approval plate specified?

_____ 4. Are all correspondence, specifications, and lettering on drawings in English?

_____ 5. Are all drawings and Bills of Material titled, numbered, dated, and legible?

_____ 6. Are there any pencil or ink notations on the drawings and Bills of Material? (Note: Pencil and ink notations are unacceptable.)

_____ 7. Do all revised drawings and Bills of Material show the latest revision and/or date?

Investigative General

_____ 1. Does the overall system drawing show the location of each major component with respect to the mine (e.g. surface, inby, or outby the last open crosscut)?

_____ 2. Does the overall assembly drawing of the device or components of the system show the location of each major component?

_____ 3. Are schematic drawings of each electrical circuit included?

_____ 4. Is each battery identified by: Type, voltage, capacity, and manufacturer's name and part number?

_____ 5. Is each transformer identified by: Manufacturer's name and part number, inductance (nominal and tolerance or maximum value), method of measuring inductance, and dc resistance (nominal and tolerance or minimum value), or; specifications showing the physical construction of the transformer to include: core type, insulation rating, size of wire, number of turns, physical dimensions and spacing (clearances) of terminals and maximum temperature rating of insulation?

_____ 6. Is each protective and power transformer identified by: Manufacturer's name and part number, inductance (nominal and tolerance or maximum value), method of measuring inductance, and dc resistance (nominal and tolerance or minimum value), and specifications showing the physical construction of the transformer to include: core type, insulation rating, size of wire, number of turns, physical dimensions and spacing (clearances) of terminals and maximum temperature rating of insulation, transformer type (see ACRI2001, Section 7.2),

voltage and current ratings of each winding, high potential or dielectric strength specifications and spacing between windings?

_____ 7. Is each inductor identified by: Manufacturer's name and part number, inductance (nominal and tolerance, or maximum value), method of measuring inductance (except for air core inductors), and dc coil resistance (nominal and tolerance, or minimum value) and; specifications of the core type, size of wire, insulation, and number of turns?

_____ 8. Is each mechanical relay identified by: Manufacturer's name and part number, method of measuring coil inductance (nominal and tolerance or maximum value) or stored energy (nominal and tolerance, or maximum value) at a specified voltage, and coil resistance (nominal and tolerance, or minimum value). If the relays are used as protective components to provide intrinsic safety isolation, the maximum dielectric voltage and physical separation (creepage and clearances) between coil, coil terminals, switching contacts, and contact leads must be specified?

_____ 9. Is each capacitor identified by: Type, capacitance (nominal and tolerance, or maximum value), and working voltage?

_____ 10. Is the dielectric voltage specified for capacitors used as protective components to provide intrinsic safety isolation?

_____ 11. Is each protective current limiting resistor that will require testing identified by: Resistance (nominal and tolerance), type of construction (single layer wirewound, metal oxide film or metal film), wattage rating, manufacturer, and manufacturer's part number?

_____ 12. Is each protective current limiting resistor that does not require testing identified by: Resistance (nominal and tolerance), type of construction (single layer wirewound, metal oxide film or metal film), and wattage rating?

_____ 13. Is each resistor identified by: Resistance value (nominal and tolerance or minimum value) and wattage rating?

_____ 14. Is each optical isolator and solid state relay identified by: Manufacturer's name and part number and, maximum voltage and current ratings, dielectric strength, and internal and external spacings (clearances) between input and output?

_____ 15. Is each zener diode identified by: Zener voltage (nominal and tolerance, or maximum value), wattage, and JEDEC number, or manufacturer and manufacturer’s part number?

_____ 16. Is each bulb and/or lamp identified by: Manufacturer's name and part number, type, voltage, current and wattage rating?

_____ 17. Is each solid state voltage and current limiting device identified by: Manufacturer's name and part number, input and output voltage (nominal and maximum), current ratings and power dissipation rating?

_____ 18. Is each heat sink identified by: Manufacturer's name and part number or details of the physical dimensions and materials used?

_____ 19. Is each piezoelectric transducer or device identified by: Manufacturer's name and part number, and crystal capacitance?

_____ 20. Is each fuse or other thermal protection device identified by: Manufacturer's name and part number, current trip rating, maximum interrupt current, voltage rating and time vs. current characteristic curves?

_____ 21. Are all non-energy storage components identified by JEDEC number, generic number of integrated circuit, power rating, electrical values with tolerances, etc., whatever is applicable?

_____ 22. Do the p.c. board layout drawings show the physical location of each electrical component?

_____ 23. Are all p.c. board artwork drawings included with scaling dimensions indicated?

_____ 24. Is a block diagram included?

_____ 25. Is a technical description of the circuit operation included?

_____ 26. Is a complete operator's manual on the installation, use and maintenance of the product included?

_____ 27. Do the schematic diagrams clearly show which circuits are intrinsically safe or housed in an MSHA certified explosion-proof enclosure?

_____ 28. Do the wiring diagrams clearly show which circuits are intrinsically safe or housed in an MSHA certified explosion-proof enclosure?

_____ 29. If an explosion-proof enclosure is to be supplied by the user, are detailed installation instructions provided?

<u>Investigative Part 23 Specific</u>

_____ 30. Does the device or system include backup power source(s) to maintain communication in the event line-power is lost (24 hours is recommended, 4 hours is the minimum acceptable time)?

_____ 31. Are all components of the system located underground, including equipment located outby, either intrinsically safe or located in explosion proof enclosures when operating under battery backup or loss of line-power?

_____ 32. Is all exposed wiring of the system, including wiring located outby, intrinsically safe when operating under battery backup or loss of line-power?

_____ 33. Do all cables carrying intrinsically safe energy levels have the following documented: Maximum length, conductor size, number of conductors, voltage rating, inductance per unit length, resistance per unit length, capacitance per unit length, and a flame resistant jacket or enclosed in flame resistant hose conduit? The L/R ratio may be specified in lieu of the inductance per unit length and resistance per unit length.

_____ 34. Do all cables carrying non-intrinsically safe energy levels have the following documented: Maximum length, conductor size, number of conductors, type of cable, voltage rating, insulation temperature rating, ampacity, and a flame resistant jacket or enclosed in flame resistant hose conduit?

_____ 35. Do all cables entering MSHA approved or certified explosion-proof enclosures have the outer diameter of the cable documented?

_____ 36. Are the hazards in regard to operating this equipment near blasting circuits addressed (reference Institute of Makers of Explosive (IME) requirements)? This includes documenting the maximum output power and normal operating frequency for RF transmitters on an MSHA controlled drawing.

_____ 37. Are all explosion-proof enclosures identified by: Manufacturer, Model/Type number, function, electrical rating, and certification or approval number?

Sincerely,

Name: _____

Title: _____

_____

(SIGNATURE)