

## 1.0 PURPOSE

To inform applicants how to apply for Mine Safety and Health Administration (MSHA) approval of electric cap lamps. 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.

## 2.0 SCOPE

This standard application procedure applies to all applications submitted for approval, extension of approval, or RAMPs (Revised Approval Modification Program) of electric cap lamps pursuant to Part 19 of Title 30 of the Code of Federal Regulations (30 CFR Part 19).

## 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 19 "Electric Cap Lamps"
- 3.3. ACRI2001 "Criteria for the Evaluation and Test of Intrinsically Safe Apparatus and Associated Apparatus"
- 3.4. ACRI2010 "Encapsulation Criteria"
- 3.5. ACRI2011 "Intrinsically Safe Active Voltage/Current Power Source Criteria"
- 3.6. APOL1009 "Application Cancellation Policy"
- 3.7. APOL2202 "Cap Lamp Evaluation Protocol"
- 3.8. APOL2204 "Policy to Determine Compliance with 30 CFR 19.7(e) and 19.4(a)"
- 3.9. ASTP2130 "Polycarbonate Surface Temperature Test", ref. 30 CFR 19.7(a)
- 3.10. ASTP2131 "Thermal Shock Test on Windows Lenses", ref. 30 CFR 19.7(a) and 18.66(b)

- 3.11. ASTP2202 "Battery Flash Current Test"
- 3.12. ASTP2205 "Cap Lamp Bulb Life Test", ref. 30 CFR 19.9(b) and (c)
- 3.13. ASTP2210 "Cap Lamp Headpiece Impact Test", ref. 30 CFR 19.7(a)
- 3.14. ASTP2213 "Cap Lamp Performance Test", ref. 30 CFR 19.9(a)
- 3.15. ASTP2215 "Miner's Cap Lamp Battery Spill Test", ref. 30 CFR 19.8(a)
- 3.16. ASTP2217 "Miner's Cap Lamp Cord Slitting Test", ref. 30 CFR 19.6(a)
- 3.17. ASTP2218 "Cap Lamp Headpiece Drop Test", ref. 30 CFR 19.6(a)
- 3.18. ASTP2221 "Cap Lamp Light Distribution", ref. 30 CFR 19.6(b), (c), and (d)
- 3.19. ASTP2222 "Lamp Bulb Safety Test", ref. 30 CFR 19.7(a)
- 3.20. ASTP2225 "Cap Lamp Battery Drop Test", ref. 30 CFR 19.6(a)
- 3.21. Program Policy Letter P09-V-01 "Guidance for Compliance with Post-Accident Two-Way Communications and Electronic Tracking Requirements of the Mine Improvement and New Emergency Response Act (MINER Act)"

These documents are available on [www.msha.gov](http://www.msha.gov) or by contacting the Approval and Certification Center at 304-547-0400.

#### 4.0 DEFINITIONS

- 4.1. *Applicant* – An individual, partnership, company, corporation, organization or association that designs, manufacturers, assembles, or controls the assembly of an electrical machine or accessory and seeks approval.... (30 CFR §18.2). Per Part 6, an Applicant is an individual or organization that manufactures or controls the assembly of a product and applies to MSHA for approval of that product.
- 4.2. *Approval* – Formal document issued by MSHA which states that a completely assembled cap lamp with or without internal accessory(ies) has met the applicable requirements of this part and which authorizes the attachment of an approval plate so indicating.

**TITLE: Standard Application Procedures for the Approval of Electric Cap Lamps per 30 CFR Part 19****MSHA Mine Safety and Health Administration, Approval & Certification Center**

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- 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, 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.
- 4.5. *External Accessory* - An accessory such as a radio remote control that is powered by the cap lamp power take off (PTO), but is not documented on the cap lamp approval documentation. The power connection to the cap lamp must be specifically documented on the approval of the external accessory by complete approval number as well as type, voltage, capacity, and manufacturer's name and part number of the battery.
- 4.6. *Hybrid Integrated Circuit* - A miniaturized electronic circuit constructed of individual semiconductor devices, as well as passive components, bonded to a substrate or circuit board.
- 4.7. *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)
- 4.8. *Internal Accessory* - An accessory such as a tracking TAG that is physically or electrically connected to the cap lamp. This accessory must be documented on the cap lamp approval documentation.
- 4.9. *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)
- 4.10. *Revised Approval Modification Program (RAMP)* - A program created to allow applicants to make simple changes to their approval by preauthorizing at

least \$1,000 and sending/emailing a letter describing the changes. Applicants are notified via a RAMP acceptance letter if changes are approved. Complex changes will be processed as an extension of approval.

4.11.30 *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 (numerical only) 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. It should also describe any areas of the circuit that derive a voltage potential higher than the input voltage (e.g. minus voltage converters, switching regulators, boost converters, etc.). Per APOL2204, the cap lamp is required to be intrinsically safe according to ACRI2001.
- 5.3. Adequate instructions for the proper use and maintenance of the cap lamp.
- 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 cap lamp. A comprehensive report and test record for each battery type tested by UL or a UL recognized laboratory 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 cap lamp. The drawing list (Reference Enclosure C) should include the following information for each drawing:
  - 5.6.1. Drawing title;
  - 5.6.2. Drawing number;
  - 5.6.3. Revision level; and
  - 5.6.4. Reference to other MSHA intrinsic safety evaluations used in their entirety, including manufacturer, model number, and complete 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 cap lamp as intended to be approved. The final MSHA-controlled drawings are used to identify the lamp in the approval and as a means of checking the

future commercial product of the manufacturer. (30 CFR §19.10(a)). The required documentation includes:

- 5.7.1. An overall assembly drawing of the cap lamp showing the physical dimensions and specific materials of the enclosures and identifying the major components. This drawing must either reference all other drawings or a drawing list meeting the requirements of section 5.7 must be provided. It must also reference 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.
- 5.7.2. Conditions of safe use drawing to be supplied to the end user that lists the acceptable replacement bulbs/LEDs for use with the cap lamp and maximum acceptable PTO load. It is recommended that the approval plate reference this drawing instead of specific bulbs/LEDs in case an alternate bulb/LED is added in the future and is desired to be used with previously manufactured cap lamps.
- 5.7.3. A block diagram showing the major components of the cap lamp.
- 5.7.4. Subassembly drawings showing the construction of the enclosure(s) and component assemblies including all physical dimensions and specific materials of enclosures.
- 5.7.5. Wiring diagrams of all internal wiring and connections to external circuits.
- 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 7.1.5. Note: As a supplement, an electronic file such as a Gerber file can be provided.
- 5.7.9. Electrical/mechanical parts lists that include the following component specifications:

Antennas: Characteristic impedance, frequency, and maximum output power.

Battery Backup Sources/Loads: Maximum average current draw of the primary light source and communication and tracking loads, and calculations documenting the total operational time of the light and communication and tracking loads (10 hours) plus only the communication and tracking loads for (at least 4 additional hours) under backup power based on a 5/5/90 duty cycle.

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

Battery and Headpiece Gland Components (e.g. strain relief, grommet, threaded insert, etc.): Manufacturer's name and part number, or details of the physical dimensions and materials used.

Battery to Headpiece Cord: Overall diameter including tolerance, number of conductors, overall conductor AWG size, conductor material, number and size of strands if applicable, individual conductor insulation material and minimum thickness, outer cable jacket material, details of any other materials used to construct the cord (e.g. separator, material used to increase tensile strength, etc.), length (nominal and tolerance, or maximum), and inductance (maximum inductance or inductance per foot of cable).

Capacitors: Capacitance (nominal and tolerance, or maximum value), and working voltage.

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

Encapsulant Used to Exclude Gas per ACRI2010: The information required for an encapsulant plus the minimum thickness of the encapsulant around the protected components and all information required by ACRI2010.

Ferrite Beads: Either: (a) manufacturer's name and part number, (b) inductance (nominal and tolerance or maximum value), or (c) impedance (nominal and tolerance or maximum value) at a measured frequency.

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

Headpiece LEDs: Manufacturer's name and part number, voltage, current and wattage rating, as well as the method of attachment of the LED to the PCB/heatsink.

Headpiece Reflector/Lens: Manufacturer's name and part number, or details of the physical dimensions and materials used.

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

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.

Inductors: Either: (a) manufacturer's name and part number; (b) 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; (c) specifications of the core type, size of wire, insulation, and number of turns.

Lamp Bulbs Protected by an Unbreakable Lens: Manufacturer's name and part number, type, voltage, current/wattage rating.

Lamp Bulbs Protected by a Safety Device (e.g. bulb crush or disconnected): Physical dimensions of the bulb, type, voltage, current, wattage rating, filament coil O.D., filament number of turns, filament material, envelope material and wall thickness, and type of envelope gas.

LED Heatsink: Manufacturer's name and part number, or details of the physical dimensions and materials used.

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



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

Protective Capacitors: Type (Reference Section 8.5 of ACRI2001 for acceptable types of construction), capacitance (nominal and tolerance, or maximum value), and working voltage.

Protective Current Limiting Resistors (requiring testing): Manufacturer's name and part number, resistance value (nominal and tolerance), type of construction (Reference Section 8.4 of 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 Section 8.4 of ACRI2001 for acceptable types of construction), and wattage rating.

Protective Printed Circuit Board Traces (not subject to open circuit failure): Width and copper thickness. Note: The trace must also be protected by a rugged enclosure and from environmental contamination as noted in ACRI2001 Section 8.11.

Resistors: Resistance value (nominal and tolerance or minimum value) and wattage rating. Note: Additional information, such as manufacturer and part number, may be required based on the intrinsic safety analysis or testing.

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.

Zener Diodes: Either (a) Manufacturer's name and part number; or (b) zener voltage (nominal and tolerance, or maximum value), and wattage rating. Note: Option (a) may be required based on the intrinsic safety analysis or testing.

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

**TITLE: Standard Application Procedures for the Approval of Electric Cap Lamps per 30 CFR Part 19****MSHA Mine Safety and Health Administration, Approval & Certification Center**

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- 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 intrinsic safety tests. 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 for inspection purposes. 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 cap lamp and charger in marketable form.
- 5.9.2. One populated sample of each printed circuit board used in the cap lamp.
- 5.9.3. One unpopulated sample of each printed circuit board used in the cap lamp.
- 5.9.4. Five of each type inductive component rated over 100 microhenries ( $\mu\text{H}$ ) that may be the source of a spark ignition (e.g., relays, speakers, transformers, inductors, etc.). Smaller value inductors may be required depending on the intrinsic safety analysis or testing.
- 5.9.5. Five sets of each type battery or battery pack.
- 5.9.6. Ten samples of each type protective current limiting resistor.

Note: Samples of surface mount components must 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 and headpiece LED for surface temperature testing. If the headpiece 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. Only three samples are required for the test, however, submission of five samples is recommended in case an output waveform is not obtained due to damage of the sample.

- 5.9.9. Ten samples of each type protective fuse or other thermal protection device.
- 5.9.10. If encapsulation is used to exclude gas, then the following samples must be submitted for testing.

Note: It is recommended that these encapsulation samples be supplied at the completion of the intrinsic safety analysis in case any changes are required to be made to the design:

- 5.9.10.1. Four 2.0 inch x 2.0 inch x 0.1 inch thick samples of the encapsulation compound for dielectric and absorption testing. Samples shall be in their solidified form with any fillers and/or additives included.
- 5.9.10.2. Four samples of the encapsulated assembly in marketable form for impact and adhesion testing. One of these four samples will be used for the force test. One of these four samples may be the sample in marketable form requested in section 5.9.1.
- 5.9.10.3. One sample for thermal endurance testing with one or more temperature sensors placed in the compound at the hottest places. If the sample contains windings, the temperature may be measured by the change of electrical resistance of these windings. Due to the time (4 to 6 weeks), possible addition of sensors, and the fatigue on the sample from

the test, it is recommended that this sample be separate from the four samples required for impact and adhesion testing.

5.9.11. If active voltage or current limiting is utilized in the design, then in addition to the one sample in marketable form required by section 5.9.1, one fully assembled version of the safety-factored power source must also be submitted. If any of the circuitry is encapsulated, then the submitted sample shall be unencapsulated for measurements and application of faults (reference ACRI2011 Section 5.4.2 for construction requirements of the safety-factored power source). Note: It is recommended that this power source be supplied upon request in case any changes are required to be made to the design.

5.10. Equipment required for Part 19 performance testing. APOL2202 Cap Lamp Evaluation Protocol describes the order of the required tests (ref. ASTP2130, ASTP2131, ASTP2202, ASTP2205, ASTP2210, ASTP2213, ASTP2215, ASTP2217, ASTP2218, ASTP2221, ASTP2222, and ASTP2225). In general, the equipment and components will include at least:

Note: Due to changes that may be made to the design of the cap lamp during the intrinsic safety evaluation, it is NOT recommended to submit these samples at the time of application. It is preferred to have these samples sent at a later date upon completion of the intrinsic safety portion of the evaluation.

5.10.1. Five complete cap lamps and chargers in marketable form (six if there is an optional PTO). The cap lamps must include the bulb/LED with the highest current draw for performance testing. If the cap lamp has an optional PTO, then three of the six cap lamps must be with the PTO and three of the six without the PTO. If the cap lamp includes alternate battery packs, then three battery enclosures with the heaviest battery pack are required for drop testing purposes and five battery enclosures with the lowest capacity battery pack are required for performance testing. If the cap lamp includes alternate bulbs/LEDs, then three headpiece/cord assemblies must be submitted for each alternate bulb/LED for headpiece drop testing purposes. Cap lamps that contain internal accessories must be submitted with the accessories that draw the most current.

**TITLE: Standard Application Procedures for the Approval of Electric Cap Lamps per 30 CFR Part 19****MSHA Mine Safety and Health Administration, Approval & Certification Center**

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- 5.10.2. Either bulb and/or LED rack(s) with adequately sized wiring and with bulb/LED holders of the type used in the headpiece, or fifty headpiece and cord assemblies.
- 5.10.3. At least fifty-five (55) samples of each bulb/LED type proposed for use with the cap lamp.
- 5.11. Applications may be submitted that follow the requirements set forth in 30 CFR, Part 6. Under these requirements the applicant may:
- 5.11.1. 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:
- 5.11.1.1. Written evidence of the laboratory's independence and current recognition by a laboratory accrediting organization;
- 5.11.1.2. Complete technical explanation of how the product complies with each requirement in the applicable MSHA product approval requirements;
- 5.11.1.3. Identification of components or features of the product that are critical to the safety of the product; and,
- 5.11.1.4. All documentation, including drawings and specifications, as submitted to the independent laboratory by the applicant and as required by 30 CFR Part 19.
- 5.11.2. 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.
- 5.12. Submit the application and checklist (Enclosure D) to MSHA by one of the following methods:
- 5.12.1. Mail to: MSHA Approval and Certification Center  
Attention: IPSO  
765 Technology Drive

**TITLE: Standard Application Procedures for the Approval of Electric Cap Lamps per 30 CFR Part 19****MSHA Mine Safety and Health Administration, Approval & Certification Center**

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Triadelphia, WV 26059

5.12.2. FAX to: 304-547-2044

5.12.3. Electronically: For information on emailing your application or instructions on setting up an FTP (File Transfer Protocol) account with MSHA go to <http://www.msha.gov/techsupp/acc/application/online.htm>. It is recommended that each electronic drawing is submitted as a separate file to avoid having to separate drawings submitted as one file at the conclusion of the approval process for indexing.

5.13. 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 for completeness and send the Applicant a Fee Authorization Form including a list of administrative discrepancies 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 including corrected discrepancies 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

Sample New Part 19 (Electric Cap Lamps) Approval Application Letter

Applicant name and address:

Chief, Approval and Certification Center  
765 Technology Drive  
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

Sample Part 19 (Electric Cap Lamps) Extension of Approval Application Letter or  
RAMP Application Letter

Applicant name and address:

Chief, Approval and Certification Center  
765 Technology Drive  
Triadelphia, West Virginia 26059

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DATE: \_\_\_\_\_

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

Gentlemen:

We request a RAMP/extension of MSHA Part 19 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 RAMP/extension does not change the model number or manufacturer's designation  
for this equipment.  
-OR-  
 This RAMP/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 Electric Cap Lamp

Manufactured According to Drawing A-100

Approval Number (leave blank for new approval applications)

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>REV.</u>
Model 100 Cap Lamp Assembly	A-100, Sht. 1	-
Model 100 Main PCB Assembly	A-100, Sht. 2	B
Model 100 Main PCB Parts List	PL-101	C
Model 100 Tracking Tag PCB Assembly	<sup>1</sup> A-113	-
Model 100 Tracking Tag PCB Parts List	<sup>1</sup> B-114	B
PC Board Artwork	<sup>2</sup> C-102, Shts. 1 - 5	C
Headpiece Assembly	A-123	G
Headpiece Parts List	S-124	F
Warning Label	L-123	-

<sup>1</sup>Ace Electronics, Inc. drawings

<sup>2</sup>Circuit Boards-R-Us drawing

User's Manual: See Document Number 0123, Rev A, "Model 100 Cap Lamp User's Manual."

**Enclosure D**

**CHECKLIST FOR PRODUCT APPROVAL OR EXTENSION OF APPROVAL FOR PART 19**

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. Additional information on the approval process and intrinsic safety requirements is available in the document titled "Understanding and Expediting the MSHA Intrinsic Safety Approval Process"

[http://www.msha.gov/TECHSUPP/ACC/application/IS\\_Guide2.pdf](http://www.msha.gov/TECHSUPP/ACC/application/IS_Guide2.pdf)

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 all correspondence, specifications, and lettering on drawings in English?
- \_\_\_\_\_ 4. Are all drawings and Bills of Material titled, numbered, dated, and legible?
- \_\_\_\_\_ 5. Are all drawings submitted for approval referenced through a single document containing the required drawing information noted in section 5.7?
- \_\_\_\_\_ 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?
- \_\_\_\_\_ 8. Have all of the required samples been submitted?

Common Discrepancies

- \_\_\_\_\_ 9. Are all components documented in accordance with section 5.7.9?
- \_\_\_\_\_ 10. Does the overall assembly drawing show the location of each major component?
- \_\_\_\_\_ 11. Are schematic drawings of each electrical circuit included?

**TITLE: Standard Application Procedures for the Approval of Electric Cap Lamps  
per 30 CFR Part 19****MSHA Mine Safety and Health Administration, Approval & Certification Center**

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- \_\_\_\_\_ 12. Do the p.c. board layout drawings show the physical location of each electrical component?
- \_\_\_\_\_ 13. Are all p.c. board artwork drawings included with scaling dimensions indicated?
- \_\_\_\_\_ 14. Is a technical description of the circuit operation included?
- \_\_\_\_\_ 15. Do component designations and specifications correspond between the schematic, bill of materials, and layout drawing for each circuit?
- \_\_\_\_\_ 16. Is detailed documentation of the enclosure(s) including wall thickness, specific material, and dimensions included?
- \_\_\_\_\_ 17. Has there been any information required for past approvals removed from the documentation? Note: Deletion of required information is not acceptable.
- \_\_\_\_\_ 18. Does the documentation of the components include the use of the words "or equal" or "or equivalent"? If so, these phrases must be removed and the description modified to agree with section 5.7.9.
- \_\_\_\_\_ 19. Are the size and position of the approval plate specified?
- \_\_\_\_\_ 20. Is a complete operator's manual on the use and maintenance of the cap lamp included?
- \_\_\_\_\_ 21. Is the output of any voltage generating IC (e.g. minus voltage converters, switching regulators, boost converters, etc) limited to a safe level in the event of an external component failure such as the resistors used to set the output voltage? An example of an unsafe condition would be a load capacitor being charged to an unsafe level.

Investigative Part 19 Specific

- \_\_\_\_\_ 22. Is the maximum average current draw of the internal accessory (e.g. Part 23 Tracking Tag) specified on an applicable MSHA controlled drawing?
- \_\_\_\_\_ 23. Is the maximum current draw of the PTO, if applicable, specified on the conditions of safe use drawing to be supplied to the end user?

**TITLE: Standard Application Procedures for the Approval of Electric Cap Lamps per 30 CFR Part 19****MSHA Mine Safety and Health Administration, Approval & Certification Center**

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- \_\_\_\_\_ 24. Are all bulbs/LEDs to be used with the cap lamp specified on the conditions of safe use drawing to be supplied to the end user?
- \_\_\_\_\_ 25. If the cap lamp includes communication and tracking components, does it provide sufficient power to facilitate evacuation and rescue following an accident? In many mining situations, at least 4 hours of operation in addition to the Part 19 required operation time of 10 hours (14-hour minimum total duration) based on a 5/5/90 duty cycle should be adequate, but mine-specific conditions may warrant more or less capability. This total operation time may be achieved via spare portable devices or cached batteries if the device is approved for battery replacement in the hazardous area (ref. Program Policy Letter P09-V-01). Calculations documenting the total operational time under backup power based on a 5/5/90 duty cycle must be included in the application (ref. "Battery Backup Sources/Loads" in section 5.7.9).
- \_\_\_\_\_ 26. If the cap lamp includes an RF transmitter, are the hazards in regard to operating this equipment near blasting circuits addressed (for example, by referencing Institute of Makers of Explosive (IME) requirements)? This includes documenting the maximum transmitter output power, maximum antenna gain, and normal operating frequency for RF transmitters on an MSHA controlled drawing. Additionally, the minimum separation distance between this equipment and blasting circuits, electric detonators, and explosives must be documented.
- \_\_\_\_\_ 27. Does the headpiece contain either an unbreakable lens or ejection mechanism in accordance with 30 CFR Part 19.7(a); or an LED that is not subject to the requirements of 19.7(a).
- \_\_\_\_\_ 28. Are the manufacturer's name and part number or drawings detailing the construction of all gland components at both the battery and headpiece entrance specified? These are necessary since they affect the results of the cord slatting test.

