

# *NMA/MSHA Approval Workshop*



Electrical Safety Division  
Approvals

May 21 and May 22, 2008

# *Electrical Safety Division (ESD)*

- Staff of 24
  - Including Chief, Team Leader and OAA
- 21 Investigators
  - 14 Engineers, 7 Technicians
- Product Approval PAR Duties
  - Additional assignments include: Technical Assistance, Accident Investigations, Training, Litigation and Regulatory Support
- Explosion Gallery and Intrinsic Safety Laboratory

# *Electrical Safety Division*

## *Approval Programs*

- Part 7: Motors and Battery Assemblies
  - Testing by Applicant or Third Party
- Part 18: Machine/System Approvals
- Part 18: Explosion-Proof Enclosures
- Part 18: Intrinsic Safety Instruments & Circuits (I.S.)

# *Electrical Safety Division*

## *Approval Programs*

- Part 19: Cap Lamps
- Part 20: Electric Mine Lamps other than Standard Cap Lamps
  - Flashlights
- Part 22: Portable Methane Detectors

# *Electrical Safety Division*

## *Approval Programs*

- Part 23: Telephones and Signaling Devices (Communications and Tracking Devices and Systems)
- Part 27: Machine Mounted Methane Monitors
- Part 28: D.C. Fuses
- Other Programs

# *Part 7 Motors and Battery Boxes*

- Testing by Applicant or Third Party
- Applicants Submits Certified Statements
  - Compliance with Design Specifications
  - Compliance with Test Requirements
  - Quality Assurance
- Third party laboratory evaluations
  - Test Observations
  - MSHA observes first test and any additional testing deemed necessary

# *Machine/System Approvals*

- Continuous mining machines, shuttle cars, scoops, high voltage longwalls, etc.
- Machines are evaluated for compliance with 30 CFR Part 18
- Typically consists of X/P enclosures and I.S. Circuits
- Factory/field inspection is required after completion of the drawing evaluation
- High voltage longwall regulations §18.53
  - Compliance guide on <http://www.msha.gov/>

# *Explosion-Proof (X/P) Enclosures*

- Designs are evaluated for compliance, certified to Part 18
- Enclosures are inspected and explosion tested unless similar to a previously tested enclosure
- Simplified drawings are acceptable in lieu of production drawings
- Certification does not authorize applicant to advertise product as MSHA approved
- MSHA can accept test results for IEC 60079-1 (flameproof enclosures) provided additional requirements are met



# *Part 18 Intrinsic Safety Approvals and Evaluations*

- Products are evaluated to 30 CFR 18.68 and ACRI2001, “*Criteria for Acceptance of Intrinsically Safe Apparatus and Associated Apparatus*”
- The Electrical Safety Division’s most complex approval program, which routinely requires in-depth evaluation and multiple tests
- Evaluation requires thorough documentation of components and circuitry
- Intrinsic Safety FAQ document on website

# *Cap Lamps*

- Cap Lamps are approved to 30 CFR Part 19
- Evaluation includes drop and impact testing, and performance tests such as light output and battery life tests
- Recently added ACRI2001 to approval requirements
- Recent cap lamp designs incorporate new battery and light technologies
- Recent designs incorporate communication and tracking components – given “23-ISA” evaluation number

# *Portable Methane Detectors*

- Approved to 30 CFR Part 22
- Requirements include ACRI2001 and methane accuracy testing; must remain accurate after being subjected to drop test
- Must include calibration requirements
- Approved detectors are used for 30 CFR Part 75 compliance
- Multi-gas instruments: measure O<sub>2</sub> deficiency
- Miner Act: sampling behind seals

# *Communications and Tracking*

- Approved to 30 CFR Part 23, “*Telephones and Signaling Devices*”
- Currently the heaviest volume of applications within ESD
- Communication and Tracking applications are currently given priority
- MINER Act has ushered in new generation of technology
- Requires new acceptance considerations:
  - Power supplies
    - Battery capacity
    - Larger batteries – off gassing concerns
    - Lithium batteries – high density batteries
  - RFI/Blasting Circuits

# *Communications and Tracking*

- Recently issued PPL No. P08-V-02  
<http://www.msha.gov/regsinf2.htm>
- Addressed provisions of the MINER Act
- Provided guidelines for processing:
  - Any component or system used to provide voice, text, or signaling data that is intended to remain operational in the event of emergency will be evaluated under Part 23
  - Line powered devices must be provided with backup standby power (24 hrs recommended)

# *Communications and Tracking*

- All components operating under standby power must be I.S. or housed within X/P enclosures, including cables
- I.S. batteries of portable assemblies will be drop tested; if >5kg, subjected to Part 7 battery requirements
- Standby power sources which include rechargeable batteries must address battery off-gassing
- Standby power source must have back-feed protection

# *Communications and Tracking*

- Potential for RFI (radio frequency interference) with blasting circuits must be addressed
- Tracking tags drop tested or impact tested
- Cap lamps powering Part 23 components must address performance requirements of §19.9(a); recommend providing sufficient operation capability of 10 + 4 hours
- Approval documentation must include lightning arrestors where necessary per §§ 57.12069 and 75.521; evaluated to ensure that it does not invalidate the Part 23 approval

# *Machine Mounted Methane Monitors*

- Certified to 30 CFR Part 27
- Must provide audible or visual warning between 1.0% - 1.5% CH<sub>4</sub>
- Must provide machine/system shutdown at 2.0% CH<sub>4</sub>
- Performance testing (500 cycle test)
- Resistance to vibration, dust, and moisture
- System and components designed to be X/P and/or I.S.



# *Other ESD Programs*

- Field Modifications per §18.81
- Experimental Permits per §18.82
- Ground Wire Monitor Program
- ST&E (Statement of Test and Evaluation)
- Diesel Electrics (§36.32)
  - New Procedure ASAP2031
- Modifications to approved or accepted equipment (RAMP applications)

# Part 6

- Independent Laboratory Testing
  - Recognized by a laboratory accrediting organization
  - Free from commercial, financial, and other pressures that may influence the testing and evaluation process
- Evaluation of third party product safety standards (e.g., IEC)
- Single source page available on MSHA.gov:  
<http://www.msha.gov/Part6SingleSource/Part6SingleSource.asp>

# *Recent MSHA Part 6 Activities*

- Completed evaluation of IEC 60079-0 and -1 and determined modification (deviation) is required to ensure equivalent protection to MSHA approval requirements
- Evaluation of IEC 60079-0 and -11 is on-going
- Participation on IEC TC31 main committee and subcommittees
- MSHA has approved several products based on independent laboratory test reports

## *In general, some helpful hints...*

- Ensure all required documentation is included with original application
- Use the checklist provided in the applicable application procedure (MSHA investigators do!)
- Bottom line: the more complete and accurate the documentation for the application, the more timely the application can be evaluated

# *Adequately Documented Applications*

- Consultation meetings prior to submittal
- Accurate and substantive drawing lists
- Timely and complete responses to discrepancy letters; communication with investigator
- Addressing discrepancies in timely manner may reduce the time the investigator spends to re-familiarize with complex applications/systems

# *Drawing Recommendations*

- 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 may be submitted in addition to a "clean" copy to be placed on file

# *Complete Intrinsic Safety Applications Should Include...*

- Technical description of operation of electrical circuit(s). Identify features critical to safety of the product.
- Adequate use and maintenance instructions
- If applying under Part 6: Test Reports
- UL1642 report (with test records) for any lithium battery
- Drawing List
- Factory Inspection Form (or Certified Statement) for Part 18 applications

# *Necessary Drawings for Complete I.S. Application*

- Overall system / assembly drawing
- Block diagram (if required)
- Subassembly drawings
- Internal wiring diagrams (if required)
- Schematics
- Layout
- Printed circuit board artwork
- Electrical parts list / Bill of material



# *Recommendations to I.S. Application Submissions*

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

# *Assistance for Applications Involving Intrinsic Safety*

- <http://www.msha.gov/TECHSUPP/ACC/application/application.htm>
- Previous Intrinsic Safety Workshop
- Intrinsic Safety FAQ and Guide
  - Drawing requirements
  - Technical design issues
  - I.S. design tips and problem solutions

# *Digitized Ignition Curves*

- Hard copies in ACRI2001 still the official version
- Digitized versions promote consistency and expedience; may aid in preventing errors
- Includes resistive, capacitive and inductive curves
- <http://www.msha.gov/TECHSUPP/ACC/application/application.htm>

# *Contact Information*



*Rob Holubeck*  
*304.547.2088*  
*holubeck.robert@dol.gov*

*Questions?*

