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 \(O_2\) 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](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% CH₄
- Must provide machine/system shutdown at 2.0% CH₄
- 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:
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](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

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Questions?