MSHA APPROVAL PROCESS

David Chirdon
Approval and Certification Center
765 Technology Drive
Triadelphia, WV 26059

January 9, 2012

ABSTRACT

The hazardous nature of underground mining necessitates the use of equipment and mining products designed to ensure safe usage in this environment. Title 30, Code of Federal Regulations (30 CFR) includes requirements that mining equipment and related products intended for use in potentially gassy areas of underground mines be approved by the Mine Safety and Health Administration (MSHA). The design and performance requirements for many of the products intended for use in the underground environment are also part of 30 CFR. This document describes the processes available to potential applicants for obtaining MSHA approval, and a program available to operators for modifying approved equipment is also described. A regulation that broadens the scope of design standards accepted by MSHA is discussed, as well as recent legislation that has impacted approval work.

KEYWORDS

Mine Safety and Health Administration (MSHA), Approval and Certification Center, A&CC, Approval, Certification, Title 30 Code of Federal Regulations, 30 CFR, Non-MSHA Product Safety Standards, MINER Act.

INTRODUCTION

MSHA's Approval and Certification Center (A&CC) was established for the purpose of testing and evaluating mine equipment and mine products to ensure compliance with the applicable parts of 30 CFR. The A&CC is the only facility in the country solely responsible for ensuring that safe equipment is provided to our nation's mines. However, in recent years, the A&CC has experienced an evolution in responsibilities. Due to the proliferation of computers and other advancements in mining-related equipment, the designs submitted for approval have become more complex. At the same time, the number of approval requests has increased, while the time required to process these requests has decreased. We have recently become more involved with accident investigations and technical assistance to MSHA enforcement offices with the

objective of accident and injury reduction. The quality assurance role has increased with applicant/third party testing. The A&CC performs approximately 600-800 post-approval product audits annually and investigates field complaints on non-conforming products. As a result, the name of the organization has become misleading. The Approval and Certification Center could more accurately be called the mine product technical assistance center.

The Mine Acts of 1969 and 1977 require that certain products used in gassy areas of underground mines meet the requirements of the applicable parts of 30 CFR. These parts include:

Part 5	Fees for testing, evaluation, and approval of mining products
Part 6	Testing and evaluation by independent laboratories and non-MSHA product safety standards
Part 7	Testing by applicant or third party
Part 15	Requirements for approval of explosives and sheathed explosive units
Part 18	Electric motor-driven mine equipment and accessories
Part 19	Electric cap lamps
Part 20	Electric mine lamps other than standard cap lamps
Part 22	Portable methane detectors
Part 23	Telephones and signaling devices
Part 27	Methane-monitoring systems
Part 28	Fuses for use with direct current in providing short-circuit protection for trailing cables in coal mines
Part 33	Dust collectors for use in connection with rock drilling in coal mines
Part 35	Fire-resistant hydraulic fluids
Part 36	Approval requirements for permissible mobile diesel-powered transportation equipment

A&CC ORGANIZATION

The A&CC is divided into five operating divisions. This organizational structure ensures that those product approval areas requiring a specific discipline are under the guidance of the similarly qualified individual(s). The five divisions and their responsible program areas follow.

Electrical Safety Division

The Electrical Safety Division (ESD) evaluates and issues approvals for complete machines (e.g. continuous miners, shuttle cars, roof bolters, scoops, longwall mining systems, etc.) and administers the field modification, the Standard Test and Evaluation (STE), the ground wire monitor, and the experimental permit programs. They also evaluate and issue certifications for explosion-proof (XP) components used to assemble machines, and evaluate and issues approvals or acceptances for electronic equipment that are intrinsically safe. Intrinsically safe means the device cannot discharge sufficient electrical or thermal energy to ignite a methane-in-air atmosphere or a layer of coal dust. Gas detectors, personal warning devices, and hand-held radios are several examples of types of equipment accepted by MSHA as intrinsically safe.

Mechanical and Engineering Safety Division

The Mechanical and Engineering Safety Division (M&SED) evaluates and issues approvals or certifications for diesel engines and diesel power packages, and issues approvals for permissible diesel-powered equipment and dust collector systems on roof drills used in underground mines. The Division also evaluates and certifies subcomponents on mining equipment such as brakes, load locking valves, and emergency de-energization devices (panic bars). The Division has expertise in the fields of Mechanical Engineering, Explosives and Blasting Safety, Fire Protection Engineering, Wire Rope Safety and Non-Destructive Testing, Surface Haulage and various Metal / Non-metal Processes. The M&ESD provides the majority of accident investigation assistance from the A&CC.

Applied Engineering Division

The Applied Engineering Division (AED) evaluates and issues approvals for refuge alternatives that are approved under 30 CFR Part 7. The refuge alternatives are required to have tests conducted on four components: (1) structure, (2) breathable air, (3) harmful gas removal, and (4) air monitoring. The division assists manufacturers in evaluating the test protocol. The AED disseminates information on training and solutions to identify engineering and related tips and safety ideas. The division evaluates new and existing technologies for adaptability to the mining environment for

the purpose of reducing accidents and fatalities. The AED participates in accident investigations to determine the cause of accidents and conduct analyses and evaluation of accident and injury data to identify solutions to affect downward trends in accidents and injuries.

Quality Assurance and Materials Testing Division

The Quality Assurance and Materials Testing Division (QA&MTD) is responsible for ensuring the quality of MSHA-approved products. This is accomplished by various audit programs. The division administers corrective action programs including manufacturing process reviews and product recall and retrofit programs. The division is also responsible for evaluating all field complaints received and is responsible for approval of mining products such as conveyor belts, electric and signaling cables, cable splice kits, hose conduit, brattice cloth and ventilation tubing, and hydraulic fluids. The primary characteristic tested and evaluated for these products is flame resistance. In addition to the above, QA&MTD administers the Center's ongoing equipment calibration program. As part of the Center's ongoing improvement program, an effort to automate and enhance the calibration program process through the implementation of an equipment database is currently underway.

Center Operations Division

The Center Operations Division (COD) provides to all of the A&CC's divisions the budgetary, personnel, labor relations, electronic data storage and retrieval, computer software / hardware support, facilities maintenance / upkeep, security services, and utilities services. With regard to approval program support, the COD provides IT support and the necessary equipment and personnel resources to keep manufacturer's proprietary documents and specifications for mining equipment and related products secure and accessible.

PRE-APPLICATION CONSULTATION SERVICES

The A&CC offers consultation services for potential approval applicants. Manufacturers are encouraged to contact the A&CC prior to submitting an application to become familiar with the current application requirements and to review the design with A&CC personnel to determine the appropriate approval request format.

APPROVAL PROCESS

A new application consists of an application request to the A&CC including all necessary drawings and / or specifications to sufficiently describe the critical features of the proposed product. The applicant may submit this information electronically or in

hard copy. Depending on the product line, there may be additional materials required for submission (e.g. checklists, drawing lists, test samples, etc.) Each application is required to be assigned a unique company assigned application code number. This number is a maximum of six digit number that is unique to each application. The Center has application procedures for the products it approves. These application procedures specify the equipment and documentation required for MSHA investigators to evaluate the product. These procedures are available, electronically from: http://www.msha.gov/TECHSUPP/ACC/application/application.htm. Hard copies of the documents can be obtained, upon request, from the A&CC.

Upon receipt of the application, the A&CC assigns an internal tracking number (PAR) and forwards the application package to the appropriate division. After determining that the application meets our basic guidelines, the assigned Division performs a preliminary review of the application. Fee estimates are prepared per 30 CFR Part 5. The estimated maximum fee is provided to the applicant who replies by either authorizing charges up to the maximum fee or requesting cancellation of the application. The technical investigation can not begin until the manufacturer has provided written authorization to proceed with the investigation at the estimated fee.

Once the fee authorization has been received, the technical evaluation can begin. The investigator compares the submitted documentation with the requirements, existing policies and procedures, and performs any necessary tests on submitted products or components. If necessary, the investigator prepares a listing of discrepancies and/or additional information or test samples required. This information is put into a "discrepancy letter" that is sent to the applicant. A time limit for response is included. When the requested information is received, the investigator reviews and, if necessary, performs any additional tests and evaluations. If additional information is necessary, another discrepancy letter is prepared. In some cases, a field or factory inspection of the proposed product is required. For machines, the investigator normally visits the factory to inspect the prototype to ensure that it is built according to the submitted drawings. In other cases, for example longwall mining systems, the inspection of the assembled system takes place at the mine site. Most other products may be submitted to the A&CC for inspection and, if necessary, tests.

After all inspections and tests are completed and all drawing discrepancies have been resolved, the paperwork is prepared for MSHA approval of the product. The final paperwork consists of an acceptance letter, copy of the approval plate design (if required), and a listing of drawings and specifications placed on file with MSHA, as applicable. These documents constitute formal notification of approval and are sent to the applicant with the official MSHA approval number.

As specified in 30 CFR Part 5, the applicant will receive an invoice for the cost of the

investigation after completion. MSHA bills on a quarterly schedule.

APPROVAL TYPES

The previously described approval process applies to the majority of new approval applications received at the center. Approvals are historically issued to complete products and machines. An approval may be thought of as a stand- alone unit. There are some unique product approval processes that are noteworthy.

Certifications

Certifications (commonly called X/Ps) are investigations of individual components that make up an approved machine. These X/Ps are evaluated against Part 18 requirements for enclosures and are issued X/P numbers. The X/Ps may be referenced on applications for machine approvals. Typical X/P enclosures include switchgear, connection boxes, headlights and luminaries, and electric solenoids. Explosion-proof enclosure certifications do not stand alone. Other equipment that is certified include certain types of connectors, and “potted components”, in addition to, subcomponents on machines such as brakes, load locking valves and emergency de-energization devices (panic bars).

Intrinsic Safety Evaluations

Intrinsically safe electrical equipment that is to be connected to an MSHA-approved machine is evaluated as a component of that machine, or is evaluated within specified electrical parameters, and is issued an intrinsic safety evaluation letter. This intrinsic safety evaluation letter specifies the conditions of use for that product. Electrical circuits evaluated for intrinsic safety can not be used as a "stand-alone" device and must be connected to a permissible machine or instrument. Examples of equipment evaluated for intrinsic safety include remote control circuits, position sensors, and alarms.

Part 7 Approvals

Testing by Applicant or Third Party (30 CFR Part 7) is relatively unique concept for MSHA. Product lines currently evaluated under Part 7 are:

- Brattice cloth and ventilation tubing
- Battery assemblies
- Multiple shot blasting units
- Diesel engines intended for use in underground coal mines

- Diesel power packages intended for use in areas of underground coal mines where permissible electric equipment is required
- Electric motor assemblies
- Electric cables, signaling cables, and cable splice kits
- Refuge alternatives

This approval part was developed for mature product lines where the manufacturers or other outside laboratories have established the capability to perform the necessary MSHA-defined tests for the applicable products. The types of tests required under Part 7 are typically those that can be performed without the application of subjective judgment. An important feature of Part 7 is that MSHA does not perform the required testing. MSHA accepts testing results from the manufacturer or from independent laboratories, after MSHA has evaluated their testing capabilities. MSHA generally will witness a laboratory's first testing of a product to acquire a comfort level with regard to that applicant's ability to manufacture the product according to MSHA requirements. Once these approvals are issued, the approval holder, at MSHA's request, is required to make sample(s) of the product available to MSHA annually for comparison with approval specifications and requirements.

Part 6 Approval Options

The A&CC published via the Federal Register dated June 17, 2003, a final rule (30 CFR Part 6) titled "Testing and Evaluation by Independent Laboratories and Non-MSHA Product Safety Standards." This final rule established alternate requirements for testing and evaluation of products that MSHA approves for use in gassy underground mines. It allows manufacturers of certain products, who seek MSHA approval under Title 30 of the Code of Federal Regulations (30 CFR), the option of using an independent laboratory to perform, in whole or part, the necessary testing and evaluation for approval which MSHA would normally perform, so that such products can be used in gassy mines in the United States. This final rule also permits manufacturers to have their products approved based on non-MSHA product safety standards. This will occur 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. To date, MSHA has reviewed the International Electrotechnical Commission (IEC) Standards for Flameproof (Explosion-proof) Enclosures and has found that these standards can be modified to provide at least the same degree of protection as those MSHA requirements.

Experimental Permits

The experimental permit program is a program intended to allow the use of research-type equipment in areas of the mine requiring permissibility. Unlike an approval

application, complete documentation of the proposed equipment is not required for an experimental permit application, as long as the evaluation and inspection reveal that the design does not pose a fire or explosion hazard. Each component included under an experimental permit is inspected and tested. Permits are issued for a limited amount of time (6 months). Additional extensions of time are permitted, if requested.

APPROVAL MODIFICATIONS

There are several programs that grant MSHA acceptance of proposed modifications to approved mining products.

Extensions

The extension of approval process permits the acceptance of substantial modifications to previously approved designs. In this case, the same processes that were previously described are followed in acquiring the approval. An extension of approval results in a change in the approval number by the addition of an extension number to the original approval number. For example, an original issuance of Approval Number 18-A070022-0 would be modified to indicate Approval Number 18A-070022-1 to indicate the first extension of that approval.

RAMPs

The Revised Acceptance Modification Program (RAMP) is a program intended to simplify and expedite the process for manufacturers to gain MSHA acceptance of minor modifications to their approved products. This program was announced in September of 1998 through the A&CC's Customer Service Newsletter. The concept is that the manufacturer is only required to submit revised documentation and a letter describing the proposed modification(s). The A&CC evaluates the proposal and returns to the applicant a revised listing of drawings and associated revision levels as the notification of acceptance of the RAMP. No change in the MSHA approval number results from a RAMP.

Field Modifications

The field modification program is a program that permits the owner (mine operator) of an approved machine to modify his product without affecting the machine approval. In this case, the operator submits an application with the modification described either in writing, via drawings, or a combination of both. After evaluation of the proposal by the A&CC, the modification is inspected by the local MSHA enforcement office or an A&CC investigator to verify that the modification was accomplished according to the submitted specifications. Field modifications are serial number and site specific.

TECHNICAL REQUIREMENTS

The technical requirements for each product line are specified in the appropriate part of 30 CFR and MSHA policies. These may include design, performance and test requirements. The following are other available sources of information that pertain to the approval requirements and should be considered when applying for MSHA approval:

MSHA Program Policy Manual

Official agency policies are included in the MSHA Program Policy Manual (available on the Internet at www.msha.gov). This manual is divided into five volumes.

- Volume I applies to the 1977 Mine Act,
- Volume II applies to Testing and Evaluation,
- Volume III applies to 30 CFR Parts 40-50 and 100,
- Volume IV applies to Metal and Nonmetal Mines, and
- Volume V applies to Coal Mines.

Industry Standards

Several of the parts in 30 CFR make reference to other industry standards for the applicable approval requirements. Some of the standards that are referenced in 30 CFR and are recommended information sources include:

- NFPA-70 “National Electrical Code”
- Military Specifications for quality control
- Military Specifications MIL-F-15160D, “Fuses; Instrument, Power and Telephone”
- Underwriters Laboratories Inc., standard for alternating current fuses (UL-198)
- American Welding Society (AWS)
- Insulated Cable Engineers Association (ICEA)
- American Society for Testing and Materials (ASTM)
- International Electrotechnical Commission (IEC) 60079-0 and 60079-1

The personnel at the A&CC are involved in a number of standards development committees to provide input to the development and revision of standards that effect mining equipment.

Other MSHA Criteria

MSHA has developed criteria for products not specifically regulated by 30 CFR or for which the regulations are incomplete. These include:

- Criteria for Test and Evaluation of Intrinsically Safe Apparatus and Associated Apparatus
- Interim Fire Criteria (A voluntary program for obtaining a fire resistance evaluation of products and materials intended for use underground)
- Mine-Wide Monitoring Systems, Barrier Classifications, and Sensor Classifications
- Criteria for Acquiring Illumination Data in a STE Applicant's Darkroom
- Criteria for Acceptance of Ground Wire Monitor Systems
- Criteria for Using the Crewstation Analysis Program (CAP) to Acquire Light Survey Data Required for STE Applications
- Design Criteria for Microprocessor Based Motor Overload Protection Systems
- Criteria for the Approval of Distribution Systems
- Criteria for the Evaluation of a Window or Lens on an Explosion-Proof (X/P) Enclosure
- Performance Criteria and Test Guidelines for Evaluation of Nontraditional Ventilation Controls in Underground Coal Mines

POST-APPROVAL SERVICES

The A&CC also offers a variety of post-approval services to the mining industry and to our enforcement offices.

Rebuild and Repair Shop Support

The QA&MTD provides technical assistance to the mining equipment rebuild and repair industry via on-site training and auditing.

Post-Approval Product Audits

The A&CC's QA&MTD travels to mine sites across the country to audit MSHA-approved mining products to ensure that they were manufactured according to the MSHA-approval specifications. QA&MTD investigators select samples of products from mine site warehouses and compare the products with the drawings on file at the A&CC. If non-conformances are noted, they are classified by QA&MTD and other qualified A&CC personnel. The manufacturer is then given the opportunity to demonstrate or achieve compliance with the approval specifications. A manufacturer may be subject to approval rescission for failure to demonstrate or achieve compliance

on an MSHA-approved product.

Field Complaints

The QA&MTD investigates complaints about MSHA-evaluated products. These may come from MSHA enforcement, mine operators, miners, distributors or product manufacturers. These complaints may be regarding non-conforming products, non-performing products, or misrepresented products. QA&MTD personnel investigate the complaint, and if it is justified, the manufacturer is given the opportunity to demonstrate and achieve compliance. If they are unable to do so, the acceptance number is rescinded. Products may have to be recalled or retrofitted to achieve compliance.

Accident Investigations

As a result of acquiring the expertise to evaluate proposed equipment designs, the A&CC has developed a staff of highly competent technical personnel. These persons have specialized knowledge in particular equipment or mining product areas. Because of this specialized expertise, the A&CC is often asked to assist the MSHA enforcement offices in the investigation of mining related accidents. Accident investigations have recently grown into a significant portion of the A&CC's responsibilities. The industry is realizing a great benefit from this involvement because in many cases the lessons learned from an accident investigation have resulted in modification to the product design or in the approval requirements, helping to minimize the potential for a similar accident to occur.

MINER ACT OF 2006

The passage of the Mine Improvement and New Emergency Response Act of 2006 (MINER Act) has had a dramatic impact on the A&CC approval programs. The Act requires post accident communication between underground and surface personnel via a wireless two-way medium, and an electronic tracking system by June 2009. This legislation has resulted in a large number of new communications and tracking technology approval applications submitted to the A&CC. These new technology applications signal a new generation of communications and tracking systems for the underground mine environment and bode well for improved emergency response capabilities. The MINER Act also requires the evaluation of refuge alternatives, and as a result, refuge alternative test and evaluation requirements were added to 30 CFR Part 7.

In addition, the MINER Act established a Technical Study Panel to provide an

independent scientific review and issue recommendations on the use of belt air to ventilate working sections and on the composition and fire retardant properties of belt materials. The Panel recommended that MSHA revise and implement a 1992 proposed rule on the "Requirements for Approval of Flame-Resistant Conveyor Belts" which incorporated the Belt Evaluation Laboratory Test (BELT). The aim of the BELT is to prevent conveyor belt entry fires and not merely to suppress them. The A&CC is making provisions for installation of the BELT. Because frictional heating is a common cause of conveyor belt fires, the Panel also recommended that MSHA evaluate a drum friction test to assess if it could complement the BELT method. The A&CC will evaluate this test for possible future conveyor belt approval requirements.

NEW TECHNOLOGY

The A&CC evaluates new technology solutions with a particular focus on the areas of intrinsic safety and accident reduction. Program Managers work with internal MSHA resources and external entities, including the international mining community, to effect long term solutions for the nation's miners.

SUMMARY

The A&CC has a technical staff dedicated to ensuring that safe mining equipment and products are provided to the mining industry. This is accomplished by evaluating and approving equipment and products that meet the requirements of 30 CFR and applicable agency policies and criteria. The post-approval product audit program supplements this approval process by helping to ensure that approved products are manufactured according to the approved documentation.

The A&CC is continually improving and streamlining its processes to achieve the most timely and cost-effective evaluations possible. The A&CC's staff is available to potential applicants for consultation prior to submitting an application for product approval. Programs are also available to the manufacturers and end users to obtain modifications to approved products.