

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH
REPORT OF INVESTIGATION

Underground Mine

Fatal Machinery Accident
July 2, 2003

Interior Holdings Corp.
St. Louis, Missouri

at

Highland 9 Mine
Highland Mining Company
Waverly, Union County, Kentucky
I.D. No. 15-02709

Accident Investigators

Edward R. Nichols
Coal Mine Safety & Health Inspector

Dale P. Ingold, P.E., General Engineer
Accident Reduction Program (Technical Support)

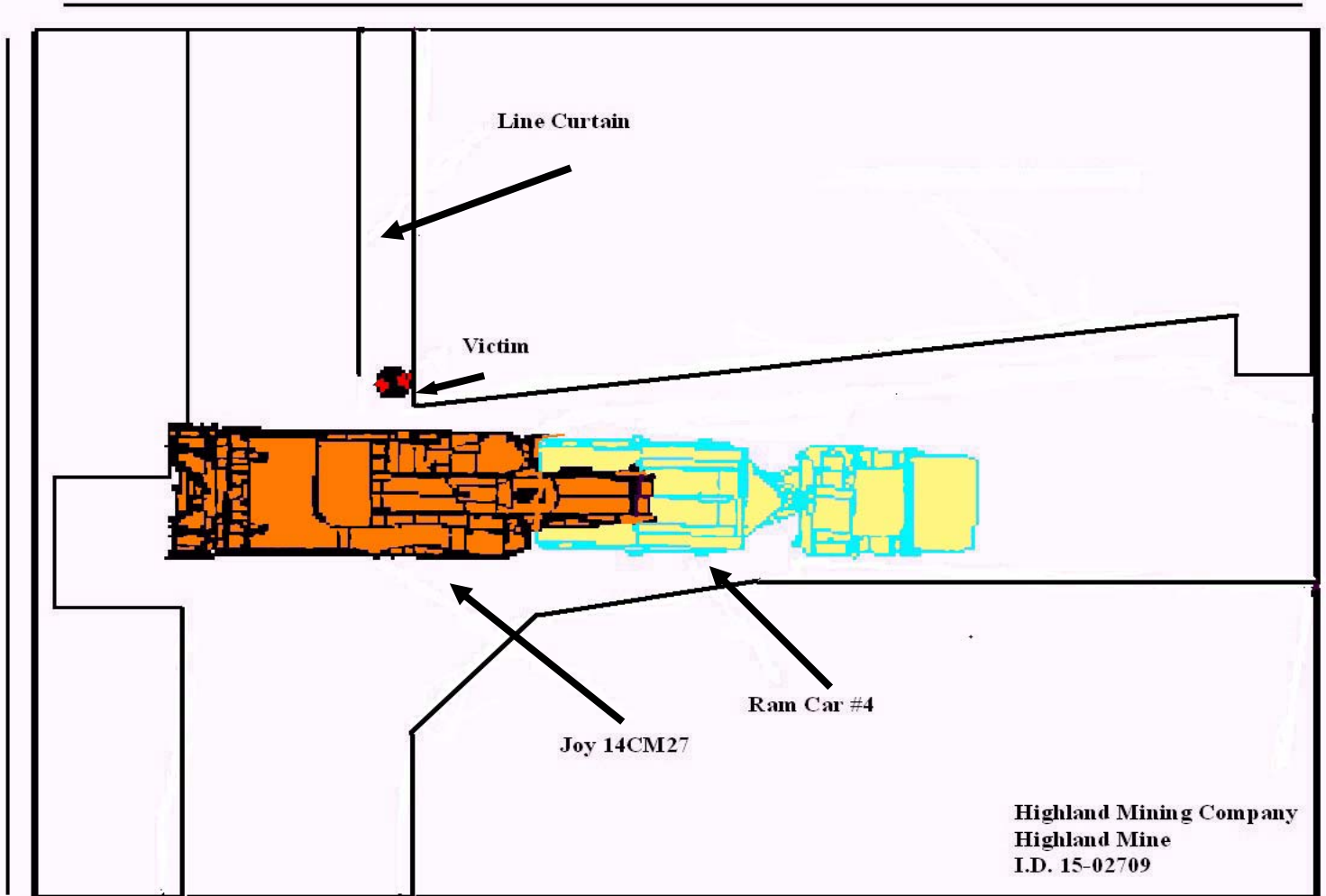
Originating Office
Mine Safety and Health Administration
District 10
100 YMCA Drive, Madisonville Kentucky 42431-9019
Carl E. Boone II, District Manager

Release Date: October 30, 2003

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FATAL MACHINERY ACCIDENT



OVERVIEW

On Wednesday, July 2, 2003 at approximately 3:15 p.m., Walter J. Monroe, age 49, a continuous miner operator employed by Highland Mining Company was fatally injured at Highland 9 Mine while coal was being mined out of the left crosscut of the No. 2 entry on the No. 1 unit (MMU 061-0). Monroe had 25 weeks and 6 days experience at the Highland 9 Mine as a continuous mining machine operator. Monroe was cutting in the right side of the left crosscut at a depth of approximately 18 inches when a carbonate nodule was encountered in the mine roof causing sparking. During or prior to cutting through the large carbonate nodule, a carbide bit tip separated from the bit, causing the bit body to “distort” and generate shrapnel (a small metal object). During the mining of the right sump, a piece of the bit base separated, projected from the cutter head, and struck the victim in his neck resulting in severe, fatal bleeding.

The direct cause of the accident was breakage and fragmentation of the No.12 bit on the continuous mining machine’s cutting drum as it impacted a carbonate nodule. Bits are not to be used when the tip (insert) is missing. The root cause of the accident was lacking or missing procedures for safely mining when carbonate nodules are encountered. These include the following when such conditions are present: undermining where possible; locating the operator farther from the machine; examining bits and replacing broken bits more frequently; using personal protective equipment; ensuring the machine configuration is appropriate for the conditions.

GENERAL INFORMATION

The Highland 9 Mine is an underground bituminous coal mine located in Waverly, Union County, Kentucky on French Road, two miles west of US HWY 60. The mine is operated by Highland Mining Company, which is incorporated in the state of Delaware. The Highland Mining Company is a subsidiary of Interior Holdings Corporation located in St. Louis, Missouri. The mine employs 229 persons producing an average of 12,000 tons of coal per day during two ten-hour production and one eight-hour maintenance shifts. The miners are represented by the United Mine Workers of America (UMWA). The average mining height is 66 inches.

Coal is extracted from the working faces on four production units with Joy continuous mining machines. Two units transport coal by ram cars and two units transport coal with the use of Flexible Conveyor Trains (FCT) to a conveyor belt that carries coal to the surface. An overland conveyor belt transports the coal from the Highland 9 Mine to the Camp 9 Prep Plant where it is processed and then transported by an overland conveyor belt to the Peabody Ohio River Terminal and barged to the Tennessee Valley Authority (TVA) Cumberland Power Plant located near Erin, Tennessee.

The last regular health and safety inspection (AAA) by the Mine Safety and Health Administration was completed on June 30, 2003. The Non-Fatal Days Lost (NFDL) rate

for the mine through June 30, 2003 is 12.86. The NFDL rate for the Nation for underground mining industry is 5.89

The principal officers at the Highland 9 Mine at the time of the accident were:

Mathew Haaga.....Operations Manager
Robert Price.....General Mine Superintendent
Mike Kirtley.....Compliance Manager
Jim Allen.....Safety Supervisor
Randy Wolfe.....Safety Supervisor

The principal officers at Interior Holdings Corporation at the time of the accident were:

K. Williamson.....President
S. F. Schaab.....Vice President
J. C. Klingl.....Vice President
J. I. Putz.....Vice President & Treasurer

DESCRIPTION OF THE ACCIDENT

Walter J. Monroe, victim, started his shift, on Wednesday, July 2, 2003 at approximately 7:00 a.m. at the Highland 9 Mine traveling underground with his regular crew to the bottom of the mine slope. The crew used a personnel carrier to travel to the No. 1 unit (MMU 061-0). Before the mining cycle could start, Section Foreman Carroll Keltner assigned specific work duties such as repairing ventilation controls and installing roof bolts. After the completion of these tasks, mining on the section began at approximately 9:00 a.m. and continued without incident.

At approximately 3:15 p.m., Ram Car Operator Rudy Utley pulled the ram car under the tail section of the continuous mining machine for his second load of coal from the No. 2 left crosscut. Monroe was standing at the right corner of the intersection just right of the continuous mining machine and had cut approximately 18 inches on the second (right-side) lift. During the process of mining, Utley noticed that Monroe flinched. Monroe grabbed his neck, made his way back toward the ram car and stated that he was bleeding. Then Monroe collapsed beside the ram car. Utley realized Monroe was seriously injured and called for help on the radio. Not knowing if anyone had heard him, Utley then ran to the No. 3 entry where he found Roof Bolting Machine Operators Tony Renfrow and Steve Bumpus. Renfrow and Bumpus rushed to the accident scene where they found Monroe lying on the ground. Renfrow saw blood on the right side of Monroe's neck and immediately applied direct pressure to the wound. Bumpus returned to the roof bolting machine for shop towels.

Maintenance Foreman Rodney Eversole and Section Foremen Carroll Keltner heard someone say an ambulance was needed and rushed to the accident scene. Monroe was lying on the ground by the ram car and Renfrow was applying direct pressure to the

wound on his neck. Keltner searched for a pulse and found a faint pulse for about two to three seconds. Keltner and Renfrow immediately began CPR. On subsequent checks no pulse was felt. Ram Car Operator Lynn Barron arrived at the accident scene with the first aid kit and assisted with administering CPR. Eversole went to the phone to call for more help. Gerald Alvey made a call to the outside Mine Supply Room Clerk Mike Chandler. At 3:25 p.m., Chandler then called the Union County Ambulance Service. Mine Emergency Technician (MET) Phillip Day heard the call from Eversole and arrived on the unit at approximately 3:30 p.m. and also assisted with CPR.

Monroe was then placed on a stretcher and transported to the surface as Day, Barron, and Utley continued to administer CPR. At 3:43 p.m. the ambulance service arrived at the Highland 9 Mine portal.

At 4:10 p.m. the ambulance service transported Monroe to the Community Methodist Hospital in Henderson Kentucky. Jeffrey W. Selby, M.D. pronounced the victim dead at 4:37 p.m.

INVESTIGATION OF THE ACCIDENT

On Wednesday, July 2, 2003, at 3:45 p.m., Safety Director Randy Wolfe, at Highland 9 Mine, notified MSHA Field Office Supervisor Robert F. Jaco in Morganfield, Kentucky, that an accident had occurred on the No. 1 unit. Preliminary information and records were obtained from the mine. Staff Assistant Ted Smith and Assistant District Manager Richard L. Reynolds dispatched an investigation team and contacted personnel from the MSHA's Approval and Certification Center and Solicitor's Office.

The investigation team, consisting of MSHA Supervisor Robert F. Jaco, Coal Mine Inspectors Archie Coburn, Edward R. Nichols, and Felix Caudill, arrived at the mine and issued a Section 103(k) order. The accident investigation began with a pre-investigation conference. Nichols and Coburn conducted witness interviews in the mine's conference room.

Jaco and Caudill, proceeded to the accident site to secure and protect the evidence. Photographs and measurements were taken of the accident scene depicting the location of the machinery at the time of the accident. The continuous mining machine was backed away from the unsupported roof in the No. 2 left working face to a safer location. The cutting bits on the machine cutter head were inspected. Bit marks were found in a carbonate nodule protruding from the mine roof at the working face. Roof bolt plates, continuous mining machine conveyor, and machine gathering head were also inspected.

On Thursday, July 3, 2003, MSHA Accident Investigator Edward R. Nichols and Kentucky Department of Mine and Minerals (KDMM) Inspector Principle II Joe Gill conducted interviews of witnesses at the MSHA Morganfield Field Office. Also present during the interviews were, representatives of Highland Mining Company,

representatives of the UMWA, and a representative of the Nashville Tennessee Solicitor's Office (see Appendix B).

General Engineer Dale P. Ingold, P.E, Ted Smith, and Richard Reynolds traveled underground to inspect and map the site of the accident. On Saturday, July 5, 2003 Ingold and Smith returned to the site of the accident for additional mapping and gathering of evidence.

On Monday morning, July 7, 2003 representatives from MSHA, KDMM, Highland Mining Company, and UMWA met at the District 10 Office in Madisonville, Kentucky to discuss the accident. Based on the information discussed during the meeting MSHA decided to modify the 103(k) order issued on the No. 1 unit to allow normal production to resume with the exclusion of the Joy 14CM27 Continuous Mining Machine (SN JM 5417). Monday afternoon Nichols and Caudill traveled to the site of the accident and conducted a follow-up investigation to gather additional evidence and modify the 103(k) order on the unit. The 103(k) Order on the No. 1 unit was terminated July 8, 2003.

TRAINING

On Wednesday, July 9, 2003 Educational Field Services Representative Leland Payne reviewed training records and all required training was found to be in compliance.

DISCUSSION

Joy Mining Machinery manufactured the continuous mining machine (model 14CM27, serial number JM5417). The continuous mining machine was reportedly put into service on February 17, 2003. Machine operation is accomplished by radio remote control. The 14CM27 has an 11'6" wide x 44" diameter cutter head with a bit tip speed of 681 feet per minute (fpm). There are 55 miner bits on the head with 135 millimeter (mm) (approximately 5 5/16") spacing on the center and end drums and 6mm to 38 mm (approximately. 1/4"-1 1/2") spacing on the end rings. Reportedly, the center and end drum spacing had been increased to reduce the coal fines, whereas the tight spacing on the end rings provides a smooth rib. Two 295 horsepower motors power the drum with an available torque of 161,616 ft.-lbs. based on the motor breakdown torque.

The continuous mining machine was fitted with Kennametal U170 4.0 16s conical cutting bits commonly called miner bits (see appendix H). Kennametal reported the bit body is made of 4140 steel heat treated and tempered to a 40-45 Rockwell "C" hardness, with an approximate density of 7.85 grams/cubic centimeter (g/cc). The 16 mm diameter cutting bit tip is made of Kennametal Grade K3560 tungsten carbide with a density of 14.35(g/cc). A notice is attached to the bit container warning of the safety risk in using dull bits. In May 2003, the mine changed to the U170 4.0 16s bit to reduce respirable dust generation. Kennametal reported that Highland 9 Mine is the only operation utilizing this bit.

Numerous small carbonate nodules with extensive pyritic dissemination were encountered in the mine roof. It is not unusual to find these carbonate nodules in the Kentucky 9 coal seam. These nodules are extremely hard to cut due to the density of their carbonate makeup. The carbonate nodules are conducive to sparking when struck with cutting bits due to the density of the limestone and the presence of pyrite. The shale that surrounds the nodules increases the propensity of the nodules to drop out, especially when they are bumped with the continuous mining machine cutter head.

At the time of the accident the bits on the cutter head encountered a carbonate nodule in the mine roof measuring roughly 14” in length by 12” in depth (see Appendix I). The bits contacting the carbonate nodules were generating a significant amount of sparks.

The piece of material recovered from the victim’s body was wedge-shaped, measuring 0.46” long x 0.32” wide x 0.27” thick at the base tapering to a sharp edge (see Appendix F). The material weighed 1.5236 grams and was approximately 0.18 cubic centimeters in volume. The material was determined to be steel. The material was found through microscopic evaluation to be from the body of the No.12 bit, located on the end drum approximately 20 inches from the right side of the continuous mining machine (see Appendix E). The bit had lost its carbide tip during or prior to cutting through the large carbonate nodule on the right side. The bit continued to hammer into the face at a rate of approximately 59 times a minute. At some point in time, a piece of the bit base separated and struck the victim in the neck.

ROOT CAUSE

Causal Factor: The presence of a carbonate nodule in the mine roof measuring roughly 14” in length by 12” in depth and numerous other small carbonate nodules with extensive pyritic dissemination were encountered in the mine roof. The carbonate nodules are conducive to sparking when struck with the cutting bits due to the density of the limestone and the presence of pyrite.

Corrective Actions: When carbonate nodules with extensive pyritic deposits are encountered in the mine roof the operator should first mine directly under the deposits to create a free face in attempt to jar the nodules loose. These nodules are extremely hard to cut due to the density of their carbonate makeup. The shale that surrounds the nodules increases the propensity of the nodules to drop out especially when they are hit with the continuous mining machine cutter head.

Causal Factor: The bit lost its tungsten carbide tip causing the steel bit body to come in contact with a carbonate nodule. The cutting bit body repeatedly impacted the carbonate nodule resulting in the shrapnel being generated.

Corrective Actions: When adverse roof conditions of this nature are encountered, cutting bits should be visually examined prior to and frequently during the operation and replaced as necessary.

Causal Factor: The continuous mining machine operator was positioned within 19 feet of the working face.

Corrective Actions: When adverse conditions exist such as mining roof-rock, and pyritic nodules, the mining machine operator should be positioned at as great a distance from the face as possible and appropriate (Personal Protective equipment) PPE should be utilized.

Root Cause: The shrapnel (a small metal object) struck the victim in the neck causing serious injury, which resulted in a fatality.

Corrective Actions: Mining companies, manufactures, and other interested parties should continue research to develop personal protective equipment that will afford better protection for the miner and also identify proper machine and component configurations for such applications.

CONCLUSION

The victim, a continuous mining machine operator, was fatally injured when a piece of shrapnel from a cutting bit struck him in the neck, causing severe bleeding. The shrapnel was generated by the breaking of a cutting bit as it struck a high-density carbonate nodule in the mine roof.

The direct cause of the accident was breakage and fragmentation of the No.12 bit on the continuous mining machine's cutting drum as it impacted a carbonate nodule. Bits are not to be used when the tip (insert) is missing. The root cause of the accident was lacking or missing procedures for safely mining when carbonate nodules are encountered. These include the following when such conditions are present: undermining where possible; locating the operator farther from the machine; examining for and replacing broken bits more frequently; using personal protective equipment; ensuring the machine configuration is appropriate for the conditions.

ENFORCEMENT ACTIONS

A 103 (k) order was issued stating, "the mine has experienced a fatal mining accident on the No. 1 unit (MMU 061-0); this order is issued to assure the safety of any person in the mine until an examination or an investigation is made to determine that the MMU 061-0 is safe. Only those persons selected from company officials, state officials, the miners representative and other persons who are deemed by MSHA to have information relevant to the investigation may enter or remain in the affected area."

Approved By:

Carl E. Boone II,
District Manager

Appendix A

Persons Underground at the Time of the Accident

Name	Job Title
Walter Monroe	Continuous Mining Machine Operator
Larry Minton	Continuous Mining Machine Operator
Lynn Higgason	Scoop Operator
Tony Renfro	Roof Bolting Machine Operator
Steven Bumpus	Roof Bolting Machine Operator
Lynn Barron	Ram Car Operator
Douglas Brantley	Ram Car Operator
Rudy Utley	Ram Car Operator
Kenny Whitledge	Mechanic
Carroll Keltner	Section Foreman

Appendix B

Persons Interviewed

Name	Job Title
Carroll Keltner	Section Foreman
Tony Renfro	Roof Bolting Machine Operator
Steven Bumpus	Roof Bolting Machine Operator
Lynn Barron	Ram Car Operator
Rudy Utley	Ram Car Operator
Phillip Day	Ram Car Operator (MET)

Appendix C

Persons Participating in the Investigation

Highland Mine

Name	Title
Mathew Haaga	Operations Manager
Mike Kirtley	Compliance Manager
Charlie Lilly	Senior Mine Engineer

United Mine Workers of America

Edgar Oldham	UMWA International Representative
Ron Shaffner	UMWA Representative

Kentucky Department of Mines and Minerals

Johnny Greene	Assistant Chief Accident Investigator
Louis Compton	Inspector Roof Control Specialist
Joe Gill	Inspector Principle II
Donnie Gatten	Inspector Electrical Instructor

MSHA Investigation Team

Richard Reynolds	Assistant District Manager
Ted Smith	Supervisor Accident Investigation District 10
Robert Jaco	Morganfield Field Office Supervisor/ Accident Investigator
Edward Nichols	Coal Mine Inspector/ Accident Investigator
Archie Coburn	Coal Mine Inspector/ Accident Investigator
Charlie Jones	Coal Mine Inspector/ Accident Investigator
Felix Caudill	Coal Mine Inspector/ Accident Investigator

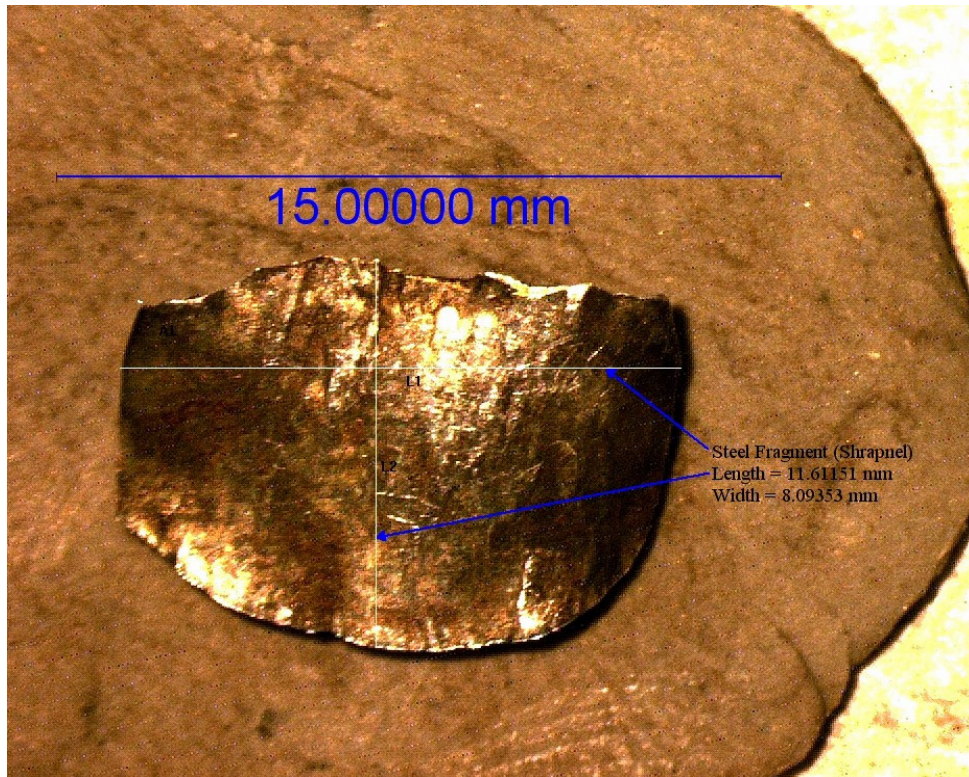
Appendix E

No. 12 Bit Located on Cutter Head



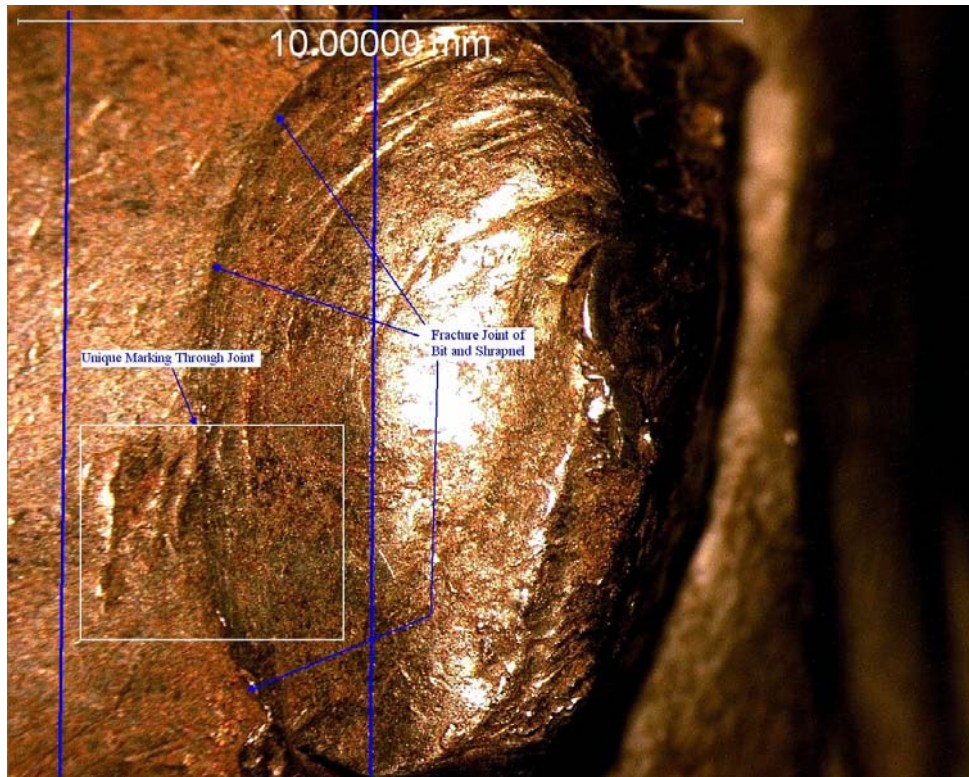
Appendix F

Microscopic Photo of Metal Shrapnel



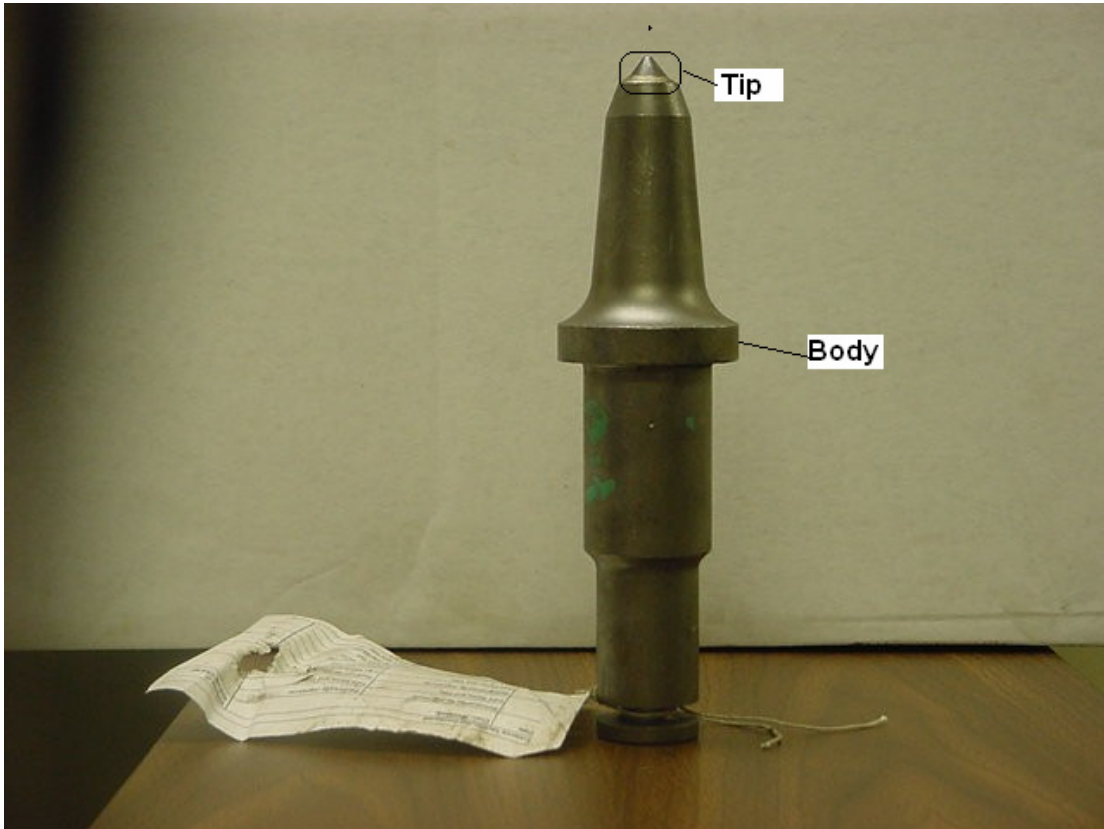
Appendix G

Microscopic Photo of Bit and Shrapnel Match



Appendix H

Kennametal U170 4.0 16s Conical Bit



Appendix I

Carbonate Nodule

