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UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Underground Coal Mine

Fatal Machinery Accident
December 21, 2004

at

Valley Creek Mine No. 2
Tennco Incorporated
Clairfield, Claiborne County, Tennessee
ID No. 40-03231

Accident Investigators

Alice Blanton
Coal Mine Safety and Health Inspector

Don McDaniel
Coal Mine Safety and Health Inspector, Electrical

Eugene Hennen
Mechanical Engineer

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Picture of Rim Assembly

OVERVIEW

At 4:10 a.m. on Tuesday, December 21, 2004, Clearence Lowe, a 62-year old maintenance/repairman with thirty-three years of mining experience was seriously injured at Tennco, Inc., Valley Creek Mine No. 2. During the underground installation of a previously assembled wheel and tire on a Joy 10SC shuttle car, the lock ring and flange separated from the wheel and struck the victim. Lowe died on January 4, 2005, from the injuries sustained in the accident.

GENERAL INFORMATION

Tennco Incorporated's Valley Creek Mine No. 2 is located near Clairfield, Claiborne County, Tennessee. The mine is accessed by four drift openings into the 40-inch thick Rich Mountain coal seam and has been in a producing status since August 23, 2004. Coal is produced on the day and second shifts with the third shift reserved for scheduled maintenance. The mine produces 1100 tons of raw coal daily using the room and pillar method. The mine employs 25 underground and three surface workers.

Coal is extracted with remote-controlled continuous mining machines equipped with wet bed scrubbers utilizing a 32-foot extended cut plan on development. Coal is mined on the 001 mechanized mining unit (MMU). Shuttle cars are used to transport coal to the section belt conveyor feeder. Coal is transported to the surface by a series of belt conveyors. The mine is ventilated with a single main mine fan, utilizing an exhausting system. The mine does not liberate detectable methane.

The principal officers for the mine at the time of the accident were:

Mitch Fannin	President
Daris Stump	Safety Director
Wayne Gilbert	Mine Superintendent

Prior to the accident, the Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection on December 1, 2004. The Non-Fatal Days Lost (NFDL) injury incidence rate for the mine in 2004 was 0.00 compared to a National NFDL rate of 5.63.

DESCRIPTION OF ACCIDENT

On December 20, 2004, at approximately 11:00 p.m., the third shift maintenance crew, consisting of David Mike Daniels, foreman and Clearence Lowe, maintenance/repairman traveled underground to perform their job duties as assigned by Mike Runyon, day shift maintenance foreman. Daniels and Lowe had completed their assigned task of repair and servicing the belt feeder and servicing the Joy continuous mining machine without incident.

The next assignment was to replace broken or damaged lug bolts on a wheel unit on the dumping end, operators' side of a Joy 10SC shuttle car. Daniels and Lowe traveled to the location of the shuttle car which was parked up two crosscuts outby the face, just inby the corner of the crosscut between the No. 4 and No. 5 entries. They noticed the tire was almost flat, indicating this would require a new tire assembly (tire).

At approximately 3:00 a.m. on December 21, 2004, Daniels and Lowe traveled from the 001 MMU to the surface where they retrieved a new size 1200-20 air filled tire which was leaned up against the front of the mine office. This tire had been delivered to the mine site by Blair Tire Company Incorporated on December 18, 2004. Together they rolled the tire over to a diesel powered Mac-8 mantrip and flipped it upon the mantrip.

At approximately 3:30 a.m. they traveled from the surface area back underground to the location of the shuttle car. They removed the tire from the Mac-8 and leaned it up on the rib. Lowe retrieved the S&S 488 scoop and Daniels used the Mac-8 to obtain crib blocks. Lowe placed the bucket end of the scoop under the dumping end of the shuttle car and raised the shuttle car off the ground just enough for the tire to clear the ground. Daniels placed crib blocks under the raised scoop bucket and shuttle car. They removed the semi-flat tire from the shuttle car using an electric impact wrench. The used tire was leaned against the outby crosscut rib.

Approximately 15 broken or damaged wheel stud lug bolts were replaced with new ones before they rolled the new tire over to the shuttle car and manually placed it onto the hub. Daniels and Lowe knelt down in front of the tire with Daniels on the left side and Lowe on the right side. They both proceeded to place lug nuts on the studs to hand tight. Lowe started tightening the lug nuts using the electric impact wrench in a clockwise motion, when they noticed one lug nut was missing. Lowe had tightened all 18 installed lug nuts at least one time and began repeating the procedure. During this time, Daniels walked away to obtain a new lug nut. Daniels had just traveled past the scoop bucket when he heard something blow up. He stepped back into the scoop bucket and saw the tire they were installing lying in the middle of the scoop bucket. He saw Lowe lying face down on the mine floor between the scoop bucket and the coal rib, approximately 10-12 feet away from his previous position. The lock rings from the tire were under the victim's head.

Daniels examined Lowe and determined that he was breathing but unconscious. He went to the mine phone located at the power center and called outside to the security guard and said that Lowe was hurt bad and to call for an ambulance. Daniels got the Mac-8 mantrip and drove it around the crosscut. After moving the scoop out of the way, he placed Lowe onto the Mac-8 mantrip, positioning him on his side. They reached the surface in approximately ten minutes.

Lowe briefly regained consciousness on the surface and asked what had happened. Claiborne County Emergency Management Services (EMS) arrived approximately 25 minutes later. Claiborne County EMS phoned for helicopter service. Claiborne County EMS transported Lowe to the Clairfield Elementary School, where he was transferred to a helicopter and flown to the University of Tennessee Medical Center in Knoxville,

Tennessee. Lowe remained at the Medical Center until he died from his injuries at 1:21 a.m. on January 4, 2005.

INVESTIGATION OF THE ACCIDENT

At approximately 6:00 a.m. on December 21, 2004, Don McDaniel, electrical inspector, located at the MSHA field office in Jacksboro, Tennessee, was notified of an accident at the Tennco, Inc., Valley Creek No. 2 Mine. McDaniel contacted Wayne Gilbert, Superintendent for Tennco Inc., and inquired about the accident. Gilbert informed him that Clearence Lowe, 3rd shift maintenance worker was injured when a tire assembly blew apart during installation. McDaniel and H.R. Boston, MSHA supervisor, traveled to the mine site and obtained preliminary information. Gilbert contacted the University of Tennessee Hospital and was informed that Lowe was cut-up but he had suffered no internal damage. Later that day, McDaniel traveled back to the mine to obtain the tire, tire rim, and the lock rings.

MSHA jointly conducted the investigation with the assistance of mine management, other miners, and Blair Tire Company. Formal interviews were conducted on January 10, and 19, 2005. Six interviews were conducted. None of those interviewed requested their statements be kept confidential.

DISCUSSION

Shuttle Car

The shuttle car on which the new tire was being installed had a Joy Manufacturing Model 10SC serial number ERT-12312 plate. The shuttle car was equipped with 1200X20 air filled tires. The shuttle car was manufactured in 1973. The rims on the shuttle car originally had the clamp type rim mount but had been changed to a bolt circle ring mount prior to the accident.

Tire and Tube

The new tire being installed on the shuttle car was a Super Grip 1200X20 NHS 24 ply tube-type tire, rated at a maximum load of 16,500 pounds at 145 PSI inflation pressure while traveling at 5 miles per hour. A Rubber Master Products 20R8.0 liner and a Rubber Master 1200R20 radial type tube had been installed in the tire. Personnel from Blair Tire Incorporated stated the tire was assembled properly and was inflated to approximately 117 PSI during assembly.

A visual inspection of the tire and the tire liner was conducted and no obvious structural failure or damage was detected. A visual inspection of the tube was conducted. The tube had a separation on the inner portion of the tube that contacts the liner. The continuous separation extended around the entire inner circumference of the tube. No other obvious

visual structural failure or damage was detected other than the valve stem was found separated from the tube.

Three Piece M Style Rim Components

The components of the rim assembly consisted of a rim base, a split locking ring and a continuous side ring or flange. These parts are designed to allow the locking ring to fit into a gutter on the base rim, "locking" the flange in place on the rim when the tire is inflated. See Appendix B.

An identification stamping is provided on the rim base, side ring, and flange to ensure compatibility or matching parts. Stamping identification is based on rim measurements and design; rim width (inside the rim between the two flanges); rim diameter (at the base of the flange); flange height (base to top); and contour of the base rim. The three pieces were stamped as required by the Federal Motor Vehicle Safety Standards 120 (FMVSS 120), indicating they all were fabricated in accordance with Tire and Rim Association dimensions.

The rim assembly consisted of a Hayes Lemmerz 20 X 8.0 LW-20 X 7.5 M rim base. The rim base had a 5/8-inch thick ring welded to it for mounting on the shuttle car wheel unit. The ring had 20 holes on a 17 3/8-inch bolt circle. One of these holes was slotted and extended completely to the inside diameter of the ring to be used for the valve stem, leaving 19 holes for the lug bolts. A F 20 X 10.0 M flange and LR 20 X 7.5-8.5-10.0 M lock ring completed the three-piece components. Referencing the "Multipiece Rim Matching Chart", 1992 Edition, published by the Occupational Safety and Health Administration, (OSHA), the rim assembly components were not properly matched. Representatives from Haynes Lemmerz confirmed that the F20 X 10.0 M flange was the incorrect flange for the 20 X 8.0 LW-20 X 7.5 M rim base.

Wheel mounting procedures for lug nut tightening during the installation process is recommended by manufactures. The information supplied by Haynes-Lammerz International is section H of the National Wheel and Rim Association's 2000 edition of the Wheel and Rim Safety Manual; which recommends the installer to follow the correct procedure and apply the correct nut torque. The procedure sequence is a crisscross pattern, depending upon the number of bolt hole mountings on the rim, type of nuts, and stud sizes. General instruction is to apply the lug nuts to hand tightness, snug the nuts to a set torque, and then finally tighten to the recommended torque, using the same crisscross pattern throughout the installation. This sequence applies to the use of either clamps or a bolt circle ring being used to mount the rim. The manual shows crisscross patterns for bolt hole rings that have up to ten holes. Mounting instructions for a twenty hole pattern could not be located. Witness statements revealed that the lug nuts were tightened to hand tightness and were then tightened using an electric impact wrench, in a clockwise motion. The impact wrench was a Milwaukee brand 9075-20, which delivers 380 ft. lbs. of torque. Since an impact wrench was used rather than a torque wrench, the torque on the installed lug nuts could not be determined.

Information obtained from Super Grip Industrial Tire indicated the tire was designed to fit on an 8.5 inch wide rim. The Super Grip representative stated the use of the narrower rim was not considered a safety issue as long as the rim was rated for the pressure used in the tire; but that the use of the narrower rim causes faster tire wear.

A visual inspection of the rim base gutter, which is designed to hold the lock ring, revealed some critical seating areas that contained corrosion and dirt build-up. The inspection also revealed the rim had dirt built up on the flange which is permanently attached to the rim base. The rim had to be cleaned with a wire brush to locate the identification stamping. The inspection did not reveal any noticeable structural failure or excessive wear in the rim base that would have initiated the rim separation.

An inspection of the lock ring revealed that it was distorted. A gap in the split in the lock ring was approximately ¾ of an inch. There is no gap in a new lock ring of the same type. According to information on page H-6 of the National Wheel and Rim Association's 2000 edition of the Wheel and Rim Safety Manual, use of distorted rim components can create a hazard because of improper fit of the components. The manual recommends that any distorted components be replaced. A determination could not be made whether the lock ring was distorted during assembly or if the lock ring was bent during the accident.

The lock ring has several features which can be used as a check to be sure that the lock ring is properly installed. 1. A safety tab which rises (faces out) approximately ¼ of an inch above the weather side of the lock ring will be on the left side of the gap in the lock ring when the rim is assembled properly. 2. The gap in the lock ring would be opened to about ½ inch. 3. The cutout on the lock ring to accommodate a pry bar during disassembly will be on the right side of the gap in the lock ring when the rim is assembled properly. 4. The non-weather side (faces in) of the lock ring was stamped with the warning, "Danger Wrong Side Out – Do Not Inflate". On a clean lock ring, this warning would be visible, to alert for backward installation of the lock ring.

The front (weather side) of the removable flange has an indentation used to hold the lock ring in place when the rim is properly assembled. The diameter of this indentation is equal to the outside diameter of the lock ring. When the three piece rim is assembled properly, the lock ring fits inside this indentation. When the tire is inflated the removable flange is pushed against the lock ring. When the flange is pushed against the lock ring the indentation in the flange traps the lock ring in position. The tire assembly blew apart when the lock ring and flange separated from the rim assembly with a violent force. One possible cause of the accident was the lock ring being installed backward. Similar accidents have occurred as a result of this condition. Due to the lack of information concerning physical factors such as the actual tire pressure at the time of the accident and the actual torque on the impact wrench, it is not possible to exclude these other causes. (1) The rim assembly components were not properly matched. (2) The rim base gutter and the rim flange contained corrosion and dirt build-up. (3) The lock ring being deformed or sprung open prior to use. One or all of the aforementioned observations may have been contributing factors in this accident.

Assembly of the Tire and Wheel

Blair Tire Company Incorporated had previously picked up the wheel assembly (used tire on the three piece M style rim components) from Tennco Incorporated for a new tire. Blair Tire personnel stated that they had assembled properly, a new 1200R20 Super Grip Tire and a Rubber Master radial type tube on the three piece M style rim components on December 16, 2004. The new tire assembly was delivered to the mine site on December 18, 2004. Blair Tire employer requirements are governed by OSHA Regulation 29 CFR Part 1910.177, "Servicing Multi-Piece and Single Piece Rim Wheels". The OSHA Frankfort Area Office and the Kentucky Occupational Safety & Health was notified of the conditions and circumstances surrounding this fatal accident.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the most basic causes of the accident that were correctable through reasonable management controls.

Even though the exact sequence of events which resulted in the failure of the tire assembly could not be determined, causal factors were identified that, if eliminated, may have prevented the accident.

Listed below are causal factors identified during the analysis and their corresponding corrective actions implemented to prevent a recurrence of the accident.

1. *Causal Factor:* The accepted tire servicing procedures were not followed during the assembly of the 1200-20 tire and wheel. Interviews with Blair Tire Company Inc. personnel revealed that training issues existed.

   Corrective Action: The mine operator eliminated the use of split rim air filled shuttle car tires and is now using foam filled tires which do not present the same hazards as air filled tires.

   When using split rim air filled tires the size and type of both the tire and the rim wheel components should be checked for compatibility prior to assembly. Multi-piece wheel components should not be interchanged except as provided in the charts or in the applicable rim manual. Rim parts should be inspected for any damage and deformity, wear, free of any dirt, surface rust, corrosion and pitting prior to mounting and inflation. The tire side of the lock ring should be a distinctive identifying color, or some other distinctive means, so as to afford immediate identification of proper placement of the lock ring. OSHA Regulations covering the Servicing Multi-Piece and Single-Piece Rim Wheels, 29 CFR 1910.177 should be followed by Blair Tire Company Inc.

CONCLUSION

The accident occurred when the lock ring and flange separated from the rim assembly violently during the mounting of the 1200-20 air filled tire. The exact mechanism of the lock ring and flange separation could not be determined. The accident resulted from the cumulative effect of deficiencies that occurred during the assembly, handling, and mounting of the wheel and tire unit.

Approved By:

_____ _____

Manager's Name Date
District Manager

ENFORCEMENT ACTIONS

The investigation did not reveal any contributing violations of 30 CFR Part 75.

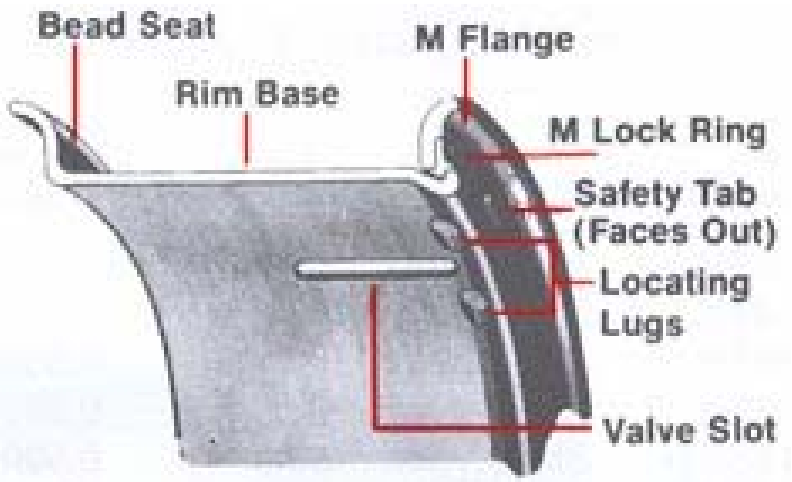
Appendix A
Persons Participating in the Investigation

Mine Safety and Health Administration

Name	Title
Alice Blanton	CMS&H Inspector/Accident Investigator
Don McDaniel	CMS&H Inspector/Electrical/Accident Investigator
Daniel L. Johnson	CMS&H Inspector/Supervisor
Eugene Hennen	Mechanical Engineer

Appendix B

Three Piece M Style Rims Components



M Type Rim

Safety Tab Assembly