MAI-2010-06

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Metal and Nonmetal Mine Safety and Health

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Cement)

Fatal Exploding Vessel Under Pressure Accident
May 14, 2010

Knoxville Cement Plant Cemex Inc.
Cemex Construction Materials Atlantic, LLC
Knoxville, Knox County, Tennessee
Mine I.D. No. 40-00840

Investigators

Stanley K. Stevenson
Supervisory Mine Safety and Health Inspector

Billy Handshoe
Mine Safety and Health Inspector

Fred T. Marshall
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Southeast District
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Michael A. Davis, District Manager

OVERVIEW

Franklin D. Lasley, mechanic, age 35, died on May 14, 2010, when the drill steel extension rod (drill steel) he was cutting exploded. Lasley was using a torch to cut approximately 4 feet of steel off a 12-foot section of 1 ¾ inch diameter drill steel. The hollow drill steel exploded when the initial cut was made. The flying shrapnel from the drill steel struck the victim

The accident occurred because management policies, procedures, and controls for cutting drill steels were inadequate and did not protect persons performing the task. Investigators determined that the most likely cause of the explosion was the presence of an explosive type material within the inner diameter of the drill steel that was ignited by an oxyacetylene torch during the cutting process. The steel shattered along a length of approximately 8 feet and appeared to have multiple areas where failures initiated. Additionally, the victim was not trained to perform the task assigned.

GENERAL INFORMATION

Knoxville Cement Plant Cemex Inc., owned and operated by Cemex Construction Materials Atlantic, LLC, (Cemex), is located off Highway 11 West, near Knoxville, Knox County, Tennessee. The principal operating official is Antonio De Luca, plant manager. The mine normally operates 3 shifts, 8 hours per day, 7 days per week. Total employment is 120 persons.

Limestone is drilled and blasted from multiple benches. The broken rock is transported by haul trucks to a primary crusher. The crushed rock is conveyed to the secondary crusher and then conveyed to the plant where it is mixed and processed with other materials to produce cement. Finished products are sold in bulk and bag for use in the construction industry

The last regular inspection was completed on February 25, 2010.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, Franklin D. Lasley, (victim) reported to work at 6:00 a.m., one hour prior to his normal starting time. He met with Stanley Morell, quarry manager. They discussed the work to be performed for the day. Lasley was scheduled to weld plates in the shop.

About 7:45 a.m., David Dudley and Mike Anderson, electricians, came into the shop to ask Lasley to help them repair a high pressure hose for the plant. Lasley helped them repair the hose and they left shortly after that. About 8:20 a.m., Brain Livesay, contract driller, came to the shop with six sections of drill steels with drill bits attached to them. He asked Lasley to cut four feet off each drill steel to salvage the drill bits. Livesay placed two sections of drill steels on the shop floor. He then went to the restroom located about 50 yards from the shop. While returning, Livesay heard a very loud explosion from the shop. He ran back to the shop to find a cloud of dust and the victim laying on the shop floor.

Terry Stout, packer loader, was loading trucks in the pack house and heard the explosion. He went to the shop, heard a hissing sound, saw a cut in the hose of the cutting torches, and turned off the valves to the compressed gas cylinders. Stout then went to call personnel in the control room to report the accident and call for Emergency Medical Services (EMS).

EMS arrived at 8:34 a.m. and treated the victim. Lasley was transported to a local hospital where he was pronounced dead by the attending physician. The cause of death was attributed to blunt force injuries.

INVESTIGATION OF THE ACCIDENT

The Mine Safety and Health Administration (MSHA) was notified of the accident at 8:45 a.m., on May 14, 2010, by telephone from Erin Laine, safety and health manager, to the National Call Center. Doniece Schlick, safety specialist, was notified and an investigation was started the same day. An order was issued under provisions of 103(j) of the Mine Act to ensure the safety of the miners.

MSHA's accident investigation team traveled to the mine, conducted a physical inspection of the accident scene, interviewed employees, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine and contractor management and employees, miner's representative, Knox County Emergency Medical Services, University of Tennessee Medical Center, Knoxville Police Department, and Rural Metro Ambulance Service.

DISCUSSION

Location of the Accident

The accident occurred at the shop area where three large bays in the front of the shop are used to perform maintenance on mobile equipment. The accident occurred in the west side bay. The front bay doors were open. The back bay door at the west side bay area was also open. The shop has flat concrete floors.

Weather

The weather conditions at the time of the accident were clear with a temperature of 69 degrees Fahrenheit. Weather was not considered to be a factor in the accident.

Drill

One drill is used at the mine to drill holes for blasting the rock. The drilling is performed by C&W Drilling who was contracted by Cemex. One driller is employed at this mine. The drill used is a 1998 Ingersoll-Rand model ECM-670. Investigators observed this drill in operation. When the drill steels are changed, an automatic greaser provides grease to the threaded area of the drill steels during normal drilling activities. The grease is added when the drill steels are changed during the downward drilling cycle. A small amount of oil/fluid was observed on the hammer section of the drill and a small amount was observed on the striker bar. This amount of oil/fluid is normal for this brand and model drill.

Drill Steel

The drill steel involved in the accident was a T45 drill steel extension rod having original nominal characteristics that included an outer diameter of 1.8 inches, an inner diameter of 0.67 inches, a 12-foot length, male threads on either end, and wrench flats on either end. It had a nominal 4 ½-inch diameter drill bit attached to one end. The drill bit had four holes that tapered from a common area at the drill rod connection to the cutting face with the holes spaced 90 degrees apart on a circular pattern centered on the cutting face. Couplers were used in the drilling process to join the drill steels together as needed to obtain the required drill hole depth.

This drill steel had reportedly broken off a drill string during the drilling process, with a drill bit attached, and was subsequently left in the drill hole. Normal procedure, in the event that this occurred, was to mark the hole, and drill another hole near the original hole as needed. The drill steel section was recovered from the muck pile some time after the shot pattern was blasted, stored in the pit and/or the drill parking lot area, and brought to the shop by the driller the day of the accident. This drill steel was one of six that had been collected from various portions of the mine and brought to the shop by the driller.

Investigators could not determine when the drill steel had been actually 'lost' in the drill hole, what blast number the drill steel was associated with, how long the drill steel had been stored on site prior to the day of the accident, or the actual location that it was retrieved from the quarry or the drill parking lot area.

Investigators could not determine the manufacturer of the drill steel or the drill bit that was involved in the accident. No identification markings were found on either the drill steel or the drill bit.

The drill steel typically used for blast hole drilling operations at the mine has approximately 5/8 inch hollow inner diameter to accommodate using air or an air/water mixture during the drilling process to force drill shavings to the surface and to use water to condition the drill hole. In this case, compressed air is supplied by an air compressor on the drill rig, piped through the inner diameter of the drill steel, and through the drill bit. The compressed air is then forced out of the drill hole from the drill bit area and up to the surface by going around the exterior portion of the drill bit and drill steel(s). Water can be introduced into the air stream on the drill which uses the compressed air to force an air/water mixture through the drill hole. According to product literature, compressed air systems on this type of drill have an operating pressure of approximately 140 PSI.

Procedure for Cutting Drill Steels

When boreholes are drilled in the quarry, the drill steel and bit sometimes get lost or stuck in the drill hole. When the steel and bit cannot be retrieved, the drill steel and bit are left in the borehole. The blaster then comes in and loads the boreholes with explosive materials. After the blast, the drill steel and bit are collected from the muck piles by using a front-end loader. The contract driller transports the drill steels to the shop where Cemex employees cut them using torches. The shortened cut piece of drill steel, with the drill bit attached, is then returned to the drill where the drill bit is retrieved to be used again. The unused section of the drill steel is then sold for scrap. The procedure for cutting drill steels has been an ongoing practice at this location for many years.

Oxyacetylene Torch Assembly

The cutting torch assembly involved in the accident consisted of a Victor H315FC welding torch, a Victor CA2460 cutting torch, and a Victor 6-1-101 cutting tip. The assembly used 25-foot long, ¼-inch I.D. supply hoses with a Victor CSR460D oxygen regulator, a Victor CSR460A acetylene regulator, and FR18 flashback arrestor, with check valves installed at the hose connections to the welding torch.

Regulator pressure settings during inspection of the torch assembly were observed to be approximately 9 PSI for the acetylene and 90 PSI for the oxygen. The acetylene pressure was within an expected operating range; however, the oxygen was higher than the expected operating range. Tables provided in Victor product information do not address the combinations outlined above. These tables indicate maximum recommended oxygen regulator pressure settings to be approximately 45-55 PSI. The information notes that a 3/8 inch I.D. hose is recommended for use with a size 6 tip size and the tabulated values for this arrangement. The arrangement being used by the victim was different than that recommended. The hose I.D. was smaller and an external flashback arrestor and check valves were installed in the system in addition to the built in units within the welding torch portion of the assembly.

The torch assembly was observed to be damaged showing a cracked inlet fitting for the acetylene portion of the welding torch. Both gas supply hoses were cut or severed. Observations indicated that this damage resulted from impacts that occurred after the drill steel ruptured.

Investigators used visual identifiers on some components and reviewed product literature to determine that all of the components of the oxyacetylene torch assembly inspected during the investigation were compatible with the oxygen and acetylene gases used.

Rupture Damage of Drill Steel

The drill steel shattered primarily toward the end opposite the drill bit. The area being cut by the victim (kerf area) was approximately 2 feet from the drill bit and was between the drill bit and the shattered section of the drill steel (see Photo No. 1). Investigators estimated that approximately 8 feet of the drill steel was shattered during the event. Smaller sections of the drill steel body had also shattered from either side of the kerf area (cut area) as shown in Photo No. 2. The sections missing in this kerf area contained marks that would visibly confirm whether or not the cut actually breached the inner diameter of the drill steel.

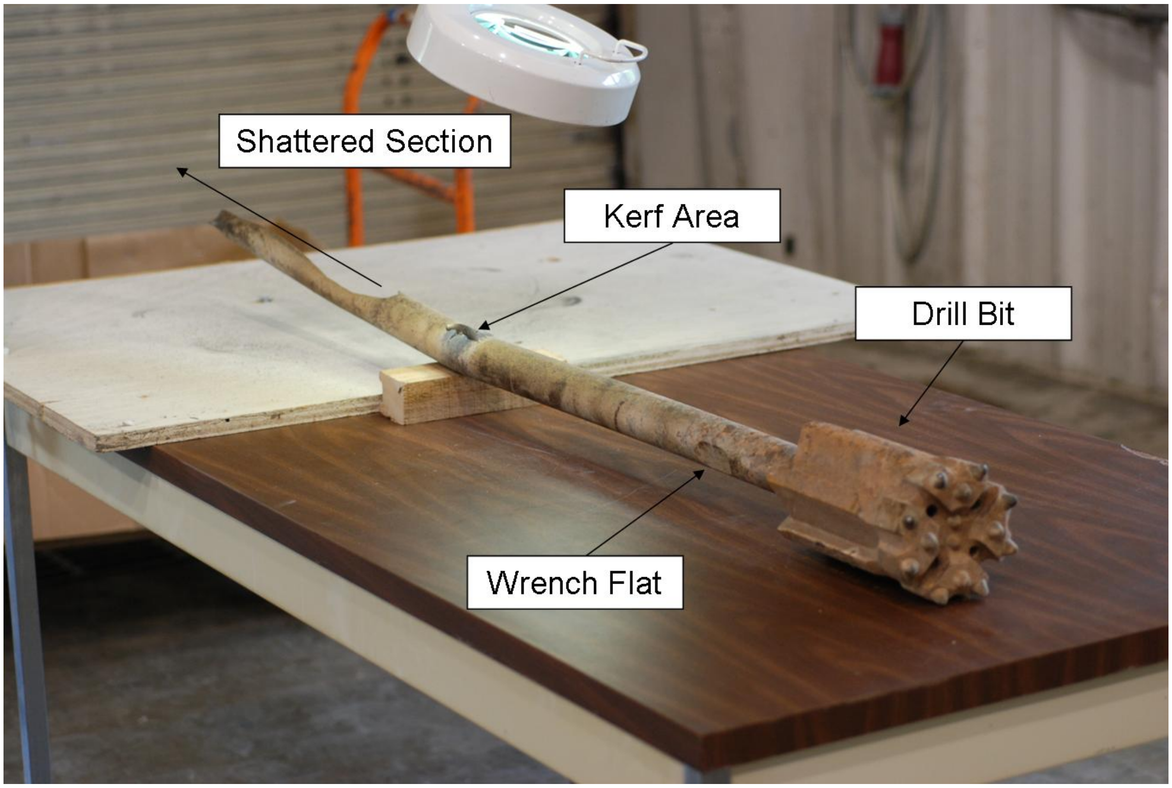

Photo No. 1: General Features of Drill Steel Involved in Accident

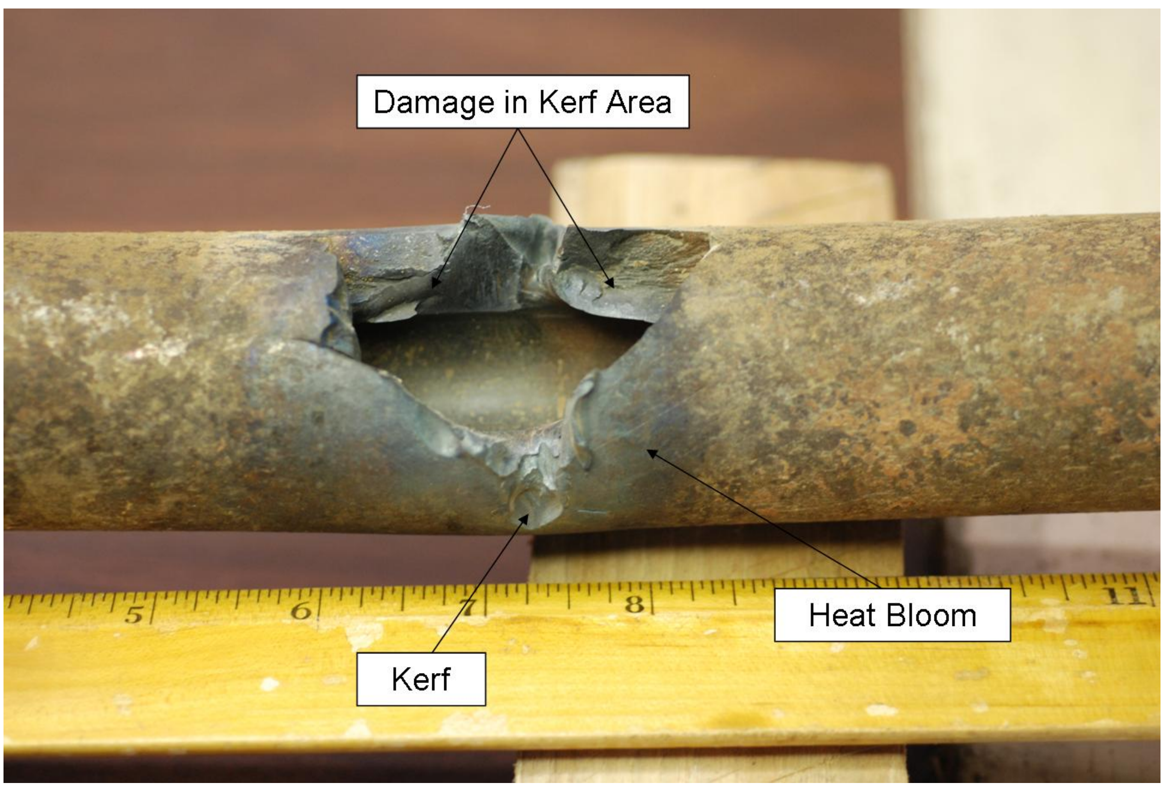

Photo No. 2: Damage to Kerf Area

Observed Kerf Area (Cut Area)

The area of the drill steel being cut by the victim at the time of the accident had a heat bloom (visible surface discoloration due to heat) on either side of the drill steel body. For discussion purposes, references hereafter will refer to the locations when viewing the end of the drill steel from the drill bit end. The heat bloom observed clockwise of the cutting area was visibly larger than the heat bloom in the counterclockwise direction of the cutting area; see Photo No. 3 and Photo No. 4, respectively.

Photo No. 3: View of Heat Bloom Clockwise of Cutting Area

Photo No. 4: View of Heat Bloom Counterclockwise of Cutting Area

An area on the clockwise side of the cutting area had a portion of a kerf remaining with ruptured sections of the drill steel missing on either side of this kerf in the immediate counterclockwise direction. This portion of the kerf was measured to be approximately 0.2 inches in width (see Photo No. 2). This is consistent with the kerf width of a single pass when compared to the stated kerf width of 0.15 inches for the size 6 tip (type 1-101) stated in the Victor product information.

Based on the relative sizes of the visible heat blooms and the position of the visible kerf, it appears that the victim was cutting the drill steel body in the counterclockwise direction (bottom towards top of Photo No. 2).

Pressure Confinement

A piece of the ruptured drill steel recovered at the accident scene had material visually plugging the inner diameter of the drill steel (labeled Item No. 18 during the investigation), see Photo No. 5. This plugged section of the drill steel had wrench flats on the rod body which are only present near the threaded ends of the drill steel (See Photo No. 1 for relative locations). This indicated that this plugged section was near the threaded end of the drill steel and on the end opposite to that of the drill bit, i.e. in the end of the section of drill steel that shattered. Additionally, a photo of a section of the ruptured drill steel (labeled Item No. 13 during the investigation) taken by the Knoxville police department shortly after the accident (see Photo No. 6) shows material within the bore area and on the fracture surfaces visibly similar in color to that within the plugged bore of Item No. 18. These observations confirm that conditions existed to provide some level of pressure confinement and to cause reflective pressures axially (along the length of the rod bore) in the end of the drill steel that shattered.

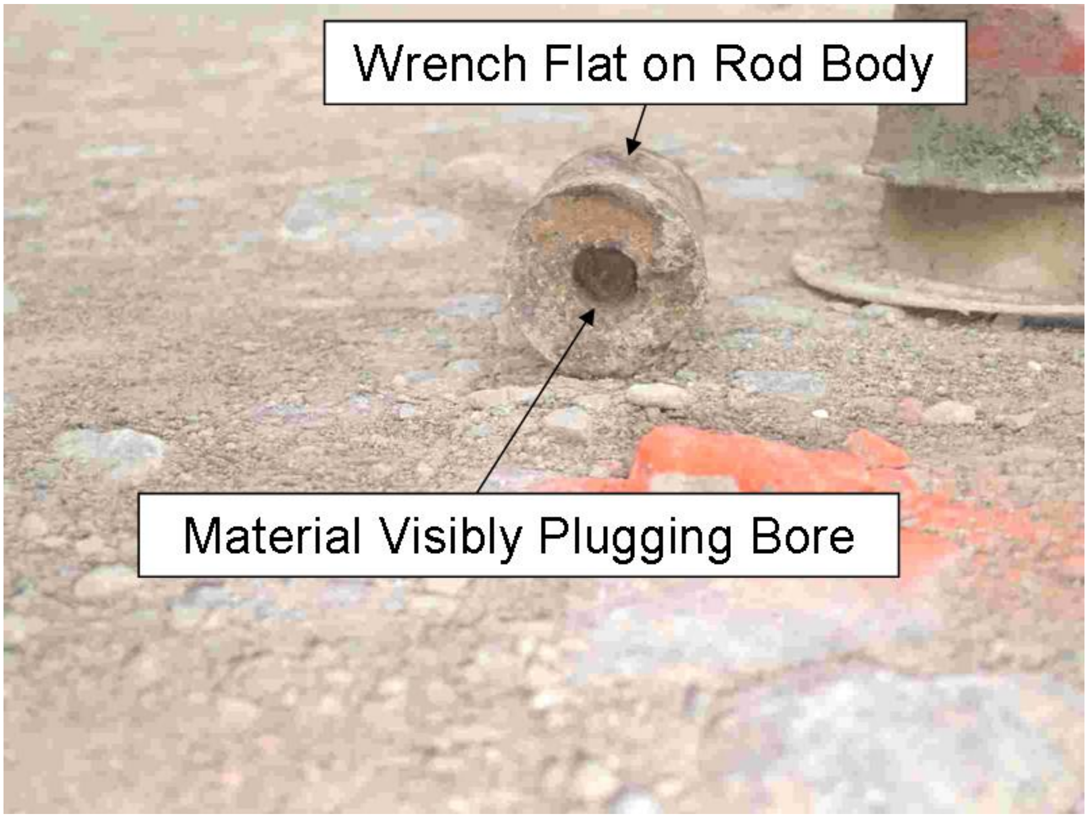

Photo No. 5: Visible Material Plugging Inner Bore of Item No. 18

Photo No**.** 6: Visible Material on Inner Bore and Fractured Surfaces of Item No. 13

Examinations made by investigators indicated that the section of the drill steel from the cut area to the drill bit was clear from obstruction and that all four of the drill bit holes were clear from obstruction.

Pressures Needed to Rupture the Drill Steel

Evaluations were conducted to determine the magnitude of internal pressure needed to fail the drill steel. From a structural standpoint, the geometry of the drill steel body (an outer diameter of 1.8 inches and an inner diameter of 0.67 inches) required an analysis using thick walled piping principles with a resulting wall thickness ratio (D_{outer}/D_{inner}) of approximately 2.7.

Examining the structural strength of the drill steel in a purely static condition, investigators estimated, using Barlow's Formula, that an internal pressure of at least 67 percent of the ultimate strength of the drill steel material would be needed to rupture the drill steel. Although the actual manufacturer of the drill steel was not identified, investigators determined that some prominent manufacturers use steels with ultimate strengths in the range of 181,000–196,000 PSI. Assuming that the drill steel involved in the accident was similar in material properties, the minimum internal pressure required to rupture the drill steel would be in the range of 121,000 to 131,000 PSI.

An analysis using dynamic loading of thick walled cylinders was also used to obtain a better understanding of the magnitude of internal pressure needed to fail the drill steel. Technical research involving dynamic loading of thick wall cylinders indicates that a few key observations can be applied to this accident. Material properties for steels are actually increased when subjected to rapid or impact loading with the net increase being greater for that of an impact load versus a rapid load. The wall thickness ratio has a direct bearing on whether or not an explosive internal pressure allows the material properties of the cylinder to behave with either rapid or impact loading characteristics. For the wall thickness ratio of the drill steel involved in the accident (2.7), it is expected to see rapid loading characteristics. This would not result in any significant increase of the material properties over that seen during a relatively static load condition. Therefore, this static evaluation can be used to estimate the minimum internal pressure needed to rupture the drill steel.

Observations of the other drill steels set aside to be salvaged at the mine indicated that the drill steel involved in the accident was likely damaged to some extent due to bending which could have some impact on the structural characteristics of the drill steel itself. Normal use of the drill steel during drilling could result in fatigue cracking within the drill steel body. However, it would be expected that the failed areas of the drill steel be more isolated if the drill steel failed due to a damaged area from bending, a pre-existing crack, or other structural deformity.

Catastrophic failure of the drill steel did not occur in the immediate area of the cut but small sections around the cut area did fail and break away. The drill steel shattered along a length of approximately 8 feet. The exact location(s) of initiation of the structural failures along the length of the drill steel could not be determined without further metallurgical examination. However, fracture patterns observed on recovered shards of the drill steel appeared to indicate that failure of the drill steel initiated in more than one area. The soot like material observed on the shard in Photo No. 7 (labeled Item No. 20 during the investigation) highlights the fracture patterns in this area, with these fractures pointing back to the general origin of the soot like material within the bore of the drill steel. Similarly, the earth colored material observed on the shard in Photo No. 6 highlights the fracture patterns on another shard, with the fractures also pointing back to the general origin of the earth colored material within the bore of the drill steel. Having multiple areas where failures initiated is consistent with appearances of thick walled cylinders subjected to an explosive internal pressure.

Photo No. 7: Soot Like Material on Item No. 20 and Highlighting of Fracture Pattern

Note: Observations discussed above were based on technical reference documents, photographs, and limited visual examination of the subject components. The components obtained under chain of custody were preserved. No destructive testing or other forensic examinations were conducted.

Deflagration to Detonation (DTD) Pressures of Hydrocarbons

The probability of the inner diameter containing a hydrocarbon based product as a fuel mixed with an oxidizer was very high and several combinations needed to be considered:

- Grease products and lubricating oils are routinely used in the drilling process. The threads of the drill steels are typically greased each time they are installed into a coupler. On the drill currently used at the mine site, a thread greasing system is installed on the machine and the duration (i.e. amount of grease) applied to the threads is manually controlled by the drill operator from inside the cab. The act of lubricating the drill steel's threaded ends during use can allow excess grease to drip and/or run into the inner diameter of the drill steels. Review of the Material Safety Data Sheets (MSDS) for the grease products used indicates that the grease can decompose under certain conditions to create a source of hydrogen gas.

- The process of using an oxyacetylene torch to cut the drill steel involves the use of a highly flammable gas (acetylene) that also had to be considered in the event that acetylene was directly introduced into the inner diameter of the drill steel and subsequently ignited.

- The process of using an oxyacetylene torch to cut the drill steel also involves the use of oxygen to cause the cutting action which means that any evaluations should also consider that a highly oxygenated gas mixture could have been introduced into the inner diameter of the drill steel, especially if the drill steel body was breached during the cutting process. However, as mentioned previously, it was not definitively determined if the kerf did indeed penetrate the inner diameter since sections of the drill steel that were on either side of the kerf were not found during the investigation.

Ignition of stoichiometric mixtures of hydrogen with air and acetylene with air were examined in addition to stoichiometric mixtures of hydrogen with oxygen and acetylene with oxygen. It was determined that both hydrogen and acetylene mixtures in either air or oxygen would be able to transition from deflagration to detonation (DTD) in the relatively small diameter of the extension rod (0.67 inches). However, based on reference documents, the maximum detonation pressures of these mixtures are expected to be in the range of 200-500 PSI. When reflective pressures are considered because of the plugged inner diameter of the drill steel, the maximum detonation pressures of these mixtures are expected to increase these detonation pressures approximately 2½ times to 500 – 1,250 PSI.

Explosives Identified in Blasting Logs

The mine was using only one contractor for blasting operations, Maxam Appalachia. The blasting logs for approximately one year were examined to determine the types of explosives that were being used at the mine. These logs indicated that a combination of products was used throughout this time period to include ANFO, emulsion, and blends of the two in varying ratios. Non-electric type detonators with boosters were used to initiate the ANFO and/or emulsion products during blasting. MSDS sheets for booster products used indicated that the boosters contained varying compositions of TNT, RDX, HMX and PETN.

Booster Detonation Pressures

Research regarding explosion pressures and product information from the boosters currently used indicate that the booster product is theoretically capable of producing explosion pressures up to a range of 1.3 – 1.7 million psi.

ANFO and Emulsion Pressures and Critical Diameters

ANFO and emulsions have limitations regarding the minimum diameter of material which allows a deflagration to detonation (DTD) condition. Technical data for the ANFO and emulsions used within the last year at the mine indicates that the inner diameter of the drill steel (0.67 inches) was too small to support a detonation under ideal conditions. However, this is primarily due to the loss of heat during the detonation. In addition, the physical properties of these explosives can change when temperatures exceed 150 ºF. This information indicates it is possible that the heat from the cutting process transferred to any material that may have been present and allowed conditions to support deflagration to detonation. Detonation pressures of ANFO and emulsions are similar to the booster detonation pressures discussed above.

Diesel fuel is a main component of the ANFO and emulsions used, requiring that an ignition of this within the extension rod bore also be examined. It is possible that a situation occurred where residual diesel fuel components from any explosives ignited due to heating of the drill steel and/or direct flame contact; however, a deflagration to detonation of diesel fuel alone would produce less pressure than that of the hydrocarbons previously considered (hydrogen and acetylene).

Summary

1. Observations were based on technical reference documents, photographs, and limited visual examination of the subject components. The components obtained under chain of custody were preserved. No destructive testing or other forensic examinations were conducted.

2. Visual observations of pieces of the accident drill steel recovered from the accident area indicate that the inner bore of the drill steel was plugged with material near the end of the rod opposite the end with the drill bit attached. The recovered piece that had the inner bore plugged with material (See Photo No. 5) also indicated that the subject drill steel broke between the wrench flat and the threaded end of the rod during the drilling process.

3. The manufacturer of the drill steel involved in the accident was not determined. No identification markings were observed while handling the pieces and the drill steels currently being purchased by the drilling contractor do not have wrench flats on the rod body. The drill steel involved in the accident had wrench flats on both ends of the drill steel body.

4. Prominent manufacturers of drill steels use steels with ultimate strengths in the range of 181,000 – 196,000 PSI. Assuming that the drill steel involved in the accident was similar in material properties, it was estimated that the minimum internal pressure required to rupture the drill steel would be in the range of 121,000 – 131,000 PSI.

5. It was determined that a hydrocarbon with air mixture and a hydrocarbon with oxygen mixture could transition from deflagration to detonation within the bore of the drill steel. Maximum detonation pressures of these mixtures are expected to be in the range of 200 – 500 PSI. Considering any reflective pressures due to the contained end (plugged inner diameter), the pressure experienced during a detonation of a hydrocarbon within the drill steel are expected to increase approximately 2 ½ times these detonation pressures to approximately 500 – 1,250 PSI. Based on the minimum internal pressure required to rupture the drill steel (121,000 – 131,000 PSI), a hydrocarbon mixture detonation would have ruptured the drill steel only if significant structural defects or deformities were present prior to the detonation.

   This hydrocarbon oxygen mixture assessment includes a hydrogen mixture produced as a byproduct of grease or other lubricating type oils, an acetylene mixture, or a fuel oil type mixture.

6. No scientific conclusion can be made concerning the actual material or fuel mixture that caused the explosion without laboratory testing. No laboratory tests were conducted since those tests typically would not analyze all possible residues. However, calculations indicate that the most likely cause of the explosion was the presence of an explosives type material within the inner diameter of the drill steel that was ignited by the oxyacetylene torch during the cutting process. Explosion pressures of explosives exceed the 121,000 – 131,000 PSI minimum estimated internal pressure required to rupture the drill steel. The drill steel shattered along a length of approximately 8 feet and appeared to have multiple areas where failures initiated. This is consistent with appearances of thick walled cylinders subjected to an explosive internal pressure.

7. Although investigators could not determine if the inner diameter of the drill steel was breached prior to the explosion to allow direct flame contact, sufficient heat during the cutting process could have been transferred through the body and/or bore of the drill steel to the ignition point within the drill steel.

Training and Experience

Franklin D. Lasley, victim, had 4 years and 44 weeks of mining experience all at this mine. He had received training in accordance with 30 CFR Part 46. However, he had not received task training as a mechanic or welder.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following root causes were identified:

Root Cause: Management policies, procedures, and controls for cutting drill steels were inadequate and failed to protect persons performing the task.

Corrective Action: Management policies, procedures, and controls were established to ensure that persons can safely perform the task of cutting drill steels by assuring the steels are not blocked. Drill steels must be drained, ventilated, and thoroughly cleaned of any residue prior to cutting.

Root Cause: Management failed to properly task train the welder in performing his task.

Corrective Action: Management established safe operating procedures and task trained all miners regarding the procedures to safely cut drill steels.

CONCLUSION

The accident occurred because management policies, procedures, and controls for cutting drill steels were inadequate and did not protect persons performing the task. Investigators determined that the most likely cause of the explosion was the presence of an explosive type material within the inner diameter of the drill steel that was ignited by an oxyacetylene torch during the cutting process. The steel shattered along a length of approximately 8 feet and appeared to have multiple areas where failures initiated. Additionally, the victim was not trained to perform the task assigned.

ENFORCEMENT ACTIONS

Cemex Construction Materials Atlantic, LLC

Order No. 8542408 was issued on May 14, 2010, under the provisions of 103(j) of the Mine Act.

A fatal accident occurred at this operation on May 14, 2010, when the victim was using a cutting torch to remove drill bits. The drill steel exploded resulting in fatal injuries. This order is issued to assure the safety of all persons at this operation. It prohibits all activity at the heavy equipment shop and drill rig area until MSHA has determined that it is safe to resume normal mining operations. The mine operator shall obtain prior approval from an authorized representative for all actions to restore operations to the affected area.

The order was subsequently modified to a Section 103(k) order and was terminated on October 14, 2010. Conditions that contributed to the accident no longer exist.

<u>Citation No. 6098262</u> was issued on September 29, 2010, under the provisions of Section 104(a) of the Mine Act for a violation of 30 CFR 56.4604(a):

A fatal accident occurred at this operation on May 14, 2010, when a drill steel exploded. The miner was using a torch to cut off the end of the drill steel to retrieve the drill bit. The 12 foot long drill steel was plugged with material at one end. The drill steel had not been drained, ventilated, and thoroughly cleaned of any residue.

This citation was terminated on October 14, 2010, management established safe operating procedures and trained all welders regarding the procedures.

<u>Citation No. 6098263</u> was issued on September 29, 2010, under the provisions of Section 104(d)(1) of the Mine Act for a violation of 30 CFR 46.7(a):

A fatal accident occurred at this operation on May 14, 2010, when a miner was attempting to salvage the bit from a plugged drill steel. The victim was using an acetylene torch to cut the drill steel and had not received new task training in the health and safety aspects of the assigned task. The mine operator engaged in aggravated conduct constituting more than ordinary negligence by failing to task train the miner before beginning a new task. This violation is an unwarrantable failure to comply with a mandatory standard.

This citation was terminated on October 14, 2010, after management established safe operating procedures and task trained all welders regarding the procedures.

Approved: ___________________________________ Date: _______________________
Michael A. Davis
Southeast District Manager

APPENDICES

A. Persons Participating in the Investigation
B. Victim Data Sheet

APPENDIX A

Persons Participating in the Investigation

<u>CEMEX Construction Materials Atlantic, LLC</u>

Antonio De Luca	Plant Manager
Michael Tilton	Director of Health & Safety
Stanley Murell	Quarry Manager
Erin Laine	Health & Safety Manager
William Duran	Attorney for CEMEX

<u>International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, forgers and helpers</u>

Mark Garrett	Director of Health and Safety Services
Stacey Smith	Miner's Representative

<u>Knox County-Rural Metro Ambulance Service</u>

Willis Burdette	911 Coordinator
Randall Brookshire	Emergency Medical Technician
Randy Osborne	Emergency Medical Technician

<u>University of Tennessee Medical Center</u>

Larry Vineyard	Chief of Investigations, Regional Forensic Center

<u>Knoxville Police Department</u>

Lieutenant Bob Wooldridge	Patrol Division
Charles Lee	Investigator

<u>Mine Safety and Health Administration</u>

Stanley K. Stevenson	Supervisory Mine Safety and Health Inspector
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