

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Surface Coal Mine

Fatal Machinery Accident
August 16, 2013

Black Thunder Mine
Thunder Basin Coal Company LLP
Wright, Campbell County, Wyoming
ID No. 48-00977

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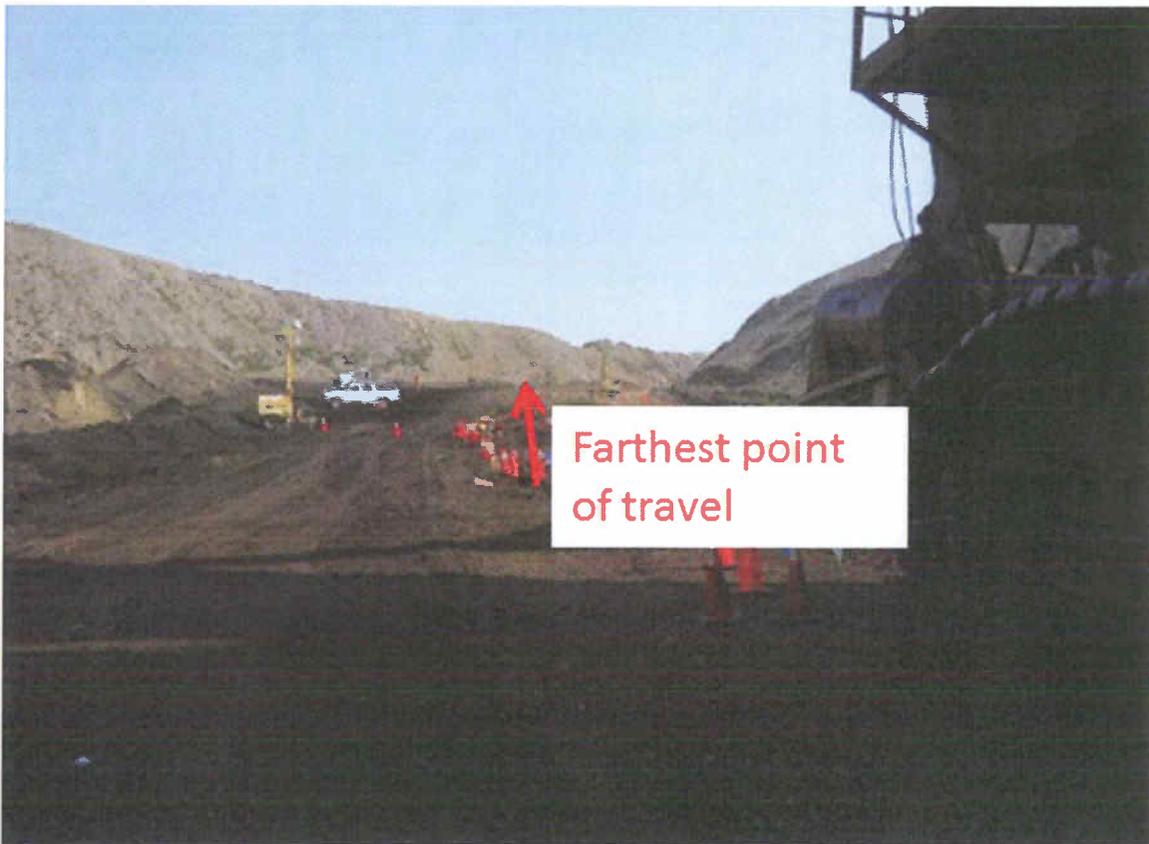
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Photograph 1: View from shovel, up the 4 West Ramp to furthest point of travel

OVERVIEW

At 12:35 a.m. on August 16, 2013, Jacob Dowdy, Utility Miner, received fatal crushing injuries when a P&H electric shovel, model 2800 Mark II (see Appendix A Figure A), was being moved out of the 4 West Pit coal seam area. The shovel lost its ability to tram (propel function) and rolled freely down the grade striking several objects including high voltage electrical junction boxes, a Caterpillar D-11 bulldozer, and two Ford F350 pick-up trucks. Mr. Dowdy was the operator of the first pick-up truck struck. Mike Lewis, the miner in the second pick-up truck, was pinned and had to be extricated from the truck.

The accident occurred due to a combination of three factors. The shovel was being operated at or above the grade capabilities of the propel function, a steering shaft was twisted, and a steering linkage shaft was missing 50% of its connecting bolts. Consequently, the steering clutches failed to engage properly, causing both steering clutches to disengage and allowed the shovel to freewheel down the grade resulting in the fatality.

GENERAL INFORMATION

The Black Thunder Mine is located 12 miles southeast of Wright, Wyoming on highway 450. The mine produced approximately 93 million tons of coal in 2012 and employs 1,573 miners. Miners work a 12 hour rotating shift schedule, two shifts per day, and seven days a week. Black Thunder Mine is operated by the Thunder Basin Coal Company LLC, a subsidiary of Arch Coal, Inc.

Prior to the accident, the last regular (E01) inspection conducted by the Mine Safety and Health Administration (MSHA) was completed on June 4, 2013. No inspection event was open at the time of the accident. The non-fatal days lost (NFDL) injury incidence rate for the mine in 2012 was 0.48, compared to the National NFDL rate of 1.00 for surface mines for the same period of time.

Principal officials for the mine at the time of the accident were:

Keith R. WilliamsPresident and General Manager, Thunder Basin Coal Co.
Kevin Hampleman.....Mine Manager, Black Thunder Mine
Tim W. McCreary.....Safety Manager, Thunder Basin Coal Co.
Les RiehemannStep-up Supervisor, Black Thunder Mine

DESCRIPTION

At 7:00 p.m. on Thursday, August 15, 2013, Jacob Dowdy, A-Crew Utility Miner, was assigned to perform various duties including cleaning and/or assisting in moving any electric shovels that were in need of those services. The operation of shovel No. 3 was assigned to Anthony Gregory. Gregory was told to finish loading coal out of the pit and then notify Les Riehemann, Step-up Supervisor, when he was finished. Riehemann would then assign utility miners to assist in the moving of shovel No. 3. After the coal loading was completed, Mike Lewis, Les Watt and John Shoun, Utility Miners, were assigned to help with the shovel move.

The shovel was trammed six-tenths of a mile before starting up the north ramp. Lewis called Riehemann for more help with moving shovel No. 3. Riehemann was attempting to locate a utility miner to assist when Dowdy called over the radio that he was available to assist them. Riehemann dispatched Dowdy to 4 West coal pit.

At 11:30 p.m., bulldozer operator Pat Wilder was dispatched to the 4 West Coal pit to assist the shovel in climbing up the ramp. Wilder trammed the bulldozer down to the bottom of the ramp. Wilder pushed a berm out to make the roadway wider and then waited for the shovel to get to the bottom of the final ramp. The direction of travel for the shovel needed to be adjusted, so it was turned to the right and started up the final ramp. The shovel travelled uphill without incident for another 50 yards and another

turn was made to adjust direction. Wilder assisted the shovel in turning by placing the bulldozer blade on the left side track to help hold the track in place while the steering clutches were disengaged and the left brake was set.

After the second steering adjustment, the shovel continued uphill on the ramp. During this time, the utility workers were positioned as follows; Shoun and Watt were in front of the shovel and Lewis and Dowdy were behind the shovel dropping cable loops from the utility pick-ups used to drag the shovel's trailing cable. The utility crew had dropped two loops off the truck. Lewis's truck couldn't pull the cable up the hill so Dowdy attached his truck to Lewis's truck with a sling. The two trucks were facing uphill and were on the right side of the ramp, slightly behind the right side of the shovel.

The shovel continued uphill. All functions of the shovel appeared to be functioning normally to all persons involved until 12:35 a.m. At that moment, the shovel stopped propelling and started freewheeling downhill. Gregory was operating the shovel while Wilder was operating the bulldozer at the left rear of the shovel. The bulldozer was at about a quarter throttle and the blade was in contact with the counterweights of the shovel. Dowdy was in the first utility pick-up truck, and Lewis was in the second pick-up truck. Both trucks were positioned on the right side of the ramp with Dowdy's truck about 70 yards downhill from the shovel.

Gregory immediately tried to engage the "propel" function with the joystick controls to stop the shovel. Shoun and Watt, who were in front of the shovel, heard a loud bang or pop and the shovel started rolling downhill. Wilder felt the shovel start to move backwards and tried to throttle up and apply pressure to stop the shovel. After the shovel started to move downhill, it pushed the bulldozer out and to the left of the shovel tearing off the lube station guard on the left track undercarriage of the shovel. Gregory, after getting no response from the control sticks, dropped the bucket to the ground and started to apply stop buttons. Lewis reported hearing shouts coming over the radio to "look out" as he saw the shovel move the bulldozer and then start moving downhill towards his location. Lewis placed his truck in reverse and turned the wheel to the left and applied the accelerator.

The shovel's right track contacted Dowdy's truck, crushing the truck. The shovel then contacted Lewis's truck impaling the truck on the "stinger," just behind the left front wheel of the truck (see Appendix A photograph 2). The stinger is a protective support where the trailing cable is attached to the shovel. Lewis was pinned inside his truck by the dash where he remained until he was extricated and taken to the local hospital. Dowdy received fatal injuries after the shovel crushed his truck.

After the shovel stopped moving, Wilder called a mayday and dismounted the bulldozer. Watt came to Wilder's aid as he was in shock. Shoun started downhill and

stopped to check on Dowdy. It was apparent that Dowdy was deceased and he continued downhill to check on Lewis. Gregory dismounted the shovel and was the first to reach Lewis. After contacting Lewis, Gregory broke the passenger side window and noticed Lewis's legs were pinned underneath the dash of the truck. Riehemann heard the mayday call and came to the area followed by utility miner Scott Hayden. Hayden used the bulldozer to push a berm behind the right side track to ensure the shovel could not move. The Mine Emergency Rescue Team arrived and Campbell County Emergency Management was also notified and dispatched to the accident site. The Campbell County Fire Department completed the extrication of Lewis first, and then Dowdy. The county ambulance service transported Lewis to Campbell County Memorial Hospital in Gillette, Wyoming for treatment. Dowdy's body was received by Tom Eekhoff, Campbell County Coroner. Gregory, Shoun, Watt, and Wilder did not receive injuries during this accident.

INVESTIGATION OF ACCIDENT

Safety Manager, Tim McCreary, notified the MSHA call center at 12:47 a.m., August 16, 2013 of the accident. The call center notified Bill Reitze, Acting Assistant District Manager (Technical) at 1:15 a.m. Reitze called McCreary at 1:30 a.m. and verbally issued a 103(j) order to ensure the safety of all miners and to secure the accident scene. Todd Jaqua, Gillette, Wyoming Field Office Supervisor was notified by Reitze and was instructed to send an inspector to the mine. Jaqua directed Coal Mine Inspector Scott Markve to proceed to the mine and begin the investigation. Markve verbally confirmed the 103(j) order and informed mine management the order would be modified to a 103(k) order.

Markve arrived at the accident scene and observed the extrication of Dowdy and conducted a preliminary examination of the area and equipment involved in the fatal accident. Photographs and measurements were taken of the shovel's route of travel. Later that morning, MSHA inspectors Dave Hamilton, Lois Duwenhoegger, James Branson, and Chad Simpson arrived at the mine to assist in the investigation of the accident. The shovel's on-board controls were photographed, as well as the location of the trucks involved. Ron Medina from MSHA's Technical Support and Kathy Cattles from MSHA's Educational Field Services also assisted with the investigation.

On August 23, 2013, the onsite portion of the investigation was completed. A list of persons who participated in the investigation is shown in Appendix B. The accident investigation team conducted six interviews. A list of persons interviewed is shown in Appendix B.

DISCUSSION

Accident Site

The accident occurred in the West Pit on the 4 West coal pit ramp. The ramp was constructed and maintained by the mine to provide access to the coal seam. The ramp was hard packed overburden that had been previously mined. The ramp varied in grade from the bottom, which was level, up to 15.48 percent at the crest of the ramp. The grade where the shovel rolled backwards averaged 14.82 percent. The shovel rolled backwards approximately 327 feet and came to a stop 57 feet from the bottom of the ramp (see Appendix A, Figure B). The grade the shovel stopped on was approximately 6 percent. The ramp condition (dry and compacted) was ruled out as a factor, but the ramp grade was almost to the upper limit of the manufacturer's maximum recommendation of 15 percent grade. The combination of the grade, the weight of the shovel, the physical defects found on the shovel and the location of Dowdy's pickup truck during the accident all contributed to the outcome of the accident.

Anonymous Complaint

Three days after the accident on August 19, 2013, an anonymous hazardous condition complaint was filed with MSHA. A separate investigation was conducted concurrent with the fatal investigation. The positive findings in the complaint investigation specifically corrected the mine's practice of using a bulldozer positioned behind an electric shovel to assist in ascending ramps. A 107(a) imminent danger order and a 104(a) citation in conjunction with the order were issued because investigators found that the mine had an unsafe practice of tramming shovels up the slope of steep ramps and using bulldozers to provide propel assistance, thereby putting the bulldozer operator in a hazardous position.

Equipment

The machine involved in the accident was an electric P&H 2800 MKII shovel that weighed approximately 1.5 million pounds (750 tons). In the position shown in Appendix A, Figure A; the shovel is 55 feet high, 96 feet long and 34 feet wide. The maximum forward uphill safe operating grade limit, according to the manufacturer, is 15 percent.

Propel and Steering/Braking System

The shovel is propelled by a reversible electric propel motor which powers the tracks through a drive-train and steering jaw clutches. The steering jaw clutches control whether the tracks are powered or not. One steering jaw clutch drives the left side track and another drives the right. When a steering jaw clutch is engaged, the track is powered. When disengaged the track is not powered. The machine is steered by powering one track and braking the other. Movement of the steering jaw linkage operates electric limit switches that automatically apply or release the propel brake on

the opposite side of the powered track when the operator selects a left or right turn using a toggle switch on the control panel. A brake wheel is splined directly to each of the two final drive assemblies to provide propel braking. When the propel brake is applied, it will brake the shovel, regardless of whether the steering jaw clutches are engaged or not.

The operator selects straight propel, right steer, or left steer using a three position toggle switch on the control panel. This toggle switch controls air pressure to two air cylinders which operate the steering linkage. A spring cylinder is paired up with each air cylinder and holds the steering jaw clutches engaged by spring force unless the air cylinders are actuated.

The propel (steering) brakes are spring-applied and air-released. It is a toggle lever type brake with "V" shaped brake shoe assemblies. The brake lining contact area is a "V" shaped notch around the perimeter of the brake wheel. The operator can apply the propel brake by shutting down the machine using the STOP button or by pushing the EMERGENCY STOP button. The spring-applied propel brakes will also set if air pressure is lost.

The P&H 2800 MKII shovel design also included a spring-applied, air-released "propel motor brake," that is also referred to as a "parking brake" in the service manual. (This brake was not present on the shovel and apparently had been removed from the machine at some time prior to the accident.) The service manual for the shovel states that: "The propel motor brake operates as a security brake or parking brake when the machine is shutdown" and "the parking brake mounts on the propel motor output shaft and functions as a security brake backing up the propel brakes when the machine is shut down." The propel motor brake is designed to automatically set when the machine is shut down or if there is a loss of air pressure while the machine is running. It does not have any part in controlling the steering function or steering jaw clutches.

The shovel is designed so that, if properly adjusted, the interlock pipe prevents both steering jaw clutches from being disengaged at the same time. After the accident, one jaw clutch was found to be marginally engaged and the other was disengaged. When the drive-train was rotated manually using a lever, both steering jaw clutches became disengaged. The disengagement of both jaw clutches indicated the steering linkage was out of adjustment.

The rest of the drive-train was not damaged and was engaged full time, without any other clutches or disengagement points. The complete drive-train was inspected and tested following the accident and, except for the steering jaw clutches, was intact and functioned as designed. The electric propel motor was also inspected and tested following the accident and functioned as designed. If the electric propel motor had been rotated in reverse by the movement of the tracks as the shovel rolled backwards at

a high rate of speed, it is likely that motor damage would have occurred due to the over-speed condition. P&H personnel stated that severe over-speed of the propel motor can damage the motor due to the high centrifugal force of the spinning rotor and cause it to fail inside the motor housing. Post-accident testing showed that the electric propel motor was not damaged and the drive-train was intact except for the disengaged steering jaw clutches. The cause of the runaway condition was determined to be the disengaged steering jaw clutches. The propel brakes were also inspected, as described later in this report, but did not set until the machine rolled 200 feet down the ramp. Once the brakes set, the machine stopped in about 100 feet.

Correlation of witness accounts

Witnesses reportedly heard something “pop” just before the shovel started rolling backward down the ramp. This would be consistent with the sound of a marginally engaged steering jaw clutch suddenly becoming disengaged. The operator said that all propel ability was suddenly lost and the shovel started rolling backward down the ramp. Witnesses said it gained momentum quickly and was traveling many times faster than normal propel speed.

Steering linkage that was out of adjustment

A number of items contributed to the out-of-adjustment condition that allowed both steering jaw clutches to disengage and the shovel to roll down the ramp. The net result of all these defects was evident by looking at the sliding area of the interlock pipe which is inside the frame of the machine and accessed through a man-hole. Following the accident, both steering jaw clutches were found to be disengaged and yet, there was a gap in the sliding area of the interlock pipe. This should not be possible according to the drawings in the service manual if the steering linkage is adjusted properly. The interlock pipe is designed to prevent both jaw clutches from disengaging at the same time. For example, if a left turn is made, the interlock pipe moves to the right and closes the gap in the sliding area of the interlock pipe. This disengages the left jaw clutch and the interlock pipe forces the right jaw clutch to engage. The interlock pipe prevents disengagement of both steering jaws at the same time. If both steering jaws were disengaged at the same time, the sliding gap would have to be less than zero, however, if properly adjusted, the steering linkage physically prevents this from occurring. P&H issued a service bulletin on July 16, 1980, concerning the propel steering linkage adjustment procedure. This P&H Service Bulletin No. 39 includes an inspection check for the interlock pipe. It states: “With the left jaw clutch engaged and the right jaw clutch disengaged the interlock pipe flanges should touch, as shown in Figure 1, view “A.” As found during the investigation, this specification was not met and the linkage was far enough out of adjustment that the pipe flanges did not touch even if both jaw clutches were disengaged.

The following items contributed to the out-of-adjustment condition:

- a. The left side steering pin was visibly twisted (see Appendix A, Photograph 3). This twisting was not visible until the pin was removed from the machine. Prior to removing the steering pin for inspection, the linkage in this area appeared to be out of adjustment. Specifically, the left side air cylinder was found almost fully retracted, yet the left side steering jaw was found completely disengaged. The left side steering jaw should have been engaged instead of disengaged when the air cylinder is retracted. The right side steering pin was also inspected and no visible twisting was found.

A small amount of twisting in the 2¼ inch diameter steering pin caused a much larger displacement at the end of the shifter lever (17 5/8 inches) and interlock lever (27¼ inches) that operate the engagement and disengagement of the steering jaws.

In addition, with respect to the steering linkage in this area, the P&H Service Bulletin No. 39 states that the process of adjusting new linkage components sometimes requires removing the 3/8 inch fillet weld that secures the splined hub to the interlock lever and then re-welding to obtain the correct adjustment. Proper steering linkage adjustment, therefore, also depends on correct initial installation.

- b. The right side shifter lever and right side shifter yoke were worn (see Appendix A, Photograph 4). The left side shifter lever was worn and the yoke was relatively new and not worn.
- c. The interlock pipe consists of two sections that are bolted together by four bolts at a flange. As found, two of the flange bolts were missing which allowed the interlock pipe to sag and rub on the frame of the machine.
- d. The right side spring cylinder rod was bent which could affect movement. In addition to these mechanical defects, the steering limit switch on the right side was out of adjustment and the interlock lever never made contact with it to apply the opposite side brake during a turn. Powdery dirt and powdery coal in the linkage was cleaned out of this area during the investigation. It could not be determined if the accumulated dirt and coal may have acted as a shim to allow the limit switch to operate correctly prior to the accident. This limit switch must operate properly to steer the machine but does not affect the steering jaw engagement.

Propel brake inspection and testing

After the accident, the propel brake was inspected according to the service manual and found to be out of adjustment. In addition, some of the linings were worn down to the rivets. The brake wheels and linings were otherwise clean with no grease or oil present. The left side brake wheel had an area of bluing which indicates the brake wheel had become excessively hot. This could be caused by dragging brakes or a severe braking stop. In normal operation, the propel brake acts more as a static brake rather than a

dynamic brake. The energy that the brakes absorbed in bringing the shovel to a stop on a 6 to 15 percent grade from a high rate of speed, as reported by witnesses exceeded the energy the brakes absorb in normal operation. The condition of the linings and the state of brake adjustment prior to this extraordinary braking demand could not be determined.

Post-accident tests showed that the propel brake immediately set when the STOP button was pushed or when the EMERGENCY STOP button was pushed.

After the accident, the EMERGENCY STOP button was found in the "brake released" position. This control button is a detented electric switch that remains in the selected position unless moved manually. The STOP button is a spring return push button that does not hold the selected position.

The spring-applied, air-released "propel motor brake," which is also referred to as a "parking brake" in the service manual, was not present on the shovel and apparently had been removed from the machine at some time prior to the accident. This brake is not used for motion stopping or to hold the shovel in place during the dig process. This is a separate brake from the propel brake. According to the shovel operators manual, this brake is to be used as a park brake when the shovel is not in dig or propel mode. The absence of this brake did not affect the outcome of this event.

Summary of Physical Factors

The steering linkage on the shovel was out of adjustment. This allowed both steering jaw clutches to disengage and the shovel to roll down the slope. The following items contributed to the out-of-adjustment condition:

1. The left side steering pin was twisted.
2. The right and left side shifter levers and the right side shifter yoke were worn.
3. Two bolts were missing from the interlock pipe flanged connection and this allowed it to sag and rub on the frame of the machine.
4. The right side spring cylinder rod was bent which could affect movement.
5. After the shovel rolled 200 feet and ran over its own trailing cable causing the machine to lose power, the propel brakes set and were able to stop the shovel on the ramp. Following the accident, this brake was found to be out of adjustment and some of the linings were worn to the rivets. The condition of the linings and the state of brake adjustment prior to this extraordinary braking demand could not be determined. The left side brake wheel had an area of bluing which indicates the brake wheel had become excessively hot. Although these brakes were found out of

adjustment after the accident, the brakes did stop the shovel while traveling at a high rate of speed down the ramp; it is believed the brakes were functional prior to the accident.

Training

Dowdy had 2 years, 50 weeks of mining experience, with 1 year experience on the Utility Crew. All of Dowdy's mining experience was at the Black Thunder Mine

Dowdy had received new miner training and the required annual refresher training as required by 30 CFR, Part 48. The mine provided training prescribed in the current approved training plan, covering slings and rigging.

The approved training plan was in compliance. Failure to follow the shovel operator task training module was found to be a contributing factor in this accident.

The task training module, identified as SHOVEL SOP0021 page 2, item 26, covers moving a shovel up or down a ramp. It states to not have anyone behind the shovel when ascending a ramp. The same paragraph in the module also directs the shovel operator to ensure that if cable must be handled, those handling the cable must be beside the shovel and the swing brakes shall be locked.

Examinations

No hazards were identified on the shovel during the on-shift examination. The on-shift examination would not have noted the excessive grade of the ramp involved in the accident.

The preoperational examination of shovel No. 3 was performed as required. No defects affecting safety were noted for the shovel prior to it being operated.

Scheduled preventive maintenance occurs on two schedules at this mine, once every 2,400 hours and 15-day scheduled maintenance. The 2,400 hour scheduled maintenance is a comprehensive maintenance event for the shovel that examines all portions and components on the shovel. The last 2,400 hour maintenance event occurred in March 2013. The 15-day maintenance is scheduled to occur on/or after 15 days of operation. The 15 -day maintenance event examines the components of the shovel to check for defects, change filters, and also replenish the lubrication supplies onboard the shovel. This would cover all components of the shovel and simple repairs would be performed if defects were found. The 15-day maintenance may also occur at a lesser interval depending on any supplemental maintenance that was scheduled. Supplemental maintenance is performed as required, according to preoperational exams or defects of the shovel that occurred during operation. Maintenance records show the last supplemental maintenance occurred on July 28, 2013. The mine provided work orders and invoices indicating maintenance was performed as scheduled or as necessary. It

could not be determined when the steering shaft was bent or when the steering linkage shaft bolts were lost.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the most basic causes of the accident that were correctable through reasonable management controls. These root causes, if corrected, would have prevented the accident or mitigated the outcome. The following root causes were identified:

1. *Root Cause:* The mine operator was aware of a hazardous practice and allowed it to continue. The mine operator was aware that miners and equipment were frequently not positioned correctly while the shovel was propelling up a ramp. The mine operator was aware that this practice violated the mine operator's standard operating procedures and the task training given by the mine operator.

Corrective Action: The mine operator implemented a written procedure to tram shovels on ramps that prohibits bulldozers or other pieces of equipment from being downhill of the shovel while it is tramping on a ramp. The mine operator's written procedure contains the following procedure and policy.

Mandatory Steps when moving electric shovels up or down ramps:

1. Ensure the grade of the ramp is within the manufacturer's recommendations with consideration for the type of machine being moved.
2. Distribute a surveyed map of the shovel move to all persons involved.
3. Pre-route the trail cable to ensure there is no need for persons to be in any downhill positions.
4. Conduct functional brake and steering tests to ensure all are in proper working condition. Maintenance personnel will assist in brake and steering checks. Make any repairs or adjustments if necessary.
5. Perform functional test of E-Stop button in the cab to ensure the brakes are activated when the button is depressed and the machine shuts down.
6. Clear the area downhill of all personnel. Ensure no persons enter the downhill area while the shovel is being moved up or down the ramp.
7. If the shovel move goes into the next shift, the shovel will be blocked from motion/secured and steps 4 to 6 completed again prior to continuing the shovel move.
8. No dozer or other piece of equipment will be used to provide assistance from a downhill position when moving shovels on a ramp.
9. If a shovel is stuck in a dig/work area, a dozer assist from a downhill position not directly in line with the shovel tracks may be used. Dozer assist in any other position may be used.
10. In the event a shovel needs maintenance of any kind or a person is required to board the machine or get in a downhill position while in the process of moving up or down a grade, the following additional steps must be taken:

- a. The shovel must first be chocked and blocked. Chocking must be accomplished from the side of the shovel.
 - b. Two likely methods to be used as chocking will be dozing dry material or inserting cribbing mats behind the downhill end of the tracks.
 - c. The chocking method must ensure secure blocking of the shovel is achieved.
11. All shovel moves must be noted in the daily on-shift inspection book.

Maximum Grades for moving shovels per the manufacturer:

SH1, SH2, SH3, SH4, SH5, SH6, SH17, SH19 - all these are 15%

SH18, SH20, SH21, SH25, SH26, SH27, SH28 - all these are 20%

SH8, SH15, SH16, SH22, SH23, SH24 - all these are 23%

The mine operator retrained all shovel operators and cable handlers in this procedure.

2. *Root Cause:* The mine operator failed to maintain the steering/propel mechanism on the shovel. The components were found to be damaged, missing or worn to the point of operational failure.

Corrective Action: On the shovel involved in the accident, the mine operator replaced all components of the steering mechanism. Also, the propel brakes were replaced due to damage during the accident.

The mine operator trained and retrained all miners who perform scheduled preventive maintenance, and maintenance before each time the shovel is trammed up or down a ramp (see #4 in Corrective Action 1 above). The manufacturer's service manual requirements were reviewed with the miners who perform maintenance to ensure adjustments of the propel clutches and brakes are within the manufacturer's specifications. Also, the mine operator is requiring the miners to use the manufacturer's propel and brake inspection sheets that list individual components and provide a place for the conditions of individual components to be recorded.

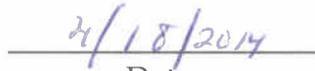
CONCLUSION

The accident occurred because the mine operator failed to correct known, unsafe shovel tram procedures and maintain the shovel in safe operating condition. The victim was positioned behind the shovel when the shovel was ascending a steep grade that averaged almost the maximum recommended grade for this model of electric shovel. The left side steering pin was twisted and the steering interlock pipe was missing 50 per cent of its bolts. The right and left side shifter levers along with the right side shifter yoke showed excessive wearing and the right side spring cylinder rod was bent. The damaged/worn parts prevented the machine from functioning safely by allowing the steering/drive mechanism to disengage from both clutches. Once the clutches were disengaged, the machine freewheeled down the ramp crushing the victim's truck resulting in the victim's fatal injuries, and trapping another miner in a second truck.

Signed



Russell J. Riley, District Manager



Date

ENFORCEMENT ACTIONS

1. A 103(j) Order was issued to ensure the safety of all miners during and after recovery actions for the affected area and equipment. This order was modified to section 103(k) order at 02:55 am on August 16, 2013.
2. A 104(d)(1) violation was issued for a violation of 30 CFR, 77.409(a). The P&H 2800 Mark II electric shovel (c/n 3) was operated where it was a hazard to miners near the shovel. The shovel was operated on a steep grade with miners positioned behind the shovel. The mine's task training specifically (SOP0021 page2, item 26) prohibits this practice. Three miners, one bulldozer operator and two pickup truck operators, were behind the shovel during the ascent. One of the pick up truck operators received fatal injuries, the second pick up truck operator was injured but survived the accident and the bull dozer operator was not injured. The shovel experienced a mechanical failure and freewheeled down the ramp crushing the trucks. This practice contributed to the fatal accident that occurred August 16, 2013. The mine operator actively ignored the 30 CFR 48.27 task training that they gave to the miners. The mine operator routinely directed the miners to act in a manner that violated this training.
3. A 104(a) violation was issued for a violation of 30 CFR, 77.404(a). The P&H 2800 Mark II electric shovel (c/n 3) was not maintained to assure safe operation.
 1. The left steering pin was found to be twisted.
 2. The interlock pipe was found to be missing two of four bolts in the coupling located on the interlock pipe.
 3. The right side spring rod was bent.
 4. The right and left shifter levers showed excessive wear.
 5. The right side shifter yoke showed excessive wear.

These components are part of the steering/drive system on this shovel. The twisted steering pin and the missing bolts allowed both sides of the steering clutches to disengage at the same time. The shifter yoke and levers added to the defective steering linkage. The bent spring rod may have prevented the safety limit switch from being activated, thereby setting brakes on the shovel. The combination of these defects allowed the shovel to freewheel down a steep ramp crushing two trucks, killing one miner and injuring another. This violation contributed to the accident that occurred August 16, 2013.

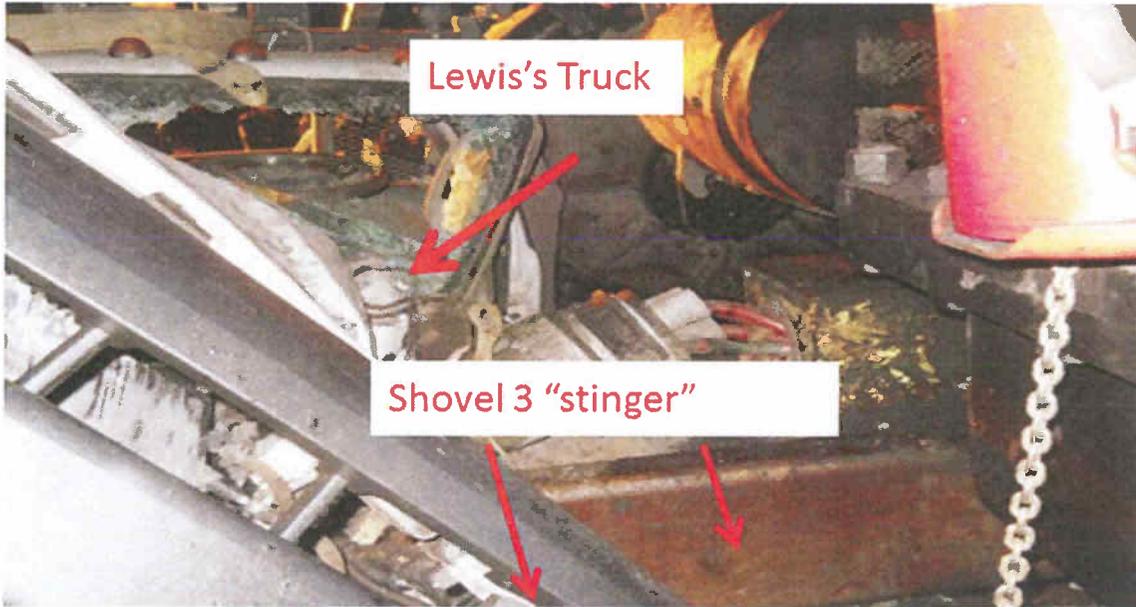
4. A 104(a) violation was issued for a violation of 30 CFR, 77.1607(b). The operator of the P&H 2800 Mark II shovel (c/n 3) failed to maintain full control of the shovel. An August 16, 2013, shovel 3 was ascending the 4 west ramp when it lost it's propel function and freewheeled down the steep ramp crushing two trucks

positioned behind the shovel (reference citation 8476275 issued for violation of 77.409(a)). The shovel operator had no control of the shovel during the freewheeling event. This condition contributed to the fatal accident that occurred August 16, 2013.

5. A 107(a) imminent danger order, number 8476682, was issued on August 21, 2013, pursuant to the hazardous condition complaint investigation. The mine has a practice that shovels are trammed up the slope of ramps and bulldozers are utilized to provide propel assistance, putting the dozer in a hazardous position while the shovel is being operated. It is reported that the dozer would put the front blade onto the rear counterweight to provide propel assistance up a slope. Under continued mining practice, if the shovel should lose propel it could rollover the top of the dozer behind it resulting in fatal type injuries to the dozer operator. An oral imminent danger order was issued to Jack Steele at 15:30 this date. Citation #8476683 is issued in conjunction with this order.
6. A 104(a) citation, number 846683, was issued on August 21, 2013, pursuant to the hazardous condition complaint investigation. The mine has a practice that shovels are trammed up the slope of ramps and bulldozers are utilized to provide propel assistance, putting the dozer in a hazardous position while the shovel is being operated. It is reported that the dozer would put the front blade onto the rear counterweight to provide propel assistance up a slope. Under continued mining practice, if the shovel should lose propel it could rollover the top of the dozer behind it resulting in fatal type injuries to the dozer operator.

This citation is being issued in conjunction with Imminent Danger Order #8476682. As such, no abatement time is set for this as this is written in conjunction with an Imminent Danger Order.

Appendix A, Photographs and Figures



Photograph 2, Lewis' Truck

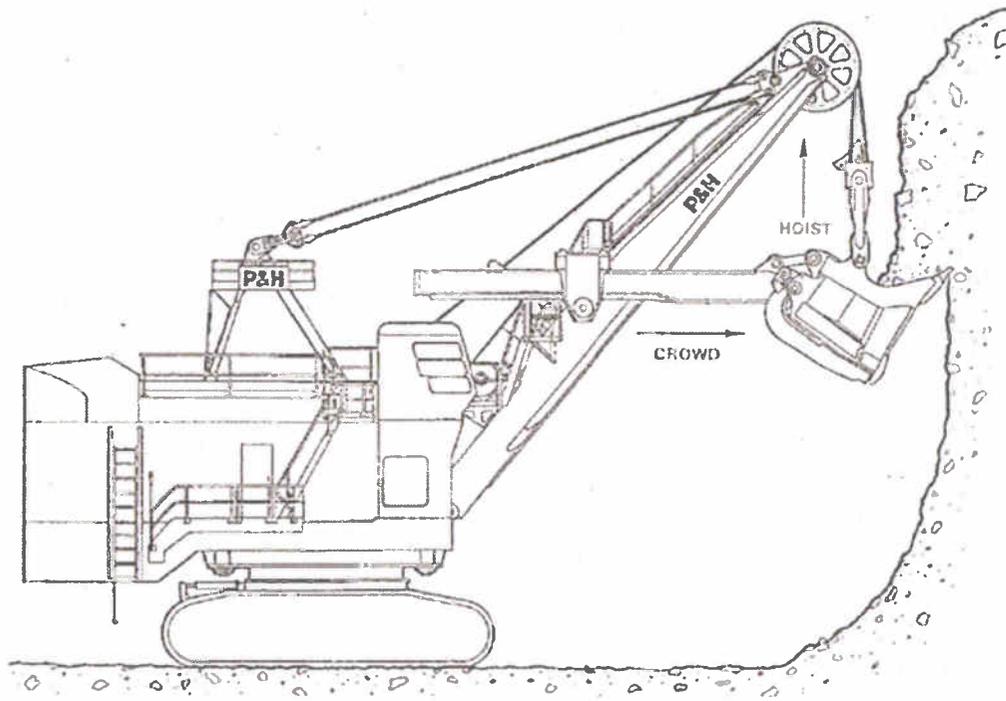


Figure A, P&H 2800MKII Shovel

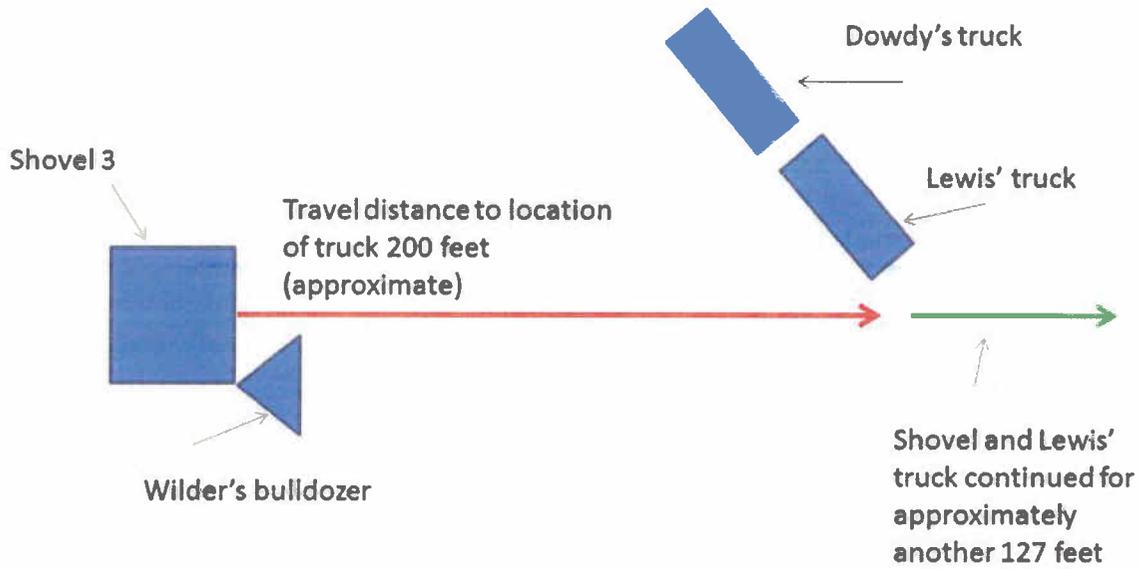
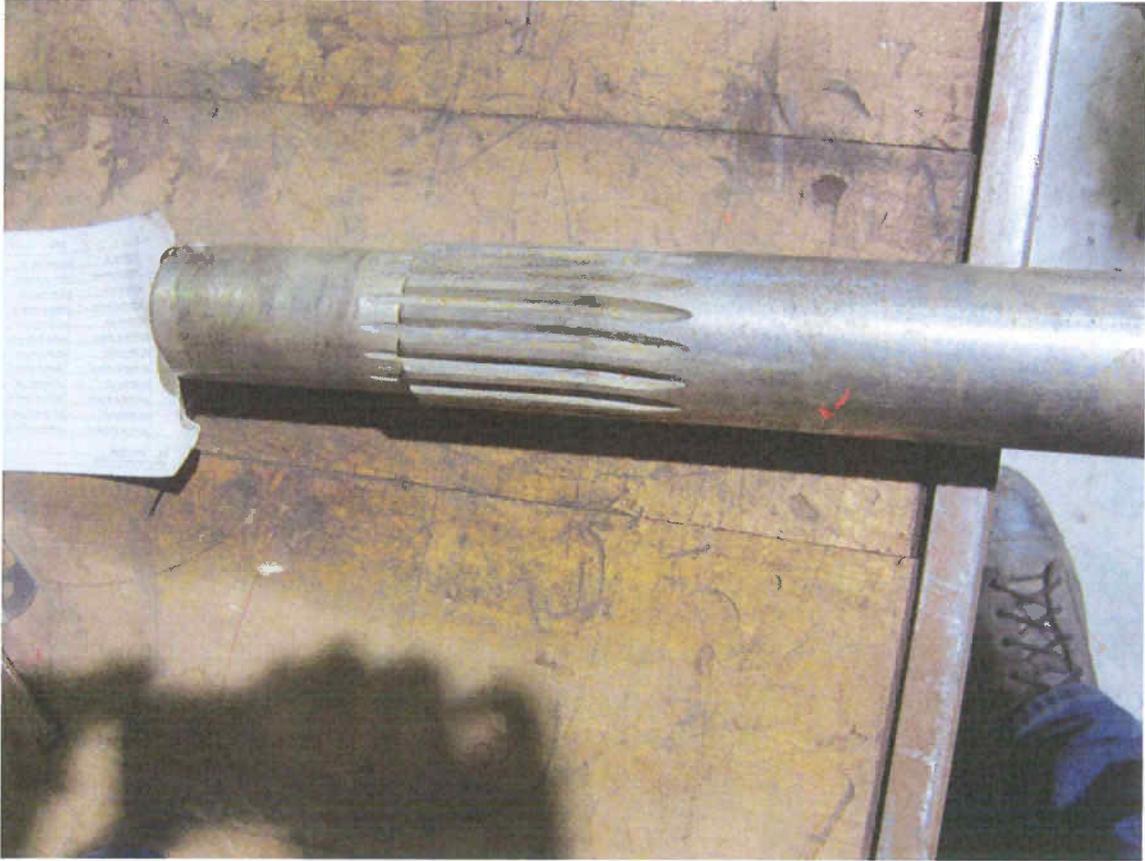
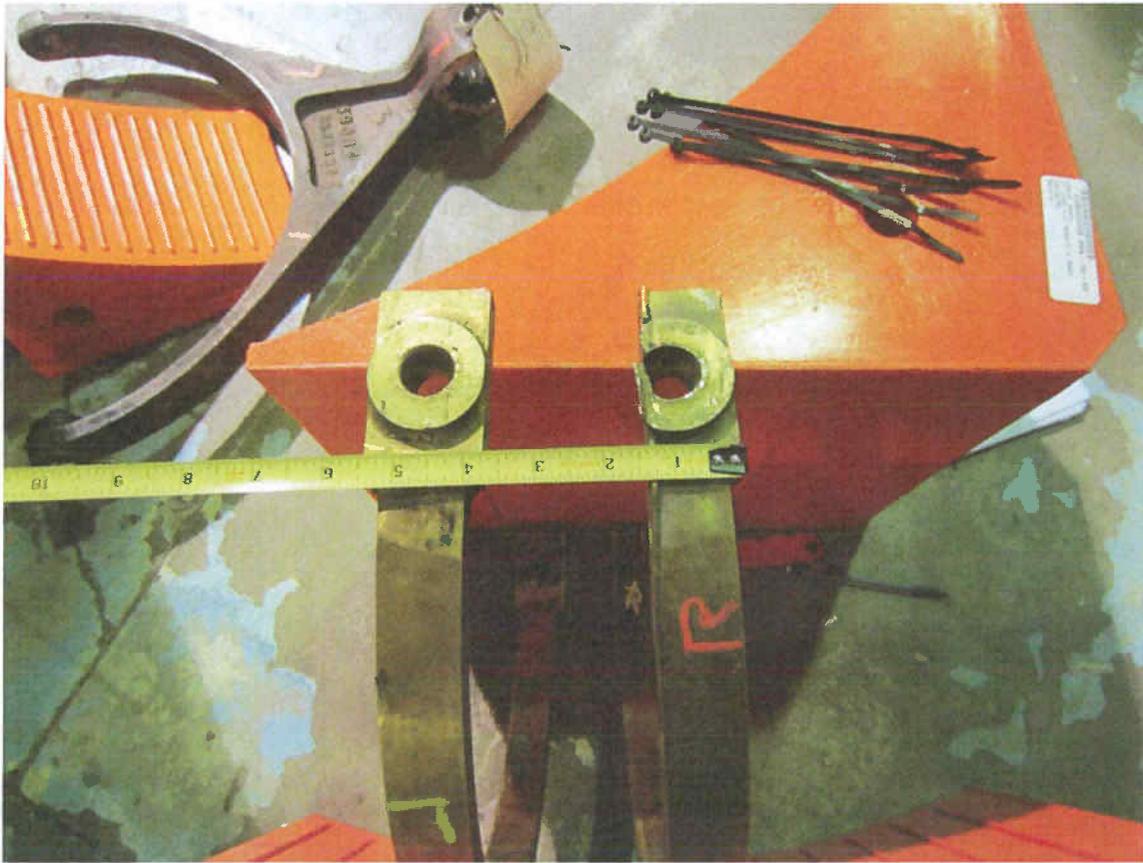


Figure B, Location of Equipment involved in Accident



Photograph 3, Twisted Left Side Steering Pin



Photograph 4, Comparison of Left (L) and Right (R) Side Shifter Yokes

Appendix B - Persons Involved in Investigation

Thunder Basin Coal Company LLC Management (Corporate and Mine Officials)

Tim McCreary	Safety Manager
Rick McCreary	Maintenance Manager
Brian Black	Electrical Superintendent
Lynn Buscholl	Safety Manager Coal Creek Mine
Robert Moore	Senior Safety Professional
Nick Brooks	Safety Professional
Steve Skinner	Safety Professional
Tom Skinner	Safety Professional
Steve Beil	Engineering Manager
Ralph Filangi	Shop Maintenance Superintendent
Dan Brannon	Pit Maintenance Superintendent
Larry McKown	Weekend Operations Superintendent
Charles Riley	Pit Maintenance Superintendent
Colter Burleson	Maintenance Superintendent
Mike Hiatt	Pit Maintenance Planner
Jim Burleson	Maintenance Planner
Tre Aars	Pit Supervisor

Black Thunder Miner's Representatives

Scott Hayden	Representative
Nick Haney	Representative
Mark McClintock	Representative
Lisa Hanes	Representative
Andy Keller	Representative
Justin Liggett	Representative
Amy Love	Representative
Joe Parker	Representative
Adam Ertman	Representative
Trish Gregory	Representative

State of Wyoming Officials

Terry Adcock	State Mine Inspector
Doug Bailey	Deputy State Mine Inspector
Carey Ashley	Deputy State Mine Inspector

Black Thunder Mine Employees

Randy BoregoEquipment Operator
Brian Thompson.....Millwright Mechanic
Jimmy JohnsonMillwright Mechanic
Landon Lein.....Millwright Mechanic
Bill McCoy.....Millwright Mechanic
Jeff Lyman.....Millwright Mechanic
Danny Olson.....Millwright Mechanic
Nick Bear.....Millwright Mechanic
Jake ShipmanMillwright Mechanic
Rory Burlson.....Electrician
Les RiehemannUtility

Joy Global/P&H

Troy ShanksTechnical Service Supervisor
Jeff Schwake.....Product Support Aftermarket
Engineer

SKV Mining
(Subject Matter Expert Hired by TBCC)

Steve Vinot.....Owner/Operator

Jackson Kelly PLLC

Christopher Peterson.....Counsel

Hall & Evans

Ken Lyman.....Counsel

Mine Safety and Health Administration Accident Investigators

Scott A. Markve	Lead Accident Investigator
Lois Duwenhoegger.....	Accident Investigator
Chad Simpson.....	Accident Investigator
Ronald Medina	Mechanical Engineer
Kathy Cattles.....	Educational Field Services
James Branson	Coal Mine Inspector (Surface)
David Hamilton.....	Coal Mine Inspector (Surface Specialist)
Peter Saint	Electrical Supervisor

Persons Interviewed

Mike Lewis	Utility Miner
John Shoun	Utility Miner
Les Watt	Utility Miner
Pat Wilder.....	Bull Bulldozer Operator
Anthony Gregory	Shovel Operator
Les Riehemann	Step Up Supervisor/Utility Person

Appendix C Victim Information

Accident Investigation Data - Victim Information

U.S. Department of Labor
Mine Safety and Health Administration



Event Number:

Victim Information: 1														
1. Name of Injured Employee: <i>Jacob R. Dowdy</i>			2. Sex: <i>M</i>		3. Victim's Age: <i>24</i>		4. Degree of Injury: <i>01 Fatal</i>							
5. Date (MM/DD/YY) and Time (24 Hr.) Of Death: <i>a. Date: 08/16/2013 b. Time: 0:35</i>						6. Date and Time Started: <i>a. Date: 08/15/2013 b. Time: 19:00</i>								
7. Regular Job Title: <i>116 Utility Miner (various duties/locations)</i>				8. Work Activity when Injured: <i>041 Assisting shovel move</i>				9. Was this work activity part of regular job? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>						
10. Experience a. This			b. Regular			c. This			d. Total					
Years	Weeks	Days	Years	Weeks	Days	Years	Weeks	Days	Years	Weeks	Days			
Work Activity: <i>1</i>	<i>0</i>	<i>0</i>	Job Title: <i>1</i>	<i>0</i>	<i>0</i>	Mine: <i>2</i>	<i>50</i>	<i>0</i>	Mining: <i>2</i>	<i>50</i>	<i>0</i>			
11. What Directly Inflicted Injury or Illness?: <i>076 Electric excavation shovel</i>						12. Nature of Injury or Illness: <i>390 severe trauma to head</i>								
13. Training Deficiencies:														
Hazard:			New/Newly-Employed			Experienced Miner:			Annual:			Task:		
14. Company of Employment (if different from production operator): <i>Operator</i>						Independent Contractor ID: (if applicable)								
15. On-site Emergency Medical Treatment														
Not Applicable		First-Aid		CPR:		EMT:		Medical Professional:		None:				
		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>								
16. Part 50 Document Control Number: (form 7000-1)						17. Union Affiliation of Victim: <i>9999 None (No Union Affiliation)</i>								