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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 8, 2015

MC#1 Mine
M-Class Mining, LLC
Macedonia, Franklin County, Illinois
I.D. No. 11-03189

Accident Investigators

Harry Wilcox
Coal Mine Safety and Health Inspector

Robert Bretzman
Supervisory Coal Mine Safety and Health Inspector

Fred T. Marshall
Mechanical Engineer

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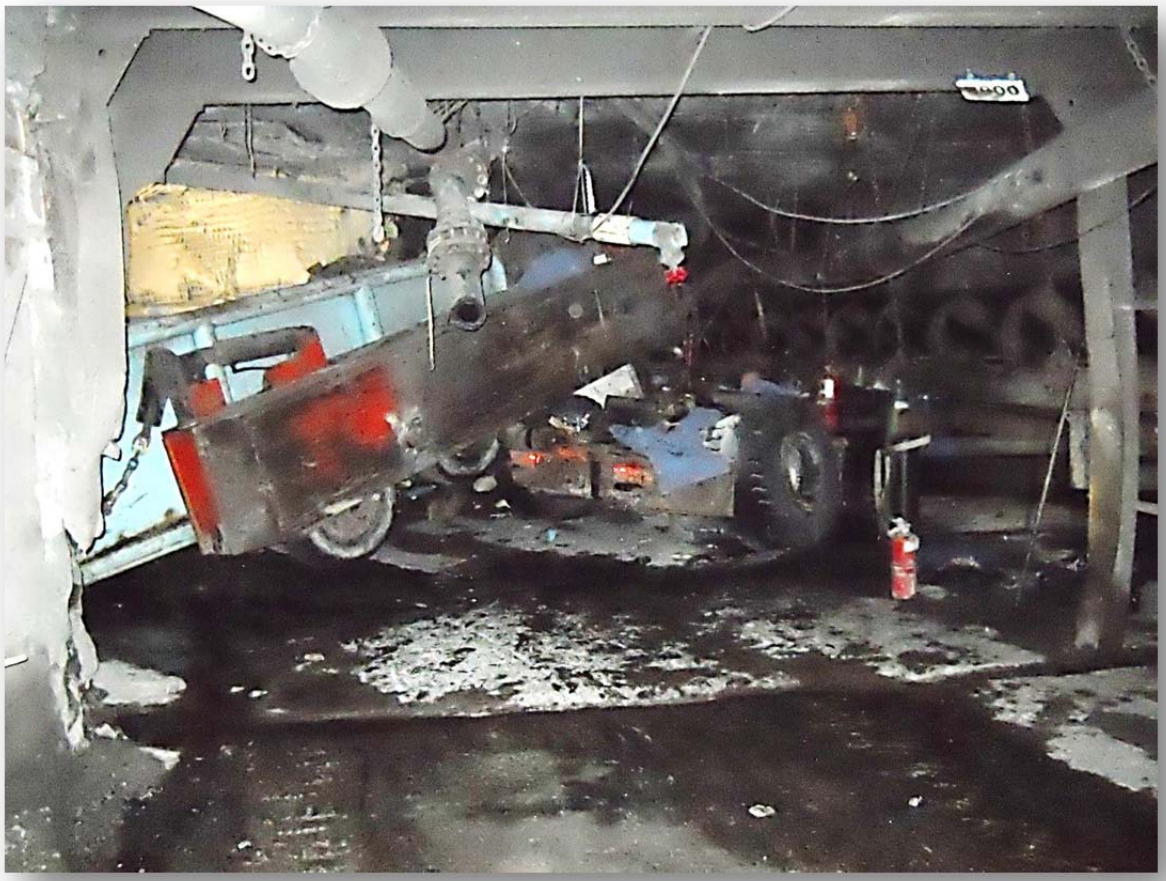


OVERVIEW

On Tuesday, December 8, 2015, at 7:53 p.m., Tyler Rath, a 20-year-old supply man with two years of mining experience, was fatally injured while driving a tractor that was pulling a shield hauler trailer loaded with longwall face conveyor chain down an 8.75 degree (15.4%) slope. He was unable to navigate the left-hand turn at the bottom of the slope and collided with the rib causing the 5th-wheel trailer connection to break. The trailer continued moving forward and hit the operator's compartment which caused fatal injuries to the victim.

The accident occurred because the mine operator failed to adequately train miners and follow written policies, programs, procedures, and controls that were in place to protect miners from hazards related to hauling equipment and material into the mine along the slope haulage road. In addition, the mine operator failed to use equipment that was properly rated for the purpose of lowering equipment and supplies into the mine along the slope haulage road.

Finally, the mine operator failed to maintain the J.H. Fletcher & Co. (Fletcher) model 3885-AD, Prime Mover Diesel Tractor, company No. 5, in a safe operating condition and maintain the slope haulage road surface in a condition that would allow adequate traction while tractors were driven on the road.

GENERAL INFORMATION

The MC#1 Mine is operated by M-Class Mining, LLC, and is located near Macedonia, Franklin County, Illinois. Coalfield Transport Inc. is the current controller for M-Class Mining, LLC, and Coalfield Construction Company, LLC, has an active part in the management and oversight of the mine. Coal is mined from the Herrin No. 6 coal seam, which averages 6 feet in height and has a depth-of-cover of 900 feet. At the time of the accident, the mine employed 401 miners. The mine operates five days per week, operates three production shifts each day, and produces an average of 77,000 tons of raw coal per day.

The mine has a dual-purpose slope at the MC#1 South portal and a shaft at the Viking North portal. The slope is 26.75 feet wide and is comprised of two sections identified as "A" slope and "B" slope. The "A" slope is approximately 3,000 feet long, originates on the surface, and is inclined at an angle of 8.75 degrees directed north-west. The "A" slope terminates at a landing area at a three-way crosscut where the haulage road intersects a slope run-around that leads to the top of the "B" slope (see Appendix B). The "A" slope entry narrows to 20.75 feet at the landing area where the haulage road is routed to an approximate 45 degree crosscut to the left at 2,924 feet. The approximately 3,000 feet long "B" slope originates at the western end of the run-around from the "A" slope landing area. The "B" slope is also inclined at an angle of 8.75 degrees directed due east. The "B" slope terminates in the Herrin No. 6 coal seam. One side of the slope is used as a haulage road to transport people and material in and out of the mine. A belt conveyor, on the other side of the slope, transports coal out of the mine. The shaft at the Viking North portal is used to transport people and material in and out of the mine.

At the time of the accident, the mine was ventilated by two blowing mine fans, two exhausting mine fans, and one belt exhaust fan. One of the blowing fans provides intake air for the MC#1 South portal area, and the other blowing fan provides intake air for the Viking North portal area. The two exhausting main fans are located at the back bleeder entries of the MC#1 South Longwall District and the Viking North Longwall district. The belt exhaust fan is located on the Main North belt entry. The mine operates five mining sections. Three mining sections utilize continuous mining machines and shuttle cars for the development of longwall gate entries. Two mining

sections utilize a longwall system consisting of a shearer, armored face conveyor (pan line), stage loader, and 1,200-ton capacity portable roof supports (shields).

The MC#1 Mine liberates 6,067,454 cubic feet of methane in a 24-hour period and is on a 5-day spot inspection schedule for excessive methane in accordance with Section 103(i) of the Mine Act.

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

Anthony Webb……	President of Underground Operations, Coalfield Construction, LLC
Travis Brown……..	General Manager, MC#1 South Portal
Michael Lilly……	Superintendent, MC#1 South Portal
Demetrius Macropoulos...	Mine Manager, MC#1 South Portal
Steve Murray……..	Safety Manager, MC#1 South Portal

A regular (E01) safety and health inspection was started on October 1, 2015, and was ongoing at the time of the accident. The previous E01 inspection of the mine was completed on September 29, 2015. The Non-Fatal Days Lost (NFDL) injury incidence rate for the MC#1 Mine in 2014 was 3.65, compared to the National NFDL rate of 3.25 for mines of this type.

DESCRIPTION OF THE ACCIDENT

The mine's tracking system records and interview statements indicate Tyler Rath checked-in at 1:50 p.m. on the mine site for his normal 4:00 p.m. to 1:00 a.m. evening shift. Edward Heins, Supply Man MC#1 South Portal, Nicolas Rash, Diesel Mechanic MC#1 South Portal, and Thomas Vaughn, Outby Laborer MC#1 South Portal, talked with Rath before the start of the shift. Rath arrived on the surface at the top of the "A" slope for his first trip into the mine at 3:58 p.m. with the Fletcher Prime Mover Diesel Tractor (No. 5 tractor) and a load of material for the Headgate 4 section. Rath started down the Slope at 4:17 p.m. and arrived at the "A" slope bottom at 4:24 p.m. Rath then started down the "B" Slope at 4:28 p.m. and arrived at the "B" slope bottom at 4:33 p.m. Rath continued into the mine as normal and delivered his load of material. He returned to the surface with an empty supply trailer at 7:03 p.m. Rath drove the No. 5 tractor and the empty supply trailer into the supply yard where Dwight Jackson, Yard Man MC#1 South Portal, assisted Rath in uncoupling the empty supply trailer. Jackson assisted Rath in coupling to an empty shield hauler trailer, and in loading a tub containing 164 feet of assembled armored face conveyor chain into the shield hauler trailer. During this process, Rath told Jackson that he had no problems taking a similar load down the slope by himself on his previous shift without a brake tractor attached to

the rear of the trailer. The use of a brake tractor involves connecting two tractors with the trailer in-between to allow the trailing tractor operator to assist with braking. Jackson told him to always use a brake tractor for this type of load. Rath acknowledged hearing the advice and went to dinner. During the dinner break, Rash heard Rath say he would be pulling a shield trailer with a tub loaded with pan line chain into the mine. Rash heard Vaughn tell Rath that he would do the brake tractor for him. Rath told Vaughn that he did not need to have a brake tractor because he had a "half" tub of chain instead of a full tub. Rath told Vaughn he had hauled a "half" tub of chain down the slope the previous day without a problem and he would be fine. Rath drove off with the loaded shield hauler trailer and entered the "A" slope at 7:46 p.m. A comparison of belt time records and tracking system records indicate that Rath arrived at the "A" slope bottom at 7:53 p.m.; the slope belt stopped running at this same time.

Heins, Rash, and Vaughn heard on the radio the slope belt was not running for some reason. Josh Lender, Warehouse/Control Room Operator, asked Rash to go down the slope to determine why the belt was off. Heins and Rash traveled into the mine at 7:57 p.m. and arrived at the "A" slope bottom at 8:01 p.m. Heins and Rash looked over the area before advancing to the tractor. From a short distance away, they saw the tractor broken in half with the trailer wedged over the top of the tractor. They also saw broken water lines spraying water over the top of the tractor. Heins and Rash were initially unable to locate Rath due to the water spraying and extensive damage to the tractor. After climbing on the tractor, Heins and Rash found Rath pinned in the operator's compartment. Several minutes elapsed while Heins and Rash broke off the pipes that were spraying water on the tractor and the victim. They called out to him and saw he was unresponsive and had obvious fatal injuries. A couple of minutes prior to leaving the accident scene, Rash called out on the radio to report the accident to Macropoulos and Lender. He left the accident scene at 8:14 p.m. when Macropoulos instructed them to exit the mine. Heins and Rash exited the mine on the "A" slope and gathered equipment to use in the recovery of Rath.

A short period of time after Heins and Rash left the area, Macropoulos arrived at the accident scene from the "B" slope with Kyle Fitch, Section Foreman MC#1 South Portal, and Brandon Tackett, Outby Laborer MC#1 South Portal. Tackett had emergency medical technician (EMT) and mine rescue expertise. Phillip Dunn, Coal Mine Safety and Health (CMS&H) Inspector, was underground at the time of the accident conducting a respirable dust survey as part of the ongoing E01 inspection. Minutes after Macropoulos arrived, Inspector Dunn and John Miklos, Safety Technician, MC#1 South Portal, arrived at the scene. Miklos found a small fire burning in the engine compartment on the right side of the tractor which was quickly extinguished with a fire extinguisher. Rodney Powell, Maintenance Supervisor, arrived at the accident scene from the surface about the same time as the other two groups. Larry Fourez, Longwall Foreman, and Shawn Stacy, Section Foreman, arrived at the accident scene with

supplies to aid in the recovery. Tackett and Dunn determined Rath had no pulse and was unresponsive with a visible head injury. No first aid was administered due to the extent of his injuries. Tackett and Dunn covered Rath's body with blankets. All miners were withdrawn from the mine via the Viking North portal. Macropoulos and Fourez stayed at the accident scene to monitor the area while mine personnel were being evacuated out the Viking North portal.

A recovery team consisting of Webb, Brown and Lilly arrived at the accident scene at 9:03 p.m. Macropoulos and Fourez stayed to help in the recovery. Brown and Lilly used knives to remove the rubber liner from the operator's compartment wall. Webb used cutting torches to remove metal from the operator's compartment wall. Pry bars and manual chain hoists were used to pull the seat and other thin gage metal out of the operator's compartment to recover Rath from the operator's compartment. The recovery team departed with Rath from the accident site to the surface where he was pronounced dead at 11:20 p.m. on December 8, 2015, by John Graskewicz, Deputy Franklin County Coroner.

INVESTIGATION OF THE ACCIDENT

Brown contacted the Mine Safety and Health Administration (MSHA) Call Center at 8:23 p.m. on December 8, 2015, to report the accident. At 8:39 p.m., the MSHA Call Center contacted Eddie Kane, Supervisory CMS&H Inspector Special Investigations, to notify him that an accident had occurred. Kane contacted Robert Bretzman, Supervisory CMS&H Inspector, and advised him of the accident.

Bretzman contacted Webb and verbally advised him of his obligations under 103(j) of the Mine Act. Bretzman then notified Harry Wilcox, CMS&H Accident Investigator, of the accident and directed him to conduct an investigation. Bretzman and Wilcox traveled from the Marion Field Office to the mine, arriving at 10:32 p.m.

The accident investigation was conducted in cooperation with the Illinois Department of Natural Resources, Office of Mines and Minerals (IDNR), M-Class Mining, LLC personnel, and Coalfield Construction, LLC personnel. Preliminary interview statements were obtained from persons having knowledge of the facts and circumstances concerning the accident. Appendix A lists the persons participating in the accident investigation.

On December 9, 2015, at 2:15 a.m., the accident investigation team traveled underground to conduct an initial on-scene investigation where investigators took photographs, prepared sketches, and made relevant measurements (see Appendix B).

On December 11, 2015, Fred T. Marshall, Mechanical Engineer from MSHA Technical Support's Approval and Certification Center, arrived to collaborate with other investigators in evaluating the No. 5 tractor, the trailer, and the accident scene. On December 11, 2015, Denzil Hughes, MSHA Supervisory Training Specialist, conducted a review of the training records for Rath and other miners as part of this investigation.

The accident investigators conducted formal interviews on December 14, 2015, at the MSHA Marion Field Office. Persons interviewed are listed in Appendix C.

DISCUSSION

Accident Scene

The accident occurred on the belt/haulage "A" Slope entry of the MC#1 Mine south portal inby the 2,900 foot location of the "A" Slope haulage road. When investigators arrived at the accident scene, Rath had been removed from the mine. The No. 5 tractor was broken in half at the center articulation point and the loaded trailer was positioned over the top of the front and rear sections of the tractor. The equipment blocked the "A" slope haulage road and belt at the three way crosscut where the haulage road intersected the "A" slope run around at the 2,924 foot location.

Rath's mine tracking/communication unit and other personal equipment were found next to the slope belt where the recovery team had placed them. These items were removed from the mine.

The floor of the haulage road was wet with water flowing down the "A" slope starting approximately 600 feet from the top of the slope. The water was flowing in two parallel ruts where the mobile equipment tires contacted the concrete floor of the slope. The water flowing down the slope originated from leaks in the conveyor belt water line and ground water seepage from the slope roof. The slope haulage road has a drainage system in the floor consisting of a continuous trough located on the rib side of the haulage road. The trough runs parallel to the slope for the entire length of the "A" and "B" slopes. Diagonal troughs cross the haulage road from the belt side and connect to the continuous trough. Both the continuous and diagonal troughs on the "A" slope were obstructed with mud and other debris, causing the water to overflow onto the haulage road surface where it formed a thin layer of water mixed with slick, damp, fine particle solids down grade from the source of the water.

The upright "I" beams on the "A" slope next to the belt and the "I" beams on the rib side of the haulage road installed as part of the Slope Construction Plan for ground control purposes were bent, distorted and scratched from contact by mobile equipment

over an extended period of time. This damage was observed beginning at 600 feet down the "A" slope and continued for 2,300 feet to the bottom. Recent damage was observed in the form of fresh scratches and dislocated "I" beams beginning at 2,300 feet and ending at the accident scene. The "B" slope had minor water leakage from a water pipe in two or three locations along the haulage road on the belt side of the slope. The "B" slope has a similar water drainage system as the "A" slope. The drainage troughs along the "B" slope were clear and unobstructed for the majority of the haulage road except at the various locations where water leakage was observed. The water at these locations overflowed onto the haulage road surface and mixed with fine particles down grade from the source of the water to create slippery conditions. The upright "I" beams on the "B" slope next to the belt and on the rib side of the haulage road also showed signs of damage at the locations where the road surface was wet.

Previous Accidents, Relevant Interview Statements, Tracking Information Analysis

A review of reported accidents for the MC#1 Mine revealed one previous accident resulting in an injury that was related to the use of powered haulage equipment. The accident occurred on the belt/haulage "A" Slope entry of the MC#1 Mine south portal inby the 2,900 foot location. On May 6, 2013, a tractor operator towing a loaded supply trailer lost control and hit the corner at the bottom of "A" slope resulting in a broken leg injury to the tractor operator. MSHA issued safeguard No. 8439194 on July 25, 2013, as a result of this accident. The mine operator implemented a slope haulage plan which detailed the requirements for safely hauling material into the mine along the slope haulage road in order to terminate this safeguard.

The slope haulage plan includes the requirement; "Loads exceeding the design rating of a single piece of equipment may be lowered into the mine only with accompaniment of a trailer braking system and/or additional piece(s) of equipment attached by a properly rated towing device for a combined braking capacity exceeding the load being transported." With the exception of Brown, the miners and management personnel interviewed were unaware of this safeguard and had limited knowledge of the safety precautions outlined in the associated slope haulage plan, indicating there was a lack of training on this safeguard.

Heins stated he experienced instances where the tractor he was operating slid on the slope haulage road while he was towing a loaded trailer. He said this had also occurred when towing heavy loads with tractors connected to the front and rear of a trailer to provide additional braking force to control the heavy loads. He stated other supply haulage operators experienced similar instances where the tractor would slide on the slope haulage roads while towing a trailer. Heins also stated there were occasions during the last two years when the tractor he was operating would lose traction while traveling down the slope and he would run into the standing "I" beams that were installed along the length of the slope to slow the tractor down. Adam Napier and

Colby Alexander, Supply Men, MC#1 South Portal, confirmed that they experienced the loss of control of the tractors on the slope. They also said that they had run into the "I" beams to slow the tractors down in order to regain control.

Additionally, the following supervisors and miners stated they had first-hand knowledge of, and/or were made aware of, the loss of traction and control of these tractors on the slope:

1. Travis Brown - General Manager, MC#1 South Portal
2. Michael Lilly - Superintendent, MC#1 South Portal
3. Demetrius Macropoulos - Mine Manager, MC#1 South Portal
4. Kyle Fitch - Section Foreman, MC#1 South Portal
5. Dwight Jackson - Yard Man, MC#1 South Portal
6. Nicolas Rash - Diesel Mechanic, MC#1 South Portal

Macropoulos stated he and Rath had discussions on Monday, December 7, 2015, concerning the use of only one tractor to haul tubs loaded with face conveyor chain on a trailer, and also dragging loaded chain tubs down the slope haulage road without the use of a trailer. They concluded that dragging the chain tub without the use of a trailer posed stability problems with keeping the chain tub centered on the haulage road. They decided hauling the chain tub on a trailer was okay since the amount of chain being hauled was less than in past longwall moves. The term "half load" used by the miners during the interviews meant a 164 foot length of face conveyor chain as compared to a 259 foot length "full load" used on past longwall moves. Macropoulos and Rath estimated the weight of chain in the smaller load would be one-half the normal full load. Macropoulos did not know the weight of a full load or a half load when he made the determination to allow the smaller load on the trailer to be pulled without a brake trailer connected to the load. Later that day, Macropoulos talked with Rath at the "A" slope bottom. Rath had completed the first trip down the "A" slope using a single tractor to pull the trailer loaded with a tub of face conveyor chain. Rath told him that he experienced no problems on this trip.

Travel times for hauling loads down the "A" slope for Rath, Heins, Vaughn, and Alexander were taken from the tracking system for December 7 and 8, 2015. The travel times consistently ranged between five to thirteen minutes. Average speed was calculated at 6.5 mph to 2.53 mph, using 2,900 feet as the distance of the "A" slope haulage road. Rath traveled the "A" slope in seven minutes for both of his trips into the mine during the evening shift of December 8th at an average speed of 4.7 mph.

Equipment

The self-propelled equipment involved in the fatal accident was a diesel powered, Fletcher model 3885 AD, serial number 2008533, Prime Mover (tractor), company No. 5.

Shield hauler trailer No. CESH-104, built by Custom Engineering, was coupled to the No. 5 tractor at the time of the fatal accident.

Testing and Examination

Initial examination of the equipment started on December 9, 2015, at the accident scene. Impact forces resulting from the accident caused extensive damage to the tractor, including the operator's compartment. The forces also caused rearward movement of various drivetrain components and separation of the two tractor halves at the articulation joint area. It appeared after the tractor contacted the rib, the two halves of the tractor articulated in the left direction, then the trailer separated from the tractor frame in the 5th-wheel area. The 5th-wheel's "kompensator" style stationary mount failed in that the sliding blocks (i.e., "shoe assemblies") had pulled out of the shoe rail within the mounting plate. This allowed the trailer tongue to cause extensive impact damage to the operator's cab.

Investigators were unable to conduct function tests on the tractor at the accident scene due to the extensive damage to the equipment. The trailer received less structural damage, but functional tests could not be conducted due to the unstable orientation of the trailer on top of the tractor at the accident scene. On December 11, 2015, the tractor and loaded trailer were removed from the "A" slope bottom area and moved across the road from the mine to an affiliated company building.

Evaluation of the Prime Mover / Tractor

Investigators conducted an evaluation of the tractor's systems and trailer configuration from December 11 to December 16, 2015. Field representatives from Fletcher were present during the evaluation of the tractor on December 14, 2015. MSHA Technical Support took six brake components and the operator's compartment display unit on December 16, 2015, for further testing and evaluation.

The No. 5 Fletcher tractor was manufactured in 2008. The maximum speed of the tractor in the forward direction on level ground is approximately 12 ½ mph. The tractor had an empty weight of approximately 47,100 pounds, with a front and rear weight distribution of approximately 71% and 29%, respectively, when not pulling a trailer.

The operator's station was located on the left side of the machine, forward of the articulation area on the engine portion of the tractor (front section). The rear section of the tractor had both a 5th-wheel and a pintle hitch arrangement to accommodate trailer towing. The tractor had a manufacturer's maximum rated towing capacity (trailer and load combined weight) of 20 tons, or 40,000 pounds, when using an un-braked type trailer (trailer intentionally designed to have no brakes). Appendix D, photo 1, shows the general arrangement of the same model machine with an unloaded shield hauler trailer.

The un-braked trailer with a 5th-wheel connection to attach to the pulling tractor was approximately 12 feet wide with an empty weight of approximately 46,140 pounds. The maximum rated capacity (i.e. maximum rated load) for the trailer was approximately 45,000 pounds resulting in the trailer having a maximum total weight rating of approximately 91,140 pounds. The un-braked trailer weighed approximately 70,440 pounds when loaded with the chain tub containing the 164 foot section of face conveyor chain which was below the trailer's maximum total weight rating. The tongue weight (describes weight applied to the 5th-wheel connection by a given load) of this loaded trailer was measured to be approximately 17,500 pounds. This provided the tractor with a loaded front and rear weight distribution at the time of the accident of approximately 51% and 49%, respectively. This even front to rear weight distribution of the loaded tractor requires the same general traction conditions for both the front and rear axles to optimize handling during braking.

The load is carried within the open frame of the trailer and supported during transport at the four corners of the load using hydraulic linkage arrangements and chains. Appendix D, photo 2, shows a general view of the trailer configuration, and photo 3 shows an example of a chain tub loaded with conveyor chain.

Table No. 1: General Comparison of Reported Face Conveyor Chain Loads

	259 feet of Chain (pounds)	164 feet of Chain (pounds)	Weight Reduction (%)
Loaded Trailer (chain, tub, & trailer)	81,733	70,440	14
Gross Train Weight (loaded trailer & tractor)	128,833	117,540	9

Table No. 1 demonstrates that the reduced face conveyor chain lengths had little impact on the loading characteristics experienced by the tractor with respect to the braking force needed on the slope and thus the ground traction required to effectively brake the train. The impact to the total gross train weight of the unit when hauling the 164 foot chain tub was less than a 10 percent reduction of gross train weight when compared to hauling the 259 foot chain tub.

Powertrain and Steering Inspection

Visual inspections of the drivetrain components did not identify any component that may have been damaged prior to the accident.

The design of the transmission controls prevented the determination of the gear the transmission was operating in at the time of the accident. The transmission's electro-hydraulic control group returns to center when electrical power is removed from the valve group.

The tractor was using Yokohama Y-67 44X18-20 tires with IND-3 type tread on all four wheels. Visual inspections indicated that the tread conditions for all four of the tires were poor. On the rear tires, the middle section of the tread, between the side lugs, was worn smooth. Photo 4 in appendix D shows the smooth middle section approximately between the 4 inch and 12 inch marks on the tape measure. On the two front tires, the tires were essentially worn smooth across the entire width of the tires. Considerable portions of the side lugs were worn smooth on the two front tires (see Appendix D photo 5). These tread conditions can adversely impact a tire's general performance from a traction and steering standpoint when considering the roadway conditions observed within the accident slope. Photo 6 in appendix D shows a new tire tread for comparison.

Due to the extensive damage caused to the steering system, the function of the steering system at the time of the accident could not be evaluated.

Brake System Design

The tractor was equipped with a foot pedal controlled, dual-circuit, full-hydraulic service brake system with spring applied, hydraulically released, fully enclosed, wet disc brakes on all four wheel ends. An engine driven hydraulic pump supplied the service brake system with operating pressure. Through the use of a master display module, Parker Hannifin Inc. model IQAN MDL2, the service brake system was programmed by Fletcher to allow different variations of front and rear service brake application curves to be selected by the tractor driver. This allowed the service brake system to provide different braking balances (i.e. the proportion of front axle brake force to rear axle brake force for the same brake pedal application position) based on the loading conditions typically encountered by the tractor. The system also provided the ability to change the 'feel' of the pedal when the brake pedal is being applied through the first four-fifths (or 0-80 percent) of pedal range. The 'feel' can be generally described as how hard the brakes will be applied for the same amount of pedal range. The system then maintains the ability to apply the brakes to 100 percent as the brake pedal goes through the 80 to 100 percent pedal range.

The tractor driver had four different brake balance variations (i.e. tongue load factor settings) to choose from that affected the proportioning of the rear brakes relative to the front brakes during pedal application. The mine operator had the ability to pre-program the front brake application characteristic (i.e., brake factor setting) to change the 'feel' of the pedal for each of the four driver selectable tongue load factor settings. The four tongue load factor settings included No Load, Light Load, Medium Load, and Heavy Load, while Brake Factor could be set at a value anywhere from -100 to +100 for each of the four tongue load factors. Increasing the Brake Factor setting through the range of -100 to +100 increased how hard the brakes applied through the 0 to 80 percent

pedal range. The Heavy Load Tongue Factor setting, with a +50 brake factor, was the selected setting at the time of the accident.

The tractor was equipped with an Ausco Products Inc., Brake Number 80695, spring-applied, hydraulically released, drive-line mounted parking brake. The parking brake was controlled by a parking brake push-pull type hand control and hydraulic release pressure was provided by the same pump source as the service brakes. The parking brake was installed within the power section (i.e., the front section) of the tractor between the transfer case and the driveline that goes through the articulation joint to the rear axle.

Service Brake Inspection and Testing

Due to damage caused by the accident, the function of the service brakes on the tractor could not be directly assessed using any cab controls. Visual inspections of the service brake system components did not identify any component that may have been damaged prior to the accident.

The right rear brake assembly housing was physically damaged and could not be pressurized. This assembly was disassembled and visually inspected. All of the brake springs were intact and none of the brake friction discs or plates were excessively worn. The other three brake ends were intact allowing these brake ends to be pressurized. A remote hydraulic source was used to measure brake release pressures (i.e. brake spring application forces) and indicator pin travel of the three undamaged brake assemblies. All three of these brake assemblies had brake wear that was within the manufacturer's operating limits and similar brake spring application forces. In addition, a similar tractor was used to demonstrate that the brake spring application forces of these three brake assemblies were similar to that of a similar Fletcher model 3885-AD tractor that passed the manufacturer's service brake tram through test (2nd gear using an engine speed of approximately 2,000 rpm in both the forward and reverse directions).

Selected components of the service brake system were removed from the accident tractor and installed in a donor Fletcher model 3885-AD tractor for functional tests. This included the foot brake pedal assembly, the service brake hydraulic pressure reducing valve, and both the front and rear service brake electro-hydraulic brake valve assemblies. These components, along with the master display module, are a large portion of the subsystem of the tractor that provides service brake function of the tractor for the tractor operator when the tractor is operating normally.

Field tests conducted with the components installed in the donor tractor at the mine site on May 10, 2016, verified functionality in that:

- The pressure reducing valve provided and maintained an adequate release pressure to the service brakes of over 1,660 psi at a low engine idle of

approximately 800 rpm.

- The foot brake pedal assembly was capable of providing the proper signal range to the tractor's master display module throughout the travel range of the foot pedal assembly shaft.
- Both the front and rear service brakes' electro-hydraulic brake valve assemblies were capable of modulating service brake pressure to the wheel ends consistent with the output signals of the tractor's master display module.

Resulting Loading of Tractor Brakes

Considering that the manufacturer's maximum gross train weight rating using an un-braked trailer was 87,100 pounds, the gross train weight at the time of the accident (i.e. hauling the 164 feet chain tub) exceeded the train's manufacturer rated capacity by over 30,000 pounds, approximately 35 percent. Theoretical calculations indicate that the service brake design provided approximately a 20 percent brake efficiency when considering the gross train weight at which the train was being operated (i.e., approximately 117,500 pounds). This brake efficiency was insufficient to safely control the train when considering that the train was being operated on a 16 percent slope.

The slope conditions were observed to be generally inconsistent throughout the slope from a haulage road traction standpoint. Low coefficients of friction, causing poor traction, would be expected in many areas of the haulage road, including portions of the roadway towards the bottom of the slope and the transition to a level roadway in the general area where the tractor impacted the belt structure and rib. Even if the loaded tractor and trailer were properly rated, because the tread on the tires was poor and the traction on the slope was poor in areas, applying the brakes in those areas would only cause the tires to slide on the slope roadway surface.

The roadway conditions observed within the accident slope (i.e. the roadway's poor traction), poor tread on the tires, and lack of distributed braking should be considered primary factors in the cause of the accident. The tractor was required to provide all of the braking for the train which, in turn, required higher traction conditions to produce the needed level of train braking. These conditions allowed the tractor to be highly susceptible to wheel skid which generally can result in loss of control due to trailer jack-knife and/or increased stopping distances. Distributed train braking (i.e. using a braked trailer) generally allows more braking to be applied to the ground under the same traction conditions than when using an un-braked trailer and results in better overall tractor control by minimizing the likelihood of trailer jack-knife and/or increased stopping distances.

Master Display Module Logs

The Fletcher programmed master display module for the tractor was capable of storing various logs and event codes. The master display module was removed from the tractor and sent to a Parker Hannifin Inc. facility (manufacturer of the module) to

retrieve the stored information in the module. A review of the logs indicated the most recent recorded information had log dates of early 2013. Product information for the Parker Hannifin design software states that logging ceases once memory on the hard-drive becomes full. No data had been recently recorded because the logs had not been routinely cleared during maintenance activities.

The programming of the master display module uses data stored in memorizing channels which is stored separately by the module in a different manner than log files. This data is used as input information for log files. Information retrieved from the memorizing channels documented the last successful service brake test was performed on the tractor by an equipment operator approximately 11 engine hours prior to the accident using the manufacturer's previously described tram through testing procedure.

Training and Experience

Rath had two years and six days of total underground mining experience, with the entirety of his experience at the MC#1 Mine. He started work as a contractor for Compliance Staffing Agency, LLC, at the mine on December 2, 2013. He was hired as a mine employee on June 14, 2014. Rath completed the initial 32 hours of the new miner training course on July 28, 2013. Rath completed the final 8 hours of the new miner training on December 2, 2013, at the MC#1 Mine. Rath received annual refresher training on June 21, 2014, and June 20, 2015. Rath had received task training on the Fletcher tractor.

During interviews, MSHA determined task training for supply men was conducted by an experienced supply man and no written training material was used. The training covered several elements listed in the slope haulage plan. However, information relevant to load weights and the braking chart from the slope haulage plan were not provided to the supply men. Mine management stated they depended on the experience of the supply men to decide the safe method of hauling supplies down the slope haulage road.

The mine operator failed to adequately train miners in the policies, programs, procedures, and controls they put in place because of the accident on May 6, 2013, and MSHA safeguard No. 8439194, to protect miners from the hazards related to hauling material and equipment in the MC#1 slope.

The mine operator failed to provide adequate training to management personnel that control or direct haulage operations at this mine. The mine superintendent and mine manager were unaware of Safeguard No. 8439194 issued on July 25, 2013, and the subsequent slope haulage plan, dated August 7, 2013, for a similar accident that occurred on May 6, 2013.

Examinations

An inadequate weekly examination of diesel equipment was conducted on the Fletcher Prime Mover tractor. The tread was worn smooth between the side lugs of all four Yokohama Y-67 44X18-20 tires on the tractor and considerable portions of the side lug tread was worn smooth on the two front tires. This reduced the traction and steering performance of the tires on the wet roadway conditions observed on the accident slope.

ROOT CAUSE ANALYSIS

An analysis was conducted to identify the underlying cause of the accident that was correctable through reasonable management controls. Listed below are the root causes identified during the analysis and the corresponding corrective action implemented to prevent a recurrence of the accident:

1. Root Cause: The mine operator failed to comply with Safeguard No. 8439194 and the written slope haulage plan of August 7, 2013. In addition, the mine operator failed to maintain the slope haulage road surface to provide adequate traction for maintaining control of the supply tractors used on the slope haulage road.

   Corrective Action: The mine operator submitted a revised slope haulage plan to MSHA that details the required equipment, procedures, and precautions in order to haul material and equipment in the MC#1 slope.

2. Root Cause: The mine operator failed to adequately train miners in the policies, programs, procedures, and controls in place to protect miners from the hazards related to hauling material and equipment in the MC#1 slope.

   Corrective Action: The mine operator retrained all miners on the revised slope haulage plan that details the required equipment, procedures, and precautions in order to haul material and equipment in the MC#1 slope.

3. Root Cause: The mine operator failed to maintain the Fletcher Prime Mover tractor in safe operating condition. All four of the foam filled Yokohama Y-67 44X18-20 tires on the tractor had no tread and were smooth in the center section of the tires which reduced the traction characteristics in wet conditions.

   Corrective Action: The mine operator removed the tires from service and submitted a revised slope haulage plan that details the method of tire inspection and retirement criteria for tires.

4. Root Cause: An inadequate weekly examination of diesel equipment was conducted on the Fletcher Prime Mover tractor. All four of the foam filled Yokohama Y-67 44X18-20 tires on the tractor were devoid of tread and smooth in the center section of the tires which reduced the traction characteristics in wet condition.

   Corrective Action: The mine operator removed the tires from service and submitted a revised slope haulage plan that details the method of tire inspection

and retirement criteria for tires. The miners responsible for the weekly examination diesel equipment were trained on the tire inspection and retirement criteria.

5. Root Cause: The mine operator failed to provide adequate training to management personnel that control or direct haulage operations at this mine. The mine superintendent and mine manager were unaware of Safeguard No. 8439194 issued on July 25, 2013, and the subsequent slope haulage plan, dated August 7, 2013, for a similar accident that occurred on May 6, 2013.

   Corrective Action: The mine operator retrained management personnel that control or direct haulage operations at this mine on the revised slope haulage plan that details the required equipment, procedures, and precautions in order to haul material and equipment in the MC#1 slope.

CONCLUSION

The victim was unable to navigate the left-hand turn at the bottom of the "A" slope and collided with a rib causing the 5th-wheel trailer connection to break. The trailer hit the operator's compartment and fatally injured the victim. The accident occurred because the mine operator failed to adequately train miners and follow the written policies, programs, procedures, and controls that were in place to protect miners from the hazards related to hauling equipment and material into the mine along the slope haulage road. The mine operator failed to maintain the No. 5 tractor in safe operating condition and failed to maintain the slope haulage road surface to provide adequate traction which was necessary for the control of the supply tractors. Also, the mine operator failed to conduct an adequate weekly examination on the tractor.

Approved By:

Ronald W. Burns

Ronald W. Burns
District Manager

2/24/2017

Date

ENFORCEMENT ACTIONS

1. Section 103(k) Order No. 9039201, a fatal accident occurred on December 8, 2015, at approximately 7:53 p.m. in the haulage road for the "A" slope at the bottom area adjacent to the 2,900 foot mark. This order is issued under Section 103(k) of the Federal Mine Safety and Health Act of 1977. This order is issued to assure the safety of all persons at this operation while the MSHA investigation proceeds. It prohibits all activities along the entire length of the MC#1 "A" and "B" slope. Only miners performing the victim recovery are permitted in the affected area.

2. A 104(d)(1) citation was issued for a violation of 30 CFR § 75.1403:
   A fatal accident occurred on December 8, 2015, at approximately 7:53 p.m. in the haulage road for the "A" slope at the bottom area adjacent to the 2,900 foot mark. The mine operator failed to comply with the requirements of Safeguard No. 8439194 issued on July 25, 2013, and associated Slope Haulage Plan, put in place due to a similar accident that occurred on May 6, 2013. The following provisions of the plan were not being followed:

   1. Loads exceeding the design rating of a single piece of equipment may be lowered into the mine only with accompaniment of a trailer braking system and/or additional piece(s) of equipment attached by a properly rated towing device for a combined braking capacity exceeding the load being transported.

   2. Slope conditions will be maintained reasonably free of excessive water, mud, debris, etc.

   This violation is an unwarrantable failure to comply with a mandatory standard.

3. A 104(d)(1) order was issued for violation of 30 CFR § 75.1914(a):
   A fatal accident occurred on December 8, 2015, at approximately 7:53 p.m. in the haulage road for the "A" slope at the bottom area adjacent to the 2,900 foot mark. The mine operator failed to maintain the diesel powered No. 5 Fletcher prime mover / tractor in safe operating condition for use on the slope haulage road where water and mud were present. All four of the foam filled Yokohama Y-67 44X18-20 tires on the No. 5 tractor were devoid of tread and smooth in the center section of the tires.

   This violation is an unwarrantable failure to comply with a mandatory standard.

4. A 104(d)(1) order was issued for violation of 30 CFR § 75.1914(f)(2):

A fatal accident occurred on December 8, 2015 at approximately 7:53 p.m. in the haulage road for the "A" slope at the bottom area adjacent to the 2,900 foot mark. An inadequate weekly examination was conducted on the diesel powered No. 5 Fletcher prime mover / tractor. All four of the foam filled Yokohama Y-67 44X18-20 tires on the No. 5 tractor were devoid of tread and smooth in the center section of the tires which affected the traction characteristics for the safe use on the slope haulage road where water and mud were present. The person conducting the examination on December 2, 2015 failed to record the obvious defect of the tires in the records maintained for this purpose.

This violation is an unwarrantable failure to comply with a mandatory standard.

5. A 104(d)(1) order was issued for a violation of 30 CFR § 48.7(a):
A fatal accident occurred on December 8, 2015, at approximately 7:53 p.m. in the haulage road for the "A" slope at the bottom area adjacent to the 2,900 foot mark. The mine operator failed to provide adequate task training to supply haulage equipment operators on the requirements of Safeguard No. 8439194 issued on July 25, 2013, and the subsequent slope haulage plan dated August 7, 2013, for a similar accident that occurred on May 6, 2013. Supply haulage equipment operators were unaware of the safeguard and the written plan. The miners providing task training to supply haulage equipment operators were not provided with Safeguard No. 8439194 and the slope haulage plan dated August 7, 2013, that contained the capacities for the typical loads, a chart depicting trailer load and stopping distance, and other information.

   This violation is an unwarrantable failure to comply with a mandatory standard.

6. A 104(d)(1) order was issued for a violation of 30 CFR § 48.7(d):
A fatal accident occurred on December 8, 2015, at approximately 7:53 p.m. in the haulage road for the "A" slope at the bottom area adjacent to the 2,900 foot mark. The mine operator failed to provide adequate training to management personnel that control or direct haulage operations at this mine. The MC#1 Mine superintendent and mine manager were unaware of the Safeguard No. 8439194 issued on July 25, 2013, and the subsequent slope haulage plan dated August 7, 2013, for a similar accident that occurred on May 6, 2013.

   This violation is an unwarrantable failure to comply with a mandatory standard.

Appendix A

Persons Participating in the Investigation

Mine Safety and Health Administration

Mary Jo Bishop	Assistant District Manager for Enforcement
Robert Bretzman	Supervisory Coal Mine Safety and Health Inspector
Harry Wilcox	CMS&H Inspector, Accident Investigator
Michael Tite	CMS&H Inspector, Electrical Specialist
Fred T. Marshall	MSHA Technical Support
Denzil Hughes	MSHA Supervisory Training Specialist

State of Illinois Department of Natural Resources, Office of Mines and Minerals

William Patterson	Supervisor of Illinois State Mine Inspectors
David Colombo	State Mine Inspector
Larry Jenkel	State Mine Inspector
Shawn Rees	State Mine Inspector
John Gabby	State Mine Inspector

Management Personnel

Anthony Webb	President of Underground Operations, Coalfield Construction, LLC
Frank Foster	Director of Safety & Regulatory Compliance, Coalfield Construction, LLC
Steve Murray	Safety Manager, MC#1 South Portal
Travis Brown	General Manager, MC#1 South Portal
Girolamo Intravaia	Safety & Compliance, MC#1 Mine
Wesley Dunn	Maintenance Chief MC#1 South Portal

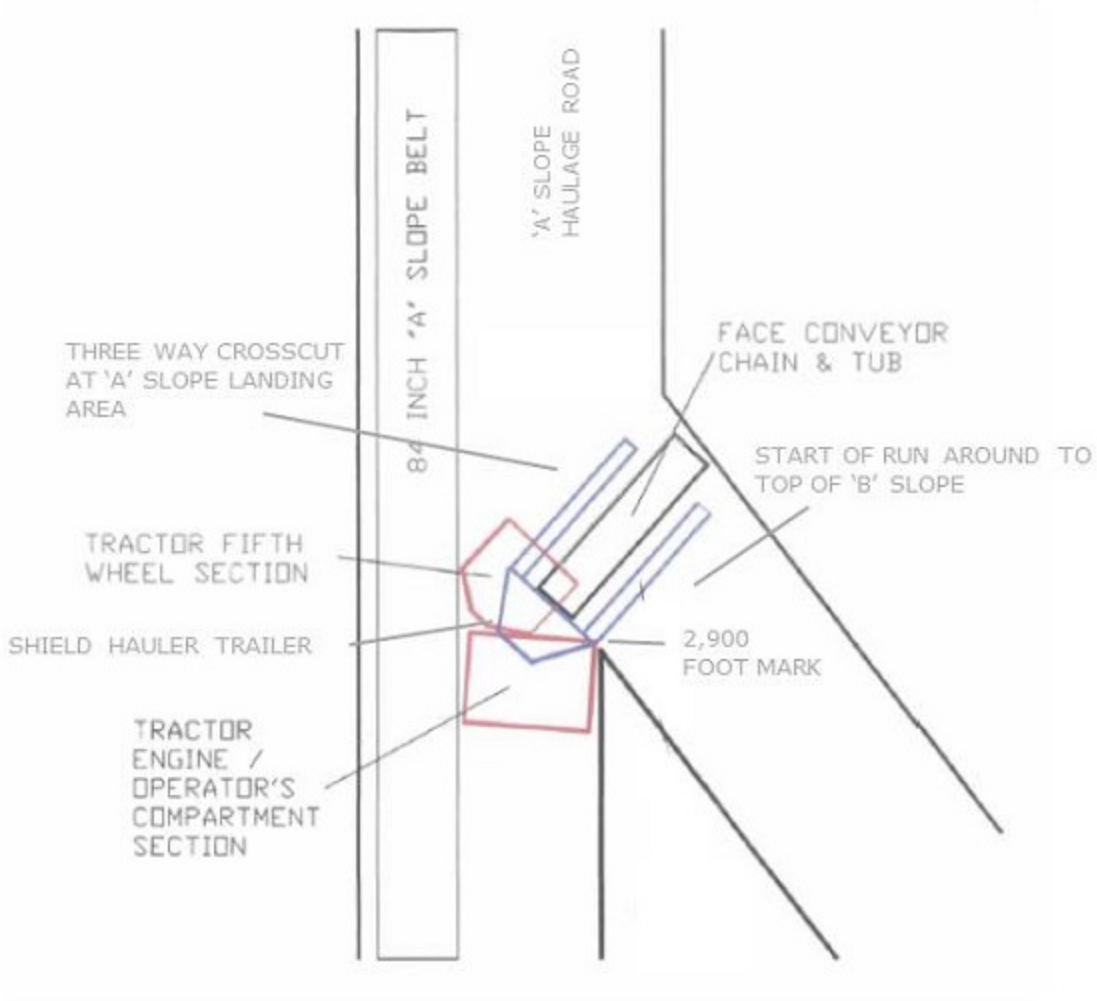
Attorneys

Todd Myers	Rajkovich, Williams, Kilpatric, & True, PLLC
Christopher Pence	Hardy and Pence

Appendix B

Drawing of Accident Scene

Not to Scale



Appendix C

Interview List

Dwight Jackson	Yard Man, MC#1 South Portal
Edward Heins	Supply Man, MC#1 South Portal
Adam Napier	Supply Man, MC#1 South Portal
Colby Alexander	Supply Man, MC#1 South Portal
Nicolas Rash	Diesel Mechanic, MC#1 South Portal
Demetrius Macropoulos	Mine Manager, MC#1 South Portal
Brandon Tackett	Outby Laborer, MC#1 South Portal
Kyle Fitch	Section Foreman, MC#1 South Portal
Travis Brown	General Manager, MC#1 South Portal
Adam Lasswell	Longwall Foreman, MC#1 South Portal
Michael Lilly	Superintendent, MC#1 South Portal
Wesley Dunn	Maintenance Chief, MC#1 South Portal
Thomas Vaughn	Outby Laborer, MC#1 South Portal
Anthony Webb	President of Underground Operations, Coalfield Construction, LLC

Appendix D

Photos

Photo 1: Side View of a Similar Tractor with Shield Hauler Trailer Showing General Arrangement

Photo 2: Rear View of a Similar Shield Hauler Trailer Showing General Arrangement

Photo 3: Oblique View of a Loaded Chain Tub with Conveyor Chain Showing General Arrangement

Photo 4: View of Tractor's Left Rear Tire Showing Tread Condition

Photo 5: View of Tractor's Right Front Tire Showing Tread Condition

Photo 6: View of New Tire Showing Tread Characteristics

Appendix E

Victim Information

Accident Investigation Data - Victim Information

Event Number: 4 2 5 4 4 9 4

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

Victim Information: 1

1. Name of Injured/Ill Employee:	2. Sex	3. Victim's Age	4. Degree of Injury:
Tyler D. Rath	*M*	*20*	*01 Fatal*

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:	6. Date and Time Started:
a. Date: 12/08/2015 b.Time: 19:53	*a. Date: 12/08/2015 b.Time: 16:00*

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
009 Supply Driver	*073 Operate Underground Supply Tractor*	Yes X No

10. Experience	Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days		Years	Weeks	Days
a. This Work Activity:	*1*	*10*	*5*	b. Regular Job Title:	*1*	*10*	*5*	c: This Mine:	*2*	*0*	*6*	d. Total Mining:	*2*	*0*	*6*

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
108 U/G Diesel Prime Mover / Tractor	*170 Crushing / Blunt force Trauma*

13. Training Deficiencies:

Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task: X

14. Company of Employment: (If different from production operator)

Operator

Independent Contractor ID: (if applicable)

15. On-site Emergency Medical Treatment:

Not Applicable: X | First-Aid: | CPR: | EMT: | Medical Professional: | None:

16. Part 50 Document Control Number: (form 7000-1)

17. Union Affiliation of Victim: 9999 *None (No Union Affiliation)*