

**UNITED STATES  
DEPARTMENT OF LABOR  
MINE SAFETY AND HEALTH ADMINISTRATION**

**REPORT OF INVESTIGATION  
SURFACE COAL MINE**

**Fatal Powered Haulage Accident  
October 3, 2001**

**Bent Mountain Mine  
Lodestar Energy, Inc.  
ID No. 15-18015  
Meta, Pike County, Kentucky**

**Accident Investigators**

**Robert M. Bates  
Electrical Engineer**

**B.G. Cure  
Coal Mine Safety and Health Inspector**

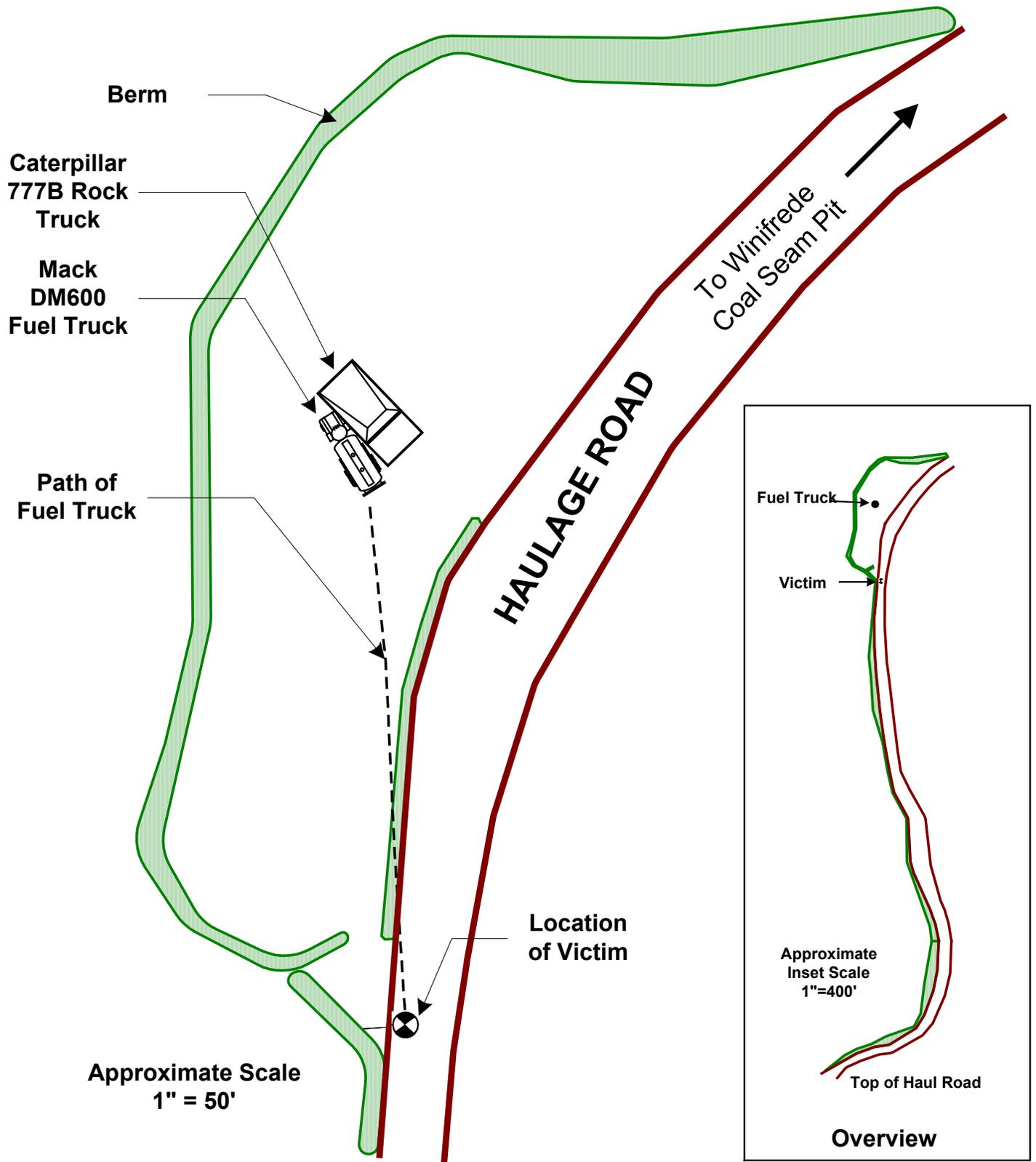
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Mechanical Engineer**

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Release Date: December 12, 2001

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**Fatal Powered Haulage Accident  
 Bent Mountain Mine (I.D. No.15-18015)  
 Lodestar Energy, Inc.  
 Meta, Pike County, Kentucky  
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## OVERVIEW

On October 3, 2001, Gary Blackburn was driving a Mack DM600 fuel truck down an inclined haulage road in order to refuel the mining equipment located in a coal producing pit. At some point along the road, he lost control of the vehicle and jumped, sustaining injuries that resulted in his death on October 4, 2001. The fatal accident investigation revealed that the braking system on the fuel truck was not adequate to stop the vehicle on the grade where the accident occurred.

## GENERAL INFORMATION

Lodestar Energy, Inc., Bent Mountain Mine is located near the unincorporated town of Meta, Kentucky, approximately one mile from the junction of Kentucky Route 801 and U.S. Route 119. Lodestar Energy, Inc. is a wholly owned subsidiary of Lodestar Holdings, Inc. of New York, New York. Lodestar Holdings, Inc. is a subsidiary of Iracoal, Inc., also located in New York.

The Bent Mountain mine went into production on December 12, 1998. Coal is currently mined in three pits using highwall drills, a hydraulic shovel, front-end loaders, and rock trucks, to produce an average of 4500 tons of coal per day. The accident occurred on the access road to the Winifrede Coal Pit, where the contour method of surface mining is used. The last regular mine safety and health inspection was completed on September 28, 2001.

The mine operates two ten-hour production shifts, seven days a week, and employs 88 persons. Maintenance is performed on each shift as the need arises. The labor force is divided into two crews, designated by the company as "A" and "B". Each crew works four consecutive days, and then is off for five days. It is a common practice for employees to work on the days when their crew is scheduled to be off. Employees at the mine refer to this as an "off shift".

## DESCRIPTION OF ACCIDENT

On the day of the accident, the day shift crew began work at 6:00 a.m. Gary Blackburn met with Scotty Branham, greaser, to coordinate the fueling and servicing activities for the day. Blackburn normally worked as a rock truck driver on the "A" crew and was not scheduled to work on this day. However, he had decided to work an off shift and was assigned the task of driving fuel truck No. FT154. FT154 was a spare fuel truck and was being used only because the normal fuel truck, No. FT916, had been removed from service so repairs could be

made. Blackburn filled the fuel truck with approximately 3000 gallons of diesel fuel and proceeded to the area known as #3 Knob, which served as a parking area for mining equipment and private vehicles.

While driving the fuel truck, Blackburn noticed that the clutch was slipping and verbally reported the condition to Roger Bartley, day shift foreman. Bartley told Blackburn to inform Mark Hamilton, day shift mechanic, of the condition of the clutch. Blackburn met Hamilton at the #3 Knob area and adjusted the clutch on the fuel truck. Hamilton had Blackburn test the clutch by setting the parking brake and depressing the accelerator while releasing the clutch pedal until the engine almost died.

At approximately 10:40 a.m. Blackburn began descending the haulage road leading to the Winifrede Coal Seam to fuel and service the mining equipment in the pit. The inclined portion of the haulage road was approximately 1800 feet in length with a grade varying from 8% to 16%. At some point along the road, Blackburn apparently lost control of the fuel truck and jumped from the vehicle, landing on the left side of the road near the berm. The fuel truck continued rolling for an additional 180 feet and struck a Caterpillar, Model 777B, rock truck parked in a flat area off of the left side of the haulage road.

At 10:50 a.m. Darrell Varney, contract coal truck driver, found Blackburn lying on the left side of the haulage road at a point approximately 1600 feet from the top of the slope. Varney immediately called for help on the C.B. radio. David Carter, grader operator, arrived on the scene a few minutes later and attended to Blackburn. Roger Bartley placed a 911 call and requested an ambulance. DHP Ambulance Service responded to the scene and transported Blackburn up the haulage road to an area suitable for helicopter landings. Blackburn was transported by a Health Net helicopter to Cabell Huntington Hospital where he died the following day.

## **INVESTIGATION OF ACCIDENT**

The accident was reported to MSHA by Paris Charles, safety director, at 11:20 a.m. on October 3, 2001. Danny Harmon, roof control/impoundment group supervisor, received the telephone call reporting the accident. Robert Bates and B.G. Cure, accident investigators, were assigned the task of investigating the accident. Because equipment failure was considered to be a possible factor in the occurrence of the accident, a request for assistance from MSHA's Technical Support Division was made. In response to the request, Dennis Ferlich, mechanical engineer, was added to the investigation team on October 4, 2001.

On October 3, 2001, a 103(k) Order was issued to ensure the safety of all persons at the mine. The order initially closed the haulage road to the Winifrede Coal Seam, as well as the area surrounding the wreckage of the fuel truck. The accident scene was photographed, measured, and visually examined by the investigation team.

On October 5, 2001, the fuel tank was removed from the truck in order to allow examination of the air system and brakes. The truck frame was raised and supported by blocks. The clutch, drive shaft, and transmission were removed and examined. Using an external compressor, air pressure was applied to the air system in order to measure the pushrod stroke on each brake. On October 6, 2001, the differential, power divider, and rear axles were examined for excessive wear or broken gears. The wheels were removed from the truck to allow detailed examination of brake components, drums, and linings. On October 10, 2001, the engine was removed from the wreckage of the truck and the cylinders were examined for signs of internal damage. On October 11, 2001, the physical examination of the fuel truck was completed and the 103(k) Order was terminated.

Formal, tape-recorded interviews were conducted at the Kentucky Department of Mines and Minerals Office on October 4, 2001. During this session, five hourly employees and two management persons were interviewed. From October 9, 2001, to October 15, 2001, informal interviews were conducted with ten hourly employees at the mine site.

The maintenance records related to fuel truck No. FT154 were examined and a copy of the records for the six-month period preceding the accident was made for the accident investigation file. Harold Thornsbury, a training specialist from MSHA's Educational Field Services Division, assisted in the review of the company's training records.

## **DISCUSSION**

- 1) There were no eyewitnesses to the accident.
- 2) The haulage road on which the accident occurred was 27 feet wide (average) and composed of dry, compacted soil and rock
- 3) The inclined portion of the haulage road was approximately 1800 feet in length and the grade varied from 8% to 16%.
- 4) At the time of the accident, the skies were clear and the temperature was 80° F. It had not rained for several days prior to the accident.

- 5) No evidence of sliding or skid marks could be found along the path the fuel truck followed during the accident.
- 6) Evidence at the accident site indicated that the victim exited the vehicle on the left side of the haulage road and struck his head on a rock laying near the berm.
- 7) An autopsy was performed. The medical examiner's report listed craniocerebral injuries as the cause of death.
- 8) There were two fuel trucks used to supply fuel to mining equipment at the mine. The normal fuel truck was a black, Mack DM600, designated as FT916. The fuel truck involved in the accident was a red Mack DM600, designated as FT154. FT154 was utilized when FT916 was being serviced or repaired. FT916 was newer, had a larger fuel tank, and was equipped with a Jacob's Brake.
- 9) FT154 MACHINE INFORMATION: The fuel truck was a 1975 MACK Model DM 600, 10 wheel tandem cab and chassis, s/n DM685SX30048, with a 3000 gallon oval-shaped fuel tank approximately 17 ½ feet long x 49 inches high x 75 inches wide attached to the frame. The chassis was double frame construction. The rear outside tire width was approximately 8 feet and the wheel base length was approximately 19 feet. The engine was a MACK six cylinder, turbocharged diesel engine rated at 235 HP at 2100 RPM. The transmission was a MACK TRXL107 Maxitorque manual transmission with two gear shift levers. One lever was the direct (main) shift lever for changing gears forward and reverse, and the other lever was the auxiliary lever for high and low range. The steering was a mechanical gear box with hydraulic assist. Emergency steering was not included. The truck was not provided with an engine brake (Jake Brake) nor a hydraulic retarder.
- 10) BRAKE SYSTEM DESIGN: The brake system consisted of 6 air-applied service brakes, with brakes on each side of the front steering axle and the two rear drive axles. A spring applied, air pressure released parking brake, integral to the service brakes, was present on all 4 brakes on the two drive axles. The service brakes could be applied using a foot brake pedal or the hand valve lever under the right portion of the steering wheel. The parking brakes could be applied manually with the parking brake valve in the operator's cab or automatically from loss of air system pressure. The air chambers were Type 30 on both the front steering axle and the two rear drive axles.

- 11) DAMAGE: The truck was extensively damaged. The engine and transmission broke away from the truck frame. The engine was pushed rearward underneath the cab, and the transmission was lying on the ground. The cab was compressed by the impact and the steering wheel was against the back of the driver's seat. The brake system air lines and other air lines exiting from the bottom of the cab were extensively damaged. The mounting brackets attaching the 3000 gallon fuel tank onto the frame were broken and the fuel tank had moved forward approximately 3 feet into the rear of the cab. The steering shaft was broken out of the steering gear box and lying on the ground. One air tank and the left engine fuel tank mounting brackets were broken and the tanks were resting on the ground. Several air lines routed on the truck frame were broken as a result of the accident. The air inlet port on the left side steering axle brake chamber was torn from the chamber.
- 12) DRIVELINE: The drive shaft, jack shaft, and U-joints were completely intact from the transmission to the drive axles. The splines on the drive shafts were examined and no defects were found.
- 13) BRAKE SYSTEM AIR PRESSURE TESTS: Many air lines on the truck were damaged as a result of the accident so the complete brake system could not be pressurized and tested. Due to the extensive damage to the cab and air system, many of the tests specified in the "MACK Air and Brake System Service Manual, No. 16-104, October 1997 (New Issue), pages 54 and 102," could not be performed, including complete air system leakage test, low pressure warning test, air pressure build-up test, governor setting test, and park brake valve test. The parking brake sides of the drive axle brake chambers were tested by applying an external pressure of approximately 120 psi to the parking brake ports. None of the parking brake chambers leaked. The same 120 psi air pressure was then applied to the service brake ports on the drive axle brake chambers. The right rear forward drive axle service brake chamber leaked through the pushrod hole at a rate of 15 psi per minute. In accordance with the MACK Air and Brake Service Manual, page 145, describing leakage around the pushrod hole, "No leakage is acceptable."
- 14) COLD STROKE BRAKE ADJUSTMENT LIMITS: The pushrod strokes of the brake chambers were measured at an ambient temperature of 65 ° F with approximately 90 psi and 120 psi of air pressure supplied to the air chambers. The pushrod stroke for the left front steering axle brake could not be checked due to damage to the inlet air port on the brake chamber. The following service brake pushrod strokes were found:

Note: The maximum allowable pushrod stroke of 2.0 inches (where adjustment is required) for Type 30 air chambers is specified in the

MACK Air and Brake System Service Manual, No. 16-104, October 1997 (New Issue), page 242, and the brake system air pressure for air system diagnostics and brake adjustment is specified as 110 psi or greater on page 58 of the same manual. Although 110 psi or greater was specified in the MACK manual, the pushrod stroke was also measured at approximately 90 psi (as pressure was building up to 120 psi) to determine if the pushrod stroke was measurably different at 90 psi versus 120 psi. No measurable differences were found between the 90 psi pushrod stroke measurements and the 120 psi pushrod stroke measurements. According to the paper, "The 43<sup>rd</sup> L. Ray Buckendale Lecture, Commercial Vehicle Braking Systems: Air Brakes, ABS and Beyond, SP-1045, page 71, dated November 1998", the rated stroke, i.e., maximum stroke before the air chamber bottoms out and output force is lost for Type 30 air chambers is 2 ½ inches.

- a. The pushrod stroke for the right front steering axle brake exceeded the maximum specified pushrod stroke of 2 inches for Type 30 air chambers. The pushrod stroke measured 2 ½ inches.
- b. The pushrod stroke for the right forward drive axle brake exceeded the maximum specified pushrod stroke of 2 inches for Type 30 air chambers. The pushrod stroke measured 2 ½ inches.
- c. The pushrod stroke for the left forward drive axle exceeded the maximum specified pushrod stroke of 2 inches for Type 30 air chambers. The pushrod stroke measured 2 1/4 inches.
- d. The pushrod stroke for the right rearward drive axle exceeded the maximum specified pushrod stroke of 2 inches for Type 30 air chambers. The pushrod stroke measured 2 7/16 inches.
- e. The pushrod stroke for the left rearward drive axle exceeded the maximum specified pushrod stroke of 2 inches for Type 30 air chambers. The pushrod stroke measured 2 1/4 inches.

15) BRAKE COMPONENT EXAMINATION: All of the brakes were disassembled, visually inspected, and measured. The following results were obtained:

- a. Right Front Steering Axle Brake: The brake linings were 5 inches wide and 5/16 inches thick. Both the forward and rearward brake

lining wear surfaces were coated with grease across the width of the linings. The brake shoe return spring was missing. A severely worn portion of the spring was found in the underside of the rearward brake shoe. Grease was packed in the interior of the brake shoes. The brake drum wear surface had a dull wear surface and was coated with a film of grease. The brake drum internal diameter was within the maximum allowable dimension of 16.620 inches, stamped on the drum. The s-cam and rollers were intact. Considering the excessive pushrod stroke of 2 ½ inches, and the coating of grease on the lining and drum wear surfaces, no significant braking force was generated by this brake.

- b. Left Front Steering Axle Brake: The brake linings were 5 inches wide and 5/8 inches thick. Both the forward and rearward brake lining wear surfaces were coated with grease in 3 bands approximately 1-1 ½ inches wide each across the width of the lining wear surfaces. The brake drum wear surface was also coated with 3 bands of grease matching the pattern on the linings. The brake drum internal diameter was within the maximum allowable dimension of 16.620 inches, stamped on the drum. The s-cam, brake return spring, and rollers were intact. The pushrod stroke could not be determined, but considering the coating of grease on the lining and drum wear surfaces, the braking force was compromised.
- c. Right Forward Drive Axle Brake: The brake linings were 7 inches wide and 3/4 inches thick. The linings were clean with no cracks or missing pieces. The brake drum wear surface was clean, indicating lining to drum contact. The brake drum internal diameter was within the maximum allowable dimension of 18.120 inches, stamped on the drum. The s-cam, brake return spring, and rollers were intact. Note: In the interviews conducted by the State of Kentucky and MSHA on October 4, 2001, company mechanics stated the four rear brakes were re-lined and the brake drums were replaced in April 2001. Considering the excessive pushrod stroke of 2 ½ inches, the service brake chamber air leakage rate of 15 psi per minute through pushrod hole, and the fact that there was very little wear on these brake linings (as compared to right rear drive and left rear drive axle brakes), no significant braking force was generated by this brake.
- d. Right Rear Drive Axle Brake: The brake linings were 7 inches wide. The forward brake lining was 3/8 inches thick, and the rearward

lining was 3/32 inches thick. The s-cam roller was missing on the forward brake shoe, and the roller shaft mounting holes were broken from the top portion of the brake shoe. The uneven wear of the forward and rearward brake linings, i.e., forward lining four times thicker than the rearward lining, indicates the forward brake shoe s-cam roller was missing prior to the accident. The lower portion of the forward lining was coated with grease across the width of the wear surface. The upper half of the rearward lining was loose. The rearward lining was worn to the point that the rivets holding the lining to the shoe were worn. Grease was packed in the interior on the brake shoes. The s-cam and brake return spring were intact. The brake drum was clean showing lining to drum contact. The brake drum internal diameter was within the maximum allowable dimension of 18.120 inches, stamped on the drum. Considering the s-cam roller was missing on the forward brake shoe making it ineffective, the thinness of the rearward lining, the grease coating on the forward lining wear surface, and the excessive pushrod stroke of 2 7/16 inches, no significant braking force was generated by this brake.

- f. Left Forward Drive Axle Brake: The brake linings were 7 inches wide and 3/4 inches thick. The brake lining wear surfaces were mud coated approximately 3 inches across the width of the lining wear surfaces. The brake drum wear surface was also coated with mud matching the pattern on the linings. The brake drum internal diameter was within the maximum allowable dimension of 18.120 inches, stamped on the drum. The s-cam, brake return spring, and rollers were intact. The parking brake was defective. With the parking brake applied and the wheels off the ground, the wheels rotated by hand. When the service brake was applied, the wheels could not be rotated by hand. Note: In the interviews conducted by the State of Kentucky and MSHA on October 4, 2001, company mechanics stated the four rear brakes were re-lined and the brake drums were replaced in April 2001. Considering the excessive pushrod stroke of 2 1/4 inches, lining to drum contact area of approximately one-half the width of the lining as shown by the mud coating, and the fact that there was very little wear on these brake linings (as compared to right rear drive and left rear drive axle brakes), the braking force was compromised.
  
- g. Left Rear Drive Axle Brake: The brake linings were 7 inches wide and 1/4 inches thick. The brake linings were grease coated approximately 3 inches across the width of the lining wear surfaces.

The brake drum wear surface was also coated with grease matching the pattern on the linings. The brake drum internal diameter was within the maximum allowable dimension of 18.120 inches, stamped on the drum. The s-cam, brake return spring, and rollers were intact. The lock ring that holds the slack adjuster onto the s-cam shaft was missing, allowing sideways movement of the slack adjuster. Considering the excessive pushrod stroke of 2 1/4 inches, the grease coating on the lining and drum wear surfaces, and the additional play in the mechanical components with the slack adjuster lock ring missing, the braking force was compromised.

- 16) TRANSMISSION: The transmission was removed for examination. The gear selector and high/low range selector cover plates were removed, and the selector positions and gears were visually examined. The gear was in 4<sup>th</sup> gear and the high/low range was in neutral. It could not be determined if these were the positions prior to the accident due to the extensive damage sustained upon impact. No visible damage was found on the internal components. The transmission input and output shafts were hand rotated and no internal problems were found.
- 17) CLUTCH: The clutch was disassembled and the friction plate pads were found to be worn down to the rivets. Several of the rivets were also worn. The friction pads/plate were measured with a micrometer and each pad was found to be worn to a thickness of approximately 0.110 inches. The friction pads and the clutch plate were blueish in color, indicating overheating from clutch slippage. Note: In the interviews conducted by the State of Kentucky and MSHA on October 4, 2001, company mechanics stated that just prior to the accident, the clutch was readjusted based on a fuel truck operator complaint that the clutch was slipping. The Technical Department at Eaton Corporation (Spicer clutches are manufactured by Eaton Corporation) was contacted to obtain specifications on the maximum allowable wear on the clutch friction pads. The technical representative stated that there is no minimum thickness specified for the clutch friction pads. He further stated that the clutch is to be changed when it can no longer be adjusted.
- 18) DIFFERENTIALS AND POWER DIVIDER: The drive axle differentials and the power divider lockout cover plates were removed and the internal components were inspected. No visible damage was found to the internal components. The lubricating fluid was visually checked, and no metal particles were visibly observed. The spline of the rear axle shafts were visually examined and no evidence of failure was found.

19) STEERING SHAFT AND GEAR BOX: The steering shaft and gear box were visually examined. The steering shaft gear was filled with grease and dirt, and the portion of the shaft housed within the gear box was coated with dirt and dry grease. The gear box was broken at the shaft input, and the attaching bolts were pulled from the gear box housing. The input shaft housing gasket was coated with dry grease and dirt.

## CONCLUSION

Gary Blackburn was fatally injured when he jumped from the fuel truck he was operating on an inclined haulage road. While descending the grade, he apparently lost some degree of control over the vehicle and ultimately made the decision to jump.

There were no eyewitnesses to the accident, so it was impossible to conclusively determine whether or not the truck was shifted out of gear on the incline. Also, it could not be determined if the engine died, resulting in an effective loss of steering. The environmental and roadway conditions at the time of the accident were favorable and were ruled out as contributing factors.

The factor that can conclusively be associated with the accident is the condition of the truck's braking system. Even if the drive train became disengaged, or an effective loss of steering occurred, the braking system on the truck should have been able to stop the vehicle. The investigation revealed that all six brakes on the truck had maintenance defects that resulted in severely reduced braking capability.

## ENFORCEMENT ACTIONS

1. 103(k) Order No. 4228786 was issued on October 3, 2001 to ensure the safety of persons at the mine until the investigation could be completed.
2. 104(d)(1) Citation No. 7378492 was issued on October 22, 2001 as a result of information obtained during the accident investigation. The condition was cited as follows:

“Adequate brakes were not provided for the Mack DM600 fuel truck (Company No. FT154) used to supply fuel to mobile mining equipment at the mine. This condition contributed to a fatal haulage accident which occurred on the Winifrede Coal Seam access road on 10/03/2001. During the accident investigation, the following deficiencies in the truck's braking system were found:

- 1) Right Front Steering Axle Brake - The pushrod stroke was excessive. Both brake lining wear surfaces were coated with grease across the width of the lining. The drum was coated with a film of grease. The return spring was missing.
- 2) Left Front Steering Axle Brake - Both brake linings and the drum were coated with grease in three separate bands approximately 1.5 inches wide each.
- 3) Right Forward Drive Axle Brake - The pushrod stroke was excessive. The service brake chamber leaked at a rate of 15 psi per minute.
- 4) Right Rear Drive Axle Brake - The pushrod stroke was excessive. The S-Cam roller on the forward brake shoe was missing. The rear brake lining was worn to the point that the rivets holding the lining were also worn. The upper half of the rear lining was loose. The lower portion of the forward lining was coated with grease across the width of the wear surface.
- 5) Left Forward Drive Axle Brake - The pushrod stroke was excessive. Approximately one half of the brake lining surface was coated with mud, indicating that only half of the lining was making contact with the drum. The spring applied parking brake was not functional.
- 6) Left Rear Drive Axle Brake - The pushrod stroke was excessive. Approximately one half of the brake lining and drum were coated with grease. The lock ring that holds the slack adjuster onto the S-Cam shaft was missing.

The accident investigation revealed that all six of the fuel truck's brakes had maintenance defects that significantly reduced the overall braking capability of the truck. Information obtained during the investigation indicates that mine management was aware that the brakes would not effectively stop the loaded vehicle on the grade where it was required to travel.”

**APPROVED BY:**

Franklin M. Strunk  
District Manager

## APPENDIX

### Persons Participating in the Investigation

#### Lodestar Energy, Inc.

Paris Charles	Safety Services Director, Lodestar Energy
Jim Ashley	Chief of Maintenance, Lodestar Energy
Charles Clevinger	Superintendent, Bent Mountain Mine
Donald Holiday	Day Shift Foreman, Bent Mountain Mine
Johnny Huffman	Master Mechanic, Bent Mountain Mine

#### Kentucky Department of Mines and Minerals

Tracy Stumbo	Chief Accident Investigator
Johnny Greene	Assistant Chief Accident Investigator
Greg Goins	Accident Investigator
Stanley Tackett	Accident Investigator

#### Mine Safety and Health Administration

Robert M. Bates	Electrical Engineer / Accident Investigator
B.G. Cure	CMS&H Inspector / Accident Investigator
Dennis Ferlich	Mechanical Engineer
Harold Thornsby	Training Specialist

## List of Persons Interviewed

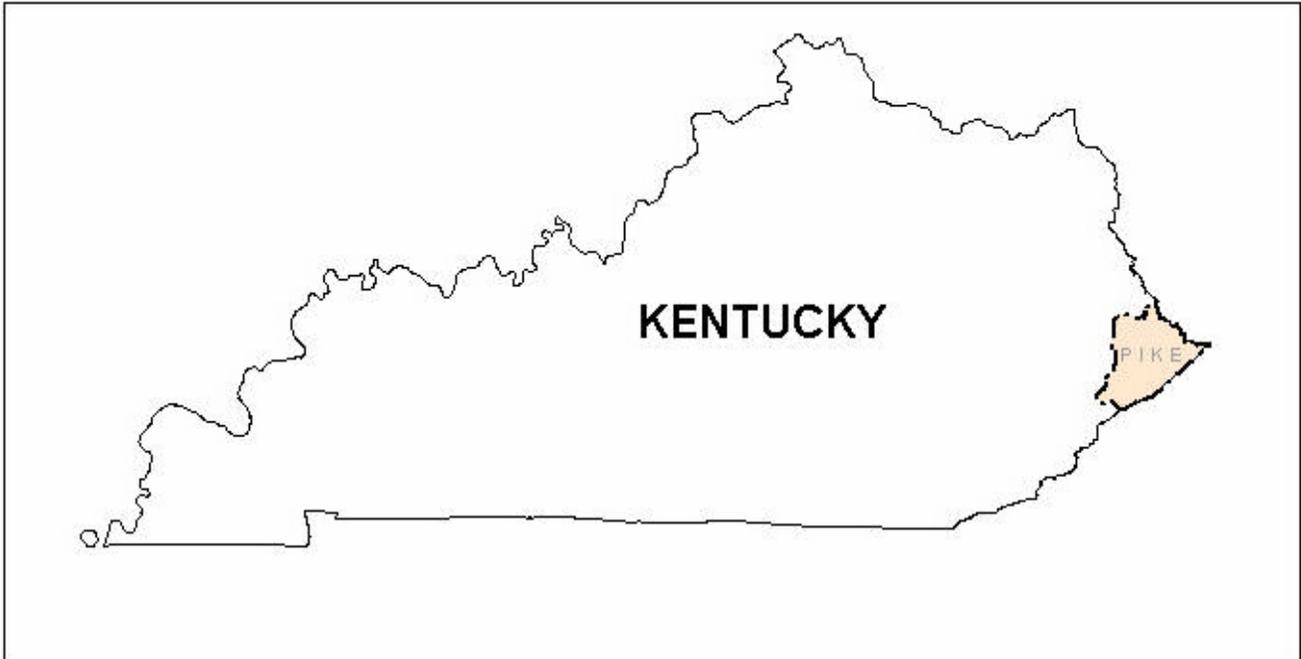
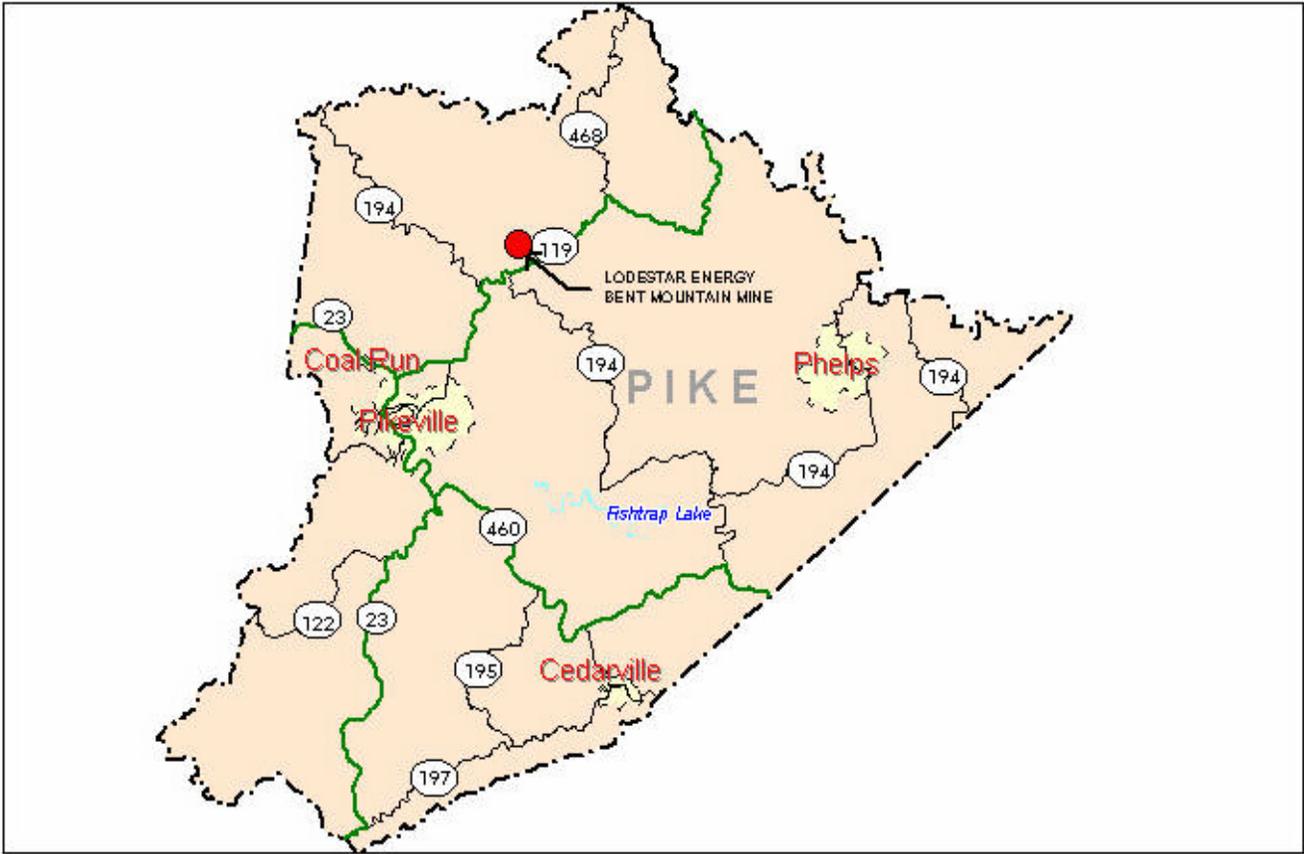
Roger Bartley	B Crew Day Shift Mine Foreman
David Carter	Grader Operator
Elcaney Cline	Dozer Operator
David Coleman	B Crew Night Shift Mine Foreman
Mark Hamilton	Mechanic
Johnny Huffman	Master Mechanic
Arco Hunt Jr.	Rock Truck Driver
Darrell Varney	Truck Driver, CK Trucking Co.



**PHOTOGRAPH 1 - OVERVIEW OF HAULAGE ROAD**



**PHOTOGRAPH 2 - FUEL TRUCK IMPACT SITE**



**MINE LOCATION**