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**Virginia Department of Mines, Minerals & Energy**  
**Division of Mines**

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**Accident Investigation Report**  
**Underground Coal Mine**

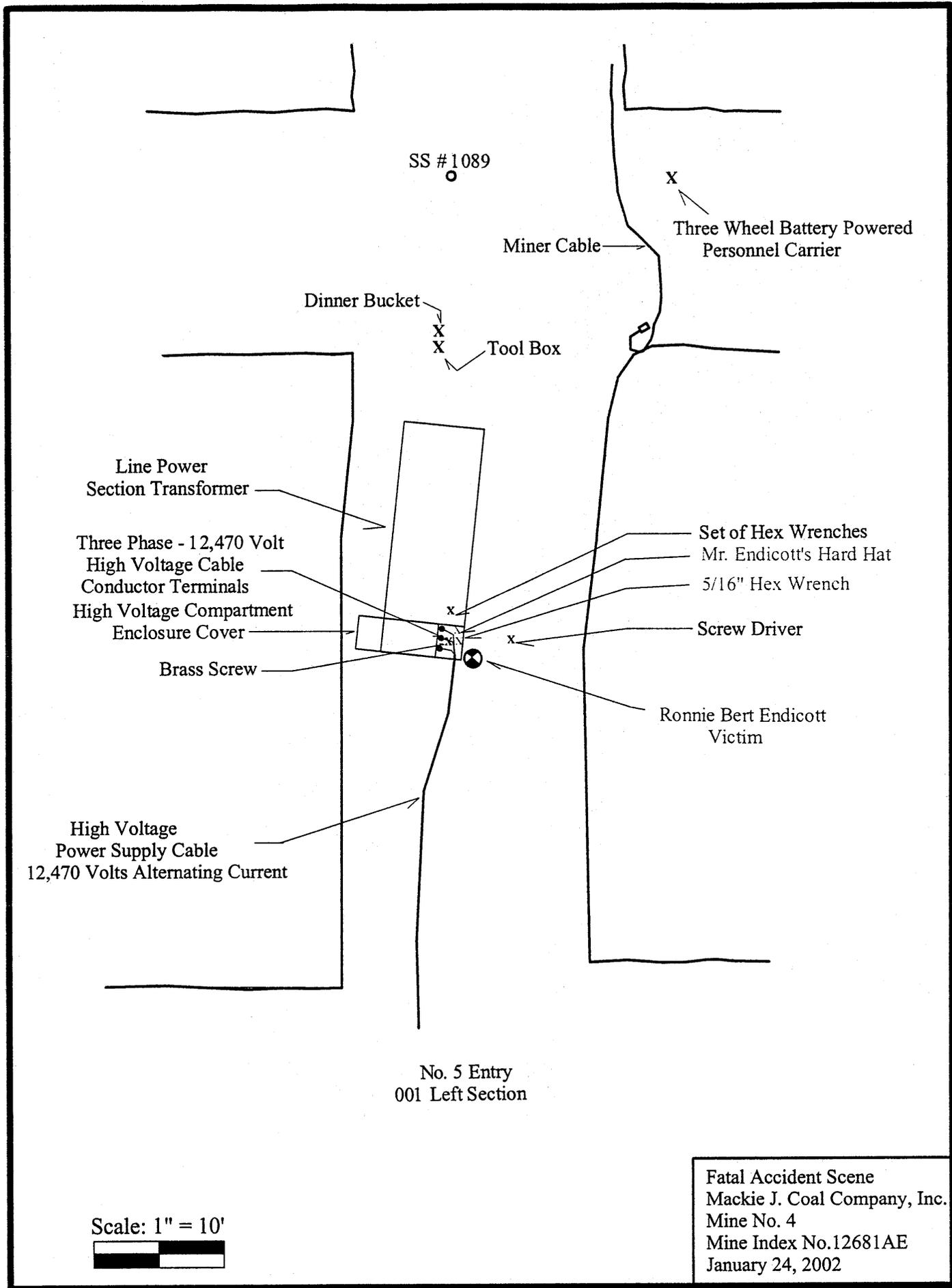
**Electrocution Fatality Investigation Report**  
**January 24, 2002**

**Mackie J. Coal Company, Inc.**  
**Mine No. 4**  
**Mine Index No. 12681AE**  
**Buchanan County, Virginia**

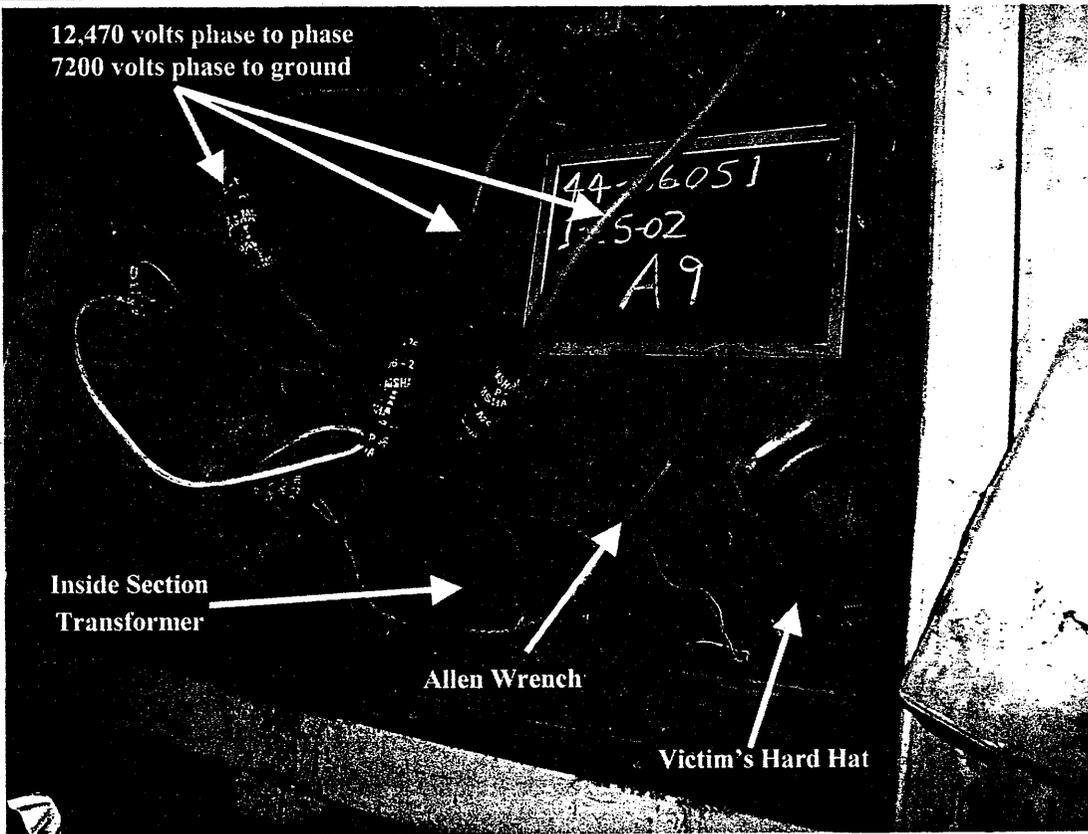
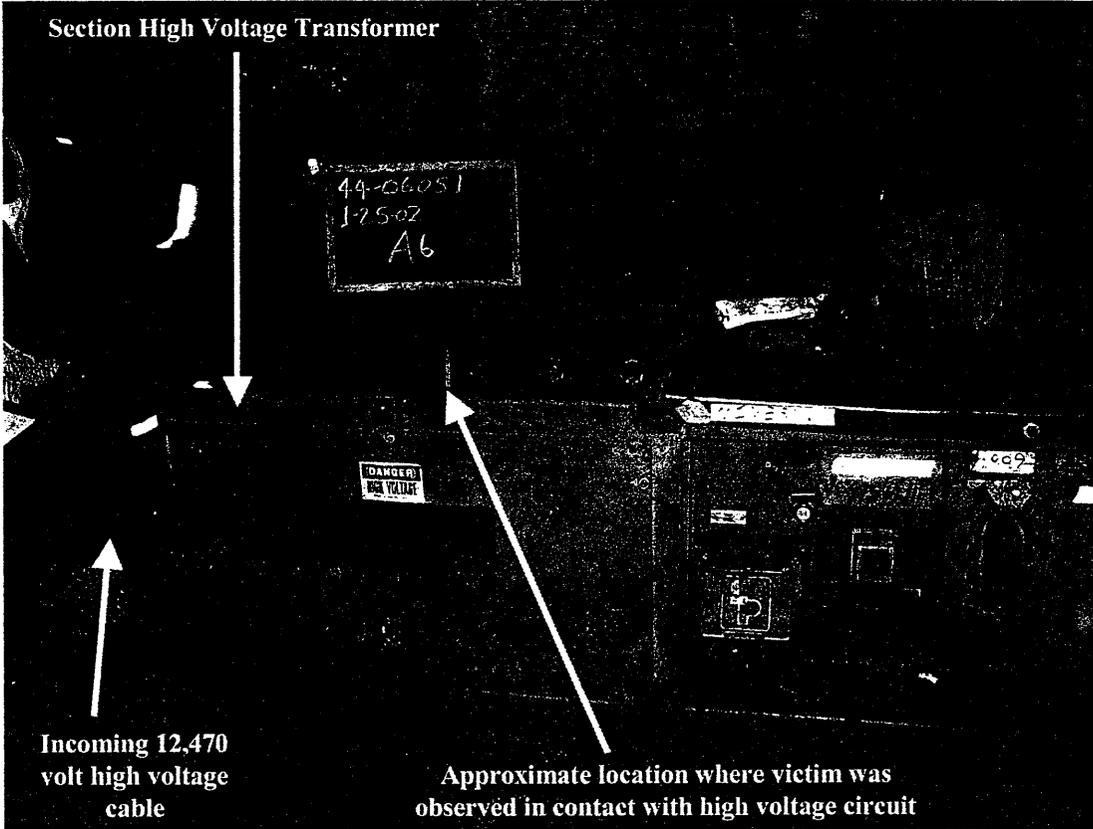
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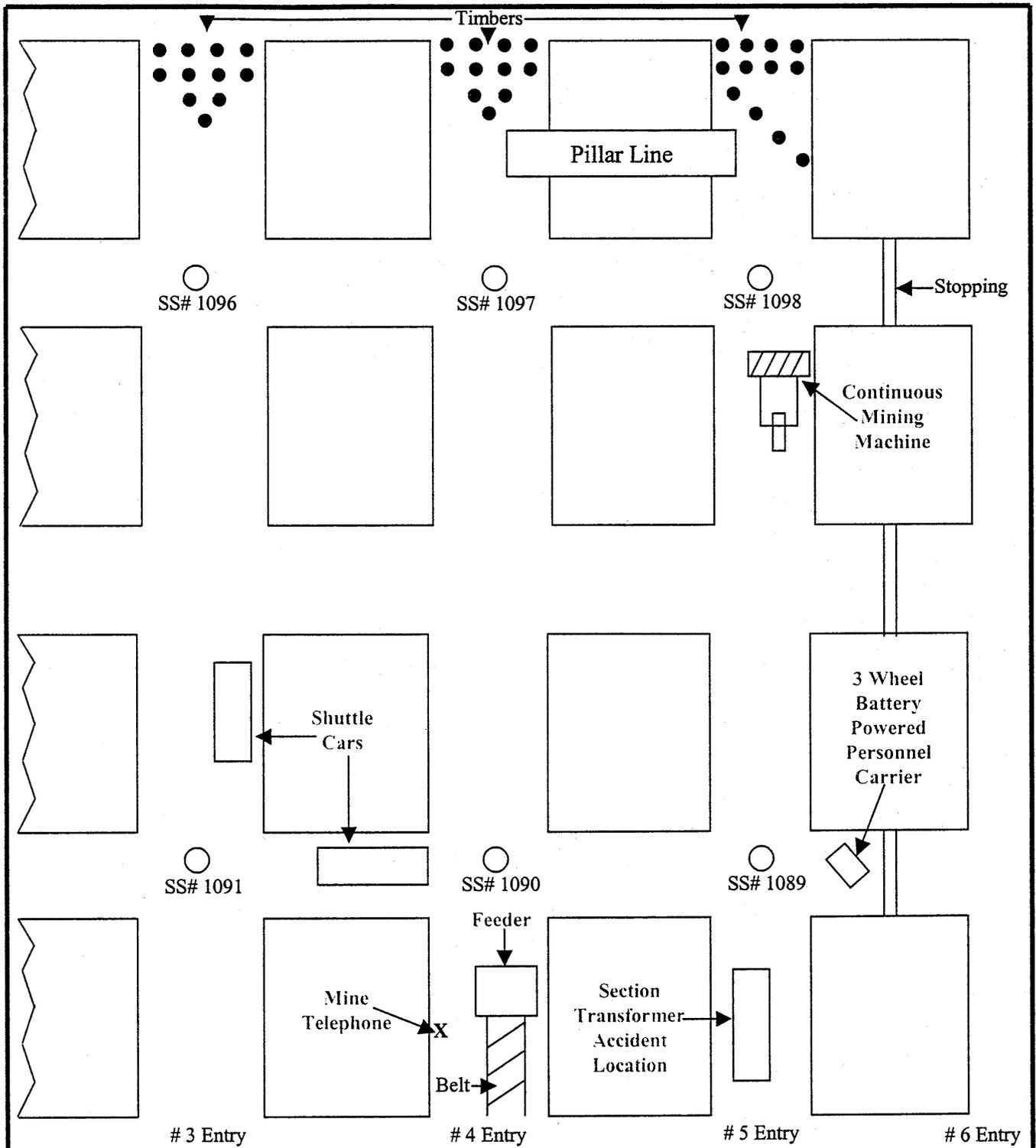
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**Fatal Accident Scene  
Mackie J. Coal Company, Inc.  
Mine No. 4  
M.I. No. 12681AE  
January 24, 2002**





NOT TO SCALE  
FOR REFERENCE ONLY

Fatal Accident Scene  
Mackie J. Coal Company, Inc.  
Mine No. 4  
M. I. No. 12681AE  
Section - Equipment Map  
January 24, 2002

**ELECTROCUTION FATALITY INVESTIGATION REPORT**  
**MACKIE J. COAL COMPANY, INC.**  
**MINE NO. 4**  
**MINE INDEX NO. 12681AE**

On Thursday, January 24, 2002, at approximately 10:30 p.m., an underground high voltage electrical power accident occurred at Mackie J. Coal Company, Inc., Mine No. 4, Mine Index No. 12681AE. Ronnie Bert Endicott, general inside laborer, was fatally injured when he came in contact with an energized 12,470 volt alternating current high voltage circuit located inside the section transformer on the 001 Left Section. Mr. Endicott was completing the installation of the underground high voltage power circuit in the section transformer following a section power move when he came in contact with the energized high voltage power circuit. Mr. Endicott, age 42, had twenty-four years and two months total mining experience with one year and four months employment at Mackie J. Coal Company, Inc., Mine No. 4. The Department of Mines, Minerals and Energy's, Division of Mines was notified of the accident at approximately 10:50 p.m. on January 24, 2002, and a joint investigation with the Federal Mine Safety and Health Administration was initiated the same day. This mine is scheduled to receive two regular inspections every six months. The last regular inspection was completed on December 11, 2001.

### **COMMENTARY**

Mackie J. Coal Company, Inc., Mine No. 4, is located on Semp Camp Branch off State Route 636, near Pilgrims Knob, in Buchanan County, Virginia. This underground mine is a one-section drift mine developed in the Jawbone coal seam. The 001 Left Section is located approximately 2,450 feet from the surface with the mining height averaging 60 inches. Approximately 600 tons of raw coal are produced daily using continuous mining methods. Mining personnel produce coal primarily on the day shift with nine employees and perform general maintenance work on the evening shift with four employees. The evening shift is primarily responsible for section power moves.

Mining personnel on the dayshift had completed pillar mining operations on the 001 Left Section having retreated to the entrance of the section off the Mains to a location requiring a section power move. The second shift crew was scheduled to move the section transformer back and to perform maintenance work on section equipment. The second shift crew consisted of Mr. Gerald Deskins, section mine foreman/electrical repairman, Mr. Endicott and Dwayne Keen, general inside laborers, and Harold Osborne, outside person. On Thursday, January 24, 2002, the second shift crew entered the mine at approximately 5:00 p.m. Mr. Deskins, Mr. Endicott and Mr. Keen traveled underground separately using three-wheel, battery powered, personnel carriers. Mr. Deskins and Mr. Endicott arrived on the 001 Left Section at approximately 5:15 p.m. and began making preparations for the section power move. Mr. Keen picked up servicing supplies while

enroute to the section and began servicing the equipment upon arrival on the section at approximately 5:20 p.m.

Prior to beginning to move the section transformer, at approximately 7:30 p.m., Mr. Deskins called the surface and instructed Mr. Osborne to de-energize the underground high voltage power circuit at the surface substation. Mr. Osborne de-energized the underground high voltage power at the surface substation as directed.

Mr. Deskins used a section of insulated electrical cable to discharge the potential electrical capacitive charge on all three-phase lead terminals inside the high voltage compartment of the section transformer before disconnecting the underground high voltage power phase leads from the section transformer. Mr. Deskins discharged the potential capacitive charge from the three high voltage phase lead terminals by momentarily contacting each phase lead with the section transformer frame ground connection. After discharging any capacitive charge from the high voltage phase leads, the insulated electrical cable used to contact the high voltage phase leads and the transformer ground connection was removed. Following this procedure, the high voltage power cable was disconnected and removed from the section transformer.

Before moving the section transformer, Mr. Deskins and Mr. Endicott removed approximately 800 feet of high voltage power cable and a high voltage cable splice box from the 001 Left Section high voltage power supply line. The high voltage power cable and the splice box were then loaded in a battery-powered scoop. The section transformer was moved back approximately 70 feet and the high voltage power cable was re-connected to the phase terminals inside the section transformer. The section transformer enclosure cover over the high voltage compartment was positioned back in place. The section transformer high voltage compartment cover was not re-bolted back in place because the high voltage phase polarity had not been tested. The high voltage power would have to be restored to the section transformer and section equipment would have to be tested to determine the high voltage phase polarity.

After completing the section power move, at approximately 8:50 p.m., Mr. Deskins called Mr. Osborne, outside person, and instructed him to energize the underground high voltage power circuit at the surface substation. Mr. Osborne returned a call to Mr. Deskins informing him that the high voltage circuit breaker located on the surface substation would not go in (energize). Mr. Deskins and the crew decided to take their dinner break before he traveled to the surface to attempt to energize the high voltage circuit breaker.

Following the dinner break, at approximately 9:15 p.m., Mr. Deskins instructed Mr. Endicott and Mr. Keen to relocate the section equipment power cables while he traveled to the surface to energize the underground high voltage power circuit. Mr. Deskins also informed Mr. Endicott and Mr. Keen to stay clear of the section transformer until the underground high voltage power was energized. Mr. Deskins departed the 001

Left Section and traveled to the surface to energize the underground high voltage power circuit.

Upon arrival on the surface, at approximately 9:20 p.m., Mr. Deskins attempted several times to energize the underground high voltage power circuit breaker (oil-filled switchgear type) at the surface substation but was unable to get the high voltage circuit breaker to go in. Mr. Deskins observed that the mechanical linkage in the high voltage circuit breaker switchgear was loose. Mr. Deskins, who was uncertain about the high voltage problem, called Mr. Jay Wallace, mine operator, at his residence to discuss the problem. Mr. Wallace informed Mr. Deskins that the loose mechanical linkage in the high voltage circuit breaker switchgear had caused problems before and recommended that he continue engaging the switchgear until the high voltage circuit breaker energized the underground high voltage power. Mr. Deskins returned to the surface substation and continued engaging the circuit breaker switchgear until it engaged, energizing the underground high voltage power circuit. Mr. Deskins returned to the mine office where Mr. Osborne was located.

Soon after the underground high voltage power was energized, Mr. Endicott, located on the 001 Left Section, called the mine office and instructed Mr. Deskins to de-energize the underground high voltage power circuit. Mr. Endicott informed Mr. Deskins that he had energized one of the shuttle cars on the section and determined that the shuttle car was running backwards. The underground equipment test performed by Mr. Endicott revealed the three-phase high voltage circuit polarity was incorrect and two phases would have to be disconnected and reversed inside the section transformer to correct the condition. Mr. Deskins informed Mr. Endicott that he would de-energize the underground high voltage power circuit and would come back to the section to reverse the polarity of the underground high voltage power. At this time, Mr. Deskins de-energized the underground high voltage power circuit at the surface substation.

Before traveling underground, Mr. Deskins called Mr. Wallace to inform him that he had successfully energized the underground high voltage power circuit and that he would have to de-energize the underground high voltage power again because the shuttle car was "running backwards". He also informed Mr. Wallace that he was going back underground to reverse the polarity of the high voltage power by reversing two high voltage phase leads inside the section transformer. While Mr. Deskins was standing outside of the mine office talking with Mr. Wallace on a cordless telephone, Mr. Osborne came outside informing him that Mr. Endicott had called back from the 001 Left Section requesting that the underground high voltage power circuit be energized. To confirm Mr. Endicott's request, Mr. Deskins asked Mr. Osborne if he was positive that Mr. Endicott had requested that the underground high voltage power be energized. Mr. Osborne confirmed to Mr. Deskins that Mr. Endicott had called to the surface requesting that the underground high voltage power be energized.

Mr. Deskins returned to the surface substation and energized the underground high voltage power circuit. The first attempt to engage the underground high voltage circuit breaker switchgear was successful and the underground high voltage power circuit became energized. Mr. Deskins returned to the mine office/shop area and made preparations to travel back underground to the 001 Left Section.

Approximately five to ten minutes after Mr. Deskins energized the underground high voltage power circuit, Mr. Keen called the surface mine office from the 001 Left Section, requesting Mr. Osborne to de-energize the underground high voltage power circuit. Mr. Osborne immediately ran to the surface substation and de-energized the underground high voltage power. Mr. Deskins observed Mr. Osborne running toward the surface substation and asked him if anything was wrong. Mr. Osborne responded by only saying that they had called outside requesting him to de-energize the high voltage power. Mr. Deskins, being unaware of any problems, proceeded to travel back underground.

As Mr. Deskins was traveling back underground, arriving near the fourth underground crosscut, he met Mr. Keen bringing Mr. Endicott to the surface on a personnel carrier. Mr. Keen informed Mr. Deskins that Mr. Endicott had contacted the energized high voltage power inside the section transformer. Mr. Deskins and Mr. Keen traveled immediately on to the surface with Mr. Endicott. Mr. Farley Cantrell, mine superintendent, was notified of the accident at his residence and living only a short distance away, traveled immediately to the mine site. Mr. Deskins and Mr. Cantrell administered first aid including cardiopulmonary resuscitation to Mr. Endicott. Mr. Keen attempted to contact rescue squad personnel but was unsuccessful and then called Mr. Joe Altizer, Division of Mines, Mine Inspector, at his residence notifying him of the accident. Mr. Altizer contacted the Dismal River Volunteer Rescue Squad, Inc. requesting their assistance. The ambulance service personnel arrived and assumed control of Mr. Endicott and transported him to the Clinch Valley Medical Center, Richlands, Virginia, where he was pronounced dead at 12:25 a.m. on January 25, 2002.

## **STATEMENTS FROM MINE PERSONNEL AND OTHER FACTORS**

Statements from mine personnel and other factors determined during the investigation revealed the following:

1. The electrical accident occurred on January 24, 2002, at approximately 10:30 p.m. in the No. 5 entry on the 001 Left Section at the section transformer.
2. There were no eyewitnesses to the accident.
3. Mackie J. Coal Company, Mine No. 4, is a contract mine operation for the Dominion Coal Corporation.
4. Mr. Deskins and Mr. Keen stated that Mr. Endicott generally assisted Mr. Deskins when performing electrical work. Mr. Deskins stated that he knew

Mr. Endicott was not a certified electrical repairman. Mr. Deskins and Mr. Keen concurred that Mr. Endicott had not performed electrical work except when working under the direct supervision of Mr. Deskins.

5. Mr. Endicott did not hold a valid electrical repairman certification as required by the Board of Coal Mining Examiners. Mr. Endicott was certified as an electrical repairman in March, 1980 and attended annual electrical retraining in 1981 and 1982. However Mr. Endicott had not attended annual electrical retraining from 1983 to the time of the accident and therefore did not hold a valid electrical repairman certification. Annual electrical retraining is required to maintain a valid electrical repairman certification.
6. The second shift crew primarily performed maintenance work and routine general work including servicing section equipment and section power moves.
7. Mr. Deskins stated that the underground high voltage power circuit was not locked out and tagged prior to or during the interim of performing electrical work on the underground high voltage power circuit prior to the accident on January 24, 2002.
8. Mr. Deskins stated that he used a section of insulated electrical cable to discharge any potential capacitive charge on the high voltage power circuit before disconnecting the underground high voltage phase leads inside the section transformer. After discharging the potential capacitive charge on the underground high voltage phase leads, Mr. Deskins removed the insulated electrical cable used to discharge the circuit. Upon completion of discharging the potential capacitive charge, Mr. Deskins disconnected and removed the high voltage cable from the section transformer.
9. Mr. Deskins stated that the underground high voltage power circuit on the 001 Left Section was not grounded with a fixed component prior to and during the interim of performing electrical work on the underground high voltage power circuit prior to the accident on January 24, 2002.
10. Mr. Deskins stated that upon completion of the section power move, the section transformer high voltage compartment cover was positioned back in place.
11. Mr. Deskins called Mr. Osborne, outside person, and instructed him to energize the underground high voltage power at the surface substation. Mr. Osborne stated that he returned a call to Mr. Deskins, located on the 001 Left Section, informing him that he could not get the surface substation high voltage circuit breaker energized.
12. Mr. Deskins stated that before he departed the 001 Left Section to travel to the surface to energize the high voltage circuit breaker, he instructed Mr. Endicott and Mr. Keen to stay clear of the section transformer until the underground high voltage power was energized.
13. Mr. Keen stated that he was servicing the continuous mining machine located in the No. 5 entry when he heard the underground high voltage power energize the first time. This occurred after Mr. Deskins had departed the section and traveled to the surface to energize the underground high voltage power.

- During this time, Mr. Keen stated that he was located in the No. 5 entry approximately 125 feet in by the section transformer.
14. Mr. Keen stated that after Mr. Deskins had energized the underground high voltage circuit at the surface substation that energized the section transformer, he was moving the continuous miner cable and had traveled the No. 5 entry to a location immediately in by the section transformer. Mr. Keen stated that while at this location, he heard Mr. Endicott call surface personnel on the mine telephone and inform them that he had energized one of the shuttle cars on the section and the shuttle car was "running backwards". Mr. Keen also stated that he heard Mr. Endicott inform surface personnel that the underground high voltage power was phased backwards and to de-energize the power and that he would switch the phase leads.
  15. Mr. Keen stated that shortly after he heard Mr. Endicott's conversation with surface personnel, while he was located at the continuous mining machine, he heard the section transformer de-energize. At this time, Mr. Keen stated that he heard a noise that sounded like one of the transformer compartment covers being moved back on the section transformer. Mr. Keen stated that he continued servicing the continuous mining machine and moving power cables in a crosscut adjacent to the location of the continuous mining machine.
  16. Mr. Keen stated that after he heard the section transformer de-energize, following Mr. Endicott's conversation with surface personnel, he did not hear Mr. Endicott call the surface and instruct them to energize the high voltage power. Mr. Keen stated that his location may have prevented him from hearing a second conversation between Mr. Endicott and surface personnel.
  17. Mr. Deskins stated that he did not hear the mine telephone paging surface personnel when Mr. Endicott called outside requesting the underground high voltage power be energized. Mr. Deskins stated that he was standing outside the mine office in the shop area talking to Mr. Wallace on a cordless telephone when Mr. Osborne came to inform him that Mr. Endicott had called him requesting that the underground high voltage power be energized.
  18. Mr. Keen stated that approximately four to ten minutes after he heard the section transformer become de-energized, the section transformer became energized again. Mr. Keen stated that when the power energized the second time, he observed arcing at the section transformer and immediately traveled toward that location where he observed Mr. Endicott with one hand inside the high voltage compartment obviously in contact with the high voltage power circuit in the section transformer. Mr. Keen traveled immediately to the mine telephone and instructed Mr. Osborne to de-energize the underground high voltage and call an ambulance that Mr. Endicott was in the power. Mr. Osborne stated that he could only recall hearing Mr. Keen instructing him to de-energize the high voltage power. At this time, Mr. Osborne and Mr. Deskins, who were located on the surface, stated that they did not have any knowledge that an accident had occurred.

19. Mr. Keen stated that he immediately returned to the section transformer to assist Mr. Endicott. The section transformer power de-energized just as he arrived to assist Mr. Endicott. At this time, he observed Mr. Endicott roll away from the section transformer. Mr. Endicott was slumped down beside the section transformer high voltage compartment. Mr. Keen quickly unloaded the personnel carrier parked in by the section transformer, loaded and transported Mr. Endicott to the surface.
20. Mr. Keen stated that as he was transporting Mr. Endicott to the surface he met Mr. Deskins at the fourth underground crosscut.
21. Mr. Osborne stated that he was located in the mine office holding the mine telephone handset when Mr. Endicott called to the surface the last time requesting that the underground high voltage power be energized. Mr. Osborne confirmed that it was Mr. Endicott he spoke with on the mine telephone because he recognized his voice. Mr. Osborne also stated that the mine telephone did not page on the surface when Mr. Endicott called, but he heard the mine telephone handset click and he answered Mr. Endicott's call.
22. Mr. Deskins and Mr. Osborne concurred that during the initial attempts to energize the underground high voltage power circuit with the surface substation circuit breaker switchgear that the switchgear was not operating properly due to loose mechanical linkage.
23. Mr. David Cordle, day shift electrical repairman, had terminated his employment at this mine approximately two weeks prior to the accident. Mr. Cordle had been responsible for conducting the monthly high voltage electrical examinations during his employment. After Mr. Cordle had terminated his employment, Mr. Deskins was assigned to perform the monthly high voltage electrical examinations and had conducted the last examination on the second shift on Thursday, January 17, 2002.
24. Mr. Deskins stated that while conducting the monthly high voltage electrical examinations on January 17, 2002, he had difficulty in getting the emergency stop switch located on the 001 Left Section transformer to function properly to de-energize the underground high voltage power circuit. Mr. Deskins stated that he had to activate the emergency stop switch two or three times before the underground high voltage power circuit would de-energize at the surface substation. Mr. Deskins stated that the emergency stop switch had malfunctioned approximately four weeks earlier and that Mr. Cordle had replaced it with a new switch.
25. Mr. Deskins stated that he did not manually activate the auxiliary protective relay devices during the monthly high voltage electrical examinations conducted on January 17, 2002.
26. On Friday, January 18, 2002, Mr. Deskins informed Mr. Jay Wallace, mine operator, of the problem he had encountered with the section transformer emergency stop switch. Mr. Wallace requested electrical assistance from the Jewell Smokeless Coal Corporation's electrical personnel who provide surface

- high voltage services at the Dominion Coal Corporation's contract mine operations.
27. On Monday, January 21, 2002, Mr. Carl Evans and Mr. Joseph Keen, Jewell Smokeless Coal Corporation's electrical department personnel traveled to the mine site to evaluate Mr. Wallace's report of the high voltage problem.
  28. Mr. Evans and Mr. Keen stated that the 001 Left Section transformer emergency stop switch was inoperative and the mechanical linkage was loose on the surface substation high voltage power circuit breaker switchgear. Mr. Evans and Mr. Keen completed adjustments on the circuit breaker switchgear linkage and tested the switchgear operation by activating the underground section transformer emergency stop switch three or four times verifying that the switchgear was operating properly.
  29. Mr. Joshua Meadows, day shift shuttle car operator, stated that on January 21, 2002, after Mr. Evans and Mr. Keen had completed adjustments on the surface substation high voltage switchgear linkage, he was instructed by surface personnel to activate the section transformer emergency stop switch to verify that the switchgear was operating properly and would de-energize the underground high voltage power circuit and section transformer. Mr. Meadows stated that the emergency stop switch operated properly and would de-energize the high voltage power on the section transformer. Mr. Evans verified that activating the emergency stop switch on the section transformer would de-energize the underground high voltage power circuit at the surface high voltage substation.
  30. Mine personnel stated that high voltage power problems similar to the problems identified during the monthly surface high voltage electrical examinations conducted on January 17, 2002, and the high voltage power problems encountered on the second shift on January 24, 2002, prior to the accident, had occurred in the past. The monthly high voltage electrical examination results as recorded by Mr. Cordle on November 26, 2001, revealed that Mr. Evans and Mr. Keen had performed similar repair work on the surface substation high voltage circuit breaker switchgear linkage. Mr. Wallace verified the mine visit by Mr. Evans and Mr. Keen in November 2001, and also stated that the loose mechanical linkage problem in the surface substation high voltage circuit breaker switchgear had occurred on previous occasions.

## PHYSICAL FACTORS

The investigation of physical factors at the scene of the accident revealed the following:

1. The electrical accident occurred in the No. 5 entry on the 001 Left Section transformer located approximately 36 feet outby survey station No. 1089.
2. The mining height at the section transformer where the accident occurred measured approximately 60 inches.
3. Mine personnel were conducting second mining operations on the 001 Left Section using a three-cut partial pillar recovery plan. The 001 Left Section was located approximately 2,450 feet from the surface.
4. The mining equipment on the 001 Left Section consisted of one Joy 14CM5 continuous mining machine, three Joy 21 SC shuttle cars, two S&S 482 battery powered scoops, two Fletcher single boom roof bolting machines and one Stamler coal feeder.
5. The Joy continuous mining machine was located in the No. 5 entry on the 001 Left Section approximately 125 feet inby the section transformer.
6. The 001 Left Section transformer, model 600 PC, serial No. 6055 was manufactured by Line Power and was rated at 600 KVA. The section transformer was provided with an input of 12,470 volts alternating current and utilized step-down transformers to provide 995, 600 and 480-volt circuits to provide electrical power to section equipment. All high voltage cables installed in the mine from the surface substation to the section transformer were No. 2 AWG-15 KV cable.
7. The 001 Left Section transformer measured approximately 17 feet and seven inches in length, 72 inches in width, and 26 inches in height. The transformer housing is constructed of metal and has compartment covers, approximately 33 inches wide, that can be removed or moved back to gain access to various high and low voltage electrical components inside the transformer. The transformer high voltage power compartment cover was moved back approximately 24 inches exposing the high voltage power phase leads and terminal connections inside the section transformer. Mr. Deskins stated that upon completion of the section power move, the section transformer high voltage compartment cover was positioned back in place.
8. The section transformer disconnecting device was observed in the closed (energized) position. This device provides a physical and visual means to energize and de-energize the transformer banks and low/medium voltage circuits located inside the section transformer. This device does not affect the incoming high voltage power. The emergency stop switch (button) provided on the section transformer was observed in the closed (energized) position. The emergency stop switch is a part of the high voltage ground check monitor circuit.
9. The No. 1 shuttle car trailing cable coupler was connected to the properly identified circuit breaker.
10. Mr. Endicott's hardhat and a 5/16" hex wrench were observed in the bottom of the section transformer high voltage compartment enclosure, in the general area where the

12,470 volts alternating current phase leads connected to the transformer terminals. The hex wrench was the correct size for the set screws used to secure the 12,470 volts alternating current input phase leads to the phase terminals.

11. The set screws used to secure the three high voltage phase leads at each phase termination were firmly secured verifying that the electrical work of disconnecting and reversing two phase leads had been completed prior to the accident. An insulating mat was observed on the mine floor adjacent to the section transformer high voltage compartment.
12. An open metal package of assorted hex wrenches was located on top of the section transformer compartment cover adjacent to the open high voltage compartment. A small screwdriver was also located on the mine floor adjacent to the section transformer high voltage compartment.
13. The underground high voltage three-phase power polarity was tested during the investigation and found to be phased correctly. This test confirmed that two phases of the underground high voltage three phase system were disconnected and reversed inside the section transformer from the time that Mr. Endicott informed surface personnel that the power was phased backwards and the time that the accident occurred.
14. Signs of electrical arcing were observed on the phase termination areas inside the section transformer high voltage compartment. An arc shield was missing from the number three phase terminal. Signs of electrical arcing were also observed on the interior and exterior surfaces of the high voltage power compartment cover that had been moved back prior to the accident. However, it could not be determined when the electrical arcing had occurred in these areas.
15. The results of the monthly high voltage electrical examinations as recorded by Mr. Deskins on January 17, 2002, did not identify any hazardous conditions observed during the high voltage electrical examinations.
16. The underground mine telephone provided on the 001 Left Section was located in No. 4 entry at the section loading point. A six-volt mine telephone battery was observed lying in the dump area of the coal feeder at the section loading point. The section mine telephone was located in the No. 4 entry while the section transformer was located in No. 5 entry, a travel distance of approximately 130 feet.
17. The underground mine telephones were Pyott Boone, battery operated and equipped with paging capability. The mine telephone system was evaluated on January 31, 2002 during the accident investigation and revealed that voice communications between the 001 Left Section and the surface were only occasionally audible. The paging system worked only intermittently and voice transmissions would fade out when communicating from the surface to the 001 Left Section. Mine personnel stated that they had not experienced any significant problems with the mine telephone system other than changing batteries and other routine maintenance.
18. The Line Power surface substation, model No. 1000SS, serial No. 3423A, was a self-contained, enclosed unit equipped with a high voltage oil circuit breaker switchgear. The substation delivered 12,470 volts alternating current, phase to phase, to the underground high voltage electrical system. The substation was equipped with a

load-break switch that provides a visible disconnecting device and is used to de-energize electrical power inside the substation. The load-break switch, model no. 1300-20-20, rating 17.5 KV/460 amperes, was observed in the open (de-energized) position.

19. The General Electric HC5 operating lever oil circuit breaker switchgear, serial no. 61557680-10, was rated for 7,200 volts with a 600 ampere rating. The oil circuit breaker is designed to automatically de-energize the underground high voltage power circuit when an auxiliary protective relay device detects an abnormal condition. The oil circuit breaker switchgear was observed in the open (de-energized) position. The indicators (flags) provided for the auxiliary protective relay devices were not displayed except the ground check monitor circuit when examined on January 25, 2002.
20. The high voltage oil circuit breaker switchgear installed in the surface substation would not trip under a ground fault or overcurrent condition when tested on January 25, 2002 during the accident investigation. The high voltage auxiliary protective relay devices would activate but the high voltage oil circuit breaker would not trip to de-energize the underground high voltage power. The substation contained two General Electric IAC auxiliary protective relay devices that are designed to detect either an overcurrent or short circuit condition. These two relay devices were connected to 150:5 current transformers. These two relay devices, when subjected to primary injection testing, activated at 106 amperes and released their flags. The short circuit relay devices activated at 25 and 23 amperes, respectively and released their flags. The substation also contains a General Electric IAU auxiliary protective relay device that is designed to detect a grounded phase condition. This grounding relay device was connected to a 60:1 potential transformer. The grounding relay device, when subjected to secondary testing, would not activate at any voltage from zero to one-hundred and twenty volts. Therefore, the grounding relay device would not detect a grounded phase condition, release its corresponding flag or de-energize the oil circuit breaker switchgear.
21. The surface substation located at the mine could not be repaired and was replaced with a similar Line Power high voltage substation. Various underground high voltage system components were removed from service and the high voltage power was supplied directly from the surface substation to the 001 Left Section transformer to facilitate removal of underground equipment to the surface. The underground mining equipment was removed from the mine and the mine discontinued operations.

## CONCLUSION

On January 24, 2002, at approximately 10:30 p.m., a high voltage electrical power accident occurred at Mackie J. Coal Company, Inc., Mine No. 4. Ronnie Bert Endicott, general inside laborer, was fatally injured when he came in contact with an energized 12,470 volt alternating current underground high voltage power circuit. Mr. Endicott was

observed in contact with the energized high voltage power circuit located inside the high voltage compartment of the 001 Left Section transformer.

## ENFORCEMENT ACTION

The following enforcement action was taken as a result of the investigation:

1. An order of closure, No. DWA0002666, was issued under Section 45.1-161.91 A. (ii) of the Coal Mine Safety Laws of Virginia on the entire mine necessary to preserve the scene of the accident pending an investigation. The order of closure was modified to allow the following: replacement of the existing surface high voltage substation; conduction of monthly high voltage electrical examinations of the newly installed surface substation and high voltage system, performed by a certified electrical repairman; replacement of the 600-volt and 480-volt alternating current grounding resistors located inside the 001 Left Section transformer.
2. An order of closure, No. DWA0002689, was issued under 45.1-161.91.A (i), referencing 45.1-161.30.A of the Coal Mine Safety Laws of Virginia. On January 24, 2002, at approximately 10:30 p.m., an electrical accident occurred at the Mackie J. Coal Company, Inc., No. 4 underground mine, in the No. 5 entry of the 001 Left Section. Mr. Ronnie Endicott, general inside laborer, received fatal injuries when he came in contact with an energized 12,470 volts alternating current underground high voltage power circuit in the 001 Left Section, Line Power section transformer, model no. 600PC, serial no. 6055. An imminent danger was present in that Mr. Endicott was performing electrical work and was not certified as an electrical repairman to perform electrical work as required by the Board of Coal Mining Examiners. The Coal Mine Safety Laws of Virginia, Section 45.1-161.30.A., requires that any person who performs electrical work shall be certified.
3. An order of closure, No. DWA0002692, was issued under 45.1-161.91.A (i), referencing 45.1-161.196 of the Coal Mine Safety Laws of Virginia. An imminent danger was present in that electrical work was being performed by Mr. Ronnie Endicott and Mr. Gerald Deskins, section foreman/electrical repairman, on the 001 Left Section underground high voltage power circuit while the high voltage power circuit disconnecting devices were not locked out and suitably tagged at the surface substation by the persons performing the work. The Coal Mine Safety Laws of Virginia, Section 45.1-161.196 requires that disconnecting devices be locked out and suitably tagged by the persons performing such work.
4. An order of closure, No. DWA0002693, was issued under 45.1-161.91.A (i), referencing 45.1-161.196 of the Coal Mine Safety Laws of Virginia. An imminent danger was present in that electrical work was being performed on an underground 12,470 volts alternating current high voltage power circuit that had not been grounded before electrical repair work was performed. The Coal Mine Safety Laws of Virginia, Section 45.1-161.196 requires all high voltage circuits to be grounded before repair work is performed.

5. An order of closure, No. DWA0002667, was issued under 45.1-161.91.A (i), referencing 45.1-161.282.A of the Coal Mine Safety Laws of Virginia. An imminent danger was observed in the Line Power surface substation, serial no. 3423A, located at the surface area of the underground mine. The high voltage circuit breaker switchgear installed in the surface substation would not trip under a ground fault condition and an overcurrent condition, when tested on January 25, 2002. The high voltage auxiliary relay devices would activate but the high voltage circuit breaker would not trip to de-energize the high voltage circuit breaker when the ground fault and overcurrent conditions were tested. The high voltage circuit breaker switchgear provides protection for the underground high voltage circuit. The Coal Mine Safety Laws of Virginia, Section 45.1-161.282.A. requires that circuit breaker devices be maintained in safe operating condition.
6. A notice of violation, No. DWA0002695, was issued to Mr. Gerald Deskins, section foreman/electrical repairman, under 45.1-161.196 of the Coal Mine Safety Laws of Virginia. On January 24, 2002, at approximately 10:30 p.m., an electrical accident occurred at the Mackie J. Coal Company, Inc., No. 4 underground mine, in the No. 5 entry of the 001 Left Section. Mr. Ronnie Endicott, general inside laborer, received fatal injuries when he came in contact with an energized 12,470 volts alternating current underground high voltage power circuit in the 001 Left Section, Line Power section transformer, model no. 600PC, serial no. 6055. Mr. Gerald Deskins, section foreman/electrical repairman, and Mr. Endicott performed electrical work on the underground 12,470 volts alternating current high voltage power circuit and failed to lock out and suitably tag the disconnecting device provided for the high voltage power circuit located at the surface substation, prior to performing the electrical work. Mr. Deskins and Mr. Endicott also failed to ground the underground 12,470 volts alternating current high voltage power circuit while the electrical work was performed on the high voltage power circuit. The Coal Mine Safety Laws of Virginia, Section 45.1-161.196 requires that disconnecting devices be locked out and suitably tagged by the persons performing this work and that all high voltage circuits shall be grounded before repair work is performed.

## RECOMMENDATIONS

1. No electrical work shall be performed on low, medium, or high voltage distribution circuits or equipment, except by a certified person or by a person trained to perform electrical work and to maintain electrical equipment under the direct supervision of a certified person.
2. Disconnecting devices shall be locked out and suitably tagged by the persons who perform electrical or mechanical work on such circuits or equipment connected to the circuits.
3. All high-voltage circuits shall be grounded before repair work is performed. The certified electrical repairman shall effectively ground the high voltage circuit prior to performing any work on the de-energized circuit.

**SIGNATURE SHEET**

This report hereby submitted by Terry A. Ratliff and approved by Frank A. Linkous:

Terry A. Ratliff 03/15/02  
TERRY A. RATLIFF, COAL MINE INSPECTOR Date

Frank A. Linkous 03/15/02  
FRANK A. LINKOUS, CHIEF Date

**APPENDIX**

- VICTIM DATA SHEET
- MINE HIGH VOLTAGE ELECTRICAL SYSTEM
- SURFACE HIGH VOLTAGE SUBSTATION INFORMATION
- PERSONS PRESENT DURING THE INVESTIGATION
- MINE LICENSE INFORMATION

**VICTIM DATA SHEET**

Name:	Ronnie Bert Endicott
Occupation:	General Inside Laborer
Mailing Address:	P. O. Box 316, Pilgrims Knob, VA 24657
Date of Birth:	April 4, 1959
Total Mining Experience:	Twenty-four years and two months
Experience with Present Company:	One year and four months
Experience in Present Occupation:	One year and four months

**PERSONNEL**

The following personnel provided information and/or were present during the investigation:

**Mackie J. Coal Company, Inc., Mine No. 4**

**FATALITY INVESTIGATION  
MACKIE J. COAL COMPANY, INC.  
MINE NO. 4  
M.I. # 12681AE  
SURFACE SUBSTATION INFORMATION  
JANUARY 24, 2002**

**Substation Data**

Location: Surface Date 02/25/02

**Transformer(s)**

Primary Voltage: 12,470 VAC Secondary Voltage: 12,470 VAC

KVA 1250 Primary fuses: 40 Amps. 15K Volts 50 KA

Transformer connections: Primary Delta Secondary Wye

**High Voltage Circuit Breaker**

Mfg. General Electric Type Oil Max Volts: 7200

Max. Current 600 C.T. Ratio 150:5

Phase overcurrent relays Mfg. GE Type IAC Tap 3

Instantaneous setting N/A Time dial setting 2

**Ground Fault Relay**

Mfg. General Electric Type 59G IAV Tap .5

**Grounding Resistor**

Mfg. Line Power Voltage rating 7200

Resistance 490 C.T. Ratio N/A and/or P.T. Ratio 60:1

Amps. 15 Ground Field Resistance 5 ohms

Date last checked 01/17/02

**Underground High Voltage Feeder Cable**

Size #2 AWG No. of conductors 3 Type GGC - SHD

Mfg. Carroll

Voltage Rating 15 KV

**Self Contained Units**

Mfg. Line Power

Model 1000SS

Serial 3423A