CAI-2008-02

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

Surface Coal Mine

Fatal Fall of Highwall
January 12, 2008

Sulphur Springs Strip
Luminant Mining
Sulphur Springs, Hopkins County, Texas
MSHA I.D. No. 41-02776

Accident Investigators

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Coal Mine Safety and Health Inspector

Todd D. Jaqua
Coal Mine Safety and Health Inspector

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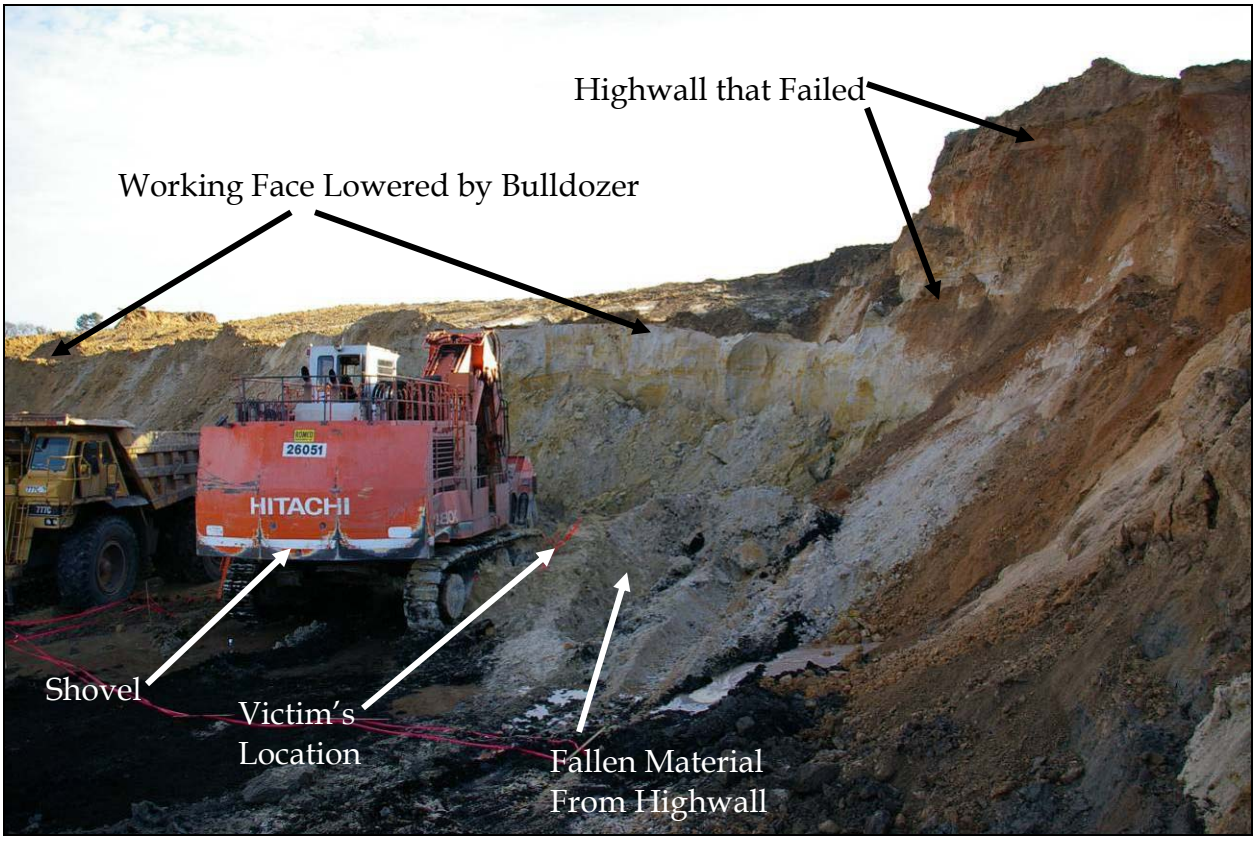

OVERVIEW

On Saturday, January 12, 2008, at approximately 5:07 a.m., Thomas E. Farmer, a 50-year old shovel operator with 22 years mining experience, was fatally injured by a highwall failure that occurred in Pit 11, Area G at the Luminant Mining, Sulphur Springs Strip mine. The highwall was approximately 45 feet high with water draining from the face. The accident occurred when Farmer went on break at 5:00 a.m. He dismounted the shovel and positioned himself between the outside of the shovel track and the toe of the highwall. While in that position, he was struck by material that fell from the highwall. The material pinned Farmer in an upright position against the track side-frame assembly and buried him to his upper chest and neck. He was subsequently discovered by a co-worker, but resuscitation efforts were unsuccessful.

The accident occurred because management failed to correct and/or danger off a hazardous ground condition and allowed miners to work below the hazardous condition before it was corrected. Contributing factors included management's failure to assure that the ground control plan and the company's safety plan were being followed. Persons were allowed to work between equipment and a dangerous highwall where equipment hindered escape from falls or slides from the highwall.

GENERAL INFORMATION

The Sulphur Springs Strip mine is owned and operated by Luminant Mining and is located near Thermo, Texas off State Highway 11, three miles southeast of Sulphur Springs, Texas. The mine began operations in 1978.

Overburden and coal are removed by a truck and shovel operation and the coal is transported by rail to customers. Explosives are not used in the mining operation. The coal is trucked from the pit to crushing facilities were it is sized and sent to storage silos. The mine produces 6,900 tons of coal a day with 121 employees. Shifts at the mine are a combination of twelve and eight hours, seven days a week.

The principal officers for the mine at the time of the accident were Jeff Mason, Mine Manager; Russell Cameron, Mine Safety Representative; Mark Barton, Mine Operations/Maintenance Manager; and Larry Nelson, Operations Supervisor.

Prior to the accident, the last Mine Safety and Health Administration (MSHA) regular inspection was completed on September 4, 2007. The non-fatal days lost (NFDL) incidence rate for the mine for 2007 was 1.52. The national incidence rate for surface coal mines for 2007 was 1.39.

DESCRIPTION OF ACCIDENT

The night shift crew started at 11:00 p.m., on January 11, 2008. Larry Nelson, operations supervisor, assigned Thomas Farmer, shovel operator and victim, to operate the No. 51 Hitachi EX-1800 shovel loading overburden in Pit 11, Area G. Alton Clifton and Wade Amerson, truck

drivers, were assigned to haul the overburden. Jack Newsom, bulldozer operator, was assigned to push down the east side working face to a safe height of approximately 20 feet.

At approximately 12:00 a.m., Nelson conducted the on-shift examination of Pit 11, Area G. At that time, he observed that the south highwall was too high and unstable. He assigned Newsom to push (slope) down the south highwall to a safe height. At the time, loading operations were proceeding north along the working face away from the south highwall.

Normal mining operations proceeded from 12:00 a.m. to 5:00 a.m. At approximately 3:30 a.m., digging on the north end of the east working face was completed and the shovel was moved to the southeast corner to start another pass on the working face. At this time, Newsom started to push down the east corner of the south highwall and later attempted to push down material from the top of the south highwall. Due to standing water on top of the south highwall, Newsom feared he would get the bulldozer stuck if he continued working there. Newsom called Nelson on the radio but was not sure if Nelson received the message that he could not continue pushing material from the top of the south highwall. The 5:00 a.m. break was close, so Newsom pulled away from the south highwall and started to push down the east highwall until break time. He was waiting to receive further instructions from Nelson concerning the south highwall.

At 5:00 a.m., the fifteen minute break started. The truck operators took their break at the truck dump. Newsom took his break on top of the east working face. Farmer shut off all lights on the shovel and started his break. During the break, Farmer exited the shovel and was between the shovel tracks and the south highwall when the highwall failed and trapped him against the tracks. It appeared that Farmer exited the shovel to take a toilet break beside the shovel. At 5:18 a.m., Amerson returned from break. The shovel lights were still off, so Amerson threw some pennies at the window of the cab to get Farmer's attention. Clifton arrived with his truck and used the truck lights to illuminate the shovel, flashing the high beam lights on and off. When this caused no reaction from Farmer, Clifton asked Johnny Nordin, blade operator who was heading west on the haul road, to call Farmer on his cell phone, but this was unsuccessful. Newsom, hearing the communication, turned his bulldozer to also illuminate the shovel. Amerson then boarded the shovel to look for Farmer. Not finding him, he returned to his truck and called Clifton on the radio and asked him to call Nelson to see if Farmer had been taken to the rest room or was with Nelson. Nelson responded that he was not with Farmer. After Amerson determined that Farmer was not with Nelson, he exited his truck to look for him.

At the time, Daryl Watkins, fuel truck operator, was heading to the shop and heard that Farmer was missing. He turned the fuel truck around and drove to the No. 51 shovel. Watkins arrived at 5:30 a.m. and met Amerson coming off his truck. Watkins, with a flashlight in hand, walked around to the south side of the shovel with Amerson where they found Farmer buried up to his head and unresponsive to verbal communication. Watkins ran to the north side of the shovel and called out for help. Clifton, who was standing near the shovel, ran to the fuel truck and made a general call for assistance on the radio. He then returned to assist Watkins and Amerson, who were giving artificial ventilation breaths to Farmer.

Nelson arrived at the shovel at approximately 5:35 a.m. and found Amerson and Watkins digging fallen material away from Farmer with their hands and hard hats and Clifton giving artificial ventilation. Nelson immediately called 911 emergency number and Mark Barton, operations/maintenance manager. Nelson directed rescue operations, calling for hand shovels and using other personnel who had arrived to watch the highwall for possible additional falling material. Newsom brought the bulldozer down from the east working face to the south side of the shovel to illuminate the rescue area and to try and remove fallen material. However, he stopped removing material as it was thought that the vibrations of the bulldozer could cause more material to fall from the highwall. Hank Kyle, No. 54 shovel operator and an EMT, arrived to help with rescue efforts. Kyle relieved Clifton giving artificial ventilation and started cardiopulmonary resuscitation (CPR) once material had been removed from Farmer's waist. CPR was continued until the Hopkins County EMS arrived at 5:48 a.m. After the Hopkins County EMS arrived, it was determined that Farmer could not be resuscitated. Farmer was removed from the fallen material at 6:32 a.m. and was pronounced dead by the Hopkins County Justice of the Peace at 6:43 a.m.

INVESTIGATION

The Mine Safety and Health Administration (MSHA) was notified of the accident at 5:51 a.m., CST, January 12, 2008, when Mark Barton, operations/maintenance manager, called the MSHA Call Center. Kendell Whitman, MSHA inspector at Longview, Texas, was notified of the accident and he proceeded to the mine, arriving at 8:00 a.m. Whitman issued a Section 103(k) order to ensure the safety of persons at the mine and conducted a preliminary investigation of the accident. An MSHA investigation team was assembled and arrived at the mine at 7:00 a.m., January 14, 2008, to start the investigation. The accident scene was documented with photographs, sketches, maps, and measurements. Interviews were conducted with persons known to have knowledge of the accident. A list of persons who participated in the investigation is contained in appendix A. Other documents and records were collected from Luminant Mining. The on-site portion of the investigation was completed on January 15, 2008.

DISCUSSION

Location of Accident: The accident occurred in Pit 11, Area G of the mine. The shovel was operating on the top of the 1B coal seam in the vicinity of survey station 49+30. In this area, Pit 11 was approximately 200 feet wide in a north-south direction and approximately 150 feet long in an east-west direction, extending approximately 150 feet east from the area G haul road (or West Ramp). The overall planned length for Pit 11 was approximately 3,000 feet in an east-west direction with mining in the pit proceeding east from survey station 63+00 to survey station 33+00.

Accident Scene: At the time of the accident, the shovel was located in the southeast corner of Pit 11. The mid-point of the shovel length was located approximately 100 feet east of the area G haul road (or West Ramp) and approximately 50 feet west of the Pit 11 working face. The shovel was oriented generally parallel to the pit boundary and was facing east in the direction of mining. In that position, the side of the shovel was situated along the toe of a highwall that

extended along the southern boundary of the pit. The distance between the shovel and the toe of the highwall was approximately 40 feet.

When the accident occurred, the southern highwall was approximately 45 feet high and approximately 75 feet wide. The southern highwall had a slope angle of approximately 70 degrees at the time of the accident investigation. The highwall at the working face in front of the shovel (to the east) had a height of approximately 20 feet. The height of the working face had been reduced by a bulldozer that had been pushing material to the shovel. The pushed material was deposited along the working face at an angle of approximately 40 degrees.

The victim was discovered on the floor of the pit where he was pinned in an upright position against the middle of the track side-frame assembly by material that fell from the southern highwall. The failed material extended across the 40-foot-wide section of the pit floor between the shovel track and the highwall. The depth of the failed material at the location of the victim was approximately 4.5 to 6 feet. The width of the failed material at the location of the victim was approximately 25 feet, extending from the rear track tumbler to just beyond the front of the track.

Visibility at the location of the victim would have been limited at the time of the accident (approximately 5:00 a.m.) because it was still dark and because the shovel lights had been turned off by the victim during the break.

Failed Area: The highwall failure was a shallow circular-type failure that occurred on the western limit of the southern highwall near the mid-point of the shovel length. The failure was delineated by an arc-shaped failure surface that originated approximately 15 feet above the toe of the highwall and extended to the highwall crest. The area delineated by the failure surface was approximately 30 feet high, 18 feet wide, and 7 feet thick. The corresponding volume of failed material was approximately 30 cubic yards. At the time of the investigation, two cracks were observed on the south highwall. One crack ran the full height of the highwall and one was a third the height of the highwall, approximately 10 feet apart.

Groundwater and Seepage: The depth of the groundwater in the vicinity of the accident was approximately 30 feet below the elevation of the original ground surface. This relatively shallow groundwater depth resulted in a significant amount of seepage from the lower portions of both the southern highwall and the adjacent working face. The rate of seepage was sufficient to undercut sizeable blocks of sandy material from the exposed faces in one to two days. Dewatering wells were established in a line from east to west and 370 feet south of the pit. The wells were pumping and had lowered the water level 7 feet.

Failed Material: The majority of the failed material consisted of a fine-grained sand containing silt that varied in color from white to orange. The sand had a relatively uniform gradation and a high moisture content resulting from the relatively shallow depth of the groundwater table. Data obtained from borings previously advanced by the company in the vicinity of the failure (borings THD-1 and THD-2) indicated that the total weight of the failed material was approximately 42 tons. The failed material created a pile approximately 25 feet long, 40 feet wide, and 4.5 to 6

feet deep along the right side of the shovel. The material did not damage the shovel but covered the right side even with the top of the track that was 6 feet high. The victim was buried with the material up to his head midway down the center of the right track.

Distance to Portable Toilet: The most direct walking distance from the shovel to the nearest portable toilet was approximately 700 feet. The time required to walk this distance at a moderate pace (i.e., approx 2 miles per hour or a 30-minute mile) was approximately 3.5 minutes. The most direct driving distance to the same portable toilet was approximately 0.2 miles (approximately 1,050 feet). The victim reportedly did not have a vehicle available to him but could have requested vehicular transport to the portable toilet at any time.

Factors Contributing to the Highwall Failure: The primary factors that contributed to the highwall failure include the steep slope angle of the highwall and the sandy highwall material. Statements from witnesses indicated that the highwall "was nearly straight up and down" or vertical. The steep slope angle of the highwall produced shear stresses in the highwall that exceeded the strength of the sandy highwall material. The combination of these factors resulted in the highwall failure. Other factors that may have contributed to the failure include the relatively shallow depth of the groundwater table in the vicinity of the failure and the high rate of seepage from the lower portion of the highwall. The groundwater may have increased the shear stress in the highwall as well as reduced the strength of the sandy highwall material. The high rate of seepage may have eroded material from the lower portion of the highwall face and removed support for the upper portion of the highwall.

Ground Control Plan: The ground control plan indicates that the average coal thickness of the 1B seam in the Carrizo formation is 5 feet in Pit 11, area G with an average height of overburden of 40 feet. An open pit method of mining is used with truck/shovel equipment excavating the pit down to each of the multiple coal seams. Explosives are not used in the mining operation. Pits in area G are normally 200 feet wide and have an average length of 3000 feet. At the time of the accident, the southern highwall was approximately 45 feet high. The ground control plan specifies a normal highwall slope of 65 degrees, but the slope can range up to 75 degrees. No benching of the highwall was required by the plan. The first lift in Pit 11, area G was started on January 10, 2008.

Onshift Examination: The daily onshift examination for Pit 11, area G was performed by Larry Nelson, operations supervisor, around 12:00 a.m. He was responsible for supervising the work at the mine and performing daily examinations in accordance with CFR 30, §77.1713. During his examination, Nelson observed that the southern highwall was too tall and instructed Jack Newsom, bulldozer operator, to push the highwall down to a safe height. Newsom attempted to reduce the highwall height, but stopped due to a water pond on top of the highwall where he thought he would get the bulldozer stuck.

Training and Mining Experience: Thomas Farmer's mining experience totaled 22 years, 10 months, and 8 days; all at the Sulphur Springs Strip. A review of training records indicated Farmer had been task trained in a number of occupations and on April 25, 2001, he was task

trained on the Hitachi EX-1800 shovel. The most current annual refresher training was conducted on February 5, 2007. Farmer's training complied with Part 48 training requirements.

Miscellaneous: The National Weather Service in Sulphur Springs, Texas (3 miles northwest of the mine) reported a high temperature of 60 degrees F, a low temperature of 39 degrees F, and no precipitation for January 12, 2008. The weather during the prior week was reportedly clear and cool with no precipitation. Consequently, weather is not believed to be a contributing factor to the highwall failure.

Failures similar to the one that occurred on the southern highwall were reportedly not uncommon at the mine. To address such situations, the company had a policy that personnel should not position themselves between equipment and the highwall.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted. Root causes were identified that could have mitigated the severity of the accident or prevented loss of life. Listed below are root causes identified during the analysis and their corresponding corrective actions to prevent a recurrence of the accident.

1. *Root Cause*: Management did not ensure that the required ground control plan was being followed. Hazardous conditions were observed at the south highwall of Pit 11, area G during the onshift examination for the night shift on January 12, 2008. The operator's ground control plan states: hazardous conditions will be corrected before the mining operation is allowed to proceed. Personnel working in the area will also be informed of the hazardous conditions and locations. If a hazardous highwall condition exists, the area will be flagged to prevent personnel from entering the hazardous area.

   Corrective Action: All persons working at the mine will receive training on the ground control plan requirements.

2. *Root Cause*: Mine Management did not ensure that the mine's Safety Handbook regarding highwall and spoil stability was being followed with regard to not working between equipment and the highwall and dismounting equipment on the side opposite the highwall.

   Corrective Action: Mine Management implemented revisions to the Safety Handbook requiring that equipment be moved away from highwalls during shift changes, break periods, lunch periods, fueling and lubrication periods and maintenance repair periods.

3. *Root Cause*: Statements indicated that highwall failures were common. The frequency of occurrence caused miners and mine management to become complacent regarding the hazards of the highwalls.

   Corrective Action: All persons working at the mine should receive training regarding 30 CFR 77.1006 and the mine's Safety Handbook on highwall and spoils safety.

CONCLUSION

The accident occurred because management failed to correct and/or danger off a hazardous ground condition and allowed miners to work below the hazardous condition before it was corrected. Contributing factors included management's failure to assure that the ground control plan and the company's safety plan were being followed. Persons were allowed to enter areas between equipment and a dangerous highwall where equipment hindered escape from falls or slides from the highwall.

Approved by:

Allyn C. Davis
District Manager

11-05-08
Date

ENFORCEMENT ACTIONS

1. A 103(k) order, Number 7285416, was issued to Luminant Mining to ensure the safety of persons at the mine until an investigation could be conducted and operations could be safely resumed.

2. A 104(d)(1) citation, Number 7610925, was issued to Luminant Mining for a violation of 30 CFR 77.1000. On January 12, 2008, a shovel operator was fatally injured at the Hitachi EX 1800 (company No. 51) shovel when the south highwall in Pit 11, area G failed, crushing him against the track of the shovel. The mine operator did not follow the established ground control plan for the safe control of all highwalls. The mine operator was aware of a hazardous highwall condition but failed to correct the condition or flag the affected area before mining operations were allowed to proceed. The shovel operator was not informed of the hazardous condition of the highwall. Larry Nelson, operations supervisor, had made the on shift examination, the night shift on January 12, 2008, and was aware of the condition of the south highwall. He engaged in aggravated conduct constituting more than ordinary negligence by allowing mining operations to proceed before hazardous conditions were corrected. This violation is an unwarrantable failure to comply with a mandatory standard.

3. A 104(d)(1) order, Number 7609764, was issued to Luminant Mining for a violation of 30 CFR 77.1006(a). On January 12, 2008, a shovel operator was fatally injured at the Hitachi EX 1800 (company No. 51) shovel when the south highwall in Pit 11, area G failed, crushing him against the track of the shovel. The shovel operator was allowed to continue mining next to the hazardous highwall. The shovel operator was not aware of and not assigned to correct hazardous highwall conditions. Larry Nelson, operations supervisor, observed the hazardous highwall conditions during the daily shift inspection on the January 12, 2008 night shift. Larry Nelson has engaged in aggravated conduct constituting more than ordinary negligence by allowing mining operations to proceed before the hazardous conditions were corrected. This violation is an unwarrantable failure to comply with a mandatory standard.

4. A 104(a) citation, Number 7610926, was issued to Luminant Mining for a violation of 30 CFR 77.1006(b). On January 12, 2008, a shovel operator was fatally injured at the Hitachi EX 1800 (company No. 51) shovel when the south highwall in Pit 11, area G failed, crushing him against the track of the shovel. The shovel operator was positioned between the piece of equipment he had been operating and the highwall where the equipment hindered his escape from the highwall failure.

Appendix A

List of persons participating in the investigation:

LUMINANT MINING OFFICIALS

Jeff Mason	Mine Manager
Mark Barton	Mine Operations/Maintenance Manager
Russell Cameron	Mine Safety Representative
Larry Nelson	Operations Supervisor
Greg Gore	Operations Supervisor
Darrel Gentry	Operations Supervisor
Gerry Pearson	Luminant Mining Senior Vice President of Mining
Lloyd Hanson	Luminant Mining Safety Director
Glen Hood	Luminant Mining Safety Coordinator

BURFORD & RYBURN, L.L.P.

David M. Weaver	Attorney

LUMINANT MINING EMPLOYEES

Brett Bassham	Hauler Operator/Representative of Miners
Joe Beason	G.C. Journeyman/Representative of Miners
Robert Browning	Rubbertire Operator/Representative
Daryl Watkins	Fuel Truck Operator
Dennis Weir	Track Operator
Jack Newsom	Bulldozer Operator
Alton Clifton	Truck Driver
Wade Amerson	Truck Driver
Hank Kyle	Shovel Operator/EMT
Joe Hooten	Shovel Operator
Robert Perryman	Shovel Operator

MINE SAFETY AND HEALTH ADMINISTRATION

Douglas E. Liller	Coal Mine Safety and Health Inspector
Todd D. Jaqua	Coal Mine Safety and Health Inspector
Kendell C. Whitman	Coal Mine Safety and Health Inspector
George Nadzadi	Training Specialist Supervisor, EFS
Christopher J. Kelly	Civil Engineer, Technical Support
William G. Denning	Staff Assistant to the District Manager

Appendix B

View of Accident Scene from Top of Working Face

Appendix C

View of Fallen Material and Victim's Location From Top of the Working Face

Appendix D

View of Fine-Grained Silty Sand that Fell From Highwall

Appendix E

Victim Information

Accident Investigation Data - Victim Information
Event Number: 4 2 6 0 8 8 9

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:
Thomas E. Farmer	M	50	01 Fatal

5. Date(MM/DD/YY) and Time(24 Hr.) Of Death:	6. Date and Time Started:
a. Date: 01/12/2008 b.Time: 5:07	a. Date: 01/11/2008 b.Time: 23:00

7. Regular Job Title:	8. Work Activity when Injured:	9. Was this work activity part of regular job?
167 Shovel Operator	098 Taking work break	Yes X No

10. Experience	a. This Work Activity:	b. Regular Job Title:	c: This Mine:	d. Total Mining:
Years	3	3	22	22
Weeks	25	25	41	41
Days	2	2	2	2

11. What Directly Inflicted Injury or Illness?	12. Nature of Injury or Illness:
094 Silty sand that fell from highwall	370 Crushing injuries/asphyxia

13. Training Deficiencies:
Hazard: | New/Newly-Employed Experienced Miner: | Annual: | Task:

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

Independent Contractor ID: (if applicable)

15. On-site Emergency Medical Treatment:
Not Applicable: | First-Aid: | CPR: X | EMT: X | Medical Professional: | None:

16. Part 50 Document Control Number: (form 7000-1) 220080170020

17. Union Affiliation of Victim: 2496 Int. B. Electrical Workers

Victim Information: