FAI-7037241-1

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface
(Crushed & Broken Limestone)

Fatal Machinery Accident
January 4, 2023

Sevierville Quarry
Vulcan Construction Materials, LLC
Sevierville, Sevier County, Tennessee
ID No. 40-00115

Accident Investigators

David Faulkner
Mine Health and Safety Inspector

David Smith
Mine Safety and Health Inspector

Originating Office
Mine Safety and Health Administration
Barbourville District
3837 S. U.S. Hwy 25E
Barbourville, KY 40906
Samuel Creasy, District Manager

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OVERVIEW

On January 4, 2023, at 2:45 p.m., John Ogle, a 28 year-old plant operator with approximately two years of mining experience, was fatally injured when the swing jaw of the primary jaw crusher (crusher) moved as he was performing maintenance, pinning him between the back side of the swing jaw and toggle block frame.

The accident occurred because the mine operator did not: 1) block moveable parts of the crusher against hazardous motion, 2) provide adequate task training for maintenance work on the crusher, and 3) conduct an adequate workplace examination of the work area.

GENERAL INFORMATION

Vulcan Construction Materials, LLC, a subsidiary of Vulcan Materials Company, owns and operates Sevierville Quarry. This is a surface crushed and broken limestone mine located in Sevierville, Sevier County, Tennessee. The mine employs 17 miners and operates one ten-hour shift, five days per week. The mine drills and blasts limestone in the pit. Front-end loaders and excavators load the blasted limestone into haul trucks that transport and dump the material into the hopper. The hopper feeds the material into the crusher and belt conveyors transfer the

crushed limestone to other sizing and crushing locations at the mine. The mine sells the final product for use in the construction industry.

The principal management officials at Sevierville Quarry at the time of the accident were:

Jeffery Watson	Plant Manager
Clinton Rhea	Plant Supervisor

The Mine Safety and Health Administration (MSHA) completed the last regular safety and health inspection at this mine on August 15, 2022. The 2022 non-fatal days lost incident rate for Sevierville Quarry was zero, compared to the national average of 1.25 for mines of this type.

DESCRIPTION OF THE ACCIDENT

On January 3, 2023, Rhea assigned Ogle; Lane Carr, Leadman; Brandon Carr, Plant Operator; and Kendall Carr, Plant Fixed Maintenance, to replace worn parts on the crusher (see Appendix A). The crew used a chain hoist attached to the bottom of the swing jaw and crusher frame to pull the swing jaw in the direction of the stationary jaw and block it against hazardous motion. When the swing jaw moved, the swing jaw die contacted the left side cheek plate. According to interviews, B. Carr and K. Carr heard a loud metal on metal popping sound as the two metal plates slid past one another. When the crew finished work for the day, K. Carr slowly released pressure off the chain hoist, allowing the swing jaw to come to rest in a nearly vertical position (see Appendix B). The crew did not notice the swing jaw's motion was impeded due to binding against the left side cheek plate (see Appendix C), and the toggle bearing was wedged in the bottom of the swing jaw.

On January 4, 2023, at 2:00 p.m., Ogle, L. Carr, and B. Carr traveled to the crusher to continue maintenance work. The swing jaw remained at rest in a nearly vertical position but was not blocked against hazardous motion. According to interviews, Ogle and B. Carr entered the area behind the swing jaw to remove the toggle bearing. Ogle welded a lifting loop to the inside face of the toggle bearing. A chain hoist was then attached between the lifting loop and crusher frame behind the swing jaw. B. Carr moved from behind the swing jaw into the crusher chamber to stretch his legs. As Ogle attempted to remove the toggle bearing, B. Carr heard two ratchets on the chain hoist made by Ogle. This action freed the swing jaw from binding with the cheek plate, causing the swing jaw to move unexpectedly toward Ogle and pin him between the back side of the swing jaw and toggle block.

B. Carr and L. Carr heard Ogle's call for help. L. Carr called 911 at 2:48 p.m. B. Carr called Rhea via cell phone, stating that Ogle was hurt and needed help. B. Carr connected a chain hoist to the bottom of the swing jaw and the crusher housing to prepare to release the pressure from Ogle by pulling the swing jaw in the direction of the stationary jaw. As B. Carr began to apply tension to the chain hoist, the 911 operator recommended that no pressure be released from Ogle until emergency personnel arrived.

Rhea and Watson drove to the accident scene. Rhea remained at the accident site, while Watson drove to the main entrance to direct emergency medical services to the scene. At 2:55 p.m.,

Emergency Medical Services arrived and used rescue tools to remove Ogle from the crusher. At 3:26 p.m., the Sevier County Ambulance Service transported Ogle to the LeConte Medical Center where Christopher Lochmuller, MD, pronounced Ogle dead at 5:01 p.m.

INVESTIGATION OF THE ACCIDENT

On January 4, 2023, at 3:07 p.m., Brandon Clemmons, Safety and Health Manager, called the Department of Labor National Contact Center (DOLNCC) to report the accident. The DOLNCC called Brian Napier, Supervisory Mine Safety and Health Inspector. Napier notified Craig Plumley, Assistant District Manager. Plumley told Steven Sorke, Staff Assistant, to notify Ryan O'Boyle, Supervisory Mine Safety and Health Inspector, of the accident. O'Boyle and John Myers, Mine Safety and Health Inspector, traveled to the mine to gather preliminary information. Samuel Creasy, District Manager, assigned David Faulkner, Mine Safety and Health Inspector, as the lead accident investigator.

At 5:07 p.m., O'Boyle and Myers arrived at the mine and issued an order under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners and preservation of evidence. Faulkner and David Smith, Mine Safety and Health Inspector, arrived shortly afterward. MSHA conducted an examination of the accident scene, interviewed miners, mine management, and other relevant personnel, and reviewed conditions and work practices relevant to the accident. See Appendix D for a list of persons who participated in the investigation.

DISCUSSION

Location of the Accident

The accident occurred inside the crusher located near the maintenance shop.

Weather

The weather at the time of the accident was fair, 66 degrees Fahrenheit with 22 mile per hour southwesterly winds. The investigators determined that weather did not contribute to the accident.

Equipment Involved

The crusher is a Hewitt-Robins 42 x 48-inch Grizzly-King Extra Heavy-Duty Jaw Crusher, manufactured in 2000. The crusher has a frame assembly weight of 62,000 pounds and a jaw assembly weight, including flywheels, of 58,000 pounds for a combined weight of 120,000 pounds. The investigators observed scarring on the left side cheek plate created by the swing jaw binding against it.

Maintenance Practices

On January 3, 2023, prior to starting maintenance on the crusher, B. Carr filled out a pre-printed Company Work Plan (Work Plan) designed to identify anticipated hazards. The Work Plan identified a stored energy hazard. L. Carr was designated leadman for this job but did not sign the Work Plan. As leadman, L. Carr was responsible for ensuring that the miners followed the Work Plan and that all hazards identified were controlled.

Weldon Johnson, Midsouth Division Machine Shop Manager, stated that the preferred sequence for wear maintenance would be to remove the jaw die before removing the toggle assembly. This reduces the weight on the swing jaw. By removing three of the four jaw die extension bolts prematurely, the jaw die was only loosely secured and posed a risk of sliding or falling from the swing jaw onto personnel working below.

After releasing the chain hoist, L. Carr and K. Carr stated that the crusher was in a stable "safe" position due to the flywheel counterweight on the bottom, as indicated by the black markings on the lower half of the flywheel. The crew was referring to a manufacturer's danger sign on the side of the crusher that depicts when the crusher chamber was safe or not safe for conducting non-maintenance work on the crusher, such as clearing stuck rocks, without entering the chamber (see Appendix E). The danger sign states, "Crusher flywheel can move causing serious bodily injury or death. The black half of flywheel must be on bottom before working on crusher. Refer to operating instructions." The manufacturer's operating instructions explain that in the event the crusher stops or becomes jammed during normal operations, the flywheel must be placed in a stable "safe" position, as depicted by the danger sign. The maintenance crew had not reviewed the operating instructions. They also did not recognize that when the toggle assembly is removed, the lower end of the swing jaw is no longer constrained. The entire swing jaw must be secured from hazardous motion regardless of the flywheel position. L. Carr was present during the maintenance work and allowed miners to position themselves within a confined space and the unblocked swing jaw. The investigators determined that the mine operator did not block moveable parts of the crusher against hazardous motion, which contributed to the accident.

Examinations

L. Carr stated that there had been no change to the Work Plan from the day before, so no examination was needed. The mine operator produced a workplace examination form, dated January 4, 2023, completed, and signed by Paul Couch, Mobile Equipment Mechanic, as evidence that a workplace examination had been conducted of the area. This form had pre-printed work locations with check marks to indicate a workplace examination was performed of the area. The "primary crusher area" was checked on the form with no hazards noted. During the interview, Couch stated that he did not examine the crusher and he knows nothing about how it works. The investigators determined that the mine operator did not conduct an adequate workplace examination, which contributed to the accident.

Training and Experience

Ogle had nearly two years mining experience, all as a plant operator at this mine. Ogle received annual refresher training on December 7, 2022. The mine operator could not produce Ogle's record of new task training for maintenance work on the crusher.

New task training records for maintenance work on the crusher for B. Carr, L. Carr, and K. Carr were provided by the mine operator, but the actions taken on the day of the accident indicate that the task training was inadequate. The mine operator did not provide adequate task training when changes occurred during the maintenance work that created conditions that affected the safety risks to miners. The changes were the swing jaw binding against the left cheek plate and the toggle bearing that was wedged in the bottom of the swing jaw.

Watson designated L. Carr as the competent person responsible for the safety of the maintenance crew, and Rhea provided task training to L. Carr to be a leadman. Watson and Rhea were familiar with the safe procedures for performing this task and would typically check in on the maintenance crews but did not during the two days of work on this crusher. Watson stated this job would take about four hours with no problems encountered. Considering this job was taking two days to complete should have indicated to Watson that the crew had encountered problems and a site visit was needed. The investigators determined that the task training for maintenance work on the crusher was inadequate and contributed to the accident.

ROOT CAUSE ANALYSIS

The accident investigators conducted an analysis to identify the underlying causes of the accident. The investigators identified the following root causes, and the mine operator implemented the corresponding corrective actions to prevent a recurrence.

1. Root Cause: The accident occurred because the mine operator did not block moveable parts of the crusher against hazardous motion.

   Corrective Action: The mine operator revised and implemented a written procedure for blocking machinery against hazardous motion to comprehensively address stored energy. The mine operator trained all miners on the procedure.

2. Root Cause: The mine operator did not provide adequate new task training for maintenance work on the crusher.

   Corrective Action: The mine operator revised their training plan to include comprehensive safety procedures for maintenance work. The plan includes task training, proper crusher examination, correction of any hazards prior to starting work, and blocking of all energy sources. The mine operator trained all miners on the revised procedures.

3. Root Cause: The mine operator did not conduct an adequate workplace examination.

   Corrective Action: The mine operator developed and implemented a new written procedure for workplace examination to ensure that miners identify, correct, and report hazardous conditions. The mine operator trained all miners on the new procedure.

CONCLUSION

On January 4, 2023, at 2:45 p.m., John Ogle, a 28 year-old plant operator with approximately two years of mining experience, was fatally injured when the swing jaw of the primary jaw crusher (crusher) moved as he was performing maintenance, pinning him between the back side of the swing jaw and toggle block frame.

The accident occurred because the mine operator did not: 1) block moveable parts of the crusher against hazardous motion, 2) provide adequate task training for maintenance work on the crusher, and 3) conduct an adequate workplace examination of the work area.

Approved by:

_____ _____

Samuel Creasy
District Manager

Date

ENFORCEMENT ACTIONS

1. A 103(k) order was issued to Vulcan Construction Materials, LLC.

   A fatal accident occurred on January 4, 2023, at approximately 2:45 p.m. This order is being issued under the authority of the Federal Mine Safety and Health Act of 1977, under Section 103(k) to insure the safety of all persons at the mine, and requires the operator to obtain the approval of an authorized representative of MSHA of any plan to recover any person in the mine or to recover the mine or affected area. This order prohibits any activity in the affected area. The operator is reminded of the obligation to preserve all evidence that would aid in investigating the cause or causes of the accident in accordance with 30 CFR 50.12.

2. A 104(d)(1) citation was issued to Vulcan Construction Materials, LLC for a violation of 30 CFR 56.14105.

   On January 4, 2023, a plant operator was fatally injured when the swing jaw of the Hewitt-Robins 42 x 48-inch Grizzly-King Extra Heavy-Duty Jaw Crusher unexpectedly moved, pinning him between the back side of the swing jaw and toggle block frame. A crew was conducting maintenance work on the toggle assembly of the jaw crusher at the time of the accident. The mine operator recognized the potential for unexpected movement in performing this task, but did not block the swing jaw against hazardous motion. The mine operator engaged in aggravated conduct constituting more than ordinary negligence by having a lead man present during the maintenance work and allowing miners to position themselves in a pinch point next to the unblocked swing jaw. This violation is an unwarrantable failure to comply with a mandatory standard.

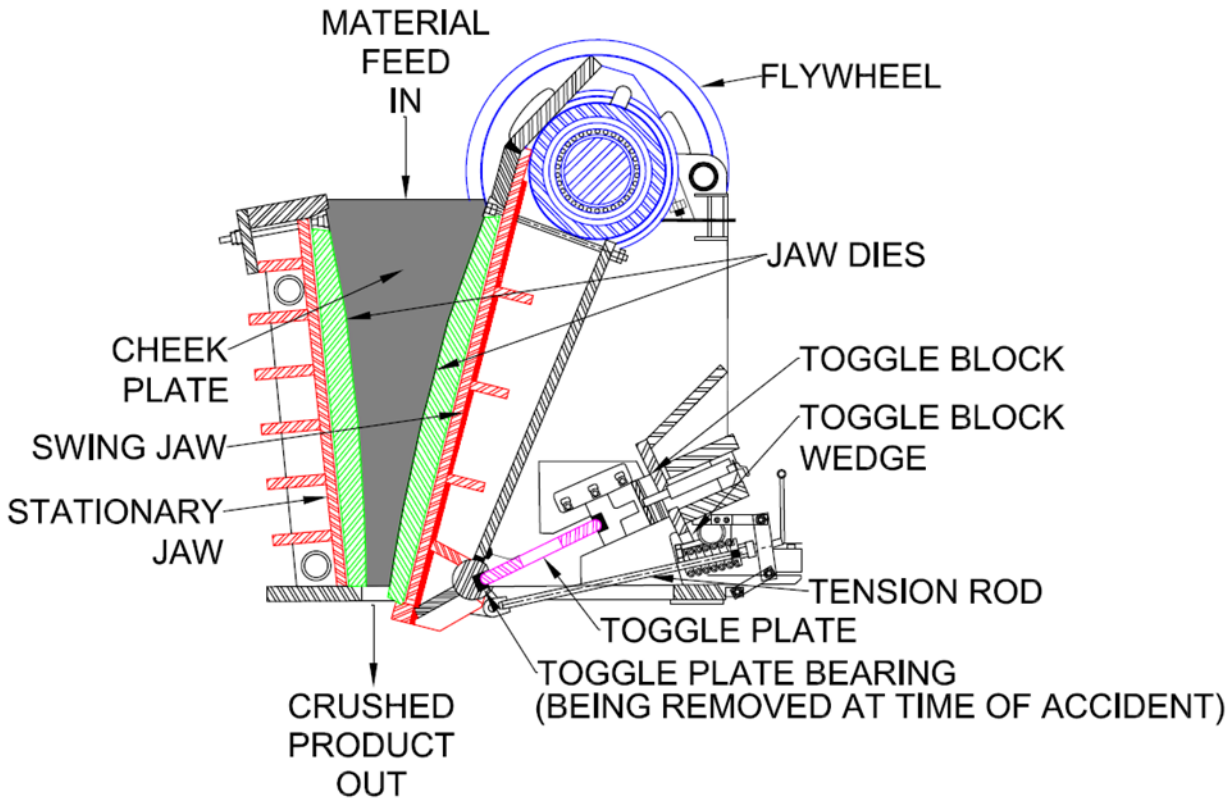
3. A 104(a) citation was issued to Vulcan Construction Materials, LLC for a violation of 30 CFR 46.7(b).

   On January 4, 2023, a plant operator was fatally injured when the swing jaw of the Hewitt-Robins 42 x 48-inch Grizzly-King Extra Heavy-Duty Jaw Crusher unexpectedly moved, pinning him between the back side of the swing jaw and toggle block frame. A crew was conducting maintenance work on the toggle assembly of the jaw crusher at the time of the accident. The mine operator did not provide adequate task training when changes occurred during the maintenance work that created complex conditions that affected the safety risks to miners. The changes were the swing jaw binding against the left cheek plate and the toggle bearing that was wedged in the bottom of the swing jaw.

4. A 104(d)(1) order was issued to Vulcan Construction Materials, LLC for a violation of 30 CFR 56.18002(a).

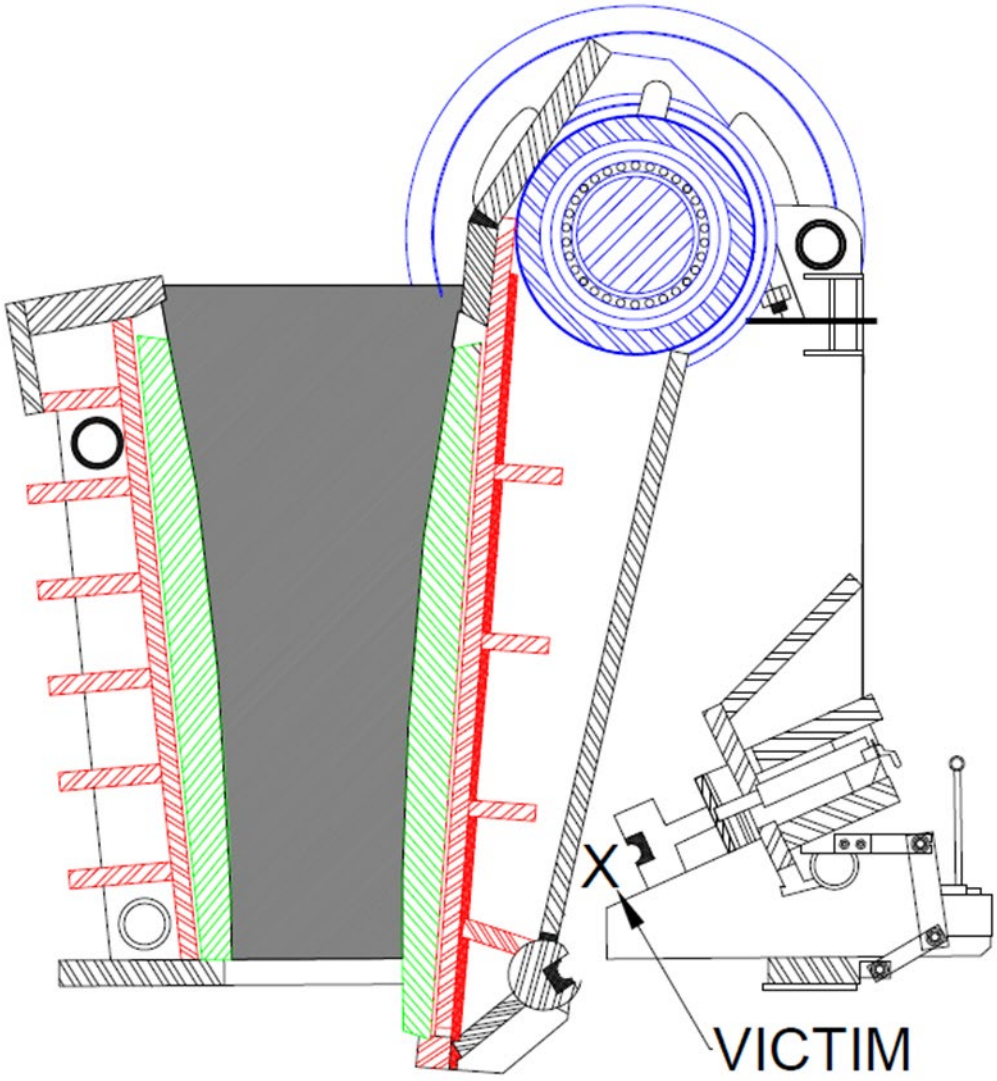
   On January 4, 2023, a plant operator was fatally injured when the swing jaw of the Hewitt-Robins 42 x 48-inch Grizzly-King Extra Heavy-Duty Jaw Crusher unexpectedly moved, pinning him between the back side of the swing jaw and toggle block frame. A maintenance crew was conducting maintenance work on the toggle assembly of the jaw crusher at the time of the accident. A mobile equipment mechanic passing through the area of the crusher check marked the area on a pre-printed examination record. The investigators determined a competent person did not conduct an adequate workplace examination on the jaw crusher prior to the crew beginning maintenance work. An adequate workplace exam of the crusher by a competent person would have identified that the swing jaw was not secured from motion. There were no chains used to secure the swing jaw in place to prevent unexpected movement. Two miners were working in the space behind the swing jaw in the presence of the Leadman who was supplying tools to these miners. The mine operator engaged in aggravated conduct constituting more than ordinary negligence by having knowledge that a workplace examination was not adequate and allowing miners to work in the area. This violation is an unwarrantable failure to comply with a mandatory standard.

APPENDIX A – Schematic of Crusher (Assembled)



Not to scale.

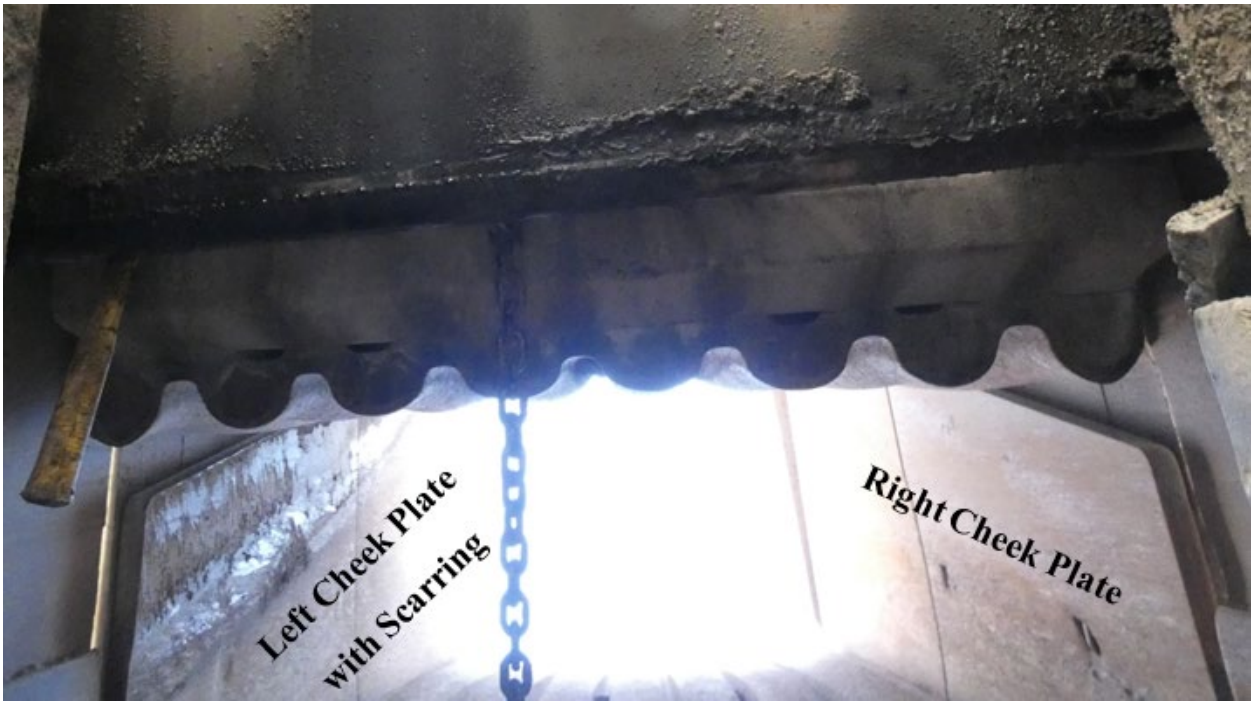
APPENDIX B – Schematic of Crusher (Disassembled)



POSITION OF SWING JAW AT TIME OF ACCIDENT

Not to scale.

APPENDIX C – Evidence of Swing Jaw Contacting Left Cheek Plate



APPENDIX D – Persons Participating in the Investigation

Vulcan Construction Materials, LLC

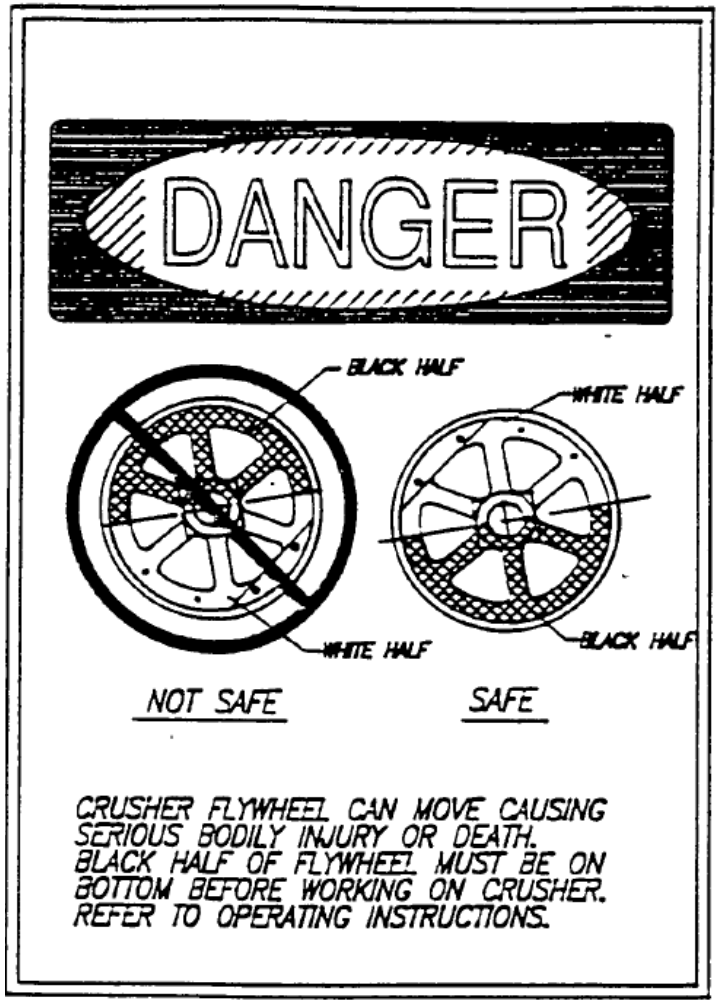
Brian Williamson	Vice President, General Manager, East Tennessee
Steven Perkins	Manager Safety and Health Central Division
Brandon Clemmons	Safety and Health Manager
Weldon Johnson	Midsouth Division Machine Shop Manager
Andrew Ramey	Safety Representative
Jeffery Watson	Plant Manager
Clinton Rhea	Plant Supervisor
Lane Carr	Leadman
Brandon Carr	Plant Operator
Kendall Carr	Plant Fixed Maintenance
Paul Couch	Mobile Equipment Mechanic
William Doran	Attorney at Law

Mine Safety and Health Administration

Craig Plumley	Assistant District Manager
Ryan O'Boyle	Supervisory Mine Safety and Health Inspector
David Faulkner	Mine Safety and Health Inspector
David Smith	Mine Safety and Health Inspector
John Myers	Mine Safety and Health Inspector

APPENDIX E – Danger Sign

Operator's Manual



Crusher Mounted Sign