

# Accident Investigation Overview

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## Crandall Canyon Mine Disaster



U.S. Dept. of Labor, Mine Safety and Health Administration  
Utah Commission of Labor

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Utah Mine Safety Commission Briefing



# Accident Investigators

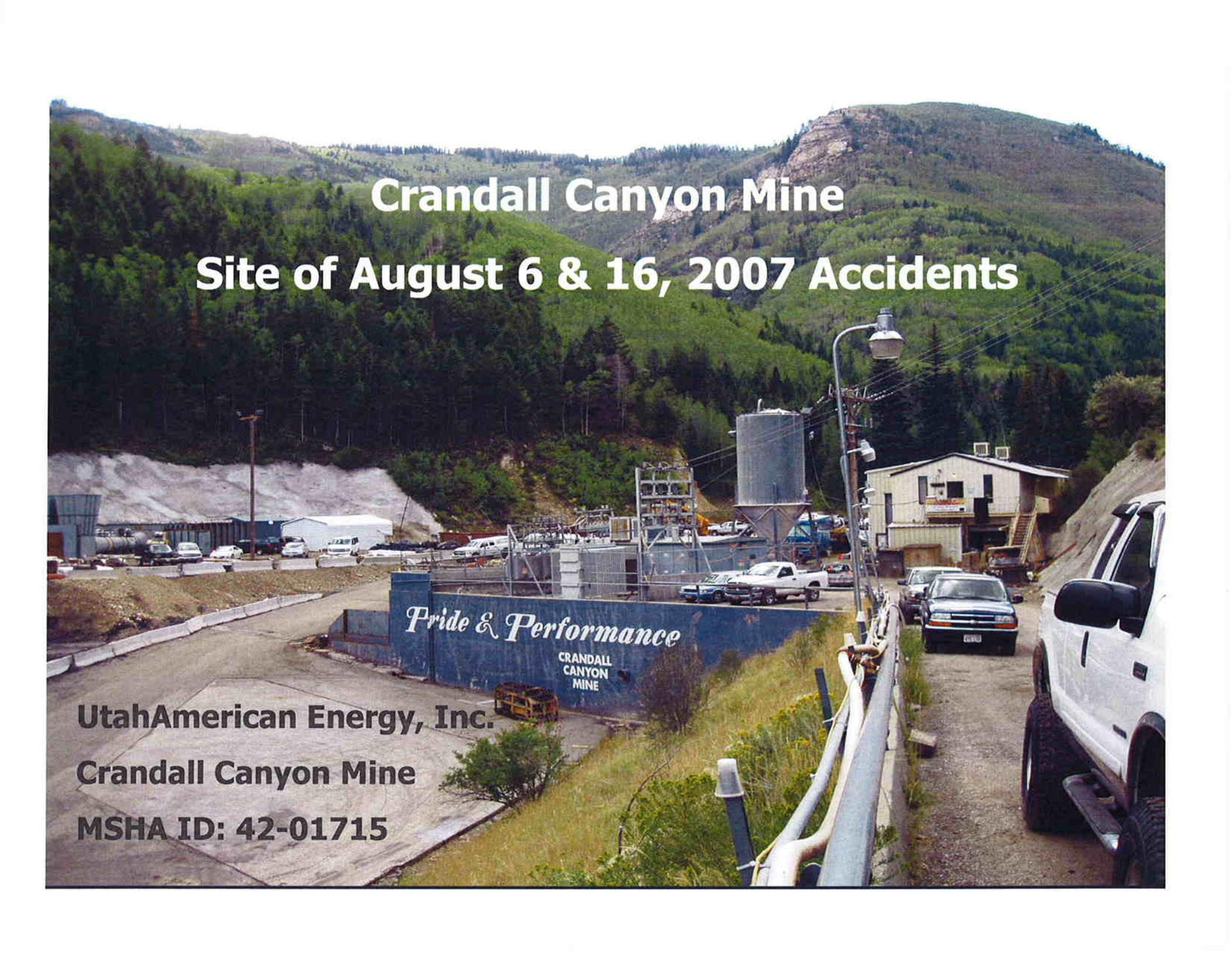
- Richard A. Gates
  - District Manager, District 11, Birmingham, AL
- Michael Gauna, PE
  - Mining Engineer, Roof Control Division, Technical Support, Triadelphia, WV
- Thomas Morley, PE
  - Mining Engineer, Ventilation Division, Technical Support, Triadelphia, WV
- Joseph R. O'Donnell Jr.
  - Supervisory Coal Mine Inspector, District 11, Bessemer, AL
- Gary Smith
  - Supervisory Coal Mine Inspector, District 2, New Stanton, PA
- Timothy Watkins
  - Assistant District Manager, Coal Mine Safety and Health, District 6, Pikeville, KY
- Chris A. Weaver
  - Supervisory Coal Mine Inspector, District 3, Bridgeport, WV
- Joseph C. Zelanko, PE
  - Supervisory Mining Engineer, Roof Control Division, Technical Support, Pittsburgh, PA
- Sherrie Hayashi
  - Labor Commissioner, Labor Commission of Utah

# Purpose of Investigation

- Determine root causes of the accident and share findings with the mining community for the purpose of preventing similar occurrences.
- Determine if violations contributed to the accident.
- Use findings as a basis for formulating and evaluating MSHA health and safety standards and policies.

# Investigation Procedure

- Thoroughly collect evidence.
  - On-site Inspection
  - Interviews (63 interviews)
  - Documents (35,000 pages, 250 maps, 1200 pictures, and hours of video and audio recordings)
- Review and analyze all relevant information.
- Upon conclusion of the investigation, MSHA will:
  - Brief victims' families on findings.
  - Present findings to mine operator, along with any resulting enforcement actions.
  - Issue a formal report describing its findings.

A photograph of the Crandall Canyon Mine site. In the foreground, a blue metal barrier with the slogan "Pride & Performance" and "CRANDALL CANYON MINE" is visible. To the right, a white SUV is partially shown. In the middle ground, there are several vehicles, including a white pickup truck and a dark sedan, parked near a large industrial building and a tall cylindrical tank. The background features a steep, forested hillside with a rocky peak under a clear sky.

# Crandall Canyon Mine

## Site of August 6 & 16, 2007 Accidents

**UtahAmerican Energy, Inc.**

**Crandall Canyon Mine**

**MSHA ID: 42-01715**

# Outline of Team Activities

- Accident Investigation Team arrived on September 4, 2007.
- Initial Family Briefing was on September 5, 2007.
  - September 13, 2007 (conference call)
  - September 20, 2007 (conference call)
  - September 26, 2007
  - October 11, 2007
  - November 7, 2007
- Initial meeting with mine operator on September 7, 2007.
  - Requested information on 3 separate occasions.
- On-Site Mine Visits – 17 occasions.
  - United Mine Workers of America (UMWA) were recognized as a miners' representative.

# On-Site Mine Visits

- August 7<sup>th</sup> to August 16<sup>th</sup>
  - Investigation activities ongoing by MSHA Technical Support Roof Control Division during rescue operations
- September 10<sup>th</sup> and September 12<sup>th</sup>
  - To observe and gather evidence
  - Included study of ground conditions in outby areas
  - Were able to go to the area of the August 16<sup>th</sup> accident
    - Short period of time
    - No equipment or materials were removed
- September 12<sup>th</sup>
  - Included a trip to the boreholes
- September 20, 2007 and October 5, 2007
  - Coordinate times recorded by the mine's Atmospheric Monitoring System with the times of the event recorded by the University of Utah's Seismic Department.

# Mining Activity at Time of Accident

- Section mechanic was the last person to leave the section before the accident.
- Mechanic left minutes before the accident.
- Interviews indicated miners were working in the #1 entry.

# August 6 Accident



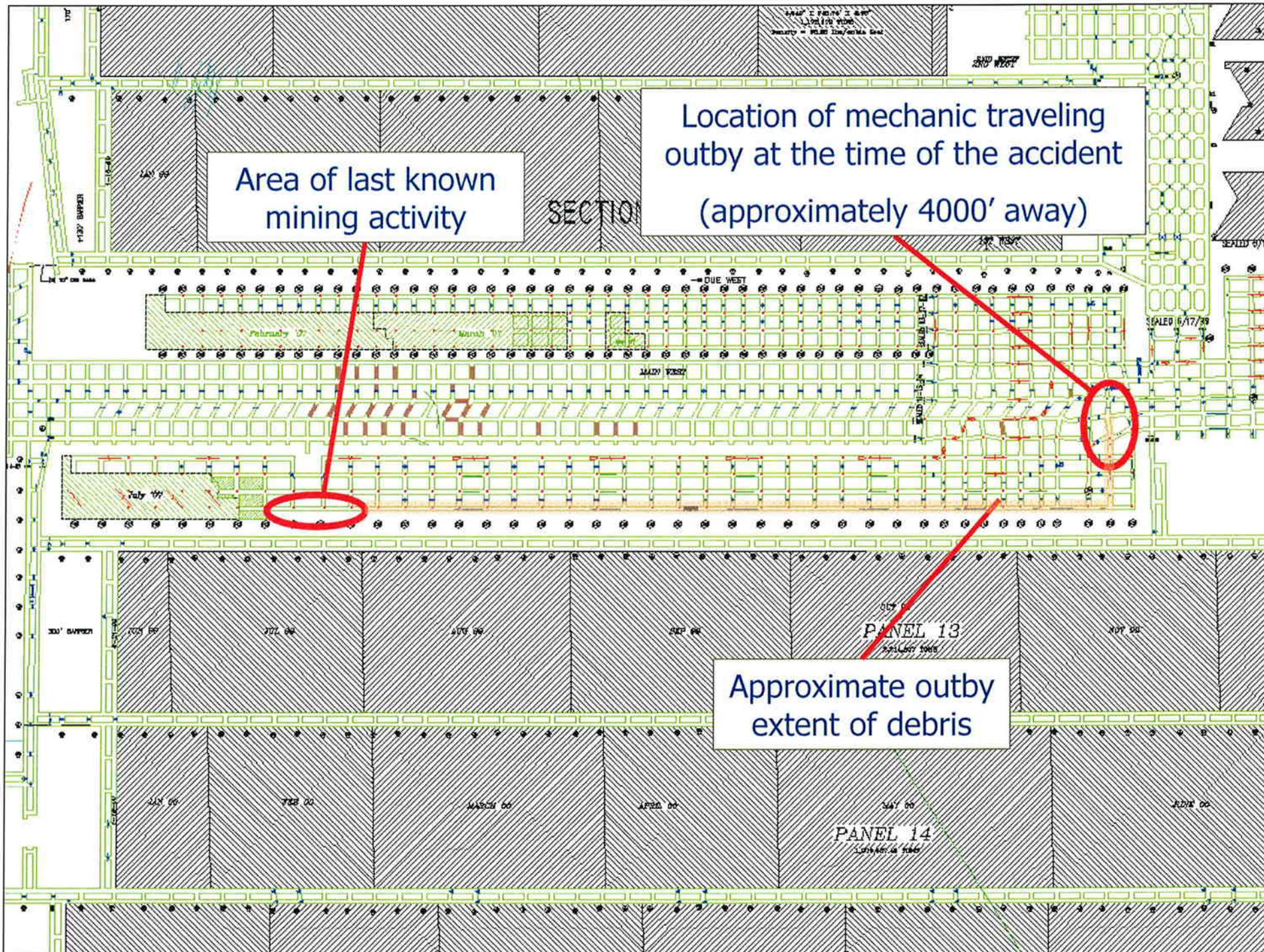
Worker's eardrum injured.  
(13,000 ft from section)

Section

Mechanic had truck blown sideways.  
(4,000 ft from section)

Office building shook on surface.  
(~3 miles from section)





Area of last known mining activity

Location of mechanic traveling outby at the time of the accident (approximately 4000' away)

Approximate outby extent of debris

SECTION 10

PANEL 13  
APRIL 1998

PANEL 14  
OCTOBER 1998

SEAL 1 1/2\"/>  
1.000 1/2\"/>  
Density = 90.00 lbs/cu ft Seal

SEAL WEST

SEAL WEST

SEAL 9/17

SEAL 6/17/99

→ DUE WEST

SEAL WEST

OUT

JAN 99

FEBRUARY 99

MARCH 99

JULY 99

SEP 99

OCT 99

JAN 99

FEB 99

MARCH 99

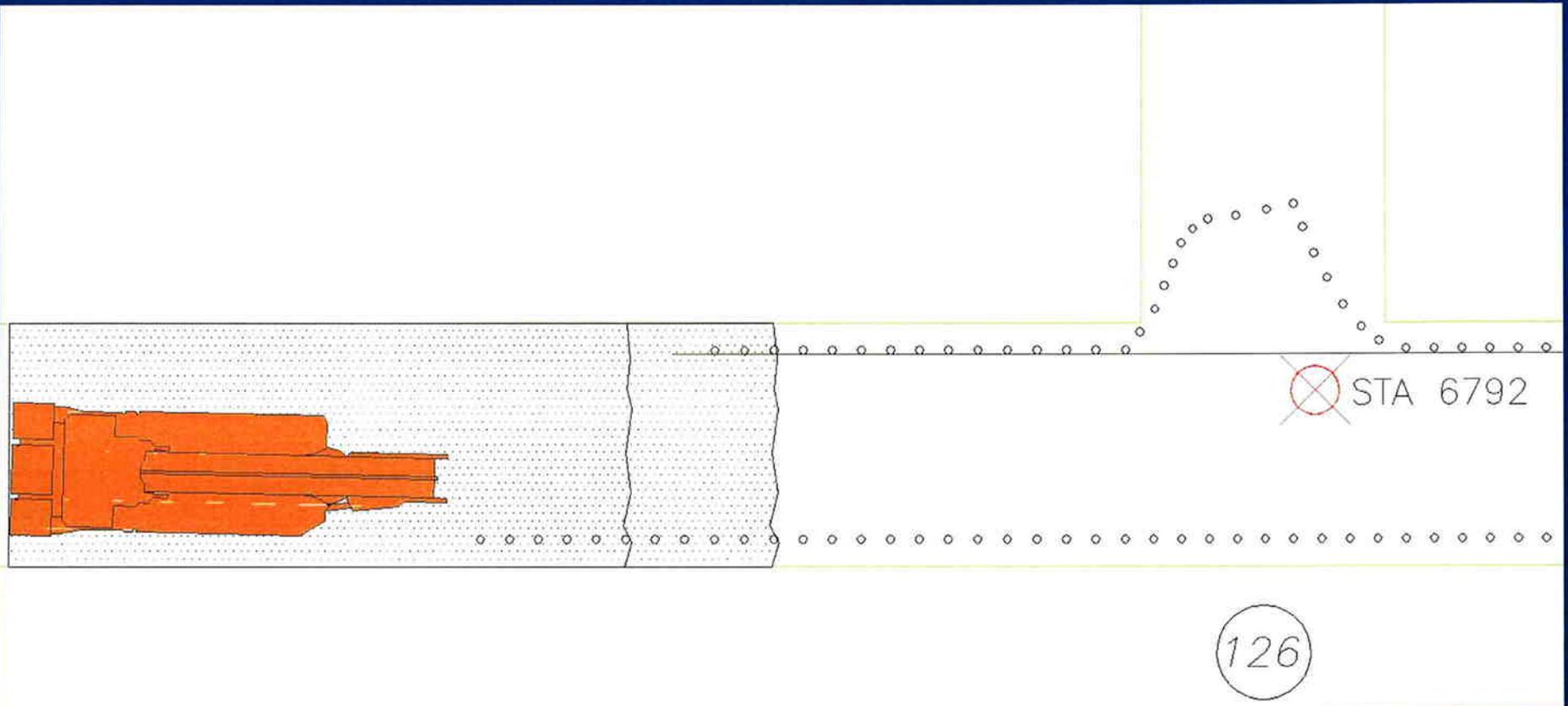
APRIL 99

MAY 99

JUNE 99

# August 16, 2007 Accident Site

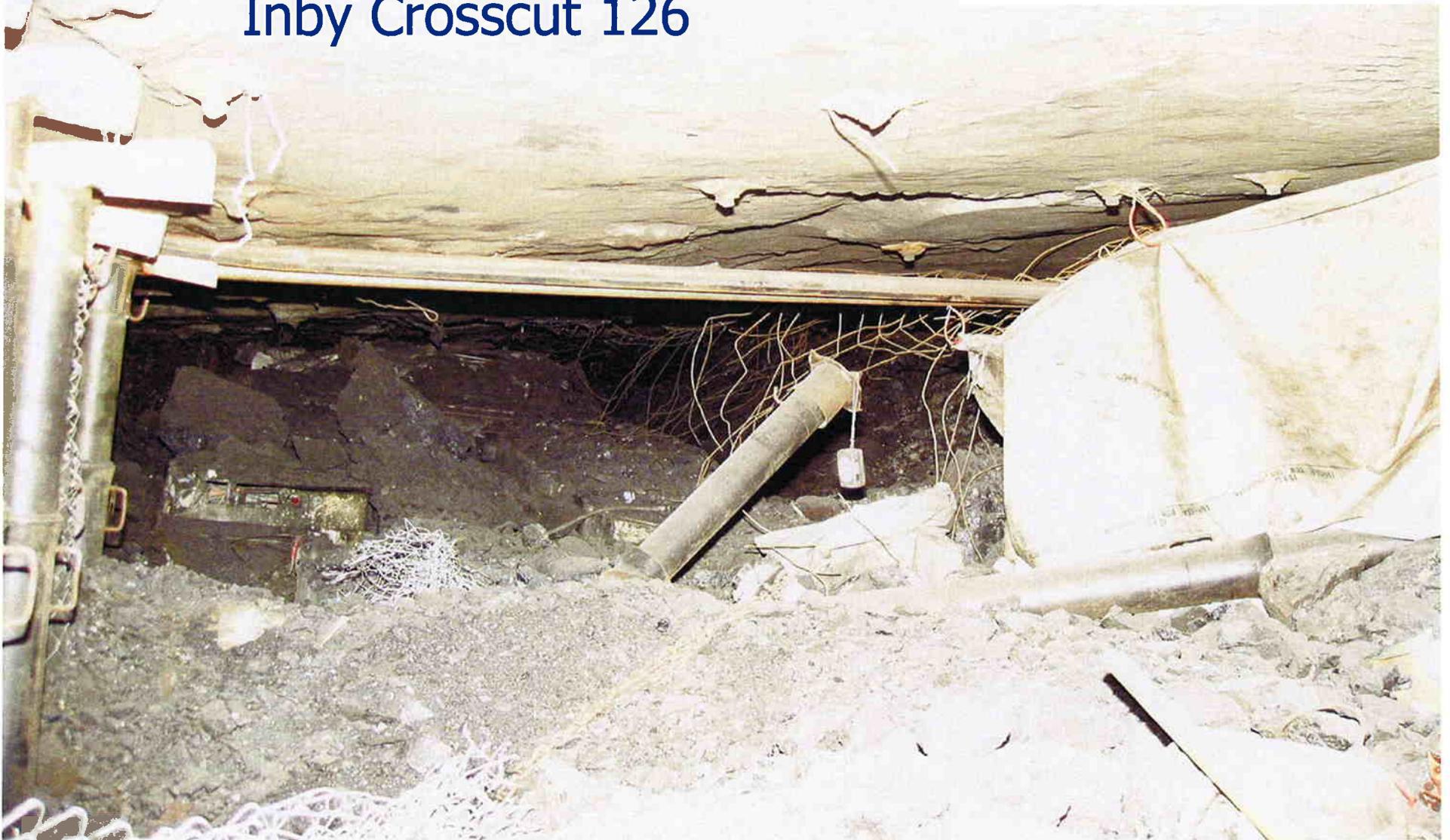
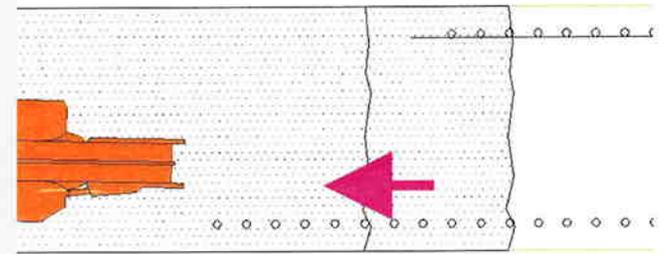
#1 Entry at Crosscut 126  
Sketch From Onsite Visit



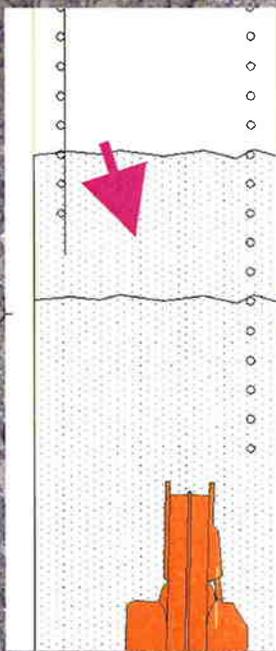
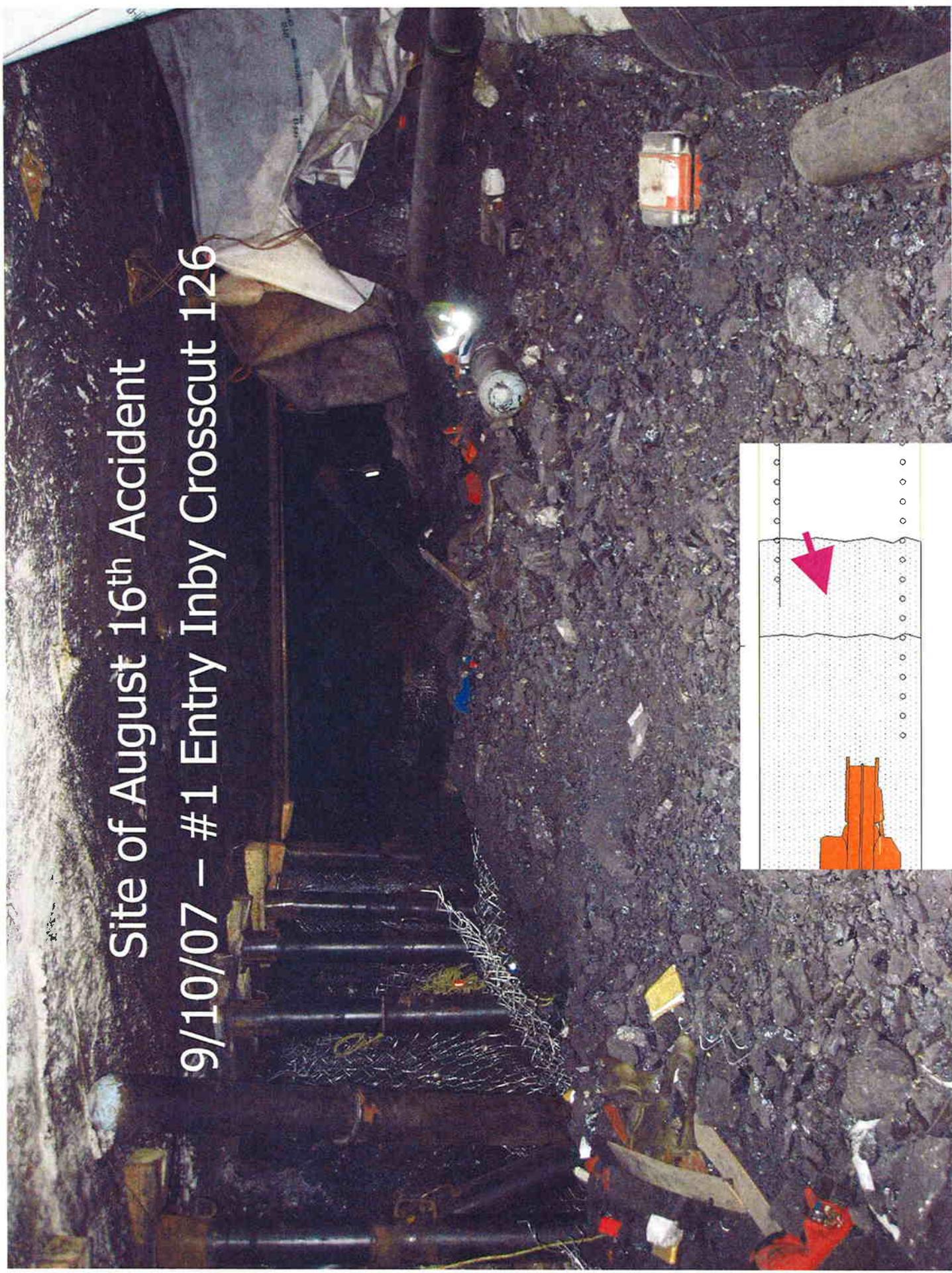
# Photographs of Accident Site

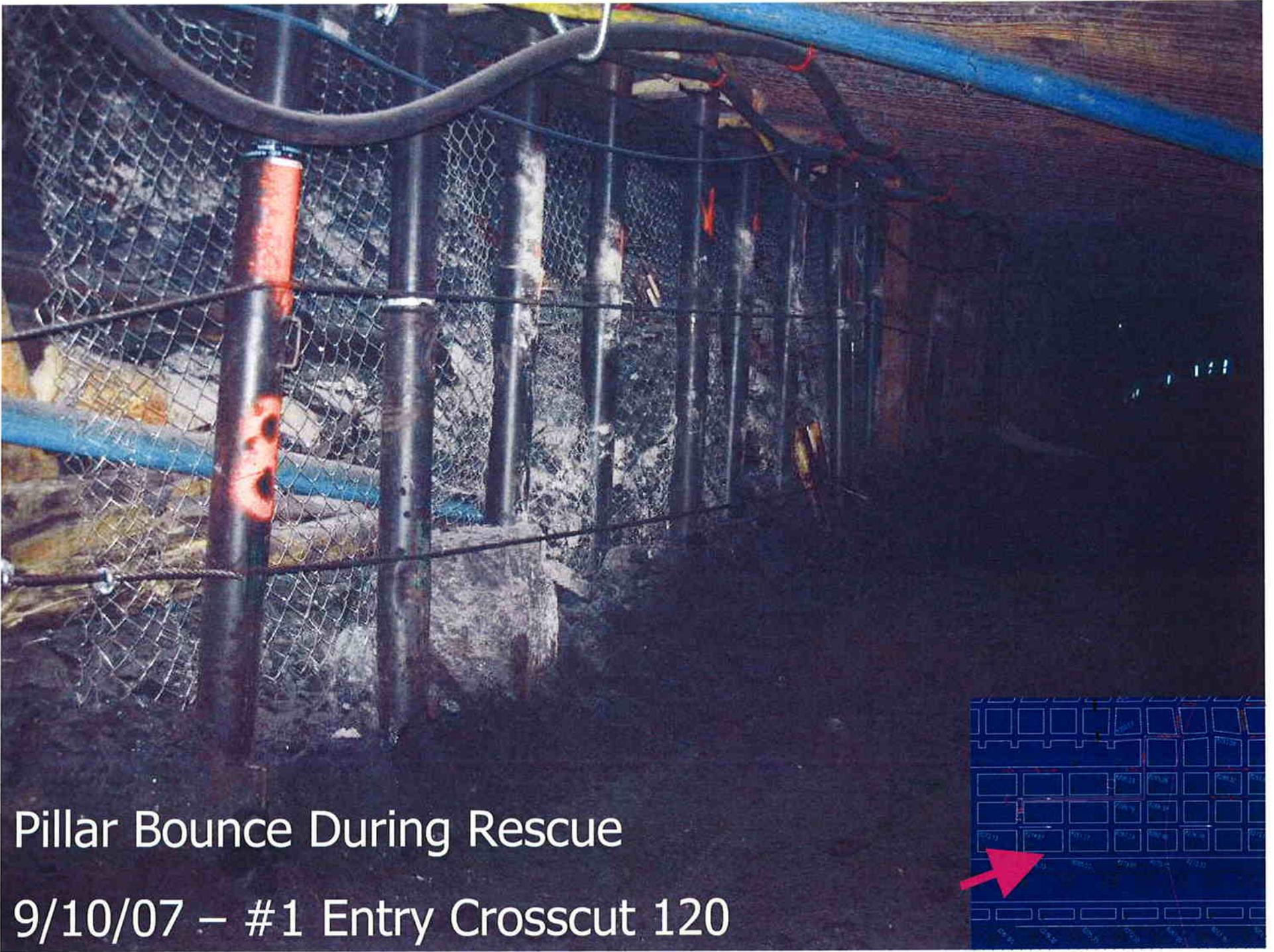
- Photographs from September 10<sup>th</sup> and September 12<sup>th</sup> On-site visits
- Photographs taken During the Rescue Operation August 7<sup>th</sup> to August 16<sup>th</sup>

Site of August 16<sup>th</sup> Accident  
9/10/07 – #1 Entry  
Inby Crosscut 126



Site of August 16<sup>th</sup> Accident  
9/10/07 – #1 Entry Inby Crosscut 126



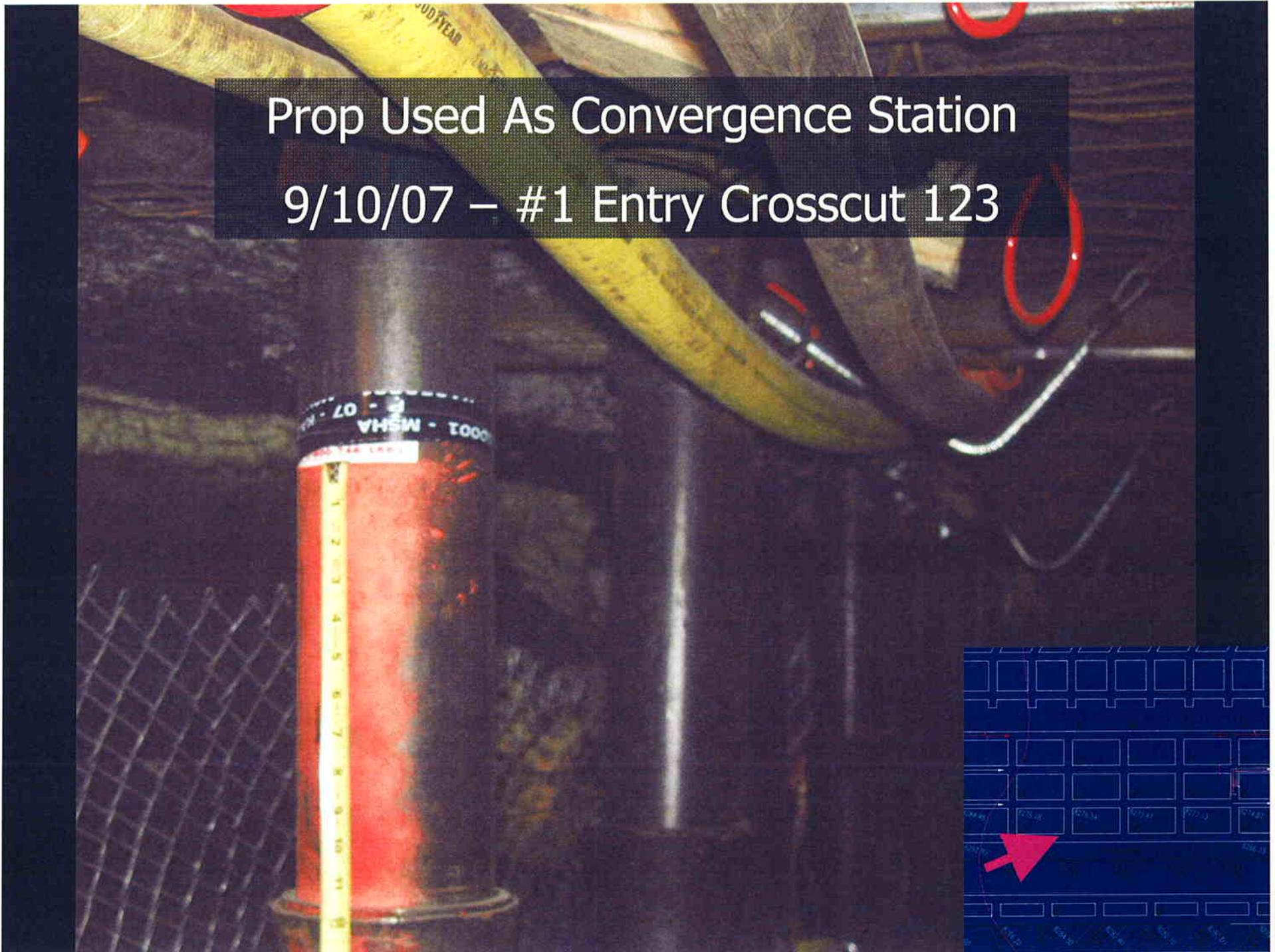


Pillar Bounce During Rescue

9/10/07 – #1 Entry Crosscut 120

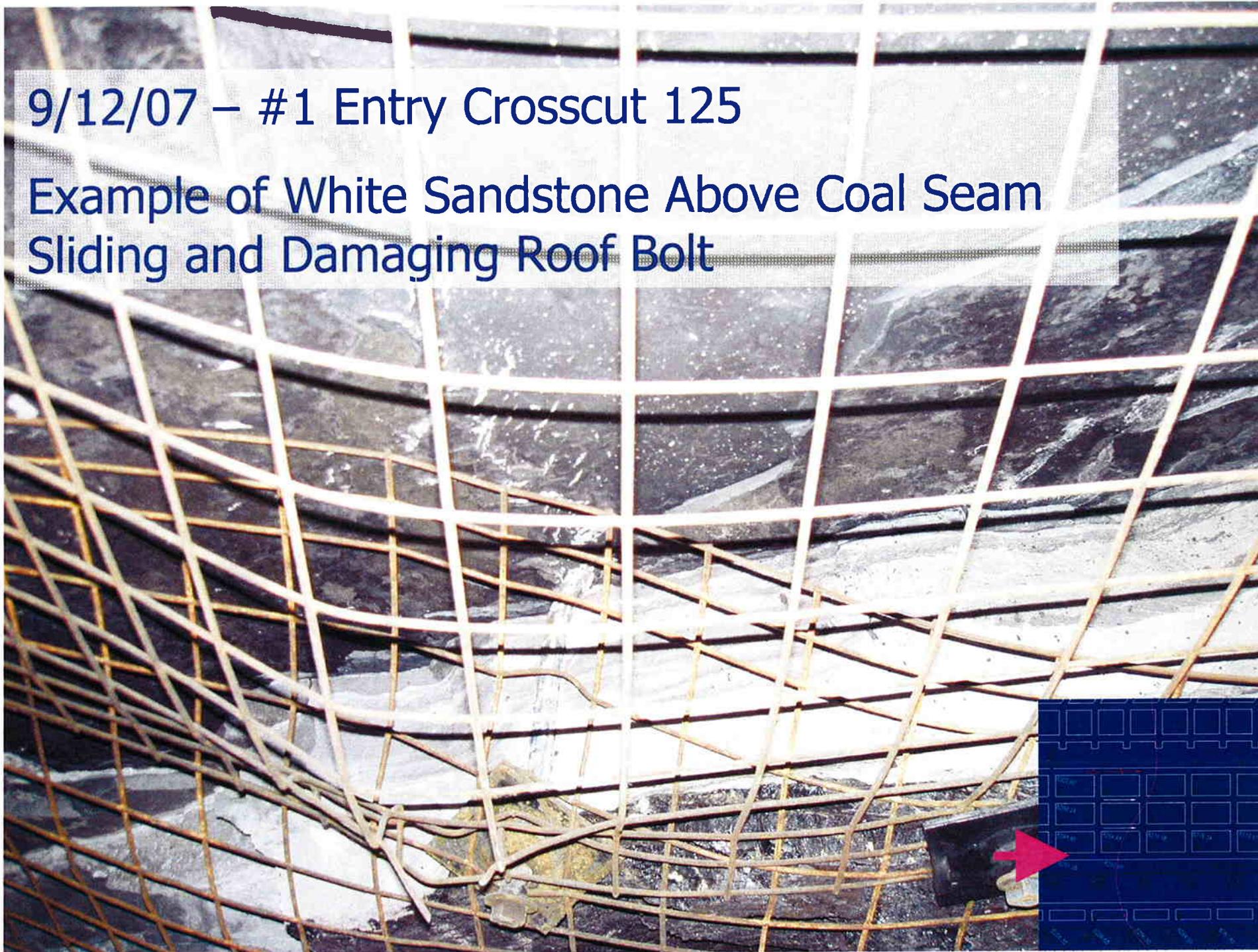
# Prop Used As Convergence Station

9/10/07 – #1 Entry Crosscut 123



9/12/07 – #1 Entry Crosscut 125

Example of White Sandstone Above Coal Seam  
Sliding and Damaging Roof Bolt

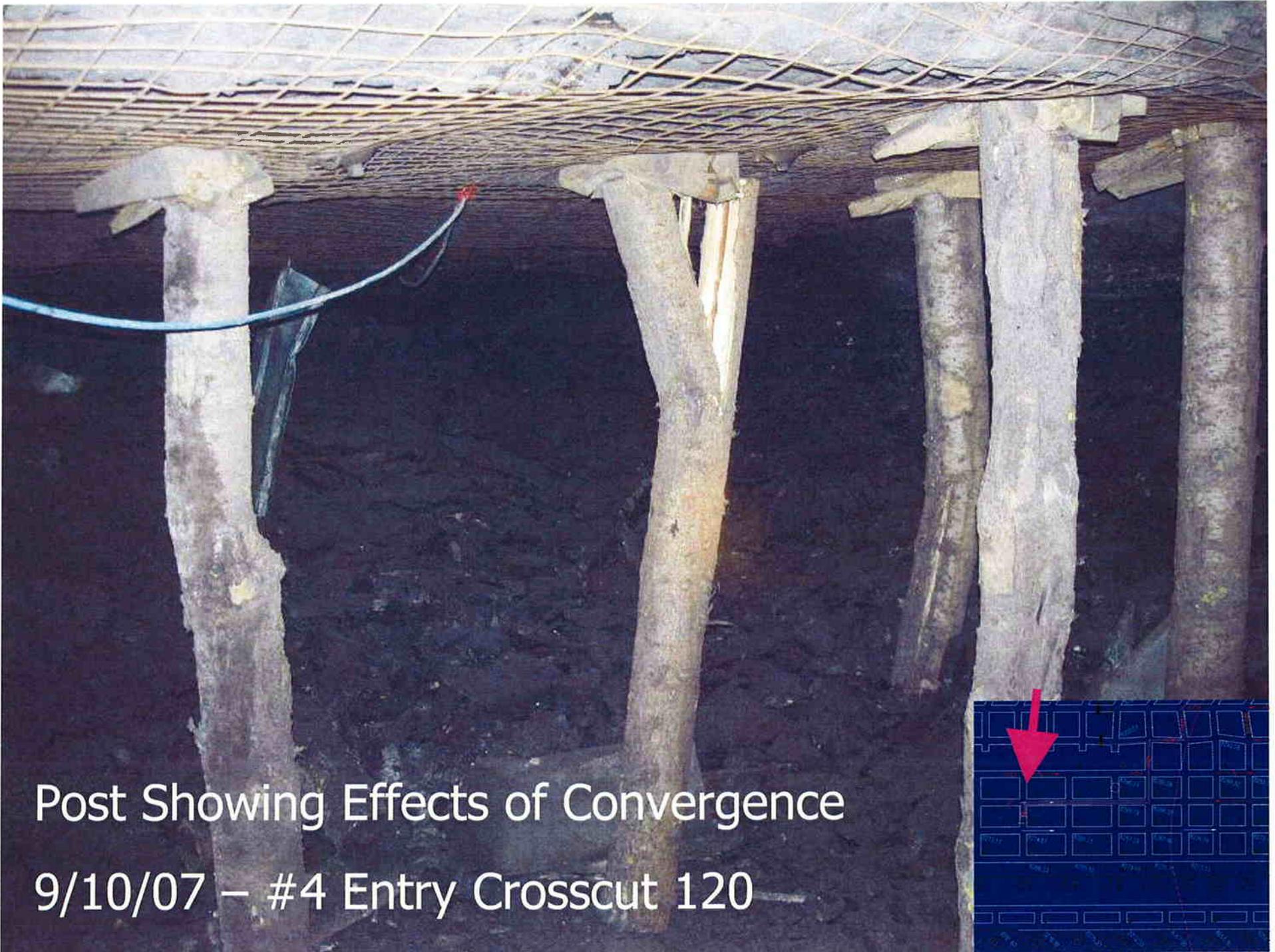




Example of Original Roof Bolt Damage  
9/12/07 – #1 Entry Crosscut 125

Damaged plates/bolts from outside belt magnet - 9/12/07





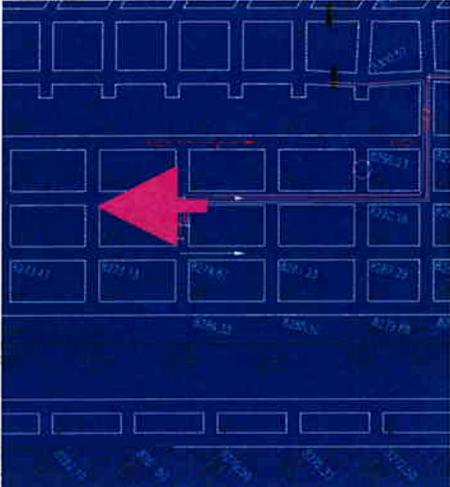
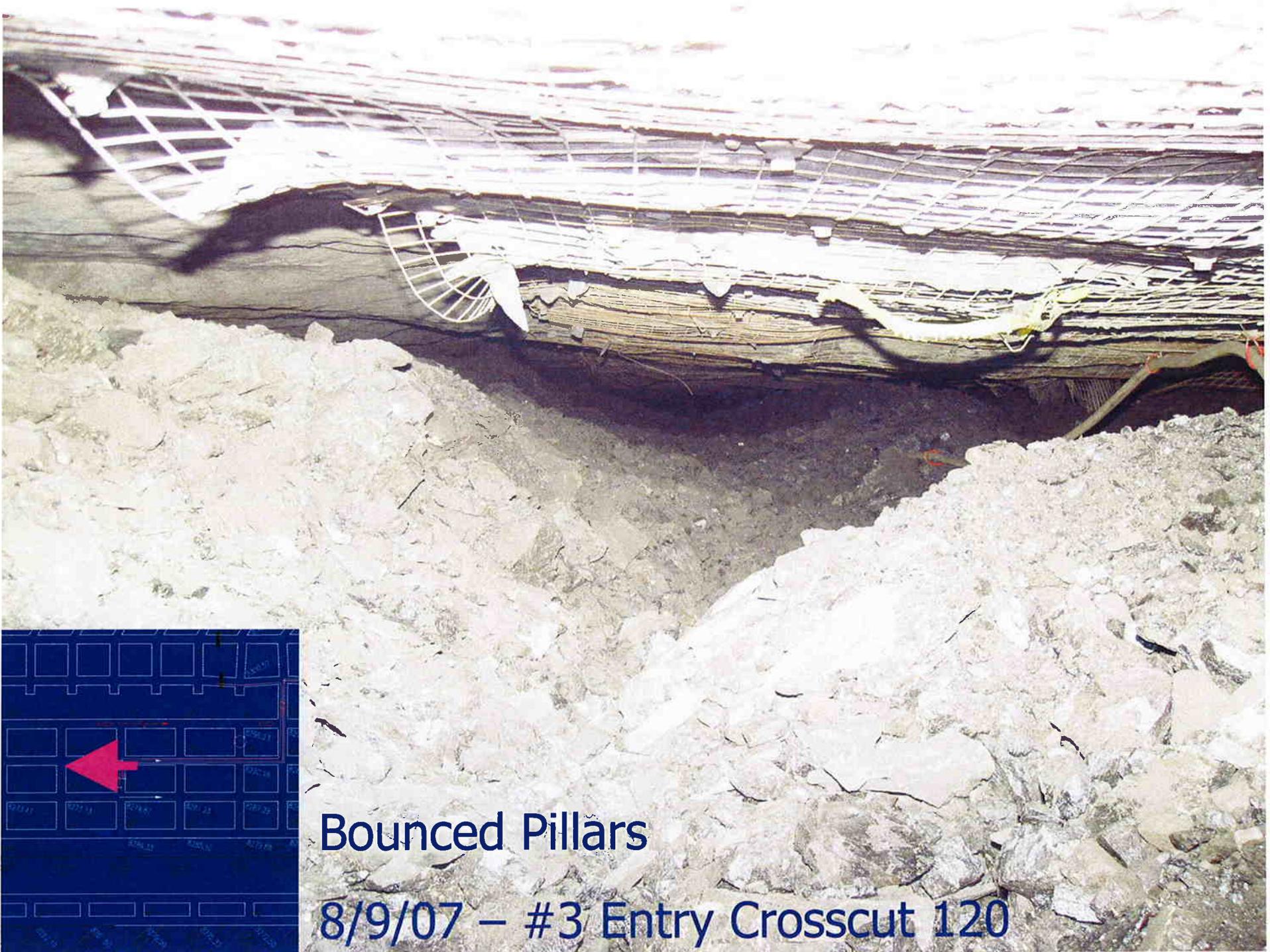
Post Showing Effects of Convergence

9/10/07 – #4 Entry Crosscut 120

# Torn Mesh, and Deformed Roof Bolts from Movement of Barrier During Accident

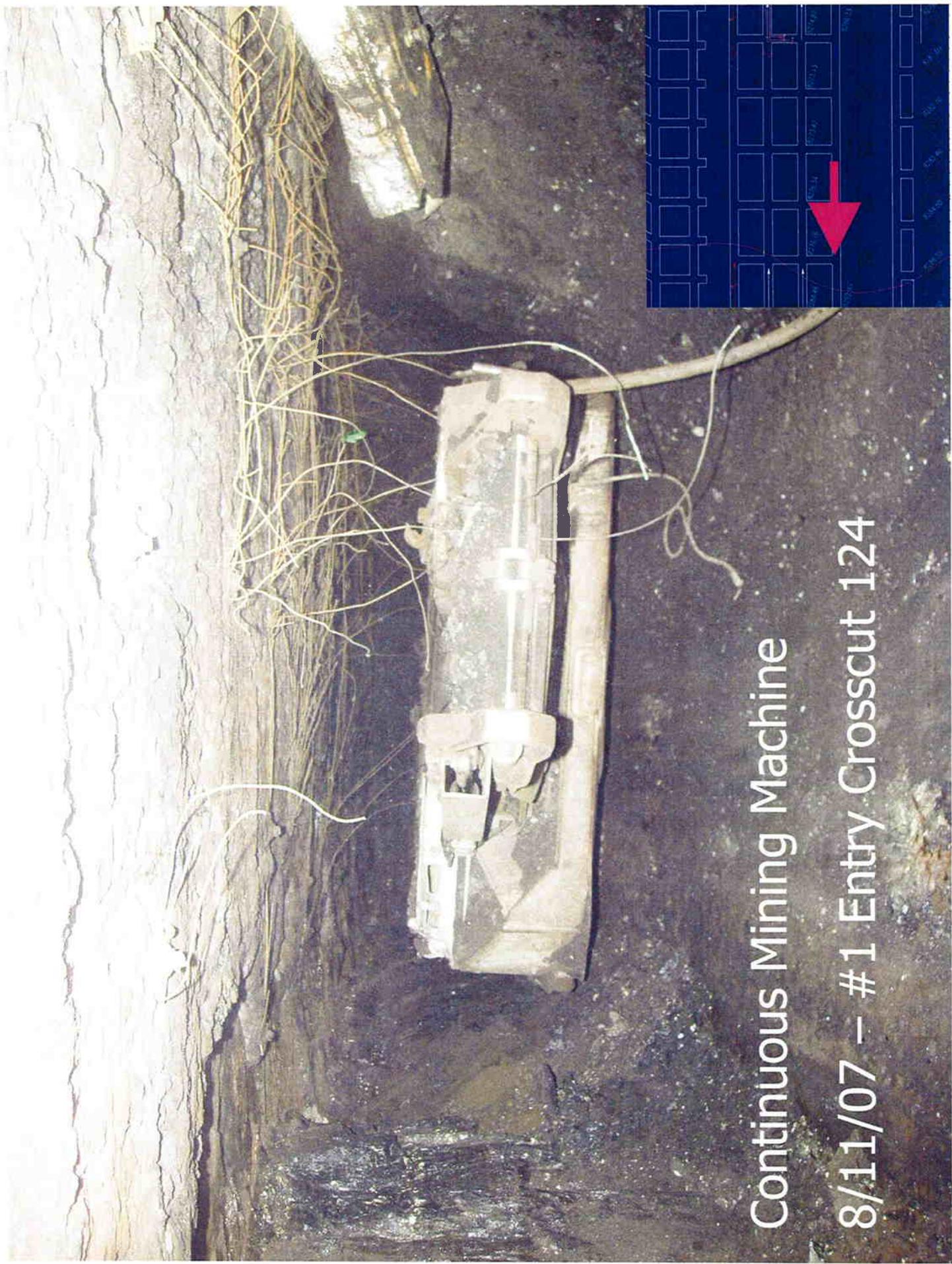
8/14/07 – #1 Entry Near Crosscut 125





**Bounced Pillars**

**8/9/07 – #3 Entry Crosscut 120**



Continuous Mining Machine

8/11/07 -- #1 Entry Crosscut 124

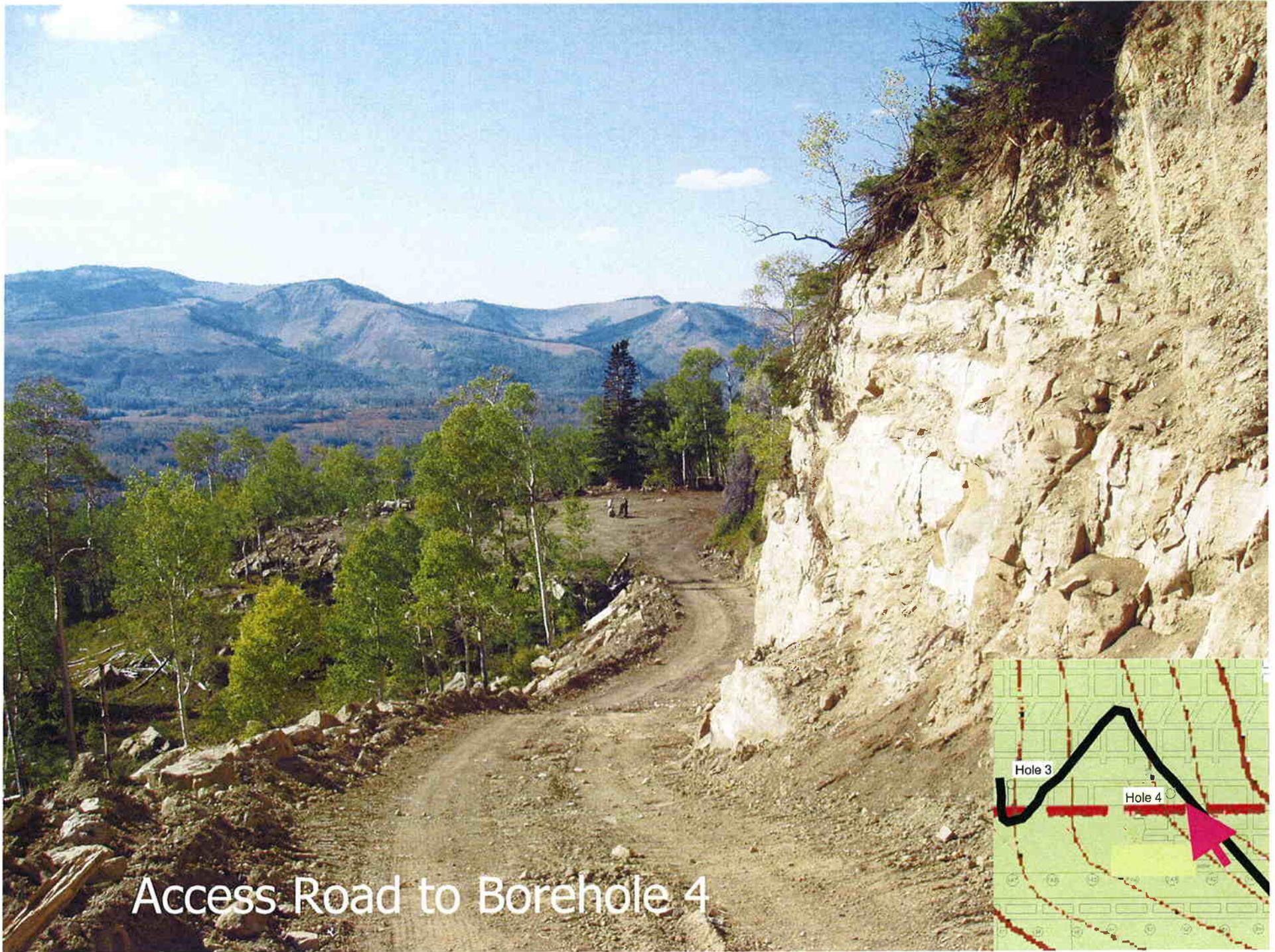


Packed Coal Blocking Entry from Initial Event  
8/12/07 – #1 Entry Crosscut 124





Overview of Borehole Sites



Access Road to Borehole 4



Access Road to Borehole 6



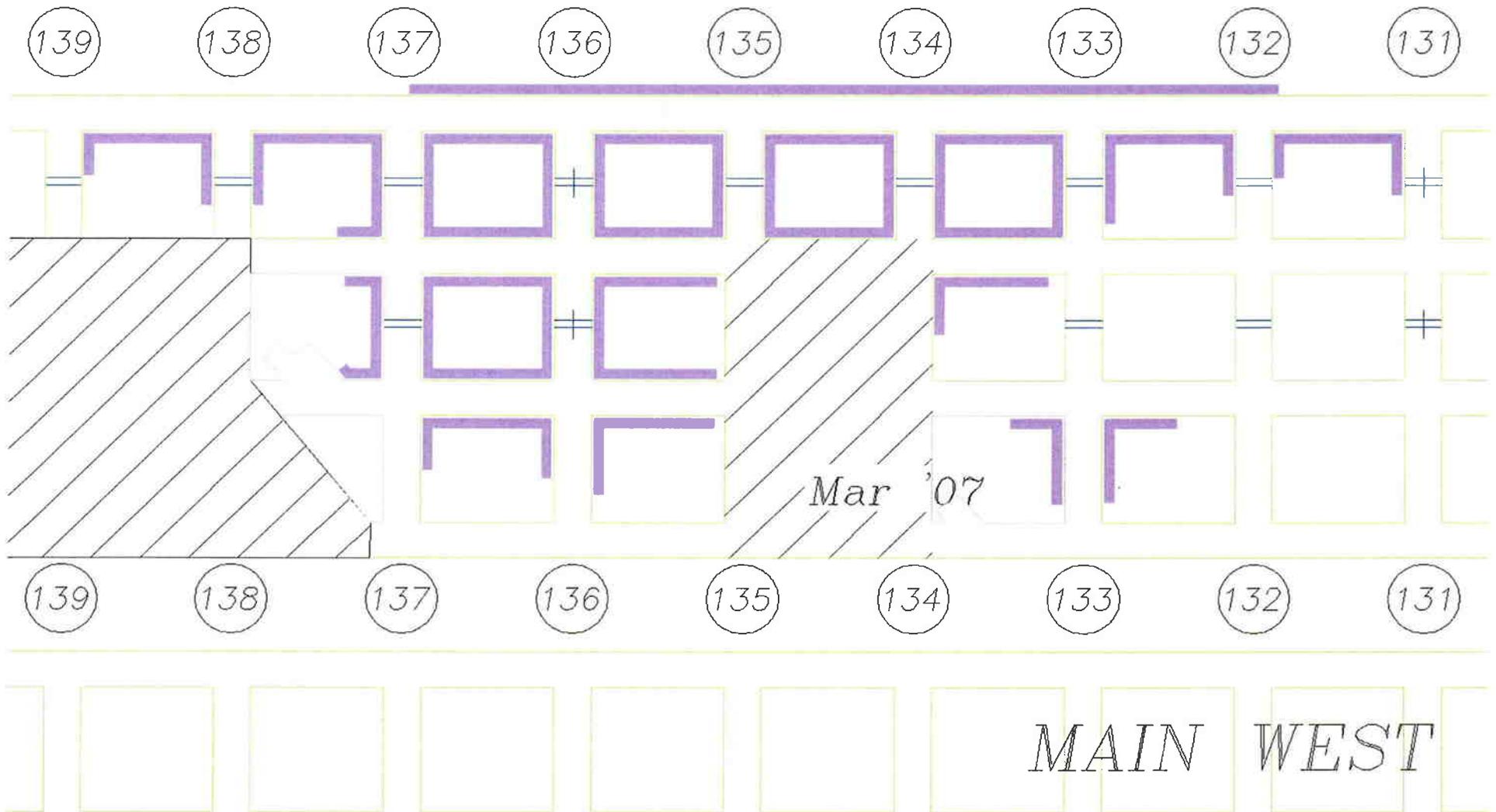
Road to Borehole Sites

# Outline of Team Activities

- Continuing the interview process:
  - Have conducted 63 interviews to date.
- Contracted with rock mechanics experts:
  - Numerical modeling of mine design
  - To gain insight into the manner and extent of failure
- Continuing to review information obtained during the investigation.
  - Including information about previous bounces.

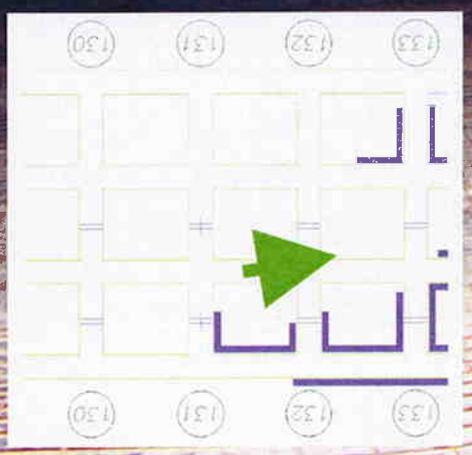
# North Barrier Pillar Bounce

- Occurred on March 10, 2007.
- Mining ceased and section was moved to the South Barrier.



**Area in Main West - North Barrier**  
 Photographed on March 16, 2007 by Mine Operator

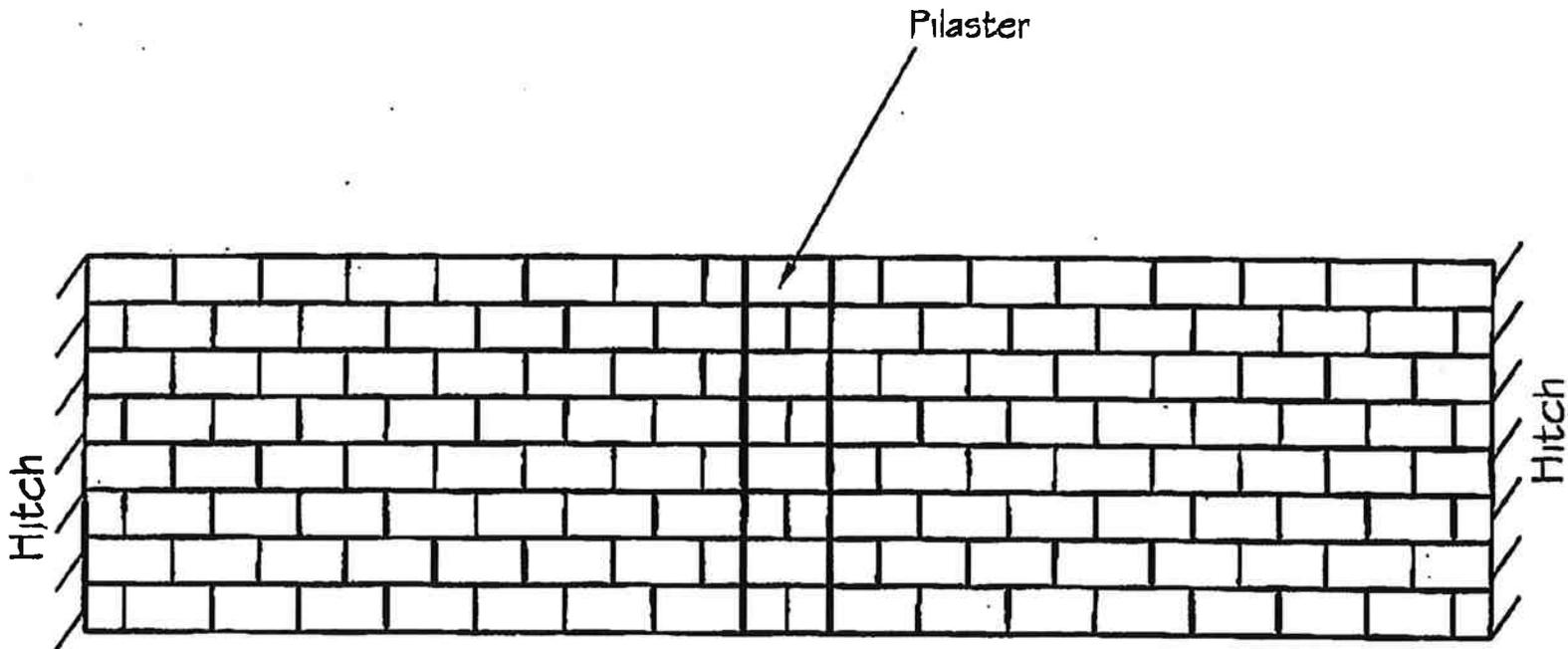
March 10, 2007 Pillar Bounce  
#3 Entry Crosscut 132



# Mine Status

- August 25, 2007 - Mine was placed in Non-Producing status.
- September 28, 2007 - UtahAmerican notified MSHA of their intent to erect barriers in the mine openings to prevent entrance by unauthorized persons.
- Barriers have been completed.

# CONCRETE BLOCK WALL



SOLID CONCRETE BLOCK  
6X8X16 (Approximate Size)

Scale: NTS

Date: 26 SEP 2007

Block Wall.dwg



# Borehole Status

- Bureau of Land Management (BLM) has jurisdiction over borehole plugging plans.
- To date:
  - All boreholes have been plugged
  - Reclamation is being conducted

Questions ???