Upper Big Branch

The April 5, 2010, explosion: a failure of basic coal mine safety practices

Report to the Governor

Governor's Independent Investigation Panel

Cover photo credit, Jeff Gentner, The Associated Press: State Police control traffic at the entrance to the Upper Big Branch mine on April 5, 2010. They are standing beneath elevated conveyor belts used to carry coal from the mine.

Back cover photo credit, Beth Spence: Miners Memorial on the grounds of the state capitol in Charleston, West Virginia, during a memorial service for the UBB miners, April 12, 2010.

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J. Davitt McAteer

and associates

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May 2011

This preliminary report sets out the findings of our investigation and recommendations to date. The report is available electronically at http://www.nttc.edu/ubb. We will update this site with additional information should it become available. The report also is available at http://www.wju.edu

DEDICATION

This report is dedicated to the men who lost their lives in the Upper Big Branch mine:

Carl Calvin Acord
Jason Atkins
Christopher Bell
Gregory Steven Brock
Kenneth Allan Chapman
Robert E. Clark
Cory Thomas Davis
Charles Timothy Davis
Michael Lee Elswick
William Ildon Griffith
Steven Harrah
Edward Dean Jones
Richard K. Lane
William Roosevelt Lynch
Joe Marcum
Ronald Lee Maynor
Nicolas Darrell McCroskey
James E. “Eddie” Mooney
Adam Keith Morgan
Rex L. Mullins
Joshua Scott Napper
Howard D. Payne
Dillard Earl Persinger
Joel R. Price
Gary Wayne Quarles
Deward Allan Scott
Grover Dale Skeens
Benny Ray Willingham
Ricky Workman

And to the man who was seriously injured in the explosion:

James Woods

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LETTER OF TRANSMITTAL

Governor Earl Ray Tomblin
State of West Virginia
1900 Kanawha Boulevard East
Charleston, West Virginia 25305

Dear Governor Tomblin:

It is with sadness and honor that I submit this report of the Upper Big Branch mine disaster to you. Sadness because events occurred which made this investigation necessary; honor because the loss of these lives compel us to make these losses meaningful by improving mine safety.

On April 13, 2010, I was asked by then Governor Manchin to conduct an independent investigation of the Upper Big Branch Mine disaster where 29 miners were killed.

As part of that effort, I and seven associates formed the Independent Investigation Panel (GIIP) which undertook an analysis of the events leading up to the disaster, the disaster itself, as well as, its aftermath.

We have attempted, through impartial analysis, to determine not only the causes of the disaster, but also to learn how to prevent further such events from occurring and to develop reforms to make mining safer.

We have followed the facts to wherever they have led; have attempted to learn the essential causes of the explosion and also have examined the existing regulatory system to determine how this could have happened; and finally how government and industry responded to this emergency.

Here, as so often before, the mine rescue volunteers proved heroic in their willingness to quickly assemble and attempt to rescue – then recover – the trapped miners. The team members all receive our praise and profound thanks. They truly are the "Minute Men" of American industry.

Further, we wish to thank the many Upper Big Branch miners and supervisors who gave candid and honest testimony. Their concern with finding the facts in order to prevent other similar disasters speaks volumes about their regard for the victims and their families and is in sharp contrast to others who declined to testify.

Sadly, despite all efforts, 29 miners died and one was severely injured. Their families have an immeasurable burden to carry the rest of their lives. To each of them we offer our sympathy, condolence and prayers knowing of its inadequacy, but offering this undertaking in an effort to make improvements which will protect the men and women who are at work today.

During the course of this investigation, I was asked by a sister of one of the victims "Please, just tell us what happened." We have endeavored to do just that. We have also attempted to learn why it happened and explain to the families, friends and general public what went wrong.

Our investigation, while thorough, could not be exhaustive. There are still questions which remain, in part, because the force of the explosion destroyed much evidence. Regrettably, some may never be answered. More than a year has passed since the disaster, and we believe it best to submit now to you what we've learned and offer concrete suggestions on how to prevent other disasters, rather than extend our inquiry indefinitely.

The findings and recommendations offered here are in a constructive spirit of transforming the U.S. mining industry into a global leader for safe and healthy mining, today and tomorrow.

Our recommendations are of no value unless adopted by industry and governments for it is only then that miners will have a better chance to return home safe and sound to their families each day.

Our nation's reliance on coal is likely to continue for sometime – all of us reap the benefits that result from the efforts of men and women working in coal mines. We owe it to them to ensure a safe and healthful work place; we as a nation and the mining industry have shown that we know how to mine safely. We are obliged to do that.

The efforts of my associates, Beth Spence, Jim Beck, Celeste Monforton, Debbie Roberts, Katie Beall, Pat McGinley and Suzanne Weise, have been truly remarkable. For more than a year, this group has attended interviews, conducted a full underground investigation, reviewed thousands of documents, transcripts, data, information and correspondence. They have worked tirelessly to determine the cause of the explosion and how to prevent it from happening again.

Following such a disaster, there is but one choice: to promptly and thoroughly investigate and to set out a course of action which will ensure, as far as is humanly possible, that the lives of the 29 men were not lost in vain.

Sincerely,

J. Davitt McAteer
Shepherdstown, West Virginia
May 2011

FOREWARD

At approximately 3:02 p.m. on Easter Monday, April 5, 2010, a powerful explosion tore through the Upper Big Branch mine, owned by Massey Energy and operated by its subsidiary, Performance Coal Company, at the convergence of Boone and Raleigh counties in southern West Virginia.

Twenty-nine miners died and one was seriously injured as the enormously powerful blast rocketed through two and one-half miles of underground workings nearly 1,000 feet beneath the surface of the rugged mountains along the Coal River. The disaster has had grave consequences for a mining company, for a community and, most importantly, for the family members who lost men dear to them.

On April 13, 2010, then West Virginia Governor Joe Manchin III asked J. Davitt McAteer, former Assistant Secretary of Labor in charge of the federal Mine Safety and Health Administration, to conduct an independent investigation into the disaster. The Governor said, "We owe it to the families of the 29 miners we lost last week to find out what caused this. We owe it to them and every coal miner working today to do everything humanly possible to prevent this from happening again… I fully expect that we will learn ... from this and make dramatic changes to protect our miners."[1]

As a result of an inquiry that continued for more than a year, the Governor's Independent Investigation Panel has reached the following conclusions:

• The explosion at the Upper Big Branch mine could have been prevented.

• The explosion was the result of failures of basic safety systems identified and codified to protect the lives of miners. The company's ventilation system did not adequately ventilate the mine. As a result, explosive gases were allowed to build up. The company failed to meet federal and state safe principal standards for the application of rock dust. Therefore, coal dust provided the fuel that allowed the explosion to propagate through the mine. Third, water sprays on equipment were not properly maintained and failed to function as they should have. As a result, a small ignition could not be quickly extinguished.

• Three layers of protection designed to safeguard the lives of miners failed at Upper Big Branch. First, the company's pre-shift/on-shift examination system broke down so that safety hazards either were not recorded, or, if recorded, were not corrected. Second, the U.S. Mine Safety and Health Administration (MSHA) failed to use all the tools at its disposal to ensure that the company was compliant with federal laws. Third, the West Virginia Office of Miners' Health Safety and Training (WVHST) failed in its role of enforcing state laws and serving as a watchdog for coal miners.

• Regulatory agencies alone cannot ensure a safe workplace for miners. It is incumbent upon the coal industry to lead the way toward a better, safer industry and toward a culture in which safety of workers truly is paramount. A genuine commitment to safety means not just examining miners' work practices and behaviors. It means evaluating management decisions up the chain of command – all the way to the boardroom – about how miners' work is organized and performed.

• The politics of coal must be addressed at both a state and national level. Coal is a vital component in our nation's energy strategy. The men and women who mine it also are a national resource whose lives, safety and health must be safeguarded.

THE GOVERNOR'S INDEPENDENT INVESTIGATION PANEL

In forming the Governor's Independent Investigation Panel (GIIP), Davitt McAteer enlisted a group of colleagues with expertise in coal mining, mining law, mining communities, occupational safety and public health. GIIP members participated in a joint federal and state investigation conducted both underground at Upper Big Branch and through witness interviews conducted primarily at the federal Mine Health and Safety Academy in Beckley, West Virginia.

On June 2, 2010, mine rescue personnel from the federal Mine Safety and Health Administration (MSHA) and the West Virginia Office of Miners' Health,

Safety and Training (WVMHST) re-entered the Upper Big Branch mine to assess conditions. It took several weeks before the mine was made safe for investigation teams. Final pre-investigative walk-throughs of the mine were conducted on June 25 and June 28.

The underground investigation officially began on June 29. The investigation teams, each with assigned duties (e.g., photography, mapping, physical evidence collection), included representatives from MSHA, WVMHST, Massey Energy and the UMWA. The GIIP, with its small numbers, selected teams with which to travel. The majority of the underground investigation was completed by January 14, 2011.

The GIIP also participated in nearly all of the witness interviews, which began May 10, 2010. Individuals interviewed included current and former employees of Performance Coal Company and Massey Coal Services; contractors employed at UBB; and UBB, MSHA and WMHST staff. Some family members also were interviewed privately, at their request.

More than 300 interviews were conducted, with the majority (221) taking place between May and August 2010. Eighteen corporate officials, including Don Blankenship, chairman and Chief Executive Officer of Massey Energy at the time of the explosion; Performance Coal president Chris Blanchard and Vice President Jamie Ferguson, and Massey Vice President of Safety Elizabeth Chamberlin, invoked their Fifth Amendment privilege against self-incrimination and refused to cooperate with investigators. (See Appendix)

The independent team also reviewed inspection records, mine plans and other documents. WVMHST made their UBB mine file available. MSHA provided violation data, citations, inspector notes and other records publicly available on its website but with certain fields of information redacted. Our request for un-redacted copies of some records (e.g., inspector notes) was denied; MSHA staff indicated that the Solicitor's Office considered the information exempt pursuant to the Freedom of Information Act (FOIA).

THE GIIP REPORT

The Governor's Independent Investigation report is divided into sections. The first section outlines the events that led up to the April 5, 2010, disaster; reconstructs the disaster itself; and describes the response to the tragedy and the rescue and recovery efforts.

The second section describes in detail the systemic failures that allowed the disaster to occur – the faulty ventilation system, the inadequate application of rock dust and the equipment failures.

The third section analyzes government oversight agencies – both state and federal – and asks the painful question posed by family members: how did you let this happen?

The fourth section examines the culture of the mine's operator, Massey Energy, its prominence in the Appalachian coalfields and its particular influence over the industry in West Virginia. It explores how that culture created a climate in which a disaster such as that at Upper Big Branch could occur.

The fifth section offers summaries, conclusions and recommendations for going forward.

We recognize that this report cannot bring back those who died in the Upper Big Branch mine. However, it is our hope that this frank and unvarnished presentation of what transpired on April 5, 2010, offers a clear picture of the real and constant risks associated with operating coal mines in a reckless manner. We also hope that it causes all mine operators to examine their own dedication to safe mining practices and their attitudes toward safety regulations and regulators. If this type of introspection provides a path for industry and regulators to recommit themselves to safe mining practices each and every day in each and every one of this nation's coal mines, then we will have honored the lives of the 29 men lost in the Upper Big Branch mine disaster.

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1 Office of the Governor, "Governor Appoints J. Davitt McAteer to Head Upper Big Branch Mine Independent Investigation Panel," April 13, 2010.

In memory of
THE MEN OF THE UPPER BIG BRANCH MINE

Carl Calvin "Pee Wee" Acord

Carl Calvin "Pee Wee" Acord, 52, had worked in the mines for 34 years and was a proud member of the "Old Man Crew" at the Upper Big Branch Mine. He enjoyed fishing with his sons, working in his yard, driving his tractor and being "PaPaw" to his two grandchildren, Chase and Cameron. He is survived by his wife, Joyce Lynn, and sons, Cody and Casey.

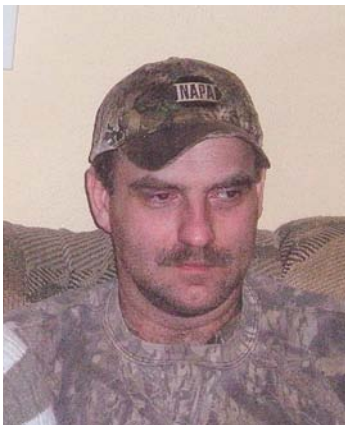
Jason Atkins

Jason Adkins, 25, of Foster was a 2003 graduate of Sherman High School, where he won all-state honors in football and basketball. He served as a member of the Racine Volunteer Fire Department and was an avid West Virginia University sports fan. Survivors include his wife, Amanda, and his parents, Robert and Shereen Bowles Atkins.

Christopher Bell

Christopher Bell, 33, of Crab Orchard, was admired for his ability to draw and detail vehicles. He was happiest spending time with his wife, Angela, and children Alexis, Meadow, Christopher and Skylar. His parents, Christopher L. and Kathy Darlene Bell, also survive him.

Gregory Steven Brock



Greg Brock, 47, of Clear Creek, was an electrician at the Upper Big Branch Mine. He enjoyed spending time with his son, Greg Kyle Brock, and his fiancée, Patti Stover, and her daughters, Shayla and Brooke Stover. He was a NASCAR fan who loved to hunt and fish and who always had a vegetable and flower garden.

Kenneth A. Chapman

Kenny Chapman, 53, of Fairdale was a roof bolter who had the ability to make others laugh. "He was somebody that always had a good time," a nephew said. Kenny also enjoyed hunting, fishing and working in his garden. He is survived by his wife, Laura, children Donna Griffith, Vicky Williams, Kenny Chapman, Jr., Michael Austin Chapman, Jason McMillion, Carl Massey and Jubal McMillion.

Robert E. Clark

Robert E. Clark, 41, of Beckley was described by friends as a caring person who never met a stranger. He enjoyed spending time with his family, riding his motorcycle, fishing, hunting, restoring vehicles, golfing, working with wood and boating. He is survived by his wife, Melissa, and son, Steven Robert Clark.

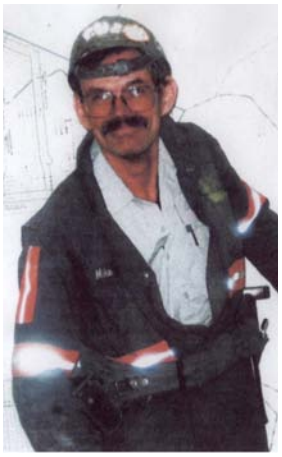
Cory Thomas Davis

Cory Thomas Davis, 20, of Cabin Creek played baseball in high school and followed his family members into the mines. He loved the outdoors, often spending weekends at a family camp on a mountaintop, hunting, fishing and putting his truck in the mud. He is survived by his parents, Tommy and Cindy Davis.

Charles Timothy Davis

Timmy Davis, 51, of Eskdale, loved fishing, hunting with his bird dogs and riding his Rhino. His son described him as "the best hunter and fisher you've ever seen." He is survived by his wife, Diana, and children Timmy Davis, Jr., Cody Davis and Misty Dawn Cooper.

Michael Lee "Cuz" Elswick



Michael Lee Elswick , 56, of Elkview was a dedicated coal miner for 36 years. He was a member of the Dunbar First Church of God. Family members described him as a rock. "When things fell apart, he was there," his daughter said. He is survived by his wife, Bobbie; son, Jeremy Elswick; daughter Jami Cash.

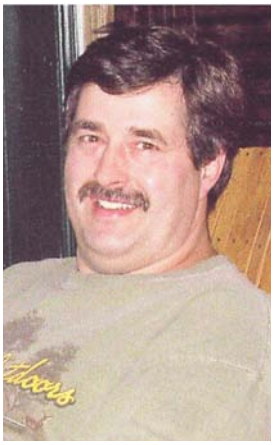
William Ildon "Bob" Griffith

William "Bob" Griffith, 54, of Glen Rogers, came from a family of miners and went to work in the mines as a young man. When he wasn't working, Bob and his wife, Marlene, worked on their 1967 Camaro. Also surviving are a daughter, Deborah Lynn, and a son, William James.

Steven "Smiley" Harrah

Steve "Smiley "Harrah, 40, of Cool Ridge was described as a thoughtful man who would always offer a helping hand. He was a veteran of the U.S. Army and enjoyed hunting, fishing and playing cards. He was devoted to his wife, Tammy, and six-year-old son, Zach, who survive him.

Edward Dean Jones



Dean Jones, 50, of Beckley, was a hard worker who was devoted to his wife, Gina, and son, Kyle Dean, who has cystic fibrosis. Father and son were exceptionally close and shared a love of the Pittsburgh Steelers and the West Virginia Mountaineers. Dean's mother, Ruby Nell Lafferty Jones, also survives.

Richard K. Lane

Rick Lane, 45, of Cool Ridge loved running coal and was known for never asking his men to do anything he would not do himself. He was an avid hunter and fisherman and looked forward to retiring to tend to his horses and cattle on his 25-acre farm. He is survived by his wife, Kim, son Rob and grandson Brody Parker Lane.

William Roosevelt Lynch

Roosevelt Lynch, 59, of Oak Hill, worked in the mines for more than 30 years while also working as a substitute teacher and basketball, football and track coach. He also served as a devotional leader and praise team leader at the Pleasant Valley Baptist Church in Minden. Survivors include his wife, Geneva; son, Mon; and daughter, Miki Rogers.

Joe Marcum

Joe Marcum, 57, of Laurel Creek, Lenore, was a coal miner for 35 years and a charter member of the Lenore Volunteer Fire Department. He was a member of the Church of the Living God and was a mainstay in Mingo County politics. His wife, Kathy, and daughters, Kathy Jo Marcum and Garnet Murphy survive him.

Adam Keith Morgan

Adam Morgan, 21, of Pineville, wore No 24 on the Wyoming East High School football team that went to the state Class AA playoffs during his senior season of 2006. He enjoyed hunting, fishing, four-wheel riding, grilling and being outdoors. He is survived by his parents, Steve and Tammy Church Morgan.

Ronald Lee Maynor

Ronald Maynor, 31, of Clear Creek, was described as a kind person who was always willing to help anyone who needed him. He enjoyed hunting and took his children fishing, hunting, and for rides on his four-wheeler. Survivors include his wife, Helen, daughter Kaitlyn, son Hunter, and parents, Nancy Burgess and Ronald K. Maynor.

Rex L. Mullins

Rex Mullins, 50, of Lively, was an outdoorsman and an ardent West Virginia Mountaineer fan. Survivors include his wife, Brenda; son Jason; daughter, Geneva Blake; stepchildren Jeremy Walker, Tessa Walker and Joseph Walter, and his mother, Joan Bailey Mullins.

Nicolas Darrell McCroskey

Nicolas McCroskey, 26, of Beckley was described as "full of life" and "sweet and helpful and kind-hearted" by a longtime friend. A graduate of Bluefield State College with an engineering degree, he loved hunting, fishing, water sports and riding his Harley Davidson. He is survived by his mother, Debbie Lynn McCroskey.

Joshua Scott Napper

Josh Napper, 25, of Salem Center, Ohio, was a nurse and an avid body builder who loved the outdoors, camping, dancing and riding his four-wheeler. He wrote a note to his family members, "If anything happens to me, I will be looking down from heaven." He is survived by his daughter, Jenna Leigh, fiancée, Jennifer Ziegler; and parents, Scott and Pam Napper.

James E. "Eddie" Mooney

Eddie Mooney, 51, of Ashford loved hunting, fishing, camping and taking his 1978 Corvette out for a cruise on the weekends. He was a member of the Rumble Community Baptist Church and is survived by his wife, Sheila, daughter Misty Case, and son Austin Mooney.

Howard D. "Boone" Payne

Boone Payne, 53, of Cabin Creek, was described as a gentle giant with flaming red hair who would go out of his way to help people. He loved hunting, fishing and basketball. He is survived by his son, Jason, daughter, Erica, father, Howard Daniel Payne, Sr., and fiancée, Bobbie Pauley.

Dillard Earl "Dewey" Persinger

Dewey Persinger , 32, of Crab Orchard loved being with his family and he enjoyed country music. He is remembered as being dedicated to his family and his friends. He leaves behind his wife, Heidi; two sons, James and Devin; and his parents, Delmas and Ada Bolen Persinger.

Joel R. "Jody" Price

Jody Price, 55,of Beckley was a coal miner, a veteran of the U.S. Navy and a member of Saint John United Holiness Church. He was known for his frequent family barbecues. His survivors include his wife, Dorean; stepsons John Jones, Alan Johnson and Matt Jones.

Gary Wayne Quarles

Gary Wayne Quarles, 33, of Naoma was a caring father and son who enjoyed spending time with his family, hunting, fishing and riding four-wheelers. He is survived by his children, Trevor and Rebekka, and his parents, Gary and Patty Quarles.

Deward Allan Scott

Deward Scott, 58, of Montcoal, was an avid outdoorsman who loved to hunt and fish. He was a veteran of the U.S. Army. He is survived by his wife, Crissie Lynn; a daughter, Jennifer Ann and a son, Daniel Allan.

Grover Dale Skeens

Grover Dale Skeens, 57, of Montcoal, found religion late in life and had a strong church involvement. He was a veteran of the U.S. Marines . "Mostly his passion was work," according to his brother-in-law. "He started out in the coal mines at an early age. He's been working there for almost 30 years." He is survived by a daughter, Renee Bishop, and a son, Jeff Skeens.

Benny Ray Willingham

Benny Willingham, 61, of Corinne, had been a coal miner for 30 years and was five weeks away from retirement. He was a Vietnam veteran of the U.S. Air Force. At his funeral, Benny was remembered as a generous and religious man who was known for random acts of kindness. He is survived by his wife, Edith Mae; daughter, Michelle McKinney; sons, Jody Canada and Patrick Canada; and his mother, Cleo Roach.

Ricky Workman

Ricky Workman , 50, of Colcord, had a passion for wheels. He loved his Harley-Davidson and in the summer drove miniature race cars. He is survived by his wife, Annette, daughters, Monica White, Heather Whitt and Chantal Hale, and seven grandchildren.

SYNOPSIS OF KEY EVENTS:

The information in this synopsis is derived from witness interviews, state and federal records, news reports, and other sources. The times listed are approximate.

MONDAY, APRIL 5, 2010

5:30 a.m. – 2:30 p.m.

Dayshift crews of miners began to arrive at UBB. By 7:00 am, at least 45 miners were underground, and the longwall, HG22 and TG22 crews were on their sections. At 10:00 am, the longwall crew notifies the dispatcher that they are not running coal because the hinge pin on the ranging arm is loose.

2:30 – 3:00 p.m.

At 2:30 pm, fireboss Mike Elswick (deceased) reports by telephone to fireboss Scott Halstead five readings of CH4 0.0% and 20.8% oxygen, but also records that conveyor belts have too much accumulated coal and need rock dust. Longwall headgate operator Rex Mullins (deceased) calls out that the section is still down but should be operating within 10 minutes. At 2:40 pm, longwall section foreman Richard Lane (deceased) calls out a pre-shift report to Kevin Medley reporting 0% CH4 and 20.8% oxygen. TG22 crew begins their mantrip ride out of the mine. At 2:42 pm, Rex Mullins (deceased) says they are running coal and the shear is going to tail. At 2:58, James Woods operating the mantrip with the TG22 crew calls the dispatcher for a road from break 78. At 2:59:38 pm, the crew cut power to the longwall by disconnecting the shearer manual stop button.

3:01 – 3:02 p.m.

Explosion erupts through the mine blasting debris out the portals and lasting for several minutes. The carbon monoxide monitoring system alarms and mine fan records show a major disruption to the ventilation.

3:05 – 3:30 p.m.

Greg Clay (dispatcher) calls Performance Coal President Chris Blanchard at the Marfork office. Blanchard tells Jonah Bowles (director of safety, Marfork Coal) to call the MSHA and WVMHST emergency hotlines and report "an air reversal on the belt line and CO 50-100 ppm." Six Performance Coal personnel enter UBB from the Ellis portal; four others enter from the UBB portal.

3:30 – 4:30 p.m.

Four trained Massey Energy mine rescue personnel (Rob Asbury, Jim Auerdnik, Mike Bolen, Shane McPherson) arrive at UBB; two of them proceed underground. The six-person group that entered UBB earlier see a light at break 46-47 coming towards them. They run towards it and encounter TG22 crew member Tim Blake at break 42. One of them stays with Blake, the others go deeper into the mine toward the TG22 crew's mantrip. They find eight miners, some dead, some still responsive, at break 66, and place them onto two mantrips and head out of the mine. As they exit, they meet up with the two Massey mine rescue team members (Asbury and Auerdnik) who assist with the victims. Performance Coal officials Chris Blanchard and Jason Whitehead do not exit with the victims, but remain and go further underground. The Whitesville Fire Department receives a call at 4:22 pm requesting an ambulance and it arrives at UBB at 4:30 pm.

4:30 pm – 5:30 p.m.

MSHA District Manager Robert Hardman arrives at UBB with other MSHA staff and issues a control order. The mine rescue plan allows for two mine rescue teams to enter the mine and establish a fresh air base (FAB) at crosscut 35.

5:30 p.m. – 8:00 p.m.

WVMHST issues a control order. MSHA administrator Kevin Stricklin arrives at the mine, while family members begin gathering at the Marfork Safety building, and the press assembles at the Marsh Fork Elementary school. MSHA and WVMHST officials begin taking written notes of the command center's activities. Mine rescue teams advance the FAB to 78 break. Blanchard and Whitehead report encountering high carbon monoxide levels on the tail side of the longwall, and seeing victims on the longwall track (later identified as Cory Davis, Timmy Davis, Adam Morgan, and Joshua Napper.)

8:00 p.m. – 10:00 p.m.

Officials conduct first briefing for the miners' families. Massey Energy issues a news release reporting "7 dead and 19 unaccounted for." Mine rescue personnel underground appear to include two teams from WVMHST, members of two of International Coal Group's teams, members of Southern Community & Technical College's Task Force 1, Massey Energy's Southern WV teams,

East Kentucky and Knox Creek teams, and MSHA's Jerry Cook, Fred Wills and Mike Hicks. Victim found at conveyor belt head drive (later identified as Mike Elswick.)

10:30 p.m. – 11:30 p.m.

Some mine rescuers proceed toward the longwall and others toward HG22. Victim found at the longwall stage loader (later identified as Rex Mullins.) Mine rescue team reports finding the refuge chamber near the longwall, but it has not been deployed. Carbon monoxide readings on HG22 at crosscut 3 are 600 ppm and 867 ppm. Families are told there are five more deceased, but unnamed miners.

11:30 p.m. – 1:00 a.m. (April 6, 2010)

One mine rescue team moves across the longwall face and finds six more victims (later identified as Christopher Bell, Richard Lane, Dillard Persinger, Joel Price, Gary Quarles and Grover Skeens). Another team finds six victims on HG22 section (later identified as Kenneth Chapman, William Griffith, Ronald Maynor, James Mooney, Boone Payne and Ricky Workman.) Command Center still unsure of the number of miners unaccounted. The team on the HG22 section reports their gas detectors are over-the-range for carbon monoxide and methane. Command Center orders teams to exit the mine. The bodies of the 18 victims have been located but not removed from the mine. Four miners (later identified as Gregory Brock, Dean Jones, Joe Marcum and Nicolas McCroskey) have not yet been located.

TUESDAY, APRIL 6, 2010

1:30 a.m.

Chris Adkins announces to the families there are 24 deceased miners, and four miners who have not yet been located. He indicates that he did not hold out much hope for the four missing men.

2:30 – 3:30 a.m.

All mine rescue team members exit the mine, along with Chris Blanchard and Jason Whitehead. Governor Manchin and Congressman Rahall speak to the families and indicate there are 25 deceased miners and four missing men.

6:00 a.m.

Rescue plan calls for drilling three boreholes near HG22 section. Monitoring of gases continues through the day.

9:00 p.m.

MSHA's seismic equipment is set-up, but does not detect any unusual noise from underground.

WEDNESDAY, APRIL 7, 2010

Monitoring of gases continues throughout the day. Briefings for families conducted at various times by Governor Joe Manchin, Congressman Nick Rahall, MSHA's Kevin Stricklin, WVMHST's Ron Wooton, Massey Energy's Don Blankenship and Chris Adkins

THURSDAY, APRIL 8, 2010

Briefings for families conducted throughout the day by Governor Joe Manchin, MSHA's Kevin Stricklin, Massey Energy's Chris Adkins, and others.

3:30 a.m. – 10:30 a.m.

Rescue plan modified to resume exploration to locate the four remaining miners and to recover the victims found previously. Four mine rescue teams enter the mine. By 9:30 am gas readings at a borehole show explosive levels; rescue teams withdrawn.

FRIDAY, APRIL 9, 2010

Funeral services begin for the seven miners from the TG22 crew.

12:30 a.m. – 5:00 a.m.

Two mine rescue teams enter the mine. Later detect elevated carbon monoxide levels and smoke. Ordered to exit the mine at 5:00 am.

4:00 p.m. – 8:00 p.m.

Two mine rescue teams enter the mine while nitrogen continues to be injected into the mine through a borehole. Two additional teams enter the mine after 7:00 pm.

10:00 p.m. – 11:30 p.m.

Mine rescue team on the HG22 section find remaining victims (later identified as Gregory Brock, Dean Jones and Joe Marcum.) Mine rescue team on the longwall section find final victim (later identified as Nicolas McCroskey).

11:35 p.m.

Don Blankenship, Chris Adkins, Governor Manchin, MSHA's Joe Main and Kevin Stricklin, and others provide final briefing for the families. Chris Adkins announces that the entire mine has been explored, all the miners have been accounted for, and there are no survivors. MSHA's family liaison notes indicate "the briefing breaks down for 20-25 minutes."

SATURDAY, APRIL 10, 2010

Plans are developed to recover the bodies of the remaining 22 victims while examining the mine for dangerous conditions that could put the recovery teams' lives at risk. Some of the victims' bodies are removed from the mine and transported to the temporary morgue on mine property. At 5:50 pm, the teams retreat because of elevated carbon monoxide and low oxygen levels.

SUNDAY, APRIL 11, 2010

Midnight – 3:00 a.m.

Mine rescue teams continue their work, but retreat when carbon monoxide levels exceed 2800 ppm. No victims are removed from the mine.

MONDAY, APRIL 12, 2010

Mine rescue team members begin removing the bodies of the remaining victims.

TUESDAY, April 13, 2010

By early morning April 13, all the miners' bodies have been removed from the mine.

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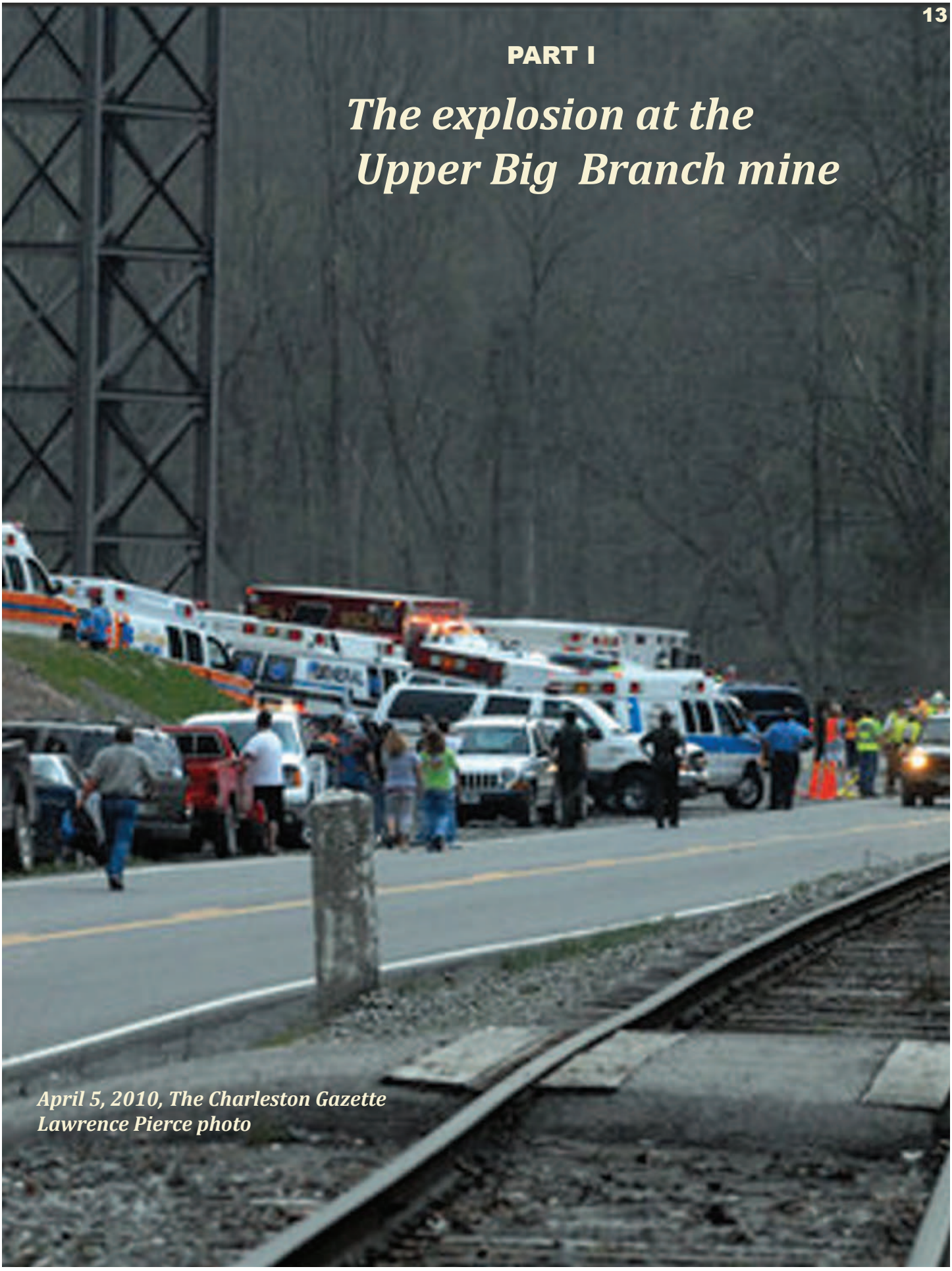
PART I

The explosion at the Upper Big Branch mine



April 5, 2010, The Charleston Gazette
Lawrence Pierce photo

INTRODUCTION

"A good guy." That was the way a lot of people described 33-year-old Gary Wayne Quarles. His father, also named Gary, called his soft-spoken son his best friend.[1] The younger Quarles's friend, Michael Ferrell, said Quarles was like a brother to him – the kind of person who offered to help out financially when he thought a buddy was up against hard times.[2]

A big man, standing 6 feet tall and weighing nearly 300 pounds, Quarles was the tail side shearer operator on the longwall of the Upper Big Branch mine, owned by Massey Energy, in Raleigh County, West Virginia.[3] It was one of the toughest jobs in the mine, and, because Quarles did it so well,[4] his co-workers might have been surprised to learn that the man they called Spanky was scared, that he dreaded going to work in the mornings.

In early April 2010, Quarles had a lot on his mind. His divorce had become final a couple of months before, and he was concerned about his two young children, a daughter, 9, and a son, 11.[5] Mostly, though, his friends said he was worried about conditions at UBB.

During Easter weekend,[6] Quarles shared a meal with Jason Gautier and Nicolas McCroskey at the Hooters Restaurant in Beckley. McCroskey, like Quarles, worked at UBB; Gautier, who had been a production foreman at UBB, had left Massey to take a job with ICG in September 2009.[8] As the men ate, Quarles and McCroskey talked about Upper Big Branch, telling Gautier "something bad was going to happen."[9] Gautier said McCroskey was "up and coming"[10] at the mine, but Quarles, like most of the dayshift longwall crew, was an experienced and highly skilled miner.

Spanky Quarles had worked underground for 14 years, starting when he was just 18 years old. He had spent the last eight of those years working on the longwall, his father said.[11] Gary Quarles said his son liked working at UBB when he first went there.

At some point, things changed. Massey moved the longwall to another mine operation, Logan's Fork, and Gary Quarles said his son told him, "Dad, that place is terrible." Then, when the younger Quarles came back to UBB, he told his father he was distressed to find that "this [UBB] … is a whole lot worse."[12]

On Easter Sunday – April 4, 2010 – the Upper Big Branch mine stood idle. Massey had given workers the day off and most of them spent the time with those they loved – eating Sunday dinner, attending church services, engaging in outdoor activities.

Gary Wayne Quarles, still stewing about the conditions at the mine, drove back and forth past Michael Ferrell's home, as if he were pacing. Ferrell, who was cutting weeds, saw Quarles pass by and knew him well enough to know that his friend had something on his mind. Ferrell also knew that Quarles wouldn't want to keep him from his work.[13]

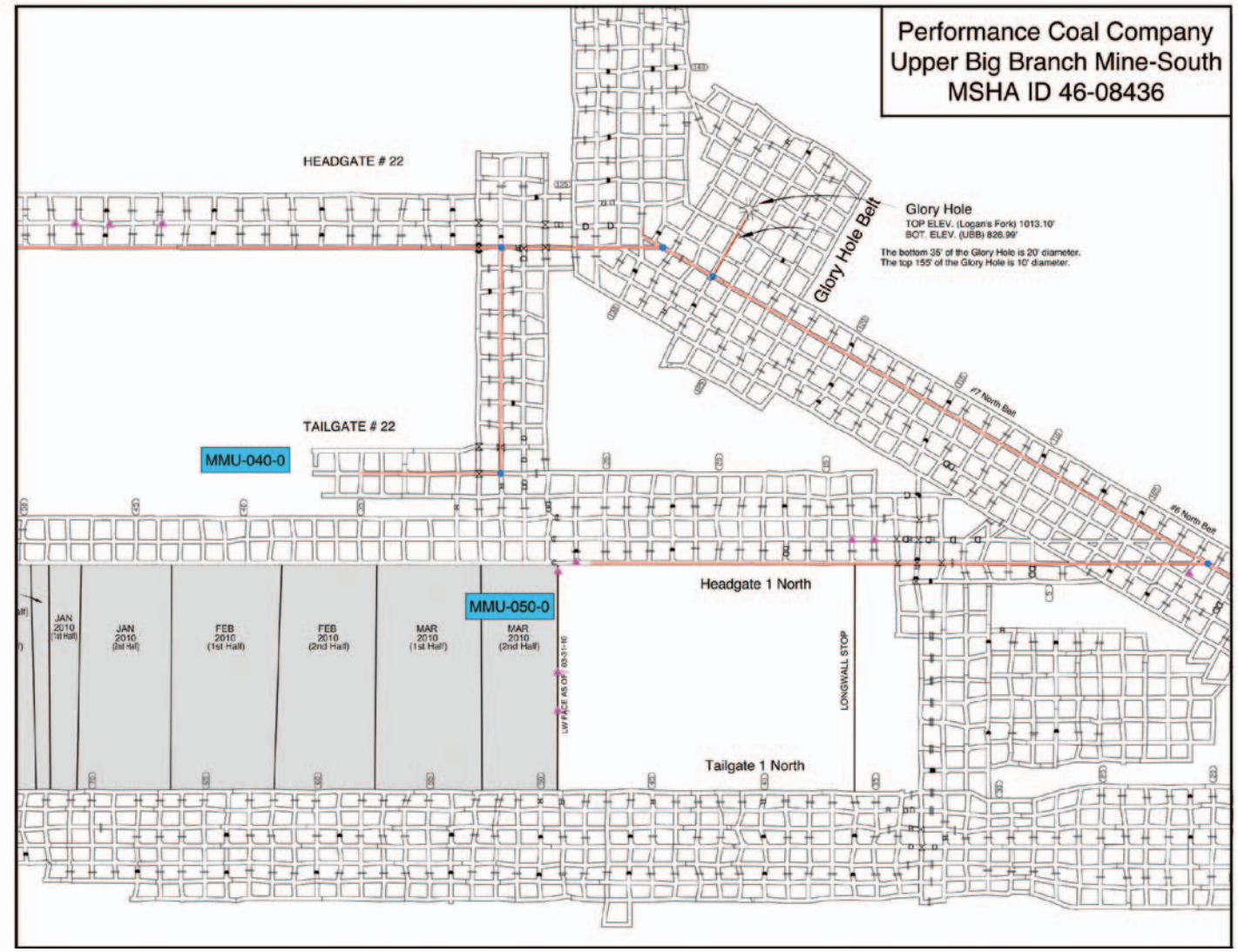
"I knowed him all my life," Ferrell said. "And I mean, his kids was like my kids. And when you're around somebody enough, you kind of know something is wrong. I knowed he didn't want to come over there and make me stop, so I just acted like I was going to take a water break because I knowed what kind of guy he was."[14]

Quarles was aware that Ferrell had recently left UBB. Ferrell maintains that he was fired after he reported safety concerns to a state mining inspector. Quarles, Ferrell said, asked if "I was working or if I needed money or anything like that." Ferrell told Quarles he was fine, that he had a job at Patriot Coal.[15]

"And he said, 'Man, I wish I had a good job like you're talking about,'" Ferrell said. He told Quarles he would put in a good word for him at Patriot, that there might be a job for Quarles there.[16]

Ferrell recalled the following exchange:

> **Ferrell**: "Well, what's the matter, Gary?"
>
> **Quarles:** "Man, I'm just scared to go back to work."
>
> **Ferrell:** "What do you mean scared, Gary? What's going on?"
>
> **Quarles:** "Man, they got us up there



Upper Big Branch Longwall/Headgate 22/Tailgate 22 Area

> mining, and we ain't got no air. You can't see nothing. Every day, I just thank God when I get out of that coal mines that I ain't got to be here no more. I just don't want to go back. When I get up in the mornings, I don't want to put my shoes on. I don't want to make myself go to work. I'm just scared to death to go to work because I'm just scared to death something bad is going to happen."[17]

"Something bad is going to happen," Gary Wayne Quarles told at least three people during the Easter weekend, as if he had a deep and abiding premonition about the Upper Big Branch mine. Evidence suggests that, during Easter weekend, as Quarles was giving voice to his fears, trouble was brewing at the mine. Maintenance Superintendent Paul Thompson testified that pumps removing water from the longwall headgate and tailgate had failed during the weekend.[18] Thompson later changed that testimony, but miners returning to UBB on Easter Monday found high water had filled the entries and impeded the flow of air.[19] Without air drawing across the gob to flush out methane – which occurs naturally in underground coal mines – the deadly gas could build up behind the longwall.

Ventilation was not a new problem at Upper Big Branch, a sprawling drift mine with approximately 2.7 miles of active underground works, located at Montcoal in Raleigh County. The company had experienced problems with airflow since the longwall was returned to UBB from the Logan's Fork mine in September 2009.

One supervisor said that the air reversed "on the longwall face just real regular," a problem he attributed to the mine filling up with water and roofing out. Brian "Hammer" Collins, the second shift foreman on the Tailgate 22 section, said the 22 Headgate section "constantly had air problems."[20] Joshua Massey, a roof bolter on the Headgate 22 swing shift crew said, "There wasn't no air. It's hard to ventilate a place when you ain't got

nothing to ventilate it with."[21] Stanley "Goose" Stewart, who worked in the mines for 34 years, 15 of them at UBB, testified at a congressional hearing that UBB was "a ticking time bomb" because "the ventilation system they had didn't work."[22]

Top-level management officials at Performance Coal – the Massey subsidiary that ran UBB – continued to tinker with the air, stealing it from one mining section to ventilate another. But nothing seemed to take care of the problem. Shuttle car operator Bobbie Pauley, who worked the Saturday evening shift before the Easter break, said her crew "didn't have any air" on Headgate 22 that night. "I won't say suffocating," she said in describing conditions on the Headgate. "But it was hot." Pauley said she overheard miner James Griffith tell foreman Brandon Bowling, "You're going to have to get me some air up here. There's no air up here, Brandon."[23]

The lack of air wasn't the only chronic problem at UBB. Some veteran miners, including Charles Semenske[24] and Timothy Blake, testified about what they felt was inadequate rock-dusting at the mine.[25] Tests conducted by the U.S. Bureau of Mines as early as 1908 proved that, contrary to previously held beliefs, coal dust is highly explosive. The tests also demonstrated that the explosive nature of the dust can be rendered inert by the application of rock dust, which is pulverized limestone rock. A number of witnesses attributed the inadequate rock dusting at UBB to the fact that a two-man crew was responsible for rock dusting the entire mine on a part-time basis; others pointed out that the dusting equipment at the mine was both outdated and poorly maintained. Tests conducted after the disaster confirmed that the company failed to meet state and federal standards for rock dusting.

As miners returned to work on April 5, some of them observed that the air was reversed in the mine. Others commented on the lack of airflow in some parts of the mine. It was hot in there, miserably hot, one said.[26] A perfect storm was brewing inside the Upper Big Branch mine – insufficient air, a build-up of methane and enough coal dust to carry an explosion long distances through the mine. All that was needed was a spark.

It came just after 3 p.m., as the day shift was completing work and the second shift was entering the mine, resulting in a massive and violent explosion that tore through Upper Big Branch.

Based on evidence gathered at the mine and testimony offered by those who were familiar with practices and conditions at Upper Big Branch, the Governor's Independent Investigation Panel has concluded that the ignition point for the blast was the tail of the longwall. As the shearer cut into the sandstone mine roof, the resulting sparks ignited a pocket of methane, creating a fireball. The fireball in turn ignited the methane that had accumulated in the gob during the Easter weekend and leaked onto the longwall face. The fireball traveled into the tailgate area, where accumulations of coal dust provided fuel for a second, more deadly, force. This dust-fueled blast ricocheted in multiple directions, traveling across the longwall face, into the tailgate entry, and through more than two miles of the mine.

Twenty-nine men were killed in the blast, including Spanky Quarles, Nicolas McCroskey and the rest of the longwall dayshift crew, making it the most deadly coal mining disaster in the United States in 40 years.

1 Gary Quarles before Committee on Education and Labor, U.S. House of Representatives, Hearing on the Upper Big Branch Mine Tragedy, May 24, 2010, Beckley, WV

2 Michael Ferrell testimony, p. 83

3 Gary Quarles testimony, p. 18

4 Michael Ferrell and Jason Gautier testified as to the ability of Gary Wayne Quarles.

6 Jason Gautier recalls the dinner was on Good Friday; Gary Quarles said his son met with the other miners on Saturday.

7 Jason Gautier testimony, p. 12

8 Jason Gautier testimony, p. 30

9 Jason Gautier testimony, p. 33

10 Gary Quarles before Committee on Education and Labor, U.S. House of Representatives, Hearing on the Upper Big Branch Mine Tragedy, May 24, 2010, Beckley, WV

11 Gary Quarles testimony, p. 27

12 Michael Ferrell testimony, p. 84

13 Michael Ferrell testimony, p. 83

14 Michael Ferrell testimony, p. 84

15 Michael Ferrell testimony, p. 84

16 Michael Ferrell testimony, p. 85

17 Michael Ferrell testimony, p. 85

18 Paul Thompson testimony, p. 16

19 This is referred to as "roofing out."

20 Brian Collins testimony, p. 52

21 Joshua Massey testimony, p. 17

22 Stanley Stewart before Committee on Education and Labor, U.S. House of Representatives, Hearing on the Upper Big Branch Mine Tragedy, May 24, 2010, Beckley, WV

23 Bobbie Pauley testimony, p. 97

24 Charles Semenske testimony, Oct. 26, 2010, p. 17

25 Timothy Blake testimony, p. 23

26 David Farley testimony, p. 23

1 Events leading up to the explosion

"Normal" and "typical" were words used to describe the early hours of April 5 by miners who made it out of the Upper Big Branch mine alive at the end of the dayshift.

"Just seemed like a normal day," said Danny "Joe" Ferrell, a continuous miner operator who had worked at UBB for 16 years and claimed to have been on the crew that took the first cut of coal out of the mine.[1]

"Just a normal day, as I remember," echoed Gene Martin, an outside loader operator with 35 years of mining experience.[2]

"It's … just a typical day basically … everybody goes to the sections, people go to the longwall," said Adam Jenkins, who had been asked to fill in as dispatcher the week before.[3]

As the day progressed, miners from the portal section, barrier section, construction crew, headgate and tailgate phoned in production reports to Jenkins, just as they did every day. "It was a typical day, just like the day before, or two days before. It's wasn't nothing no different," the dispatcher said.[4]

The day didn't start so well for two relatively inexperienced miners who made up what they called the "water crew," also referred to as the "pump crew." Red hat Jason Stanley and his buddy, David Farley, who had only recently earned his black hat, were charged with keeping pumps working behind the longwall headgate in the direction of the Bandytown fan. When they arrived at their work site and realized the pumps had shut down some time during the Easter weekend, Farley and Stanley knew they would be spending the day working in deep water.[5]

Even before he learned about the water situation, Farley had the sense that something was different about the air velocity in the mine. Soon after he, Stanley, and their foreman, Jeremy Burghduff, entered the mine at about 6:00 a.m., Farley remembers commenting to Stanley, "It don't feel like no air is blowing," and that Stanley replied, "It don't, does it?"[6]

Although it wasn't uncommon for the men to experience low air when they first entered the mine, Farley said the crew usually could feel some movement when they got behind the longwall. "But that day, it was almost like there was nothing," he said.[7]

Farley said Burghduff didn't respond to the conversation about airflow, and the foreman did not go ahead of the two young miners to perform the pre-shift examination of the area behind the longwall. Farley said he knew Burghduff hadn't done the required examinations because when he and Stanley started to leave the mine that afternoon, "we walked to 100 Break, because there's a date-up board at 102, and I seen that he didn't make it to the date-up board." Asked how he knew, Farley replied, "He didn't sign his name."[8]

Wherever he spent the day, Burghduff left Stanley and Farley without a multigas detector, which is required by MSHA regulation,[9] as they traveled up the tailgate to the Bandytown fan, checking and repairing pumps.

Stanley said the only passable entry they could travel was the Number One entry on the tailgate, and that during the previous month to six weeks, they had had no telephone communication when they had been in that area because a line had been cut at some point and had not been repaired.[10]

Farley said he and Stanley went into chest-high water to make the repairs. He said he didn't know how long the pumps had been down, only that the crew had been off on Saturday and Sunday "and when we came back to work Monday, they was down."[11]

"Them pumps were in bad shape, and I was trying to get them back up and running," Farley said.[12] Stanley explained that the pumps would "gob up" and "we'd have to disassemble them, take them apart."[13]

Farley said deep water collected – at times neck-deep – where the mine floor dipped down at an area of 88 break. The high water was an ongoing problem, according to Travis Nelson, another miner who was familiar with the area. Nelson testified that "we had a very bad problem with water" two or three weeks before the explosion. "We had to keep pumps constantly running so it didn't roof out," he said.[14]

In West Virginia, the Dangers are Double

Historically, West Virginia has been among the leading coal producing states in the nation. Unfortunately, the state's coal miners have paid a high price for this production.

West Virginia coal mines have recorded the highest rates of fatal accidents and injuries in the country, and mines in southern West Virginia, where the Upper Big Branch mine is located, have been particularly deadly.

A study by the U.S. Mine Safety and Health Administration concluded that 70 miners were killed on the job in southern West Virginia in 1996, resulting in 28 percent of all U.S. mining fatalities in an area that employs just 13 percent of the nation's miners. A report prepared in 2001 for West Virginia Governor Bob Wise concluded that between 1991 and 2000, 25 percent of the country's 458 coal mining fatalities – 116 deaths – occurred in southern West Virginia. Independent contractors accounted for nearly 30 percent of those fatalities.[1]

During the past 20 years, coal companies have increased the use of contractors, or contract workers, to augment their workforces. This practice has made it more difficult for federal and state governments to accurate assess and characterize a company's safety performance. If contractors are killed or injured on the job, the death or injury is attributed to the contract company, not to the mine where the accident occurred. One of the victims of the Upper Big Branch disaster was a contractor, not a Massey employee. The death of Joshue Napper, 26, is recorded as a fatality for David Stanley Consultants, LLC, not Massey Energy.

Unfortunately, the trend of southern West Virginia mines accounting for a disproportionate share of fatalities has continued into the 21st century. The disaster at the Upper Big Branch offers yet more evidence that in southern West Virginia, "the dangers are double."[2]

1 *Report to Governor Bob Wise on Mine Safety and Health in West Virginia and Recommendations to Make West Virginia Mines the Safest and Healthiest in the Nation*, J. Davitt McAteer, Fall, 2001.

2 From the mining song, "Dark as a Dungeon," c. 1946, written by Merle Travis (1917-1983)

Members of the investigation teams that entered the mine after the explosion observed that UBB sloped downhill toward the back end of the mine, which made it natural for water to flow that way and to collect in swags or dips that had not been adequately graded. Danny "Joe" Ferrell, one of the miners who drove the entries heading back to where the Bandytown fan was installed, said his crews cut a lot of bottom to try to get the water to flow down to the Bandytown pump, where the fan was located. "We cut a lot of bottom, and it still didn't run at it very good," he said. "It flowed, but not good, no. They still had to put some more pumps in it to get it to go."[15]

Farley said it was usually cold when he worked in that area, and he would wear long johns, three pairs of socks, a thermal shirt, a jacket, gloves and a beanie in addition to his chest waders.[16]

"But that day it was miserably hot," he said. "I ended up taking – because we've got to put our waders on, and I ended up taking my long johns off. I mean, I stripped down to where I was just in my boxers. I mean, it was hot, hot."[17]

Farley and Stanley managed to get only four of six pumps up and running because they lacked clamps and couplings to fix the other two. By the time they completed work on the fourth pump, it was 1:50 p.m. – the time they usually left the tailgate. They searched for Burghduff, and found him lying down at 92 break. "Whenever we went through the mandoor … he kind of bounced up," Farley said, adding that Burghduff said he wasn't feeling well and wanted to go ahead and leave the mine.[18]

Unfortunately, the accuracy of written records describing conditions encountered by the pump crew on April 5 and in the weeks leading up to the explosion are of concern. As a certified foreman, Burghduff was responsible for ensuring that the hand-held gas detector he used was calibrated properly so as to take accurate readings. His nickname, "Burghdog," was on the device he used most often. Records from the mine indicate he had last calibrated the Burghdog-labeled detector on March 5, 2010. It was due to be calibrated again on April 5.

Burghduff testified that his device had been damaged a few times because it got wet.[19] He said he would let it dry out. Sometimes it worked; other times he would have to borrow a spotter from mine foreman Everett Hager while his was being repaired.

Investigators downloaded data from the methane detectors used by Burghduff for the period of September 2009 through April 23, 2010. In the six weeks preceding the disaster, when he was supposed to be

checking for hazardous conditions in the area leading back to the Bandytown fan, the "Burghdog" device was not turned on during at least 25 of his work shifts.[20]

The foreman's anemometer readings taken in the Bandytown fan area also were questionable. Investigators questioned the lack of fluctuation in readings taken from February 16 through March 10. The velocity generated by the fan was approximately 400,000 cubic feet per minute. Yet Burghduff's readings indicated less than one-tenth of one percent variation.[21]

This data raises doubt about the daily and weekly air readings and other data recorded by the crew foreman in the weeks leading up to the disaster. Accurate air readings and water levels in those key ventilation entries would provide a valuable history of conditions in a critical part of the mine in the days and weeks just prior to the explosion.

David Farley wasn't the only person who noticed that something was different about the airflow on April 5, 2010.

The Thursday before the explosion, outby construction boss Mike Kiblinger had entered the mine with the intention of setting a head for a new mother drive at the point where coal from Headgate 22 dumps onto the seven north belt.[22] As a construction crew cut a belt channel in the area, Kiblinger noted that the dust was blowing out of the mine. When he returned on Monday, the construction crew was cutting an overcast, and the dust was blowing into the mine, or inby, toward the longwall.[23] This suggested to Kiblinger that a major ventilation change had taken place over the weekend.

Roof bolter Joshua Williams also noticed that the air was reversed on April 5 as he and his crew cut the overcast on the Ellis portal, the construction site where ventilation controls had been removed. The Thursday before, as they had cut the belt channel, the air was going out toward the Ellis punchout.[24]

"We thought it was going the right way, going out that way," Williams said. "Because if it had been going the other way, it [dust] would have been going up towards the longwall."[25]

On Monday, as the crew cut the overcast, the air was "all going inby, back up towards Ellis Switch and … toward the longwall," he said.[26]

Williams said the crew was cutting between sets of doors; the inby set was closed, but the outby set was open. "That's the way [mine manager] Wayne Persinger told us … how to do it," Williams said.[27]

Joshua Massey, a roof bolter with the swing shift on Headgate 22, saw doors propped open by cinderblocks in the area where the construction work was taking place. As he traveled to Headgate 22, Massey observed that as the crew cut the belt channel, "instead of eating the dust from the belt cutting the sandstone, they was leaving doors open for the dust to go straight out the drift mouth. We'd come out a couple times, and they'd still be propped open with cinderblocks and whatever they could find to hold the doors open."[28]

Williams said he and his roof-bolting partner told foreman Bobby Baker about the air reversal. "He didn't say nothing," Williams said. "He just walked away. Me and the other bolt man told him, and he just – he said, 'Well, I'll figure it out.'" Williams said he took that to mean that Baker would check for open doors, but he never heard back from the foreman.[29]

When the crew quit cutting, somewhere in the neighborhood of 2:45 p.m., Williams said the dust was light, the air "foggy-looking." Crew members left about 2:55 p.m. with the air still going the wrong way.[30]

Scott Halstead, who had assumed responsibility for the longwall belt on March 1,[31] spent ten or 15 minutes at the face of the longwall on April 5, enough time to notice a fluctuation in the air.[32] "I mean, it'd pick up and it would die, then pick up and die," Halstead said. He assumed the air fluctuation was due to high water in the area going up toward the Bandytown fan because if the pumps in the top end of the longwall near the fan were not maintained, "it would cause the air to fluctuate" and "when they [management] had problems [with the air], that's where they'd run to."[33]

April 5 was a frustrating day for the longwall crew. One of purchasing agent (and sometimes dispatcher) Greg Clay's responsibilities was to receive longwall production reports every 30 minutes between 7:00 a.m. and 4:00 p.m. and forward them to UBB President Chris Blanchard, Vice President Jason Whitehead and Lisa Williams, executive secretary at Marfork Coal.[34] Lisa Williams then would send the information to Chris Adkins, Chief Operating Officer, and Don Blankenship, Chairman and Chief Executive Officer, at Massey Energy. At approximately 10:00 a.m. Clay received a call that production was down because a hinge pin on the ranging arm of the shearer had come loose.[35]

"They didn't run nothing that day hardly," Clay said. "They kept on having the same problem. What it was, they was going to change the hinge pin to another style on the midnight shift that night, so it was run and then it went down, then it come back up, then it went back down."[36]

The shearer is a large, complex piece of machinery used to cut coal from the face of the longwall. The

Upper Big Branch mine used a Joy 7LS shearer, which weighs in excess of 90 tons and costs in the neighborhood of $3.4 million. This type of longwall system is capable of producing 2,300 tons of coal an hour.[37] The shearer has a main body that houses electrical functions; units that move the cutting edge along the face; and pumping units to power hydraulic and water functions. Each end of the main body is fitted with a ranging arm that moves up and down and contains electrical motors, which transfer power through a series of gears to cutting drums mounted onto the arms.

Depending on the severity of the problem, repairs to a shearer can take hours. On the morning of April 5, the shearer had made two passes on the longwall when crew members reported that production was down because of problems with the "B-Loc" on one of the ranging arms. The "B-Loc" is a retainer for a hinge pin that holds the ranging arm in place.

Robert Hale, the third shift longwall maintenance supervisor, said he met the dayshift longwall crew coming into the mine at about 6:35 a.m. or 6:40 a.m. as he and his crew were exiting. The maintenance crew had returned to the mine on Easter Sunday evening. Their normal tasks included greasing the shearer, changing bits, checking oil on motors and drives, repairing anything that is damaged or broken. The goal is to have all the machinery serviced and ready for the day shift to begin production. On April 4, the task list for the hoot owl crew assigned to the longwall included adding flights to the face chain because some of them were worn and replacing a cowl blade on the shearer because the arm was broken. The crew had spent most of the night replacing the cowl blade, Hale said, but he added that the shearer was "up and running" when they left the mine.[38]

By Hale's estimates, the longwall should have started producing before 7:00 a.m. Hale said longwall superintendent Jack Roles later told him production was down for about three hours because of continuing problems with the ranging arm pin.[39]

Roles spoke to several people about the problems on the longwall that day. Bobby Goss, longwall specialist for Massey Coal Services, said Roles told him that he had been on the face during the day and that the wall was down most of the day.[40] David Shears, a utility man on the longwall, said Roles told him the same thing.[41]

Longwall chief electrician Danny Laverty said the wall "got started producing that morning,"[42]but he got a call from headgate operator Rex Mullins about 10:00 a.m. or 10:30 a.m. about the trouble with the hinge pin.[43] "Then they were down the biggest part of the day after that," he said.[44]

"I spoke to him at different times through the day, just asked him to give me some kind of update," Laverty said of Mullins. He said Mullins told him that the pin "was not wanting to line up, and that's really the only thing that I ever found out about it"[45] until the headgate operator called back sometime between 1:30 p.m. and 2:30 p.m. to tell him the longwall was running."[46]

Clay said Mullins called in a production report at 2:30 p.m., saying the crew was still having problems with the hinge pin and estimating it would be another ten minutes before they would be able to start up again. At 2:42 p.m., Mullins called out that production had resumed, Clay said.[47]

Maintenance foreman Thomas Sheets, who with Virgil Bowman, was wiring the new mother drive at Headgate 22, said he and Bowman exited the mine under the mother drive belt somewhere between 2:00 p.m. and 2:15 p.m. Sheets said he noted that production was down, because "it is our job to know if the belts are running or not."

"Somewhere between 2:00 and 2:15, the longwall belt was not running … I do know after, after the fact, that I was told that the longwall started at 2:30," Sheets said, referring to a conversation he had later that evening with purchasing agent Clay.[48]

Following the explosion, the shearer was found at the tail with four feet, four inches of travel remaining, suggesting that this is where it was at the time of the blast. The cowls on each drum were found flipped to the headgate side, indicating that the shearer was traveling toward the tail. The electrical breaker to the shearer, located at the headgate, was found "knocked," meaning that the power to the shearer had been manually disconnected. The removal of power in this manner can only be done by someone at the headgate. A person must both push in a button and pull a lever. The disconnect has a visible "off" position. The water to the longwall face also was turned off at the headgate.

Fireboss Michael Elswick, who had been employed at UBB only four days, was in the mine for the dayshift on April 5 because he had agreed to switch shifts with another miner, according to information provided to the Governor's Independent Investigation Panel. At 2:30 p.m., Elswick called his final safety report to Scott Halstead.[49] In it, he reported that conveyor belts needed to be cleaned and rock dusted.[50]

Elswick's daughter, Jami Cash, told *The Charleston Gazette* that Halstead later told her that her father had complained of a strange burning sensation in his eyes and told Halstead he couldn't see. "That's when

Scott Halstead said he was on his way in to get him," Cash told *The Gazette*.[51] In interviews with investigators, Halstead said he did not remember Elswick either reporting hazardous conditions or complaining of burning eyes.[52]

Brian "Hammer" Collins, the second shift foreman for Tailgate 22, arrived at the mine at about 2:15 p.m. and shortly thereafter took a pre-shift call from Steve Harrah. Harrah, the Tailgate 22 dayshift boss who was also known as "Head," liked to joke and give him a hard time, Collins said.[53]

"He called out. I said, 'Yeah, Head,'" Collins recalled. "He said, 'How are you doing, son?' I said, 'I'm doing all right.' I said, 'You ain't my daddy, though.' I never will forget that. He said, 'Anyway, son, here's what you got. He gave me the pre-shift. I think he was calling me from 78 Break switch. 'Well,' he said, 'I'm on my way out … I'll see you here shortly … and tell you what we got.'"[54]

At about 3:00 p.m., as dispatcher Adam Jenkins was directing traffic in and out of the mine, he received a call from James Woods from the Tailgate 22 crew. Woods, who was operating a mantrip at 78 break, asked for a road outside. Shortly thereafter, men from the UBB construction crew called, also asking for the road. Jenkins told them he had given the road to the man he called "Woodsey" and told the construction crew to call him from Ellis Switch.[55]

A couple of minutes later, "that's when it happened," Jenkins said. "All the dust started, just a white smoke started pouring out the portals, and it sounded like thunder. It was constant. And I didn't know what happened. And [mine superintendent] Gary May, he said, 'Oh, Lord … something bad's happened.' He said to get ahold of everybody and tell them to get outside now. And I hollered and hollered and hollered for over a half hour."[56]

After about 15 minutes, workers on the barrier section responded, and Jenkins told them to get out of the mine. "And the … construction crew, they never made it to the Ellis Switch. I guess the force in the mantrip, they had went back out the other side. They went out Ellis side instead of coming all the way up to our portal [the UBB portal]."[57]

The dispatcher continued to try to reach men inside the mine. "I was still hollering when [Massey Energy Chief Operating Officer] Chris Adkins showed up in his helicopter," Jenkins said. "When he come upstairs, I was still hollering on the phone. And I hollered and hollered and hollered just, you know, praying and hoping that somebody would answer me, and it never happened."[58]

1 Danny Ferrell testimony, p. 22
2 Gene Martin testimony, p. 57
3 Adam Jenkins testimony, p. 42
4 Adam Jenkins testimony, p. 43
5 David Farley testimony, p. 22
6 David Farley testimony, p. 24
7 David Farley testimony, p. 24
8 David Farley testimony, p. 25
9 MSHA 30 CFR 75.1714.7
10 Jason Stanley testimony, p. 55
11 David Farley testimony, p. 20
12 David Farley testimony, p. 22
13 Jason Stanley testimony, p. 85
14 Travis Nelson testimony, p. 41
15 Danny "Joe" Ferrell testimony, p. 29
16 David Farley testimony, p. 23
17 David Farley testimony, p. 23
18 David Farley testimony, p. 26
19 Jeremy Burghduff testimony, April 1, 2011, p. 21, p. 39
20 Jeremy Burghduff testimony, April 1, 2011, p. 75
21 Jeremy Burghduff testimony, September 2, 2010, p. 84
22 Michael Kiblinger testimony, p. 23
23 Michael Kiblinger testimony, p. 22, p. 80
24 Joshua Williams testimony, p. 17
25 Joshua Williams testimony, p. 18
26 Joshua Williams testimony, p. 21
27 Joshua Williams testimony, p. 59
28 Joshua Massey testimony, p. 21
29 Joshua Williams testimony, p. 71
30 Joshua Williams testimony, p. 63
31 Scott Halstead testimony, p. 25
32 Scott Halstead testimony, p. 45
33 Scott Halstead testimony, p. 60
34 Gregory Clay testimony, p. 21
35 Gregory Clay testimony, p. 24
36 Gregory Clay testimony, p. 27
37 Joy website, acquired February 10, 2011
38 Robert Hale testimony, p. 48
39 Robert Hale testimony, p. 46
40 Bobby Goss testimony, p. 23
41 David Shears testimony, p. 59
42 Danny Laverty testimony, p. 40
43 Danny Laverty testimony, p. 53
44 Danny Laverty testimony, p. 40
45 Danny Laverty testimony, p. 53
46 Danny Laverty testimony, p. 56
47 Gregory Clay testimony, p. 27
48 Thomas Sheets testimony, p. 33
49 Scott Halstead testimony, p. 25
50 Preshift examination of belt conveyors, phoned outside by Mike Elswick, received by Scott Halstead, April 5, 2010, 2:30 p.m.
51 Ward, Ken, Jr., and Harki, Gary A., "UBB fireboss reported burning eyes prior to blast, family says," *The Charleston Gazette*, Sept. 16, 2010
52 Scott Halstead testimony, p. 32
53 Brian Collins testimony, p. 68
54 Brian Collins testimony, p. 67
55 Adam Jenkins testimony, p. 43
56 Adam Jenkins testimony, p. 44
57 Adam Jenkins testimony, p. 44
58 Adam Jenkins testimony, p. 68

MEN AND MANAGEMENT:

Why miners wouldn't leave the longwall unless the situation was dire

The Upper Big Branch miners tolerated haphazard planning and poor engineering to produce coal. In addition, they had to deal with ineffective upper management on a daily basis. The miners understood the significant financial investment needed to operate a longwall. If the UBB miners wanted to keep their jobs they had to produce coal. Leaving the longwall face unattended was not an option unless it was quitting time or an emergency.

The physical evidence compiled and examined by investigators tells us that something dire happened on the longwall in the moments before the explosion. The shearer operators and two other victims (Joel Price, Gary Quarles, Christopher Bell and Dillard Persinger) were found about two-thirds of the way down the longwall face. These men must have seen something ominous and out of the ordinary.

The decision to either open a new longwall mine or install a longwall system in an existing mine is an expensive decision. The capital investment can be in the hundreds of millions of dollars for a new mine, or $40 to $50 million dollars for an existing mine. It is not uncommon for a large longwall system to be capable of producing thousands of tons per hour. Given today's pricing for metallurgical coal of $200 to $300 per ton, an operator is in a position to generate huge revenue.

The pressures to produce coal and control costs exist at all mines; however, the pressure is much more intense at longwall mines. The magnitude of the financial investment and the opportunity to achieve the highest levels of profitability increases the pressure on everyone employed at the mine. From the mine's top management to the red hat trainee, everyone knows that when the longwall is down, it costs the company money.

Longwall crews are generally comprised of workers who have been at the mine for a while and have several years of experience. It is not uncommon to find a promising young worker placed on the longwall crew to learn from the experienced men. Once crews are established, they often stay together for years. This is important to management because the crews develop a close relationship and an efficiency that leads to high production levels.

Miners who work at longwall mines know that the longwall is the heart of the operation. They take great pride in the number of passes they make on the longwall each shift, and a spirit of competiveness can be seen throughout the operation.

The longwall at Upper Big Branch had returned to the mine for the current panel after having been at the Logan's Fork Mine for about two years. The Tailgate 1 North section was originally supposed to be a room and pillar section; the coal blocks were not designed with a longwall in mind. Somewhere along the way, a decision was made to move the longwall from Logan's Fork and use it at UBB starting with Headgate 1 North. The Headgate 22 section would be developed for the next longwall panel and mining would progress from there. What wasn't anticipated were bad top and bad ribs, along with water in the headgate entries. This made the headgate side of the current longwall unavailable for use as the tailgate side of the next longwall. This forced UBB management to start up the Tailgate 22 section.

Everyone knew that the development of the next longwall panel was behind schedule. Management decided to prepare yet another area of the mine where they could move the longwall while the Tailgate 22 section was completed, but this, too, was behind schedule. When it was ready, it would be a very short panel so it would provide only a very brief home for the longwall.

The pressure was on at Upper Big Branch. Everyone knew it and felt it. Knowing that every pass taken on the longwall would bring it that much closer to finishing before it had a place to move to did not deter the efforts of the longwall crews. They work extra hard at trying to mine more coal and avoid such circumstances. Each crew and every member of a crew take great pride in doing their part in bringing success to the mine. They know that if the equipment is not running, coal is not being produced.

Longwall crews do not leave the face area unless it is quitting time or there is an emergency. The longwall face at Upper Big Branch was 1,000 feet wide with 176 shield bases for a miner to step over. Walking through this narrow space and having to duck in the low areas means a miner would have to have a good reason to leave the longwall face.

Our investigation tells us that these men witnessed something ominous and took steps to try to avert a disaster. Regrettably, they were not able to do so.

2 When the world came to an end

For those working outside an underground mine, the sound generated by a fan is part of the rhythm of daily life. "You hear the fan all day, and you kind of just get immune to it," explained Greg Clay, the purchasing agent who sometimes acted as a dispatcher at the Upper Big Branch Mine.[1]

At the time of the explosion, Upper Big Branch was ventilated by three large fans. The fan at the South Portal exhausted air from the south side of the mine. Air from the North Portal fan and the Ellis Portal was pulled toward the opposite end of UBB and out of the mine by the Bandytown fan.

On the afternoon of April 5, as Clay sat at his desk waiting for the 3:00 p.m. production report, he wasn't paying too much attention to the North Portal fan until he heard a loud noise, which he described as a "bam."[2]

Joshua Williams, a young miner who was on a mantrip exiting the mine, described the moment as "when the world came to an end."[3]

The sensation Williams and Clay described occurred deep inside the Upper Big Branch mine as a series of explosions tore through most of the working parts of the mine – blasts that occurred within milliseconds, in such rapid succession that they sounded like one explosion. When it was over, all the eyewitnesses – those who were working at the point of ignition and could testify with absolute certainty as to what transpired in the minutes just before and just after 3:00 p.m. on April 5, 2010 – lay dead. However, evidence left behind suggests the following conclusions can be drawn:

As the shearer operator cut into the sandstone top of the longwall, the friction created sparks. Sparking occurs frequently in underground mining, and the Upper Big Branch mine was no exception. Typically, when machinery cuts into coal, there is little sparking because the coal is soft. When shearer bits hit rock surrounding coal, sparks fly. On April 5, 2010, the sparks ignited a pocket of methane or natural gas that likely had risen from the floor or migrated from the gob – a previously mined area located behind the longwall – onto the longwall face where the shearer was cutting.

Although the shearer was equipped with water sprays that are designed to douse the flame at the point of ignition, later testing found that the sprays on the shearer were ineffective because some had been removed and some were clogged. The crew could do nothing to halt the propagation of the fireball as it ignited coal dust that had built up in the Tailgate 1 North area. As the flame propagated, it formed the shape of a wedge that grew to a massive slug that sped through the mine, up to the roof and down to the floor.

Shearer drum cutting out

The explosion reported in the media as a single event actually was a series of explosions created as the compressed air on the leading edge of the force caused the coal dust to become airborne. Thus, the explosion generated its own fuel with the air/dust mixture behaving like a line of gunpowder carrying the blast forward in multiple directions – toward the outside of the mine, deeper into the tailgate and along the longwall face toward Headgate 22, Tailgate 22 and 9 North.

The line of the explosion raced out of the tailgate and through crossover 21. While the main force was concentrated in the track entry, it also spread through the crosscuts to the left and right as it encountered fresh coal dust. Once it crossed the connector, it traveled down the longwall Headgate 2 North, up the 6 North belt entry and 7 North belt and on to Headgate 22, where it reached its strongest levels. When the force reached the end of the entry on Headgate 22, it reversed course and raced back out, obliterating everything in its path.[4]

If the ventilation system at UBB had been operating properly, lethal gases such as those that triggered the explosion would have been cleared away from the face. An effective ventilation system would have swept contaminated air away from working sections and into the return. It also would have exerted positive pressure on the gob to keep the gases away from the working face. At UBB, much of this air exited from the back of the mine, drawn by the pulling force of the Bandytown fan. Because the ventilation at UBB was disrupted over the Easter weekend when the "de-watering" pumps failed and allowed water to accumulate in the entries leading to the fan, the flow of air was impeded.

Evidence revealed[5] that shortly before the initial explosion, the longwall crew had moved away from the shearer. This unanticipated movement suggests that a member or members of the crew had spotted trouble. In all likelihood, crew members observed the ball of flame at the shearer moving to the tailgate entry, and one of them called out to the shearer operator in the headgate entry (the entry at the longwall face), alerting him to problems. The longwall shearer manual disconnect stop button, located at the longwall headgate, was depressed, cutting power to the longwall at 2:59:38 p.m.[6]

The Governor's Independent Investigation Panel finds significant the fact that the headgate operator de-energized the longwall through a two-step process and shut off the water to the longwall. This shutdown is standard industry procedure when potentially serious problems occur on a longwall, and it is something that had to be done manually.[7]

On the surface, Greg Clay, purchasing agent and dispatcher, jumped from his chair and looked out the window. He could see rock dust and debris blowing out of the portals and said "it just sounded like jet engines."[8]

"The air was just gushing out of the portals. And then you could hear the fan just making a … real dull sound," he said. Clay said the sound continued for three and a half or four minutes. "Then it just went back to its normal sound. And the air quit coming out," he said.[9]

Dispatcher Adam Jenkins recalled "a white smoke started pouring out the portals, and it sounded like thunder. It was constant."[10]

RULED OUT: *Earthquakes, thunderstorms and barometric pressure*

At the time of the April 5, 2010, explosion, rumors circulated that earthquakes, thunderstorms and/or other severe weather triggered the blast. After examining information acquired from scientists, the Governor's Independent Investigation Panel has ruled out any connection between the explosion and either weather events or earthquakes.

The two concerns raised in reference to the thunderstorms that occurred in the area were lightning and barometric pressure.

Lightning: Lightning strikes are tracked by an independent company, Vaisala. The National Oceanic and Atmospheric Administration relies upon their reports. The GIIP obtained Vaisala's report for April 5, 2010, which included information from 6:00 a.m. on April 5 to 6:00 a.m. on April 6. The report was issued for the Performance Coal Company location, using their specific latitude and longitude and using a search radius of 10 miles. According to the report, 293 lightning strikes were detected for the given time period and location; however, these strikes occurred either in the morning of April 5 or in the evening following the explosion.

The latest morning lightning strike on April 5 occurred at 10:09:42 a.m., some five hours prior to the explosion. No lightning strikes were recorded at or near 3:02 p.m., the approximate time of the explosion. Therefore, because there were no lightning strikes at or near the time of the explosion, it can be concluded that lightning did not have an effect on the Upper Big Branch mine explosion that occurred on April 5.

Barometric pressure: The GIIP obtained information from the National Weather Service regarding the barometric pressure for April 5, 2010. Large and significant movement or changes in the barometric pressure have been linked to explosions in coal mines because significant drops of pressure can cause a spike in the amount of methane gas (CH4) liberated in a mine. At 11:00 a.m., the barometric pressure was 30.23. inches; at noon, 20.22; 1:00 p.m., 30.19; 2:00 p.m., 30.18; 3:00 p.m., 30.18, and 4:00 p.m., 30.16. The fact that the pressure dropped in slight increments, as the day progressed and the air heated up, is indicative of normal barometric pressure, and as such, can be ruled out as a contributing factor or a cause of the UBB explosion.

Earthquakes

In order to obtain more information concerning an earthquake that occurred in the area on April 4, 2010, the investigation team contacted several individuals with the U.S. Geological Survey. Bruce Presgrave, the supervisory geophysicist with the U.S. Geological Survey and National Earthquake Information Center, said an earthquake of magnitude 3.4 occurred 100 km away from the UBB coal mine. According to Presgrave, the earthquake was too small, it occurred too long before the explosion and was too far away in distance from UBB to have caused the explosion. He said, "My answer might have been different if 1) the explosion had happened shortly (within minutes, not a day) after the quake, and 2) if the quake had been felt strongly at the mine or in nearby towns." Presgrave said that neither of these conditions was met.

Mike Kiblinger, outside (or outby) construction foreman, stood ten feet from the drift mouth at the Ellis punchout. "I could see it coming out," he said, describing a brown dust that blew out of the mine.[11] "It was blowing crib blocks out and just a real strong wind, like a hurricane. And a couple people blew out of the mines. You know, they were walking in just a little ways, and they got blew back out."[12]

Kiblinger was pretty sure what the problem was. "I thought it was an explosion," he said.[13]

Mine Superintendent Everett Hager was also standing near the mouth of the Ellis portal. He was overheard saying. "What the hell have they done now?' Some miners believe the "they" Hager was referring to were UBB President Chris Blanchard, Vice President Jason Whitehead and Mine Manager Wayne Persinger.[14]

Roof bolter Tim Blake and his fellow crew members left the Tailgate 22 section at approximately 2:40 p.m.[15] and were exiting the mine in a mantrip driven by James Woods. Blake sat in the right side in the front of the ride with Jason Atkins next to him and Carl Acord and Steve Harrah on the other side. On the back of the mantrip, Benny Willingham and Deward Scott were on one side; Robert Clark and William Lynch were on the other.[16]

Blake and Woods survived the explosion, although, with Woods sustaining life-threatening and in all likelihood life-altering injuries, Blake was the only one left to tell the story of what happened to the Tailgate 22 crew on April 5. As Woods called out for the road from 78 Break, it still seemed like just another day at the mines. Blake said he didn't hear the call-out but was later told Woods called for the road at 2:58 p.m.[17] The crew reached 66 break, when "everything just went black. It was like sitting in the middle of a hurricane, things flying, hitting you and stuff like that."[18] He said it wasn't a gradual storm that built but a force that "just hit us all at once."[19]

It all just took between one and three minutes, Blake said. "The boss's methane detector, it went off. We was hollering – some of them was hollering, 'Stop the trip' and … my buddy beside of me said, 'Let's don our rescuers.' And that's what I done. I held my breath, put my rescuer on. And then it was just – nothing but just pure silence and stuff still flying by."[20]

Shuttle car operator Roger Toney, who with his crew spent the day working on the construction project near the Ellis portal, was on his way out of the mine when he felt such intense pressure in his ears "that I thought they were about to bust."[21]

"And instantly, you couldn't see anything. It just – dust just blew overtop of us," Toney said. "And there was a lot of debris in the dust. And even though I had my safety glasses on, dust just blew all in my eyes and … it got hard to breathe I guess because of all the dust."[22]

Toney said the power went off on the mantrip. As it came to a stop, "everybody kind of ducked down in the seat because there was a lot of debris flying over the mantrip," he said. "There's signs all through the mines, and it sounded like every one of them came overtop of our mantrip. And we could hear – I couldn't see anything, but I could hear big stuff hitting the mantrip… it sounded like cinderblocks and crib blocks and rocks…"[23]

"It was throwing blocks, foam," Williams said. "That's when I laid down on the mantrip and threw my jacket over my head and was starting to get my rescuer out because I didn't know what in the world was going on."[24]

Section foreman Bobby Baker's gas detector went off, and Baker told the crew to get their rescuers ready because they were in high carbon monoxide, Toney said, adding that his understanding was that the detector showed 100 parts per million carbon monoxide and 19 percent oxygen.[25] "So I popped mine open and put it on, but I didn't activate it," he said. "I held it close to my mouth, and I had my finger on the activation tag in case I needed it. As I was breathing, I kept thinking, if I get to where I can't draw a breath, then I'll pop it and put it in."[26]

Joshua Williams, who was on the same mantrip, said his ears popped and he couldn't hear anything. "And then that's when we hit air. We just started pushing our mantrip back," he said. "It blew our mantrip … probably about five breaks … but the guy got it turned around and started back to Ellis."[27]

Toney said driver Jeremy Reed wrecked the mantrip in a curve that had two switches. "And I'm thinking, oh, my gosh, we're not going to get out of here," he said. "Well, the guy driving backs up, walks over the frog[28] and gets back on the track. We go through the switch and he wrecks again. At this time a couple of guys jumped out and walked past the mantrip toward the outside. Well, he backs up over the frog, gets back on the track and the third time he gets through."[29]

After what Toney estimated to be about 30 seconds "of an intense air coming through there, the power was restored"[30] and the mantrip moved slowly toward Ellis Portal. Reed made it to a break or two from the outside, where he stopped behind two mantrips in front of him.[31]

Brent Racer, who operated a shuttle car for the second shift on Headgate 22, was just entering the mine.

Racer and his crew had walked about three breaks underground and boarded a mantrip, where he sat down beside fellow buggyman Greg Crouse. The second shift longwall crew was in a mantrip in front of them.[32]

"We were waiting on the boss and the electrician," Crouse said. "They were a little late getting to the mantrip. I guess that probably saved us a little."[33]

Racer didn't think much about it when the power went out. "That stuff happens all the time. Power goes out all the time. Breaker knocks." He wasn't too concerned because he could hear the belt running.[34]

But then Racer felt the air. "And it felt like sand picking up, you know, like at the beach, pinging you in the face when it starts blowing real hard. And you couldn't hear the belt, and all of a sudden you heard this big roar, and that's just when the air picked up. I'd say it was probably 60-some miles per hour. Instantly black. It took my hardhat and ripped it off my head, it was so powerful."[35]

Crouse said, "Me and Racer decided we better get out of there, so we got up. We couldn't see. Everybody else had already gone and gotten out. We couldn't see, so we just turned backwards, you know, turned to where we knew where the portal was and just started feeling [along the rib] our way back toward the portal."[36]

"All I could hear was Greg telling me, '… get up. You got to go. We got to get out,'" Racer said. "Well, I didn't know where out was. My hardhat was off and my light was dangling. I couldn't see nothing. I could feel him holding onto me and he's like, come on. So we got out."

"It broke my hardhat and took it and slung it up against the mantrip when I tried to put it back on. And it cracked it," Racer said.[37] He and Crouse were among the last men to come out of the mine alive, exiting with the second shift longwall crew.[38]

Safe on the outside, Racer watched as crib blocks and other materials blew out of the mine and he noted "a lot of black dust, you know, everywhere."

As the men stood outside the portal stunned and shaken, someone suggested that there had been a roof fall, Racer said. He said veteran miner Stanley "Goose" Stewart dismissed that idea, saying, "Boys, I'll tell you what. I've been in the mines a long time ... I don't think that's no fall … a fall is an instant … that lasted a couple of minutes."[39]

Stewart, who also had been entering the mine, said someone asked him, "What do you think it was, Goose?" To which Stewart replied, "The place blew up."[40]

"So then we started thinking for the worst," Racer said, "and all of them haunting noises of the phones, the COs [alarms] going off, the belt bosses, all that stuff, all them beeping noises and stuff and no one answering the phones."[41]

Racer said he sat at the phone to listen for an answer from inside the mine. "They couldn't get ahold of Deano [Dean Jones, foreman on Headgate 22], nobody on the crew … it's like dead silence. No one was answering."[42]

1 Gregory Clay testimony, p. 32

2 Gregory Clay testimony, p. 31

3 Joshua Williams testimony, p. 50

4 The information provided is based on alcohol/coke testing of residue left behind after the explosion and observation by members of the Governor's Independent Investigation Panel.

5 Location of bodies at shield no. 105

6 JNA computer on the Joy longwall equipment

7 During a post-explosion assessment by investigators of the longwall, a fire hose was observed lying in the stage loader conveyor area and stretching across part of the coal face; additional pieces of hose were found in a several places along the face. It could not be determined whether the hose was stretched out by the crew or blown there by the force of the explosion.

8 Gregory Clay testimony, p. 31

9 Gregory Clay testimony, p. 32

10 Adam Jenkins testimony, p. 44

11 Michael Kiblinger testimony, p. 84

12 Michael Kiblinger testimony, p. 24

13 Michael Kiblinger testimony, p. 92

14 Investigators were unable to confirm with Everett Hager this event. Through his attorney, Hager invoked his Fifth Amendment right and declined to be interviewed by investigators. (See appendix for list of individuals who also invoke their Fifth Amendment right.)

15 Timothy Blake testimony, p. 40

16 Timothy Blake testimony, p. 47

17 Timothy Blake testimony, p. 49

18 Timothy Blake testimony, p. 40

19 Timothy Blake testimony, p. 40

20 Timothy Blake testimony, p. 41

21 Roger Toney testimony, p. 40

22 Roger Toney testimony, p. 41

23 Roger Toney testimony, p. 41

24 Joshua Williams testimony, p. 51

25 Both state and federal regulations require that mine air contain no less than 19.5% oxygen.

26 Roger Toney testimony, p. 44

27 Joshua Williams testimony, p. 51

28 "Frog" is a slang term for a section of rail that is part of a track switch and works as a divider that helps a vehicle go in the direction that the track switch is thrown. "Frogs" can become worn and frequently cause vehicles to jump the track.

29 Roger Toney testimony, p. 46

30 Roger Toney testimony, p. 43

31 Joshua Williams testimony, p. 52

32 Brent Racer testimony, p. 98

33 Gregory Crouse testimony, p. 87

34 Brent Racer testimony, p. 99

35 Brent Racer testimony, p. 99

36 Gregory Crouse testimony, p. 85

37 Brent Racer testimony, p. 100

38 Brent Racer testimony, p. 101

39 Brent Racer testimony, p. 101

40 Stanley Stewart testimony, June 5, 2010, p. 201

41 Brent Racer testimony, p. 101

42 Brent Racer testimony, p. 102

3 The aftermath of a disaster

As Tim Blake put on his rescuer and wiped the dust from his cap light, he could see only as far as his hand in front of him. Debris was still flying about him, and he heard a terrible sound. "It was my buddy beside of me, the 23-year-old boy," he said. "He couldn't get his rescuer on. There was still stuff, you know, coming by, and I reached over and shook my buddy, tried to get him awake. No … nothing."[1]

Blake grabbed the young miner, Jason Atkins, and pulled him from the mantrip, lay him down, took his rescuer off and put it back on, "trying to do something." He then turned to James Woods, who was lying out of the trip. "I done his rescuer the same way, donned his rescuer. Then I went to the next man [Deward Scott]. I couldn't find his rescuer because he carried it on a belt. He just laid it up on the mantrip, and it blew away when all this happened. I couldn't find his."[2]

Benny Willingham was still in the mantrip. "I worked with him a few minutes, put his rescuer on him, tried to give him some chance, you know. Then I went to the next man, which was Robert Clark. Done the same thing for him, put his rescuer on him, worked with him a minute or two. Went to Bill [Lynch], and he was laying face down. I had to grab him and jerk him up and pull him over, put his rescuer on him. All of these guys, you know, I was feeling for pulse. They all had pulse, you know, so they was still alive."[3]

Blake found Carl Acord positioned half in and half out of the mantrip. Describing his efforts to assist Acord, who despite his nickname of PeeWee was a large man, Blake said, "I had to manhandle him, get him down, lay him flat down. I put his rescuer on him. I went to the next man, which was the boss [Steve Harrah], and he was laying face down," Blake continued. "I had to roll him over, put his rescuer on him." By that time, Blake said even though he was wearing a rescuer, "I was fighting to breathe myself."[4]

As the air cleared a bit, Blake was able to see his watch. It was about three minutes to four. He knew his own rescuer, which contained an hour of air, was ready to expire. "So I went around to each man again, felt for a pulse. Everybody had a pulse but one man. I couldn't find no pulse on him. That's the man I couldn't find a rescuer."

After doing what he could for his fellow crew members, Blake then had to leave them. "That was the hardest thing I ever done," he said.[5]

Blake had walked about 1,000 to 2,000 feet[6] when help arrived. "I don't know how many breaks I walked. I'd walked I'd say at least ten to 20 breaks, saw a mantrip coming, so I just sat down on a timber," he said. "I heard somebody holler, 'There's a man walking,' and so I sat there and waited on them."[7]

The men who found Tim Blake were Performance Coal Company President Chris Blanchard and

Above, the mantrip in which the Tailgate 22 crew was riding; below, the remains of a cinderblock wall gives an indication of the force of the explosion.

Causes of Death

The bodies of the 29 victims of the Upper Big Branch Mine explosion were found in six different locations throughout the mine. By combining the results of autopsies performed by the West Virginia Medical Examiner[1] with information about where the victims were found, we could determine the following:

• Seven victims in a mantrip at 78 break, heading out of the mine perished as a result of carbon monoxide intoxication. Two men on this mantrip survived the explosion.

• One victim, whose body was located near the 6 North Belt, died as a result of injuries suffered in the explosion.

• Four victims found on Headgate 2 North outside the longwall panel, were victims of carbon monoxide intoxication. Contributory blast injuries were also present on these victims.

• Eight victims were located in the longwall area. Three died as a result of carbon monoxide poisoning, with contributory injuries caused by the blast. Five victims died from injuries sustained in the explosion, with two of the five also having contributory carbon monoxide intoxication.

• Six victims were found on a mantrip in the Headgate 22 area of the mine. Five of the six were victims of carbon monoxide intoxication. The sixth died as a result of injuries suffered in the explosion, with contributory carbon monoxide intoxication.

• Three victims were located on Headgate 22, away from the mantrip and inby the section. Their deaths were attributed to injuries sustained in the blast.

Of the 29 men killed, 19 died as result of carbon monoxide intoxication, and the remaining ten died as a result of injuries suffered in the explosion.

1 The West Virginia Department of Health and Human Services, Medical Examiner.

other UBB management officials who had rushed into the mine shortly after the air slowed and the dust stopped blowing out of the mine's portals. Blake took off his rescuer. "Of course, it was so hot you couldn't touch it," he said.[8] "And they asked me what happened. I told them the story."[9]

Blanchard had been at his Marfork office when he received a call from Greg Clay shortly after 3:00 p.m. telling him about what had occurred at UBB. Over the next several minutes, Blanchard readied a group of Performance officials to go underground. This group, which included Vice President of Operations Jason Whitehead, Longwall Coordinator Jack Roles, Mine Superintendent Everett Hager, Section Foreman Patrick Hilbert and Mine Manager Wayne Persinger loaded onto a mantrip and entered the mine through the Ellis Portal sometime between 3:20 and 3:25 p.m.

Before entering the mine, Blanchard apparently recalled that state and federal law requires quick notification of regulatory agencies in the event of an accident. He called Jonah Bowles, director of safety at Massey's Marfork Coal, and directed him to call MSHA and the state Office of Miners' Health, Safety and Training.

Bowles called MSHA's hotline at 3:30 p.m. and reported a "hazardous inundation of carbon monoxide gas" had occurred at 3:27 p.m.[10] By this time, it can be reasonably surmised that officials on site at UBB knew that they had a situation more serious than had been reported. The hotline notified MSHA's Mt. Hope office at 3:42 p.m.

Bowles's call to the West Virginia Mine and Industry Accident hotline (Homeland Security) came in at 3:39 p.m. When asked the time of the incident, Bowles replied, "It was reported at 3:27." He said with certainty "it is an air reversal on the beltlines" and reported "CO 50 to 100 PPM." Asked if there were any injuries, he responded, "No, the mines is being evacuated at this time."[11]

Blanchard apparently did not call his boss, Massey Chief Operating Officer Chris Adkins, who was at the Massey Energy office in Julian. Bowles said Adkins called him a short time later to ask what was going on at UBB.[12] Clay said he did not know how Adkins or Massey CEO Don Blankenship were made aware of the situation.

Shortly after Blanchard's group entered the Ellis Portal, Mine Superintendent Gary May ran into the mine on foot through the UBB portal. Dispatcher Adam Jenkins placed the time at approximately 3:30 p.m.[13]

Safety Director James Walker, who had been in the upstairs office at UBB when the explosion occurred, said he, like Greg Clay, knew something was wrong

when he heard a change in the sound of the fan. He looked at the fan and it was "bogging down like it was going into a stall air reversal." Walker then saw dust or smoke coming out of the track entry.[14]

Acting on instinct, Walker said he quickly put his gear back on and started underground with Gary May. At that point he realized he didn't have his gas detector and went back to get it. By the time Walker returned, May had already entered the mine. Walker, with Safety Director Berman Cornett, traveled into the mine on foot. Once inside, they boarded a mantrip driven by Mine Foreman Rick Foster.[15] Jenkins estimated this group entered the mine some 12 to 15 minutes after May.[16] They caught up with May, who was still alone, at Ellis Switch.[17]

During this time Chris Adkins arrived at Upper Big Branch by helicopter, accompanied by Elizabeth Chamberlin, Massey's vice president for safety. The two went to the office which would serve as a command center, and Adkins took over telephone communications with those officials who were underground.

At approximately 3:30 p.m., members of Massey's Southern West Virginia Mine Rescue Team returned to the Performance Coal Company safety training office after spending the day at another Massey operation, the Parker Peerless mine in Raleigh County. Mark Bolen, a member of the team, said his supervisor, Rob Asbury, alerted him "there had been an event at UBB." They got the team trailer and van ready and went immediately to the Ellis Portal.[18]

Team member Jim Aurednik, who was on vacation at his home in Beckley, received a call from Asbury telling him to report to the mine as quickly as possible. "I didn't even know there was an explosion at the time I received the call," Aurednik said.[19]

When he arrived at the mine at approximately 4:00 p.m., Aurednik said there were no ambulances on site, and he, Asbury and Bolen were the only trained mine rescue personnel on the scene. Bolen had prepped their mine rescue apparatus so that Asbury and Aurednik were able to proceed underground sometime after 4:00 p.m.[20]

Foreman Pat Hilbert, who was driving the mantrip with Blanchard's crew, said they had to stop at the first overcast to remove block from the track. "We didn't know what we had, so we was just trying to be careful and watch exactly everything as we went," he said.[21]

They cleared the block from the track and proceeded slowly to Ellis Switch, occasionally stopping to remove block or debris from the track. "At 42 Break we seen a single light walking towards us, " Hilbert said. It was Tim Blake, who had walked from where he left his crew.[22]

"Chris Blanchard then asked Timmy what was going on, what has happened, you know, what have we got, and that's when I first learned that we had an explosion," Hilbert said.[23]

Blanchard's crew reached Blake somewhere between 4:00 p.m. and 4:05 p.m.[24] "He sat down in front of the mantrip, and he told us that his whole crew was down about 20 breaks away," Hilbert said. "He said that he stayed with them as long as he could, put rescuers on them and tried to keep them breathing until he knew he had to get some help. He said he tried to call on the radio. He pushed the button on the tracking device to try to get help, and nobody ever came. He said he was with them about 45 minutes."[25]

Since Hilbert was an EMT, Blanchard left him with Blake while the rest of the team went on foot to find the other members of the Tailgate 22 crew.[26] "So I'm sitting there with Timmy, and Timmy said, 'That's all my friends,'" Hilbert recalled. "I said, 'I know, Timmy, mine, too.' He said, 'What can we do?' I said, 'Timmy, all we can do is pray.'"

The two men paused in the darkness of the mine and said a prayer for their fallen friends and co-workers.[27]

About ten minutes later, UBB longwall coordinator Jack Roles ran back and told Hilbert the crew needed the mantrip and that he, Roles, would stay with Blake. As Hilbert drove the mantrip to between 66 and 67 Break on Five North belt, he started seeing lights. He also saw a flash from Harrah's gas detector and looked down at his own. The air was clear.[28]

"Everything was good, so I kept going," he said. "And then I pulled into just all of them laying there beside the track. And the next thing I know we was loading them up and taking them out. And it took probably three or four minutes to load them up."[29]

Hilbert and the others placed the men, some dead, some still responsive, into two mantrips – the one Hilbert had driven into the mine and the one the stricken miners had been riding as they exited the mine.

"We put four in a mantrip with me," Hilbert said, "which was the boss, Steve Harrah; James Woods, the electrician; Bill Lynch and Carl Acord … and they told me to go on. Wayne Persinger got in with me and was working with Woodsey because he was still responsive."[30]

Hilbert began to exit the mine at approximately 4:30 p.m. and continued two or three breaks when he

saw Gary May and Berman Cornett walking toward him. Persinger told Hilbert to stop and let Cornett get in to help Lynch and Gary May to help Harrah, who was still responsive.

"I could hear Wayne working with Woodsey," he said. "I could hear Gary May talking to … Steve. But, then all of a sudden, I hear something strange. I thought I heard Steve moan. I turned around and that's when I guess we lost him because Gary May started CPR on him then."[31]

In the meantime, the crew on a second mantrip spotted Jack Roles and Tim Blake at 47 Break. James Walker said Blake was "kind of hysterical" and "covered with soot." Blake told them the explosion "felt like a force of air."[32]

Walker estimates that it was sometime after 4:00 p.m. that he heard someone shout, "Get on the mantrip, we've got to get out of here." Blake, Roles and Walker boarded this mantrip, driven by Foster.[33]

The second mantrip "pulled out right behind us," said Hilbert, whose mantrip reached the surface before 5:00 p.m.[34]

Everett Hager, driving the mantrip in which the Tailgate 22 crew members were riding when they were stricken, exited the mine behind Hilbert. Hager's mantrip transported Jason Atkins, Benny Willingham, Robert Clark and Deward Scott.[35]

Hilbert said he thought there was only one ambulance crew at the scene at that time.[36] Jim Hodges, chief of the Whitesville Fire and Emergency Rescue Services Department, said his department was not notified until 4:22 p.m. An ambulance was immediately dispatched to UBB, arriving at the mine at 4:30 p.m.[37] When the mantrip in which James Woods was riding arrived on the surface, Woods was immediately loaded into the ambulance. Blake also opted to go to the hospital to be evaluated.[38]

Asbury, and Aurednik, had started underground with their rescue gear at about 4:00 p.m., but backed out of the mine when they saw headlights of the exiting mantrips. They helped remove the miners from the mantrip driven by Foster and began administering CPR to some of them.[39]

Greg Clay said Blanchard and the other officials who entered the mine were headed to the longwall. "When they walked up on the mantrip where the guys – where the deceased was, they called out and that's whenever they told me to call for ambulances," Clay recalled. "Rick Foster had called out and said there's bodies everywhere."[40]

A scoop located on the Headgate 22 section after the April 5 explosion

Clay believes that as the stricken miners were brought to the surface, Blanchard and Whitehead went deeper into the mine, making it as far as the longwall. "They didn't go to the miners sections," Clay said. "They was up on the longwall."[41]

Clay said that Blanchard and his crew "found more bodies, and they was experiencing some gas" and "that's when Chris Adkins told them, he said, 'Come on out, don't be a hero, come on outside.'"[42]

After they did what they could do to help victims on the surface, Asbury and Aurednik, along with Bolen, put their mine rescue equipment back on a mantrip and once more proceeded underground. By this time they had learned that Chris Blanchard and Jason Whitehead were in the mine. "We knew that these two gentlemen, under the influence of adrenaline … might not realize the danger they were putting their self in without apparatus, so we were looking for them," Bolen said.[43]

When the three trained mine rescue team members reached the 78 break, they saw Blanchard and Whitehead traveling toward them. Blanchard and Whitehead reporting seeing "a lot of CO when they went up the tail side [of the longwall] and that they had seen a couple of victims on the longwall track," Aurednik said.[44]

Bolen reported to Chris Adkins that Blanchard and Whitehead were okay. The command center notes place this report at about 8:00 p.m., near the time that other mine rescue personnel had begun to assemble at the fresh air base at 78 break.

Blanchard and Whitehead, who were not trained mine rescuers, were underground unsupervised for about four hours following the explosion. They re-

A continuous miner inside the Upper Big Branch mine after the April 5 explosion

mained underground with the mine rescue teams until rescue operations were halted at about 12:45 a.m. because of dangerous conditions in the mine. All personnel involved in the rescue exited the mine by about 2:30 a.m.

Massey later issued a statement asserting that Blanchard and Whitehead "risked their lives to save fellow coal miners, including one of the injured coal miners who survived the explosion with their assistance. These rescue efforts were their one and only objective."[45]

Mark Moreland, an attorney who represents families of two of the miners killed in the disaster, took exception with the Massey response, charging in a letter to MSHA that the actions by Blanchard and Whitehead "impugned the credibility of physical evidence."[46]

After his own dramatic exit from the mine, Brent Racer stood outside the portal. Since he was an EMT, Racer felt he should stay to see if he could offer assistance to those being brought out of the mine.[47] As they arrived outside, Racer began administering CPR and hooked up oxygen bottles.[48]

"Some more paramedics arrived and then that's when they – the one guy kept coming around and he would declare them if they were dead or not, which almost every single one of them that they brought out was dead," Racer recalled. "It's still hard to look at that picture in the back of my head ... Some things still remind me of it when I'm underground now."[49]

Hilbert said seven victims were pronounced dead at the scene and "we moved them over and covered them up."[50]

1 Timothy Blake testimony, p. 42

2 Timothy Blake testimony, p. 42

3 Timothy Blake testimony, p. 42

4 Timothy Blake testimony, p. 43

5 Timothy Blake testimony, p. 44

6 Times are estimates based on investigators' travel.

7 Timothy Blake testimony, p. 44

8 The SCSR generates a chemical reaction to produce oxygen and heat is a byproduct.

9 Timothy Blake testimony, p. 44

10 MSHA escalation report #1-73921756

11 WV Mine Industrial Rapid Response Line, audio recording, April 5, 2010

12 Jonah Bowles testimony, p. 37

13 Adam Jenkins testimony, p. 61

14 James Walker testimony, p. 56

15 James Walker testimony, p. 58

16 Adam Jenkins testimony, p. 48

17 James Walker testimony, p. 59

18 Mark Bolen testimony, p. 17

19 Jim Aurednik testimony, p 22

20 Jim Aurednik testimony, p. 24

21 Patrick Hilbert testimony, p. 60

22 Patrick Hilbert testimony, p. 60

23 Patrick Hilbert testimony, p. 61

24 Times are estimates based on witness testimony and investigators' travel.

25 Patrick Hilbert testimony, p. 61

26 Patrick Hilbert testimony, p. 61

27 Patrick Hilbert testimony, p. 62

28 Patrick Hilbert testimony, p. 62

29 Patrick Hilbert testimony, p. 63

30 Patrick Hilbert testimony, p. 63

31 Patrick Hilbert testimony, p. 63

32 James Walker testimony, p. 60

33 James Walker testimony, p. 62

34 Times are estimates based on memory of witnesses and investigators' travel time.

35 Patrick Hilbert testimony, p. 109

36 Patrick Hilbert testimony, p. 64

37 Personal communication with Jim Hodges, Whitesville Fire and Rescue

38 Patrick Hilbert testimony, p. 64

39 Jim Aurednik testimony, p. 24

40 Gregory Clay testimony, p. 50

41 Gregory Clay testimony, p. 54

42 Gregory Clay testimony, p. 53

43 Mark Bolen testimony, p. 20

44 Jim Aurednik testimony, p. 31

45 National Public Radio, "Massey Energy's Entire Response to NPR's Inquiry," September 2, 2010

46 Ward, Ken, Jr., "Massey's access to mine after blast questioned," *The Charleston Gazette*, Sept. 3, 2010

47 Brent Racer testimony, p. 102

48 Brent Racer testimony, p. 103

49 Brent Racer testimony, p. 103

50 Patrick Hilbert testimony, p. 67

Coal Workers' Pneumoconiosis and the UBB miners

Coal workers' pneumoconiosis (CWP), also called black lung disease, develops when respirable coal mine dust is inhaled and deposits in the lungs. It is a chronic, fibrotic, and irreversible disease that robs miners of their breath and life. CWP is wholly preventable with diligent use of dust control measures including proper ventilation, water sprays and dust collectors.

Autopsies of the 29 men who lost their lives in the Upper Big Branch explosion were performed by the West Virginia Medical Examiner.[1] Lung examinations, necessary to determine the presence or absence of CWP is a specialized review, requiring physicians with expertise, additional training and practice. At our request a recognized expert in occupational diseases and with experience in lung examinations of this sort reviewed the autopsy reports and determined the presence or absence of CWP.[2]

Of the 29 victims, five did not have sufficient lung tissue available to make a determination relating to CWP: two due to massive injury and three due to autolysis.[3] The remaining 24 victims had sufficient tissue for examination.

Seventeen of the 24 victims' autopsies (or 71 percent) had CWP. This compares with the national prevalence rate for CWP among active underground miners in the U.S. is 3.2 percent, and the rate in West Virginia is 7.6 percent.[4] The ages of the UBB victims with CWP ranged from 25 to 61 years.

Of the seven not identified as having CWP, four had what was characterized as "anthracosis" on their autopsy report. This term is often used in lieu of the term pneumoconiosis, or may refer to a black pigment deposition without the fibrosis and other characteristics needed to make a firm diagnosis of pneumoconiosis. Consequently, it is possible that upon further expert review, these four miners could have had pneumoconiosis. Three of the 24 victims had no pneumoconiosis or anthracosis noted.

Of the 17 UBB victims with CWP, five of them had less than 10 years of experience as coal miners, while nine had more than 30 years of mining experience. At least four of the 17 worked almost exclusively at UBB. All but one of the 17 victims with CWP began working in the mines after the 2.0 milligram coal mine dust limit was put in affect in 1973. This was an exposure limit that was believed at the time sufficient to prevent black lung disease. It has since been determined ineffective to protecting miners' health.[5]

The victims at UBB constitute a random sample of miners. The fact that 71 percent of them show evidence of CWP is an alarming finding given the ages and work history of these men.

1 The West Virginia Department of Health and Human Services, Medical Examiner.

2 Robert Cohen, MD, F.C.C.P., Director Pulmonary and Critical Care Medicine, Cook County Health and Hospitals System; Chairman, Division of Pulmonary Medicine/Critical Care, Stroger Hospital of Cook County, Chicago, Illinois, conducted a confidential review of the UBB victims' autopsies.

3 The destruction of cells through the action of its own enzymes.

4 National Institute for Occupational Safety and Health, US Centers for Disease Control and Prevention. Table 2-12. CWXSP: Number and percentage of examined employees at underground coal mines with CWP (ILO category 1/0+) by tenure, 1970-2006. *The Work-Related Lung Disease Surveillance Report, 2007.* Publication No. 2008-143, September 2008; *Morbidity and Mortality Weekly Report (MMWR).* Pneumoconiosis Prevalence Among Working Coal Miners Examined in Federal Chest Radiograph Surveillance Programs: United States, 1996—2002. April 18, 2003, 52(15); 336-340.

5 National Institute for Occupational Safety and Health, US Centers for Disease Control and Prevention. *Criteria for a Recommended Standard: Occupational Exposure to Respirable Coal Mine Dust,* September 1995; US Department of Labor, Mine Safety and Health Administration. Proposed rule on lowering miners' exposure to respirable coal mine dust including continuous personal dust monitors, 75 *Federal Register* 64412, October 19, 2010.

4 Confusion in the Command Center

Early on the morning of April 5, 2010, Wayne Wingrove, an underground inspector with the West Virginia Office of Miners' Health Safety and Training (WVMHST), began a general quarterly inspection of the Upper Big Branch mine. He had just been assigned to UBB at the beginning of April.

Wingrove left UBB property at about 2:00 p.m. and arrived at his home approximately an hour later. At 3:39 p.m., Jonah Bowles made his calls to the West Virginia Mine Industrial Rapid Response line.[1]

At 4:23 p.m., the Response line received a call from an operator with Raleigh County 911 who reported receiving a call at 4:22 p.m. The operator said, "We do have a mine accident. We have ten people they think are still underground. I don't have any details. They just say they had a major accident. It's Performance Coal Company."[2]

Minutes later, at about 4:30 p.m., Wingrove received a call from the WVMHST office telling him to get back to the mine, that a call had come into the state hotline reporting "something bad had happened."[3]

At 5:14 p.m., a staff member for the Response line called Massey Energy's office and spoke with Jeff Gillenwater, the company's vice president for human resources. Gillenwater told the official, "I did just put out a press release [at 4:57 p.m.] saying we did have an explosion and injuries are unknown at this time. I'm trying to get that information as well right now myself, but I don't have any numbers yet."[4]

By the time Wingrove arrived back at UBB, he could see bodies lined up outside the mine, across from the opening of the track entry, covered with plastic, their boots sticking out.[5] The inspector said it "felt like somebody had their hand on my heart and was squeezing the heck out of it."[6]

When he went to the UBB offices to check records, Wingrove found that federal officials were already on site. At 6:00 p.m., he issued a control order pursuant to Chapter 22A-2-68 of West Virginia Code.[7,8]

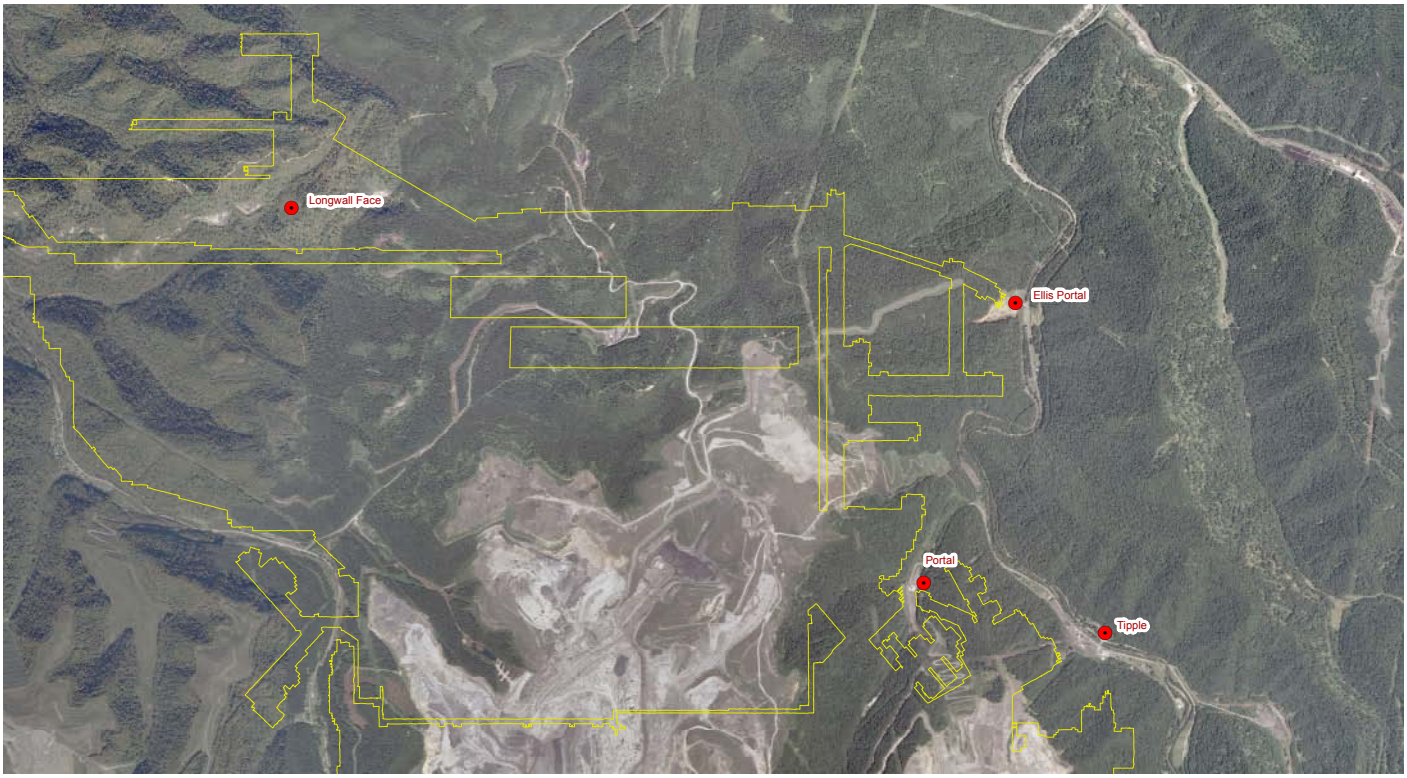
Robert G. Hardman, district manager for the Mount Hope District 4 office of the U.S. Department of Labor's Mine Safety and Health Administration (MSHA), had arrived at the mine shortly after 5:00 p.m., accompanied by his staff assistant, Mike Dickerson.[9] MSHA's

A miner's boot found during the investigation

national call center records indicate the federal agency was notified at 3:30 p.m. of an event that had occurred at 3:27 p.m. The district office received notification at 3:42 p.m. of a call from Performance Coal Company to the national call center reporting an inundation of gas resulting in an evacuation of the mine.[10] While en route to the mine, Hardman received a call at 4:30 p.m. from Elizabeth Chamberlin, Massey Energy's vice president for safety, during which she told him one "disoriented man says men are down" and there were signs that an explosion had occurred.[11]

By the time Hardman and Dickerson had driven the approximately 35 miles to UBB, nine miners had been brought to the surface; six of them had been confirmed dead. Even before he arrived at the mine site, Hardman had issued a 103 (j) order by telephone at 4:00 p.m.[12] Section 103 (j) of the Federal Mine Safety and Health Act of 1977 allows MSHA – even if federal officials are not on site – to take any steps necessary to protect lives, including supervising and directing rescue and recovery missions, and to ensure the protection of property needed for accident investigations.

At 5:20 p.m. Hardman amended the order to a written 103 (k) order. Section 103(k) of the Federal Mine Act gives the MSHA representative who is on site the authority to take steps necessary to ensure the safety of persons in the mine and to protect evidence. With the issuance of a (k) order, the mine is effectively under the control of the Mine Safety and Health Administration. The company remains in charge of rescue efforts,



Aerial map of UBB mine area, West Virginia Geological Survey

but all plans must be submitted to state and federal authorities for approval before they are executed.[13]

Shortly before 4:30 p.m., the man who would become the face of MSHA during the long days of rescue and recovery arrived in West Virginia on a flight from Washington, D.C. Kevin Stricklin, MSHA's top administrator for coal mine health and safety, had flown into Charleston's Yeager Airport that evening with the intention of driving to Pikeville, Kentucky, where he had a meeting scheduled the following day with Kentucky mining officials. Stricklin also had on his agenda an April 8 meeting with Massey Energy officials to discuss hazard complaints MSHA had received concerning other Massey mines in the area.[14]

Before he left the airport, Stricklin received a call from his office advising him that there was "a pretty major issue at the Upper Big Branch mine…. and there may be some people unaccounted for."[15] Rather than continuing south on U.S. 119 to Pikeville, Stricklin instead turned left at Danville onto State Route 3 and followed a convoy of state vehicles to the Upper Big Branch mine. He arrived sometime between 5:30 p.m. and 6:00 p.m.[16]

Stricklin met Hardman outside the mine, where he learned that six people were confirmed dead and at least 20 were unaccounted for underground. Hardman told Stricklin he was heading to the UBB portal to set up a command center.[17] Stricklin accompanied him and volunteered to take responsibility for talking to family members and the media, allowing Hardman to concentrate on running the command center.[18]

The MSHA officials went to an office on the second floor of a metal building, which Massey Vice President Chris Adkins had assigned for use as the command center. After issuing the written (k) order, Hardman said he "started the normal protocol of organizing a command center … and we began the thrust of the rescue effort."[19]

By their very nature, mine rescue efforts are conducted under unimaginable stress and with great uncertainty. Critical decisions must be made with the best available information, which is often incomplete and sometimes inaccurate.

A command center, or incident control center, is established to assess all the available information, direct the mine rescue operation and make decisions concerning the mine rescue teams, including when they enter the mine, their assignments, their methods of exploration, firefighting duties and location of fresh air bases (FABs). The command center is comprised of representatives of the mine operator, MSHA, the state agency and a miners' representative, if employees have designated one. All steps in the rescue plan must receive written approval from MSHA and the state agency. Ideally, individuals with specialized skills and expertise in mine emergency response man the command center; in

reality, personnel in the command center are representatives of the mine operator and the agencies who are available at the time.

The officials rely on data from atmospheric monitoring systems, values provided by technicians taking air readings at the mine portals, and observations from miners who witnessed the event or who have specialized knowledge about the mine. Key information also comes from mine rescue teams, who, when they are deployed underground, become the eyes and ears inside the mine for the command center. It is the command center's task to evaluate the information received, make decisions based on it and provide direction to the mine rescue teams.

Mine rescue team members are trained to respond to mine emergencies such as fires, explosions, roof falls and water inundations, in which the environment is both dangerous and unstable. They volunteer hundreds of hours each year to hone their skills through training exercises and mine rescue contests.

Team members practice using specialized monitoring equipment to take gas readings and learn to interpret the results. They practice fighting fires, assessing air velocities, building ventilation controls to divert airflow, administering first aid, establishing and maintaining communication lines. Their training activities follow established mine rescue protocols again and again, so that in an actual emergency, their response will be second nature. During mine rescue contests – the most robust of the training activities used in the United States – teams are expected to obey established protocols with precision. In fact, they are penalized for failing to adhere to procedural rules. As experienced mine rescuers will explain, when the adrenaline is pumping, individuals might do something crazy – but that's where the training kicks in, to stop them from doing something stupid that places them or other team members at risk.[20]

The mine rescue teams also rely on the command center to watch their backs. The first priority and duty of officials in the command center must be the safety of mine rescuers.

The manner in which a command center operates depends on the experience, knowledge and expertise of those who come together in the hours after a tragedy – how well they function as a group, how well they respond in a stressful environment and how well they are able to withstand the pressures of outside influences.

At Upper Big Branch, many things did not work well. For example, note taking was spotty, and, as a re-

Disasters, the media and politics

Beginning with the 1968 Farmington, West Virginia, mine disaster, the news media has played an increasingly larger role at the scene of mine disasters. Those who are old enough to remember Farmington recall images of grieving widows broadcast by local and national television.

In the years since, especially with the advent of cable television, mine disasters have become full-blown media events, with high profile news anchors flying in to set up cameras, interview local residents and provide endless coverage of rescue efforts. When the Sago Mine blew up in 2006, cable news provided minute-by-minute on-air reporting throughout the forty-plus hours of rescue and recovery efforts. In their haste to get the story first, they sometimes got it wrong. The classic example, now used as a teaching tool in college journalism classes, was the erroneous report that the miners, except for one, were alive. In truth, only one was alive. Twelve were dead.

The presence of the cameras also has placed pressure on politicians in mining states, compelling them to be on site at disasters to comfort families and to take their places at the front of news briefings. Especially since the miraculous rescue of nine miners trapped for more than 78 hours after a flood at the Quecreek mine in Pennsylvania in 2002, governors, senators and representatives have played an ever larger and more public role in the aftermath of mining disasters. While it is understandable that political figures feel the need to respond to disasters in their states by expressing genuine concern for families of trapped or deceased miners, their presence, and that of the new, more intrusive, media, has placed a greater strain on those charged with undertaking mine rescue procedures.

Life and death decisions – whether to send rescuers in or pull them back – are questioned, discussed and second-guessed, allowing the emotion of the moment to infringe upon the detached discipline and scientific approach that forms the basis of mine rescue. At its core, mine rescue is best served when decisions are based "on the numbers," the raw data as to the toxicity of the atmosphere and the potential for secondary explosions or fires. The emotion generated by media reports should not ever be a factor in those decisions.The mining community needs to address the rescue and recovery system in light of the new challenges presented by technology and the now ever-present media.

sult, command center officials failed to create an adequate written record to indicate how events transpired. Interviews with officials who were present have led the Governor's Independent Panel to conclude that phone calls to the command center from underground either were not recorded or were recorded haphazardly. Communication from the media and families of the missing miners filtered into the command center and decisions were influenced by these events.[21]

Stricklin said he didn't know who had been in charge of the evacuation, but that Chris Adkins was in charge of rescue and recovery for the company.[22] Early in the command center operation, Adkins constantly had the phone to his ear in order to provide instructions and make inquiries to the mine rescuers underground. Other officials in the command center were at a disadvantage because they heard only Adkins' side of conversations or what he said the speaker on the other end of the line had said. At approximately 7:30 p.m. WVMHST mine rescue coordinator Danny Spratt took a special phone adapter from his state truck and hooked it to the phone in the command center.[23]

The adapter was something WVMHST had had specially made following the 2006 Aracoma disaster after officials witnessed Adkins and other Massey officials using a single phone for nine hours straight in the command center. At Aracoma, the phone system was set up so that only one person could hear communications from rescuers underground.[24] The adapter allowed six headsets to be connected to the phone line so that multiple individuals could hear communications from teams underground. One of the headsets had a boom microphone for the person who served as primary communicator to the underground teams. When Spratt set up the device in the UBB Command Center, he suggested that one of the outlets be used for a digital recorder. Spratt knew an audio recording would assist with evaluating the emergency response. It was something WVMHST had used during its emergency response drills. His suggestion was rejected.[25] Any decision about recording would have been made jointly by Chris Adkins and Bob Hardman, the company and MSHA leaders in the Command Center.

Not surprisingly, there was a great deal of chaos as state, federal and company officials tried to determine who was underground, where they were and what condition they were in.

While mine rescue protocol envisions an orderly process, even well trained rescuers often respond to disasters with an adrenalin-fueled instinct to rush underground. At times people who are not trained in mine rescue enter the mine unsupervised, without a clear plan of action and without the proper apparatus, as was the case with Massey officials at Upper Big Branch.

By the time the Command Center was set up, Hardman was staging mine rescue teams to go underground, Stricklin recalled. Stricklin said it was then he learned that Performance Coal officials Chris Blanchard and Jason Whitehead were in the mine.[26] Also by this time, three members of Massey's Southern West Virginia Mine Rescue Team – Jim Aurednik, Rob Asbury and Mark Bolen – were underground, beginning to repair phone lines to establish communications; they said they also were searching for Blanchard and Whitehead.[27]

At 5:30 p.m., Hardman modified the (k) order to allow two Massey mine rescue teams to enter the mine to 35 Crosscut. When the teams reached that point, it was determined that the air quality would allow further exploration. At 6:15 p.m., Hardman modified the (k) order to allow the teams to advance to 78 Crosscut.[28]

Stricklin estimated that the Command Center was set up and officials on the surface were in contact with Blanchard and Whitehead underground "somewhere in the vicinity of 6:15 to 6:30."[29] Stricklin said Massey's Southern West Virginia team went underground at 6:45 p.m., the first team into the mine.[30] Hardman said that by 7:05 p.m., two state teams were in the mine and a total of nine teams were available outside the mine.[31]

Although the rescue efforts were underway, Hardman acknowledged that he "never did get a handle initially … on how many we had underground. But there were bare-faced people employed by Massey underground in the mine." Hardman was unable to locate records indicating who the individuals were or what time they entered the mine.[32]

Stricklin said he expressed concern to both Hardman and Adkins about people being underground who "weren't mine rescue trained" and "were on their own," saying, "We need to get these people out of here."[33]

Since the disaster, a number of family members have expressed concern that the company officials who rushed into the mine after the explosion may have been attempting to locate and cover up evidence of corporate wrongdoing. While it is problematic for persons with an inherent interest in the outcome of an investigation to be alone in a mine following a disaster, Massey Energy has maintained that Blanchard and Whitehead were motivated only by a desire to rescue those trapped in the mine.[34]

Unfortunately, the situation was further complicated by the fact that these company officials did not, according to rescue team members, provide adequate information about where they had gone or what they

had discovered. Nor were they adequately debriefed.

Officials in the Command Center should have been made aware of what Blanchard and Whitehead had witnessed because it would serve to inform mine rescue teams as to conditions they might encounter in the mine. Mine rescue protocol emphasizes that mines should be evacuated and that mine rescue team members who explore a mine must be briefed so that they have the critical information they need about conditions underground. That protocol calls for one team member to serve as a "briefing officer" at the fresh air base to record and track the activities of rescuers as they explore the mine.[35] At a minimum, the standard operating protocols for briefing and debriefing were not consistently practiced by those in charge of the rescue operations at UBB.

As the evening wore on, Stricklin also became more and more frustrated as a result of the operator's failure to provide accurate information about the number of people who had not been accounted for.

There is no safety precaution more fundamental than maintaining a system that tells operators who is in a coal mine at a given time. Throughout the 19th and 20th centuries, operators used a "tag-in" system. Each miner was assigned a number with a corresponding metal check tag that was moved to an "in" position hook by the miner as he entered the mine. When he left the mine after his shift, the miner moved the tag to an "out" position. This method didn't tell the operator where in the mine the miner was, but it did provide a record of who was in the mine.

After the 2006 Sago disaster and Aracoma fire, mine operators were required to install electronic tracking systems that would enable them to approximate each miner's whereabouts in the mine. Such a tracking system was being installed at Upper Big Branch. Derrick Kiblinger, a UBB miner who was in charge of the installation, said, "It's still in the process … the tracking system was really far behind … maybe 20 percent of it would have been done" on April 5.[36]

Kiblinger described having difficulty getting parts fast enough to keep the installation on schedule and said he needed a larger crew to get the job done.[37] "When I started in October, somebody should have been working on every shift to even be close," he said. "Had this system been in place, you would have known a lot quicker where these men were. You would have known within 2,000 foot, probably a little better, where they were."[38]

UBB miners appeared to be confused about the status of the tracking system. Some testified that they believed the tracking system was functioning because they had been assigned tag readers and were wearing them when they went underground. Several reported receiving training about the system at an annual refresher class conducted early in 2010. Their testimony suggests they had not been told that the system was not completely installed. More importantly, they were not aware that management had informed MSHA it was going to use a manual check-in/check-out system until the electronic system was "installed and functional."[39]

After the Sago disaster, operators were required to submit an Emergency Response Plan (ERP) that outlined how the company would respond in the event of an emergency. In the ERP, the company designated a "responsible person," a person in charge for every shift. In their ERP submitted to MSHA on October 9, 2009, Performance/UBB officials indicated they had a backup system for keeping track of the miners who were underground.

In a transmittal letter from Jonah Bowles, safety director for Marfork Coal Company, to MSHA District 4 Manager Robert Hardman, the company stated,

> "Until the new tracking system is installed and functional, an employee will be on duty on the surface when anyone is underground. The Responsible Person on each shift will provide this employee with a roster of all persons underground and the proposed zone in which they will be working. A written log of each miner's location will be maintained by this employee. It is the responsibility of each worker to notify this employee when they move to another work zone."[40]

During interviews with investigators, UBB miners did not seem to be aware of this backup system.[41]

According to the ERP, the Responsible Person on the day shift was the superintendent and the backup was the chief electrician. On April 5, 2010, the dayshift superintendents were Gary May (UBB side) and Everett Hager (Ellis side), and the chief electrician was Rick Nicolau.

Unfortunately, in addition to having a tracking system that wasn't functioning, the company also did not maintain the metal/brass "tag" system, and the backup written log system was not maintained. As a result, for hours after the explosion, there was complete confusion as to how many miners were in UBB and who those miners were.

When he arrived at UBB at approximately 7:00 p.m., MSHA mine rescue team member Jerry Cook recalled being told by Hardman that 19 people had not been accounted for and that seven deceased miners

had been removed from the mine.[42] By this time, officials had learned that another of the initial nine miners brought out of the mine had died.

At 8:32 p.m., Massey Energy CEO Don Blankenship released a statement, which said, "It is with a heavy heart that Massey Energy confirms at this hour seven dead and 19 miners unaccounted for."[43] These figures account for only 26 miners rather than the 29 who actually died in the explosion.

Just before 10:30 p.m. Hardman again asked how many miners had not been accounted for. Massey Vice President Chris Adkins posed the question to Keith Hainer, the company's vice president for maintenance, saying they "need to know how many unaccounted for."[44] Shortly after 11:00 p.m. Hardman was still trying to confirm the number of missing miners saying there were "22 underground when I got here," and "we found five, so 17 left."[45]

Some time around midnight, Chris Adkins asked Performance Coal longwall coordinator Jack Roles how big the crew was in an apparent effort to pin down the number of miners still missing and unaccounted for.[46]

Jimmy Gianato, director of the West Virginia Office of Homeland Security and Emergency Management, told investigators with the Governor's Independent Investigation Panel that he was with Danny Spratt, a WVMHST official, at the mine Command Center when he had a growing concern as to the actual number of persons who were underground. The numbers provided by Massey continued to change. In addition, some miners had been put into ambulances and taken to hospitals and others had been removed by helicopter. When he asked that evening (April 5) for an accounting, Gianato said Massey officials Elizabeth Chamberlin and Chris Adkins (on the phone in the Command Center)[47] said they were having difficulty establishing a number.[48] Gianato said he advised Chamberlin that they needed to do whatever it took to account for every worker, even if it meant calling each individual miner's home.[49]

Command center notes place the time at 12:30 a.m. on April 6 – more than nine hours after the explosion – when state, federal and company officials finally got an accurate number as to the people who were underground when the explosion occurred.[50]

"They didn't do a very good job with that for a couple of reasons," Stricklin said. "I don't know if they had people coming out of two different portals. They had people that had already started underground when this explosion occurred, and the Pyott-Boone [tracking] system seemed to be pretty useless in my opinion. As the evening went on, it frustrated me more and more, because I wanted to go down and give the families definite information of how many people were unaccounted for, and it seemed like I was having a very hard time getting that from Massey."[51]

"They kept saying they were working on the Pyott-Boone system to get an exact number, and I'm not sure that number ever came from the Pyott-Boone system," Stricklin told investigators. Stricklin apparently was not aware that the tracking system was only 20 percent installed. He said he asked mine officials whether they had a traditional tag-in, tag-out system and recalled that they replied that they didn't know. "That was, I believe, from Elizabeth Chamberlin, who didn't work at that mine."[52]

Even without this vital information, Stricklin, accompanied by state officials and Massey representatives, met for the first time with shocked and grief-stricken family members at approximately 8:30 p.m.[53] The families had gathered near the UBB entrance in the Marfork safety building.

By this time, there were seven known fatalities. After consultation with Elizabeth Chamberlin, Stricklin made the decision to meet with the family members of the known dead and then conduct a separate meeting with the families of the missing miners.[54]

"After a period of time, we left the room where the seven deceased miners' families were, and we went into a bigger meeting area with the rest of the family and friends of the other miners that were missing," Stricklin said. "At that time, I still didn't have a finite number of miners that were missing, and that really bothered me, to go into the room – but we went in, and we basically gave them an update of just preliminary information on what had occurred and that there were already fatalities involved in this."

Another complication in the rescue efforts was that for several days after the disaster, news reports based on briefings by MSHA officials and West Virginia Governor Joe Manchin raised the possibility that some of the missing miners may have reached a safe shelter one break outby the longwall face.

The next briefing for the families was conducted at 10:30 p.m. Among those participating were Stricklin, Congressman Nick Rahall, WVMHST director Ron Wooten, Jim Gianato and Massey Energy's Michael Snelling and Jennifer Chandler. The families were informed that the bodies of five more miners had been located, but the identities of the men had not been confirmed and, therefore, would not be provided to them. The family members desperately wanted this information and also asked whether officials had had any communication from missing miners underground, particularly from any who may have deployed safe shelters.[55]

The company and government officials again met with the families at about 1:30 a.m. on April 6, after

rescue workers had been ordered out of the mine. Chris Adkins of Massey Energy told family members that the bodies of 24 deceased miners had been located and that four miners had not been accounted for. According to written notes kept by one of MSHA's family liaisons, Adkins told the families he did not hold out much hope for the four missing men.

At approximately 3:20 a.m., Governor Joe Manchin and Congressman Nick Rahall, who had continued their vigil with the families, corrected the information previously reported by Adkins, telling family members that the total number of deceased miners was 25 with four not yet located. Notes from the MSHA family liaison indicated that ten of the victims had been positively identified – the seven from the Tailgate 22 crew and three others.

Even though they knew that 25 were dead, the officials meeting with the families didn't know the names of the deceased because the mine rescue team members weren't able to easily find identification without moving bodies. The final identification came when they removed the bodies on April 10, 12 and 13. A family member told the Governor's Independent Investigation Panel that this time was particularly agonizing because each family was holding out hope that their loved one was one of the missing, not one of the dead.

Meetings with the families, followed by media briefings, became a ritual that continued until the last miner was brought out of the mine early in the morning of Tuesday, April 13.

1 WV Mine Industrial Rapid Response Line, audio recording, April 5, 2010

2 WV Mine Industrial Rapid Response Line, audio recording, April 5, 2010

3 Wayne Wingrove testimony, p. 27

4 WV Mine Industrial Rapid Response Line, audio recording, April 5, 2010

5 Wayne Wingrove testimony, p. 30

6 Wayne Wingrove testimony, p. 29

7 Chapter 22A-2-68 of West Virginia Code states "following a mine accident resulting in the death of one or more persons and following any mine disaster, the evidence surrounding such occurrence shall not be disturbed after recovery of bodies or injured persons until an investigation by the Office of Miners' Health, Safety and Training has been completed."

8 Wayne Wingrove testimony, p. 30

9 Robert Hardman testimony, June 6, 2010, p. 8

10 Robert Hardman testimony, June 6, 2010, p. 7

11 Mike Dickerson, MSHA Family Liaison, written notes

12 Robert Hardman testimony, p 8

13 Section 103(k) of the federal Mine Safety and Health Act of 1977 states: "In the event of any accident occurring in a coal or other mine, an authorized representative of the Secretary, when present, may issue such orders as he deems appropriate to insure the safety of any person in the coal or other mine, and the operator of such mine shall obtain the approval of such representative, in consultation with appropriate State representatives, when feasible, of any plan to recover any person in such mine or to recover the coal or other mine or return affected areas of such mine to normal."

14 Kevin Stricklin testimony, p. 34

15 Kevin Stricklin testimony, p. 12

16 Kevin Stricklin testimony, p. 12

17 Kevin Stricklin testimony, p. 13

18 Kevin Stricklin testimony, p. 14

19 Robert Hardman testimony, June 6, 2010, p. 10

20 Paraphrased from conversations with MSHA and WVMHST mine rescue team members, May 2010 through April 2011.

21 GIIP review of Command Center notes and interviews with officials who were present in the Command Center.

22 Kevin Stricklin testimony, p. 15

23 Personal communication with Danny Spratt, April 7, 2011; confirmed by other officials in the Command Center.

24 McAteer and Associates, *Aracoma Alma Mine #1 Report,* November 2006, p. 36

25 Personal communication with Danny Spratt, April 7, 2011

26 Kevin Stricklin testimony, p 17

27 Based on testimony of Mark Bolen, Jim Aurednik and Shane McPherson.

28 Robert Hardman testimony, June 6, 2010, p. 13

29 Kevin Stricklin testimony, p. 18

30 Kevin Stricklin testimony, p. 43

31 Robert Hardman testimony, June 6, 2010, p. 16

32 Robert Hardman testimony, June 6, 2010, p. 11

33 Kevin Stricklin testimony, p. 19

34 Blanchard and Whitehead invoked their Fifth Amendment right against self-incrimination and have not answered questions about their actions.

35 Mine Safety and Health Administration, "Responding to a Mine Emergency: Training Responsible Persons at Underground Coal Mines," Instruction Guide Series 110 (1G 110), 2008.

36 Derrick Kiblinger testimony, June 9, 2010, p. 18

37 Derrick Kiblinger testimony, June 9, 2010, p. 77

38 Derrick Kiblinger testimony, June 9, 2010, p. 79

39 Letter from Jonah Bowles, Safety Director, Marfork Coal Company, to Robert Hardman, submitting Emergency Response Plan, October 9, 2009.

40 Letter from Jonah Bowles, Safety Director, Marfork Coal Company, to Robert Hardman, submitting Emergency Response Plan, October 9, 2009.

41 Testimony of Samuel Brewer, p. 41; Terry Claypool, p. 68; Adam Fraley, p. 46; Roger Toney, p. 83.

42 Jerry Cook testimony, p. 20

43 Massey Energy news release, April 5, 2010, 8:32 p.m.

44 MSHA Command Center notes, April 5, 2010

45 MSHA Command Center notes

46 MSHA Command Center notes

47 Elizabeth Chamberlin and Chris Adkins are two of the Massey officials who invoked their Fifth Amendment right against self-incrimination.

48 The tracking system had not been completely installed and the system of using brass tags was not being fully utilized.

49 Personal communication with Jimmy Gianato.

50 Kevin Stricklin testimony, p. 45

51 Kevin Stricklin testimony, p. 16

52 Kevin Stricklin testimony, p. 16

53 Kevin Stricklin testimony, p. 23

54 Kevin Stricklin testimony, p. 22

55 Mike Dickerson, MSHA Family Liaison, written notes

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Pg 1

7:07 Rescue Teams Being Assembled
Team Mantriping From Zone #1 Portal To Zone 10 Intersect

7:00 3929 Co @ 07 Ch4 Bandy Comp Fan
7:15 Busted Line Cutting Water To Mine

6:15PM FOB Established @ Break 78 / Zone 10
Vent Controls Pistoned In by 78

7:10 Robt Asbury / Chris Blanchard / Jason Whitehead FAB 78 Bk

1:A Break 15 on Mother Drive (3 victims) No Rescuers Downed
Track Entry Traumatic Injuries Just Inby Crossover
Cache @ LW Is Empty Sled 1

Tail Side Most Severe Damage
Head Side Not As Bad

7:22 Looking For Shelters

20.8 O2 High Co No Ch4 at Cut

7:25 Keith ? Taking Over Com Center

6:45 Tailgate side Air To Bad

Mn Team 3 @ FAB 3 @ Mother Drive

North Portal 7:00 - 7:22 PM
7:10 - 722 PM
#1 Entry #2 #3
88.5 X 1100 97,350 86.94 X 270 23473.8 CFM 83.2 X 299 = 24,885 CFM
20.8 O2
0 Ch4
0 Co
#4 Fan
Inby 5250 5250 340,000 CFM

#5

5 The long days of rescue and recovery

In the long days and nights that followed the terrible afternoon of April 5, 2010, questions were raised about when the rescue became a recovery effort; whether standard mine rescue protocol was followed; whether company officials remained underground in violation of that protocol; whether the lives of rescuers were unnecessarily put at risk; whether family members were given false hope.

But throughout the long and arduous rescue and recovery effort, no one questioned the courage of company, federal and state rescue team members. These rescuers, nearly all of them volunteers, began to assemble at Upper Big Branch in the hours after the explosion to do what they do so well – descend into a mine where there is great destruction and where the atmosphere is both dangerous and unstable to search for and attempt to rescue men and women they may not know in settings with which they are not familiar.

The risks are huge. In the United States alone, the history of mining and rescue efforts is filled with examples of rescuers being overcome by toxic gases or killed as a result of a second or third explosion. In 1907, two rescuers were overcome by deadly fumes after the Monongah disaster; 13 were killed in an effort to locate trapped miners after the 1976 Scotia Mine explosion; 12 more died in 2001 in the Jim Walters mine trying to save the life of one miner; and three were killed at Crandall Canyon in 2007 as they attempted to save six miners.

Every time rescue teams are deployed, officials in command centers must balance the risks of rescuers' lives against the lives of the trapped miners. Historically, and according to accepted protocol, after a determination has been made that all the miners within the coal mine are deceased, the initial sense of urgency changes. The effort turns from one of rescue to one of recovery, and the calculation of risk shifts in the direction of more protection for mine rescue team members. As a matter of practice, rescue team members do not remove the bodies of deceased miners until the determination has been made that there are no survivors. Ordinary recovery procedure calls for the mine to be completely inspected by teams under apparatus if necessary prior to removing the bodies. But the explosion at Upper Big Branch posed additional difficult choices for decision-makers not only because of the large number of victims, but because, for the first time following an explosion, officials knew of the presence of safe chambers, which, if activated, could have allowed miners to survive for days after the explosion.

The first mine rescue personnel on the scene at the Upper Big Branch mine on April 5 were Rob Asbury and Mark Bolen, members of Massey Energy's Southern West Virginia Mine Rescue Team. Asbury and Bolen arrived at UBB at about 3:30 p.m., followed a short time later by team members Jim Aurednik and Shane McPherson.

Asbury and Aurednik went underground first, where they encountered the mantrip with the Tailgate 22 crew as it was coming out of the mine. They assisted with the victims as they were brought out of the mine. Asbury, Aurednik and Bolen then went underground and began to repair telephone lines to establish communication. McPherson was asked to identify bodies of the first crew members that had been brought out of the mine, but he was not able to do so.[1]

McPherson said after his unsuccessful attempts to make identifications, he prepared to go into the mine, grabbing a first aid kit and some supplies. "And I gave my apparatus to a guy named Clinton Craddock at the time to ready my apparatus for me. I grabbed a couple other guys to get a mantrip ready for me," he said. "And in between all that, talking with Wayne [Persinger], Elizabeth [Chamberlin] and anybody that could tell me any information, I gathered all the information that I could," he said.

All the information in the world could not have prepared McPherson for what he saw as he entered the mine. "It's basically disbelief and half shock, I would think, to what we were seeing, but at the same time trying to locate those guys," he said.[2]

Mine Rescue and Recovery Quandary

The decision of the Upper Big Branch Command Center to send large numbers of mine rescue teams underground to recover the bodies, despite the fact that the entire mine had not been inspected by rescue team members and all possible ignition sources had not been determined to be extinguished, and more significantly the lack of adequate back-up teams, was a departure from mine rescue protocol. By proceeding in this manner, the Command Center decided that if the recovery of the victims' bodies was accomplished quickly (i.e., with as many mine rescuers underground as possible) the overall risk would be lower than the standard, more methodical approach. Their decision was further complicated by the fact that victims were spread over such a large area. During this "quick" approach, there was one large movement of air in the Headgate 22 section. Investigators were unable to determine what caused the event. Although there were no injuries or deaths, the potential existed for disastrous consequences. There were large numbers of mine rescue teams underground, but they were not backed up by an equal number of teams on the surface.

One major coal company, CONSOL Energy, deemed the risk to their mine rescue team members unacceptable because a safer alternative recovery scheme was available. This plan would have included a complete preshift examination,[1] which would have ensured that all possible ignition sources were extinguished prior to entry and adequate backup teams made available. Although this plan would have taken longer and the recovery of the victims' bodies could have been significantly delayed, the mine rescue teams would have been in a much less precarious situation. The Command Center decided to forego standard mine rescue protocols – procedures designed to safeguard the lives of rescue team members – in an effort to remove the bodies more expeditiously. The decision scales were tipped toward speed, not security and safety.

This issue needs to be carefully examined by the mine rescue community and new technology developed which provide improved information upon which to make judgments affecting the lives of mine rescuers.

[1]That the post-explosion conditions in UBB were hazardous and unstable is suggested by the fact that investigators could not begin the underground portion of their work until June 29, 2010, after the mine had been fully examined and serious hazards corrected.

At 4:15 p.m., MSHA Field Office Supervisor Fred Wills had left his Mount Carbon office and was on the way home when he received a call relaying a message from Link Selfe, the assistant district manager for enforcement programs in Mount Hope.[3] Instead of continuing home, Wills drove to Mount Hope, where he learned about the explosion that had occurred, that Selfe had already left for UBB and that he wanted Wills to report to the mine.[4]

Wills estimated his own arrival at UBB at around 5:30 p.m. to 6:00 p.m. "I was there, Link Selfe was there. I think Mr. [Kevin] Stricklin was there. I think we all got there just about the same time. Once I arrived at the mines, I had only been there about 25 minutes or 20 minutes, and Link had said I was going to go underground."[5]

Wills said he thought he was sent underground because he was an experienced mine rescue captain and trainer.[6] Sharing a mantrip with Wills were MSHA mine rescue team members Mike Hicks and Jerry Cook. Hicks, field office supervisor at the Mount Hope office, and Cook, supervisor of the Pineville field office, had met at the federal Mine Academy in Beckley and traveled together to UBB. Hicks estimated they arrived at the mine at about 6:00 p.m. or 6:30 p.m. with their mine rescue apparatus.[7]

Cook said before he and Hicks entered the mine, Hardman briefed them on the situation underground and told them nine miners were either dead or had been rescued and 19 remained missing. Cook said he was led to believe nine miners were on Headgate 22 and six were on the longwall. Hicks and Cook proceeded into the mine with apparatus and a multiple gas detector. Hicks later donned his apparatus, while Cook did not.[8]

By the time the first full rescue teams were preparing to enter the mine, state teams had arrived at UBB. Eugene White, inspector-at-large for the West Virginia Office of Miners' Health, Safety and Training's Region 3 in Danville and a member of the State's South Mine Rescue Team, had been engaged in training activities in Logan.[9]

White had stopped at a store to purchase equipment when he received a call from one of his assistants who "said that my aunt had called him," White recalled. "She lives on Route 3, just a couple of miles from the mines. She … wanted him to get ahold of me to let me know that something bad was going on, that the rumor was there had been a massive roof fall and there was some people missing."[10]

White caught up with other members of the team and was told they were no longer involved in a training exercise – they were on call and moving. "I knew exactly where the mine was because it's not too far from my home," White said. "So I proceeded immediately from Logan … at a fairly fast rate of speed to UBB. A lot of emergency vehicles were passing me, ambulances, rescue guys."[11]

When White arrived at UBB, he was briefed by Wayne Wingrove and White's assistant, Johnny Kinder. "That's when I realized then how bad it was," White said. "I walked up to one of the firemen that I knew. He was the incident commander for the rescue people. He's the one that informed me … that there were seven bodies already had been brought out of the mines, and they had them covered over with mine curtain."[12]

White called for security to make sure that, with so many people walking around, the bodies were protected and treated with respect. He and his crew began getting themselves and their equipment ready to go underground.

"At some point I walked down into the UBB shop and … two Massey teams were getting prepared to go underground. They were briefing them. And I realized that we didn't have any state team members ready with them, so we went and got a couple of our state guys to travel with them," White said.[13]

The Massey teams entered first, and the two state teams – North and South –prepared to follow. Massey Energy's Chris Adkins briefed them, White said, and Selfe was there from MSHA, as well.[14]

At that time, rescue teams held on to hope that survivors had somehow made their way to rescue chambers and were waiting for help to come. "And our objective was to try to search the coal mine, find those persons and hopefully bring them to the surface," White said. "So once they briefed us, immediately we were prepared to go underground. We traveled as two State teams. There was no company representatives or MSHA with our two teams as we proceeded underground."[15]

The mantrip carrying MSHA's Wills, Hicks and Cook proceeded to the fresh air base at 78 Break, where, to Hicks' surprise, they ran into Performance Coal Company president Chris Blanchard. "We were trying to find out why he was there because … as far as I know, he's not a mine rescue member," Hicks said. "And then while we're sitting there talking to him, he's talking on the phone. Then Jason Whitehead [at the time the vice president of Performance Coal] comes up from up in here somewhere, and then there was a couple of the Massey team members come up in there, and none of them had their machines on them."[16]

Hicks and Cook both said they saw two apparatuses at the fresh air base. The equipment did not belong to Blanchard and Whitehead, but to two other Massey team members who came and got them later.[17]

Normally, when mine rescue teams are briefed, part of the briefing process involves telling the team members about everyone who is underground. Since he had not been told the Massey officials were in the mine, Hicks said it "was a total shock when I found Blanchard and Jason Whitehead."[18]

Wills, too, was surprised to learn that Blanchard and Whitehead were underground. "I thought we were the first people going underground," he said. "I thought the mines was evacuated."[19]

Wills said Blanchard told him that he and Whitehead had traveled toward the longwall on the headgate and tailgate, looking for survivors. "They didn't go into particulars exactly where they went to, because I don't think they wanted me to know," he said.[20] MSHA's Command Center notes indicate Blanchard and Whitehead reported encountering high carbon monoxide levels on the tail side of the longwall. They also saw victims on the longwall track, who were later identified as Cory Davis, Timmy Davis, Adam Morgan and Joshua Napper. It was not clear to investigators why the information contained in the Command Center notes was not shared with Wills, Hicks or other underground rescue team members.

Blanchard told those gathered at the fresh air base at 78 break that the Command Center wanted them to split up. Half the teams would go toward the longwall and half toward Headgate 22, where they suspected they would locate the missing miners, Hicks said. Both Hicks and Cook said they spoke with Blanchard, explaining their hesitation to send teams deeper into a mine that had just exploded without backup team members in place. "We didn't even know who was inby the fresh air base," Hicks said.[21]

Wills explained that general mine rescue protocol is that for every active mine rescue team inby the fresh air base, "you should have an equal number outby in case one of the teams runs into trouble."[22]

While the debate continued, Cook took his team and traveled to the longwall. Hicks kept six people with him at the fresh air base to back up Cook's team. Hicks said he was told the Command Center wanted him to take his team up to Headgate 22. "I told them, 'We can't do that. We don't have any backup,'" he said.[23]

After getting off the phone with Chris Adkins in the Command Center, Jason Whitehead told Hicks that Hicks "had been overruled and that we were to go," that there was a backup team on the way. "I said, 'Well, they're not here,'" Hicks replied. "So I got on the phone and I talked to Chris Adkins."[24]

Adkins dismissed the concerns articulated by Hicks and Cook about insufficient backup, saying, "We need to find 16 men, not play mine rescue."[25] The failure to follow established mine rescue protocol and insist on one-to-one backup strongly suggests that the command center was negligent in its duty to protect mine rescue personnel.

"You know, it's bad enough trying to find 29 people," Cook said. "You don't need to have 40 more to look for…They just had a major explosion. They could've, they could've killed every one of us … We were expendable that night, that's my opinion … they didn't care what they did with us. That's my opinion."[26]

Hicks said Adkins told him, "We have to hurry." Hicks said he refused to go until he spoke with Hardman, his district manager. Hardman, he said, "basically told me the same thing, 'We have to hurry.'"

Hicks related this conversation with Hardman:

Hicks: "Bob, I don't have people to back these people up,"

Hardman: "Well, they're up there without machines on anyway, so they're not under air anyway. You got your teams coming."

Hicks: "Bob, I don't have teams here.'"

Hardman: "We have to go."

Hicks followed orders and proceeded to Head gate 22.[27]

It should be noted that when Cook and Hicks reported to UBB the following day, Tuesday, April 6, they were told they would not be allowed to work together, that they would be assigned to different shifts and that they would not be allowed to go underground.[28] Demoralized and upset, the two veteran mine rescuers[29] pressed for an explanation from MSHA mine rescue team trainer Virgil Brown. They said Brown told them they had been through enough in the mine.

"I thought that was a lot of bull. I'm a mine rescue person. That's what I do," said Cook, who had been involved in rescue efforts at Sago, Aracoma and Crandall Canyon. "And I just never did believe that was the reason why we didn't go back underground. I think because we run our mouth [expressing opposition to the command center's decision to go forward without one-to-one backup], and we done what we did when we was in there."[30]

Eugene White said the state teams started underground sometime between 7:00 and 8:00 p.m. When he arrived at the fresh air base, White said he saw Whitehead, Blanchard and Wills.[31]

Wills worked with Whitehead, Blanchard and four mine rescue teams to set up a new fresh air base at 106 Break on the North 6 belt. He said once they got communications established to that point, they could go no further. "The gas levels were too high inby us," he said.[32]

White said his team was instructed to go to a crossover panel in front of the longwall face line from the headgate to the tailgate. Since he was in charge of the West Virginia South team, White instructed the state North team to stay at the fresh air base to serve as backup.

"Chris Blanchard, who knows the mine… elected to go with us," White said. "He did not have an apparatus." Because they weren't picking up any CO or methane, the team took Blanchard because none of them had been in the mine before.[33]

As Jerry Cook traveled with his team to the longwall, his eye was drawn to reflective materials. He and another rescue team member followed the reflected light and found three victims near a bolter located in a crosscut between the Two and Three entries.

"And we walked around it, and we had one victim was laying in front of the bolter, between the track and the bolter," Cook said. He wrote down the number of the tracking device worn by the miner to help with identification. "And we had one guy on the end of – laying across the track, and one guy in between the track entry and the belt entry, laying on some gob, laying on his

back. And on his shirt he had the … name "Tim" wrote on it. We checked the victim on the track and we found his ID tag, and his name was Josh Napper, I believe what it was."[34]

Cook then looked outby the track entry, once more saw reflective material and located a fourth victim a break outby from where the other victims had been found. He could find no identification on this man.

After they found the four victims [later identified as Cory Davis, Timmy Davis Adam Morgan and Joshua Napper], Cook said his team traveled up the track entry, where he observed two or three self-rescuers that had been deployed "after the fact, after the event, because they had no soot, nothing on them. They were fresh," he said.

"And then I looked down. I seen tracks in the rock dust over the – where the soot had got overtop the rock dust and they – you could tell somebody had walked through there, fresh. Having not been told anyone had been in that area, Cook "had to assume that we might've had somebody survive this, so I started looking for a survivor." Cook did not learn that Blanchard and Whitehead most likely had created the tracks until his debriefing after he exited the mine.[35]

Eugene White also saw tracks as his team completed an exploration toward Headgate One North and came back toward Tailgate One North. Blanchard, who was with White's team, told White that he and Whitehead had already traveled that entry prior to rescue teams entering the mine. Massey mine rescue team member Jim Aurednik saw footprints, too, but he said, "I pretty much knew that Jason [Whitehead] and Chris [Blanchard] were there and all the tracks going in belonged to them."[36]

At about 10:00 p.m., Jason Whitehead reported to the Command Center that a single victim had been found inby the mother drive [later identified as Michael Elswick]. His self-contained self-rescuer was on his belt and had not been activated.

MSHA's Jerry Cook continued to follow the tracks until State Inspector Danny Cook called out that he had located yet another victim. "He was hard to see because he was so black, but he was lying in the stage loader area," Jerry Cook recalled. "His boots were blowed off his feet. I can't remember if he had – I don't think he had his hard hat on at that time."[37] He doesn't think the victim was identified that night [later identified as Rex Mullins].

Cook said Massey team members Rob Asbury and Shane McPherson radioed to say they had discovered two more bodies at Shield 85 [later identified as Richard Lane and Grover Skeens] "that were blowed up underneath the pan line." Asbury and McPherson then reported locating four more victims [later identified as Christopher Bell, Dillard Persinger, Joel Price and Gary Quarles] between Shields 102 and 105 or 106.[38]

McPherson recognized one of them as a good friend of his. "I think his name was Spanky or they called him Spanky," Cook said. "… his last name was Quarles."[39]

Once they found the four, McPherson said he went up to the longwall face with Asbury and Cook, where they found the body of headgate operator Rex Mullins. "Rob and I started down the face, and that's when we just started, you know, finding some of the bodies."[40]

The teams were unable to locate one victim who was lying by the stage loader [later identified as Nicolas McCroskey]. "We was right there at him," Cook said. "We just never did see him. I mean, we looked and we never did see the victim. And he was the – I think he was the last victim out of all of them that was found."[41]

White couldn't pinpoint the time, but, as his team was preparing to move the fresh air base further into the mine, they got a call to exit as soon as possible. One of the teams had detected an explosive range of methane.[42]

It was Hicks' team, traveling on Headgate 22. The team had located a body, and, then, as they traveled further into the Headgate, they encountered heavy smoke, methane and carbon monoxide.[43] Wills recalled that "the CO was 8,000 parts per million; methane was maybe over 8 percent and the oxygen level was down about 3.2 percent."[44],[45]

By that time, rescuers had located the bodies of 25 victims, including the seven brought out in the immediate aftermath of the blast. Rescue efforts were suspended[46] and the crews arrived on the surface sometime between 2:30 and 3:30 a.m. on Tuesday morning, April 6.[47] Rescuers did not return underground until 3:30 a.m. on Thursday, after which they engaged in a pattern of entering the mine only to have to withdraw because of potentially explosive air conditions. On the surface, Massey started to drill boreholes in an attempt to clear the air in the mine and make it safe for rescuers.[48]

Eugene White returned underground in the early morning of Thursday, April 8, and traveled with Massey's Southern West Virginia Team, captained by Rob Asbury. "As a matter of fact, from that day on, every time I went in the coal mines, I traveled with that team," White said.[49] By then, bodies of all but four of the miners had been located.

On this trip into the mine, as they passed the four bodies in the headgate entry to the longwall (later identified as Cory Davis, Timmy Davis, Adam Morgan and Josh Napper), the rescue team members covered them with brattice cloth because "it is more respectful to the victims."[50]

The rescue teams were instructed to evacuate the mine later that Thursday morning – White remembers it as after sunrise when he arrived on the surface. Teams went back underground on Friday, according to Command Center notes, but were pulled out a short time later because of dangerous conditions. They returned underground at 4:00 p.m. on Friday.

Some of the damage in the UBB mine

Eugene White and his team traveled to 22 Headgate, where it was already known that six victims were on a mantrip [later identified as Kenneth Chapman, William "Bob" Griffith, Ronald Maynor, James "Eddie" Mooney, Howard "Boone" Payne and Ricky Workman]. Three of the missing miners were also members of the Headgate 22 crew [later identified as Gregory Brock, Edward Dean Jones and Joe Marcum].[51]

As they approached the mantrip, White offered this description, "The best of my recollection, the mantrip was on the track. There was two victims in the outby end, facing the outside," White said. "One's leg was hangin' out of the trip. On the inby side, the … top canopy of the mantrip had kind of collapsed down and had --- there was four victims in that end of the mantrip."[52]

As the team proceeded up the track, they located another victim in the middle of the entry "like he's walking outby toward the mantrip."[53] They went a couple more breaks and found another victim. "He, from what I understand now, was the section foreman," White said, referring to Dean Jones. "It appears to me, with my background and my knowledge of coal mining, that these guys are --- end of the shift, are going toward the mantrip."[54]

With three of the four missing miners accounted for, and running low on oxygen, the teams began to withdraw from the mine. Another team made a run to the longwall face but was unable to find the last missing man.[55]

"They holler out that they can't find them," White said. Then as the teams worked their way out, they found a fourth body near the gate shields at the mouth of the longwall [later identified as Nicolas McCroskey]. "Several people had probably went by this individual," White said.[56]

The team marked the position and locations of bodies, placed them in body

bags and left them by the longwall track. They returned to the longwall starter box area, and did the same thing with the victims that had been located there.

At approximately 11:35 p.m. on that Friday night, April 9, Don Blankenship, Chris Adkins, Governor Joe Manchin, MSHA chief Joe Main, Kevin Stricklin and other officials returned to the Safety Department building to deliver the sad news to the family members that the entire mine had been explored, that all the miners had been accounted for and that there were no survivors. MSHA's family liaison notes indicated that briefing broke down for 20 to 25 minutes.

The removal of bodies from deep underground in a mine that lacked both power and mobile transportation units was a daunting task. The virtually impassable roadways at UBB made recovery efforts much more difficult. Thick, dense coal dust and soot hindered travel and rendered cap lights nearly useless. As they attempted to maneuver through the debris-filled mine, rescuers had the additional burden of wearing heavy breathing apparatus and carrying supplies, including water, phones and equipment.

The process of removing the remaining 22 victims from the mine began on Saturday, April 10. A large group of rescuers – as many as 100 men – formed a human chain. Each two-man team carried the victims to another two-man team, who would then carry the victim to another team until the body reached a mantrip that competed the journey to the surface of the mine. It was a grueling, dangerous and time-consuming process that continued into the early morning hours of Tuesday, April 13.

By the time Eugene White returned to UBB on Monday evening, only the final nine bodies[57]– those of the Headgate 22 crew – remained in the mine. As Monday night turned into Tuesday morning, these last victims were physically carried from the section, solemnly transferred from mine rescue team to mine rescue team and then onto mantrips. After more than a week, the members of the Headgate 22 crew emerged for the last time from the blackness of the Upper Big Branch mine, their bodies draped by American flags.[58]

1 Shane McPherson testimony, p. 24

2 Shane McPherson testimony, p. 29

3 Fred Wills testimony, p. 21

4 Fred Wills testimony, p. 21

5 Fred Wills testimony, p. 24

6 Fred Wills testimony, p. 36

7 Mike Hicks testimony, p. 38

8 Mike Hicks testimony, p. 39, Jerry Cook testimony, p. 17

9 Eugene White testimony, p. 12

10 Eugene White testimony, p. 12

11 Eugene White testimony, p. 13

12 Eugene White testimony, p. 15

13 Eugene White testimony, p. 16

14 Eugene White testimony, p. 17

15 Eugene White testimony, p. 18

16 Mike Hicks testimony, p. 47

17 Mike Hicks testimony, p 70, Jerry Cook testimony, p. 25

18 Mike Hicks testimony, p. 69

19 Fred Wills testimony, p. 43

20 Fred Wills testimony, p. 27

21 Mike Hicks testimony, p. 48

22 Fred Wills testimony, p. 38

23 Mike Hicks testimony, p. 49

24 Mike Hicks testimony, p. 49

25 MSHA Command Center notes

26 Jerry Cook testimony, p. 74

27 Mike Hicks testimony, p. 49

28 Jerry Cook testimony, p. 64

29 Hicks had seven years experience with MSHA mine rescue, Cook had 12.5 years experience.

30 Jerry Cook testimony, p. 74

31 Eugene White testimony, p 25

32 Fred Wills testimony, p. 37

33 Eugene White testimony, p. 27

34 Jerry Cook testimony, p. 33

35 Jerry Cook testimony, p. 56

36 Jim Aurednik testimony, p. 38

37 Jerry Cook testimony, p. 40

38 Jerry Cook testimony, p. 40

39 Jerry Cook testimony, p. 40

40 Shane McPherson testimony, p. 33

41 Jerry Cook testimony, p. 42

42 Eugene White testimony, p. 35

43 Briefing by Department of Labor, Mine Safety and Health Administration on Disaster at Massey Energy's Upper Big Branch Mine-South, at the request of President Barack Obama, April 15, 2010.

44 Fred Wills testimony, p. 33

45 1% methane is the maximum allowed by law in a mine's atmosphere. At 1.5%, methane is highly explosive in air containing coal dust or other explosive gases. Methane alone is highly explosive at levels between 5% and 15% of the atmosphere. The most explosive mixture is when methane is at 9.5%. The law requires that mine air contain no less than 19.5% oxygen. Carbon monoxide, or CO, is toxic at 50 parts per million.

46 Briefing by Department of Labor, Mine Safety and Health Administration on Disaster at Massey Energy's Upper Big Branch Mine-South, at the request of President Barack Obama, April 15, 2010.

47 Eugene White testimony, p. 36

48 Briefing by Department of Labor, Mine Safety and Health Administration on Disaster at Massey Energy's Upper Big Branch Mine-South, at the request of President Barack Obama, April 15, 2010.

49 Eugene White testimony, p. 43

50 Eugene White testimony, p. 51

51 Eugene White testimony, p. 62

52 Eugene White testimony, p. 62

53 Eugene White testimony, p. 64

54 Eugene White testimony, p. 65

55 Eugene White testimony, p. 67

56 Eugene White testimony, p. 68

57 Eugene White testimony, p. 70

58 Eugene White testimony, p. 72

Chambers, communication and tracking systems

"We banged and banged and banged, everyone did," was how Sago mine survivor Randal McCloy, Jr.,described what his 11 crew members did on January 2, 2006, after they barricaded themselves in the coal mine.[1] After the early morning explosion, the 12 man crew tried to escape, but retreated as far as possible from the smoke and fumes to await rescue. The mine phone underground had been destroyed in the blast. They had no way to let crews on the surface know that all but one of them were alive – except for using the sledgehammer. McCloy and his coworkers used it to bang and bang as hard as they could on the roof bolts, in hopes that rescuers on the surface would hear them. Ten hours passed and eventually 11 of the men, all but McCloy, succumbed to carbon monoxide poisoning.

Just a month later, the Sago miners' families learned that 72 potash miners in Saskatchewan, Canada, had escaped a mine fire and were awaiting rescue in a refuge chamber. Not only were the miners in a safe place, they were in contact with rescuers on the surface. The Sago families also learned that wireless tracking systems were commercially available and some mine operators were using them.

After Elvis Hatfield and Donald Bragg tried to escape the January 19, 2006 fire in Massey Energy's Aracoma Alma mine, but got disoriented in the black dust and smoke, MSHA took emergency action to require operators to install fire-resistant lifelines in escapeways. Lifelines were already general practice in a number of other countries.

Less than a month after the Sago disaster, the WV legislature passed a law requiring, among other things, new standards for communication, tracking and refuge chambers.[2] Underground coal mine operators were required to have a plan, no later than April 15, 2007, to provide safe shelters for miners, and a plan for communication and tracking no later than July 31, 2007. There were no deadlines, however, for the actual installation and full operation of these improvements. Operators simply had to have a plan. The U.S. Congress also responded by passing the Mine Improvement and New Emergency Response Act (MINER Act) which was signed into law by President G.W. Bush on June 15, 2006.[3] It mandated post-emergency communication and tracking and a study by NIOSH on practicalities of refuge chambers for use in underground coal mines. Ultimately, refuge chambers of various types were required to be in place by March 2009 and located generally within 1,000 feet from the nearest working face.[4]

On April 5 at the Upper Big Branch mine, safe shelters manufactured by Strata were located within 1,000 feet of the longwall, HG22 and TG22 faces. These particular shelters are designed to be deployed by a miner in case of emergency through a rapid inflation process. Investigators found the shelter located near the longwall to be moved a few feet by the force of the explosion, but otherwise deployed as designed when tested underground by investigators. The safe shelter near the HG22 section showed signs of heating and coked coal dust on the top of the door edge. It deployed as designed when investigators tested it. The TG22 safe shelter show no significant external damage and also inflated when investigators tested it. Regrettably, the force of the explosion caused fatal injuries to the 29 miners deep in the mine. None were able to make it to the safe shelters.

The MINER Act set a deadline of June 2009 for underground coal mine operators to have functioning wireless communication and tracking systems. In contrast to the provisions adopted by the State of West Virginia, MSHA expects operators to provide coverage throughout each working section in a mine.

The most recent data available from MSHA indicates that only 36 percent of the 535 active underground coal mines nationwide have fully installed communication and tracking systems. The tracking system at UBB was only about 20 percent installed on April 5,[5] but the mine was not considered out of compliance by MSHA. The federal law gave MSHA the discretion to allow mine operators to provide an alternative system if he "sets forth the reasons such provisions can not be adopted."[6] In a December 2010 Procedure Instruction Letter (PIL) to mine operators, MSHA indicated that a sufficient number of approved communication and tracking systems are commercially available and it expects mine operators to comply by June 15, 2011, with the requirement.[7] MSHA's PIL did not indicate whether citations and penalties will be assessed against operators who fail to meet the June 15, 2011, deadline.

1 McAteer & Associates, *"The Sago Mine Disaster: a preliminary report to Governor Joe Manchin III,"* July 2006

2 West Virginia Senate Bill 247, enacted January 27, 2006

3 Public Law 109-236

4 75 *Code of Federal Regulations* §1506, Refuge Alternatives

5 Derrick Kiblinger testimony, June 9, 2010

6 Public Law 109-236

7 MSHA, Program Instruction Letter No. I10-V-19, December 14, 2010; a Program Policy Letter issued by MSHA on April 28, 2011 (PPL-11-V-13) updates MSHA's position stating: "fully wireless communications technology is not sufficiently developed at this time to permit use throughout the industry." This suggests the agency will continue to allow mine operators to use "acceptable alternatives to fully wireless communication systems."

PART II

The systems failures at Upper Big Branch

Signs on road leading to the Upper Big Branch mine

Photos by Jim Beck

6 Coal dust and rock dust

Nathaniel Jeter described himself as a dust man, the senior member of a two-man crew responsible for spreading rock dust throughout the Upper Big Branch mine during the hoot owl, or overnight, shift.[1] On nights when he wasn't pulled off his dusting duties to do other jobs,[2] Jeter drove a motor that pulled or pushed a big orange track duster. The duster had two pods[3] that held about a ton and a half of rock dust.[4] When properly functioning, the duster spread a wide swath of rock dust through the track entries.

Rock dust, or crushed limestone, has long been regarded as a vital safety component in underground mines because it dilutes the explosive nature of coal dust. Yet this geographically expansive mine had but one crew spreading dust – and even then dusting wasn't a fulltime job. Jeter estimated that he generally spent only about three days a week rock dusting because he also was called upon to help with construction projects – building stoppings, setting timbers and delivering supplies to sections.[5]

Mines the size of Upper Big Branch typically use track-mounted tank or pod dusters – like the one Jeter operated – to rock dust the track haulage, belt lines, airways, working sections and construction sites. Efficient use of a track duster in a mine the size of Upper Big Branch would have required drilling a borehole midway in the mine and not far from the working sections. This would have allowed a speedy delivery of bulk rock dust to refill the tank dusters. There was no such borehole at UBB. As a result, the rock dust crew had to take a loaded duster from the outside to their point of destination and disperse the dust. When the duster was empty, the crew had to travel back outside to refill. The nearly two-hour round trip travel time suggests it is unlikely that more than one tank of dust per shift or per day was applied using the orange duster.

In addition to the tank or pod dusters, UBB miners testified that scoops or roof bolt machines equipped with small machine dusters were used to spread dust. Miners also stated that they spread rock dust by hand on the floor and walls of working sections, using 40-pound bags of dust that were transported to the sections on flat cars. A flaw with this method was that the roof was not dusted, as required by law, because it was difficult for the miners to spread it on the top. Also, as some of them testified, trying to dust the top made it extremely hard for the workers to breathe.

The dusting, difficult to begin with because the small crew had to cover an extremely large area and contend with mine traffic,[6] was further complicated by the fact that the big orange duster at UBB didn't work properly much of the time.

"Sometimes it would clog up, so we would have to spend 30 minutes trying to unclog the hoses to get dusted," Jeter said. "Then it would clog up again." The crew carried dust to spread by hand "just in case, to play it safe," he said.[7]

Cody Irwin also complained about what he referred to as the pod duster used at UBB, saying, "it would break a lot."[8]

"You just had to twist all the knobs right," he said. "And sometimes you could turn the air up too high or have your dust up too high, and it'd clog the hose up and you'd have to beat on it… You have to have it just right."[9]

It's not surprising the two-man hoot owl dust crew had trouble with the orange duster, which was prone to failure because of its age and because it had not been adequately maintained. The lack of maintenance was immediately evident to investigators. Following the explosion, the very first time Massey employees attempted to use the duster to perform MSHA-required dusting, the motor burned up.

Documents obtained from and communications with the manufacturer, the A. L. Lee Corporation of Lester, West Virginia, indicate that the duster likely came with Massey's purchase of the property from Peabody in 1994. An official for A. L. Lee estimated that it originally was sold in the 1980s, although the company's sales records do not go back that far. The company was able to locate a 1996 record of rebuilding a rail-mounted, twin-tank machine rock duster from Upper Big Branch, Performance Coal Company. Lee converted the duster

from 250V to 128V and returned it to Performance. By early 2010, the duster was in excess of 25 years old and had not been rebuilt for at least seven years.

During the course of the investigation, investigators located a white duster, which workers said was used when the orange duster was down. The white duster, parked near the UBB Truck Shop, was locked and tagged "out of service." Investigators later found it had been stripped down to its frame for parts.

In order for the Upper Big Branch mine to have been rock dusted well enough to have been in compliance with minimum state and federal regulations, management should have assigned crews to rock dust designated areas of the mine each shift. A mine the size of UBB could justify a two-man crew assigned solely to rock dusting on at least two shifts each day, and preferably on all three shifts. Yet a two-man crew was responsible for dusting the entire mine on a part-time basis with no set schedule and with faulty equipment.

UBB's orange pod duster, above, and white rock duster, below

The age and poorly maintained condition of the dusting equipment, coupled with the fact that UBB did not have an established rock dust crew that adhered to a schedule like that of a production crew, indicate that rock dusting was not a priority at Upper Big Branch in the early days of 2010.

Jeter said he took his job very seriously and "did it to the best of my abilities,"[10] but he became increasingly frustrated. "You give me a duster that's supposed to work properly," he said. "If you want me to do my job properly, I need equipment that works properly. If I come to you and say, look, my duster is not working, we need to get it fixed, please don't blow me off. Because if something happens, they're going to be looking at me, well, why this didn't get done."[11]

Jeter said he complained often and loudly to Gary May, mine superintendent for the South Side of UBB, and Everett Hager, superintendent for the headgate and tailgate sections.[12] He even mentioned the faulty equipment to Performance Coal President Chris Blanchard during a meeting in 2008.[13]

"I said to him, 'Well, when are they going to get the track duster fixed?' He said, 'What track duster?' I said, 'That orange thing that I use with two pods on it.' He said, 'Track duster? I didn't know we had a track duster.' I said, "Well, yeah. We need to get that fixed.' He said, "Well, I'll look into it.' So they had the write-up for it, all the parts and everything, but it never left the mines."[14]

It should be noted that Jeter was fired on February 5, 2010,[15] for allegedly sleeping on the job.[16] He maintains that he was not asleep and that he was unfairly dismissed.[17] Regardless of which story is true, the events of April 5 strongly support Jeter's assertion that the amount of rock dust applied in UBB was insufficient to stop the propagation of an explosion.

Following Jeter's departure, UBB records indicate that Gary Young and Dustin Richardson were assigned to the rock dust job. A short time later, Richardson was given another assignment and Clifton Stover was assigned to work as a rock duster with Young. Beginning on February 9, 2010, Young and Stover recorded their rock dusting efforts in a spiral-bound notebook. In all, the two men made 25 entries, including one on the day of the explosion.

The handwritten notes tell a frustrating story of days in which rock dust couldn't be applied because the

miners ran out of dust, because the men had no motor to run the duster and, most often, because the equipment failed.

On February 10, the entry reads: *"Everything broke/malfunction, worked on hoses and duster."* On Thursday, February 11: *"got duster mostly empty, breaks, track from 25-34, 35."* There is a gap in the entries until Thursday, February 18: *"Took duster to 1 North, got 2 breaks & belt dusted. Duster went down AGAIN, got cleaned off and ready to install new seal on back pod. Need (2) 2" brass ball valves, (2) crescent wrenches, (2) pipe wrenches, and some pen. oil. Should be able to get running from there, til the rest can be repaired. Also cleaned all the filters for the ocmp. (wouldn't hurt to change them as well.)"*

After another gap of six days, the record notes on Wednesday, February 24: *"Dusted from 1-2 breaks up from power center down to track. Hand dusted,"* followed by another gap until Monday, March 1, when the note explains: *"Dusted 2N & 3N, track & breaks from 52. Helped drag some cable, switched out several times. Had to unclog hose (discharge) and change fill hose before standing."* A Thursday, March 4 notation reads, *"Dust from Ellis to 25 break, from 3-4 brk to around 18 (Ellis 5)."* On March 9: *"Had no motor to run duster."* Again on March 11: "*Had no motor again, no ride either."* On March 23: *"NO RIDE, NO help. NO spotter. I'll call you today. I'm set up to fail here."*

During his testimony, Clifton Stover confirmed that the track duster was frequently inoperative because of malfunctions and equipment failure; on some shifts he had no helper and thus could not dust beyond the track; he was frequently taken away from rock dusting to perform other chores; on some days, when the duster was down, he piled bags of rock dust on a mantrip and applied it by hand; on several days no rock dusting was done at all.

Stover also said the neutral, intake and return airways were not rock dusted. Stover testified that no one had explained to him how much rock dust to apply. About a week prior to the explosion a boss told him the rock dusting he and Young had been doing was inadequate suggesting that they were not applying enough dust which may well have been a result of the difficulty of getting enough dust into the mine.

Furthermore, the rock dust effort was also hampered because Young, who was employed as a contractor, was laid off shortly before the explosion.[18] Young testified that the crew would be directed to rock dust in areas where the company had received citations for inadequate rock dusting.[19]

Jeter's testimony, Stover's testimony and the Young and Stover log also is backed up by the testimony of other miners. A roof bolter on the hoot owl shift spoke of "low, low dusting."

"I mean, you know, like low rock dusting, they didn't do a lot of it," he said. "They had one rock dust crew for the whole mines, and they worked the hoot owl. And we hardly ever seen them because they were always doing other things instead of rock dusting like they should have been."

James Fleming, who was on the third shift belt move crew, cited "not enough rock dusting" as one way in which things changed at UBB during his four years at the mine.[20] "As far as I can remember, they only had two men on one shift trying to rock dust this whole coal mines," Fleming said. "And then when they do rock dust, the only place they rock dust is the track and belt entries. That's it."[21]

Ray Ara, longwall utility man on the midnight shift, said the rock dust "wasn't too great on the tail side," that it was "grayish" rather than white. "I don't know how often they got over in there and dusted … it ain't like being on the main line or being on the other side you know."[22]

Michael Ferrell, who worked as a belt construction foreman at UBB until the second week in February, said rock dusting was insufficient on the tailgate side of the longwall,[23] and Tim Blake noted that as he walked down the intake on April 5, it "was pretty bad, lack of rock dust."[24]

Morris Hulgan, who worked evening shift on Headgate 22, said management relied on scoop operators to rock dust the section, a less than ideal situation because the scoop man had so much to do. Hulgan said for the most part rock dusting was done by hand.

Michael Smith, an evening shift roof bolt operator on the Tailgate 22 section, also said most of the dusting on his section was done by hand. "We really didn't have a scoop man, so we didn't really have many people to dust," he said.

"When we'd hand dust, we'd only hand dust the ribs," he said. "We wouldn't hand dust the top. Most of the time the top was … dusted with a scoop duster and a bucket duster. Like I say, that was done basically once a week by us."[25]

When asked why the crew didn't hand dust the roof, Smith replied, "Well, we really had no air. If we … it would just leave a cloud of dust and choke us up."[26]

UPPER BIG BRANCH MINE
PRESHIFT EXAMINATION OF BELT CONVEYORS
March 10, 2010 through April 5, 2010

	ELLIS #4			ELLIS #5			NORTH #4			NORTH #5			NORTH #6			NORTH #7			LONGWALL			GLORY HOLE			TG #1			TG #2			HG #22		
DATE	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.	O.	D.	E.
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10	√	√	√	√	√	√	√	√	√	√	√		√	√		√	√	√	√						√			√	√	√	√	√
11	√	√	√	√	√	√	√	√	√			√	√	√	■	√	√	√	√	√					√	√	√			√	√	√
12	■	√	√	√	√	√	■	√	√	√	√	√	√	√	√	■	√	√	■	√					√	√	√	√	√	√	√	√
13	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√										√	√	√
14	√	√	√	√	√	√	√	√	√	√	√	√	√	■	√	√	√			√							√		√	√	√	√
15	√	√	√	√	√	√	√	√	√	√		√	√	√	■	√	■	√	√		√				√	√	√	√	√	√	■	√
16	√	√	√	√	√	√	■	■	√	■	√		√	√	√	√	√	√	√	√					√	■	√	√	√	√	■	√
17	√	√	√	√	√	√	√	√	√	√	√	√	√	√	■	√	√	√	√						√	√	√	√			■	√
18		√	√			√		√						√				√		√						√	√		√		√	√
19	√	√	√	√	√	√	√	■					√	■	√	√	√	√	√	√					√	√	√		√	√	√	√
20	√	√	√	√	√	√							√	√	■	√	√	■	√	■					√			√			√	■	√
21	√	√	√	√	√	√							■	√	√	■	√		√								√		√	√	■	√
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28	√	√	√	√	√	√							√	√	√	√	√	√	√	√							√		√	√	√	√
29	√	■	√	√	■	√	■			■			√	■	√	√	√	■	√	√					√	■	√	√	√	√	■	√
30	√	√	√	√		√									√	√	√	√	√	√					√	√	√	√	√	√	√	√	√
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4																																	
5	■	√		■	√		√	√					√	√		√	√			√					√	√					√		

O = Owl Shift
D = Day Shift
E = Evening Shift

No Records: 3/18/10 (Owl Shift)
4/4/10 (Owl Shift)
4/4/10 (Day Shift)

√ = Needs Dusting (561)
■ = Dusting Performed (65)

Note 1: The information used in determining when rock dusting was performed consisted of UBB's own Pre-Shift Examination of Belt Conveyors reports for the hoot owl, day and afternoon shifts. The symbols noting "dusting performed" were based on notes made by firebosses or belt examiners, such as "ran duster", "dusted", etc., but not when the examiner simply wrote "cleaned."

Note 2: Due to the difficulty in reading the handwritten examiners' notes on the reports and the possibility of error by investigators in interpreting them, some variation may be found by others interpreting these same reports.

In addition to witness testimony, strong evidence from company pre-shift records indicates that rock dusting was a haphazard and poorly managed operation at UBB. Although the GIIP has found the pre-shift examination recordkeeping to be problematic at times, a review of the pre-shift examinations of the belt conveyors for the period between March 10, 2010, and April 4, 2010, revealed 561 notations (or requests by the examiners) that the belts needed dusting. Under pre-shift requirements, a notation is also to be made when the dusting is performed.

During the same March-April time period, pre-shift reports indicate that of the 561 dustings requested, only 65 dustings were subsequently noted. Thus, rock dusting was carried out just 11.6 percent of the time it was requested. (See graphic above)

In addition to the 30 days prior to the explosion, reports prepared by UBB firebosses and foremen, as required by both federal and state regulations, were available for the January through March 2010 period. Using the available pre-shift examination data for the working sections for the period January through April 2010, investigators identified 1,834 instances when rock dusting was needed, and only 302 times (16.47 percent) when rock dusting was performed.

Extensive tests conducted by MSHA after the disaster support miners' testimony that the Upper Big Branch mine was poorly dusted. In analyses of 1,803 dust samples taken from UBB after the explosion, MSHA found that 78.92 percent were out of compliance with the federal standard.[27]

State and federal citation records likewise offer dramatic evidence of inadequate dusting. During 2009, mining inspectors with the WVMHST issued 26 citations at the Upper Big Branch Mine for coal dust accumulation and for failure to adequately apply rock dust. Federal inspectors also cited the mine for the same conditions. In the 15 months preceding the disaster, UBB received citations from federal or state inspectors *every month but one* for rock dust issues. Violations were observed in all four miner sections, on the longwall and along several of the belts. Nearly half the 40 citations issued by MSHA were classified as "significant and substantial."[28]

On a violation in April 2009, a federal inspector wrote of the "failure to keep combustible materials from accumulating in the area where #2 section is punching through into the #1 section. At the #1, 2, 3 punch through, coal has been left in each intersection in piles as wide as the intersection and up to 2 ft. in depth."

Problems with accumulation of coal dust and inadequate rock dust persisted in 2010. State and federal inspectors wrote 14 citations in the three months preceding the disaster.

A violation written by a state inspector on March 23, 2010 – just ten days before the explosion – found that:

> "The Head Gate 22 conveyor belt which is close to 1 mile in length is not being maintained properly due to [three words illegible] cleaning under the belt as well as the spillage in the walkway and rock and coal from the ribs in the walkway as well. In addition, float dust is present from the belt head to the belt tail."[29]

Just weeks earlier the same inspector wrote a similar violation:

> "The track entry and breakthrough connected [illegible] from the longwall track switch to the #1/HG22 working section needs rock-dusted due to float dust in this area."[30]

And on several occasions in 2009, state inspectors wrote violations noting:

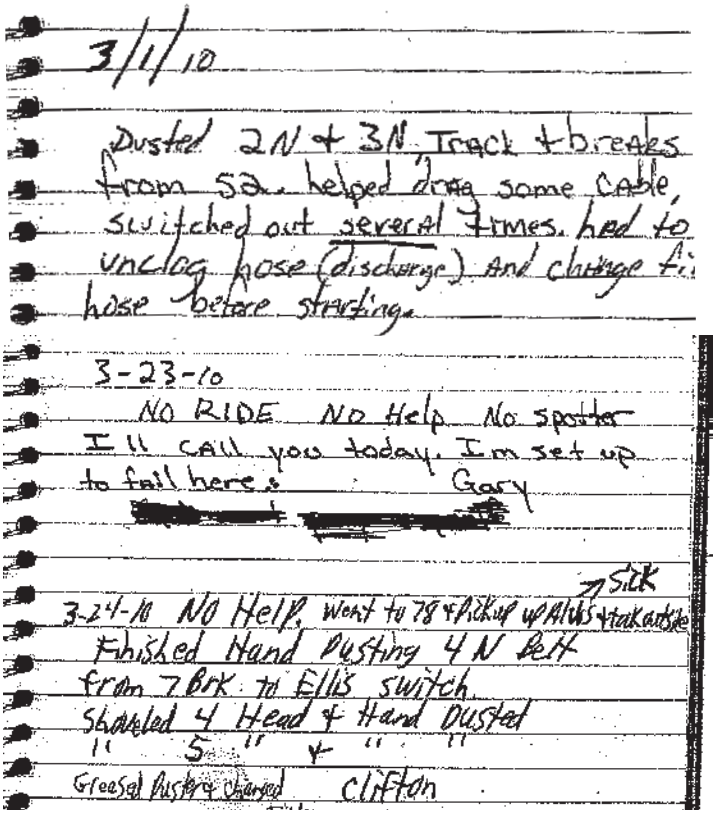
> "Management is aware of the condition of the conveyor belt [with float dust] as the conditions have been recorded since 5/21/09 in the pre-shift record book for conveyor belts."[31]

West Virginia code governing the WVMHST states that "dangerous accumulations of fine, dry coal and coal dust shall be removed from the mine, and all dry and dusty operating sections and haulageways and conveyors and back entries shall be rock dusted or dust allayed." It specifies that rock dust be "applied and maintained in such quantity that the incombustible content in the return entries shall not be less than 80 percent."[32]

The federal mine act also states very specifically that "coal dust, including float coal dust deposited on rock-dusted surfaces, loose coal, and other combustible materials shall be cleaned up and not be permitted to accumulate in active workings or on electric equipment therein."

Federal law in place on April 5, 2010, also was specific about the application of rock dust.[33]

Despite the detailed requirements outlined in the law, evidence suggests that Massey did not have adequate procedures in place to ensure that the company complied with rock dust requirements. When asked by MSHA for records of analyses used to determine the adequacy of the company's rock-dusting system, a law firm representing the company wrote, "Performance Coal Company has not independently had rock dust analyzed."[34] The company was not making an active effort to


3/1/10

Dusted 2N + 3N Track + breaks from 52. helped drag some cable, switched out several times. had to unclog hose (discharge) and change fi hose before starting.

3-23-10
NO RIDE NO Help No spotter
I'll call you today. I'm set up to fail here. Gary

SICK
3-24-10 NO Help. Went to 78 + Pick up APLUS + takaride
Finished Hand Dusting 4N Belt
from 7 Brk to Ellis switch
Shoveled 4 Head + Hand Dusted
" 5 " + " "
Greased Dusters cleaned Clifton

Excerpts from Stover-Young rockdust notebook

determine if it was adequately rock dusting and making the coal dust inert so as to make their miners safe, but rather simply relying on federal or state inspectors to catch them if the rock dusting was not adequate.

Likewise, section bosses and foremen appeared to lack a protocol by which they could determine whether the dusting was adequate. They, too, appeared to depend on having an inspector write a citation to let them know the dusting was inadequate, or they relied on their own "eyeball test" – whether it looked like enough dust had been applied.[35]

"It must've been up to standard," longwall foreman Harold Lilly said, "because I can't remember getting a violation on --- it didn't bother me, wasn't real black."[36]

Massey Energy officials have stated that coal dust played no part in the explosion at the Upper Big Branch Mine. The company's general counsel, Shane Harvey, told the Associated Press that the mine "appears to have been very well rock-dusted with rock dust still in place."[37]

The combined evidence from a number of sources strongly suggests otherwise: the witnesses who testified that the mine was not well dusted; the series of citations issued by state and federal officials in the year leading up to the disaster; the preshift examination records of the conveyor belts, which indicate that only 11.6 percent of the rock dustings requested were completed; the absence of a systematic rock dust procedure; the frequent changes in rock dust personnel; the fact that rock dust crews were given other assignments; the physical distance the explosion traveled; and the findings from the rock dust samples taken after the explosion. Had coal dust not been a factor in the explosion, the damage at Upper Big Branch might well have been contained to the longwall area. The victims on Headgate 22 were located about 0.75 miles from the longwall. The victims on the mantrip at 66 break were found approximately 1.15 miles from the longwall face.

The fact that the explosion killed men working so far away from the initial impact, offers strong evidence that coal dust played a significant role in propagating the blast throughout the mine, and, in George Samuel Rice's prescient 1913 words, "leaving a trail of wreckage and death."[38] Ultimately, all of the historic lessons so painfully learned as result of the terrible loss of life during the first decade of the 20th century apparently were forgotten or ignored by the management of UBB.

1 Nathaniel Jeter testimony, p. 14

2 Steve Campbell, who left UBB to work for MSHA, described Jeter as a "motorman" who had assignments other than dusting, Steve Campbell testimony, p 51.

3 Nathaniel Jeter testimony, p. 17

4 Nathaniel Jeter testimony, p. 18

5 Nathaniel Jeter testimony, p. 16

6 Nathaniel Jeter testimony, p. 20

7 Nathaniel Jeter testimony, p. 18

8 Cody Irwin testimony, p. 23

9 Cody Irwin testimony, p. 23

10 Nathaniel Jeter testimony, p. 47

11 Nathaniel Jeter testimony, p. 54

12 Nathaniel Jeter testimony, p. 65

13 Titles from letter from Allen, Guthrie & Thomas, PLLC, to Norman Page, MSHA, April 23, 2010

14 Nathaniel Jeter testimony, p. 65

15 Termination date obtained from Massey personnel list.

16 Nathaniel Jeter testimony, p. 60

17 Nathaniel Jeter testimony p. 47

18 Clifton Stover testimony, February 27, 2011

19 Gary Young testimony, p. 73

20 James Fleming testimony, p. 20

21 James Fleming testimony, p. 21

22 Ray Ara testimony, p. 34

23 Michael Ferrell testimony, p. 89

24 Timothy Blake testimony, p. 23

25 Michael Smith testimony, p. 62

26 Michael Smith testimony, p. 75

27 Soot and Coking map

28 Lincoln Selfe testimony, p. 41. During his interview, Selfe MSHA District 4 Assistant District Manager testified that "every time I was in the mine it was very well rock dusted." Given the fact that during the months running up to the explosion the mine was cited monthly and the dusting crews were hampered by equipment failures, etc., it suggests that there was a disconnect between MSHA's District 4 management view and the MSHA inspectors' experience.

29 WVMHST, Violation No. 31091, March 23, 2010, at 11:30 a.m.

30 WVMHST Violation No. 31080, March 2, 2010, at 1:00 p.m.

31 WVMHST Violation No. 10784, June 16, 2009, at 12:10 p.m.

32 WVMHST "Control of coal dust; rock dusting" 24-2-24

33 Mine Act, Section 304; 30 CFR 75.403. "…All underground areas of a coal mine, except those areas in which the dust is too wet or too high in incombustible content to propagate an explosion, shall be rock dusted to within forty feet of all working faces, unless such areas are inaccessible or unsafe to enter or unless the Secretary or his authorized representative permits an exception upon his finding that such exception will not pose a hazard to the miners. All crosscuts that are less than forty feet from a working face shall also be rock dusted. Where rock dust is required to be applied, it shall be distributed upon the top, floor, and sides of all underground areas of a coal mine and maintained in such quantities that the incombustible content of the combined coal dust, rock dust, and other dust shall be not less than 65 per centum, but the incombustible content in the return aircourses shall be no less than 80 per centum. Where methane is present in any ventilating current, the per centum of incombustible content of such combined dusts shall be increased 1.0 and 0.4 per centum for each 0.1 per centum of methane where 65 and 80 per centum, respectively, of incombustibles are required," On September 23, 2010, MSHA used its emergency rulemaking authority to improve the rock dust requirements for underground coal mines. (75 Federal Register 57849) The new standard (75.403) requires the incombustible content of coal dust, rock dust and other dust to be not less than 80 percent

34 Letter from Allen, Guthrie & Thomas, PLLC, to MSHA, June 2, 2010, p. 19

35 Longtime UBB weekly examiner Charles Semenske testified that he couldn't be sure that rock dusting meets regulatory requirements unless a physical sample is taken and sent to a laboratory for analysis. Semenske, who had worked in coal mines for 39 years, depends on the color of "everything" to tell him whether rock dusting is good, but conceded that "you can't really tell unless you see how much they have put on it, you know, more or less just dig down, you know, and see how much dust you have on it,"

36 Harold Lilly testimony, p. 66

37 Ward, Ken, Jr., Coal Tattoo, *The Charleston Gazette*, September 17, 2010.

38 U.S. Department of the Interior. Bureau of Mines. *Notes on the Prevention of Dust and Gas Explosions in Coal Mines*, by George S. Rice, Washington, DC: Government Printing Office, 1913.

ROCK DUST:

'Keeping an explosion from leaving a trail of wreckage and death'

There are sound historic reasons for the strongly worded provisions regarding control of coal dust in both state and federal law. Although commercial mining began in the United States in 1730 in Virginia,[1] it was widely believed that coal dust was not explosive until well into the first decade of the 20th century. A series of disasters in 1906 and 1907 spurred pioneering work of mining engineers J. Taffanel in France and George Samuel Rice in the U.S. Taffanel's and Rice's research provided convincing evidence – which became accepted fact – that coal dust was and is highly volatile.

On March 10, 1906, an explosion that ripped through the Courrières mine in northern France took the lives of 1,099 men in Europe's most deadly mine accident. Soon after, a number of countries began examining the possible explosiveness of coal dust. Taffanel suggested that since the Courrières mines had been free from methane, the disaster "demonstrated in an indisputable manner the reality of the coal-dust danger."[2] He began conducting experiments in Lievin, France, in 1907, focusing on the chemistry of dust explosions. This work formed the foundation for continued research into mine explosions.[3]

In the U.S., there appeared to be little urgency about addressing the issue of coal dust explosions until the terrible month of December 1907, which began with a December 1 explosion at the Naomi Mine in Fayette City, Pennsylvania, that killed 34 miners.

Less than a week later the most deadly mining disaster in U.S. history took place in Monongah, West Virginia, when a massive explosion ripped through the Monongah No. 6 and 8 mines. The final death toll was more than 500 boys and men.[4]

The Monongah disaster was followed on December 16 by an explosion in Yolande, Alabama, that killed 57 miners, then by a blast on December 19 at the Darr Mine in Van Meter, Pennsylvania, which claimed 239 more lives. Finally, as the year came to a close, the Bernal mine in Carthage, New Mexico, exploded on December 31, killing 11 more miners.[5]

With the blood of 703 dead men spilled in the nation's mines in one short month, the U.S. Congress took action in 1908, appropriating funds for an investigation into the causes of the explosions.[6] A testing station was established in Pittsburgh, Pennsylvania, which operated under the auspices of the United States Geological Survey until it was transferred to the newly formed Bureau of Mines (BOM) in July 1910.[7]

George Samuel Rice, the chief mining engineer for the BOM, compiled a collection of materials, papers and research studies, all of which pointed to the need to render coal dust inert. In 1913, Rice stated "coal dust is the agency that causes an explosion to sweep through a mine, leaving a trail of wreckage and death."[8]

By then, Rice also had made recommendations as to how to prevent dust explosions. Most impressive was his suggestion to render the dust inert by applying rock dust to it.[9] Sir William Garforth of England had suggested the use of rock dust to prevent or limit coal dust explosions as early as 1891. However, it was Rice who made the case in the U.S., based on test results that confirmed that when coal dust and rock dust had an incombustible content of 64 percent, ignitions could be prevented.[10]

Although Rice and the BOM advocated use of rock dust as early as 1910, most coal mines in the U.S., with the exception of a mine operated by the federal government in Colorado, did not start using it until the 1920s.[11] Even then, there was no federal law mandating its use, and only the most progressive, safety-oriented coal operators opted to follow BOM guidelines and recommendations.

Through the years operators tried other methods to address the coal dust situation, but, in the end, rock dust proved to be the most successful method to address the explosiveness of coal, and its use became an industry standard.

Rock dust works because it causes a decrease in the temperature of coal dust. During an explosion, the rock dust disperses and mixes with coal dust,[12] acting as a thermal inhibitor and reducing the flame temperature to the point that an explosion of coal particles can no longer occur.[13] The amount of rock dust required to prevent an explosion depends on the size of the coal particles as well as the size of the rock dust. As the coal particle size is reduced, a more severe explosion hazard is present.[14]

On April 7, 1927, the BOM issued a safety decision recommending that all coal mines be rock dusted and

emphasizing the importance of thoroughly cleaning up the coal dust prior to the rock-dusting.[15]

An information circular produced by the Bureau of Mines similarly offered a conclusion that emphasized the importance of rock-dusting:

> … the only safe procedure in the preventing of disastrous explosions is to rock dust thoroughly in every accessible part of a mine. Re-rock-dust immediately when the content of either floor dust or rib and timber dust falls to 55 per cent in any zone in the mine and maintain at all times the average noncombustible content of the mine dust above 65 per cent.[17]

Although the recommended standard was thorough and complete, containing much of what since has been written into federal laws governing coal mine safety, Congress did not grant the Bureau the authority to inspect mines or formulate a regulatory code.[18] As a result, dusting was haphazard – performed to the recommended standard in some progressive mines, not performed at all in others.

In a 1939 report, the BOM concluded that rock-dusting practices in the U.S. fell far short of providing absolute protection against coal dust explosions; that state mine safety laws were inadequate with respect to rock dusting requirements; that limestone or gypsum is accessible to all coal fields in the country; and that the average cost of rock-dusting amounted to $.0089 per ton of coal mined.[19] (As of October 2010, the cost per net ton of bulk mine safety dust was $28, according to Greer Industries, still a great bargain for the safety it provides.[20])

In addition, BOM records for a nine-year span leading up to the 1939 report, revealed that in 60 rock-dusted mines where explosions had taken place, rock dust was credited with stopping or limiting the explosions in 26 of them.[21]

Still, it wasn't until 1969 that the Bureau was granted the authority to regulate the mining industry with the passage of the Federal Coal Mine Health and Safety Act (Coal Act), passed by the Congress in the aftermath of the catastrophic explosion that killed 78 miners at Consolidation Coal Company's Farmington No. 9 Mine on November 20, 1968. The Coal Act provided for monetary penalties for all violations and criminal penalties for knowing and willful violations. In 1973, the Mining Enforcement and Safety Administration was formed; in 1977, it became the Mine Safety and Health Administration (MSHA).

The rock-dusting standard in place when the Upper Big Branch Mine exploded on April 5, 2010, was the same standard that was established in 1927, unchanged through the years despite the increased use of machinery in the mines, which has resulted in a finer, more explosive coal dust. In September 2010, five months after the UBB explosion, MSHA issued an emergency temporary standard[22] raising the percentage of incombustible content for intake airways from 65 to 80 percent.[23] The Mine Act requires the agency to replace an emergency temporary standard with a permanent, final standard within nine months.[24]

1 McCartney, Martha W., *"Historical Overview of the Midlothian Coal Mining Company Tract, Chesterfield County, Virginia"*

2 *Transactions of the American Institute of Mining Engineers, Vol. 50, Investigations of Coal Dust Explosion, Vol. 50, 1915*, p 589

3 Sapko, Michael J., Eric S. Weiss, Marcia L. Harris, Chi-Keung Man, Samuel P. Harteis, *National Institute for Occupational Safety and Health, A Centennial of Mine Explosion Prevention Research,* p. 2.

4 McAteer, J. Davitt, *Monongah*, West Virginia University Press, 2007, p. 241

5 National Institute for Occupational Safety and Health, Mining Disasters

6 *U.S. Department of the Interior. Bureau of Mines. The Explosibility of Coal Dus*t, by George S. Rice. Washington, DC: Government Printing Office, 1911.

7 *U.S. Department of the Interior. Bureau of Mines. The Explosibility of Coal Dust*, 33

8 *U.S. Department of the Interior. Bureau of Mines. Notes on the Prevention of Dust and Gas Explosions in Coal Mines,* by George S. Rice, Washington, DC: Government Printing Office, 1913.

9 Rice, *The Explosibility of Coal Dust*, 84-6 and Ibid, 16-7.

10 *U.S. Department of the Interior, Bureau of Mines, Report of Investigations: Methods of Rock-Dusting American Coal Mines,* by J.J. Forbes, September 1939.

11 Ibid.

12 NIOSH, *How does limestone rock dust prevent coal dust explosions in coal mines?*, by C.K. Man and K.A. Teacoach, Pittsburgh, PA.

13 Ibid.

14 U.S. Department of the Interior. Bureau of Mines, *Coal-dust Explosibility Factors Indicated by Experimental Mine Investigations (1911-1929)*, Rice, G.S. and Greenwald, H.P., Technical Paper 464, 2919

15 U.S. Department of Commerce. Bureau of Mines. Information Circular: *Effective Rock-Dusting of Coal Mines,* by George S. Rice, Washington, DC: 1927.

16 Ibid.

17 Ibid.

18 MSHA website, History of Mine Safety and Health Legislation.

19 U.S. Department of the Interior, Bureau of Mines, *Report of Investigations: Methods of Rock-Dusting American Coal Mines*, by J.J. Forbes, September 1939, p. 20

20 Correspondence with J. Davitt McAteer

21 U.S. Department of the Interior, Bureau of Mines, *Report of Investigations: Methods of Rock-Dusting American Coal Mines*, by J.J. Forbes, September 1939, p. 21

22 MSHA, Maintenance of Incombustible content of rock dust in underground coal mines, 75 *Federal Register* 57849, September 23, 2010, which became fully effective on November 22, 2010.

23 U.S. Department of Health and Human Services. NIOSH. *Report of Investigations 9679: Recommendations for a New Rock Dusting Standard to Prevent Coal Dust Explosions in Intake Airways*, Pittsburgh, PA, May 2010

24Section 101(b), Federal Mine Safety and Health Act of 1977

IF-018
Revised 3-09

STATE OF WEST VIRGINIA
OFFICE OF
MINERS' HEALTH, SAFETY AND TRAINING
1615 Washington Street East
Charleston, West Virginia 25311-2126

(40)

Copies - Company
Inspector
Assessment
Regional Office
Post
Rep of Mines

Region 4-Oak Hill
134-0726-2010

No: 31091

NOTICE OF VIOLATION

Company / Operator Performance Coal Co. Contractor: Yes ___ No ✓

Permit Number U304232 Mine Name Upper Montcoal Eagle

Date of Issue 3-23 20 10 Time 11:32 ___ A.M. ✓ P.M.

Notice is hereby given that the undersigned authorized representative of the Director of the Office of Miners' Health, Safety and Training, upon making an inspection of this mine finds that the violation referred to in West Virginia Code, Chapter 22A, Article 2, Section 24(A)(C) and/or West Virginia Administrative Regulation:

Title ___, Series ___, Section ___ exists as follows:

The Head Gate 22 conveyor belt (section) which is over 1 mile in length is not being maintained properly due to spillage in the walkway, coal dust and coal granules in the walkway as well. In addition, power is present from the belt head to the tail piece.

Type of Issuance: N.O.V. ✓ Order ___

Area or equipment (if order is issued): ___

The foregoing violation shall be totally abated by 8:00 ___ a.m. ___ p.m. on 3-26 20 10

The foregoing violation was totally abated by ___ ___ a.m. ___ p.m. on ___ 20 ___

Action taken to abate the violation: ___

Company / Operator Agent Served: Everett Hogg

Authorized Representative: Gerald W. Parker Inspector No. 134

REVIEW: In accordance with Section 22A-1-17 of the Code, an operator or any representative of the miners may apply to the Director of the Office of Miners' Health, Safety and Training for review of this notice of violation within thirty (30) days from the issued date.

VIOLATION ASSESSMENT EVALUATION

S and S Violation: ☐ **Recommend Special Assessment:** ☐

Likelihood of Occurrence: Unlikely: *(0)___ Reasonably likely (10)✓ Occurred (20) ___

Severity of Injury Expected: None: *(0)___ No lost work days *(6)___ Lost or restricted days (11)✓

Permanently disabling (15)___ Fatal (20)___

* If these are checked in each category, do not go further unless a knowing violation.

No. of Persons Potentially Affected: 0 (0) ___ 1 (1) ✓ 2 (2) ___ 3 (4) ___ 4-5 (6) ___ 6-9 (8) ___ 9+ (10) ___

Negligence: None (0) ✓ Low (10) ___ Moderate (15) ___ High (20) ___

Knowing Violation: No ✓ Yes ___ Repeat ___

Good Faith in Abatement: Lack of good faith (+15%) ___

No compliance (extenuating circumstances) (0%) ___ **Extra effort (-15%)** ___

WVMHST Violation No. 31091, issued March 23, 2010 for accumulation of coal dust under HG22 conveyor belt which runs for close to one mile.

7 Bring the air with you

"They used to say if you go to Headgate 22, bring the air with you 'cause there ain't none up here," said Bobbie Pauley, the only woman employed as an underground miner at the Upper Big Branch mine at the time of the April 5 explosion. When Pauley said "they," she was referring to experienced miners like her fiancé, Howard "Boone" Payne.

Payne, a roof bolter on the Headgate 22 dayshift crew, stood 6'5" tall and had flaming red hair. Friends described him as a "man's man." Pauley said he was honest and direct -- he said what he meant and meant what he said.[1]

A belt fireboss who retired in August 2009 after 43 years in the mines, offered a similar description of his friend. "Boone was a fellow that always said exactly what he thought," he said.

And what Boone Payne thought was that there wasn't enough air on Headgate 22. He complained to a number of people about the problem. "He would talk about how they just didn't have any air up there," the fireboss said.

Roof bolter Michael Ellison recounted a confrontation between Payne and UBB management during the miners' annual refresher training class on February 23, 2010. Ellison said Payne asked Performance Coal Company President Chris Blanchard where the crew would be working after they finished the Headgate 22 panel.

The response was flippant, Ellison recalled, something to the effect that the miners would be on the panel until Christmas because they weren't running enough coal. "That made Boone mad, and he stood up, and he said, 'Well,' he said, 'If you f---'n think you can do any better … you come up there with bad top, no air, and see what you can do.' He was very straightforward. I don't think they [management officials] knew what to say."[2]

Dennis Sims, who previously had worked as a bolter on the Headgate, said he and Payne talked with Blanchard about the lack of air. "We all knew we didn't have enough air," Sims said.[3]

Boone Payne may have been more vocal and direct than most, but he wasn't the only miner who was concerned about the airflow on Headgate 22. Morris Hulgan, a miner with 28 years of experience, said the ventilation "was terrible." There were times, Hulgan said, when the section boss would pull out his anemometer to measure the airflow "and it wouldn't even turn… He pulled us off the section -- and it was like that all the time. You might have a little [air] … and then all of a sudden, you wouldn't have nothing."[4]

Joshua Massey, a roof bolter on the Headgate 22 swing shift, said simply, "There wasn't no air. It's hard to ventilate a place when you ain't got nothing to ventilate it with."[5]

The lack of air on Headgate 22 was not an occasional problem; it was chronic. "They constantly had air problems," said Brian "Hammer" Collins, a section foreman on Tailgate 22.[6] The problems were "very common knowledge," according to Larry Richmond, an electrician on Headgate 22 who had 28 years of experience.[7]

Gina Jones said her husband, Dean, the section foreman, "would come home practically every day telling me he had no air..."[8]

Mrs. Jones said when she asked her husband if he told his bosses about the problem, he replied that he had talked about it with mine superintendents Everett Hager and Gary May, as well as with Blanchard. "He told Chris Blanchard, you know, a dozen times that I know of," Mrs. Jones said. She said her husband told her Blanchard would come up to the section for a short period of time and then leave.[9]

For about six months leading up to the explosion, Dean Jones came home so exhausted, "I'd look over at the dinner table and he would be asleep," Mrs. Jones said.[10] At one point her husband told her he shut down the section for lack of air, and "Chris Blanchard called the dispatcher and told him to tell Dean if he didn't get the section running in so many minutes he would be fired," she said. Being fired was a scary prospect for a man whose 14-year-old son had a serious illness. "Chris

Blanchard knows that my son has cystic fibrosis, he knew my husband needed the insurance and would have to work," she said.[11]

Michael Ellison had been scheduled to work on the April 5 dayshift crew, but, in what he now considers a lucky break, he woke up early that morning gasping for breath. "My blood pressure was sky high. I told my wife … I don't feel good today. And I called in and took a personal day. That's the only reason I'm here," he said.[12]

Ellison, a roof bolter who had been assigned to Headgate 22 early in 2010,[13] said when he started work there, some of the crew members told him he should bring a big supply of water with him because there was no air, and it got really hot. "They told me I better grab me a gallon of water," he said. "And I said, 'No, I've got plenty of drinks in my bucket.' And I got up there, and I couldn't believe it. It literally felt like you were melting. We got up there, and usually we would get started by about 15 after 7 of the morning, and by 8:30, all of us looked like we had been standing out in a rainstorm, just soaking wet."[14]

Ellison said the airflow to Headgate 22 was adversely affected when a new beltline was being put in at the mother drive. "They had our air so messed up at different times that nobody knew where actual air was, you know, coming in from," he said.[15]

Ellison said the airflow improved a couple of weeks before the explosion. "You could feel it get a little bit better," he said. "Some days it would be better. Some days it would be just like it was. They had … little signs that point over for a mandoor and things. You didn't see them moving until about a couple weeks before the explosion, you could see them starting to move. We started getting some decent air. And then it just went right back that way again… The signs didn't even blow."[16]

Bobbie Pauley, who operated a shuttle car for the swing shift on Headgate 22, said the section had ventilation problems from the time they started driving the headgate. "You could never get enough air to the face," she said. "Management kept trying different things. I assume the ventilation changes had been approved. But you don't ruffle a lot of feathers when you work for Massey. If we didn't have enough air, we ran coal."[17]

Pauley said Payne told her that Blanchard was in the mine directing ventilation changes from January to March. "But they're just trying anything, Bobbie," Pauley said Payne told her. "They don't know what they're doing."[18]

Federal and state inspection records for the mine support this view. Upper Big Branch was cited *every* month during 2009 – 64 citations in all (57 from MSHA, seven from the state) – for failure to ventilate the mine according to the approved ventilation plan.[19] Ventilation problems were observed throughout the mine by inspectors in 2009 and early 2010 and included such violations as insufficient air reaching the last open break off the left side of the Headgate section[20]; stoppings with holes in them that caused belt air not to be separated from return air[21]; airlock doors open on both sides[22] and reversed airflow.[23]

Moreover, UBB was cited for the manner in which ventilation changes were made in an attempt to correct or redirect airflow. Because results for making changes to ventilation cannot be predicted, it is considered a cardinal sin to make ventilation changes with miners underground. Nevertheless, a citation issued by MSHA on September 1, 2009, noted:

> "Intentional change in the ventilation system was in the process of being implemented and unnecessary persons were working in the mine. Several required ventilation controls were not yet installed and several ventilation controls were installed but not approved in the ventilation plan 8/6/09. Airflow has reversed in the longwall setup entries and airflow was reversed in neutral aircourses. [Two sections] returned to production on 9/1/09 prior to the completion of the ventilation change…"[24]

Every underground coal mine in the United States is required by law to have a ventilation system approved by MSHA. The West Virginia Office of Miners' Health Safety and Training also must approve ventilation plans for state mines. Any modification to the plan must first be approved by MSHA before a change is implemented. Once the plan is approved, it is the operator's responsibility to comply with the plan.

The ventilation system is designed to push fresh air through the mine, keeping it from being stagnant, preventing the buildup of methane and other toxic gases and removing coal dust. The ventilation system also serves to keep previously mined areas free from any buildup of gases. By law, a mine is required to provide all underground working places with a current of air containing not less than 19.5 percent oxygen, not more

than 0.5 percent carbon dioxide and no harmful quantities of other noxious or poisonous gases.[25]

The ventilation system used at Upper Big Branch is commonly referred to as a push-pull system. In the Upper Big Branch North area of the mine, air is pushed into the mine at the North Portal and pulled through the mine by the Bandytown fan. Once the air has traveled its intended course, it exits the mine through entries at Bandytown and out the return shaft, and at the North Portal and Ellis Portal through designated return entries.

Fresh air and return air are directed through the mine by "ventilation controls" referred to as stoppings, overcasts, regulators, seals and airlock doors. The location, construction and maintenance of these controls are critical to the proper functioning of a ventilation system. Missing controls, poorly constructed controls or controls in need of repair will result in an ineffective or failed system. At Upper Big Branch, physical evidence indicated that ventilation controls were missing at the Ellis Portal construction site. Investigators also found that the airflow traveling to the Bandytown fan from the headgate and tailgate sides of the longwall was restricted because of buildup of water and bad roof.

State, federal and independent investigators were in agreement that Upper Big Branch had an excessive number of airlock doors. Airlock doors are used to prevent air from short-circuiting as people and equipment enter or move into different areas of the mine. Decisions to use doors instead of overcasts may result from the fact that the doors can be installed faster and at less cost to the operator. A problem with using doors is that the air can be short-circuited if the doors are left open, as workers testified was the case on repeated occasions at UBB. Testimony also indicated that the doors were not properly maintained, resulting in leakage in and around them.

Both federal and state regulations require that an operator provide a minimum of 9,000 cubic feet per minute (cfm) of air in the last open crosscut. At least 3,000 cfm must reach every working face. The Upper big Branch ventilation plan called for 15,000 cfm in the last open crosscut. The consistent testimony by a large number of witnesses suggests that this requirement was not being met on the Headgate 22 section. If sufficient air is not provided to a working section, the potential exists for methane buildup and coal float dust accumulations.

The section specific methane dust control plan for the Upper big Branch longwall required a minimum of 40,000 cfm at the intake to the longwall. A minimum of 400 linear feet per minute (lfm) was required at #9 shield, or 50 feet off the headgate. A minimum of 250 lfm was required at #160 shield, or 100 feet off the tailgate. The quantity of air required by regulation and the plan is always the minimum for safe operation. Operators may be required to provide more than the minimum if the situation warrants – and it's something they should do on their own to assure the safety of workers.

An MSHA test conducted before the UBB disaster used smoke to track the current of air on the longwall face. The results indicated that air was traveling in and out of the shields at various locations on the face.[26] This problem usually occurs because there is not enough positive pressure on the gob, and it has the potential for allowing gob air containing methane to get to the face without being detected. While methane monitors are located on the longwall equipment, they do not cover the entire face. Continuous monitoring of air quality and quantity across the longwall face by electronic monitors with the ability to automatically shut down the longwall system would provide a much safer environment for workers.

It should be noted that the fans at the Upper Big Branch had sufficient capacity to adequately ventilate a mine that was as physically large as this one and that had a number of operating sections. The challenge in ventilating such a mine is that the air must be forced and directed through multiple controls to make sure all areas are adequately ventilated.

The push-pull ventilation system at Upper Big Branch also had a design flaw: its fans were configured so that air was directed in a straight line even though miners worked in areas away from the horizontal path. As a result, air had to be diverted from its natural flow pattern into the working sections on the longwall, Headgate 22, Tailgate 22 and the crossover sections. Because these sections were located on different sides of the natural flow pattern, multiple diversionary controls had to be constructed and frequently were in competition with one another.

For example, as a number of witnesses suggested, when the longwall was receiving sufficient air, the Headgate 22 section had very low airflow. The competition for air at Upper Big Branch led to the dangerous practice of ad hoc modifications of the ventilation system by foremen concerned with providing adequate air for

their crews on a day-to-day or shift-by-shift basis. These changes might include opening doors or altering regulators, such as stoppings. This practice deviates from the basic safety tenet of maintaining an overall ventilation plan designed by engineers. If the mine's ventilation plan is not followed by all management personnel, the risk of ignitions from methane can increase substantially.

Methane gas is a natural by-product of decomposing organic matter and is the most hazardous gas found in underground mines.[27] The danger of methane, which has contributed to more than 10,000 miner deaths in the United States since 1925, has been known for centuries.[28]

Since UBB is considered a gassy mine that liberates excessive quantities of methane, attention to ventilation is crucial. Stanley "Goose" Stewart, who operated a continuous miner on the Headgate 22 second shift, told members of the House Committee on Education and Labor at a hearing in May 2010 there were many red flags that had prompted him to tell his wife that UBB was a "ticking time bomb."[29]

"Many things were wrong at the mine, such as low air constantly," Stewart said. "The area of the mine we were working was liberating a lot of methane. Mine management never fully addressed the air problem when it would be shut down by inspectors. They would fix it just good enough to get us to load coal again."[30]

Stewart said he was particularly alarmed on July 26, 2009, when his second shift crew was "told by management to make an air change from sweep air to split air in Headgate 21." He said stoppings were removed while crews were still working. "It scared me," Stewart said, "and when I got home I wrote it down."[31]

In early January 2010 an MSHA inspector noted that Performance Coal's senior management officials showed a "reckless disregard" for worker safety when they told a foreman to ignore a citation the mine received for faulty ventilation.[32]

That inspector was Keith Stone from MSHA's Mount Hope office.[33] Stone, who was assigned to Upper Big Branch for the first quarter of 2010, began his quarterly inspection on January 7 on the Headgate 22 section. As he walked down the primary escapeway, Stone noticed that the airflow wasn't moving in the direction indicated on the map.

Canopies and shields and methane migration

The canopy of a longwall shield is the component that sits on top of the legs of the shield. The canopy is pressurized against the mine roof to support it. It is made of steel and extends over the face conveyor, towards the coal face and behind the legs of the shield on the gob side.

The shields at UBB were 1.75 meters wide and 176 shields extended across the full longwall face. Canopies are tapered in the rear to allow material to slide off of them. Each canopy has four sides, plus the top which is pressurized against the roof, and the bottom, under which miners travel.

This construction allows for openings in the canopy. At UBB, the openings in the canopies were used for a water spray system and space to run a water line to the sprays. In testimony, miners stated that they would store extra bits and sprays at various locations inside the openings.

Since methane is generally found near the roof of a coal mine, it is conceivable that methane could migrate into the canopies of the shields and accumulate to an explosive range. Air used to ventilate the face could travel in a direction that does not sufficiently sweep methane accumulations inside the canopy openings, allowing it to accumulate.

The inside portion of the canopy where methane could accumulate comes within a few feet of the cutting drum of the shearer. If the shearer is cutting rock and producing a large number of sparks, this would provide a heat source for an ignition. Moreover, the methane in these canopies would not flow in the area of the methane monitor. The methane is basically trapped in an area above a monitor and would also not flow close enough to a miner wearing a multi-gas detector.

In April 2011, investigators conducted smoke tests on the shields near the tailgate of the UBB longwall. The tests revealed a "conduit effect" that could allow methane to migrate from the gob area through the canopy void and come in close contact with the cutting drums of the shearer.

"Air flow according to the map, should have been coming inby toward the face," he said. "Air was going outby."[34] When the air split at the crossover, it went down toward the mouth of the longwall and met with the longwall intake. "That air was supposed to be coming up that way towards 22 section, but it had reversed…"[35]

Stone informed UBB foreman Terry Moore, who was traveling with him that day, that the primary escapeway air was backwards. As a result, Stone explained, workers who were trained to exit by that route – the shortest route out of the mine – instead would have to exit by the other intake, which was feeding the section. In the case of a fire or other emergency, miners would have to travel a longer distance and go deeper into the mine before they could exit.[36]

Stone told Moore to immediately withdraw miners from the section. He issued a D2 order, removed the miners from the face and "shut the immediate section down – because their men did not have a safe access to the surface in the event of an emergency."[37]

Stone said Moore told him that he knew about the problem with the airflow. "He stated it had existed for at least three weeks when he took the foreman's job. He informed me that he had mentioned it to the superintendent (Everett Hager)," Stone said. "And he was told not to worry about it."[38,39]

Stone also talked to members of the crew "and they had expressed concern over this condition themselves," he said.[40] "They said they had mentioned it a couple weeks prior to some management officials; they was told it was fine, not to worry about it. I asked them … who they questioned. The names they give me was Chris Blanchard, who is president of the company, and Jamie Ferguson, who was the vice president of the company at that time."

Later that day, after the order was lifted, Stone found air in the belt entry traveling the wrong direction, so he issued another order, this time removing men from the longwall face.[41]

Keith Stone had been a federal mine inspector for less than a year when he was assigned to UBB. It took an immense amount of courage for the young inspector to shut down production and withdraw miners from sections twice during his first trip into the mine. When Performance Coal President Chris Blanchard learned that the Headgate 22 section was shut down, he called Stone on the mine phone to challenge the inspector's findings and argued that the situation was unacceptable. Keith Stone didn't cave. When he found a problem, he took the appropriate action to ensure the safety of workers until the situation was remedied.

The last time Stone went to UBB was to terminate an order for air flow reversal in the tailgate of the longwall issued by Keith Sigmon, a ventilation specialist out of MSHA's Mount Hope office.[42] "The regulator that's shown on this map at the mouth of the longwall tailgate – was not installed and that was one of the contributing factors to the air reversal. It was not letting air feed the tailgate," Stone said.[43] UBB was down two and a half days while workers knocked a stopping and built a regulator.[44]

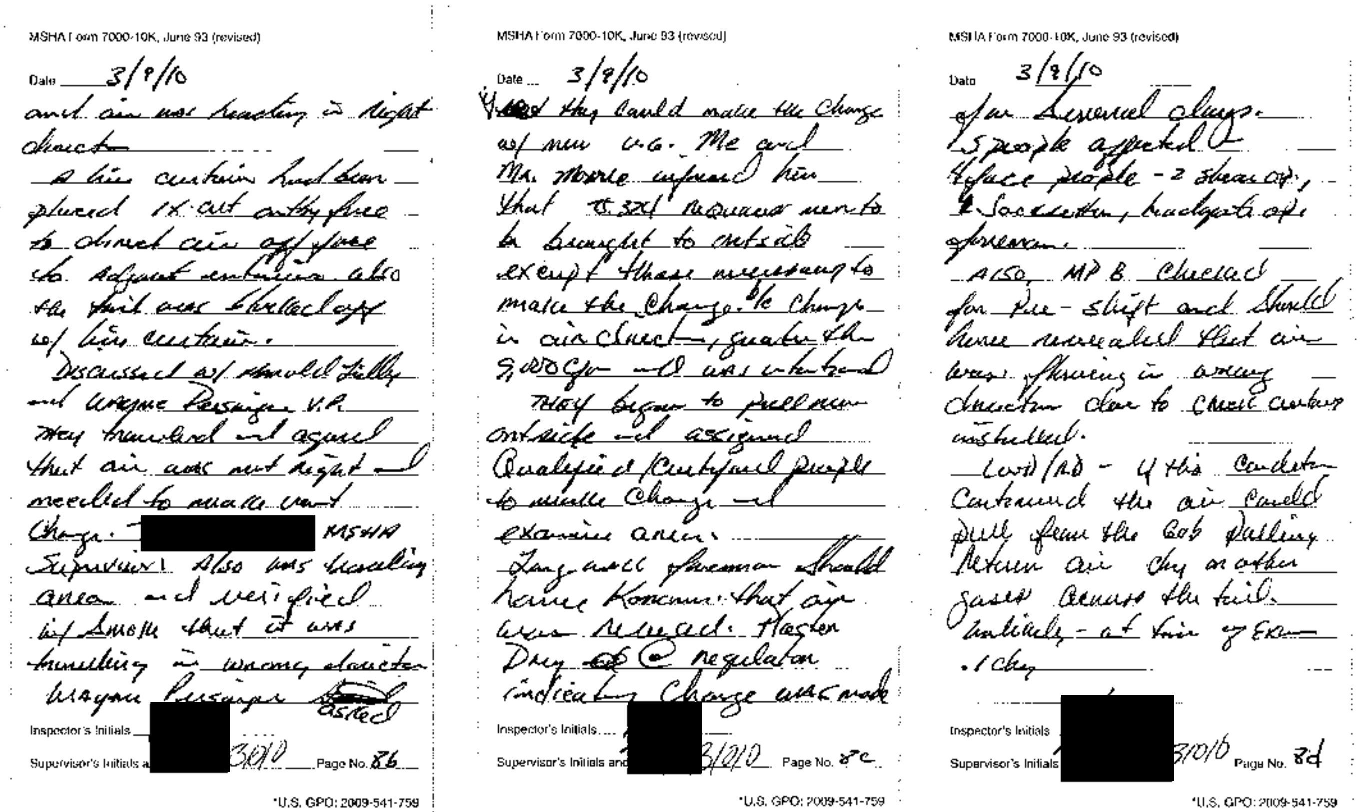
Stone said his greatest concern at UBB was always ventilation. "I don't know if the first day set the tone for that, you know, issuing the two [orders]," he said. "And then you do it again and…. A couple other inspectors issue it, so it's just a recurring thing, you know, and it's hard to stay on top of."[45]

Stone was so concerned that he spoke with the ventilation specialists in MSHA's Mount Hope office. He feared that UBB officials might be engaged in a practice not unheard of in the industry – that of operators manipulating the air during ventilation inspections in order to have plenty of air in the section being inspected at that time. In effect, air is "stolen" from sections that are not being inspected. As the inspection moves to another section, the air is shifted so the air on that section complies with the required ventilation plan.

In response to Stone's request for help, ventilation supervisor Joe Mackowiak sent ventilation specialists Keith Sigmon, Benny Clark and Clyde Gray to UBB on March 9, 2010. Field office supervisor Tom Moore, and a new MSHA trainee accompanied Stone, Sigmon, Clark and Gray. One ventilation specialist was sent to each section with one person staying outby, Stone said.[46]

"Joe wanted to make sure that each section, the longwall and both headgate sections had a … ventilation specialist there to make sure they weren't stealing air, or you know, just make sure they had enough air top right," Sigmon said."[47] "Joe wanted one of us at each section, you know, because if they were changing the air, he wanted us there, all three of us, to make sure that if they knew we were coming, they couldn't do anything.[48]

Sigmon said UBB submitted requests for ventilation plan changes frequently. "I started in ventilation in December,'" he said. "I would imagine, say, since Decem-


MSHA Form 7000-10K, June 93 (revised)

Date 3/9/10

and air was heading in right direction

a line curtain had been placed 1X cut outby face to direct air off face to adjust entries also the tail was barricaded w/ line curtain.

Discussed w/ Harold Lilly and Wayne Persinger V.P. They traveled and agreed that air was not right and needed to make vent change. [redacted] MSHA Supervisor. Also was traveling area and verified w/ smoke that it was travelling in wrong direction. Wayne Persinger asked

Inspector's Initials [redacted]

Supervisor's Initials a[redacted] 3010 Page No. 8b

*U.S. GPO: 2009-541-759

MSHA Form 7000-10K, June 93 (revised)

Date 3/9/10

if they could make the change w/ men U.G. Me and Mr. Morris informed him that 75.321 requires men to be brought to outside except those necessary to make the change. The change in air direct, greater than 9,000 cfm and was w/ [illegible]

They began to pull men outside and assigned Qualified Certified people to make change and examine area.

Longwall foreman should have known that air was reversed. Master Day at @ regulator indicating change was made

Inspector's Initials [redacted]

Supervisor's Initials and [redacted] 3/2010 Page No. 8c

*U.S. GPO: 2009-541-759

MSHA Form 7000-10K, June 93 (revised)

Date 3/9/10

for several days. 5 people affected - 4 face people - 2 shearers, 1 foreman, 1 headgate oper.

Also, MP & checked for pre-shift and should have revealed that air was flowing in wrong direction due to check curtain installed.

Lw/AD - If this condition continued the air could pull from the gob pulling return air, CH4 or other gases across the tail. Initially - at time of Exam - 1 day

Inspector's Initials [redacted]

Supervisor's Initials [redacted] 3/10/10 Page No. 8d

*U.S. GPO: 2009-541-759

Inspector Keith Sigmon's notes from March 9, 2010, report that he discussed air reversal with Massey officials Harold Lilly and Wayne Persinger, who agreed that the air was not right and needed to make ventilation changes. Persinger asked if they could do it with men underground. Sigmon advised that federal law required that workers be brought outside. Sigmon warned that this was a dangerous situation and, if the reversal continued, "the air could pull from the gob pulling return air, CH4 or other gases across the tail." [redactions made by MSHA]

ber 30, probably 20-some revisions went through our ventilation department." He said he had cited the mine a couple of times for using a ventilation plan that had not been approved.

Before working for MSHA, Sigmon worked for CONSOL Energy, where the mines had resident engineers and survey crews. "And so here, you deal a lot with Massey operated coal mines, especially out of Mount Hope," he said. "And so it was a culture shock to me that they were not engineered as well."[49]

Sigmon said he believed Massey was "well understaffed in all their engineering department. They've got a lot of young engineers who seem to be hard workers but just not the knowledge level that they need to be at probably, you know. I always said this mine needs a resident engineer … they need somebody there constantly, but that's something you don't see, you know, is resident engineers at any of the mines."[50] Eric Lilly, who invoked his Fifth Amendment right against self-incrimination and declined to be interviewed, was assigned to UBB as resident engineer in the six months leading up to the explosion.

Richard Kline, the assistant district manager for MSHA's Mount Hope office, expressed concern about troubling trends he had witnessed with respect to engineering in the industry as a whole. "I don't think we have the engineers in these mines that we used to have," he said. "We're not engineering mines. They're trying to use duct tape to fix things instead of engineering. They're not taking the time to look ahead at what they have."[51]

Testimony from members of Massey's Route 3 Engineering work force support Sigmon's and Kline's characterization of the perception that inadequate engineering was being done by people who had very little experience. Of those interviewed, Heath Lilly said he had very little involvement with the UBB mine; Raymond Brainard said he traveled underground at UBB only once every couple of years; Matthew Walker had never been underground at UBB. Keith Trent and Daniel Snodgrass both said they had no degrees, only on-the-job training. Trent had been underground one time in the previous eight years and Snodgrass hadn't been underground in two years.

Mackowiak said he was aware that Keith Stone had cited UBB for the low airflow on Headgate 22 in early March. "I found that shocking the first time it was issued because the mine is basically sitting on top of a bleeder fan, and, therefore, should've had plenty of operating volume."[52] Given the location of the mine's fans, it should have had sufficient air.

The second time it occurred, Mackowiak picked up the telephone and called Bill Ross, a former MSHA ventilation specialist and Mackowiak's one-time boss, who had taken a position with Massey.

"He'd asked me on several previous occasions that any time there was a problem to give him a call and he would be more than happy to go to that mine and help," Mackowiak said. "So I called Bill Ross … and I said there is a problem, here's what it is, low operating air volume on Headgate 22. This is the second time that's happened and it's inexcusable."[53]

Mackowiak recalled that Ross told him he'd love to go to UBB, but "they won't let me." Mackowiak said when he asked Ross who wouldn't let him, "he stated it was Chris Blanchard."[54] Ross suggested that it might help if Mackowiak emailed Massey Energy's senior Vice President and Chief Operating Officer, Chris Adkins, asking for Ross's assistance. Mackowiak said he did so on March 17.[55]

The following email exchange took place:

> Mackowiak to Adkins, March 16, 2010, 1:40 p.m.: *"Low air on the headgate section again, despite last week's shut down. I called Bill Ross and he is on another project right now. I think they could use some help. Good luck.*
>
> Ross to Mackowiak, March 16, 2010, 2:32 p.m.: *"What's the verdict?"*
>
> Mackowiak to Ross, March 17, 2010, 5:37 a.m.: *"I haven't received a reply yet."*
>
> Ross to Mackowiak, March 17, 2010, 7:30 a.m.: *"What did you say to him? I want to help out at the mine if they will listen."*
>
> Mackowiak to Ross, March 17, 2010, 7:44 a.m.: *"I emailed him and told him that the headgate was out of air again despite last week's shutdown. I called u and u were on another project, and they seemed like they needed some help."*[56]

Mackowiak admits that reaching out to Ross was "out of the ordinary" but his intent was not to interfere with an order issued from an inspector. "My purpose in doing that," Mackowiak explained, "I wanted to supplement that order and essentially elevate this issue from a mine level to a corporate level to where someone would respond to this appropriately, because the second time I have a low – low operating air volume on a section is inexcusable."[57]

In Mackowiak's view, Massey took a "band-aid approach" to ventilation. "As an inspector would find issues in the mine, and they would issue violations or citations and orders, the company would react to that with generally a plan change, but you would only see a small component of it, whatever was necessary to abate that condition and then move on," Mackowiak said. "And that was done a myriad of times."[58]

Beginning on December 18, 2009, Massey and MSHA discussed ventilation changes in the Upper Big Branch mine in a series of meetings and written communications. The Governor's Independent Investigation Panel made repeated and numerous requests of MSHA for records relating to these communications. The GIIP's interest was in determining the veracity of Massey Energy's claims that the ventilation problems at UBB were caused by MSHA.[59] In public statements, Massey CEO Don Blankenship asserted that MSHA forced UBB to institute ventilation changes with which the company disagreed.[60]

The GIIP initially requested MSHA's records related to UBB's ventilation plan submissions and the agency's denial letters in mid-July 2010. MSHA provided some records on March 31, 2011. Based on a review of the documents provided by MSHA, the GIIP found no evidence to suggest or support any company officials' assertions to MSHA's ventilation plan requirements for UBB would make the mine less safe or put miners' lives at risk. Nor did GIIP investigators identify any records indicating that UBB management or Massey Energy officials expressed such a concern to MSHA.

Mackowiak pointed out that federal regulations call for operators to develop and follow a ventilation plan "and a plan revision is necessary when it's – basically can have a material effect on health and safety." In Mackowiak's view, any time the company "would reverse an air course, change its direction or change its type from intake to return or return to intake," the action would have a material effect on health and safety.[61]

Mackowiak said Massey submitted revisions at

such a quick pace that often multiple changes were occurring, with no mechanism to track the changes other than quarterly inspections.[62]

"I receive more pressure for plan approvals from Massey subsidiaries than the entire rest of the district mines combined, and that's not just this mine. This mine was fairly bad with regard to that. The other mine that is the worst in the district would be the Justice Mine, which is also a Massey Energy subsidiary," Mackowiak said, adding that there were "three or four plans" pending for UBB at the time of the explosion.[63]

MSHA district officials were so frustrated with Massey's actions with regard to annual ventilation maps that the district actually changed its procedures.

Previously, MSHA allowed operators three submittals before the agency issued a violation. "Well … it took four separate submittals in order to approve that map," Mackowiak said of Massey's 2009 submission. "So it took 11 months to get an annual map. So as soon as an annual map was acceptable at this location, one month later they would do their next annual map. To say the least, I was upset."

According to Mackowiak, because of the ongoing problems with Massey, MSHA changed its policy so that the agency no longer allowed three submittals before issuing a violation. Violations could be issued on the first submittal if "there was a ventilation issue shown on the map that could materially affect health and safety." That was, according to Mackowiak "exclusively due to the poor submittals from Upper Big Branch Mine."[64]

1 Personal communication with Bobbie Pauley, April 30, 2010

2 Michael Ellison testimony, p. 59

3 Dennis Simms testimony, p. 52

4 Morris Hulgan testimony, p. 18

5 Joshua Massey testimony, p. 17

6 Brian Collins testimony, p. 52

7 Larry Richmond testimony, p. 32

8 Gina Jones testimony, p. 11

9 Gina Jones testimony, p. 12

10 Personal communication with Gina Jones

11 Gina Jones testimony, p. 14

12 Michael Ellison testimony, p. 77

13 Michael Ellison testimony, p. 18

14 Michael Ellison testimony, p. 21

15 Michael Ellison testimony, p. 27

16 Michael Ellison testimony, p. 33

17 Personal communication with Bobbie Pauley, April 30, 2010

18 Bobbie Pauley testimony, p 87

19 Federal MSHA standards: 75.320 (air quality detectors and measurement devices), 75.323 (actions for excessive methane), 75.325 (air quantity), 75.333 (ventilation controls), 75.337 (construction and repair of seals); State of West Virginia standards: 22A-2-2 (Plan of ventilation); and 22A-2-4 (Ventilation of mines in general).

20 Citation No. 8072754, July 8, 2009

21 Citation No. 6612472 , July 15, 2009

22 Citation No. 8080099, October 28, 2009

23 Citation No. 8100144, December 30, 2009

24 Citation No. 6612936 , September 1, 2009

25 West Virginia Underground Mining Laws, Rules and Regulations22A-2-4 (a); MSHA 30 CFR 75.321

26 Keith Sigmon testimony, p. 18; Clyde Gray testimony, p. 12

27 *Dictionary of Mining, Mineral, and Related Terms*. Washington DC: US Department of Interior, Bureau of Mines, 1968

28 *Historical Summary of Mine Disasters in the United States, Volume I, Coal Mines* (1810-1958), Washington DC: US Bureau of Mines, 1960; and *Volume II Coal Mines* (1959-1998) Beckley WV: Mine Safety and Health Administration, 2000.

29 Stanley Stewart before the U.S. House Committee on Education and Labor, May 24, 2010

30 Stanley Stewart before the U.S. House Committee on Education and Labor, May 24, 2010

31 Stanley Stewart before the U.S. House Committee on Education and Labor, May 24, 2010

32 *The Washington Post,* Steven Mufson, April 23, 2010; MSHA Citation No. 8087709, January 6, 2010

33 Jerome Keith Stone testimony, p. 12

34 Jerome Keith Stone testimony, p. 22

35 Jerome Keith Stone testimony, p. 23

36 Jerome Keith Stone testimony, p. 24

37 Jerome Keith Stone testimony, p. 25

38 Jerome Keith Stone testimony, p. 26

39 This is also noted on the citation, Citation No. 8087709, dated 1/7/2010. The citation says, "Terry Moore, mine foreman, state he was aware of this condition and that it has existed for approximately three weeks."

40 Jerome Keith Stone testimony, p. 26

41 Jerome Keith Stone testimony, p. 32

42 Jerome Keith Stone testimony p. 50

43 Jerome Keith Stone testimony, p. 51

44 Jerome Keith Stone testimony, p. 52

45 Jerome Keith Stone testimony, p. 56

46 Jerome Keith Stone testimony, p. 55

47 Keith Sigmon testimony, p. 12

48 Keith Sigmon testimony, p. 56

49 Keith Sigmon testimony, p. 82

50 Keith Sigmon testimony, p. 54

51 Richard Kline testimony, p. 14

52 Joseph Mackowiak testimony, May 18, 2010, p. 25

53 Joseph Mackowiak testimony, May 18, 2010, p. 26

54 Joseph Mackowiak testimony, May 18, 2010, p. 26

55 Joseph Mackowiak testimony, May 18, 2010, p. 26

56 Email exchange provided by MSHA

57 Joseph Mackowiak testimony, May 18, 2010, p. 27

58 Joseph Mackowiak testimony, May 18, 2010, p.13

59 MSHA provided in March 2011 some of the documents we requested. We learned from career agency staff that our request reached a standstill in the Office of the Assistant Secretary or further up the Department of Labor's chain of command. We confirmed with the US Department of Justice that they were not the cause of the delay.

60 e.g., Don Blankenship testimony before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, May 20, 2010; Don Blankenship letter to Governors of IL, KY, VA, WV, June 7, 2010

61 Joseph Mackowiak testimony, May 18, 2010, p. 14

62 Joseph Mackowiak testimony, May 18, 2010, p. 14

63 Joseph Mackowiak testimony May 18, 2010, p. 32

64 Joseph Mackowiak testimony, May 18, 2010, p. 17

8 The footprint of a disaster

Every mine explosion leaves behind a footprint that offers clues to investigators as to where the blast originated and how the force traveled from the ignition point. Conflicting theories have been put forth as to whether the April 5, 2010, explosion at the Upper Big Branch mine was triggered by methane or natural gas; whether it was solely the result of an immense methane inundation; or whether coal dust aided in propagating the blast.

Massey Energy's assertion is that the explosion was caused by a massive and unforeseen inundation of methane or natural gas from a crack in the mine floor. In a report to President Obama released on April 27, 2010, MSHA officials offered the opinion that the UBB explosion was caused by "the combustion of accumulations of methane, combined with combustible coal dust mixed with air."

Although both theories were put forth before investigators had been allowed to enter the mine, MSHA looked to the past to find answers. "Historically," the April 27 report stated, "blasts of this magnitude have involved propagation from coal dust. When methane and coal dust levels are controlled, explosions from these sources can be prevented."[1]

The footprint left behind in the Upper Big Branch mine supports MSHA's theory. It tells the story of an explosion that started with the ignition of a small amount of methane gas and then was fueled by coal dust that had been allowed to build up for miles through the mine.

When a mine explodes suddenly and with great force, as happened at Upper Big Branch, methane is immediately suspected as a primary source. Odorless, colorless and highly combustible, methane is the most common hazardous gas found in underground coal mines. Created naturally by the decomposition of organic materials – the same process that creates coal – methane is lighter than air and tends to rise to the roofs of mines. It can migrate into voids in the earth created when coal seams are removed.

Because methane is universally recognized as highly explosive, mine operators are required to keep levels under one percent of the mine's atmospheric content. Concentrations between 5 percent and 15 percent pose the greatest threat of explosions, with the most explosive mixture at 9.5 percent.

Methane explosions occur when a buildup of methane gas comes into contact with an ignition source, such as a flame or spark. Because sparking is common in the mining process, history is replete with methane explosions.

Small methane ignitions do not have to turn into major explosions if mine operators adhere to basic safety measures, such as maintaining adequate ventilation systems, removing explosive coal dust from mining operations, spreading required amounts of rock dust and ensuring that water sprays on mining equipment are kept in good repair and function properly. Because these basic safety systems failed at UBB, a minor flare-up of methane led to the nation's worst coal mining disaster in 40 years.

The footprint of an explosion caused by natural gas is not dramatically different from that of one caused by methane. Methane and natural gas have similar, but not identical, chemical composition, and both occur naturally in underground mines. Methane is the primary gas in natural gas, making up approximately 90 percent of its content. Because natural gas also contains other hydrocarbons, such as hydrogen, ethane, propane and butane, the explosive range for natural gas is slightly lower than that of methane.

The composition of the gas has an effect on flame heat and speed, and it has an effect on the amount of coking that can be produced in an explosion. However, because natural gas is primarily methane, the

Forensic soot and dust sampling

After a coal mine explosion, an effort is undertaken to determine its cause and what factors, such as coal dust or methane, contributed to the explosion. Over the past 100 years of mining in the US and throughout the world, techniques have been developed for collecting and analyzing forensic evidence. The dust or soot left behind after an explosion is key physical evidence used by investigators to determine the cause of the blast.[1,2]

Typically, three types of dust or soot samples are collected: channel, band and spot.[3] Channel samples are taken from the area of the mine near to where the ignition may have occurred. Each channel sample is analyzed and the percentage moisture, volatile matter, fixed carbon and ash are determined. The "volatile ratio" is calculated using the volatile matter and fixed carbon.

Band samples, collected from the mine floor, ribs and roof at 100 foot intervals, are taken throughout the explosion zone and in locations far beyond it. Each sample is evaluated and provides two pieces of data: the degree of coking and the percent incombustible content. Coking is determined using the "alcohol coke test," which identifies trace, small, large or extra-large quantities of coke in each sample. The alcohol coke test was used by the US Bureau of Mines (BOM) dating back to 1940. The technique has been improved over the years, and it is considered the best available method to determine the presence of coke.

The percentage of incombustible content of the dust samples also provides key forensic evidence. When coal dust and rock dust are mixed, the post-explosion incombustible content is higher in the post-explosion mixture than the pre-explosion mixture. The volatile content of the mine dust decreases because of the post explosion flame, leaving ash with higher incombustible content.

Lastly, spot samples are taken after an explosion, generally in places were an ignition may have occurred. In cases where there is trace or no coke accumulations, spot samples can help distinguish areas where no flame occurred. The alcohol coke test is used to identify the extent that a sample was exposed to flame.

Evidence from experimental coal dust explosions indicates that coke is not formed where the mine dust contains more than 50% incombustible content.[4] When coke is found in samples collected after an explosion, it tells us that the application of rock dust was inadequate and failed to meet mandatory standards for incombustible content. In a 1922 US BOM bulletin, mining engineers noted that coal dust is coked by a slow-moving flame.[5] In areas where the flame velocity is high, little or no coke is produced.[6] That evidence is consistent with the forensic evidence collected at UBB, where the explosive heat passed so quickly that no coking occurred.

At UBB, 1,803 samples were collected by teams of at least 30 individuals working over a period of three to four weeks. The samples were analyzed at MSHA's analytical laboratory at Mount Hope, WV and at an independent commercial laboratory in Illinois. A large number of samples showed high flame and coke. There was simply not enough rock dust applied at UBB. [See Soot and Coking map – source: MSHA]

1 U.S. Department of Labor, Mine Safety and Health Administration, Dust Sampling and Laboratory Testing Procedures after Underground Coal Mine Explosions, 1996.

2 Massey Energy issued a press statement on September 17, 2010 asserting that the sampling and analytical methods used to evaluate post-disaster soot and dust are "faulty" and "unproven." The company cites litigation between MSHA and Jim Walter Resources, Inc., (JWR) related to citations issued following the September 2001 disaster in Brookwood, AL that killed 13 miners. The circumstances leading to the JWR and UBB disasters were significantly different, as were the post-disaster mine conditions. For example, in order to extinguish and control volatile mine fires in JWR #5, 30 million gallons of water were injected into the mine workings. As a result, dust and soot were moved about in the mine, and later moved again (or removed altogether) over a month-long period when the water was drained. In addition, the coal in UBB and JWR #5 had substantially different friability levels, which relates to the ease at which the coal crumbles. As measured by the Hardgrove Grindaility Index (HGI) the coal at JWR #5 had an HGI of greater than 90 (highly friable), while UBB's HGI ranged from 55 to 62. Moreover, following the JWR disaster, 88 tons of rock dust was applied inside the mine post-disaster and prior to the forensic sampling. At UBB, no additional rock dust was applied before the forensic samples were collected.

3 U .S. Department of Labor, Mine Safety and Health Administration, Dust Sampling and Laboratory Testing Procedures after Underground Coal Mine Explosions, 1996.

4 Ibid.

5 Bureau of Mines Bulletin 167, Rice, G.S., Jones,L.M., Egy W.L., Greenwald, H.P., *Coal-Dust Explosion Tests in the Experimental Mine, 1913-1918*, Inclusive, 1922.

6 U.S. Department of Labor, Mine Safety and Health Administration, Dust Sampling and Laboratory Testing Procedures after Underground Coal Mine Explosions, 1996

difference between methane explosions and natural gas explosions can be measured only in slight degrees and is not significant.

One of the reasons investigators suspected that the April 5 explosion involved methane is that the Upper Big Branch mine had a history of methane inundations and outbursts reaching back to 1997. The Eagle 3 Seam has a history of liberating methane and experiencing gas inundations.

Miner Stanley Stewart, who was on his way underground when UBB blew up, also was present for the first such incident on January 4, 1997, which involved a series of explosions on the tailgate side of the No. 2 West longwall panel in the gob area behind the shields.[2]

In his detailed report released on July 14, 1997, MSHA inspector Ernie Ross, Jr., concluded that the explosions occurred when a flammable methane/air mixture was ignited by heat and/or sparks generated by a fall of the sandstone/shale behind the longwall shields.[3]

"I thought I was a dead man that day," said Stewart, a utility man who was positioned at No. 174 shield when the shearer cut out at the tailgate entry.[4] After hearing what he believed to be a roof fall behind the shields, Stewart looked toward the tailgate entry and observed a bright red glow. He pointed in the direction of the glow, alerting tail end shearer operator Ricky Ferrell. Ferrell reported seeing an orange glow where Stewart was pointing.

As Stewart began to run away from the glow and toward the headgate, he felt heat around his legs and saw smoke coming from behind the shields. Ferrell de-energized the shearer and observed a flash from behind the shields. The hair on the back of Ferrell's neck and hands was singed from the heat.[5] As Ferrell proceeded toward the headgate, he encountered light smoke and called for the power to be de-energized on the face.

The head shearer operator was at the No. 170 shield when he saw a bright flare-up past the end of the shields in the tailgate return entry and felt the heat on the back of his neck. He saw a big ball of fire.

Foreman Jack Roles (UBB's longwall coordinator and supervisor on April 5, 2010) was at the No. 160 shield when he heard a roof fall and saw a flash at the tailgate. Roles telephoned the surface and informed longwall coordinator John Hubbard that a possible ignition had occurred at the tailgate. Hubbard directed Roles to remove the men from the longwall, de-energize the power and increase the ventilation.

Roles made sure workers were leaving the area where the ignition had occurred. He instructed the men to go to the headgate and increase the ventilation along the face line.

Chief electrician Elmer Blair had been working at No. 150 shield when he heard the roof fall and noted an odd odor, which he described as similar to the smell of old works. Blair then felt an increase in air temperature.[6]

The miners traveling from the tailgate arrived at Blair's location and told him something "blew up." Blair instructed David Flowers, an electrician stationed at the headgate, to de-energize the power to the longwall.[7] The crew installed additional ventilation controls and traveled to the surface approximately ten minutes later. Roles and Blair remained underground to check the tailgate for methane and a possible damaged power cord. After making the methane checks, Blair observed a flash – the second such incident – near the bottom backside of the No. 174 shield. As Roles and Blair proceeded toward the headgate, a third incident occurred, which both men felt "bucked the air" as they passed the No. 36 shield.[8]

Methane inundations occurred again in 2003 and 2004 at Upper Big Branch. A July 3, 2003, episode was blamed on a "mountain bump" near the #16 longwall working section.[9] "Mountain bump" is a term associated with seismic jolts most common in the deepest mines where pillars hold the most weight.[10] As the bump occurred, the mine floor began to hoove, causing fractures in the floor along the longwall face. High concentrations of methane were released into the atmosphere.

MSHA's report on the 2003 inundation determined that the bleeder system was inadequate.[11] When working properly, the bleeder system dilutes methane-air mixtures and other gases and moves it away from active areas. MSHA issued a citation because fan charts showed disturbances for six weeks prior to the inundation, noting that the disturbances were indicative of problems with the gob. In an eerie foreshadowing of April 5, 2010, MSHA investigators found that the problems were most likely due to the amount of water that had been allowed to build up in the gob area. Another citation was issued because the airflow was traveling in the wrong direction to the longwall.[12]

On February 18, 2004, a floor methane outburst

occurred along the 17 longwall panel. When he arrived at the area, former UBB Superintendent Wendell Wills described the sound as "like a train in a tunnel."

"It was so loud coming out of the bottom," Wills said. "The bottom had busted, and … you could look down the pan line of the longwall and you could see – it looked like road heat coming off the road, coming out from the jacks."

Wills said the mine was evacuated and he "stayed there monitoring to see if it was going to quit or what was going to happen and make sure we had good ventilation. They called me outside, and we proceeded then to re-ventilate."

State Inspector Gerald W. Pauley issued a control order at 1:00 p.m. on February 18, 2004, citing "an inundation of methane" on the longwall section. The control order was modified several times before being lifted on February 20 at 3:30 p.m. "due to good air flow" and methane readings that were consistently below one percent.[13] While the section was closed down, stoppings were built and air was directed across the longwall to a fan behind the North Mains, Wills said.[14]

In the aftermath of this inundation, MSHA asked three mining engineers and a geologist to address the situation. The officials subsequently issued two memoranda, one on March 4, 2004, and the other on July 15, 2004. The March 4 memo concluded that several factors may have contributed to the fracture formation from which methane was released in both 2003 and 2004, including overburden and interburden size, location of a barrier pillar and a zone of geologic weakness.[15]

The memo stated, "Although these factors may have influenced the formation of the floor fracture, the source of gas is more likely to be a pressurized geological reservoir, rather than bleed-off from a coal seam. Thus, the Lower Eagle seam may have trapped gas beneath structurally high areas, but it is less likely that the Lower Eagle seam is the actual source of the gas."[16]

The July 2004 memo stated that there were numerous gas wells on the property below the Eagle seam and "consequently methane trapped in zones below the Eagle seam could be released into the mine through fractures opened by longwall extraction."[17] The first memo noted that the company had proposed degasification wells for the next longwall panel; the second memo explained that because "locating and degassing the floor methane zones is highly problematic; the historic means for handling the situation relies on contingency plans to mitigate" a methane inundation.[18]

The second memo was addressed to MSHA's acting District 4 manager. It offered specific recommendations for addressing the situation that were shared with Performance Coal management in a meeting held on May 26, 2004. These recommendations included increasing airflow on the longwall face; ensuring adequate ventilation in the longwall bleeder system; making sure work crews were aware of conditions associated with the occurrence of an outburst; using precursors to indicate that a floor outburst may be about to occur; restricting welding and cutting activities in areas that have a high probability of floor gas outbursts; developing a plan for sealing fractures after outbursts occur; and, in the event of an outburst, sample the gas and analyze it for hydrocarbons.[19] The Governor's Independent Investigation Panel did not identify any evidence to suggest that Performance Coal managers implemented the recommendations[20] or that MSHA officials either urged or required them to do so.

On April 26, 2010, Massey Energy board member Stan Suboleski, who is a mining engineer, said that "methane was not detected at the working face of the longwall" shortly before the April 5 explosion.[21] In July, the company advanced the theory that high levels of methane or natural gas poured into the mine through a massive crack in the floor, overwhelming the mine's ventilation system and triggering the blast. Company officials pointed to the earlier inundations to support their theory of a sudden outburst of methane.[22]

Massey CEO Don Blankenship entered the debate when he spoke at the National Press Club on July 22, 2010. "I'm a realist," Blankenship told the audience. "The politicians will tell you we're going to do something so this never happens again. You won't hear me say that. Because I believe that the physics of natural law and God trump whatever man tries to do. Whether you get earthquakes underground, whether you get broken floors, whether you get gas inundations, whether you get roof falls, oftentimes they are unavoidable, just as other accidents are in society."[23]

The issue of a massive, unforeseen inundation is significant from a legal standpoint because mitigating factors can excuse or decrease the liability of a mine or business owner following a disaster such as occurred at Upper Big Branch. If, for example, it were determined that the explosion and deaths were the result of an "act of God" – something over which the owner had no control and could not have predicted, the company could

argue that it would have no legal liability.

In this case, however, even if the cause of the explosion had been found to be an infusion of natural gas or methane into the UBB mine atmosphere, such an event was entirely foreseeable. The previous incidents in 1997, 2003 and 2004 were well documented and should have served as ample warning for the company and provided an incentive to develop and follow a plan to deal with future outbursts.

On August 11, 2010, Massey released to the news media photos of the crack that company officials said was the source of the alleged inundation. In a meeting with family members the week before, they described it as some 100 to 150 feet long and contended that it offered evidence that the disaster could not have been prevented.[24]

MSHA, the WVMHST and the Governor's Independent Investigation Panel responded to Massey's assertion by conducting a detailed investigation of the crack. MSHA geologist Sandin Phillipson measured and checked the crack to determine if it could be the source of an inundation so great as to cause one gigantic methane or natural gas explosion. The joint investigation team found the crack, located directly in front of the tail drum of the shearer, to be 36 feet long, 4 to 5 inches deep and the result of geologic stresses caused by longwall mining.

Cracks in mine floors occur because of bottom hooving resulting from geologic stresses or pressures on the coal pillar, which in turn cause the floor to push upwards. Several factors can influence bottom hooving, including over and/or under mining, coal block design and second mining. Examinations conducted in various parts of the mine during the investigation suggest that bottom hooving was a common occurrence at the Upper Big Branch mine.

Phillipson found that the crack identified by the company did not go into a void but stopped at the sandstone formation two or three layers down. He said that the strata directly below the crack had not been disturbed and did not show any signs of cracking or fracturing.[25]

During their lengthy underground investigation, investigators never detected methane from the crack identified by the company. MSHA coal administrator Kevin Stricklin said, "It wasn't a massive crack. It was what you would typically see in a longwall mine."[26]

Members of the Governor's Independent Investigation Panel who participated in the underground investigation likewise found no evidence that the aforementioned crack was different from any number of cracks in the mine floor. "There were," one said, "cracks all over that floor."[27]

During the course of the investigation, however, investigators did detect methane on a regular basis in cracks directly behind the shields in the area of Shields #160 to 162. This finding supports the theory that the explosion started, not with an inundation from the crack in the floor identified by Massey, but at the tail of the longwall where these shields were located.

Another item of evidence that contradicts the "big crack" theory is that dust sampling conducted by MSHA during the investigation indicated that a flame did not travel across the longwall face. If, as Massey officials maintained, one million cubic feet of methane had been suddenly released at the tailgate of the longwall, the result would have been a five million cubic foot flame going across the face and throughout the tailgate entries in both directions. Evidence found during the investigation does not suggest a force of this magnitude. While a very violent and strong force occurred in the tailgate area, causing metal covers from the tail drive to be blown a great distance down the face, supplemental supports and portions of stoppings were still in place. This infrastructure would have been demolished in a methane blast of the magnitude described by Massey officials.

On the contrary, the distance the force traveled in Upper Big Branch and the damage created in different areas of the mine offer persuasive evidence of the role of coal dust in spreading the explosion.

Analysis of extensive dust sampling indicates the presence of flame in the 8 North and 9 North areas and also on the Headgate 22 continuous miner section. The deepest point of penetration on 9 North was almost a mile from the longwall. The flame did not propagate, or spread, in the 6 North and 7 North areas of the mine, suggesting that the flame speed was slower in these areas.[28]

Evidence and examination of the Headgate 22 section indicates a very powerful force that traveled on to the section and back out. The faces, the deepest points of penetration on Headgate 22, are almost 6,000 feet away from the longwall tailgate.

Even at this distance from the point of ignition, the force was great enough to blow two metal canopies

Evidence of the force of the explosion was left in the mine.

off of the section mantrip and hurl them for hundreds of feet in opposite directions. The power of this force suggests an explosion that gained strength and size as it traveled from the longwall tailgate, fueled by coal dust along the way. Analysis of the dust samples taken from Headgate 22 after the explosion also offers evidence that the company was not in compliance with the required rock dusting standards on this section. This inadequate rock dusting allowed coal dust to provide fuel for the explosion to continue to gain force as it traveled in and out of this section of the mine. (see Soot and Coking Map)

Descriptions of the explosion by surviving miners also support the theory that both methane and coal dust were involved.

One of them was Stanley Stewart, who had been heading underground at the time of the explosion. Stewart said as he emerged from the mine, he could see air "still whooshing out…. It was still strong." He estimated that the wind blew for at least two minutes.[29]

Ultimately, the footprint left behind in the Upper Big Branch mine and the testimony of survivors supports the initial theory that the explosion started with methane and fed on coal dust as it tore through the mine. The footprint, supported by witness testimony, also offered concrete evidence that Massey Energy failed in its responsibility to provide a safe workplace for its workers.

Mining is an industry, which, by its very nature, must address adverse geological and physical conditions. Meeting those challenges requires extensive advanced engineering. Both evidence in the mine and testimonial evidence suggests that Massey Energy's management failed to properly ventilate UBB because they did not have adequate resources, knowledge and/or capability to develop a sound, workable ventilation plan to address the particular circumstances of UBB.

The ventilation system for a mine with a history of methane infusions such as those experienced at Upper Big Branch must be capable of removing even a large gas inundation. The troubled ventilation system at UBB was incapable of providing sufficient air to sections and to the longwall. It certainly was not robust enough to handle a massive influx of natural gas or methane.

Likewise, the company did not place enough emphasis on rock dusting and maintenance of equipment. Even full compliance with federal and state rock dusting standards may not have prevented the initial ignition on the tail of the longwall. However, a well dusted mine would have put the brakes on a propagating explosion and the death toll would have been significantly less.

Furthermore, investigators examining the shearer on the head and tail drums of the UBB longwall found numerous missing, plugged and poorly maintained water sprays. These sprays, when working properly, are vital to safe longwall operation. Effective water sprays create a mist that can extinguish sparks generated when the cutting bits on the shearer strike rock adjacent to the coal seam; dilute or douse methane ignitions created when sparks come in contact with explosive methane gas; knock down coal dust generated by the shearer's cutting action; and keep parts of the longwall machinery cool as it cuts through the coal and rock.

When sprays become clogged, a short-term solution is to remove the nozzle entirely. While this takes away the misting spray, it allows water to come out onto the shearer drums, cooling the shearer motor so that it doesn't overheat and ultimately burn up.

At UBB, of the 23 sprays on the head drum visible to investigators, nine were plugged; of the 30 sprays on the tail drum visible to investigators, seven were totally missing. Some other sprays were found to have been rendered ineffective because, in an effort to unclog them, the nozzle openings had been widened. When spray nozzles are removed or the openings widened, they no longer provide a fine spray. Instead the water gushes out like a water hose. Not only is the effective mist of water lost, the water pressure to the other sprays is altered, making them less effective.[30] When investigators tested the water sprays on the UBB longwall, there was not enough water pressure on the tail drum to even produce a reading.

Coal mining operations, especially those with longwall mining equipment, require a large quantity of water, and in many locations it is common for mine operators to draw water from nearby streams and rivers, and private wells. UBB pumped water into the mine from the nearby Coal River and from underground wells nearby. River water, while close at hand and inexpensive, contains sediment, which has a tendency to clog water sprays if not filtered properly. Modest efforts were made at UBB to design and use filters to screen out sediment, but, like other maintenance tasks, the filters were neglected. Investigators heard testimony and examined physical evidence indicating that the screen and sock filters were frequently plugged so much so that the water flow to the machinery was reduced.[31] On the UBB longwall in particular, the river water was not filtered adequately, sediment reached the sprays, lodged directly in spray points and clogged them.[32]

If all the water sprays had been properly maintained and had been functioning as intended – creating a fine mist of water at the shearer nozzle point – and if rock dust had been properly applied, any ignition of methane that occurred likely would have been extinguished at its source.

Ultimately, 29 miners lost their lives in the Upper Big Branch mine because these safety systems failed in a major way. Massey Energy failed to maintain an adequate ventilation system at Upper Big Branch. The company failed to maintain its equipment. It failed to properly rock dust the mine. If those basic matters of safety are effectively practiced, there is no reason for miners to die as a result of explosions in 21st Century America.

1 Briefing by Department of Labor, Mine Safety and Health Administration on Disaster at Massey Energy's Upper Big Branch Mine-South, at the request of President Barack Obama, April 18, 2010.

2 United States Department of Labor. Mine Safety and Health Administration. Nonfatal Methane/ Air Explosion (Upper Big Branch Mine-South). Prepared by Ernie Ross, Jr., Mount Hope, WV, 1997.

3 Ibid at 13.

4 Stanley Stewart testimony, June 5, 2010, p. 80

5 United States Department of Labor. Mine Safety and Health Administration. Nonfatal Methane/ Air Explosion (Upper Big Branch Mine-South). Prepared by Ernie Ross, Jr., Mount Hope, WV, 1997.

6 United States Department of Labor. Mine Safety and Health Administration. Nonfatal Methane/ Air Explosion (Upper Big Branch Mine-South). Prepared by Ernie Ross, Jr., Mount Hope, WV, 1997.

7 Ibid

8 Ibid

9 U. S. Department of Labor. Mine Safety and Health Administration. Report of Investigation (Underground Coal Mine): Methane Inundation, by James R. Humphrey and Fred Wills, Mount Hope, WV: 2003.

10 United States Mine Rescue Association website, Mine Accidents and Disasters,http://www.usmra.com/saxsewell/crandallcanyon.htm. (last visited October 5, 2010).

11 U.S. Department of Labor. Mine Safety and Health Administration. Report of Investigation (Underground Coal Mine): Methane Inundation, by James R. Humphrey and Fred Wills, Mount Hope, WV: 2003.

12 Ibid

13 Control order, written by Gerald Pauley, West Virginia Office of Miners' Health Safety and Training, February 18, 2004, Case No. 134-0409-2004

14 Wendell Wills testimony, p. 17

15 Memorandum for John M. Pyles, "Evaluations of Controls on Floor Bursts at Performance Coal Company Upper Big Branch Mine South, prepared by John R. Cook and Sandin E. Phillipson, March 4, 2004

16 Ibid

17 Memorandum for Stephen J. Gigliotti, regarding the methane floor outbursts at Performance Coal Company's Upper Big Branch mine, prepared by George Aul and Michael Gauna, July 15, 2004

18 Ibid at p. 3; March 4, 2004, memorandum at p. 6

19 Ibid at p. 3

20 Personal communication with Shane Harvey and Robert Luskin, September 22, 2010

21 Massey Energy Press statement, April 26, 2010

22 Associated Press, July 22, 2010

23 Ward, K., Jr., Coal Tattoo, July 22, 2010

24 The Charleston Gazette, August 11, 2010

25 MSHA presentation to families, August 2010

26 *The Charleston Gazette*, August 11, 2010

27 James Beck, February 2011

28 Soot and Coking Map

29 Stanley Stewart testimony, June 5, 2010, p. 201

30 E.g., Kenny Woodrum testimony, May 19, 2010, pp. 88, 96, February 10, 2011, p. 24; Travis Nelson testimony, February 10, 2011, p. 56; Tommy Estep testimony, March 1, 2011, e.g., pp. 16, 50, 59.

31 Examinations and testing of the water sprays and filters were conducted at MSHA's Approval and Certification Center, Triadelphia, WV, March-April, 2011. See also; e.g., Kenny Woodrum testimony, February 10, 2011, p. 25, 46; Tommy Estep testimony, March 1, 2011, p. 40, 44

32 UBB management understood how the river water sediment wreaked havoc on the machinery. For a while, they used river water in the hydraulic hoses attached to the longwall shields. The hoses got clogged with sediment and slowed the hydraulic motion on the shields making it harder for them to move up and forward. UBB management switched to a different water source so the longwall shields would work properly.

COAL AGE

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Accidents Will Happen!

IF a mine official really wants to prevent injury to his employees, he must constantly teach his men by precept and example. Ignorance will not effect its own elimination; it must be crowded out by knowledge. Almost any man is teachable; the difficulty usually lies in the lack of ability to instruct him, which in turn may be overcome by patience.

AFTER an accident has occurred, how weak and insufficient it sounds to hear someone say, "Well, accidents will happen!" Ninety per cent. of all mine accidents result from carelessness or ignorance. Therefore there is a cause, and it ought to be removed.

The careless workman is more blameworthy than the one who is ignorant. Carelessness recognizes danger, but, recognizing it, takes a chance. The worst kind of carelessness is that occurring in connection with work assigned for the purpose of protecting others. Carelessness in mine inspection, for example, involves grave criminal responsibility.

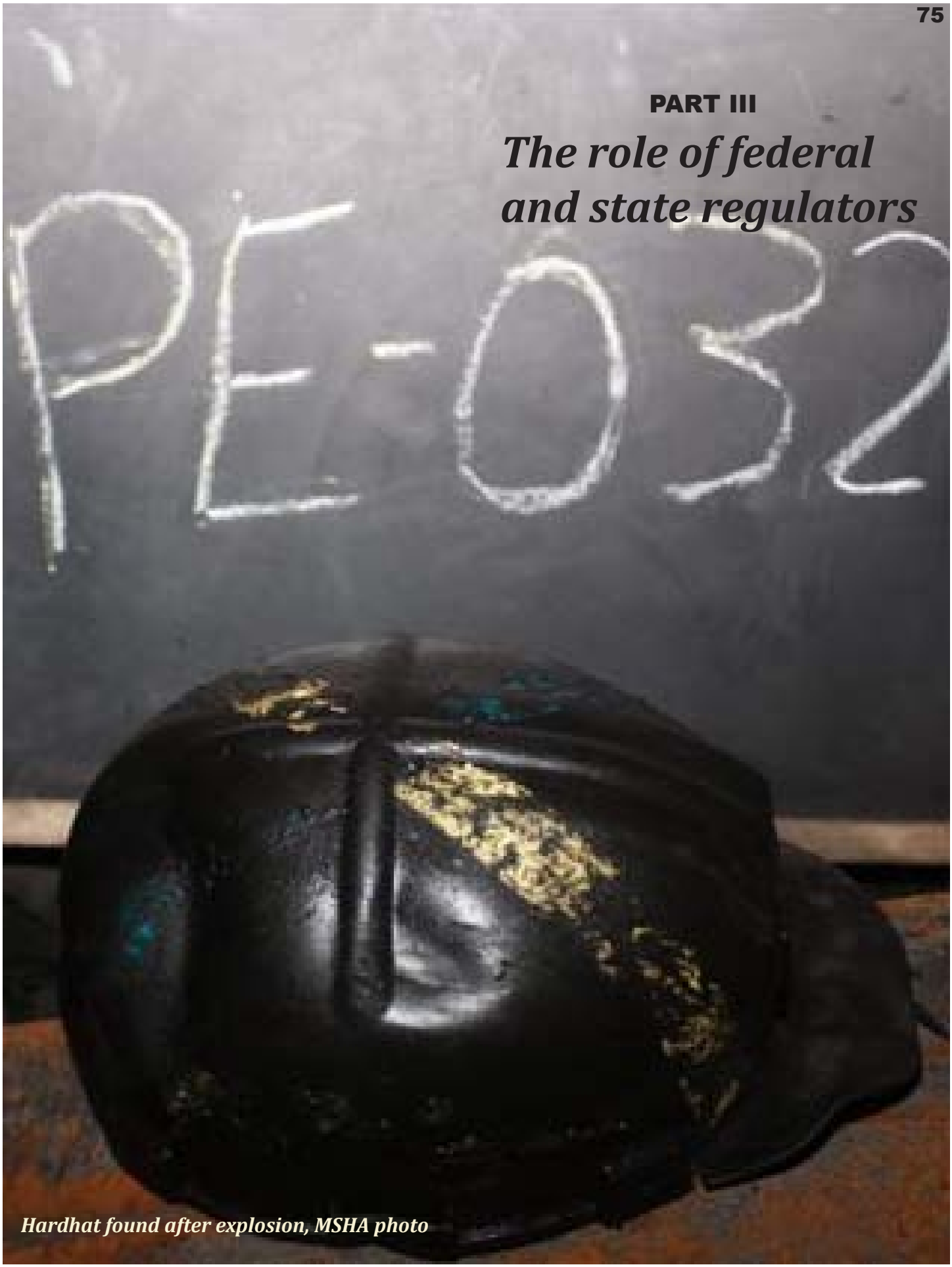
To remove the causes of accidents discipline of a high order is essential. The compilation of a large set of rules is not sufficient. Lax enforcement of regulations is a common cause of failure. Rigid observance of a clear and definite code of requirements is always productive of good results. Without this, discipline is out of the question.

That mine official who attempts to seek refuge behind the worn-out adage, "Accidents will happen," is but half a man. The worth-while manager immediately seeks the exact cause of every accident. He is not satisfied until he receives a complete report from a committee or special board of inquiry.

It is not sufficient merely to hold a formal investigation, no matter how thoroughly the investigation is carried out. If similar accidents are to be avoided, the cause of the first one must be carefully explained before a gathering of all the members of that branch of the organization having authority or power to prevent such accidents. Nothing is ever gained by a suppression of facts brought out by an investigation.

A few accidents are unavoidable, but they represent only a small part of the whole number. Such casualties cannot be foreseen. However, men in authority can prevent the improper classification of accidents and should not allow preventable ones to be designated as unavoidable, thus losing the benefit of the lesson.

The next time you are about to say, "Accidents will happen," stop and think first; then you won't say it. Only weaklings and incompetents evade responsibilities in this age of industrial safety and efficiency. We must have a new slogan—one that brings out the best that is in us. Let us now say, *Accidents Must Not Happen!*



PART III

The role of federal and state regulators

Hardhat found after explosion, MSHA photo

9 How could this happen? (The federal role)

"How did you let this happen?" That is the agonizing question posed by wives and parents and children of the miners killed in the Upper Big Branch disaster as they reflect on the role of federal and state mine safety officials responsible for inspecting the nation's coal mines, for enforcing mine safety laws and for keeping their loved ones safe. "If you were doing your job," they ask over and over again, "how could this have happened?"

In the days and months following the UBB disaster, officials with the U.S. Department of Labor and its Mine Safety and Health Administration (MSHA) have repeatedly defended the agency's performance. They point out that that the federal Mine Act places the duty for providing a safe workplace squarely on the shoulders of the employer, and they insist that the operator is ultimately responsible for operating a safe mine.[1] While that is true, it is not the whole the story.

As any student of mining history can attest, merely having laws on the books has never been enough to ensure worker safety. The ability of the government to rigorously enforce those laws is a hard-earned right paid for with the blood of coal miners.

In the United States, businesses are created to provide goods and services, as well as income for owners and investors. They also provide employment and income for workers. Because the goals imbedded in mine health and safety regulations have the potential to narrow an operator's profit margin, some mine owners sometimes try to evade, ignore or sidestep those regulations. Workers need a strong watchdog to ensure that the drive for profit is not allowed to overshadow workers' rights to a safe workplace. For coal miners, that watchdog at the federal level is MSHA.

MSHA receives a substantial annual appropriation from Congress to issue regulations and ensure that mine operators comply with them. In fiscal year 2010, the appropriation was $357.3 million. In part because of the 2006 Sago, Aracoma and Darby disasters, and at the request of the late Senator Robert C. Byrd, Congress gave the agency emergency funding to hire an additional 170 coal mine inspectors. In June 2008, MSHA reported "the overall number of coal enforcement personnel is at its highest level since 1994."[2]

Located in 92 duty stations across the country, the agency's 2,300 employees are responsible for inspecting coal mines and other operations, such as stone quarries, metal mines and dredging operations. They monitor a variety of mandates on mine operators, including requirements to submit and receive approval on engineering plans for ventilation, dust control and roof control, as well as for training and emergency response plans.

MSHA officials are authorized to enter mine property at will and are required to conduct complete mine inspections four times per year at every underground mine, two times per year at every surface mine and spot inspections every five days at mines that liberate excessive quantities of methane. At large coal mining operations, MSHA's quarterly inspections may extend over the entire three-month period.

MSHA's Mount Hope, West Virginia, District 4 has seven field offices scattered throughout southern West Virginia. The district is responsible for inspecting the Upper Big Branch mine, along with some 245 other coal mines in the region. Approximately 160 of those mines are active producing surface or underground operations. The large number of mines puts pressure on the staff, according to Mount Hope District Manager Robert Hardman, who said the average inspector in his district had only three years of experience.[3]

The inspector's job, if done right, is a tough one. The best mine inspectors have keen eyes and ears, know regulations inside-out, can quickly digest the mine's ventilation, roof control and other engineering plans, and thoroughly document their observations. They also need thick skin. Unlike highway patrolmen, who are engaged with speeders for ten minutes while writing tickets and then never see the offenders again, mine inspectors spend days in the mine with the very company officials they cite for safety violations. After writing citations, which, in effect, indicate that officials are not

doing their job and, as a result, the company is going to be fined, the inspectors must return to the mine to make sure the safety violations have been addressed.

Some companies, Massey among them, relish the opportunity to challenge inspectors' enforcement actions by disputing findings and arguing about what the law requires. Massey's Vice President for Safety Elizabeth Chamberlin reportedly took a violation written by an inspector, looked at her people and said, "Don't worry, we'll litigate it away."[4] Inspectors must be able to defend their findings on the spot and explain how the rule protects miners. Some inspectors find it difficult to exert tough authority. As one long-time MSHA official told investigators, "Massey trains our inspectors better than we do." He meant that the way inspectors are treated during inspections at Massey mines impacts the enforcement attitude of the inspectors.

Realizing that some companies are more prone to test the boundaries of safe practices, the Congress gave MSHA the power to establish a "pattern of violation" category to address mine operators who are cited over and over again for "significant and substantial (S&S)" violations. MSHA was given the authority to determine what constitutes a "pattern of violation," and the agency is responsible for notifying mine operators when they fall into this category. After that, any S&S violation issued by an inspector within 90 days will result in miners being ordered out of the affected area.[5] MSHA, however, never used this tool until April 12, 2011, when two coal mines – one in Leslie County, Kentucky, and another in McDowell County, West Virginia, were placed on pattern of violation status.

It wasn't until 2006, when the Sago, Aracoma and Kentucky Darby disasters brought attention to the unused "pattern of violation" provisions of the Mine Act that MSHA began to notify a few operators that they had a "potential" pattern of violation. Of the 20 operators who were sent those warning letters in December 2007, Massey Energy mines received four of them. None of these mines actually received stiffer sanctions because as soon as they reduced their violation rates, they were taken off the "potential pattern of violation" list.

Looking just at the numbers, federal officials were kept busy at UBB. Inspectors spent 1,854 hours at the mine in 2009, nearly twice the time as in 2007.[6] During 2009, they wrote 515 citations and orders for safety violations, including 48 withdrawal orders for repeated significant and substantial (S&S) violations.[7] The monetary penalties proposed for violations in 2009 and early 2010 totaled nearly $1.1 million.[8]

Additional actions could have been taken. Several provisions of the MINER Act, passed in the aftermath of the 2006 disasters, gave MSHA tough new enforcement tools to use with recalcitrant mine operators.[9] Among these was the authority to issue "flagrant" violations, with fines of up to $220,000, against companies which repeatedly failed "to make reasonable efforts to eliminate a known violation of a mandatory health or safety standard that … reasonably could have been expected to cause death or serious bodily injury."

MSHA has used the authority more than 125 times at coal mines during the last five years, issuing fines of $19.5 million.[10] But, despite the fact that the Upper Big Branch mine was cited dozens of times in the year preceding the disaster for violating ventilation plan requirements, MSHA never cited Upper Big Branch for a flagrant violation. Even as they have asked for more enforcement tools, MSHA officials have not explained why they failed to use the "flagrant" tool at UBB. An MSHA spokesperson said it is a matter being examined by MSHA's "internal review" team.[11]

Despite MSHA's considerable authority and resources, its collective knowledge and experience, the disaster at the Upper Big Branch mine is proof positive that the agency failed its duty as the watchdog for coal miners.

Equally disturbing is the fact that high-ranking MSHA officials apparently were aware that the agency was falling short in its responsibilities. On March 25, 2010 – less than two weeks before the disaster – MSHA chief Joe Main submitted a required report to the U.S. Senate Appropriations Committee, which outlined widespread lapses in enforcement.[12]

An audit of 25 field offices during 2009 conducted by MSHA's Accountability Office found incomplete inspections, failure to monitor mines liberating high amounts of methane and inadequate supervisory actions. Auditors found that in 21 of the 25 field offices, supervisors failed to conduct in-depth reviews to make sure enforcement levels and actions were in accordance with the agency's policies and procedures. In 20 field offices, the auditors found inadequate evaluation of the gravity and negligence of the health and safety violations issued against operators. In 15 offices, auditors found that inspectors failed to adequately document findings so that enforcement actions would be able to withstand legal challenges.

Although the report did not reveal which field offices were audited, the results suggest a troubling and

widespread pattern of oversight failure.[13] After pressure from lawmakers and the press, MSHA on April 15, 2011, released portions of its audit findings.[14] MSHA's lack of transparency further diminishes confidence about the agency's ability to regulate the industry. Had the results and locations of the offices audited been revealed at the time the audits were completed, miners and their families would have been put on notice that they were working at mines where MSHA's performance was not up to standard. Instead, the public learned about these deficiencies more than a year later and only because of the determined efforts of a dogged newspaper reporter.

The reporter was Ken Ward, Jr., of *The Charleston Gazette*, who also reported in September 2007 that MSHA failed to meet its statutory responsibility to conduct mandatory inspections in the Mount Hope district. "Federal regulators are behind schedule this year to complete required quarterly inspections at more than 60 percent of southern West Virginia's underground coal mines," he wrote.[15]

This revelation came just months after the completion of an internal review by the team assessing the Mount Hope district's enforcement at Massey Energy's Aracoma Alma #1 mine, where two miners needlessly died in a preventable fire. The internal review team said they "were shocked by the deplorable conditions of the mine"[16] and concluded that managers in the Mount Hope district failed to promote the importance of strict enforcement of the Mine Act and adequately supervise and oversee inspection activities.

Tragically, investigators probing the UBB disaster have made similar characterizations about conditions. The failures at Upper Big Branch were not minor. They went to the very heart of mine safety basics – methane, ventilation, rock dusting – and they also could be observed in the failure to apply the best of modern technologies to safety efforts.

Failure #1: Disregarding the documented risk of methane outbursts at UBB.

The Upper Big Branch Mine was a gassy mine. It liberated about one million cubic feet of methane per 24-hour period, and, as a result, was subject to special spot inspections.[17] More significantly, the UBB mine had experienced at least three major methane-related events. The first occurred in January 1997,[18] another in July 2003 and a third in February 2004. All took place in longwall mining sections.

Witnesses to and investigators of the 1997 incident include a number of individuals who remain employed by MSHA, the West Virginia Office of Miners Health Safety and Training and Massey Energy.[19]

Upper Big Branch management elected to consider each methane outburst or explosion as an anomaly. MSHA's responsibility, as the watchdog, was to recognize them as evidence of hazards unique to this mine (and mines in similar coal seams) that warrant special precautions. MSHA technical experts who investigated the 2003 and 2004 outbursts indeed did recommend special precautions.[20] However, officials in MSHA's Mount Hope district office did not compel (or to our knowledge even ask) UBB management to implement those recommendations. Senior officials in the Mount Hope office couldn't explain why no action was taken, but agreed in retrospect that the methane outbursts in 2003 and 2004 were extraordinary events deserving special attention. District manager Robert Hardman observed, "A prudent mine operator would have taken action in a mine if you had an incident that this memorandum describes."[21]

The problem, of course, is that not all mine operators are prudent. If MSHA has knowledge, data or evidence that a mine operator does not take his responsibility seriously and does not take all necessary precautions to protect miners' safety, MSHA *must* step in.

Failure #2: Overlooking the deadly potential of a precarious ventilation system.

Clyde Gray worked for 30 years as a coal miner and supervisor and another nine years with MSHA as an inspector and ventilation specialist. He has seen mines with extraordinarily well-engineered ventilation systems and others with ventilation systems that appeared not to have been planned at all. The latter are quickly identified because the operator generally submits constant revisions to the base plan. Gray recalled this about UBB: "These people are constantly submitting plans to get revisions,[22] … they hit us a lot with revisions for this mine. Just changing, flip-flopping, changing air flow directions, installing and moving controls to facilitate what they want to mine … we have to go back … and see what was previously submitted, trying to figure out what they're going to do this time … They're constantly flip-flopping back and forth."[23]

In the seven months leading up to the disaster – from September 2009 to March 2010 – UBB management submitted to MSHA more than 40 revisions to the mine's ventilation plan. Although some involved routine maintenance (e.g., replacing damaged seals), many

pertained directly to airflow and attempts to provide adequate ventilation in all the coal mining sections. At least six of those proposed airflow revisions were rejected by MSHA because they contradicted existing safety regulations.[24] MSHA managers and ventilation specialists recognized that the mining plan and the ventilation system at UBB were not systematically engineered.

"They're trying to use duct tape to fix things instead of engineering," said Mount Hope assistant district manager Richard Kline. "They're not taking the time to look ahead at what they have."[25]

To illustrate what he considered UBB management's haphazard approach to ventilation, Kline described visits to the Mount Hope office by Performance Coal Company President Chris Blanchard. Kline said Blanchard would drive 40 miles to the Mount Hope office to ask a favor about a plan awaiting MSHA review, saying, "I really need it in a hurry. We'd like to make the change over the weekend."[26]

Mine operators who routinely need special consideration for plan approvals should suggest to MSHA supervisors that they need to conduct an in-depth review. MSHA managers and ventilation specialists recognized the precarious nature of UBB's ventilation system, particularly after the longwall section started operation in September 2009. "You take a mine this size – you got three sections in there, you got that longwall. And it's critical that the [ventilation] controls in this mine stay absolutely right on the money because, if you don't, then something could change," explained Clyde Gray. "You could alter or short circuit to one of the sections."[27]

Massey had publicly maintained that MSHA officials forced them to make ventilation changes that they didn't want to make – with disastrous results. After a complete review of the record, the Governor's Independent Investigation Panel found no evidence of MSHA directing Massey's ventilation proposals.

MSHA inspectors traveling inside the mine witnessed the system's instability first-hand. They cited UBB nearly two dozen times because the mine operator failed to follow his own ventilation plan. This should have raised a red flag for MSHA managers.

MSHA managers and ventilation specialists were aware that the entries beyond the longwall section were prone to flooding.[28] If dewatering pumps were not maintained and water levels diligently monitored, mine entries filled with high water, impeding airflow and disrupting ventilation to the working sections. When

Making the "Safety Case" and an employer's duty of care

Following the 1988 Piper Alpha Oil Platform disaster in the North Sea that killed 167 workers, Lord Cullen of Whitekirk's public inquiry endorsed the "safety case" approach to assessing the risk of catastrophic events. Numerous regulatory bodies abroad require this risk assessment technique for oversight of certain hazardous industries, including mining. In the U.S. it is used by the Nuclear Regulatory Commission and the Department of Energy particularly for decision-making related to radiation hazards.

The United Kingdom's Ministry of Defence defines a safety case as "a structured argument, supported by a body of evidence that provides a compelling, comprehensible and valid case that a system is safe for a given application in a given operating environment."[1] A key feature of the safety case model is assessing risk in a specific context. For an underground coal mine that would include the mine's unique physical characteristics, equipment available, skill of personnel, and safety performance history.

In Australia, the safety case approach goes hand-in-hand with their "duty of care" regulatory regime. Under Western Australia's Mines Safety and Inspection Act of 1994, employers, employees and any others who may have an influence on hazards in a workplace, such as mining engineers and outside contractors, are required to do everything reasonably practicable to protect the health and safety of workers. The duty of care standard imposes primary responsibility for safety on mine owners and mine managers. Specific rights and duties flowing from the duty of care include: (a) provision and maintenance of a safe mine; (2) safe systems of work in connection with a mine; (c) employment of qualified persons to provide health and safety advice; and (d) comprehensive monitoring of conditions at the mine. Gross negligence occurs if the offender knew his violation of the law was likely to cause death or serious harm to a person to whom a duty of care was owed, but he still did so, resulting in serious harm to the person.[2]

1 Ministry of Defence, "Safety Management Requirements for Defence Systems, Part 1," United Kingdom: 2004

2 Section 8B, Mines Safety and Inspection Act 1994, Western Australia Consolidated Acts

NIOSH's Coal Dust Explosibility Meter: Miners deserve better than a 20-year research project

The National Institute for Occupational Safety and Health's (NIOSH) is our nation's primary research agency in the field of occupational safety and health. Its mission is to generate knowledge and "transfer that knowledge into practice for the betterment of workers." One office within NIOSH is devoted specifically to mine safety and health research and it employs about 350 engineers, scientists and technicians.

For more than 20 years, government researchers with the former Bureau of Mines (now part of NIOSH) and MSHA have studied and subsequently developed an instrument to provide real-time, in-mine analysis of rock dust.[1,2,3,4,5]

In a description of the need for the technology in documents filed with the U.S. Patent Office in 1986, researchers explained the potential impact on miners' safety when results from an analytical laboratory are delayed for weeks at a time. "In the meantime, the mine operators must rely on visual inspection (dark or light) of rock dusted areas to estimate the quality of the rock dusting practice on a day-to-day basis."[6] They note "an advantage of the present invention [is] a quick and reliable method for determining the rock dust content"; that it is a "completely safe method of determining inert content of a dust mixture"; that it "can be made with very small sample sizes"; and that "the apparatus … makes use of standard off-the-shelf electronic components and … can be manufactured at low cost."[7]

As originally reported by *The Charleston Gazette's* Ken Ward, Jr., a 1989 report from the Bureau of Mines said the "rock dust explosibility meters" were among "the most promising methods" for helping prevent deadly coal dust explosions.[8,9] "The Bureau of Mines has developed an optical rock-dust meter that can be used underground to give a direct and rapid read-out of the rock-dust content of mine dust samples, thus eliminating the need for laborious and time-consuming laboratory analysis of rock-dust content."[10]

The Bureau reported that the device was in the process of being readied for commercial sale. To this day, this rock dust meter is not being used in U.S. coal mines. Yet, the federal agencies charged with advancing mine safety practice continued to experiment with the device and write about its potential to prevent coal dust explosions.

In 1996, many of the Bureau of Mines' staff and much of its resources were transferred to NIOSH. NIOSH reiterated the need for a real-time device to measure the adequacy of rock dust because, under the current system, "the processing time for this analysis [in MSHA's laboratory] can be as long as two weeks."[11] NIOSH noted that in-mine measurements would "eliminate the danger of operating under hazardous conditions while samples are being processed" and indicated yet again "efforts are underway to commercialize the coal dust explosibility meter (CDEM)."[12]

NIOSH, and later MSHA staff, continued to experiment with, write papers and give presentations about the CDEM at conferences,[13,14,15] but the agency's leaders did nothing to compel the mining industry to invest in and adopt the devices. In 2006, NIOSH staff recommended the agency for *R&D Magazine's* R&D 100 Award. Upon receiving the award, the agency asserted that "… the device, the Coal Dust Explosibility Meter – Model 100, significantly speeds the ability of coal mine operators, coal miners and safety inspectors to determine if certain conditions exist in an underground coal mine that could lead to a potentially deadly and devastating coal dust explosion, and, if so, to take quick corrective action."[16] The NIOSH director applauded the recognition, noting, "It is a great example of how research partnerships can bring forward innovative technologies that create a safer workplace for miners."

While everything that has been written and said about the CDEM may be true, not a single commercial device has been manufactured or made available to government inspectors, mine managers or miners themselves. And yet, NIOSH officials stated again in 2006 "the device will be manufactured and marketed commercially."[17]

NIOSH researchers worked with MSHA staff in Pennsylvania and Alabama to field-test the devices. In a 2008 report, they once more noted the serious deficiency in the current rock dust analysis system: "This process, from obtaining the samples to reporting the analytical results, typically takes several weeks… with real-time results, the potential for a disaster can be mitigated immediately."[18]

Following the UBB disaster, NIOSH director Dr. John Howard was called to testify on May 20, 2010, before a subcommittee of the Senate Committee on Appropriations. Among other things, Howard said that NIOSH was

"aggressively pursuing commercialization of the Coal Dust Explosibility Meter… Recent mine disasters have renewed interest in this technology, and NIOSH has found a manufacturing partner with broad experience in the manufacture and marketing of field instruments. The CDEM will be commercially available next year."[19]

Coal miners have already heard these promises. Six years ago, NIOSH launched its "Research to Practice" (r2p) initiative, which is designed to ensure that NIOSH-generated research is "transferred or translated into the workplace to prevent injury, illness, and fatalities." Regrettably, it appears that 29 more miners had to die in order to convert 20 years of federally-funded research into practice.

Another needed reform involves modifying the definition of "incombustible content" (IC)[20] to prohibit most moisture from being counted as IC. Rock dust often dries out as a mining section advances, but MSHA conducts its rock dust surveys as the section advances and many areas are too wet to sample. The CDEM uses molecular sieves to dry the rock dust out prior to determining the IC level.[21] A revision to the IC definition would eliminate ambiguity in the sample results, and allow MSHA to use the CDEM for enforcement purposes. Determining the adequacy of rock dust could be further improved with a special sample collection tool that would retrieve a spot sample of only the upper 2 to 3 millimeters of dust. This top layer of dust is the significant contributor to coal dust explosions.[22]

NIOSH's Research to Practice (r2p) initiative is "… focused on the transfer and translation of knowledge, interventions, and technologies into highly effective prevention practices and products, which are adopted into the workplace. …The goal of r2p is to reduce workplace illnesses, injuries and fatalities by encouraging the use of NIOSH-generated knowledge, interventions, and technologie ... [for] improving worker health and safety."[23]

Senior NIOSH officials should truly embrace their r2p goal and direct agency staff to consult and assist small coal mine operators in purchasing and using explosibility meters. MSHA should immediately adopt a requirement that compels coal mine operators to use some reliable method to ensure, on every shift, the adequacy of the rock dust applied in their mines.[24] The result will create a commercial market for the NIOSH-designed explosibility meter, or similar devices, and a dramatic increase in worker safety.

1 U.S. Patent No. 4,799,799. "Determining inert content in coal dust/rock mixture." Inventors: Michael J. Sapko, Finleyville, Pennsylvania and Jack A. Ward Jr., Oakmont, Pennsylvania. Date filed: December 19, 1986; date of patent: January 24, 1989.

2 Sapko, MJ, Watson, RW. "Novel Rock Dust Meter," 21st International Conference of Safety in Mines Research Institutes, Sydney, Australia, October 21-25, 1985, pp. 421-424.

3 Lucci CE, Cashdollar KL, Sapko MJ. Coal Dust Explosibility Meter, Proceedings of the 26th International Conference of Safety in mines Research institutes, Katowice, Poland, Sept.4-8, 1995.

4 Sapko MJ, Verakis H. Technical developments of the coal dust explosibility meter. Society of Mining Engineers Annual Meeting and Exhibit, March 27-29, 2006, St. Louis, Missouri

5 Harris ML, Sapko MJ, Cashdollar KL, Verakis HC. Field evaluation of the coal dust explosibility meter (CDEM). Mining Engineering. 2008 60(10):74-78.

6 S. Patent No. 4,799,799. "Determining inert content in coal dust/rock mixture." Inventors: Michael J. Sapko, Finleyville, Pennsylvania and Jack A. Ward Jr., Oakmont, Pennsylvania. Date filed: December 19, 1986; date of patent: January 24, 1989.

7 U.S. Patent No. 4,799,799. "Determining inert content in coal dust/rock mixture." Inventors: Michael J. Sapko, Finleyville, Pennsylvania and Jack A. Ward, Jr., Oakmont, Pennsylvania. Date filed: December 19, 1986; date of patent: January 24, 1989.

8 Proceedings of the 23rd International Conference of Safety in Mines Research Institutes, Washington, DC, September 11-15, 1989.

9 Ward K., Jr. "Industry, regulators ignored coal-dust meters," The Charleston Gazette, September 25, 2010.

10 Proceedings of the 23rd International Conference of Safety in Mines Research Institutes, Washington, DC, September 11-15, 1989.

11 Coal dust explosibility meter. NIOSH: Technology News, No. 461, July 1997.

12 Coal dust explosibility meter. NIOSH: Technology News, No. 461, July 1997.

13 Sapko MJ, Verakis H. Technical developments of the coal dust explosibility meter. Society of Mining Engineers Annual Meeting and Exhibit, March 27-29, 2006, St. Louis, Missouri.

14 Harris ML, Sapko MJ, Cashdollar KL, Verakis HC. Field evaluation of the coal dust explosibility meter (CDEM). Mining Engineering. 2008 60(10):74-78.

15 Harris ML, Sapko MJ, Cashdollar KL, Verakis HC. Field evaluation of the coal dust explosibility meter (CDEM)008 Society for Mining, Metallurgy, and Exploration (SME) Annual Meeting and Exhibit, February 24-27, 2008; Salt Lake City, Utah.

16 National Institute for Occupational Safety and Health. NIOSH Update: NIOSH Update: NIOSH Receives R&D 100 Award 2006 for Innovation in Mining Technology, November 3, 2006.

17 National Institute for Occupational Safety and Health. NIOSH Update: NIOSH Update: NIOSH Receives R&D 100 Award 2006 for Innovation in Mining Technology, November 3, 2006.

18 Harris ML, Sapko MJ, Cashdollar KL, Verakis HC. Field evaluation of the coal dust explosibility meter. *Mining Engineering*. 2008; 60(10): 74-78

19 Testimony of John Howard, MD, MPH, JD, LLM, director of the National Institute for Occupational Safety and Health before the Senate Committee on Appropriations, Subcommittee on Labor, HHS and Education, May 20, 2010.

20 30 *Code of Federal Regulations* 75.503.

21 When the CDEM shows a rock dust sample complies with the mandated IC content, it truly is compliant, however samples with higher moisture may erroneous indicate they are non-compliant.

22 Sapko MJ, Weiss ES, Harris ML, Man C, HarteisSP. A centennial of mine explosion prevention research. Society of Mining Engineers Annual Meeting and Exhibit, Feb. 28 – March 3, 2010, Phoenix, AZ.

23 National Institute for Occupational Safety and Health. Research to Practice at NIOSH.

24 The Robert C. Byrd Mine and Workplace Safety and Health Act of 2011 (H.R. 1579 and S. 153) includes a provision which would require coal mine operators to use direct reading monitors such as the CDEM once the U.S. Secretary of Health and Human Services certifies they are commercially available, and the U.S. Department of Labor has approved them for use in underground coal mines.

MSHA inspectors learned that miners assigned to check the pumps were wading through chest-high water, this should have raised yet another warning flag that the ventilation system could be compromised at UBB.

As mine inspectors observe deviations from the mine's ventilation plan, such as air flowing in the wrong direction, they issue citations. Inspector Keith Stone twice evacuated mining sections because of reversed airflow.[29] MSHA ventilation managers and ventilation specialists, as well as the inspectors, should have recognized that such violations suggest that the operator has been negligent in conducting thorough pre-shift examinations. UBB received dozens and dozens of violations for hazards that should have been identified during pre-shift and on-shift examinations. There was a disconnect between these ongoing problems and MSHA's enforcement strategy.

MSHA managers and ventilation specialists also recognized that a January 2010 proposal to open an additional mining section would further tax UBB's already stressed ventilation system.[30] This plan for creating another mining section near the Ellis portal should have sent up even more red flags.

MSHA is charged with doing more than reviewing plans, inspecting mines and writing citations and investigation reports. MSHA inspectors, with the guidance of their supervisors and engineering experts, must use their independent eyes to integrate information and see the cumulative effect of all of the safety lapses and to develop a comprehensive enforcement strategy that includes special attention to those operators who skirt the bounds of safe operations.

Ultimately, the district manager and his assistants are responsible for examining the inspection records and asking about the signs of danger. If they do not have the authority, resources or know-how to compel a mine operator to take action to save lives, it is their duty to elevate it to their superiors. The GIIP did not identify evidence that they did so.

Some inspectors took appropriate action. Keith Stone made his supervisor, Joe Mackowiak, aware of reverse airflow at UBB. Mackowiak sent a team of ventilation experts to the mine. Unfortunately, their diligence was not repeated at every level of MSHA.

<u>Failure #3:</u> Neglecting to use its regulatory authority to force technological improvements to advance miners' safety

As described in "Chapter Six: Coal dust and rock dust," rock dusting is a fundamental safety practice used in underground coal mines to render explosive coal dust inert. Mine operators are required to comply with at least minimum rock dusting requirements, specifically creating an environment where the content of dust is no less than 80 percent incombustible material within 40 feet of the working face.[31] Experienced coal miners say "a white mine is a happy mine." But without actually testing the dust to determine the percentage of incombustible content, miners and supervisors have no way of knowing whether a sufficient amount of rock dust has been applied.

Nearly all U.S. coal mine operators, including Massey Energy, rely solely on MSHA to sample the rock dust in all their mines and determine whether they have a sufficient percentage of incombustible content. An MSHA inspector is expected to collect samples of deposited dust in an underground mine at least during each quarterly inspection[32] and additionally when "any doubt exists concerning adequacy of rock dust applications in the active working sections."[33] The inspector packages up the samples and mails them to MSHA's analytical laboratory in Mount Hope, West Virginia. Typically, the inspector receives the results by email two to three weeks later. At that time he will determine whether citations must be issued to the operator for failing to have a sufficient quantity of incombustible rock dust.[34]

The lag time between when the sample is collected and when results are available means miners and the mine operator lack real time knowledge as to whether their rock dusting practices are adequate. Even if an operator receives a citation, the information is not very useful for prevention purposes. Mining has already advanced far from where the samples were collected. The condition of rock dust three weeks before doesn't really matter; miners need to know if it is sufficient in the here and now.

This practice of rock-dust testing is particularly troublesome because for more than 20 years, government researchers with the former Bureau of Mines (now the National Institute of Occupational Safety and Health) and MSHA have studied and subsequently developed an instrument to provide real-time, in-mine analysis of rock dust.[35] Despite two decades of study and testing, no form of this coal dust meter explosibility meter (CDEM) is being used in U.S. coal mines. (See: Coal Miners deserve better than a 20-year research project)

The Mine Act places not just a responsibility, but also a duty, on MSHA to "develop, promulgate and revise as may be appropriate, improved mandatory health or safety standards for the protection of life and prevention of injuries in coal or other mines."[36] MSHA has the regulatory authority to compel mine operators to modify, install and even prohibit work practices or equipment for the purpose of improving miners' safety. The Mine Act is considered a "technology forcing" statute, meaning that MSHA has the authority to use regulatory action to spur technological change.[37] Far from being restricted to the status quo, the agency may propose standards "…which require improvements in existing technologies or which require the development of new technology, and … is not limited to issuing standards based solely on devices already fully developed."[38]

The CDEM is fully developed, field-tested and has proved completely capable of doing the job for which it was designed. Yet no action – regulatory or non-regulatory – has been taken to compel the industry to adopt the devices. If MSHA were to require that mine operators implement a system ensuring the adequacy of their rock dust, a market for the devices would immediately develop. The CDEM and other similar devices would become commercially available. MSHA has the authority to compel this requirement. To date, it has not done so.

<u>Failure #4:</u> Allowing the U.S. mine safety system to atrophy.

When members of Congress deliberated more than 40 years ago about the need for a comprehensive federal coal mine safety law, they observed that the coal industry "has strengthened our Nation with raw material of power. But it has also frequently saddened our Nation with news of crippled men, grieving widows and fatherless children … Catastrophes in the coal mines are not inevitable. They can be prevented, and they must be prevented."[39]

The challenge to prevent these catastrophes is even greater when mine inspectors are forced to rely on 19th century safety practices and equipment in this 21st century world.

At a time when microchips are widely used just about everywhere, many of our nation's mine inspectors continue to use pencils to make handwritten notes on tri-fold paper, a practice that dates back decades.[40] They are forced to prepare for inspections by thumbing through hundreds of pages of mine files instead of being able to review records through a searchable electronic database. If they had the equipment to record their findings on voice-activated recorders, which could be auto-transcribed and linked with photographs from digital cameras, their inspections would have more depth and texture and might encourage a closer review by supervisors.

The ultimate failure of MSHA at UBB, however, was the agency's inability to see the entire picture, the inability to connect the dots of the many potentially catastrophic failures taking place at the mine ---– especially the operator's failure to properly ventilate the mine, to control methane, to apply sufficient amounts of rock dust. The failure to consider the previous methane outbursts when addressing the current ventilation woes points to a disconnect which suggests the whole picture is not being considered by MSHA's enforcement. If they had pressed for the use of technology that allowed the immediate testing of rock dust application, they may have been aware that UBB's rock dusting was woefully inadequate. If they had the technology to put all of the information about the mine in an electronic, easily accessible format, they might have acted much more quickly and dealt more severely with the operator, placing UBB in pattern of violation status, issuing "flagrant violation" citations or even closing down the mine.[41]

The ability to stand back and take a long look – to see the red flags, to connect the dots – and the ability and willingness to take quick action when necessary distinguishes a regulatory agency which can prevent disaster from one which only reacts. Enforcement aimed at prevention is what Congress envisioned for MSHA when it passed the federal Mine Law, and that's what Senator Byrd had in mind when he spoke about the UBB disaster at a May 20, 2010, congressional hearing:

"I am perplexed as to how such a tragedy on such a scale could happen, given the significant increases in funding and in manpower for MSHA that have been provided by this subcommittee. Congress has authorized the most aggressive miner protection laws in the history of the world – history of the universe. But, such laws aren't worth a dime if the enforcement agency is not vigorous about demanding safety in the mines. These laws are also jeopardized when the miners themselves are not incorporated into the heart of the inspection and enforcement process, as Congress intended for them to be. Now's the time – long past the time – to cast off the fears, the cronyism and other encumbrances that have shackled coal miners and MSHA in the past."[42]

1 For example: Testimony of Joseph A. Main, assistant secretary of labor for mine safety and health, before the U.S. Senate Committee on Health, Education, Labor and Pensions, April 27, 2010; Labor Secretary Hilda Solis to the National Mining Association Executive Board Meeting, September 23, 2010

2 Testimony of Richard Stickler, acting assistant secretary of labor for mine safety and health, before Subcommittee on Employment and Workforce Safety, U.S. Senate Committee on Health, Employment, Labor and Pensions, June 19, 2008

3 Robert Hardman testimony, May 27, 2010, p.15. (Mr. Hardman and other MSHA senior officials have not elaborated on measures they took to ensure that the quality and thoroughness of inspections were not compromised by the inspectors' lack of experience.)

4 Lincoln Selfe testimony, p 64

5 Section 104(e) (1) of the Federal Mine Safety and Health Act of 1978.

6 Testimony of Joseph A Main, assistant secretary of labor for mine safety and health, before the Senate Committee on Health, Education, Labor and Pensions, April 27, 2010; Briefing by Department of Labor, Mine Safety and Health Administration on disaster at Massey Energy's Upper Big Branch Mine South, at the request of President Barack Obama, April 15, 2010.

7 Testimony of Joseph A Main, assistant secretary of labor for mine safety and health, before the Senate Committee on Health, Education, Labor and Pensions, April 27, 2010; Briefing by Department of Labor, Mine Safety and Health Administration on disaster at Massey Energy's Upper Big Branch Mine South, at the request of President Barack Obama, April 15, 2010.

8 Testimony of Joseph A Main, assistant secretary of labor for mine safety and health, before the Senate Committee on Health, Education, Labor and Pensions, April 27, 2010; Briefing by Department of Labor, Mine Safety and Health Administration on disaster at Massey Energy's Upper Big Branch Mine South, at the request of President Barack Obama, April 15, 2010.

9 Section 8(a) on penalties and Section 9 on collection of fines.

10 Ward, Ken, Jr. "MSHA never hit Upper Big Branch with major fines." *The Charleston Gazette*, March 30, 2011

11 Ward, Ken Jr., "MSHA never hit Upper Big Branch with major fines," *The Charleston Gazette*, March 30, 2011

12 Letter to the Senator Tom Harkin, Chairman, Subcommittee on Labor, Health and Human Services, Education and Related Agencies, from Joseph A. Main, assistant secretary of labor for mine safety and health, March 25, 2010.

13 U.S. Department of Labor, Mine Safety and Health Administration, letter and report from Joseph A. Main, assistant secretary of labor for mine safety and health to Senator Tom Harkin, chairman, Subcommittee on Labor, Health and Human Services, Education and Related Agencies, Committee on Appropriations, March 25, 2010

14 The Mt. Hope district office was not subject to the special MSHA audits in 2008, 2009 or 2010.

15 Ward K., " MSHA behind on southern West Virginia mine inspections," *The Charleston Gazette,* September 23, 2007

16 Mine Safety and Health Administration, US Department of Labor. Internal review of MSHA's actions at the Aracoma Alma Mine #1, June 2007.

17 Section 103(i), Federal Mine Safety and Health Act of 1977

18 MSHA Report of Investigation, Non-Fatal Methane Explosion (January 4, 1997), Upper Big Branch Mine South, Performance Coal Company, Mt. Hope District Office, July 14, 1997

19 These include Richard Kline, the assistant district manager of MSHA's Mount Hope district office, who remains in that position today; William Ross, a coal mine inspector in MSHA's Mount Hope district who later was promoted to supervisor in the office's ventilation division and, who, after retiring from MSHA, took a job with Massey Energy; Donald Winston, an MSHA inspector for the Mount Hope district later promoted to his current position as supervisor in the district's roof control division; Steven Snyder, an inspector-at-large with the West Virginia Office of Miners Health Safety and Training, who retired from the agency on December 31, 2010; Gerald Pauley, a coal mine inspector with WVMHST who remains in that position and Jack Roles, section foreman at UBB in 1997 who in 2010 was longwall coordinator. Some of these men also were familiar with the 2003 and 2004 incidents.

20 MSHA internal memorandum, dated July 15, 2004, to Stephen J. Gigliotti, acting district manager, District 4, from MSHA mining engineers George Aul and Michael Gauna, re: methane floor outbursts at Upper Big Branch Mine South. Recommendations included: "Be aware of the conditions associated with the occurrence of an outburst, such as approximate panel position. Insure that all crews recognize that mining has advanced into a zone with a potential for a floor outburst. Consider developing a plan to outline procedures to manage the sudden release of gas from the floor outburst."

21 Robert Hardman testimony, p. 43

22 Clyde Gray testimony, p. 66

23 Clyde Gray testimony, p. 76

24 The Governor's Independent Investigation Panel, first made requests of MSHA in mid-July 2010 for documents related to UBB's ventilation plan submissions and the agency's approvals or denials of them. The GIIP received some documents responsive to this request in March 2011. The GIIP was interested in confirming or rebutting Massey Energy's assertion that "MSHA made us do it." Based on a review of the documents provided, we found no evidence that Massey Energy or UBB management expressed concerns to MSHA that complying with federal ventilation standards would put miners' lives at risk or make the mine less safe.

25 Richard Kline testimony, p. 14

26 Richard Kline testimony, p. 22

27 Clyde Gray testimony, p. 81

28 Albert Benny Clark testimony, May 11, 2010, p. 34; Kevin Lyall, May 12, 2010, p. 30, 34, 43, 51; Joe Mackowiak, May 17, 2010, p. 64; Gerald Pauley, May 12, 2010, p. 44, 84; Keith Sigmon, May 11, 2010, p. 34

29 Jerome Keith Stone testimony, p. 22

30 Clyde Gray testimony, p. 81

31 Section 304, Federal Mine Safety and Health Act of 1977 stipulates "Where rock dust is required to be applied, it shall be distributed upon the top, floor, and sides of all underground areas of a coal mine and maintained in such quantities that the incombustible content of the combined coal dust, rock dust, and other dust shall be not less than 65 per centum, but the incombustible content in the return aircourses shall be no less than 80 per centum. Where methane is present in any ventilating current, the per centum of incombustible content of such combined dusts shall be increased 1.0 and 0.4 per centum for each 0.1 per centum of methane where 65 and 80 per centum, respectively, of incombustibles are required." In September 2010, MSHA issued an emergency temporary standard revising the standard to a minimum of 80 percent incombustible content, and an additional 0.4 percent for each 0.1 percent of methane where methane is present in any ventilating current.

32 Mine Safety and Health Administration. *General Coal Mine Inspection Procedures and Inspection Tracking System*, Handbook No. PH-08-V-1 (January 2008), p. 62.

33 Mine Safety and Health Administration. *General Coal Mine Inspection Procedures and Inspection Tracking System*, Handbook No. PH-08-V-1 (January 2008), p. 60.

34 Section 101(a), Federal Mine Safety and Health Act of 1977

35 U.S. Patent No. 4,799,799. "Determining inert content in coal dust/rock mixture." Inventors: Michael J. Sapko, Finleyville, Pennsylvania and Jack A Ward Jr, Oakmont, Pennsylvania. Date filed: December 19, 1986; date of patent: January 24, 1989. Sapko, MJ, Watson, RW. "Novel Rock Dust Meter," 21st International Conference of Safety in Mines Research Institutes, Sydney, Australia, October 21-25, 1985, pp. 421-424. Lucci CE, Cashdollar KL, Sapko MJ. Coal Dust Explosibility Meter, Proceedings of the 26th International Conference of Safety in mines Research institutes, Katowice, Poland, Sept.4-8, 1995. Sapko MJ, Verakis H. Technical developments of the coal dust explosibility meter. Society of Mining Engineers Annual Meeting and Exhibit, March 27-29, 2006, St. Louis, Missouri. Harris ML, Sapko MJ, Cashdollar KL, Verakis HC. Field evaluation of the coal dust explosibility meter (CDEM). *Mining Engineering*. 2008 60(10):74-78.

36 Section 101(a), Federal Mine Safety and Health Act of 1977.

37 Ashford NA, Caldart CC. *Technology, Law, and the Working Environment*. Washington DC: Island Press, 1996, p. 502.

38 *Society of Plastics Indus., Inc. v. OSHA*, 509 F.2d 1301 (2nd Cir. 1975).

39 U.S. House of Representatives, Committee Report No. 91-563 to accompany H.R. 13950 Federal Coal Mine Health and Safety Act, October 13, 1969.

40 It should also be noted that the mine emergency response directed through the command center established at UBB also relied on incomplete, hand-written notes for its formal record.

41 As provided in Section 8, federal Mine Safety and Health Act of 1977

42 US Senator Robert C. Byrd. Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, May 20, 2010.

10 How could this happen in West Virginia?

Inspectors with the West Virginia Office of Miners' Health Safety and Training (WVMHST) face many layers of challenges as they attempt to regulate a vast and powerful industry with limited resources and personnel.

State inspectors usually travel alone and are typically assigned to several mines for a year, during which time they are expected to complete four inspections. Like their federal counterparts, the inspectors sometimes find themselves trying to do their jobs in hostile work environments. They must maintain an ongoing relationship with company officials, who, as described in the previous chapter, may not be at all hesitant to challenge the findings or even the authority of the inspector.

State mine inspectors face an additional obstacle, which can be described simply as the politics of the state of West Virginia. While the chain of command for the federal Mine Safety and Health Administration extends away from West Virginia toward the nation's capital, the chain of command for West Virginia state inspectors leads directly into the governor's office. A mine operator who is unhappy with an inspector's actions has only to pick up the phone and call any one of a number of state officials or the governor's office to issue his complaint.

This is not to suggest that any state official or governor intervened in a mine safety issue, but the perception that such an intervention is possible can create a chilling effect for inspectors trying to do their jobs. What *is* factual and well documented is that Massey Energy Chairman and CEO Don Blankenship had a long history of wielding or attempting to wield influence in the state's seats of government.

An example is a case involving Hugh Caperton and his company, Harman Coal. In August 2002, a West Virginia jury verdict awarded Caperton and Harman $50 million in compensatory and punitive damages. Caperton had alleged that Harman was forced into bankruptcy because of Massey's fraudulent business practices with regard to a coal contract.[1] In a June 2004 opinion, a state trial court found that Massey "intentionally acted in utter disregard of [Caperton's] rights and ultimately destroyed [Caperton's] businesses because, after conducting cost-benefit analyses, [Massey] concluded it was in its financial interest to do so.[2]

In that year's general election, Blankenship spent more than $3 million of his own money to unseat State Supreme Court Justice Warren McGraw and replace him with a judge more sympathetic to Massey's interests. Through the political action group, "And for the Sake of the Kids," Blankenship financed a media campaign that portrayed the progressive McGraw as a dangerous radical who was soft on sex offenders. The beneficiary of Blankenship's largesse was Brent Benjamin, a virtually unknown lawyer who had barely won the Republican primary.[3]

At the time a close personal friend of Blankenship already was sitting on the state's highest court -– Judge Elliott "Spike" Maynard, who, like Blankenship, was a native of Mingo County. In 2008 Benjamin and Maynard provided two votes in a slender 3-2 majority for a decision that overturned the $50 million jury award.[4] Caperton sought a re-hearing and moved for the disqualification of Maynard and Benjamin.[5]

"Having two of the votes that go against you come from, one, a close personal friend of Don Blankenship's, and, two, a justice who received the benefit of Don Blankenship's $3 million spending spree on the Supreme Court race certainly gives me pause, and it should give every citizen pause as to whether really justice was done here," Caperton told West Virginia Public Broadcasting.[6]

In the meantime, photographs had surfaced of Blankenship and Maynard vacationing on the French Riviera in the summer of 2006. As a result, Maynard recused himself from the case.[7] Benjamin refused to do so, casting the deciding vote for reversal of the $50 million verdict.[8]

Caperton appealed to the United States Supreme Court, which in June 2009 issued a 5-4 ruling ordering the West Virginia court to rehear the case and for Benjamin to recuse himself.[9] Writing for the majority, Justice Anthony Kennedy wrote that Blankenship's money made it appear as if he were choosing his own judge. "Just as no man is allowed to be a judge in his own cause, similar fears of bias can arise when – without the other parties' consent – a man chooses the judge in his own cause," Kennedy wrote.[10]

The Court concluded "that Blankenship's campaign efforts had a significant and disproportionate influence in placing Justice Benjamin on the case" and that "…the risk that Blankenship's influence engendered actual bias is sufficiently substantial that it must be forbidden…"[11]

The reality that powerful industries and their leaders cast long shadows over the state's government is not unique to West Virginia, nor is it unique to the coal industry. It is a problem facing regulators of any large industry. But, with a powerful national lobby, the coal industry poses unique challenges for small state agencies that try to regulate it with inadequate resources. Although West Virginia has provided more support for mine safety than some other mining states, the state's budget for mine safety enforcement simply is not enough.

The state's regulatory efforts date back to February 22, 1883, when the West Virginia Legislature passed the state's first mine safety act. Ironically, given events that occurred at UBB, the law called for the appointment of a mine inspector to make certain the state's mines "were properly drained and ventilated." The first mining inspector, Oscar A. Veazey, was hired in 1883, and the following year the first comprehensive mine safety laws were proposed.

In 1887, the Legislature passed an act expanding the number of inspection districts to four and creating the position of chief mine inspector. In July 1905, the West Virginia Department of Mines was formed, and the inspection force was increased to seven. The Department of Mines served as the state's regulatory agency until 1985, when it was merged with several other agencies to form the West Virginia Department (later Division) of Energy. In 1991, the agency was reorganized, and the West Virginia Office of Miners' Health Safety and Training was created.[12]

While the West Virginia Mine Act gives the WVMHST director and inspectors broad authority to administer and enforce state mining regulations,[13] the agency has only 126 employees, including administrative and support staff. This work force is charged with ensuring that health and safety regulations are followed in some 705 underground and surface mines, quarries and coal handling facilities spread across the back roads of the state. In 2010, there were on any given day a total of 78 inspectors whose job it was to carry out the four mandated complete inspections of underground mines and two complete inspections of surface mines, along with their other duties. Of those 78 inspectors, 13 are electrical inspectors, who only address electrical issues, and 13 are surface mine inspectors, who cover both surface coal mines and quarries.

The result is that, on a given day, the state has only 52 inspectors assigned to inspect 261 underground mines with 405 working sections.[14] State inspectors also are charged with regulating approximately 2,300 independent contracting companies. They also are responsible for investigating all serious mining accidents, providing industry training, reviewing safety programs for all facilities and conducting miner and foreman certificate examinations. To illustrate the scope of the challenge for the 78 inspectors, there are 27,892 men and women employed in West Virginia's coal mines and facilities, and the state's mines produced 144 million tons of coal in 2009.

WVMHST records indicate that, even with the limited staffing and resources, state mine inspectors spent a considerable amount of time at the Upper Big Branch mine. Inspectors were on site for at least 70 days in 2009 and for another 15 days in the three months preceding the April 5, 2010, explosion. They wrote more than 330 violations and assessed $154,600 in penalties.

Given this presence, why, then, did inspectors for the WVMHST, like MSHA, fail to recognize the serious safety lapses that led to the disaster? Further, since 19th century regulators in West Virginia were charged first and foremost with seeing that mines were properly "drained and ventilated," how did they miss the fact that the Upper Big Branch mine had a seriously compromised ventilation system and that one of the major contributing factors was inadequate drainage? And, how did they miss the build-up of dust that was so evident to inspectors after the mine blew up?

Gerald Pauley, an inspector working out of the WVMHST's Oak Hill office, was assigned to the Upper Big Branch mine in April 2009 and had completed his assignment there at the end of March 2010. Pauley, with more than sixteen years of experience with the agency

and 35 years in the mining industry, had some strong opinions as to how the state might have been able to do a better job at UBB.

"A couple of guys should be assigned to that mine," he said. "It's a very expansive mine, very large mine. Just to be able to go in all directions at one time, every couple or three weeks or something. That's my opinion."[15] According to WVMHST acting director C. A. Phillips, Pauley had requested additional inspection help from his supervisor, Steve Snyder. An electrical inspector was assigned responsibility at UBB, but the complete mandatory inspections were not completed.[16]

Some mining experts question whether Upper Big Branch, was, in fact, a very large mine. Within the mining industry, mines generally are referred to as big, mid-sized or small based on annual production. By that standard, Upper Big Branch could not be described as a big mine. The longwall operation that was begun at UBB in September 2009 produced 1.2 million tons of coal in that year. If it had been in production the entire 2009 year, the longwall could have been expected to produce 3.7 million tons. By comparison, the average production for longwall mines in the country in 2009 was more than 4 million tons.[17]

Because it takes a considerable coal reserve to justify the capital spent on longwall equipment, Upper Big Branch, like most longwall mines, was large in geographic area, both inside and outside the mine. As a rule, longwall mines have at least two or three continuous miner sections contemporaneously developing panels for future longwall mining. The longwall panels themselves are up to 1,000 feet wide and several thousand feet long. When the mining is complete, the mined-out longwall panels are converted into large areas of gob. Since longwall mining had been taking place at UBB since 1996, the mine had immense gob areas. These gob areas must be addressed through bleeder systems and seals. In other words, they require attention until the day the entire mine is sealed.

Longwall mines also require a large amount of surface area to house facilities and infrastructure. UBB was no exception. The mine occupied surface land stretching across parts of Raleigh and Boone counties that housed outside facilities and infrastructure both at Montcoal and some two miles away at the Ellis Portal.

Inside the mine, investigators placed the distance from the Ellis Portal to the longwall at approximately 3.36 miles and the distance from the North Portal to the longwall at about 4.40 miles. It was another 2.3 miles from the entrance to the longwall panel on out to the Bandytown fan. These miles of entries and crosscuts required ventilation and maintenance and had to be examined on a regular basis. In addition, UBB had a massive belt system that conveyed coal from the underground to the surface, crossed West Virginia Route 3 above ground, then went underground again for several miles to the Marfork Plant.

So when Gerald Pauley talked about a large mine, he was referring not to coal production, but to the physical area that had to be examined. The last time he was underground at UBB was on March 30 when he was accompanied by state inspector Jeff Spratt. The men "walked intakes from Ellis Portal to 78 break and went to the mother drive area. We were up to the mouth of Headgate 22, the area where Tailgate 22 starts. We went to the barrier section," Pauley said.[18]

Pauley admitted that quarterly inspections were not always completed, saying that he "tried to get to as many places" as he could, but he was hampered by the fact that the mine "is very large, sprawling, active, fast-paced, a lot of activity."[19]

The last time he visited the longwall was on December 15, 2009, when Spratt again accompanied him. Pauley had not visited the longwall headgate entries that extend to the Bandytown fan during the first three months of 2010, saying he had been in those entries one time and stopped when he ran into water "up to my knees."[20]

West Virginia's Mine Act requires operators to submit to the WVMHST director each year a map describing the mine's ventilation plan.[21]

When questioned by investigators after the explosion, Pauley appeared to have limited knowledge about UBB's ventilation system. He testified that he would not "have a clue" as to how many ventilation plan revisions were submitted since the state received the original plan. He seemed uncertain as to whether "phases" described by the company were different plans or whether they were part of one plan. When asked about ventilation changes submitted by the company during 2009-2010, he said he would "guess a half dozen" but could not "hold myself to that."[22]

Despite the fact that he had been the inspector assigned to the mine for a full year, Pauley also did not appear to have a great deal of knowledge about MSHA's actions with regard to ventilation at UBB. "There was the ventilation change that was made in September of

'09," he said. "I know that MSHA had them down for a few days until they had it completed. And it was where it was such a massive change that I think they ended up writing an order on that. I don't know all the details. I know that they didn't work for a few days over that deal."[23] Under the WVMHST system, the ventilation plans are reviewed by the supervisory level officials, so Pauley may not have been expected to be overly familiar with them.

Pauley said he also was aware that MSHA had found a problem with air reversal on the tailgate side in February or March 2010.[24]

A state official speaking confidentially to members of the Governor's Independent Investigation Panel said simply, "We just don't have the horses." The state does not have dedicated ventilation specialist inspectors, he said, and the inspectors they have do not receive advanced training that would provide expertise in regulating mine ventilation systems. As a result, instead of offering an independent layer of safety for miners, West Virginia, like most other states, relies on MSHA to flag ventilation problems in mines, usually following the federal lead as to whether ventilation systems meet code.

As for rock dusting, Pauley said that during the year prior to the explosion, the mine had been rock dusted and he didn't have to write many violations for dusting on production sections. On March 30, 2010, the last day he was in the mine before the explosion, Pauley said the rock dusting "was okay… I mean it had rock dust there … where a person would walk, you know, it might not be white, white. You know, you might get the grayer look. But, you know, it had been rock dusted. I can tell it had been."[25]

Pauley said he didn't write many cleaning dusting violations. "When I did write a belt up, it would basically need touch-up cleaning and some additional rock dusting," he said. But he added that he had written 15 or 16 violations for cleaning and rock dusting in the eight months of 2009 he inspected UBB and six more in the first quarter of 2010.[26]

During his last quarterly inspection, Pauley said he wrote violations for cleaning and dusting on Four and Five Ellis belts, Four North Belt head area, the area from the longwall switch to Headgate 22 switch and the Headgate 22 section belt.

A violation written on March 23, 2010 – just ten days before the explosion – found that "the Headgate 22 conveyor belt, which is close to one mile in length, is not being maintained properly due to [three words illegible] cleaning under the belt as well as the spillage in the walkway and rock and coal from the ribs in the walkway as well. In addition, float dust is present from the belt head to the belt tail."[27]

Just weeks earlier, a similar violation stated: "The track entry and breakthrough connected [illegible] from the longwall track switch to the #1/HG22 working section needs rock-dusted due to float dust in this area."[28]

On several occasions in 2009, state inspectors wrote violations noting in one case, "Management is aware of the condition of the conveyor belt [with float dust] as the conditions have been recorded since 5/21/09 in the pre-shift record book for conveyor belts."[29]

After the April 5 explosion, investigators determined, based on extensive tests, that inadequate rock dusting was a significant contributing factor to the size and intensity of the explosion.

Unfortunately, the WVMHST failed to recognize that the mine was not adequately rock dusted in part because their inspectors relied on visual inspections. Perhaps the failure occurred because the agency, at the time, did not have the means to conduct independent rock dust testing. Perhaps inspectors recognized the need for rock dusting, but did not grasp the severity of the problem at UBB. Or, most likely, the officials did not connect the dots so as to see the complete picture and recognize the overall heightened danger presented by each independent violation.

Jeff Spratt, who accompanied Gerald Pauley on at least two inspections pronounced the rock dusting "adequate,"[30] and another inspector characterized it as "good" and "plentiful."[31] The April 5 explosion offered indisputable evidence that the dusting at UBB was neither adequate nor plentiful.

Nine days after the blast, Governor Joe Manchin issued an executive order tightening state requirements for coal dust control in underground mines. The order specifically directed WVMHST director Ronald Wooten "to take immediate steps to secure necessary equipment and personnel to test dust samples collected by mine inspectors." Part of the governor's plan was for the WVMHST to open its own lab. Lawmakers provided the state agency a supplemental appropriation of more than $400,000 in July 2010 to fund eight new positions, seven vehicles and equipment required for rock dust analysis. In September, Wooten admitted that state inspectors had not cited a single mine for violating the

new rock dust standards instituted by the governor. He said that his agency had started to set up the lab at its Charleston offices, but the governor's office intervened, saying it wanted the lab to be located at the former Dow Tech Center in South Charleston, where Manchin was promoting an education, research and technology park. And while a spokesperson for the WVMHST stated that the agency was "moving forward and will establish this testing facility as quickly as we are able to do so,"[32] the lab still was not operational as of May 1, 2011.

Tragically, UBB firebosses and foremen testified that they believed UBB was in compliance with incombustibility standards because the WVMHST did not often issue citations for inadequate rock dusting. This was their stated belief even though their own fireboss examination books tell a completely different story – a story documented in ongoing notations of the need to dust.

The Governor's Independent Investigation Panel has concluded that state mine inspectors failed to recognize faulty ventilation and inadequate rock dusting because they lack sufficient training to develop specialized expertise in ventilation, because they do not have an adequate inspection force and because they rely on visual inspections rather than scientific testing to determine whether rock dusting is compliant with state law.

The state's failure at Upper Big Branch does not stop with safety issues inside the mine. The inability to protect the lives of miners is also a political failure – a failure by the state's government to nurture and support strict safety standards for coal miners. If miners' lives are to be safeguarded, the cozy relationship between high-ranking government officials and the coal industry must change, as must the relationship between the enforcement agency and the industry it regulates.

As a major employer and a major taxpayer in the state, the coal industry has long had real and presumed influence over the seats of power in Charleston. Political figures depend on the industry for campaign contributions, and they realize that careers can be destroyed if they oppose policies and legislation supported by what has come to be known as "Big Coal." A governor who openly challenges the industry can find himself driving a cab in Chicago, as Governor William Marland did in the 1950s after he supported a severance tax on coal.

The relationship between the industry and regulators also has been problematic in terms of mine safety. It has long been an accepted practice in West Virginia for mine safety officials to move with relative ease from employment with industry to government and back.

For example, WVMHST Director Ronald Wooten worked at Consol Energy for some years before being named to head up the state regulatory agency in late 2006. Wooten left WVMHST for a job with Western Coal Corporation while the UBB investigation was still underway. Terry Farley, the state's lead investigator into the UBB disaster, also resigned from the agency to take a position with Alpha Engineering Services, Inc., before the conclusion of the investigation.[33]

This is not to suggest that either man did anything unlawful. Each asked for and received approval from the West Virginia Ethics Commission to seek employment with industry. This "revolving door" phenomenon is not peculiar to West Virginia nor to the coal industry.[34] The problem with this system of moving back and forth is that it has the potential for adversely affecting the state's ability to effectively regulate the industry.

Miners depend on inspectors who are focused on mine safety inspection and enforcement, not on finding higher-paying jobs in the industry they are charged with policing. If only one official or inspector backs off a serious safety problem because of the promise of a job with a company, the consequences can be grave for workers whose very lives depend on rigorous enforcement of the law. This revolving door of employment, coupled with the easy access of coal operators to seats of power, jeopardizes the agency's ability to adequately protect workers. And even when WVMHST officials do impose strong sanctions, the agency's efforts on occasion have been undermined by the Coal Mine Safety Board of Appeals, a politically appointed body made up of industry and labor representatives.

In one case, UBB miner Thomas Harrah falsified his qualifications so that he could work as a foreman at UBB and another Massey mine. After Harrah failed to pass the WVMHST foreman's test, he used the mine foreman certification numbers of two men who had passed the test. Credentialed with a forged foreman's card, Harrah was allowed to perform more than 200 safety examinations at UBB in 2008 and 2009 and at Massey's Slip Ridge Cedar Grove Mine in August 2009. He conducted required state training for UBB miners and foremen until WVMHST staff uncovered his deception.[35]

WVMHST officials moved to permanently withdraw Harrah's coal miner certification, a severe sanction that would have prevented him from working in West Virginia coal mines.[36]

The Board rejected the permanent revocation and allowed Harrah to take a coal miner training course after one year. With successful completion of the train-

ing, Harrah could test again for his coal miner's certification, and, if he passed, would be able to resume working as a certified coal miner in West Virginia.[37]

In another case, the WVMHST temporarily suspended the certification of a miner who was involved in a serious accident that resulted in the death of another miner. The suspended miner appealed his penalty to the Board, which granted the miner's request to be reinstated pending appeal. The Board ruled that the WVMHST was required to submit a "proper application" to the Board prior to suspending a miner's certificate. Prior to overturning the WVMHST action, the Board failed to give notice to the state agency and did not allow state officials the opportunity to respond to the appeal.[38]

The West Virginia Supreme Court of Appeals found that the Board exceeded its powers when it modified the order of suspension by imposing the additional requirement of making the WVMHST submit an application to the Board. The Court found that WVMHST fulfilled its statutory requirements by sending the Board a copy of a letter notifying the miner of his suspension. The Court further found that once probable cause is determined, the director of the WVHMST has the authority, under West Virginia law, to suspend a miner's certification.[39]

The actions of the Coal Mine Safety Board of Appeals in these instances provide a graphic illustration of the intertwining of coal and government that works to the detriment of those dedicated to creating an atmosphere in which miners are assured safe working conditions.

There are within the WVMHST many dedicated, committed and safety-conscious inspectors and supervisors who are not afraid to issue citations or provide tough enforcement. However, the overwhelming scope of the job, the economic circumstances of a booming coal industry, the pressure to get along, the recognition of the importance of mining jobs within the state are factors that place immense pressures on state inspectors, pressures which make the regulatory enforcement process difficult to carry out. For those dedicated safety officials and for the workers whose lives hang in the balance, the politics of coal must be acknowledged in any discussion of workplace safety and a commitment must be made to ensure that the public interest – miners' safety – is the foremost consideration.

1 Caperton v. A.T. Massey Coal Co., Inc., 556 U.S. ___, ___, 129 S.Ct. 2252, 2254 (2009) (hereafter "Caperton").

2 Caperton, 556 U.S. at ____, 129 S.Ct. at 2257.

3 Ibid.

4 Caperton v. A.T. Massey Coal Co., Inc., 679 S.E.2d 223, 229 n. 1 (W. Va. 2008).

5 Caperton, 556 U.S. at ___, 129 S.Ct. at 2258.

6 West Virginia Public Radio, January 17, 2008

7 Maynard lost his re-election bid in 2008 after the Riviera photographs were made public.

8 Caperton v. A.T. Massey Coal Co., Inc., 679 S.E.2d 223 (W. Va. 2008).

9 Caperton, 556 U.S. at ___, 129 S.Ct. at 2254.

10 Caperton, 556 U.S. at ___, 129 S.Ct. at 2254.

11 Ibid. The Caperton case returned to West Virginia, where the state Supreme Court once again ruled in Massey's favor on procedural grounds in December 2009. Caperton v. A.T. Massey Coal Co., Inc., 690 S.E.2d 322 (W. Va. 2009). The case was re-filed in Buchanan County Circuit Court in Virginia, where it was pending at the time of the release of the GIIP Report. Hugh Caperton, et al. v. A.T. Massey Coal Co., Case No. CL 10000771-00 (filed November 9, 2010).

12 West Virginia Office of Miners' Health Safety and Training website, "A Brief History of Coal and Safety Enforcement in West Virginia," acquired Feb. 24, 2011.

13 West Virginia Code §22A-1-4

14 Personal communication with C.A. Phillips, Office of West Virginia Office of Miners' Health, Safety and Training, April 14, 2011; Email from Kathy Sloan dated April 13, 2011.

15 Gerald Pauley testimony, p. 13

16 Personal communication with C.A. Phillips, Office of West Virginia Office of Miners' Health, Safety and Training.

17 Weir International, Inc. United States Longwall mining Statistics 1989-2009

18 Gerald Pauley testimony, p. 27

19 Gerald Pauley testimony, p. 68

20 Gerald Pauley testimony, p. 43

21 WV Code §22A-2-1

22 Gerald Pauley testimony, p. 72

23 Gerald Pauley testimony, p. 34

24 Gerald Pauley testimony, p. 32

25 Gerald Pauley testimony, p. 68

26 Gerald Pauley testimony, p. 68

27 WVMHST, Violation No. 31091, March 23, 2010, 11:30 a.m.

28 WVMHST Violation No. 31080, March 2, 2010, 1:00 p.m.

29 WVMHST Violation No. 10784, June 16, 2009, 12:10 p.m.

30 Jeff Spratt testimony, p 17

31 Randy Smith testimony, p. 61

32 Ward, K, Jr., "State hasn't followed up Manchin coal-dust order," *The Charleston Gazette*, Sept. 23, 2010.

33 Alpha Engineering officers and employees were part of Massey Energy's own UBB investigative team before Mr. Farley went to work there. (See affidavit of Terry L. Farley, Dec. 22, 2010; Screening Agreement between Alpha Engineering Services, Inc., and Terry L. Farley, Nov. 11, 2010.)

34 Legal and public administration scholars have documented and discussed the "revolving door" phenomenon for more than a half-century, identifying it as a symptom of what these experts refer to as the "agency capture" theory of administrative law. It holds that captured regulatory agencies are often substantially influenced by the very industries they are supposed to regulate. See, e.g., Marver H. Bernstein, Regulating Business By Independent Commission 3-4 (1955) ("Capture is the result of lobbying, corporate consolidation, and a revolving door in which regulators ultimately work for the businesses they regulate."); Louis L. Jaffe, Judicial Control of Administrative Action at 323. (1965). See, also, Rafael Gely & Asghar Zardkoohi, Measuring the Effects of Post-Government-Employment Restrictions, 3 Am. L. & Econ. Rev. 288, 290-92 (2001).

35 On April 13, 2011, Thomas Harrah pled guilty to performing a foreman's duties even though he had failed the foreman's exam.

36 Office of Miner's Health, Safety &Training v. Thomas Harrah, Docket No. 09-DEC-10, Board of Appeal's Final Order (March 9, 2010).

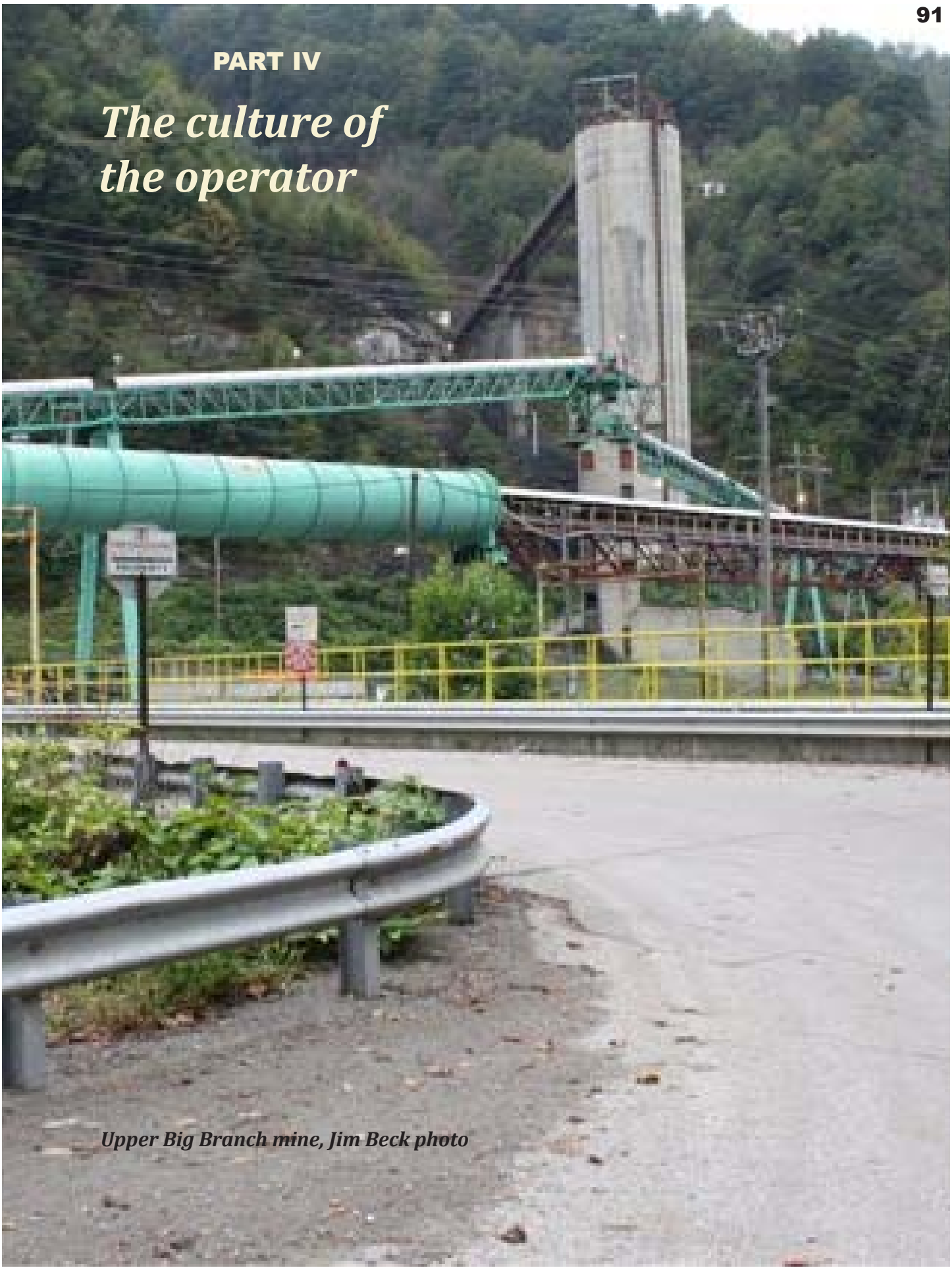
37 The final order can be found at http://wvgazette.com/static/coal%20tattoo/Harrah.pdf

38 State ex rel. Wooten v. Coal Mine Safety Bd., 703 S.E.2d 280 (W. Va. 2010).

39 Ibid.

PART IV

The culture of the operator



Upper Big Branch mine, Jim Beck photo

11 The Massey way

Every coal company has its own personality and its own method of operation. An examination of Massey's history and corporate culture is instructive in understanding how the company operated.

Massey's origins date back to 1916 when founder A. T. Massey began his career as a coal broker in Richmond, Virginia. In 1920 Massey incorporated the A. T. Massey Coal Company, which marketed coal produced by small, independent mines throughout the coalfields. Massey's grandson, E. Morgan Massey, who took the reins of A. T. Massey Coal in 1972, moved the company from coal sales to coal mining and production.[1]

Don Blankenship became the company's chairman and chief executive officer in 1992. Blankenship's rise began in 1984 when the United Mine Workers of America (UMWA) targeted for a selective strike a Massey subsidiary run by Blankenship. The 15-month struggle was punctuated by violence on both sides and marked the first time in 60 years that a coal company had brought in strikebreakers and armed guards.[2] When it was over, it was apparent to most observers that Massey had won a major victory, eroding the UMWA's influence and solidifying the company's position in the Appalachian region.

Blankenship further enhanced Massey's position in the coalfields in the late 1980s by buying huge reserves of metallurgical (met) coal at discount prices. At the time many companies were dropping out of the met coal business because of an influx of cheap foreign steel that had crippled the U.S. steel industry.[3] Blankenship bet on the resurgence of the met coal market, and he was right. As the company prospered, so did Blankenship, who was named president of A.T. Massey in 1990 and chairman and chief executive two years later when E. Morgan Massey retired. The company was renamed Massey Energy in 2000.[4]

At the time of the Upper Big Branch explosion, Massey Energy was the fourth leading coal producer in the country and the largest in the Appalachian region, producing approximately 40 million tons of coal each year from underground and surface mines in Virginia, West Virginia and Kentucky.[5]

The company is acknowledged for the number of jobs it provides and for such contributions as bringing doctors to coalfield communities; providing financial assistance to coalfield schools and scholarships for students; supporting volunteer fire departments and sports events; and staging an annual Christmas gift-giving program for needy children. But Massey is equally well known for causing incalculable damage to mountains, streams and air in the coalfields; creating health risks for coalfield residents by polluting streams, injecting slurry into the ground and failing to control coal waste dams and dust emissions from processing plants; using vast amounts of money to influence the political system; and battling government regulation regarding safety in the coal mines and environmental safeguards for communities.

While Massey Energy officials have maintained that the safety standards of their mines exceed the state and national requirements, it would be hard to convince Delorice Bragg and Freda Hatfield, whose husbands died in a fire in Massey's Aracoma Alma Mine #1 in January 2006. Federal authorities cited Massey for "reckless disregard" for safety rules in connection with the deaths of Don Bragg and Ellery "Elvis" Hatfield.

Federal, state and independent investigations concluded that the Aracoma fire was the result of negligent mining practices – a spark from a misaligned conveyor belt ignited combustible materials that had been allowed to build up along the belt. A crew of twelve men who were working deep underground traveled through heavy smoke, feeling their way out of the mine. Ten escaped with their lives. Hatfield and Bragg, who somehow became separated from the rest of the crew, perished. MSHA determined that the company failed to adhere to such basic safety standards as performing safety inspections, installing a sprinkler system and maintaining a water supply that could have been used to fight the fire. The most serious safety violation involved the removal of stoppings, or ventilation controls. This

allowed the fire to enter the miners' primary escape passage, and, in the words of U.S. District Judge John T. Copenhaver "doomed two workers to a tragic death."[6] In formal testimony, a district MSHA official said simply, "Aracoma was a mess."[7]

Federal indictments were issued, and on December 23, 2009, Aracoma Coal Company entered a guilty plea to ten criminal violations of mine safety law related to the fatal fire and agreed to pay a $2.5 million criminal fine. The plea included one felony count of willful violation of mandatory safety standard resulting in death (admitting that the failure to replace a ventilation wall had resulted in the deaths of Hatfield and Bragg), eight counts of willful violation of mandatory safety standards and one count of a false statement.[8]

MSHA's investigation of the fatalities resulted in more than 1,300 citations against the company for violating federal mine safety laws and regulations. Massey paid an additional $1.7 million in civil penalties to resolve those citations, making the combined total of $4.2 million in criminal and civil penalties the largest fines imposed on a coal company in the history of federal mine safety laws.[9] A separate civil suit brought on behalf of the widows was settled for an undisclosed amount in late 2008.

More than four years later, evidence surfaced indicating that Blankenship was aware of problems at the Aracoma mine prior to the fire. On April 17, 2010, coal industry watchdog Ken Ward, Jr., a reporter for *The Charleston (WV) Gazette*, wrote that Blankenship sent one of his top troubleshooters, Linton Stump, to investigate conveyor belt conditions at Aracoma. Stump detailed his findings in a memo to Blankenship dated January 13, 2006 – six days before the fire – in which he warned Blankenship "while safety reports from Aracoma managers showed 'everything was okay,' Stump had found that 'indeed it was not.'"[10]

Logan County Circuit Judge Roger Perry ruled that the memo could be used in civil actions brought by miners who had survived the fire, saying, "It could be argued that Mr. Blankenship was personally overseeing operations at Aracoma." In October 2010, Massey settled with nine of those workers.[11] Four foremen were sentenced to one year of probation on federal misdemeanor charges in December 2010.[12]

While the UBB investigation was underway, the American University's (AU) School of Communications released a detailed study of Massey's safety record conducted by its Investigative Reporting Workshop. The study, based on a careful search of available data from public sources, including MSHA's on-line database, concluded that from 2000 to 2010, *no United States coal company had a worse fatality record than Massey Energy*. Fifty-four workers were killed in Massey mines during that time, including the 29 who lost their lives in the April 5 explosion and two who died at other mines after the explosion.[13]

Blankenship protested that Massey worked in "difficult underground conditions" and maintained that the 23 miner deaths in Massey mines in the ten years preceding the UBB disaster was "about average."

"If you look at the number of fatals, we're a big producer, so absolute numbers when you're producing 40 million tons a year tend to get big, even with your best efforts," he said.[14]

The assertion just wasn't true, according to the AU investigators who found that during that 2000-2009 time period, just six fatalities occurred in the mines operated by Peabody Energy, the nation's largest coal producer. Massey averaged 17.5 million tons per fatality. Peabody, on the other hand, averaged 296 million tons of coal for every miner lost.[15]

The AU investigators said their job was complicated by MSHA's reporting system, which attributes fatalities to subsidiaries rather than to companies that actually own mines. The report stated that "controlling companies such as Massey – defined by the government as companies 'controlling the coal, particularly the sale of the coal' – are not typically named, although controllers often set safety standards and claim credit when awards are given for good safety histories.'"[16]

During the 10-year time period examined, the reporters found that Massey had been cited for 62,923 violations, including 25,612 considered "significant and substantial."[17] During that time, MSHA proposed $49.9 million in fines against Massey, $15 million more than any other company.

A report to President Obama from MSHA following the April 5 disaster stated that the number of citations inspectors issued at the Upper Big Branch Mine increased dramatically in 2006 and included "an alarming increase in the kinds of serious problems that required miners to be removed from portions of the mine."

In December 2007, the agency warned the operator that the mine would be placed in "pattern of violation" status if conditions did not improve. The level of serious violations dropped, but spiked again in 2009 when MSHA issued 515 citations at UBB – 39 percent of which were for "significant and substantial" violations. The agency issued 48 withdrawal orders at UBB – a rate nearly 19 times the national average. Another 124 citations were issued in 2010 prior to the explosion. MSHA maintained that, but for a computer program error, UBB would have been placed into "potential pattern of violation status" in October 2009 because of the significant and substantial violations assessed to it in 2008 and 2009.

"In short," the report stated, "this was a mine with a significant history of safety issues, a mine operated by a company with a history of violations, and a mine and company that MSHA was watching closely."[18]

In testimony before a U.S. Senate subcommittee on May 20, 2010, Blankenship maintained that safety had been his number one priority since he became part of Massey's management team. "I felt that other safety programs were too reliant on slogans and signs. So I designated safety as S-1: Safety First."

Blankenship went on to tout Massey as "an innovator of safety enhancements," a company that "has introduced many safety practices that have later been adopted throughout the mining industry in the United States and around the world." Blankenship ticked off those practices, which included reflective clothing, metatarsal boots, seat belts for mining equipment, flapper pads for roof bolters, strobe lights on underground equipment, lights on belt line feeders, reflective tape on surface vehicles, among others.[19]

In a letter to U.S. Senator Jay Rockefeller dated June 1, 2010, Blankenship again offered his defense of Massey's safety record. "Massey does not place profits over safety," the letter stated. "We never have, and we never will. Massey Energy's safety program has more than 120 rules and equipment enhancements that exceed legal requirements. The result has been a 90 percent reduction in our lost time accident rate, which has been better – often dramatically better – than the industry average for 17 of the last 19 years. Our safety innovations have been adopted by our competitors and have been praised by MSHA. In fact, just last fall, MSHA honored Massey Energy with three Sentinels of Safety awards, the highest safety honor in the mining industry. No other mining company has ever matched that accomplishment."[20]

The Governor's Independent Investigation Panel made an effort to determine how Massey's Safety One (S-1) strategy was implemented at the Upper Big Branch mine, and why a program aimed at providing Massey miners with added safety in the workplace failed so badly on April 5, 2010.

In a deposition arising out of the lawsuit brought by the Aracoma widows, Blankenship said he personally developed the S-1 program after watching Ford Motor Company commercials that advertised Q-1, "quality is job one."[21]

He offered this description of the program:

- S-1 is intended to mean that "[s]afety is job one."
- S-1 is essentially a documentation of what Massey believes are the best safety practices, as well as requirements that Massey internally has "that exceed the law as to equipment and procedures."
- "[E]veryone is suppose [sic] to be familiar with the manual. They have instruction on it. They use the S-1 or P-2 manuals when they are installing belts or doing different things. It is sort of, to speak, the reference book for the activity at the mines."
- The S-1 manual provides guidelines that miners are expected to use in the execution of their duties on a day-to-day basis.
- Massey miners do not carry the S-1 manual with them when they work. There may be a copy of the manual at the group office, but "maybe not at every mine."[22]

After Blankenship coined the S-1 phrase and began to develop the manual, there "was a concerted initiative to put it in place."[23] At one time the company maintained a list of its S-1 compliant mines, but Blankenship said during the deposition that Massey no longer did so.[24] One former safety director, Frank Foster, testified that during his long tenure as safety director at Massey, no mine was certified as S-1 compliant.[25]

Despite Blankenship's protests to the contrary, Massey Energy's safety program in fact appeared to be just a slogan, at least to the workers at UBB. When asked about S-1 and P-2, Denver Lambert, a miner with 34 years of experience who had worked at UBB since 2001, correctly identified the terms as "safety first, produc-

tion second," but when asked if they were just slogans or "was that the way they managed the mine," Lambert replied, "That's slogans."[26]

Bruce Vickers, who had worked at UBB since 1996, testified that S-1 is "supposed to be safety first." When asked whether safety was first and production second, Vickers replied that it "all depends on who you got to work for."[27]

Purchasing agent Gregory Clay, who had worked at UBB for 15 years, went even further. Asked if he was familiar with the terms S-1 and P-2, Clay said, "Safety first, production second. It should be the other way around. They want production." He said he was unaware of an S-1 handbook.[28]

Michael Ferrell, who worked for 13 years at Massey until he left in February 2010, testified that Massey's safety program did not call for any practices significantly different from those required by state and federal law. Ferrell said those who tried "to do the right thing" in terms of safe mining were "usually the people that [got] kicked in the teeth for it."[29]

Sign at the entrance to the Upper Big Branch mine

Jonah Bowles, who retired three months after the UBB explosion, served as safety director at Marfork, another Massey operation. Bowles mentored the two safety directors at UBB – Berman Cornett and James Walker.[30]

Bowles testified that the safety directors met monthly with Elizabeth Chamberlin, Massey Energy's vice president for safety. When asked whether safety violations were discussed at the meetings, Bowles responded, "I'm sure discussions about the violations took place… usually we had a discussion on how many violations was received and stuff like that, but not picking out exactly what violation it was or anything like that."[31]

Bowles said he did not know if miners who might be adversely affected by hazardous conditions cited in the violations were made aware of them.[32] For each violation received, Bowles would "write the number of points that violation would cost and the estimated cost, and I'd have to write that on the face of the violation," which was then sent to the president.[33]

"It was a big thing, you know, the cost of the violations," he said. "Lots of times, you know, if I got a serious violation, I'd call the superintendent and tell him what it cost him that day for his particular violations that he got."[34]

There is an obvious disconnect between the lofty safety standards extolled by Blankenship and the reality of conditions inspectors and investigators found in the Upper Big Branch mine. Requiring reflective clothing, metatarsal boots and seat belts are all good practices. But they do not address the basics of safe mining – proper ventilation, adequate rock dusting, well-maintained equipment and fire suppression. In those basic areas of worker safety, Massey Energy has fallen woefully short.

As for Blankenship's assertion that the company does not place profits over safety, again, evidence strongly suggests otherwise. For example, section foremen at UBB were required to fill out a number of reports at the beginning of their shifts, during the shifts and at the end of the shifts.[35]

The reports recorded production metrics such as continuous miner load time (in seconds); shuttle car haul time (in seconds), time for installation of a row of

roof bolts (in seconds). All bosses appeared to know the "Six Key Numbers" of interest to upper management – the continuous miner load rate, shuttle car haul rate, feeder dump rate, roof bolt per row rate, average cut depth and linear foot per continuous miner. There is nothing on the daily forms that reflects measures of safety, such as pounds of rock dust applied by machine or linear feet of accumulated float coal dust removed.[36]

As for the dramatic decrease in lost time accident rate, investigators identified more than two dozen cases at the Upper Big Branch mine alone in which Massey failed to report injuries. The Department of Labor said Massey misrepresented the injury data by as much as 37 percent. Underreporting of that magnitude can certainly skew the data and be the difference between an average or worse than average injury rate.[37]

And, it should be noted, none of Massey's underground mines received the joint National Mining Association and MSHA Sentinels of Safety awards in 2009. The Massey worksites that received the awards were two coal processing plants and a surface mine.[38]

This history of inadequate commitment to safety coupled with a window dressing safety program and a practice of spinning information to Massey's advantage works against the public statement put forth by the company that the April 5, 2010, explosion was a tragedy that could not have been anticipated or prevented.

1 Information from Massey Energy website and Funding Universe website, acquired July 15, 2010

2 *Time*, August 26, 1985

3 Funding Universe, acquired July 25, 2010

4 Massey Energy website, acquired July 15, 2010

5 Information from Massey Energy website and Funding Universe website, acquired July 15, 2010

6 Coal Tattoo, Ken Ward, Jr., January 18, 2010

7 McAteer, J. Davitt and Associates, *The Fire at Aracoma Alma Mine #1: A preliminary report to Governor Joe Manchin III*, November 2006.

8 *State Journal*, January 2, 2009

9 Coal Tattoo, Ken Ward, Jr., February 2, 2010

10 Ward, Ken, Jr., *The Charleston Gazette*, April 17, 2010

11 Coal Tattoo, Ken Ward, Jr., November 18, 2008

12 Associated Press, Dec. 9, 2010

13 Russonello, Giovanni, Investigative Reporting Workshop, American University, Nov. 23, 2010 (available on-line at http://investigativereportingworkshop.org/investigations/coal-truth/story/massey-had-worst-mine-fatality-record-even-april-d/)

14 Don Blankenship, testimony before U.S. Senate Committee on Appropriations, Subcommittee on Labor, Health and Human Services, Education, and Related Agencies (May 20, 2010). A video recording of Mr. Blankenship's testimony is available on-line at: http://www.c-spanvideo.org/program/293624-3

15 Russonello, Giovanni, Investigative Reporting Workshop, American University, Nov. 23, 2010 (American University School of Communications, Investigative Reporting Workshop)

16 Russonello, Giovanni, Investigative Reporting Workshop, American University, Nov. 23, 2010 (American University School of Communications, Investigative Reporting Workshop)

17 The term "significant and substantial," as defined by federal law, refers to those violations in which an "inspector has indicated that based upon the particular facts surrounding the violation there exists a reasonable likelihood the hazard contributed to or will result in an injury or illness of a reasonably serious nature."

18 Briefing by Department of Labor, Mine Safety and Health Administration on Disaster at Massey Energy's Upper Big Branch Mine South, at the request of President Barack Obama, April 2010

19 Don Blankenship, testimony before U.S. Senate Committee on Appropriations, Subcommittee on Labor, Health and Human Services, Education, and Related Agencies (May 20, 2010). A video recording of Mr. Blankenship's testimony is available on-line at: http://www.c-spanvideo.org/program/293624-3

20 http://masseyubb.com/2010/06/01/don-blankenships-letter-to-senator-rockefeller/

21 D.L. Blankenship Deposition, 7-11-08, Delorice Bragg, et al., v Aracoma Coal Co., et al., Civil Action No. 06-C-372-P ("B. Depo"), pp. 198-199.

22 Id. at 21- 24

23 Id. at 26

24 Id. at 27

25 Id. at 27

26 Denver Lambert testimony, p. 44

27 Bruce Vickers testimony, p. 57

28 Gregory Clay testimony, p. 113

29 Michael Ferrell testimony, p. 139

30 Jonah Bowles testimony, p. 19

31 Jonah Bowles testimony, p. 48

32 Jonah Bowles testimony, p. 49

33 Jonah Bowles testimony, p. 58

34 Jonah Bowles testimony, p. 59

35 Massey Energy Production Report (PR1-101, PR2-102), Massey Energy Lost Footage Report (PR 103).

36 Massey Energy Section Boss Start of Shift Report (SSR-104), Massey Energy Section Boss End of Shift Report (ESR-105), Daily Underground Report (DUR-114).

37 Russonello, Giovanni, Investigative Reporting Workshop, American University, Nov. 23, 2010 (available on-line at http://investigativereportingworkshop.org/investigations/coal-truth/story/massey-had-worst-mine-fatality-record-even-april-d/)

38 http://www.nma.org/newsroom/press_release_detail.asp?idVar=204

12 The normalization of deviance

The explosion of the Challenger space shuttle on January 28, 1986, is generally remembered as having been caused by the failure of a rubber O-ring designed to seal joints on the shuttle's solid rocket booster.

In *The Challenger Launch Decision: Risky Technology, Culture and Deviance at NASA*, sociologist Diane Vaughan, professor of sociology and international and public affairs at Columbia University, challenged the theory that the disaster was simply a technological failure coupled with a failure of middle level management, as suggested by an investigatory Presidential Commission. While the technology and management did indeed fail, Vaughan probed deeper into the political and managerial culture of NASA to offer a richer understanding of why, in the face of overwhelming evidence that it was extremely risky to do so, the agency made the fateful decision to launch the Challenger.[1]

Vaughan explored organizational rather than individual misconduct and found answers in the theory of "normalization of deviance" as it pertained to a culture of production and structural secrecy at NASA.[2] "Normalization of deviance" refers to a gradual process through which unacceptable practices or standards become acceptable. As the deviant behavior is repeated without catastrophic results, it becomes the social norm for the organization. Individuals who challenge the norm – from within the organization or outside it – are considered nuisances or even threats.

In the case of NASA, engineers had known since 1977 that the O-rings had a design flaw, but they didn't believe the rings were susceptible to damage. When they learned otherwise, they made a fix, but the O-rings continued to sustain damage during each subsequent launch. Vaughan's interpretation is that this history "portrays an incremental descent into poor judgment. It was typified by a pattern in which signals of potential danger – information that the booster joints were not operating as predicted – were repeatedly normalized in engineering risk assessments prior to 1986."[3]

Flying the space vehicle with the defective part became the norm, and there were no grave consequences until that cold day in January 1986 when the Challenger lifted off with a seven-member crew that included New Hampshire schoolteacher Christa McAuliffe. Seventy-three seconds later, the space craft violently broke apart and disintegrated in a cloud of smoke as family members at the scene and school children across the country looked on in horror.[4]

With similarly catastrophic results, Massey Energy engaged in a process of "normalization of deviance" that, in the push to produce coal, made allowances for a faulty ventilation system, inadequate rock-dusting and poorly maintained equipment. The pre-shift, on-shift examination system – devised with the intention of identifying problems and addressing them before they became disasters – was a failure.

Most objective observers would find it unacceptable for workers to slog through neck-deep water or be subjected to constant tinkering with the ventilation system – their very lifeline in an underground mine. Practices such as these can only exist in a workplace where the deviant has become normal, and evidence suggests that a great number of deviant practices became normalized at the Upper Big Branch mine.

These are some examples:

Lack of Air. Extremely low airflow was a chronic problem in some parts of the mine. It became part of the routine of miners and section bosses on Headgate 22 to "go get some air" by closing airlock doors or hanging curtain. In the months leading up to the disaster, the airflow was reversed on a number of occasions. An outsider would consider such a situation as indicative of a serious problem with the mine's engineering and ventilation plan. At UBB, low airflow became part of the standard operating procedure.

Illegal ventilation changes. Evidence was uncovered of major ventilation changes being made while miners were working underground, a blatant disregard for worker safety and a violation of law. Again, such a practice became the norm at UBB.

Engineering issues. The Upper Big Branch mine lacked an effective engineering design. Rather than having an overall engineering plan to guide the mining, testimony suggested the mine was engineered as operations advanced. To the outsider, this would seem like a backwards way of operating. The engineers, working for Massey's Route 3 Engineering, were based at the Route 3 office of the UBB mine site about one mile from the North and South portals, and evidence suggests that they frequently were not involved with ventilation changes made by upper management at the mine. Of the engineers who offered testimony to investigators, one said he traveled underground at UBB only once every couple of years;[5] one said he had very little involvement with the UBB mine;[6] one had never been underground at UBB.[7]

Water problems. Upper Big Branch had continual problems with high water. In addition to compromising the ventilation system, the high water posed safety risks for workers. Nevertheless, sending men – particularly very young, inexperienced workers – into chest-deep water appeared to be viewed not as a hazard, but as just another job that had to be performed. An outsider would see the potential for a miner breaking an ankle or incurring some other type of major injury because he/she was unable to see the unstable floor surface under the water.

Lack of Safety Equipment. Miners, including those working to pump water out of the mine, were placed in hazardous conditions deep in the mine with no communication, no vehicles, no gas detectors and only one way in and out. Sending miners into remote parts of the mine without basic safety equipment can only be seen as a deviance that poses substantial threat to life and well-being.

Inadequate Rock Dusting. Although rock dusting has long been recognized as one of the most basic elements of safe mining – a major factor in preventing flare-ups from turning into major explosions – dusting was not a priority at UBB. The company's indifference to rock dusting was evidenced by the fact that only a two-man crew was assigned to dust the entire mine on a part-time basis, and the rock dusting equipment assigned to them did not work properly. As a result, it was not surprising that tests conducted after the explosion revealed inadequate dusting and return entries that were completely black.

Ineffective fireboss system. The preshift, onshift examination process, aimed at identifying problems and protecting miners' lives, was irrevocably broken at UBB. Although both state and federal inspectors wrote citations for ventilation violations, fireboss records in many cases failed to reveal when and where inadequate ventilation was found. It was acceptable at this mine to do nothing because identifying unsafe conditions might have meant dedicating manhours to correcting the problems. In other instances, when firebosses recorded the need to clean up high levels of coal dust, there is no record that the problems were addressed.

The inference drawn is that it did not matter whether or not a fireboss did his/her job, thus negating one level of safety at the mine. In fact, in the ten days leading up to the disaster, only eleven percent of the rock dustings requested were completed.

Fraudulent fireboss practices. In the weeks preceding the disaster, investigators found that one UBB foreman's hand-held methane detector had not been turned on, even though he filled in examiner's books as if he had taken gas readings. This foreman was responsible for assessing gas and water levels in the critical entries adjacent to the longwall panel and reporting conditions leading to the Bandytown fan. Data downloaded from methane detectors indicated that devices used by other foreman also had not been turned on at times when the foremen were underground and responsible for identifying hazardous conditions.

Not only is the failure to take these required readings a violation of state and federal law, it demonstrates an utter failure to understand the purposes of the examinations and their life-or-death consequences. Moreover, it suggests a profoundly dangerous attitude that firebossing a mine is just another burden imposed by MSHA and the WVMHST. A section foreman's failure to perform them diligently and honestly reflects poorly on the attitudes up the company's chain of command. If the mine foreman, superintendents or other top officials communicated no sense of urgency about examiners' work, and if they failed to take care of hazards that diligent firebosses reported, some examiners may come to the conclusion that their assignment is not really that important in a mine fixated on production. Their concept of what is important is delivered through messages such as "get those water pumps repaired," "get those pumps set," we need to "get it in the coal." It may be lost on them that their work is vital to protect their fellow

miners' lives – that pumps keep the water levels low, so the air can flow and the mine does not blow up.

Faulty equipment and structure. From a poorly maintained top of the line shearer to broken rock dusters and damaged and defective airlock doors, an inattention to equipment and structure was the norm at this mine. MSHA testing of the shearer found water sprays missing or clogged. Additionally, MSHA found worn bits on the machine, which exposed steel shafts that increased the danger of sparking when the bits hit rock. The water lines on the longwall were inadequate to supply water to the shearer needed to suppress fire, as revealed by MSHA testing on Dec. 20, 2010. Mantrips, the vehicles that transport workers, were in terrible condition, as evidenced by violations written by MSHA during the investigation. The main track haulage was not maintained from the North Portal to Ellis Switch, and, as a result, MSHA wrote numerous post-explosion violations and orders. Apparently, failure to maintain equipment and structure was not considered a safety issue that had the potential to cause harm if not addressed.

Airlock doors versus overcasts. The company often installed airlock doors rather than constructing permanent overcasts to direct airflow. By one count, there were 12 sets of airlock doors from the North Portal to the longwall.[8] Many UBB employees and state and federal inspectors testified that they had never seen so many doors as they saw at UBB. The doors are cheaper and can be installed much more quickly than overcasts, which is probably the reason the choice was made to use doors. There are, however, a number of downsides to using doors rather than building block overcasts. One is that the doors are vulnerable to damage within days of installation if they are struck by heavy equipment moving through them. The doors also can be compromised by human error if accidentally left open by workers. And, perhaps most importantly, it is almost impossible to make them truly airtight. It can only be concluded that use of doors was a relatively inexpensive shortcut taken to address ventilation issues, but most certainly not the best choice for the safety of workers.

Safety mechanisms disabled. Testimony suggested that methane detectors on equipment had been "bridged out," or disabled, so that production could continue without taking time to make repairs. Although equipment disabling has not been directly tied to the explosion itself, this practice is a present and constant danger to workers and a violation of state and federal law.

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In addition to inattention to basic safety standards, Massey exhibited a corporate mentality that placed the drive to produce above worker safety. Miner after miner testified about the pressure to produce coal, and some said directly that Massey's safety program, Safety One (S-1) took a back seat to Production Two (P-2). These are some of the ways in which this culture of production over safety manifested itself:

Production reports every 30 minutes. The frequent callouts on longwall production were relayed up the Massey management chain to the headquarters of Massey Energy. This reporting, coupled with downtime reports of when and why coal was not being run, sent a chilling message to workers about what management considered most important. In instances in which a section boss did halt production because of a dangerous condition, such as wholly inadequate ventilation, he was instructed to write only "downtime." He was not to create a record acknowledging a potentially deadly situation.

Injury reports. A large safety board on the outside of the bathhouse at UBB listed reportable injuries with a space available to include the injured worker's name. Such a public display of this type of information can generate peer pressure and intimidate workers, causing them to fail to report the seriousness of injuries for fear of retaliation.

Institutional secrecy. Workers at UBB were treated in a "need to know" manner. They were not apprised of conditions in parts of the mine where they did not work. Only a privileged few knew what was going on throughout Upper Big Branch. Miners, and even section foremen were not informed about ventilation changes so that many were not even aware of how the air was supposed to travel.

Violations part of doing business. Massey Energy officials have made public statements expressing the opinion that both the number of violations issued against the company and the severity of those violations are part of the cost of mining coal. Information obtained from MSHA's data retrieval site provides evidence that Massey engaged in a consistent practice of contesting violations and tying up the regulatory process. Between 2000 and 2009, MSHA proposed $1,974,548 in penalties

for violations at the UBB mine. To date, the company has paid just $657,905.58, or 33.3 percent, of those proposed penalties. Fighting the violations allowed Massey to pay only a third of the assessed penalties over a ten-year period while accelerating profits, thus negating the punitive intent of the fines.

At the same time, the company has maintained an ongoing public relations campaign in which officials put forward the notion that their mines exceed industry standards for workplace safety. Although this assertion is not true, it is widely believed to be factual by workers, especially those who have never worked for other mining companies.

Intimidation of workers. There is ample evidence through testimony that miners were discouraged from stopping production for safety reasons. Workers said that those who questioned safety conditions were told to get on with production. An example is Headgate 22 foreman Dean Jones, whose wife said he told her he received a "get it in the coal" message from Chris Blanchard through the dispatcher when Jones shut down his section because of lack of air.

In another instance, Tailgate 22 foreman Brian "Hammer" Collins described what happened when he stopped his crew from running coal because he found inadequate ventilation when he did his pre-shift exam. Collins didn't allow any work to start on his section until the ventilation problems were resolved – a process that took about an hour. When he came to work the next day, he said Performance Coal Vice President Jason Whitehead suspended him for three days for "poor work performance." Collins stood his ground. "I am hard-headed…I said, 'No, if I ain't got the air in my last open break, I cannot load [coal].'"[9] Collins should have been commended for attempting to change the culture.

"Nasty Notes." Miners also mentioned disrespectful written messages they received from Performance Coal President Chris Blanchard. They called them "nasty notes." "Anybody that bosses for Chris Blanchard will tell you the same thing," said Glenn Ullman, a miner with six years experience with Massey. If a crew didn't complete a job during a shift, a nasty note would be waiting on the next shift, "some sarcastic note for all my men to see … [you'd] feel belittled," Ullman said.[10] Some firebosses and foremen said in interviews they were going to "run coal right," and didn't care if they were fired for it. Others, Ullman said, were intimated by Blanchard's "nasty notes" and didn't say anything because they were "job-scared."[11]

Other mine managers also left notes for crew foremen in assignment books. "Finish up on move. We need to be running in the morning. The very first thing." "Orders from Chris. It must be running by 7:00 a.m." "Tell your guys extra effort is needed in order to be off Saturday. Hammer down."[12]

Enhanced Employment Agreements. The company also used "enhanced employment agreements" to discourage workers from complaining about safety concerns or working conditions. Under terms of the agreements, the company offered pay increases, bonuses and guaranteed employment in exchange for employees' agreeing to work for a three-year period. However, by accepting the company's terms, the miners became "at will" workers. If they left voluntarily or if their employment was terminated "for lack of performance as determined by management, unacceptable conduct … or a serious safety infraction," the miners had to return the "enhanced pay" and all of the bonuses received under the contract. They also could not work at any competitor's coal mine within a 90-mile radius of the mine where they had worked.[13]

The enhanced pay is subject to statutory deductions and withholdings, including state and federal income taxes, and Social Security and Medicare. Even if an employee banked 100 percent of the enhanced pay, he would not have enough to buy out his contract because the net take-home pay from the bonus would always be less than the gross amount of the enhanced pay he is obligated to pay back. The miner would have to delve into personal savings to make up the difference or face being sued and having to pay a financial penalty. In effect, the enhanced employment agreement effectively handcuffs the employee.

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A third area in which the normalization of deviance can be observed is a management system that fosters an "us against them" mentality. Some ways in which this could be seen:

An enemies list. Massey appeared to cast as enemies not only regulators and inspectors, but also politicians who failed to blindly support the company and community residents who questioned whether some coal practices negatively impacted their health or well-being. Such an "us against them" attitude can poison the political process, impose a chill on free speech and have a detrimental effect on safety in the workplace.

Employees as members. The designation of employees as "members" suggests "we are Massey in

this together" and helps create the cultural dynamic at work within the company. If everyone associated with the company is in this together, then management concerns and worker concerns are one. Veteran miner Stanley Stewart referred to a "Massey code of silence" in which workers kept their mouths shut in order to "be a member."[14] Some miners even affixed stickers to their hard hats saying, "I support Massey Energy 2010." Investigators observed one sticker that said, "Not Guilty." Those who violate the membership agreement, who are disloyal to the company by complaining about work conditions or calling hotlines to report safety issues, place themselves on the outside of the club.

Too big to be regulated. As the largest coal producer in the Appalachian region at the time of the disaster, Massey Energy used the leverage of the jobs it provided to attempt to control West Virginia's political system. Through that control, the company challenged federal and state oversight agencies, including MSHA, the Environmental Protection Agency and the West Virginia Office of Miners' Health, Safety and Training. Many politicians were afraid to challenge Massey's supremacy because of the company's superb ongoing public relations campaign and because CEO Don Blankenship was willing to spend vast amounts of money to influence elections. In one well-documented instance, he used his resources to elect a relatively obscure judge to the state Supreme Court, a plot so intriguing that the author John Grisham borrowed it for one of his best-selling novels. If politicians live in fear of a company, it isn't a stretch to assume that workers also are fearful. If their elected officials depend on the corporation for campaign funds, there is no one to whom the miners can turn to make sure their workplace is safe.

MSHA made us do it. When deviant mining practices led to the terrible tragedy of April 5, 2010, the company response was to go on the offensive against the federal regulatory agency. The message was direct: MSHA made us change the mine's ventilation system in ways that were dangerous. This position assumes that the government runs the company. Just the opposite is true. The ventilation system is the responsibility of the operator, and the operator is aware of this responsibility. MSHA's responsibility is to review the system to ensure that it complies with all safety regulations. These regulations represent the bare minimum degree of protection for workers. If Massey officials believe they are being pressured to run their mining operations in an unsafe manner, the company has the option of stopping production.

Illegitimacy of Regulators. Massey rhetoric challenged the very legitimacy of safety inspectors. The company maintained that their operations exceeded safety standards. The implied "therefore" is that they don't need those guys telling them what to do. Several miners testified that the company had postings in big letters on the bulletin board at UBB stating that MSHA penalties at the mine exceeded a million dollars. Some miners even wore stickers on their hats with a dollar amount intended to represent how much it cost Massey when the longwall was down. The not-so-subtle message to employees is that MSHA is costing the company money – and workers shouldn't aid in that process. In an organization where deviance is *not* the norm, the same information might be used to deliver a very different message, "We have some very serious safety problems at this mine, so much so that we've racked up a million dollars in penalties. If you see unsafe conditions, be sure to bring them to our attention. Your safety is our most important concern."

At the end of the GIIP's investigation, the evidence leads to the conclusion that the explosion at the Upper Big Branch mine occurred when a spark from the shearer ignited an explosive accumulation of methane, causing a fireball. The fireball in turn ignited coal dust that had been allowed to build up, and the coal dust carried the explosion throughout more than two miles of the mine. Like the O-ring failure on the Challenger, this explanation describes the systems failures that occurred at UBB. It does not answer the deeper question asked by family members and loved ones, "Why did this happen?"

Many systems created to safeguard miners had to break down in order for an explosion of this magnitude to occur. The ventilation system had to be inadequate; there had to be a huge buildup of coal dust to carry the explosion; there had to be inadequate rock dusting so that the explosiveness of the coal dust would not be diluted; there had to be a failure to maintain machinery; there had to be a breakdown in the fireboss system through which unsafe conditions are identified and corrected. Any of these failures would have been problematic. Together they created a perfect storm within the Upper Big Branch mine, an accident waiting to happen.

Such total and catastrophic systemic failures can only be explained in the context of a culture in which wrongdoing became acceptable, where deviation became the norm. In such a culture it was acceptable to mine coal with insufficient air; with buildups of coal dust; with inadequate rock dust. The same culture

allowed Massey Energy to use its resources to create a false public image to mislead the public, community leaders and investors – the perception that the company exceeded industry safety standards. And it became acceptable to cast agencies designed to protect miners as enemies and to make life difficult for miners who tried to address safety. It is only in the context of a culture bent on production at the expense of safety that these obvious deviations from decades of known safety practices make sense.

Failure to address the effect of normalization of deviance in any examination of the Upper Big Branch disaster would not only be a disservice to the families, friends and loved ones of the men who died on April 5, 2010. It also would be a disservice to current and future coal miners whose lives depend on this nation's willingness to ensure safe mining practices.

1 Vaughan D., T*he Challenger Launch Decision: Risky Technology, Culture and Deviance at NASA*. Chicago: The University of Chicago Press, 1996.

2 Ibid

3 Ibid

4 Ibid

5 Raymond Brainard testimony, Oct. 26, 2010

6 Heath Lilly testimony, Sept. 15, 2010

7 Matthew Walker testimony, Sept. 9, 2010

8 Brian Collins testimony, p. 30

9 Brian Collins testimony, p. 17

10 Glenn Ullman testimony, p .49

11 Glenn Ullman testimony, p. 48

12 Notebook for J. Burghduff, October 2009

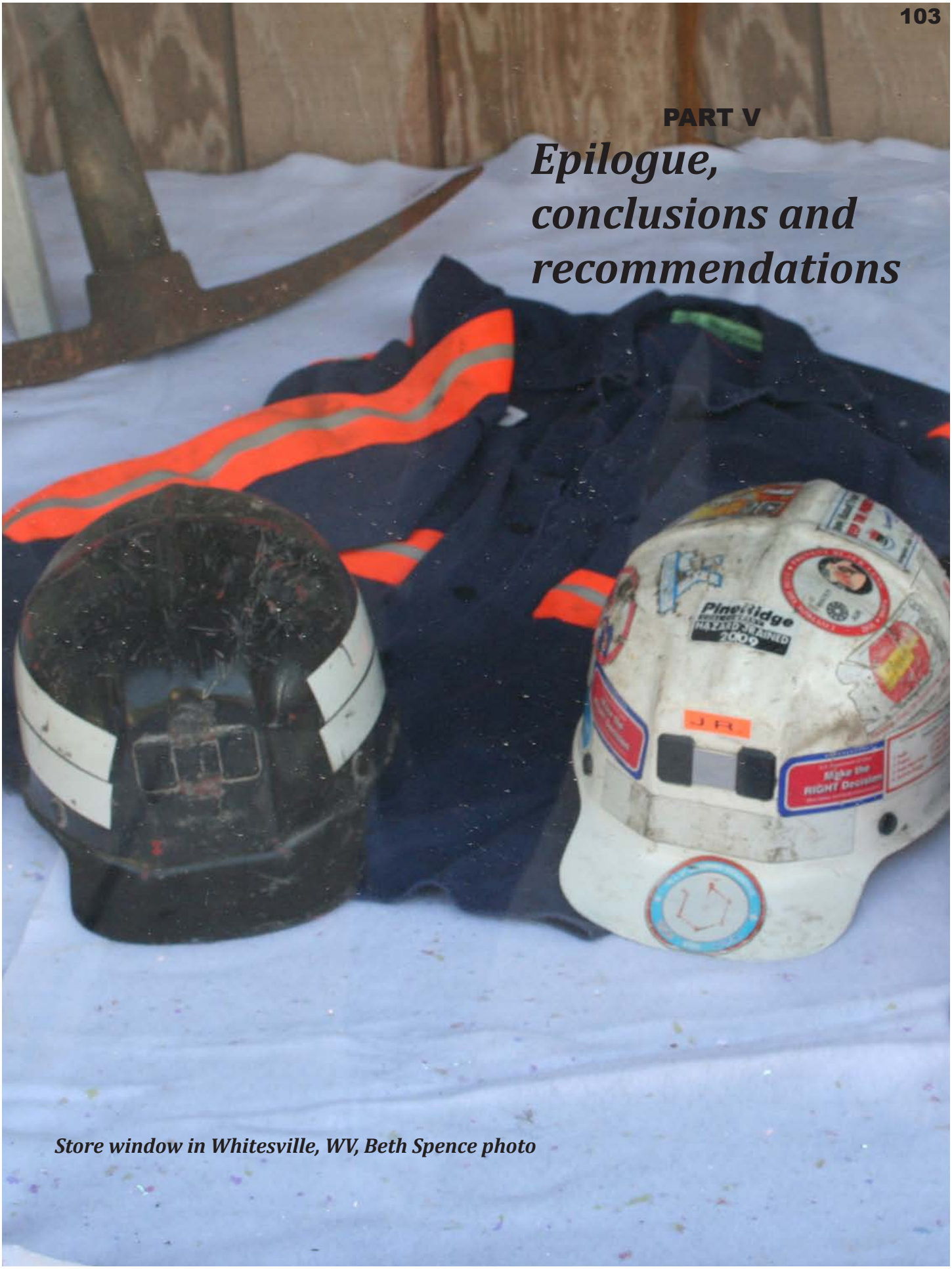
13 Outlined in memorandum from Jason Bussey, Human Resource Manager to Stanley Stewart, "Enhanced Agreements," December 14, 2007

14 Stanley Stewart testimony, June 5, 2010, p. 185

Part of memorial to miners in Whitesville, WV, Beth Spence photo

PART V

Epilogue, conclusions and recommendations



Store window in Whitesville, WV, Beth Spence photo

EPILOGUE

As is true with all mining disasters, the one at Upper Big Branch did not end with the April 5, 2010, explosion that took the lives of 29 men. Instead, the blast set in motion a chain of events that has altered the future for the coal industry, government regulators and, most importantly, the families and loved ones who suffered such overwhelming losses.

The changes began late in December 2010 when longtime Massey Energy CEO Don Blankenship retired.[1]

The following month, January 2011, Massey officials announced that the company would be sold to coal giant Alpha Natural Resources. When finalized sometime in 2011, the deal will make Alpha one of the three largest coal companies in the country, an enterprise worth $15 billion[2] with more than 110 mines and about five billion tons of reserves.[3] Massey Energy will cease to exist as a company.

In late April 2011, as the Alpha deal was nearing completion, *The Charleston Gazette* reported that Massey Energy officials had scheduled meetings with federal and state mine safety regulators to discuss a plan to seal the Upper Big Branch mine.[4]

Blankenship attempted to downplay the connections between his retirement, the sale of the company and the Upper Big Branch disaster, telling a television reporter in Charleston, West Virginia, that he just thought it was time to retire. As for the explosion at his company's mine that killed 29 men, Blankenship said, "I pretty well think I know what happened and what the outcome will be, so I'm not concerned any more about the investigation. I think it's pretty much behind us."[5]

Few would agree that the UBB disaster is history – or that Blankenship's retirement and the sale of Massey weren't connected to it. The deal with Alpha was finalized as Massey announced a net loss of $166.6 million in 2010, down from a $104.4 million profit in 2009. The company incurred losses of $70.1 million in the last quarter alone. NPR's Howard Berkes, who has reported extensively on Massey since the explosion, tied the sale explicitly to the UBB disaster saying "close to 70 percent of last year's loss, or $115 million, were the results of costs associated with the Upper Big Branch disaster that killed 29 coal miners."[6]

In late April 2010, Massey Energy made an offer of a $3 million cash settlement to each victim's family. In late April 2011, Massey notified families that the offer would expire on June 1 – just before the Alpha purchase is finalized and before MSHA is due to release its report on the disaster. At the time the notification was given, seven families had agreed to settlements with the company. Nine others had filed suit against the company, as did a survivor of the explosion.[7]

Although Alpha officials indicated they had had no contact with the families, the *New York Times* reported that the Alpha takeover "could help Massey shed legal burdens arising from a marred safety record" that included the UBB disaster.[8]

A question that looms over the future of the coalfields is whether the new company will have an improved safety record.

Alpha's chief executive, Kevin S. Crutchfield, said that he would "draw on his company's cleaner safety and environmental record to help resolve Massey's legal issues," but that it would take time. "I think we've established a pretty credible track record with regards to safety and environmental stewardship," he said. "The goal is to run the combined company in the same manner."[9]

That credibility may have taken a hit when Crutchfield announced on April 16, 2011, that he has named Massey Chief Operating Officer Chris Adkins to help spearhead the implementation of Alpha's main safety program, "Running Right," in partnership with a current Alpha executive.[10]

"Can't think of two better individuals to lead this

effort," Crutchfield said of Adkins and the Alpha executive who will share the responsibility with him. Adkins' history makes him a questionable choice to run a safety program. One need look no further than UBB, where conditions, as described in this report, reflected a mine in which safety standards were swept aside in the rush to produce coal.

Adkins also served as Massey's chief operating officer when the 2006 conveyor belt fire killed two miners in the company's Aracoma Coal Company's Alma #1 mine. An MSHA official who testified during the investigation of the deaths said when the state required inspectors to keep a list of mines that presented the most problems, the Alma Mine #1 was at the top of his list.[11] In 2010, Adkins was still chief operating officer when Massey closed its Freedom Mine in Kentucky after MSHA found conditions "so persistent and dangerous" that the mine had "a high risk level for a fatal accident on any given day."[12] Adkins also was Massey's presence in the UBB Command Center; he was the man who, according to MSHA Command Center notes, told rescuers who were trying to follow safety protocols that they weren't "playing mine rescue."

And more than a year after 29 men died in the Upper Big Branch mine, there is strong evidence that Massey has not changed the manner in which it operates its mines. On April 29, 2011, after receiving tips on its hotline, MSHA conducted an impact inspection and found 20 instances of aggravated misconduct at Massey subsidiary Inman Energy's Randolph coal mine in Boone County, West Virginia. During the safety blitz, the agency issued 20 withdrawal orders and five citations. Eleven orders had to do with violations of the ventilation plan at the mine.

Inspectors found that the company was illegally operating two sets of mining equipment simultaneously and cutting, mining and loading coal from the same section. Combustible materials had accumulated in active workings. The company failed to use ventilation curtains, necessary for proper ventilation to prevent mine explosions. Inspectors found insufficient water pressure on the continuous miner to suppress dust and to prevent sparking and methane ignitions.[13]

Another question that remains unanswered is whether the contentiousness between the company and federal regulators will continue. Massey CEO Baxter Phillips said in a press briefing on Feb. 2, 2011, that he has "passed down through the organization" that "we would like every conversation to be professional and businesslike" and that he wants to "basically turn down … the tension that appears to exist."[14]

But in a conference call with Alpha on January 31, Phillips said he would work with Alpha "to reduce regulatory impediments,"[15] a statement that suggests the new company well may continue past campaigns against the agencies that regulate coal, particularly MSHA and the EPA.

Undoubtedly, ongoing investigations will result in criminal and civil penalties against the company and its managers. The first federal criminal indictment came on February 25 when Massey Energy's chief of security, Hughie Elbert Stover, was formally charged with lying to the FBI and obstructing the criminal investigation.

The indictment charged that Stover directed and trained security guards to give advanced notice of MSHA inspections, a practice that he denied when questioned by federal agents. Stover also is charged with directing the disposal of documents at UBB "with the intent to impede, obstruct and influence" the disaster investigation.[16]

The United States Congress has had difficulty getting traction for new mine safety legislation. In the 112th Congress (2011-2012), the Robert C. Byrd Mine and Workplace Safety and Health Act (S. 153) was introduced by Senator Jay Rockefeller on January 25, 2011. Senator Joe Manchin III and two other senators co-sponsored the legislation. A similar bill (H.R. 1579) was introduced by Rep. George Miller (D-CA) on April 15, 2011, with seven co-sponsors, including West Virginia Rep. Nick J. Rahall II. Similar legislation was introduced in the House and Senate of the 111th Congress, but it was not adopted.

As far as the regulatory agencies are concerned, personnel changes will likely take place at MSHA as an internal review of the agency's performance nears completion. At the conclusion of a similar review following the 2006 Aracoma fire, personnel changes were made in district and field offices. Similar changes can be expected when the UBB internal review is completed.

The Charleston Gazette reported on February 5, 2011, that the Obama Administration has proposed increasing MSHA's budget by approximately five percent to allow the agency to split its operations in southern West Virginia. The Mount Hope District 4 office directs the inspection of mines throughout southern West Virginia with field offices in Logan, Madison, Mount

Carbon, Mount Hope, Pineville, Princeton and Summersville. The increased funding would allow the creation of a new district office in Pineville, which would oversee field offices in Logan and Welch.[17]

Even if a new district office is opened and officials are replaced, however, the future will not be any different from the past unless the agency makes the kinds of sweeping changes necessary to address the culture of MSHA and its relationship to the industry it regulates.

The West Virginia Office of Miners Health Safety and Training, too, must address internal problems having to do with a revolving-door work force and inadequate resources.

None of the changes that have taken place in industry or government since April 5, 2010, offers much solace for the families of the men who died in the Upper Big Branch mine. The deep personal losses ricochet through communities and families, forever altering lives and futures in ways that can never be adequately measured and are rarely acknowledged as part of the true cost of mining coal.

"You cannot replace a man's life, what he might have accomplished or the difference he might have made in his children's lives," said Geraldine McKnight, widow of Roy "Big Sack" McKnight, who was just 30 years old and the father of two young children when he was killed in the Scotia, Kentucky, mine disaster of March 9, 1976.[18]

The men who died in the Upper Big Branch Disaster ranged in age from 61 to 20. They included the veterans of the "Old Man" production crew and young men barely out of high school. They were men who served their communities as volunteer firefighters, youth coaches and leaders of churches. A number of them were veterans of the U.S. military. They were loyal friends and dependable neighbors. All were family men – husbands, fathers, sons, brothers, grandsons and grandfathers. They were men like Big Sack McKnight, men whose lives cannot be replaced.

Retired miner Leo Long expressed the sentiments of many family members when he spoke at a Congressional hearing in May 2010 in Beckley, West Virginia. "It just tore us apart, broke our hearts," the elderly man said of the death of 31-year-old Ronald Lee Maynor, the grandson he had helped rear. "I cry every day and every night. I can't help it."

And then he issued the challenge that would help make sense of the seemingly inexplicable losses. "I beg you," he pleaded with the members of Congress who had traveled to Beckley. "Do something."[19]

1 As payment for stepping down, Blankenship received what the national media described as a "Golden Parachute" of benefits worth approximately $12 million that included a free house for life, millions in deferred compensation and a "salary continuation retirement benefit" of $18,241 per month that will continue for ten years.

2 Ken Ward, Jr., "Will Alpha improve safety?" *The Charleston Gazette*, Feb. 1, 2011

3 New York Times dealbook, This is a longer version of the article that appeared in print, http://dealbook.nytimes.com/2011/01/20/massey energy is to be sold to alpha natural resources, (acquired February 2, 2011)

4 Ward, Ken, Jr., "Massey Plans to seal UBB Mine," *The Charleston Gazette*, April 30, 2011

5 WCHS-TV, December 5, 2010

6 NPR, Howard Berkes, "Massey's losses continue to mount since W.Va. mine blast," Feb. 1, 2011

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8 New York Times dealbook, This is a longer version of the article that appeared in print, http://dealbook.nytimes.com/2011/01/20/massey energy is to be sold to alpha natural resources, (acquired February 2, 2011)

9 Ibid

10 Berkes, Howard, "In Merger, Massey Mine Execs Would Get Top Jobs," April 16, 2011

11 McAteer, J. Davitt and Associates, *"The Fire at Aracoma Alma Mine #1," 2006*, p. 53

12 Berkes, Howard, "In Merger, Massey Mine Execs Would Get Top Jobs," April 16, 2011

13 Coal Tattoo, Ken Ward, Jr., May 3, 2011

14 NPR, Howard Berkes, "Massey's losses continue to mount since W.Va. mine blast," Feb. 1, 2011.

15 Ibid.

16 NPR, Howard Berkes, "Security Chief Indicted in Mine Disaster Probe," Feb. 28, 2011.

17 Ward, Ken, Jr., "Obama budget includes new MSHA district," *The Charleston Gazette,* February 15, 2011

18 Stern, Gerald M., *The Scotia Widow*s, Random House, 2008, p. 130

19 Porterfield, Mannix, "I beg you, do something," *The (Beckley) Register Herald*, May 24, 2010

IN CONCLUSION

"Some pretty hard questions have got to be asked. The families need answers, and we, as a country, need answers. Something has gone drastically wrong – and we need to find out what it is, what happened, and we need to do our best *to make sure it doesn't happen again*," said Kate Wilkinson, New Zealand Minister of Conservation, on the loss of 29 miners at the Pike River coal mine in November 2010.[1]

"MSHA is launching a full investigation to determine the cause of this tragedy and will take the necessary steps *to ensure that this never happens again*," said U.S. Labor Secretary Elaine Chao, on the loss of 12 miners in the Sago mine, in Buckhannon, West Virginia, January 4, 2006.[2]

"We just have got to find the answers to what caused this and to make sure whatever it takes *that this never happens again*," West Virginia Governor (now U.S. Senator) Joe Manchin III, said on April 11, 2010.[3]

Following all man-made disasters, such as coal mine explosions, government officials stand in front of the public and grieving family members and promise to take steps to ensure that such tragedies don't happen again. For a while people pay attention. Investigative bodies like this one are formed and spend months sifting through evidence to attempt to pinpoint the causes of the disaster and offer recommendations aimed at preventing another one.

We have done so in this report, again with the genuine hope that reforms can be instituted and that the Upper Big Branch disaster is the last coal mining disaster ever in this country. However, we offer these recommendations with reservation. We have seen similar reports, written with the same good intent, gathering dust on the bookshelves of the national Mine Health and Safety Academy.

We also have witnessed times when this country rolled up its sleeves and went to work with a steely determination to improve workplace conditions. Some of the most dramatic improvements for miners' health and safety in the United States came after some of the worst human tragedies – the disaster at Monongah in 1907 and the explosion at Farmington in 1968 – when big, bold reforms were put in place by courageous lawmakers at both the state and federal level.

These reforms have given us, among other things, quarterly inspections of underground coal mines, imminent danger withdrawal orders, greatly expanded miners' rights, respirable dust limits and mandatory minimum hours of safety training for miners. And they have saved miners' lives. The 1969 Coal Mine Health and Safety Act was the most comprehensive occupational safety and health law ever enacted in this nation and perhaps in the world. In the five years after its passage, the rate of coal mine fatalities declined 37 percent; the fatality rate again dropped 25 percent in the five years after passage of the Federal Mine and Health Act of 1977.[4]

This tells us we can mine coal safely in this country. Disasters are not an inevitable part of the mining cycle. There are not preordained numbers of miners who have to perish to produce the nation's energy. While we are all in God's hands, the safety and health of our miners is also in the hands of the mining community.

However, laws and regulations are effective only if they are respected by companies and enforced with diligence by regulators.

"The Upper Big Branch disaster laid bare the loopholes that riddle our mine safety laws. These loopholes allowed dubious mine operators like Massey

Energy to violate mine safety rules repeatedly with impunity," said U.S. Rep. George Miller (D-CA), the senior Democrat on the House Education and Workforce Committee.[5]

Ultimately, the responsibility for the explosion at the Upper Big Branch mine lies with the management of Massey Energy. The company broke faith with its workers by frequently and knowingly violating the law and blatantly disregarding known safety practices while creating a public perception that its operations exceeded industry safety standards.

The story of Upper Big Branch is a cautionary tale of hubris. A company that was a towering presence in the Appalachian coalfields operated its mines in a profoundly reckless manner, and 29 coal miners paid with their lives for the corporate risk-taking. The April 5, 2010, explosion was not something that happened out of the blue, an event that could not have been anticipated or prevented. It was, to the contrary, a completely predictable result for a company that ignored basic safety standards and put too much faith in its own mythology.

1 "No survivors in New Zealand Pike River coal mine after second explosion," *Herald Sun* (Australia), November 24, 2010

2 U.S. Department of Labor news release, January 4, 2006

3 Brown, K., WV Public Broadcasting, April 12, 2010

4 Comparing the five-year fatality rate for 1965-1969 to the five-year rate for 1969-1973

5 Ward, Ken, Jr., Coal Tattoo, April 15, 2011

FINDINGS and RECOMMENDATIONS

Finding #1: The disaster at Upper Big Branch was man-made and could have been prevented had Massey Energy followed basic, well-tested and historically proven safety procedures.

Recommendations:

1. Require that every mine superintendent be certified by the state agency in underground mining and in carrying out the mine health and safety laws with regard to individual mines. The state agency should develop and administer an examination, including an in-mine demonstration of the superintendent's skills, as part of the certification process.
2. Require a quarterly report certifying that all safety standards are being complied with. Sanction for knowingly or negligently falsifying the report would be the revocation of the mine superintendent's certification.
3. Adopt provisions similar to those contained in the Sarbanes-Oxley Act to make a Board of Directors accountable for mine safety compliance. Boards of Directors should utilize existing health and safety committees or form a committee to oversee health and safety aspects of the mines under the company's control. The committee would be responsible for ensuring compliance with all federal and state regulations and would be required to certify that the mines are in compliance each quarter. A criminal penalty should be assessed on these board members who certify, negligently or willfully, that the mine is in compliance when it is not.

Finding #2: The Upper Big Branch mine explosion occurred because of failures of three basic safety practices: a properly functioning ventilation system; adherence to federal and state rock dusting standards; and proper maintenance of safety features on mine machinery. Although many standards have been adopted to safeguard the lives of miners, these basic systems should be the primary concern of operators and enforcement officials.

Recommendations:

4. Specifically use a "pattern of violation" and/or "flagrant violation" authority for violations of key standards designed to prevent explosions,[1] and apply meaningful sanctions, such as revoking the operator's ventilation plan. If an operator's plan is revoked for reckless or repeated behavior, he should be offered a brief period of time (e.g., five days) to make the safety case to MSHA as to why the mine's ventilation plan should not be revoked. [See "Making the Safety Case"]
5. A procedure should be adopted that would require mine operators repeatedly cited for failing to follow their own approved ventilation plan to notify MSHA and WVMHST when subsequent ventilation changes are completed and before miners are allowed back underground. Affected miners would be entitled to full compensation by the operator at their regular rates of pay and work schedule for the entire period they are idled.
6. Each mine should be required to maintain and continuously update records of the amount of rock dust purchased and the amount used daily. Failure to maintain adequate records would result in a citation with a monetary fine.
7. WVMHST and MSHA should undertake reorganization on their ventilation approval system to ensure that plans and requirements are known and understood by both the ventilation specialists as well as the inspectors.

Finding #3: 21st century coal mine safety practices have failed to keep pace with 21st century coal mine production practices. Improved technology is required to ensure that the lives of miners are safeguarded.

Recommendations:

8. "Black box" technology must be instituted for mining equipment, including shearers, continuous miners, roof bolters, shuttle cars, motors,

1 For example, 30 CFR 75.370, the requirements to develop and follow a ventilation plan approved by MSHA, that is designed to control methane and respirable dust and suitable to the conditions and mining systems in the mine; 30 CFR 75.400: the prohibition of accumulated coal dust, including float coal dust deposited on rock-dusted surfaces, loose coal, and other combustible materials, in active workings including on equipment therein; 30 CFR 75.402: the requirements for rock dusting; 30 CFR 75.403: the requirement to maintain incombustible content of rock dust.

conveyors and shields. The black boxes should provide information regarding methane, oxygen, carbon monoxide and coal dust levels.

9. Immediate implementation of a computerized, real-time electronic personnel-recording system to formally identify and locate all personnel who are underground at a given time, including supervisory personnel. Redefine the state and federal regulations to ensure that no one, including management, goes underground without a tagging device.
10. Each mine must be required to institute a "Communication and Information Recording Center" outside the underground portions of underground mines and away from the working areas of surface mines. These communications centers would provide instantaneous communication to MSHA, to state agencies, to company officials and state and county emergency management officials regarding safety and health.
11. Mine operators should be required to adopt computer-based monitoring of air quality, quantity and direction of flow throughout a mine. A suitable system would alert not only the mine operator and miners to impending danger, but it would also alert the state and federal regulatory agencies. Regulatory agencies would have the authority to shut down an operation based on data provided by the system.
12. Current monitors for methane, carbon monoxide and coal dust must be upgraded to include memory chips, as well as instant communication to the communications center.
13. Operators must be required to use real-time continuous monitoring for explosive methane gas and respirable dust in coal mines.
14. Mechanized rock dusting must be conducted in all portions of underground mines, as well as the installation of "passive barriers" to help stop ignitions from turning into large explosions, such as occurred at Upper Big Branch.
15. Operators must assess the adequacy of rock dust through direct readout explosibility meters and submit these results electronically to regulatory agencies.
16. The state inspector system for writing violations must be converted from paper and pencil to a computerized system. This system must be capable of generating reports for individual mines.
17. Electronic records should be maintained regarding methane, intake and return air levels on all coal producing sections for no less than seven years. Had this information been available, investigators would have had data related to the previous methane inundation at UBB.
18. The regulatory agencies should use ventilation simulation models as part of their plan approval and modification process. The simulation model results for each mine would be part of the mine file and available to inspectors for review before commencing an inspection.
19. Mine operators should be required to install equipment, such as seismographs, to monitor geologic activity at or near their mining operations.
20. MSHA and NIOSH should develop an approved rescue vehicle for removing injured miners safely from the mines. State and federal agencies should have a vehicle for removing injured miners and victims from a mine in a safe and efficient manner. Rescue workers should not have to carry miners great distances underground.

Finding #4: The pre-shift/on-shift examination system, established in the early 1900s to identify hazards and take corrective actions, has in many instances, become a meaningless exercise. Examiners are overly dependent on paper, and their examinations are characterized by a monotonous routine and the reliance on "dittos" and abbreviations. Moreover, evidence shows that certified foremen, mine foremen and examiners at UBB were not adequately trained to understand and perform their safety inspections and how their recognition of hazards provides essential information to assure miners' safety.

Recommendations

21. Pre-shift and on-shift examinations must be computerized with the information transmitted to regulatory agencies, much like coal truck weights are transmitted to the Department of Transportation on a daily basis.
22. The West Virginia Office of Miner's Health Safety and Training should re-double its efforts to ensure that all examiners are trained, and tested as many times as necessary, including in-mine demonstrations of their skills, to ensure the examiners understand their duties and perform them as they should be performed.
23. The West Virginia Office of Miners' Health, Safety and Training should focus training efforts on those mines in which mine operators are found to be lax on safety training. MSHA and

the state should have the authority to revoke the licenses of habitual offenders, for those who falsify records and for flagrant violations.

24. MSHA and the State agency should provide annual training to miners on their statutory rights under the Mine Act and applicable state mine safety laws. This curriculum should outline the benefits of designating a miners' representative.

25. Digital photographs from recent inspections and other appropriate visual aids should be used to demonstrate to miners, managers and inspectors acceptable and non-acceptable mining equipment and conditions.

26. Federal and state agencies should undertake an aggressive campaign to undermine the "safety myths" or inaccuracies that emerged during the UBB investigation. Agencies should dispel these inaccuracies on federal and state agency websites and incorporate "myth busters" into miners' training. A few examples of the inaccuracies that emerged during interviews with miners and bosses include:

    a) a proper air velocity reading can be taken instantaneously;

    b) a CH4 monitor on a mining machine can be disconnected if it is defective or keeps alarming, and the operator is allowed to run coal for up to 24 hours while waiting for a new monitor to be installed;

    c) a miner should not don an SCSR until he knows it's really an emergency or when a boss tells him to don it;

    d) a miner can make a run by himself, without a CH4 detector, because only a boss can be certified to carry a spotter;

    e) red hat miners can be left by themselves while a boss goes ahead of them to check for hazardous conditions.

Finding #5: MSHA and WVMHST inspectors and their supervisors are the watchdogs for mine workers. When faced with a mine operator that repeatedly ignores, evades or disregards fundamental safety regulations, federal and state inspectors and supervisors must craft enforcement strategies which match the compliance approach of the mine company. This means using all the administrative and legal authority at the agencies' disposal, and promptly elevating to supervisors any regulatory, resource or political constraints that prevent action needed to protect miners' lives.

Recommendations:

27. Existing laws and regulations must be stringently and effectively enforced. Supervisors and managers are responsible for ensuring that front-line inspectors are provided equipment, tools, training and management support to succeed at their jobs.

28. Inspectors are responsible for elevating to their supervisors problems or concerns that the inspectors believe impede their ability to enforce the law. Likewise, supervisors and district managers are responsible for elevating issues to senior officials in the agency.

29. When either state enforcement agencies or MSHA recognize a significant or persistent problem at a mine, the agencies should coordinate their responses. State and MSHA district offices should meet periodically to review problematic mines and formulate strategies to best protect miners. Cooperative efforts would maximize the effectiveness of the agencies against recalcitrant violators.

30. MSHA should use its resources, and experienced and talented personnel to bolster its ability to notice the warning signs and see the big picture at mining operations with persistent health and safety problems.

31. WVMHST should modify inspectors' work assignments to ensure that mines covering a large geographic area have an appropriate number of inspectors assigned to them, and that all mandatory inspections are completed.

32. Management and labor in the agencies must discuss and negotiate terms to provide more flexibility for the days and hours in which mine inspections are conducted. If inspectors' work shifts are extended because of travel distance to the mine or demands at the mine, it is not unusual for the employee to complete 40 hours of work by Thursday. Currently, inspections on Fridays, Saturdays and Sundays are somewhat infrequent, but should be encouraged. An effective mine safety enforcement system should be flexible enough to facilitate inspections any day of the week, at any hour of the day.

33. The current law, which states that no mine operator or anyone else should provide advance notice for federal mine safety and health inspectors, should be strengthened. Such a violation should constitute a felony.

Finding #6: Federal and state mine safety laws allow mine operators to use administrative or judicial review to avoid or delay paying citations and penalties. Mine operators know they can contest violations and tie them up in litigation for years. They also recognize that by litigating citations, the company stands a good chance of getting the fines reduced to a fraction of the original amount.

Recommendations:

34. Government officials must ensure that adjudicating bodies have the personnel and resources necessary for speedy resolution of contested citations and penalties.
35. Government officials must implement alternative dispute resolution mechanisms with appropriate means for worker involvement.

Finding #7: Miners' rights to a safe workplace are compromised when the operator's commitment to production comes at the cost of safety. Workers should not be penalized if operators fail to follow safety requirements so that miners' interests can be separated from the operator's interest.

Recommendations:

36. State and federal officials must ensure that miners are aware of the protections afforded under state and federal law. An ongoing effort should be made to re-educate miners about the existence of the MSHA hotline and the state hotline and about the protections afforded them if they report unsafe conditions.
37. When a mine is closed by a state or federal inspector's order, all affected miners would be entitled to full compensation by the operator at their regular rates of pay and work schedule for the entire period they are idled.

Finding #8: The emergency response to the Upper Big Branch disaster raised concerns about how decision-making was conducted in the Command Center and the manner in which mine rescue teams were deployed underground. Standard protocols were not followed, effective records were not kept and rescuers' lives were placed in jeopardy.

Recommendations:

38. The mining industry, MSHA, and West Virginia should adopt the National Incident Management System (NIMS) Incident Command Model, a nationally recognized emergency incident management system, to improve coordination, cooperation and communication between public and private entities.
39. Protocols should be established and followed with regard to mine rescue and recovery, using lessons learned and best practices identified from other emergency response events.
40. The one-to-one backup system for mine rescue personnel, which is already established protocol, is absolutely critical for the safety of these volunteers.
41. The mine rescue community should convene a summit of mine rescue team members, in particular, individuals who responded to the mine emergency incidents from 2006 to the present, to discuss the state of the U.S. mine rescue system. Advisory guidelines should be written for mine rescue teams.
42. MSHA and West Virginia should require a digital recording of the activities and communications in a mine emergency command center. Briefings and debriefings of mine rescue team personnel also should be recorded. The current paper and pencil method fails to produce a thorough record of key data and decision points. Such a record is necessary to conduct a thorough investigation, assess the effectiveness of existing mine rescue operations and contribute to training curriculum for advanced mine rescue personnel.
43. Mine operators' emergency response plans (ERPs) must be treated more than just more paperwork. ERPs should be developed collaboratively with miners, their families, local responders, and mine rescue team members, and revised based on mine-specific drills and table-top exercises.

Finding #9: Investigations of major mining disasters must be conducted in an open, independent and transparent manner that inspires public trust in the fact-finding process and the conclusions that are reached.

Recommendations:

44. The U. S. Department of Labor should adopt a public investigation process for major mine disasters. Procedures should be established to provide for public hearings, including interviews of witnesses.
45. If the investigations continue to be under the MSHA's direction, the agency should have subpoena power to compel witnesses to appear to testify under oath and for companies and individuals to produce evidence, including documents, data, correspondence and physical evidence.

46. Explicit rights should be provided to any individual who is willing to speak with or provide a statement to MSHA, the state agency or the independent panel during an accident investigation, to do so without the presence, involvement or knowledge of the operator or the operator's agents or attorneys.
47. Rights should be granted to a deceased miner's immediate next-of-kin to name an individual to serve as a miners' representative in such investigations.
48. A coordinated, formal debriefing of all mine rescue team members who respond to a major mine emergency should be conducted within a month of the event. The objectives of the assembly would include offering counsel on post-traumatic stress, discussing what worked well and what didn't in their mine emergency response, and identifying team members whose testimony would be helpful to accident investigators.

Finding #10: Testimony from UBB miners indicated that the SCSR training they received was not effective in educating them about the practicalities of donning the device in a potential emergency situation. Miners at other operations also may not be receiving effective training.

Recommendations:

49. SCSR training should be realistic and conducted in actual mining situations, such as riding in a mantrip and working on a longwall. It should incorporate a variety of actual in-mine scenarios for which the SCSR must be donned and activated. The training should emphasize the importance of activating the SCSR at the very first warning of an emergency.
50. SCRS training should be conducted quarterly, instead of annually.
51. MSHA, WVMHST and NIOSH should develop a program to measure and evaluate the effectiveness of training provided by certified trainers.

Finding #11: The prevalence of coal workers' pneumoconiosis among the deceased Upper Big Branch miners is both surprising and troubling.

Recommendations:

52. WVMHST, NIOSH, MSHA and the mining industry should adopt before the end of 2011 rules to: reduce the permissible exposure limit (PEL) for coal mine dust to 0.09 mg/m^3; reduce the PEL for crystalline silica to 0.05 mg/m^3; and mandate continuous dust monitoring, verification of mine operators' dust control plans at normal production (e.g., at least equal to the average production recorded for the most recent 30 production shifts), and single-shift sampling.

United States Senator Robert C. Byrd
November 20, 1917 – June 28, 2010

Senator Robert C. Byrd served West Virginia in the United States Senate from 1959 until his death in 2010. He was the longest-serving senator in the history of the United States Congress.

In one of his last commentaries, Senator Byrd lamented the loss of the 29 miners in the Upper Big Branch disaster.

"Reflecting on President John F. Kennedy's death, Robert F. Kennedy once said, 'Tragedy is a tool for the living to gain wisdom,'" he wrote.

Senator Byrd also said, "As West Virginians, our birthright is

coal… Coal brings much-needed jobs and revenue to our economy. But the industry has a larger footprint, including inherent responsibilities that must be acknowledged by the industry.

"First and foremost, the coal industry must respect the miner and his family. A single miner's life is certainly worth the expense and effort required to enhance safety.

"The old chestnut that 'coal is West Virginia's greatest natural resource' deserves revision. I believe that our people are West Virginia's most valuable resource. We must demand to be treated as such."

APPENDIX I

List of officials who declined to be interviewed

The Fifth Amendment of the Constitution of the United States provides an individual with protection from self-incrimination. Self-incrimination, according to *Black's Law Dictionary*, includes acts or declarations either as testimony at trial or prior to trial by which one implicates himself in a crime. The Fifth Amendment prohibits the government from requiring a person to be a witness against himself involuntarily or to furnish evidence against himself. The following individuals, when they were subpoenaed by the State of West Virginia,[1] through their attorneys invoked their Fifth Amendment rights and declined to be interviewed by investigators examining the April 5, 2010 explosion at Upper Big Branch mine.

Christopher Adkins, Senior Vice President and Chief Operating Officer, Massey Energy

Robert Asbury, Captain, Massey Energy's Southern WV mine rescue team

Chris Blanchard, President, Upper Big Branch mine

Don Blankenship, Former Chairman and Chief Executive Officer, Massey Energy

Elizabeth Chamberlin, Vice President of Safety, Massey Energy

Jamie Ferguson, Vice President, Performance Coal; member of Massey Energy mine rescue team

Rick Foster, Mine Foreman, Upper Big Branch

Gary Frampton, Chief of Safety, Route 3 Engineering; former MSHA employee

Everett Hager, Superintendent for north side, Upper Big Branch mine

Eric Lilly, Engineer, Route 3 Engineering

Gary May, Superintendent for south side, Upper Big Branch mine

Paul McCombs, Chief Engineer, Route 3 Engineering

Terry Moore, Longwall Section Foreman, Upper Big Branch mine

Rick Nicolau, Chief Electrician, Upper Big Branch mine[2]

Wayne Persinger, Mine Manager, Upper Big Branch

Jack Roles, Longwall Coordinator, Upper Big Branch mine[3]

Bill Ross, Massey Coal Services; former MSHA ventilation supervisor, Mt. Hope district office

Jason Whitehead, Vice President, Upper Big Branch mine; several months after the disaster, promoted to Vice President, Underground Operations, Massey Energy

1 The individuals' titles are based on publicly available documents and witness testimony. We were unable to confirm them personally with the individuals due to their declination to be interviewed.

2 Mr. Nicolau agreed to a voluntary interview, which was scheduled for May 19, 2011.

3 Mr. Roles' did not technically invoke his Fifth Amendment rights. His attorney asserted that the subpoena issued by the State of West Virginia on behalf of the WV Office of Miners' Health Safety and Training was unlawful. The attorney indicated that if his client were subpoenaed again, Mr. Roles would invoke his constitutional privilege.

APPENDIX I I

Glossary of mining terms

Anemometer: a handheld device used to measure air velocity.

Apparatus or rescue breathing apparatus (RBA): A closed-circuit respiratory protective device that provides an independent oxygen source for individuals who are expected to work in environments containing toxic air contaminants, such as carbon monoxide. The device weighs about 35 pounds and is carried on the emergency responder's back. RBAs provide about four hours of service, compared to the typical self-contained self-rescuers (SCSR) used by most US miners, which provide less than one hour.

Barrier Section at UBB: a continuous miner section located off of the North Mains between Headgate 16 and Headgate 17, near the north portal. HG16 and HG17 were previous longwall mining sections and the mine operator was trying to recover the remaining coal between the two gob areas.

Belt/Conveyor Belt: A belt used to carry the mined coal and rock; power cables are run along with the belts.

Black Hat: A miner who is no longer an apprentice, but a fully certified underground coal miner.

Brattice: A board or other partition used in a mine passage to confine the air and force it into a particular working section. If not installed and used properly, intake air will short circuit into the return airway.

Brattice Cloth: Fire-resistant canvas or duck cloth used to erect a brattice and temporarily force air to flow in a particular direction.

Break: The distance between coal pillars. Break distances vary from mine to mine depending on geology and the type of mining used. At UBB, the break distances were 105 ft or 120 ft from center to center.

CFM: a measurement of air in cubic feet per minute.

Connector section/Crossover panel: A stretch of track which connects two parallel tracks, and enables a mantrip or vehicle to pass from one track to the other.

Continuous Miner: A mining machine designed to remove coal from the face and load it into shuttle cars or conveyors without the use of drills or explosives.

Cowl Blade: a metal, half moon shaped component that covers the cutting drum of the shearer on a longwall mining machine. There is one cowl for each drum. The cowl helps control the coal, rock, and debris generated from the cutting action of the drums.

Curtain (mine curtain/check curtain): A sheet of brattice cloth, often coated with fireproofing, hung across an entry to prevent the passage of an air current, but not to hinder the passage of equipment or vehicles. Curtains are used to deflect the air from the entries into the working sections and to hold the air along the faces.

D2 order: refers to section 104(d)(2) of the Mine Act (30 USC 801 et seq.) If a mine operator has received a violation for an unwarrantable failure to comply with a mandatory standard that could significantly and substantially contribute to a hazard, and on a subsequent inspection the inspector finds the same violation, a D2 order is issued to withdraw miners from the affected area.

Date-up board: Usually made of a piece of belting or designed to the mine operator's specifications by a vendor, date-up boards are placed at specific locations in airways, belt lines, track entries or even near the working faces for mine examiners to record the date, time and initials to indicate when they made their required examination of the area.

Dewatering pumps: Pumps used to remove water from a mine.

Drift: a horizontal opening into a coal mine; miners and supplies enter at the drift; also can provides a source for ventilation.

Ellis Portal: One of the Upper Big Branch mine portals where miners and equipment entered and exited. The Ellis portal had five drift entrances and was relatively new compared to the other UBB portals. Typically, the longwall, HG22 and TG22 crews began and ended their shifts at the Ellis portal.

Ellis Switch: An area in the Upper Big Branch mine where a device was located that enabled a mantrip or other vehicle to pass from one track to another.

Face: The solid surface of the unbroken portion of the coal bed at the advancing end of the working section.

Fan: A mechanical piece of equipment that is powered by electricity that can provide either fresh air to a mine or pull return air out of a mine. Fans are either set on top of a shaft or sit in a drift opening.

Fresh air: Air sent into an underground mine containing not less than 19.5% oxygen, not more than 0.5% carbon monoxide and no harmful quantities of other noxious gases.

Fresh Air Base (FAB): An area in the mine established by mine rescue teams in which breathing apparatus do not have to be worn, and where supplies and equipment are located. It is the base camp or safe area for the mine rescue teams deployed underground. It is where back-up mine rescue team members assemble to replace other teams, or respond in case a team member goes down. The FAB serves as communication link between teams underground and the command center on the surface. As the mine is explored during an emergency situation, and the teams determine that they can proceed further inby without the need of breathing apparatus, the fresh air base can be moved deeper into the mine.

Gob: An area of the mine where coal has been extracted and the top allowed to fall down. The area behind a set of longwall shields, for example, is referred to as the gob.

Headgate (Longwall Headgate): The start of the longwall face. As coal is extracted, the longwall travels to the headgate where it is dumped on to a stage loader conveyer. Coal travels through a crusher and is dumped onto a rubber conveyer belt. The first shield (shield #1) in the line of shields across the face is located at the stage loader, along with electrical and water disconnects, drive motors and phone communications. Fresh air to ventilate the longwall face enters the longwall section at the headgate.

Headgate 22 Section: A continuous miner section in the UBB mine where crews were driving the headgate entries for a new longwall panel.

Hinge pin: As used in this report, metal pins that are used to attach the ranging arm to the shearer.

Hot Seating: A term referring to a system of shift changing when an oncoming crew of workers comes onto the work section just as the crew they are replacing departs.

Inby: Toward the working face, or interior of the mine; away from the portal (entrance).

Kennedy stoppings: a stopping which uses tin panels as its major component; usually for temporary use.

LFM: a measurement of air in linear feet per minute.

Longwall: A method of extracting coal seams from a long working face. As the workings advance in a continuous line, which may be several hundreds of yards in length, space from which the coal has been removed is either allowed to collapse or is completely or partially filled or stowed with stone and debris.

Longwall Shields: At UBB the longwall mining machine had 176 shields, roof shields or supports, each measuring 1.75 meters wide (or about 5.74 feet.) One "pass" on the longwall is a complete trip by the shearer from shield #1 to shield #176; a second "pass" would be the return trip from shield #176 to shield #1.

Mandoor: Metal doors that are placed in stoppings for miners to go from one entry to another. There are single mandoors and there are walk-through doors that are used to allow not only workers but also supplies to pass through them. When closed, the doors maintain the integrity of the ventilation system.

Mantrip: A vehicle on a track used to take miners to and from the working places. Due to the low ceilings in mines, mantrips tend to be of reduced height.

Methane: (CH_4) formed by the decomposition of organic matter; a tasteless, colorless, and odorless gas; highly explosive in concentrations of 5-15 percent of ambient air.

Methane Detector: an electronic device used to measure the percentage of methane in the air.

Mother Drive: a belt drive that powers the coal conveyor belt. In the UBB, a mother drive was located in the North Glory Mains at Break #102.

Multi-gas Detector: a handheld electronic device that can measure percentages of methane, carbon monoxide and other air contaminants.

Outby: Away from the mining face; toward the mine entrance.

Omega Blocks: a lightweight material shaped in the form of a cement block used to construct stoppings.

On shift examination: A required examination under MSHA regulation 30 CFR § 75.362 stipulating that at least once during each shift, or more often if necessary for safety, a certified person designated by the operator must exam any areas where miners are assigned to work and/or where mechanized mining equipment is being installed or removed. The certified person is expected to check for hazardous conditions, test for methane and oxygen deficiency, and determine if the air is moving in the proper direction.

Overcast: An enclosed airway to permit one air current to pass over another one without an interruption. Overcast are built of incombustible materials, such as concrete, tile, stone or brick.

Pre-shift examination: A required examination under MSHA regulation 30 CFR § 75.360**,** stipulating that a certified person designated by the operator make an examination within 3 hours preceding the beginning of any 8-hour interval during which any person is scheduled to work or travel underground.

Portal: Entrance to the mine; see also Ellis Portal.

Power Center: See mother drive.

PSI: pounds per square inch.

Punch out: Punch out or punching out refers to the point when a continuous mining machine or a longwall shearer cuts into another entry or cross-cut. In the case of a longwall, when the shearer reaches the tail or the end of the block of coal, the term "cutting out" may be used. Punch out can also refer to the portal.

Pyott-Boone Electronics: A Virginia company providing communication, tracking and other electronic products to the mining industry. The tracking and communication system used at UBB was a Pyott-Boone system.

Ranging Arm: A large metal component attached to the body of the longwall shearer. There is a ranging arm with a cutting drum on both the head side and tail side. The ranging arm rises up and down to cut coal and its motion is controlled by miners known as shearer operators.

Red Hat: An apprentice miner; he or she wears a red hardhat. Under WV mine safety regulations, a red hat can earn a black hat after six months and more than 108 days working underground, as well as passing a written test.

Regulator: An adjustable opening in a stopping that is used to control air quantity.

Return air: Air that has already ventilated a working area of a coal mine.

Rib fall: A rib fall occurs when the rib, or coal wall of an entry or cross-cut, falls out into an entry; brought on by geologic pressures or weak or fractured coal seams. When the coal wall slides to the mine floor instead of out into an entry, it is referred to as sloughing.

Roof fall: A roof fall is when the mine roof or top falls to the mine floor; some are intentional, others are unintentional and caused by unsupported top or insufficient roof support. During longwall mining, roof falls occur behind the shields and are considered intentional roof falls.

Seals: Block walls constructed according to strict performance standards in order to withstand a specific amount of pressure. Seals separate abandoned workings from active workings.

Self-Contained Self Rescuer (SCSR): A respiratory device carried by miners at all time and used during an emergency to provide a supply of oxygen for up to 60 minutes.

Shaft: A vertical opening that connects the surface to the underground workings of a coal mine.

Shearer/shearing machine: An electrically-driven machine for making vertical cuts in the coal.

Shield: A framework or screen of wood or iron protecting the workers on a longwall; shields push forward as the coal is cut.

Sloughing: See rib fall.

Stage Loader: See mother drive.

Starter Box (Longwall Starter Box): Located on the headgate side of the longwall; it is where electrical motors are positioned that power the longwall.

Stopping: A ventilation control that is used to separate fresh air from return air; some are temporary, others are permanent; built across old airways, headings, or entries, to confine the ventilating air current to certain passages.

Swing Shift: When a miner works one shift for a continuous set of days (e.g., day shift) and then swings to a different shift (e.g., night shift) for the next consecutive set of days.

Switch: A device for enabling a car or a mantrip to pass from one track to another.

Tailgate (Longwall Tailgate): This is the end of the longwall face; the last shield is at the tailgate. At the tailgate there is a tail drive, an electrical motor that helps power the face conveyer chain. Air that has already ventilated the longwall face exits at the tailgate and goes in to another air course.

Tailgate 22 Section: A continuous miner section in the UBB mine where crews were driving the tailgate for a new longwall panel.

Ventilation: The directing and controlling of air usually provided by mechanical means to an underground coal mine.

Primary Source: *Dictionary of Mining, Mineral and Related Terms*. Washington, DC: Department of the Interior, Bureau of Mines, 1968.

APPENDIX I I I

McAteer and Associates

J. Davitt McAteer

Davitt McAteer, a native of West Virginia, 1966 graduate of Wheeling Jesuit University, and a 1970 graduate of the West Virginia University College of Law, has devoted much of his professional efforts to mine health and safety issues. He worked with consumer and environmental advocate Ralph Nader on efforts to enact the landmark 1969 Federal Coal Mine Health and Safety Act. During the 1970s, Mr. McAteer worked on safety and health programs for the United Mine Workers and founded the Occupational Safety and Health Law Center. He served as Assistant Secretary for Mine Safety and Health at the United States Department of Labor (1994-2000) during the Clinton Administration. During two of those years, he also served as the Acting Solicitor of Labor. Today, Mr. McAteer is Vice President of Sponsored Programs at Wheeling Jesuit University, leads several national centers that impact economic development, education, and mine safety, including the Robert C. Byrd National Technology Transfer Center and the Erma Ora Byrd Center for Educational Technologies, which houses the NASA Sponsored Classroom of the Future. He is director of the University's Coal Impoundment Project, which identifies and develops methods of stabilizing or removing coal impoundments throughout Appalachia, and is consultant to the University's Clifford M. Lewis, S.J., Appalachian Institute. In 2008, Mr. McAteer was honored by the American Public Health Association with the David Rall Award for Public Health Advocacy.

Katherine Beall

Katherine "Katie" Beall is a recent graduate of the West Virginia University College of Law. Prior to law school, Beall obtained a Bachelor of Science degree in Business Administration and a Masters degree in Accounting from West Virginia University. Ms. Beall's prior experience includes working for three years as an auditor for Arnett & Foster in Charleston, WV, obtaining her certification as a Certified Public Accountant (CPA), and clerking for the Honorable Ronald Pearson, United States Bankruptcy Court Judge for the Southern District of West Virginia.

James A. Beck, Jr.

Mr. Beck's career in the coal mining industry started in 1971 as a general laborer for Pittsburgh Coal Company, now Consol Energy, in southwestern Pennsylvania. After becoming a certified first grade mine foreman in Pennsylvania, he progressed through the management ranks, holding positions as section foreman, general mine foreman and superintendent of safety. He has served as a mine superintendent in Pennsylvania, Kentucky and West Virginia. His management experience also includes serving as vice president of safety and training, vice president of operations, and president and CEO in the Central Appalachia coal region. Mr. Beck has extensive operational and mine design experience in longwall mining, continuous miner room and pillar, surface mines, highwall miner operations and preparation plants. He is a two time recipient of the West Virginia Coal Safety Leader of the Year award given by the West Virginia State Council of the Joseph A. Holmes Safety Association. Mr. Beck is currently employed by Wheeling Jesuit University as a Project Director at the National Technology Transfer Center working on mine health, safety and technology innovations. He holds a Bachelor of Science degree in Geology from California University of Pennsylvania, an Associate degree in Mining Technology from Penn State Fayette campus and completed the Management Development Program at the Kellogg Graduate school of Management of Northwestern University in Evanston, Illinois. Mr. Beck resides in Danville, West Virginia with his wife Lisa.

Patrick C. McGinley

Patrick C. McGinley is the Charles H. Haden II Professor of Law at West Virginia University College of Law. He earned a Bachelor of Arts degree from Dickinson College and a Juris Doctor from Duke University School of Law. Professor McGinley teaches courses in administrative, environmental and natural resources law. He served from 1972 to 1975 as Counsel to the Commonwealth of Pennsylvania's Office of Deep Mine Safety where he enforced coal mine safety laws. He was co-editor of the five-volume treatise *Coal Law & Regulation* and of the annual proceedings of the Eastern Mineral Law Foundation (now Energy and Mineral Law Foundation) of which he was a founder. He also has served as chair of the American Bar Association-American Law Institute course of study: "Legal issues in the Coal Industry." He is admitted to practice law in Pennsylvania and West Virginia.

Celeste Monforton

Celeste Monforton, DrPH, MPH is a professorial lecturer at the George Washington University's School of Public Health and Health Services. Her research includes evaluation of worker health and safety laws and policies, and their effectiveness in protecting workers from illnesses, disability and death. Her research has been published in the *American Journal of Public Health*, *Environmental Health*, *Journal of Occupational & Environmental Medicine*, *Public Health Reports*, and the *Journal of Law & Policy*. Prior to earning her doctoral degree in 2008, she was a career federal employee at the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA, 1991-1995) and Mine Safety and Health Administration (MSHA, 1996-2001). In 2007 Dr. Monforton received the Lorin Kerr award from the American Public Health Association and in 2010 the Tony Mazzocchi Award from the National Council for Occupational Safety and Health. She is on the advisory board of United Support and Memorial for Workplace Fatalities, a not-for-profit advocacy group for family members who have lost loved ones from workplace hazards.

Debbie Roberts

Debbie Roberts is a paralegal with nearly 30 years of experience working for law firms in Virginia and West Virginia. She joined Wheeling Jesuit University and McAteer & Associates, Shepherdstown, WV, in February 2005. Ms. Roberts' project management skills were instrumental in the Associates' investigation of the Sago mine explosion (2006), Aracoma Alma mine fire (2006) and this report on the Upper Big Branch mine disaster.

Beth Spence

Beth Spence is the coalfield specialist for the American Friends Service Committee, a humanitarian organization which has operated programs in the Appalachian region since the Great Depression. A native of Logan County, WV, Ms. Spence has worked as a newspaper reporter and editor. She has written extensively about housing, education and health issues in coalfield communities. Ms. Spence worked with community groups on housing, recreation and redevelopment issues following the Buffalo Creek disaster, and she later helped create two non-profit housing organizations in southern West Virginia. She was the lead writer for this report, which she also designed.

Suzanne M. Weise

Suzanne M. Weise is a Lecturer in Law at the West Virginia University College of Law and also serves as a supervising attorney, West Virginia University College of Law Child and Family Clinical Program. In private practice, Ms. Weise specializes in environmental and administrative law, as well as law relating to public access to information. Her trial and appellate court experience includes litigation of issues involving federal and state environmental regulatory statutes, access to public information, and state open governmental proceedings laws. She earned a Bachelor of Arts degree from Boston University and Juris Doctor from West Virginia University. Ms. Weise has been a member of the West Virginia Bar since 1986.

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