The Sunshine Mine Fire Disaster, May 2, 1972

By
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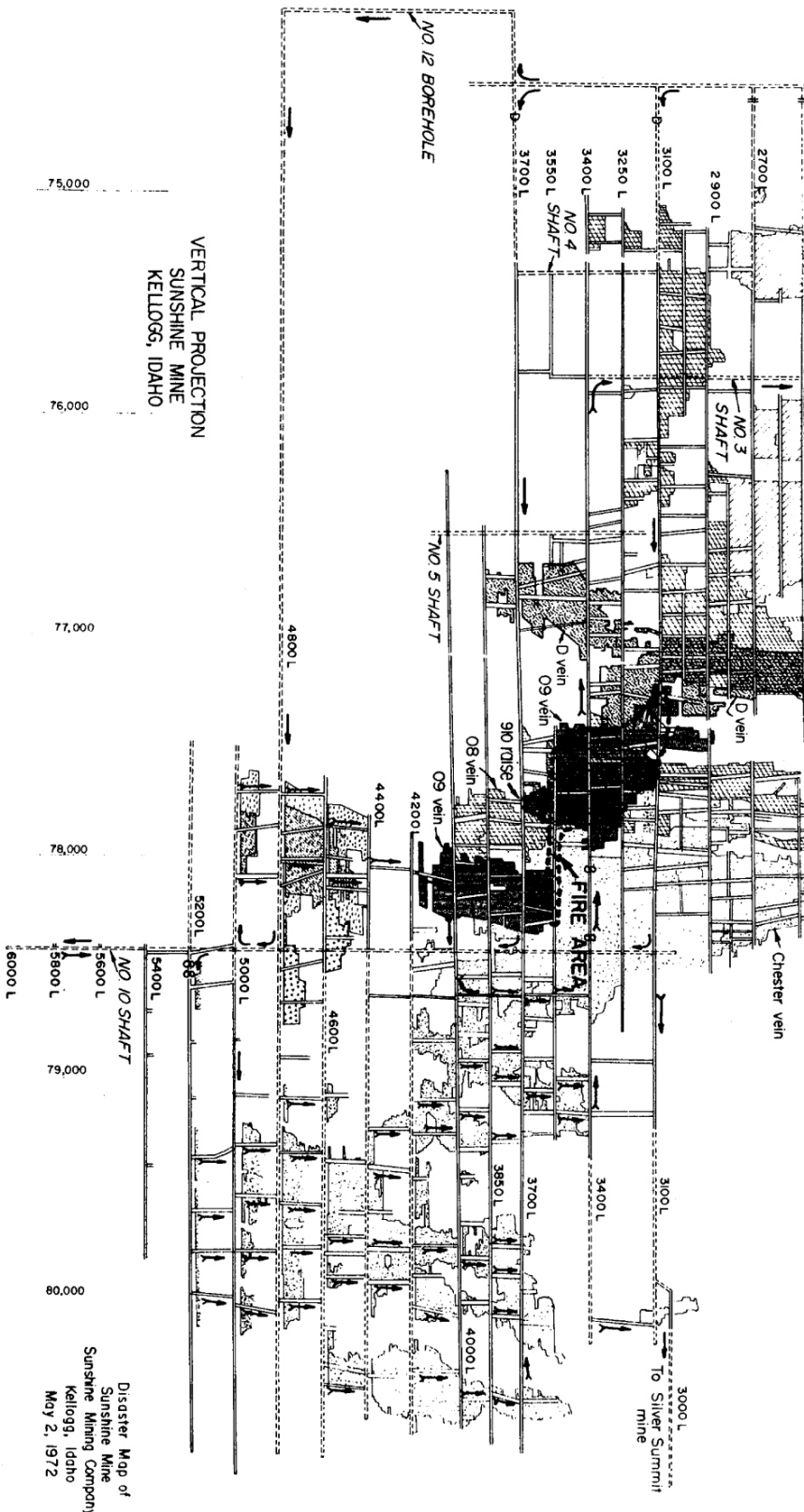
May 2, 2022, marked the fiftieth anniversary of the Sunshine Mine fire disaster, the nation's second-deadliest hard-rock mine fire and the only hard rock fire disaster not in a timbered shaft. As one of only a few surviving members of the Sunshine rescue effort, I am writing this summary now for the mining industry, hoping that the industry will learn from the fire safety shortcomings in the Sunshine Mine.

The Day Shift

Beginning at 7:00 a.m., May 2, 1972, 173 men, the normal day shift crew, entered the Sunshine Mine and worked until the time that they learned of the fire.[1] During the morning, Custer Keough and William Walty enlarged the 3400-foot-level ventilation exhaust airway, through which two 150 h.p. booster fans helped move exhaust air out of the mine.

Keough and Walty drilled and blasted along the top and sides of the drift, then installed rock bolts to stabilize the opening. A mechanic, Homer Benson, used an oxy-acetylene cutting torch to cut off rock bolts protruding into the drift. Benson completed his task and returned to his shop on 3700 level at 10:35 a.m. Keough and Walty ate lunch on the 3400 level. The oxy-acetylene cutting area was adjacent to a huge polyurethane foam installation.

Most mine personnel had lunch from 11 to 11:30 a.m. Jim Bush, Bob Bush, Harvey Dionne, Fred (Gene) Johnson, and Jim Salyer, all mine supervisors, ate in the "blue room" (supervisors' room) near the 3700 level's No. 10 shaft station. Arnold Anderson, Gary Beckes, Norman Ulrich, and John Williams were in the electric shop, also near the 3700 level's No. 10 shaft station to the south.



"Final Report of Major Mine Fire Disaster, Sunshine Mine ... *2 May 1972," U. S. Bureau of Mines, p. 138.*

Meanwhile, hot metal or a smoldering cigarette butt ignited a small fire. It exploded in size upon reaching the polyurethane foam-covered bulkhead in the mine exhaust airway on the 3400-foot level. Weakened by fire, the bulkhead collapsed. Smoke-laden exhaust rushed through abandoned workings, pushed by two 150 h.p. fans located upstream from the bulkhead. Combustion of the bulkhead led to a deadly short-circuit that carried smoke and fire gases back to the intake side of the exhaust fans.

Larry Hawkins, sampler, John Reardon, pumpman, Kenneth Ross, geologist, and Floyd Strand, chief electrician, completed their morning activities at the No. 10 shaft area. At 11:30 a.m., they were en route to the Jewell shaft on a man coach. That route took them past the 919 manway, No.5 shaft, and No.4 shaft. Had they seen or smelled smoke, they would have reported it quickly.

The Fire

At 11:45 a.m., Gary Beckes stepped from the 3700-level electric shop and smelled smoke. He immediately notified his boss, Arnold Anderson, who entered the main drift, saw the smoke, and yelled to the mine shift bosses: "There's smoke in the main drift!"

Supervisors Bob Bush, Jim Bush, Harvey Dionne, Gene Johnson, and Jim Salyer were in the underground office close by. Hearing the shouted warning, Salyer was asked to telephone nearby maintenance work stations, while Bob and Jim Bush, Dionne, and Johnson joined Anderson and another electrician. All walked upstream into the smoke about 900 feet and located its source.

A quick appraisal by the four supervisors revealed that smoke entering through a bulkhead above the abandoned 919 manway was getting darker and that air upstream from that location was free of smoke. Consensus led to a decision to close a fire door near the Jewell shaft to stop the flow of smoke into the No. 10 shaft.

At 11:50, Delbert (Dusty) Rhoads and Jim Salyer phoned Pete Bennett in the 08 machine shop, told him of smoke, and asked him to check for fire in the shop area. With no fire in their shop, Bennett and Ken Tucker walked toward the 808 and 820 drifts. By the time they reached the 820 crosscut, it was so full of smoke that they could not enter it. They next walked toward the 08 shop and found even heavier smoke. They then walked to the Jewell shaft.

At noon, Johnson telephoned maintenance foreman Tom Harrah demanding my help. Anderson "stuck his head in" the electric shop on 3700 level and told Beckes, Story, Williams, and Wood that Johnson had notified hoistman Ira Sliger to hoist everyone to the 3100 level.

The Disaster Develops

At 12:01 p.m., I opened my dinner bucket and started to unwrap a sandwich when Tom Harrah phoned me saying: "Meet me in front of the warehouse right now!" I ran down a flight of stairs into the mine yard. Harrah said: "There's a fire in the mine and Johnson wants you to dump the stench [ethyl mercaptan pumped into the ventilation system to alert miners to evacuate] and bring the helmets [McCaa SCBAs] to No. 10 shaft on 3100 level." Harrah ordered surface personnel to take all of the helmets from storage to the Jewell shaft top station.

At 12:03 hoistman Sliger dumped the south skip into 3100-level chute pocket, then lowered it to 4400 level at 12:05 and stopped there. At 12:05 a witness saw Donald Wood, No. 10 chippy hoistman, vomiting in the ditch near the 3700 electric shop. Roger Findley told Sliger via telephone that three men were stranded on 4500 "because the No. 10 chippy signals were out."[2] Gene Johnson told Sliger to get his cager up to 3700 as soon as possible. "There's a fire down here." Sliger lowered the south cage from 4400 level to cager Byron Schulz at the 5600 pocket.

As I crossed the mine yard at 12:10 after

dumping the stench, I glanced at the mine exhaust, shuddered at the sight of thick black smoke, and said a prayer of hope that no one was downwind from its source. In the mine rescue room, I fueled up a flame safety lamp and grabbed a mine gas test kit, then went to the change room, dressed for the underground, and headed into the mine.

According to the hoist operation log, at 12:12 about twelve men rode the cage from the 3700 level to the 3100 level, including two cagers and three other men who had ridden up from the 4500 level. At 12:16 Greg Dionne re-boarded the cage and went down to the 4600 level, with short stops on the 3700 level and 4400 level to pick up additional men, including Delbert Rhoads who, among others, had ridden the No. 10 chippy cage down to 4400 level after lunch.

At 12:20 Bob Bush instructed Bennett and Tucker to proceed to the Jewell shaft. As Bennett and Tucker walked along the 3700 level toward the Jewell shaft, they met Jim Bush and Harvey Dionne returning toward No. 10 shaft. Bennett and Tucker also met Edward Davis at No.4 shaft and told him to leave the mine.

Tony Sabala and others in a shop near No. 8 shaft on 3700 level heard a big bang. Air rushed out of a normally closed man-door into the inactive 08 and 09 veins. The smoke "looked like a tornado" coming toward Sabala and Don Beehner. They made their way to No. 10 station.

Meanwhile, Virgil Bebb and Gene Johnson remained at No. 10 shaft top station on 3100 level. Knowing that some smoke was flowing into the Silver Summit escapeway, they directed men to the Jewell shaft. Men from 4600 level arrived at 12:24 p.m. Johnson told them to run to the Jewell. Bebb and Charles Casteel volunteered to help Johnson count the men coming from their levels. Volunteer cager Greg Dionne remained at the 4600-level station to load more escaping personnel.

At 12:29 a cage crammed with the last men from the 4600 level arrived at the 3100 level. On the 3100 level, Arnold Anderson and Delbert Rhoads were on the phone asking permission to shut off the 3400-level main exhaust fans. They rode a cage to 3400 and waited for instruction to stop the fans. That order was never given. Anderson and Rhoads died.

At 12:35 the first load of men from the 5000 and 4600 levels arrived at 3100 level. The third load from 5000 level arrived at 3100 level at 12:44. Two men survived the ascent, eight died. At 1:01 the fourth load of men from 5000 level, including the shaft sinking crew, arrived at 3100 level. None survived.

Supervisor Activity on 3700 Level

James Bush and Harvey Dionne walked along 3700 level toward the 08 machine shop area. About one hundred feet into the 08 drift, heavy smoke drove them out. Dionne then returned to the fire door to be sure that it was closed. Bush headed back toward the manway. He found Wayne Blalock, Bob Bush, and Pat Hobson totally exhausted. Jim helped them as much as he could, half-carrying his brother Bob and pushing Blalock and Hobson. About two hundred feet from the No. 5 shaft, Jim Bush left the three men, staggered into fresh air, and collapsed. Regaining strength, he headed toward the Jewell shaft. He met three men with a locomotive and man-coach heading toward No. 10 shaft and told them that Bob Bush, Blalock, and Hobson were back in the smoke and needed help.

One of those men, Ronald Stansbury, went farthest in and located Bob Bush lying on the ground, but Stansbury lost strength and retreated toward No. 5 shaft. On the way, he saw Roberto Diaz on the ground. Alternately crawling and stumbling, Stansbury reached fresh air at No.5 shaft, where he met Jasper Beare, Harvey Dionne, and Paul Johnson reentering the drift. Johnson and companions walked toward No. 10 shaft and found the man-coach derailed, it having struck a body on the track. Before reaching fresh air as they walked back toward the Jewell shaft, John-

son collapsed and died. Before reaching the Jewell shaft, Dionne removed lagging limiting airflow down No. 12 borehole, thereby providing more fresh air to 4800 and lower levels.

Rescue Begins on 3100 Level

I arrived at 3100-level's Jewell shaft station at about 1:00 p.m. Motorman Al Smith and train arrived at about 1:10 p.m. from No. 10 shaft, pulling two muck cars loaded with men. Some of the men on the station were mine rescue personnel. One asked: "Where are you going with the helmets?" I mentioned the request to deliver them to No. 10 shaft. Mine rescue personnel Donald Beehner, Larry Hawkins, and James Zingler insisted on joining up with me. I objected strenuously, knowing that my last mine rescue training had been in 1966. Nevertheless, they insisted on going with me.

The four of us set out to deliver the SCBAs to Gene Johnson at No. 10 station. Having been warned about very heavy smoke "back past the timber station," we donned our McCaas before encountering it. I was in the lead muck car, Hawkins was motorman, Zingler rode the back end of the locomotive, and Beehner rode on a timber truck behind the locomotive.

Upon seeing heavy smoke coming out of a crosscut that connected with the No. 5 shaft pilot raise and flowing toward No. 10 shaft, I signaled Hawkins to stop the locomotive, got out of the muck car, and entered the smoke equipped with a flame safety lamp and a multi-gas detector. I encountered Roger Findley a short distance into the smoke. He was obviously in distress, even though wearing a self-rescuer. I helped him out of the smoke and asked Zingler to take him to safety.

Before proceeding, a quick look at my flame safety lamp indicated adequate oxygen, but a test with a Draeger carbon monoxide detector tube (all I had was a low-level product) indicated carbon monoxide far beyond the range of the detector. The tube turned totally black before one-fourth of the metered sample volume had passed through it.

I cautioned Beehner and Hawkins to make sure that their face pieces were sealed. I also cautioned Hawkins to go slowly into the dense smoke, not wanting to run into someone. After moving a few minutes, I saw Byron Schulz, coming toward us, fall down and quickly signaled Larry to stop the train. Schulz was gasping for breath through a self-rescuer. Hawkins and I decided to "clear" a McCaa and put it on him. As we prepared the McCaa, Beehner removed his face mask, extended it toward Schulz and said: "Here, use this, it's oxygen."

In a matter of seconds, however, Beehner collapsed. Hawkins and I finished putting the McCaa on Schulz and loaded him onto the timber truck—not a good place to ride, but there was no alternative. We then turned attention to Beehner, only to be thwarted by a malfunction of Hawkins' McCaa. He said, "I can't get any air!" I responded: "Hit your bypass!" Hawkins said: "I did. It didn't work. I have to get out of here!"

Hawkins left. With the facepiece of his McCaa in place, Schulz could talk. He said over and over: "They're all dead back there!"[3] With Schulz on the timber truck now ahead of the locomotive and Hawkins walking ahead toward Jewell shaft, I abandoned the effort to deliver McCaas to Gene Johnson. I attempted to lift Don Beehner into the muck car but was unable to do so by myself. I had to leave him there.

I motored slowly through the smoke. After a short time, I saw a halo of light from Hawkins' cap lamp and flashed the headlight on the locomotive, to signal him to step aside. As I passed, he climbed onto the end of the muck car.

Upon reaching the surface, I was bombarded with questions: "What's it like in the mine?" and "What do we do now?" I reported that the 3100 level could not be used without mine rescue equipment. Lacking knowledge of conditions on 3700 level, I said that I would check that level as soon as I got a fresh McCaa.

Reconnaissance on 3700 Level

Recognizing the urgency of responding quickly, George Clapp, Bill Crouch, Stan Taylor, and Ken Tucker insisted on going with me to reconnoiter 3700 level. Each wore a McCaa apparatus. We traveled through clear air until we arrived at No. 5 shaft.

To my horror, black smoke was boiling out of the shaft and flowing toward No. 10 shaft. I took a carbon monoxide reading and found it beyond the measurement range of my tester, just as on 3100 level. I was convinced that no one could survive in that environment without respiratory protection. Still, hope lived on; miners know how to barricade against fires. They also know how to use compressed air to keep a work heading ventilated.

Crouch, Clapp, and Tucker entered the smoke for a closer look at what was happening. They located five bodies a short distance into the smoke and returned to fresh air, after which we headed back to the Jewell shaft.

By the time I returned to the surface, the Bunker Hill Mine's "hot shot" crew was at the mine portal, ready to go into action. The men asked about conditions in the mine. I described the smoke and carbon monoxide concentrations on the 3100 and 3700 levels and told them about the five bodies found earlier. They decided to retrieve the bodies as the first order of business.

I became a guide for the Bunker Hill mine rescue team, which recovered the bodies. Upon arrival at the Jewell shaft, a shaft repairman told me that a small amount of smoke was coming into the shaft at an upper level. I immediately ordered everybody to the surface. No further entry was allowed until leakage of smoke from the mine fire into the Jewell shaft intake airway was stopped.

Reality Sets In

By late afternoon on May 2, we had accounted for hardly half the crew on duty in the mine that morning. The only way rescue teams could reach personnel trapped in the fire zone was by way of No. 10 shaft.

By the early morning of May 3, as the scope of the disaster was coming into focus, additional help was on the way. All Coeur d'Alene District mines with mine rescue teams sent them to Sunshine. Additional teams came from elsewhere in the U.S. and from western Canada. Officials from the U.S. Bureau of Mines, the State Mine Inspector's Office, and United Steelworkers Health and Safety Department also arrived on the scene.

On May 4 and 5: Mine rescue personnel from the Burgin Mine, Kennecott's Tintic Division, joined in the mine rescue activities. Fresh air entering the mine through the Jewell shaft was being monitored to ensure that contaminated air was not flowing into the work zones in the mine. Rubber inflatable bags were used to construct temporary seals and bulkheads in drifts and raises along the airways. This enabled rescue crews to establish fresh air bases as they progressed farther into the mine. Air-tight doors between the Sunshine Mine and its connection to the Silver Summit mine on 3100 level enabled the access to No. 10 hoist from both mines needed for recovery of the No. 10 shaft and access to lower working levels.

At 3:50 p.m. on May 7, a mine rescue team electrician shut off power to exhaust fans on 3400 level. Air quality in the mine improved quickly. A huge cave-in occurred soon after the team passed under the 919 manway. The cave-in completely blocked the drift, broke the twelve-inch diameter compressed air line, and severed the 13,800-volt power line supplying the Strand substation. Power for the No. 10 hoist on 3100 level came from that substation.

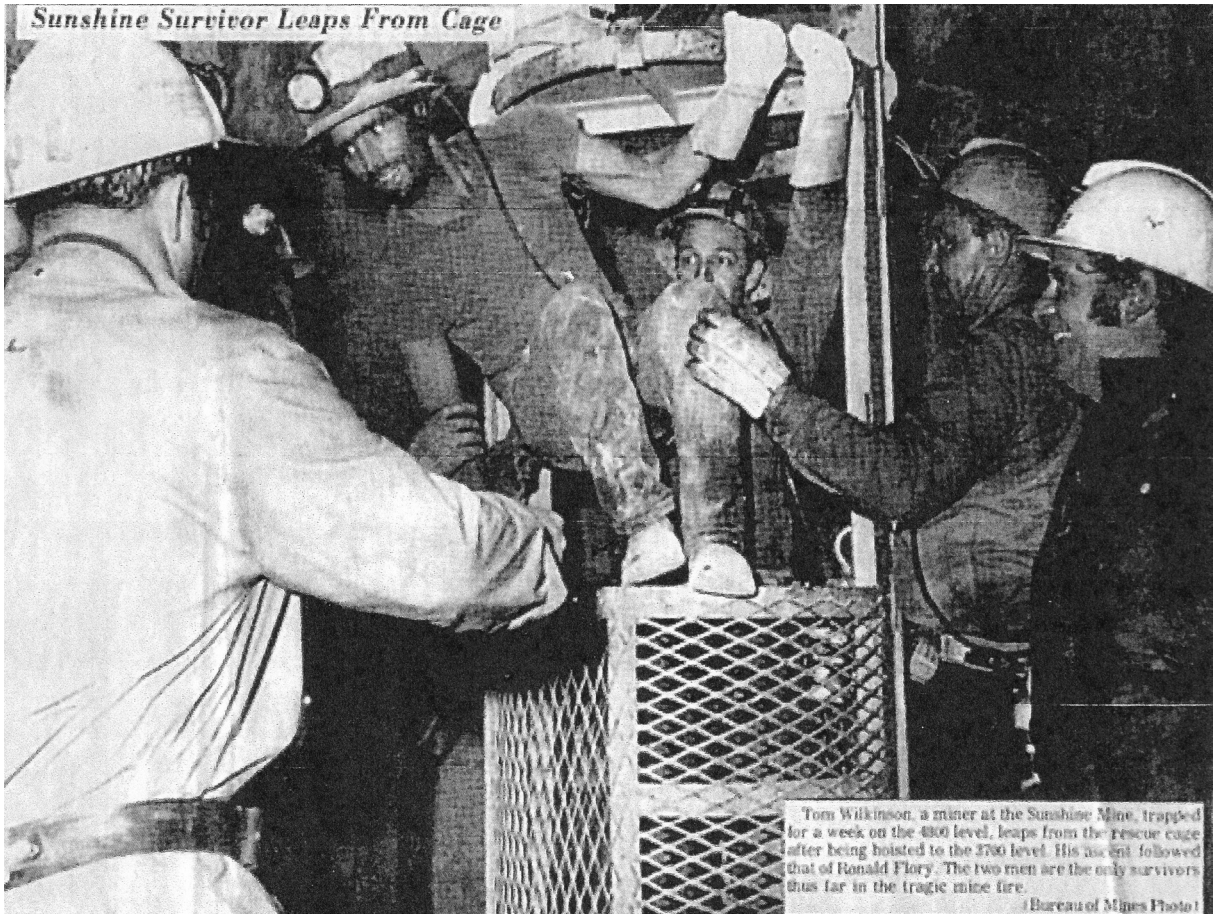
On May 8, a U.S. Bureau of Mines crew from the Nevada Test Site brought two rescue capsules small enough to pass through the four-foot-diameter No. 12 borehole. Four bureau experts traded off working from a capsule. The big challenge involved barring down loose slabs in the borehole

to allow safe passage of the capsule. After hours of hard work, they reached the 4800 level shortly after 7 a.m. on May 9. A fresh USBM crew began exploring the 4800 level for survivors.

On May 9, ventilation was re-established to the No. 10 hoist on the 3100 level. Electrical and mechanical maintenance was completed. Rescue efforts via the No. 12 borehole that day led to the recovery of two men, Ronald Flory and Tom Wilkinson, found in good condition after being trapped for seven days. They were brought to the surface on the afternoon of May 9.[4]

Flory and Wilkinson's Experience

Flory and Wilkinson had been mining in a stope below 4800 level. Told there was a fire, they climbed to 4800 and walked toward No. 10 shaft. Tom soon collapsed from the toxic smoke. Ron half-carried, half-dragged him toward the shaft. Miners Richard Allison and Ron Wilson were driving a drift nearly a mile from No. 10 shaft, ventilated through connections to the Jewell shaft. Told by a messenger that there was a fire and that the mine was evacuating, they motored toward No. 10 shaft where they saw Flory and Wilkinson struggling to reach No. 10 shaft and took them back to fresh air.



"Tom Wilkinson, a miner at the Sunshine Mine, trapped for a week on the 4800 level, leaps from the rescue cage after being hoisted to the 2700 level. His ascent followed that of Ronald Flory. The two men are the only survivors thus far in the tragic mine fire." Bureau of Mines Photo.

By the time Flory and Wilkinson recovered somewhat from smoke inhalation and walked to No. 10 shaft, stepping over bodies along the way, they received no response to their cage call signals or telephone calls. By that time, the fire had burned for one hour and twenty minutes. Unable to gain a response from either hoistman at No. 10 shaft, they returned to fresh air.

That Flory and Wilkinson could survive their second attempt to reach No. 10 shaft raises a question: If nothing but wood burned when the fire began, how could the smoke become less toxic, allowing them to reach No. 10 shaft and make phone calls?

The Recovery

By early morning on May 10, thirty-six bodies had been recovered, eleven had been located but not recovered, two men had been rescued, and forty-four were missing. By late afternoon on May 11, all bodies previously unaccounted for had been located. The last victims were removed from the mine by 3:40 a.m. on May 13. On May 15, Sunshine officials provided bureau officials with an accounting for the 173 employees who were underground when the fire erupted. Of those, ninety-one died, eighty escaped, and two were rescued.

While the record of the Sunshine Fire Disaster includes reliable information on where smoke was first smelled or observed, no one saw fire or evidence of burning until a mine rescue crew examined the 3400-level exhaust airway during the second week of the fire. Where the 09 vein intersected the exhaust airway, nothing remained of a one hundred-foot-long, polyurethane foam-covered, timber-and-plywood bulkhead.

James M. Day, attorney, was solicitor for the U.S. Department of the Interior at the time of the mine fire. He held a preliminary hearing at Kellogg, Idaho, in the summer of 1972 to gather information about the fire. In May 1973 he held another hearing at Coeur d'Alene, Idaho. The polyurethane foam product labeled as "non-burning and self-extinguishing" under American Society for Testing and Materials' testing standards, and certified by the U.S. Bureau of Mines as safe for use in underground mines, had been identified as a potentially deadly accelerant in fires, including mine fires.[5]

The Peril of Polyurethane

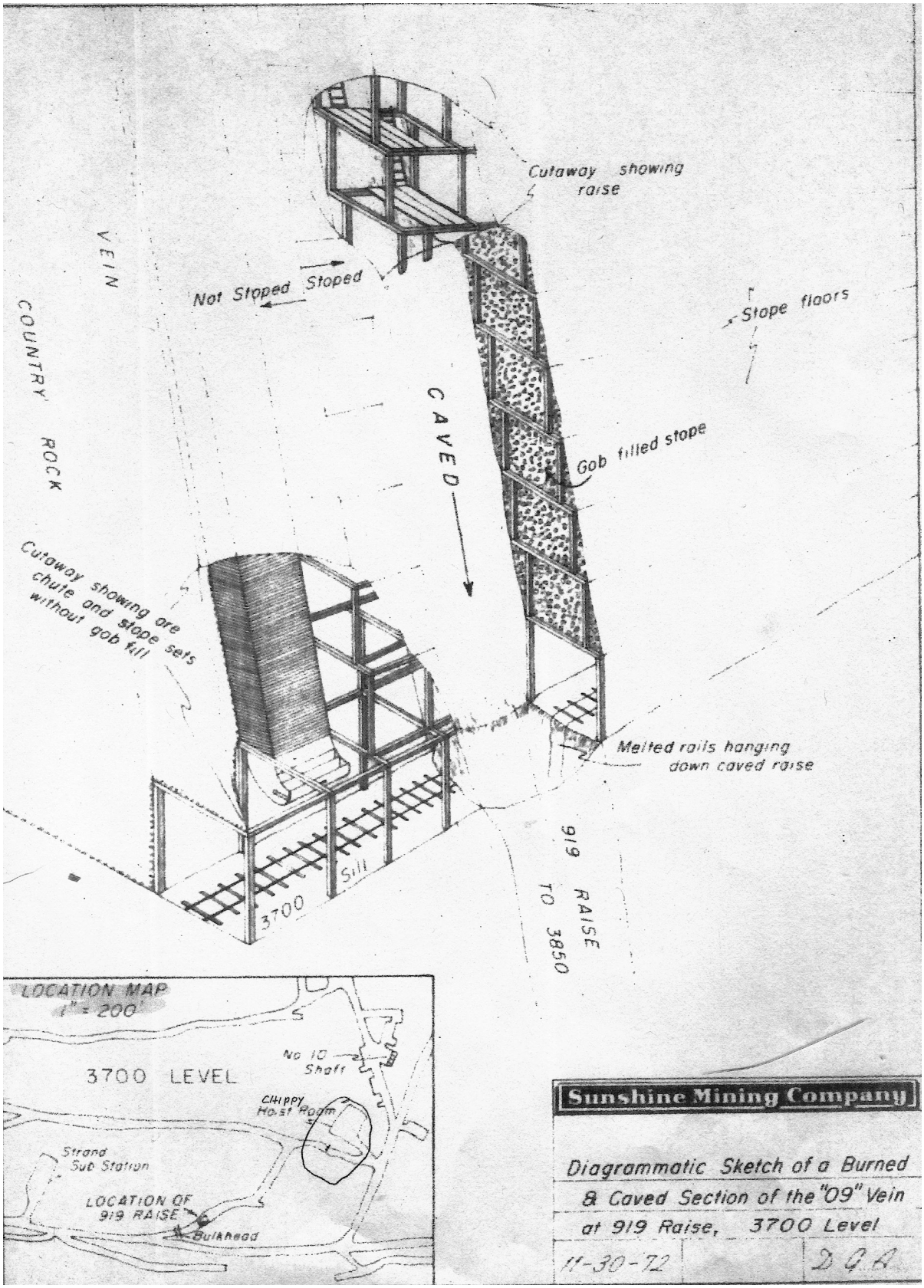
Fires in timbered hard rock mines with nothing more combustible than wood develop slowly and seldom result in fatalities. Nothing in the history of U.S. fires in hard rock mines suggests that a killer fire could occur other than in a timbered shaft or steeply inclined timbered airway. The "chimney effect" in such openings quickly leads to intense combustion with deadly fire gases.

The rapid and toxic development of deadly smoke and fire gases in a fire involving polyurethane foam is more than adequate to explain a phenomenon recognized by all parties to the Sunshine Mine fire litigation: The fire developed more rapidly and with much deadlier concentrations of fire gases than "ordinary" timbered mine fires.

The focus on polyurethane foam as an accelerant in the Sunshine Mine fire led Sunshine's legal counsel to spend many days at the mine site and turned me loose to explore accessible mined-out areas within the mine fire zone. The quantity and makeup of soot deposits and the direction of smoke movement in areas subjected to the fire provided evidence confirming the presence of polyurethane foam residues.[6]

Polyurethane foam's effect on a wood fire was confirmed by the British SMRI/Buxton test in October 1976. Armed with the Buxton test data, attorneys for Sunshine Mining Company identified the 3400-09 intersection as the ignition point of the Sunshine Mine fire.

From "Knocks Fire Cold" (*Mining and Quarrying*, August 1962): "A revolutionary method of insulating and sealing passageways in coal and


Cutaway showing raise
VEIN
COUNTRY ROCK
Not Stoped Stoped
Stope floors
CAVED
Gob filled stope
Cutaway showing ore chute and stope sets without gob fill
Melted rails hanging down caved raise
919 RAISE TO 3850
Sill
3700
LOCATION MAP
1" = 200'
3700 LEVEL
No 10 Shaft
CHIPPY Hoist Room
Strand Sub Station
LOCATION OF 919 RAISE
Bulkhead
Sunshine Mining Company
Diagrammatic Sketch of a Burned & Caved Section of the "09" Vein at 919 Raise, 3700 Level
11-30-72
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metal mines by applying sprayed-in-place urethane foam to exposed underground surfaces was demonstrated by the U. S. Bureau of Mines for the American Mining Congress in Pittsburgh on May 10. . . . Since the foam will not support combustion, it can be used to insulate combustible materials in the mine and makes possible the quick erection of emergency, flame-retardant curtain walls to localize an outbreak of fire underground. . . . As a result of this research, rigid urethane foam has been applied on roof, ribs, and stoppings in more than 200 mines to minimize spalling and reduce air leakage through ventilation controls."

From *Fire Hazards of Urethane Foam in Mines* (U.S. Bureau of Mines, RI 5837, 1966): "After two years of research on sealants and coatings, the Bureau of Mines published a report on urethane foam. Fire hazard from foam exists if flame propagates beyond the ignition source or penetrates the foam. . . . Foam on the ribs and adjoining roof presents a fire hazard. . . . Flame propagated in all tests with foam on the ribs and across the roof . . . Figure 15 shows the dense smoke produced during one of the tests."

Possible Causes of the Fire

An oxy-acetylene cutting torch was used that morning to cut off rock bolts displaced by a rock burst in the exhaust airway after it was enlarged from its original size. Rock burst damage was most severe near the 3400-09 bulkhead. Dropped hot metal may have ignited the fire.

Cigarettes were smoked in the high-velocity exhaust airway by two men working on the 3400 level that morning.

Electrical wiring or equipment often causes fires. However, subsequent investigations concluded that there were no electrical cables or installations in the burned area.

Spontaneous combustion causes many fires. However, testimony by Bernard Lewis, Ph.D., an expert in spontaneous combustion, testified that spontaneous ignition of materials including oily rags that might have been placed behind the bulkheads would have occurred within a week or less after being sealed off. The bulkhead where the fire occurred had been in use for about ten years before the fire.

A Critical Error

The fatal flaw in the Sunshine Mine's ventilation system involved the location of two 150 h.p. ventilation fans upstream from the 09 ventilation control bulkhead. The two fans, operating in series, developed a tremendous pressure between the exhaust airway and the rest of the mine. To illustrate the amount of force, no one person could open a standard-sized door against such pressure.

Special focus on the causes of the disaster involves a decision, made by mine supervisory personnel about fifteen minutes after smoke first appeared on 3700 level, to close a fire door about four thousand feet from the bottom of No. 919 manway. Closing the fire door near the Jewell shaft on 3700 level stopped fresh air from diluting the deadly smoke boiling out of No. 5 shaft. Had the fire door remained open, it is likely that more or even all of the men could have survived.

The logic used in deciding to close the fire door was simple. Smoke coming out of the 919 manway was flowing into No. 10 shaft. Stopping air coming in would stop the flow of smoke into No. 10 shaft. Not recognized was the benefit of fresh air reducing the concentration of carbon monoxide and other fire gases in the smoke.

If that fire door had remained open, the fire smoke and gases entering the hoist cab at No. 10 shaft would have been diluted by 50 percent or more. The hoistman may have stayed on duty or—after the worst smoke cleared in the short time that the polyurethane burned—returned to his hoist. Each trip would have brought forty to forty-eight men to 3700 level with access to the Jewell shaft.

In my opinion, had that fire door remained open, it is possible that no one would have died in

the Sunshine Mine fire. That opinion reflects the fact that two of the last ten men hoisted survived the fire. Their arrival on 3100 level came a full hour after smoke first appeared—even though they and the operators of the 3100 main hoist had breathed undiluted fire smoke and gases.

That is history and cannot be changed. However, mine operators must understand the logic behind a very basic rule governing mine fires: Never make changes in mine ventilation during a fire unless absolutely certain that those changes cannot have any adverse impact upon those exiting the mine.

All movement of the No. 10 main hoist was automatically recorded on a chart called a tattletale. The last evacuation conveyance, carrying ten men, arrived at 3100 level at 12:44 p.m. Two of the ten survived, although exposed to deadly smoke and fire gases for a full hour. Bear in mind that the closed fire door on 3700 level prevented any dilution of fire gasses by fresh air from the Jewell shaft crossing 3700 level. That fact opens the door to speculation on survival if the concentration of recirculating smoke and fire gases were reduced.

Use and Misuse of Self-Rescuers

By 1963, the number of self-rescuers on each working level of the Sunshine Mine was double that of the average number of men working on each level. That practice continued until I left Sunshine in 1966 for a better opportunity. When I returned to the mine in February 1972, self-rescuer storage was a shambles. The disdain miners had for self-rescuers as "never needed in a hardrock mine fire" was paramount.

Between 1965 and 1972, more production levels and a development level were added in the Sunshine Mine. Senior mine management recognized a need for self-rescuers on those levels and ordered enough to supply as needed. That order was cancelled by the supplier and for good reason. The BM 1447 self-rescuer used in all gassy mines was becoming outdated—although the Mine Safety Appliances Company, its manufacturer, never stated a shelf-life—and replaced by the W-65 self-rescuer that offered longer protection time while reducing the temperature of inhaled air.

Bureau of Mines' interviews with survivors identified forty-three men who stated that, in the words of one, they "would not have made it without wearing a self-rescuer." Unaware that self-rescuers get hot from converting carbon monoxide into carbon dioxide, some men "breathed around them" and died. Others discarded them. Survivors witnessed two senior mine supervisors take self-rescuers out of their mouths and throw them away, one saying: "This thing is burning the hell out of my mouth. It's no good!" Both died.

Why No. 10 Hoist Operators Died So Quickly

To establish the nature of the fire involving the 3400-09 bulkhead, I supervised construction of a replica in a British fire test mine near Buxton, England, in October 1976. Instrumentation downstream from the fire recorded a temperature of 2,220 degrees Fahrenheit, carbon monoxide between 3 and 7 percent, carbon dioxide between 13 and 17 percent, and oxygen less than 1 percent. D. Graham Wilde managed the facility for the British Safety in Mines Research Institute (SMRI). It was he who concluded that the Sunshine fire initially burned as a fuel-rich fire.

Collapse of the 3400-09 bulkhead changed the dynamics of ventilation within the fire zone. Two 150 h.p. fans upstream from the 3400-09 bulkhead pushed deadly fire gases into the mined-out zone. Those gases rushed through passageways where they found the easiest path back to the intake side of the fans, blowing open the ventilation control door near the bottom of the 4000-09 vein manway. Deadly smoke rolled through the 4000-level main drift, up No. 5 shaft to 3700 level connected to No. 10 shaft. Most of that bolus of

smoke and fire gases flowed into No. 10 shaft. A lesser amount went up No. 5 shaft to 3550 level, then up a pilot raise driven years earlier to allow extending the shaft to 3100 level. The No. 10 main hoistroom on 3100 level was ventilated by adequate intake airflow from the surface to keep air fresh. A small electric fan pulled air into the hoistroom through a small ventilation duct. That fan pulled deadly smoke into the hoistroom. Ira Sliger was the hoistman on 3100 level. The combination of his advancing age and having only one lung forced him to leave the mine quickly. Robert Scanlan, his backup, replaced Sliger and died at his post from carbon monoxide poisoning.

Don Wood, hoistman on 3700 level, had been overcome earlier. A significant difference in hoist operator exposure to deadly gases from combustion of polyurethane foam is reflected in distance from the fire. The 3700-level No. 10 hoistroom was only 300 feet from the fire, far less than the 3100-level No. 10 hoistroom. To reach the 3100-level hoistroom, smoke from the polyurethane foam fire flowed 900 feet down to the 4000-foot level, west about 1,000 feet to No. 5 shaft, up through that shaft and its pilot raise about 900 feet, then out through a tunnel connecting with the main 3100 tunnel and another 1,000 feet to the No. 10 hoistroom. A comparison of mixing zones of smoke and pre-fire air must take into account the difference between 300 feet and 3,800 feet.

The Aftermath

The major public criticism of Sunshine's top management was its not assigning someone to take charge, should a mine emergency occur. Ralph Nader made hay with that failure during an evening news program in Spokane on May 3, accusing Sunshine's managers of a "callous disregard for safety" for mine workers. My response is simple: Had all top management been at the mine when the fire started, none of them could have helped the supervisors in the mine make crucial decisions.

The Sunshine Mine reopened early in December 1973, confident that major changes in mine ventilation, combined with employee safety and health training and testing, were adequate to protect against another fire disaster. Never again would Sunshine Mine workers believe that a dangerous mine fire could not occur in a hard-rock mine—a belief shared widely prior to May 2, 1972.

Raised in Illinois, Robert E. Launhardt, went to work at the Sunshine Mine shortly after graduating from college in 1954. He served as Sunshine's safety director from 1961 until 1967 when he left mining for other employment. He returned to the mine as safety director in February 1972, two and a half months before the fire. He later served as an investigator for the company before retiring in 1995, and remained an advisor to Sunshine until it declared bankruptcy. *He wishes to extend his thanks for ongoing help to the U.S. Mine Rescue Association, the Mining History Association, and William "Bill" Hawes, himself among the rescue personnel.*

Notes:

1. *Miners entered the Sunshine Mine via the Jewell shaft to the 3700 level, which they traversed most of a mile aboard a man train to the 3700-level No. 10 shaft "chippy" hoist station to descend into the lower parts of the mine. (Although equipped to move miners, the double-drum hoist operating in No. 10 shaft from the 3100 level was normally used to lift ore and waste rock.) Of the 173 men who went underground that morning, 58 remained in the vicinity of the Jewell shaft or worked somewhere along the 3100 or 3700 haulage levels, while 51 descended to work areas on the 4000 to 4800 levels, and 64 deployed to jobs on the 5000 to 5800 levels. Please see the mine map on page 20. James M. Day,* The Price of Silver: The Story of the Sunshine Silver Mine Disaster *(Carson City, NV: Bridger House Publishers, 2007), 16-9; U.S. Bureau of Mines, "Final Report of Major Mine Fire Disaster, Sunshine Mine . . . May 2, 1972" (Alameda, CA: USBM, 1973), 57. (Italicized endnotes are the editor's.)*
2. *The signals were then in good order, but hoistman Wood had been driven from his station by the smoke.*
3. *Alas, Schulz was essentially correct. He was the last man of the day shift to escape the mine that day.*
4. *Flory and Wilkinson had survived by drinking water from a cooler in the air conditioning system and by eating from the lunch buckets of men who had died on 4800 level. "Greatest Thing in the World," [Spokane, WA]* Spokesman-Review*, 10 May 72, 2; Day,* Price of Silver*, 144.*
5. Thirty-five years later, Day, director of the Office of Hearings and Appeals in the Department of Interior at the time of the fire, compiled four file drawers of notes made by Bureau of Mines' engineers during the fire into his book *The Price of Silver*. The book has complete lists of the survivors and victims of the fire. It contains data he obtained through analysis of the "tattletale" hoisting records from the No. 10 main hoist on 3100 level, and tells where smoke was observed, by whom, and how the information was used.
6. As soon as possible, I began to look for clues about the cause of the disaster. My first discovery involved "oily" black soot deposits not characteristic of wood smoke. I entered inactive areas involved in the fire, enabling me to offer written information that pointed to the polyurethane-covered 3400 level, 09 intersection with two mined-out veins behind the bulkheads as the place where the fire started. Bureau of Mines' personnel, who worked as observers in the mine through December 1972, were well aware that I suspected polyurethane foam as the agent that generated levels of carbon monoxide 20 to 30 times higher than wood combustion.