

GRANITE MOUNTAIN SHAFT FIRE, BUTTE, MONTANA

by H. Mason Coggin

The Clinton Administration killed the US Bureau of Mines two years ago and nothing was created to fill a research and development gap left by one of America's most useful and practical agencies. Mine safety was assigned to the Mine Safety and Health Administration (MSHA) but it has never had the task of reporting on a disaster of the magnitude described below. It is a rewrite of the Bureau of Mines investigation into the Granite Mountain Shaft fire of June 8, 1917 in Butte, Montana and the recommendations that came from this investigation.

On the night of June 8, 1917, a fire at the North Butte Holding Company's North Butte mine caused the death of 163 men. At that time it was the worst mine disaster in an American metal mine. It was only through the efforts of the North Butte's and Anaconda Company's mine rescue teams that all 410 men working in the mine at the time were not lost.

The mine consisted of a main shaft, the Granite Mountain, which was 3,740 feet in depth. It had two main hoisting compartments and a third compartment, separated from the other two by a heavy timber partition. It carried a man cage, air lines, water pipes, and electric power lines. As a downcast shaft with a heavy flow of air it was the main source of fresh air for the workings of the Granite Mountain and the adjacent shafts. A second shaft, the Speculator, was about 3,000 feet in depth, equipped with cages, and connected by drifts or crosscuts to the Granite Mountain shaft some 800 feet away at various levels. Two supplementary ventilation shafts, the Gem and the Rainbow, were connected on and various levels and there were connections to other mines.

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With the Granite Mountain shaft the North Butte mine was the best ventilated mine in the Butte district. Two surface fans at the Rainbow and Gem shafts exhausted about 50,000 cubic feet of air per minute (cfm) from the workings. Another 10,000 cfm naturally up drafted through the Speculator shaft. A reversible fan at the collar of the Speculator shaft was not in use when the fire started. Augmenting the ventilation system was a large number of electric fans with canvas vent pipe carrying air to the working faces in the drifts, stopes and raises. A large number of underground doors controlled the air currents. The mines were electrified to supply power, light, and 15 trolley locomotives. Almost every level was supplied with 2300 volt power that ran from the Granite Mountain shaft to a transformer on the various stations.

Planning to prevent a serious fire in the Granite Mountain shaft, the North Butte Co. had started installing a sprinkler system in the shaft for fire protection at the time of the fire. In a typical manner small tanks were located at intervals in the vertical shaft to reduce and equalize the water pressure on each of the various levels. Included in the fire prevention plan was a program to move the main transformer from the 2,600 level station to a transformer bay several hundred feet away from the shaft.

At the time of the fire, six men were lowering 1,200 feet of lead armored cable into the shaft for this transformer move when the cable slipped from its lashings on the hoist cable and fell down the shaft. The cable lodged itself between the 2400 and 2800 levels. The cable weighed approximately 3 tons and was lashed to the hoist rope by lengths of hemp rope, placed every 10 feet along the

cable for the first 500 feet then at 5 foot intervals thereafter. Clamps were not used in fear of crushing the cable. During the fall the cable broke water pipes and damaged some of the protective lead armor around the cable, exposing and fraying the oil-impregnated fabric and jute insulation. Half of the cable by volume was this oil impregnated, highly flammable material that acted as insulation for the electrical cables at the time.

At 11:30 p.m. the assistant foreman, a shift boss, and two shaft men were just below the 2,400 foot level trying to attach the cable to the cage and pull it back up. As the damaged cable was being examined, the flame of a carbide lamp came into contact with the insulation and a blaze started.

The men were forced to retreat to the 2,400 foot station. In spite of their efforts to extinguish the fire, the shaft timbers became ignited. The heat from the fire changed the air flow in the normally downcast one compartment to an upcast chimney. Smoke began spreading through the mine and within 30 minutes smoke began issuing from the Speculator shaft. Within one and a half hours it had spread into the two connecting mines. Foremen and shift bosses ran through the mine warning the men to leave. A number of the men escaped through the connecting mines. Three groups had bulkheaded themselves into the end of a dead end drift and 25 out of 29 were saved in one location and 6 out of 8 in another. Thirty two men were taken up the Speculator shaft to safety. Of the 410 men in the mine at the time of the fire 163 perished. Two were burned to death and the others were asphyxiated by the gases from the fire.

Soon after the fire started, the fans at the Gem, Rainbow, and Speculator shafts were reversed to force approximately 100,000 cfm of fresh air into the mine and exhaust

them through the Granite Mountain shaft. Eventually the fire was abated with water. Care was taken to maintain the upcast flow of air in the Granite Mountain shaft. Fans

were installed underground to aid the rescue parties and establish fresh air bases. About 48 hours after the fire started suction fans were placed in operation over the Granite Mountain shaft insuring that it would remain an upcast shaft to clear smoke and gasses from the lower levels.

Mine rescue teams from the North Butte Mining Co. and the neighboring Anaconda Copper Mining Co. equipped with self contained oxygen breathing apparatus began immediately to assist live men to safety and reclaim the bodies of the 163 men who were lost.

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A Bureau of Mines rescue team arrived from Red Lodge, Montana one day after the fire began. Twelve hours after the start of the fire 50 self contained oxygen breathing apparatus were available, and 30 men wearing this equipment worked three shifts per day for well over a week.

By the second morning the Bureau of Mines rescue car reached the site by rail from Colorado bringing the rescue apparatus to insure the rescue. Forty-eight hours after the fire started the Speculator was cleared of gases. Twenty five live men were rescued from behind bulkheads on the 2400 and 80 bodies were recovered from other workings. The recovery of 75 more bodies followed in the next eight days. Several additional bodies were recovered in the following weeks.

The US Bureau of Mines made the following conclusions from their studies of the disaster:

1. The upper end of an electric cable being lowered in a shaft should be firmly clamped, even if such clamping does ruin 8 or 10 feet of cable.
2. Electric cables in hoisting or ventila-

tion shafts are a fire hazard. Bore holes should be used to bring such cables into a mine if practicable; if not, they should be placed in upcast shafts or in shafts or shaft compartments that are as nearly fireproof as possible.

3. When a mine has two shafts, and the one downcast is afire and filling the workings with smoke, efforts should be made by fans and other means to convert this shaft into an upcast.

4. The main hoisting shaft of every deep mine should be fire proofed.

5. Connections between mines should be closed with airtight doors held closed by a positive latch that can be readily opened from either side in case of need.

6. To provide adequate ventilation and allow safe removal of men in case of disaster every mine should have at least two hoisting shafts. Levels should be connected with both shafts.

7. Tightfitting fire doors, of fireproof construction, should be provided in every drift, crosscut, or other opening leading from any shaft. These doors should be self-closing and equipped with a latch or other means of preventing opening by reversal of the air current.

8. Direction signs in several languages should be posted indicating the direction of escape ways.

9. Timbered shafts should have ample facility for quick action fire protection. Water lines for fire protection should be extended through mine workings, especially if timber or other combustible matter is present.

10. There should be means for warning men promptly in an emergency.

11. Rescue apparatus and men trained to use this equipment should be available at every mine where men are employed to work underground.

Note: In the succeeding years all of the recommendations and many more were written into the mine safety code of many states

and then were adopted by the Mine Safety and Health Administration when it was established in the 1970's. The Granite Mountain Shaft Fire and the loss of 163 men was an American catastrophe. It had a profound effect on how industry and mine safety officials planned for the prevention of fires and the protection and rescue of miners if a fire should occur.

Harrington, D., "Lessons From The Granite Mountain Shaft Fire, Butte": in *Bureau of Mines Bull.* 188 1822. 50 pp. ✕

SMOKE HOUND

*You've heard the one, of the 'wrath to come',
Now heed the 'smoke hound's song.
As he sits on the floor, 'mid the furnaces roar,
And 'strings' the rustler along.
'My son,' says he, 'ere long you'll be
A 'fire eater,' tried and true,
Possibly, a czar, with hammer and bar,
Therefore this applies to you,"*

*"If your mind should run, to that life to come,
And doubts surround you, sore,
I wish you to learn, that you're bound to burn,
When you life on earth is o'er.
You've chosen a trade, that the devil has made
For his helpers, here, to train,
And Dante's dream, will make it seem,
This training is not in vain,"*

*As the 'smoke hound' spoke,
from the furnace broke, a stream of gas and fire.
The rustler turned, his shoe soles burned,
Says he, "You are a liar,
I've followed the plow, to farm I know how
Although I may have to bum,
If I can make the gate before it's too late
Arkansas here I come."*

Sam L. Manatt
Copper Queen Bulletin, Feb. 1928

Mason Coggin is still looking for old mining poems. If you have any old poems that you would like to share please send them to H. Mason Coggin at the Arizona Department of Mines and Mineral Resources, 1502 W. Washington, Phoenix, AZ 85007.