

1952-02-26
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M/NM FATAL

INVESTIGATION REPORT OF AN ACCIDENT FATAL TO THREE EMPLOYEES AT AN UNDERGROUND MICHIGAN MINE - MAY 31, 1952

Introduction:

An underground shift boss, age 51, with 31 years underground experience; a miner, age 41, with 10 years underground experience, and another miner, age 39, with 11 years underground experience, sustained fatal burns when they were exposed to hot sulphur ash and gas which came down the ladder and ore raises as No. 21 Contract stope was being filled. This accident occurred following the end of the second shift of May 31, 1952 - approximately 12:30 A.M. June 1, 1952.

Nature and Extent of Injuries:

Deep third degree burns, FATAL TO THE THREE EMPLOYEES. 6,000 days lost time, specific charge for each, a total of 18,000 days charged for the accident.

Cause of Injuries:

Exposure to sulphur gas and burning ash from the footwall slates which followed a blast to fill the stope.

Cause of Accident:

Failure to follow instructions and to return to surface following the lighting of fuses to blast the stope. An Un-safe Act.

Physical Factors Involved:

When stopes are mined out to the pillar limits it becomes necessary, as a safety measure, to fill the stopes. This is usually done by blasting them in. Holes are drilled into filled stopes above and the material is brought down by blasting. Fuse blasting is used with fuses 20 feet or more long to allow adequate time for those setting off the blast to reach a point of safety - usually Surface. Plans for the job are made well in advance and reliable men are selected. Stopes are filled when all other employees have been brought to Surface - usually at the end of the last shift on the last day of the work week.

Foot and hanging wall rock in the area of this accident is black slate which has a high sulphur content. When these slates are broken and exposed they oxidize, causing intense heat and fire. This process of oxidation causes sulphur dioxide gas to be released and areas where this occurs must be filled or sealed tightly.

Sulphur fires immediately to the east of No. 21 Contract Stope had been bulkheaded about two months previous to this accident.

The stope was inclined toward the west to avoid breaking into the old fire area above and to the east. This stope, when completed, was not considered large, as it was about 40 feet wide and 50 feet long, and extended from the back of the 750' Level to the 111' sub above the 950' Level - a vertical distance of approximately 90 feet.

The tugger was located on the 111' sub and, from the bottom of the stope, the ore was scraped into the ore raise about 15 feet from the stope entrance. (This ore raise was about 15 feet east of the ladderway through to the 950' Level.)

The ladderway was in very good condition, extending from the 750' Level down to the 950' Level. Ladders were offset at each of the subs and each ladder was inclined to make climbing safe and easy.

In order to reach the top of this stope from the 950' Level it was necessary to travel about 1300 feet south and east from the shaft, then climb a distance of 200 feet up the ladderway to the top of the stope on the 750' Level. Another route from the 650' Level involves traveling 1360 feet south and east from the shaft to a ladderway going down a flat incline, then down this incline 140 feet to another short ladderway and down 20 feet to the 178' sub above the 950' Level. From here it was necessary to travel west about 150 feet to the ladderway, then up 30 feet to the top of the stope on the 750' Level.

Ore in the area was relatively hard and very little timber was necessary in the small sub-level drifts.

Fuse used in this mine was Clover Brand with a burning rate of 40 seconds per foot. Explosives used in blasting long holes were 1 3/4 x 16 inch sticks of 40 per cent Gelatin Extra, Hercules Powder.

A small hole, 2' x 2' in size had been broken through the back of the stope up to the cave above during mining operations and no indication of sulphur gas or smoke was noted coming from this opening.

Fresh air from the ventilation shaft entered the mine on the 950' Level and traveled up through the raises and subs to the levels above. Air from the east side of the mine was exhausted on the 650' Level and from the west side of the mine on the 750' Level. (No. 21 Contract stope was located in the east side of the mine.) All return air was exhausted up the Main Hoisting Shaft. About 20,000 c.f.m. of air was going through the east and another 20,000 c.f.m. through the west part of the mine.

Events Leading Up To and Description of the Accident:

During the week of May 26 specific plans were made to fill No. 21 Contract stope. The Mine Captain, the Underground Superintendent, and all the Shift Bosses discussed the methods to be used and it was decided that holes were to be drilled from the 750' Level through the pillar in No. 21 stope up into the caved area above. (The deceased shift boss had made some excellent suggestions for doing the job safely during the time plans were being made.) Drilling was to be done from the

protection of the drift and miners were to complete the drilling and loading of the holes before the end of the second shift on May 31, 1952. Long fuses were to be used, about 20 feet in length, and a shift boss was to remain underground with the two miners after other employees had completed the second shift, to light the fuses and come to Surface immediately.

Miners in Contract 21 drilled five holes, 15 to 17 feet long, through the pillar into the caved area above during the two shifts on May 31, 1952. The two miners on the second shift charged these holes before the end of the shift, using a total of 72 sticks of 1 3/4 x 16 inch powder and fuses 9 feet long. (This information from the powderman after the accident.)

The two deceased miners and the deceased shift boss came back to the shaft with the other members of the second shift and waited until all had been hoisted to surface. The watchman, on Surface, was notified that these three men were to work a short period overtime, to blast the holes in, filling the stope, and that they should be on surface at about 12:30 A.M.

A pumpman and his helper were tending the pumps on the 650' Level and they saw the two miners and the shift boss get off the cage on the 650' Level. These three deceased men then were seen going in toward No. 21 Contract stope on the 650' Level-the last time they were seen alive.

They apparently traveled 1360 feet south and east from the shaft to the ladderway going down the incline, then continued on down this incline 140 feet to another short ladderway. They then climbed down 20 feet in the ladderway to the 178' sub above the 950' Level. From here they traveled west 150 feet, then climbed up 30 feet in the ladderway to light the fuses on the 750' Level.

After lighting the fuses they apparently climbed directly down the ladderway to the 45' sub above the 950' Level-a distance of 155 feet-and sat down near a low wood barricade at the ore raise from this stope which was being filled. (An unsafe place to stop when the stope was being filled and contrary to instructions.) This was only about 65 feet below the bottom of the stope.

Neither the pumpman nor his helper heard the blast as the five holes were detonated, but the watchman on surface stated that he felt the tremor at about 12:30 A.M. About 15 minutes later the pumpman and his helper arrived on surface. They had placed wet handkerchiefs over their faces to prevent the inhalation of harmful dust and gas as they rode the cage up through the return air. They advised that they had no word from the three other men in the mine.

All supervisors were notified immediately, and efforts were made to reach the three men by underground telephone, but without success. In the meantime, mine rescue crews were formed as the sulphur gas was quite strong and seemed to be getting worse. A crew of five men was sent underground with one of the safety inspectors to locate the three missing men. They reported, by telephone, that the air was clear on the 750' and the 950' Levels, so they were instructed to follow the fresh air course in and try to go up the ladderway to No. 21 Contract stope. Within a few minutes, they reported the three men were found in a sitting position on the 45' sub near a low wood barricade at the ore raise for Contract 21 stope--about 15 feet east of the ladderway.

Another rescue crew aided in removing the bodies to surface where the Coroner and the Doctor were waiting. Death was instantaneous.

Conclusions:

The investigation revealed that the pressures developed by the material coming into the stope had forced hot sulphur gas and ash against the air current and down the ladderway, and the ore raise to the 950' Level. The amounts of this material were progressively less on each sub and only a small amount reached the 950' Level. On the 45' sub, where the three deceased men were found, this ash extended only about 25 to 30 feet west of the ladderway. The heat from this sulphur ash was apparently very intense as timber on the 45' sub and above showed signs of having been scorched, and the bodies of the three men were severely burned.

It was concluded that the blasting on the 750' Level either released the burning material from an old dormant sulphur fire in another stope, or the blast ignited finely divided particles of the slates, causing a flash fire to follow in their course. (Tests are being conducted to check on this latter theory.)

Filling these stopes is a necessary procedure in mining the ore safely and has been practiced for many years.

Why these men stopped on the 45' sub above the 950' Level, contrary to the instructions given, will never be known. They also used fuses shorter than those recommended for the job. With the nine-foot fuses they would have had ample time to climb down to the level and to reach the shaft, then be on their way up to surface. (The burning time of the nine-foot fuses would have allowed six minutes for these men to climb down 200 feet, then travel the 1300 feet to the shaft.)

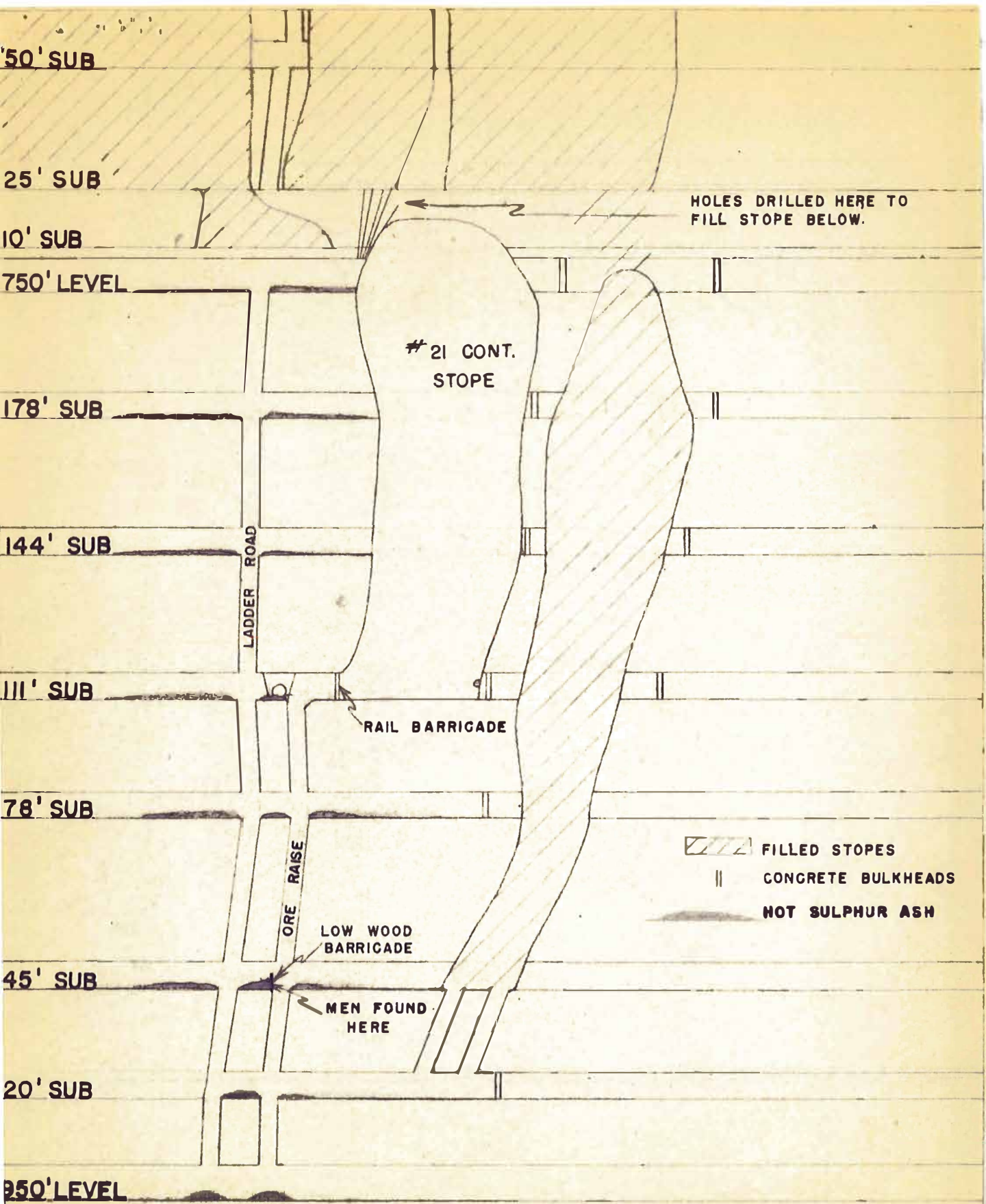
It was thought, by those investigating this accident, that the three deceased men stopped on the 45' sub, where they assumed

they would be safe, with the intention of going back up to investigate the results of the blast. This was, of course, contrary to instructions given the shift boss. Information from some of the second shift crew indicated that all were familiar with the job of filling this stope as they heard it discussed in the underground lunch room during the time men were eating on the day of the accident.

The three deceased men were in very good physical condition according to their physical examinations of 1951 and were regarded as good safe workmen.

Recommendations:

1. Require written instructions for doing specific jobs, with copies for those doing the job, and for the Superintendent and Captain.
2. Make sure that instructions are followed according to the plans on these specific jobs.
3. When filling stopes by blasting, make sure that the method used will allow adequate time for those doing the blasting to reach surface.
4. Discuss this accident at all safety meetings.

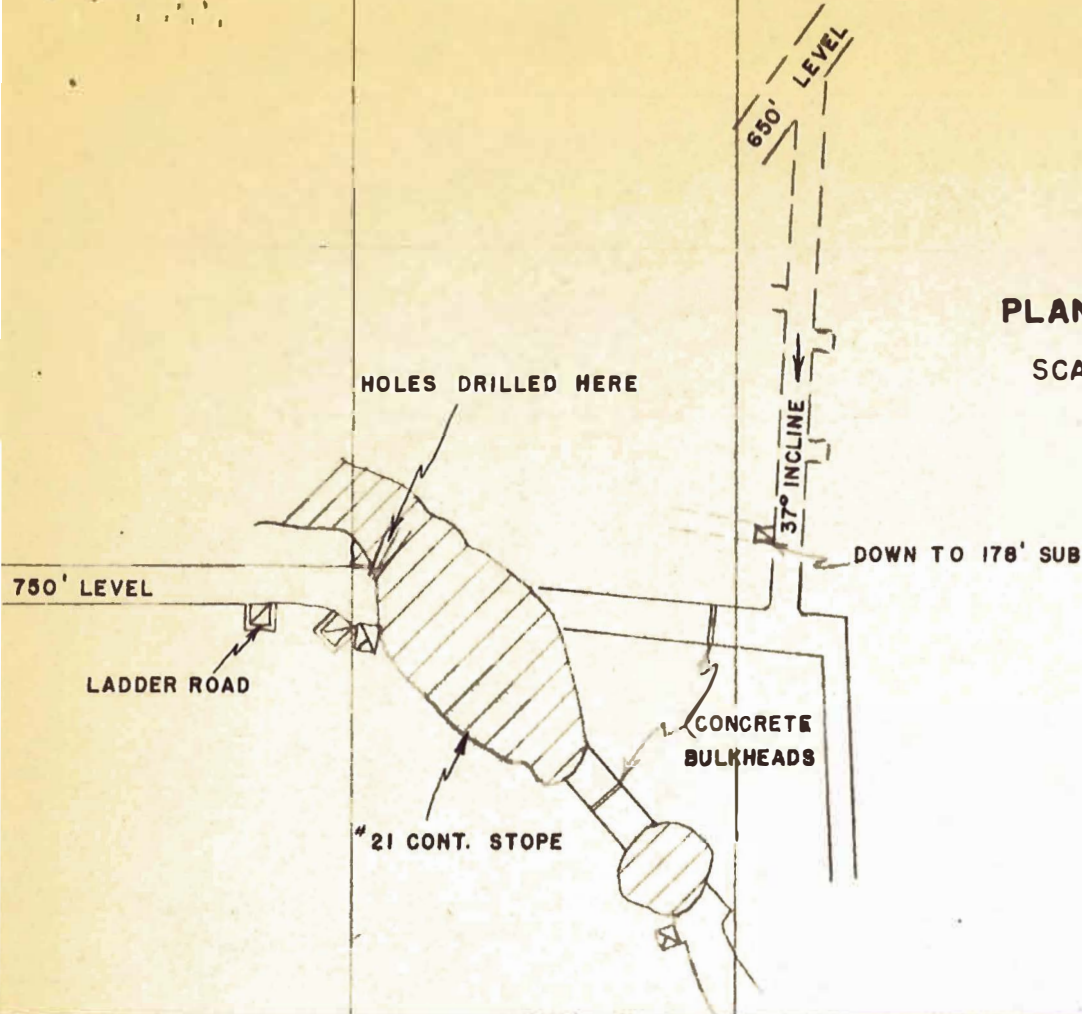


SECTION SHOWING AREA IN WHICH THREE MEN.
 WERE FATALLY BURNED IN A MICHIGAN IRON MINE, MAY 31, 1952

SCALE 1" = 30'

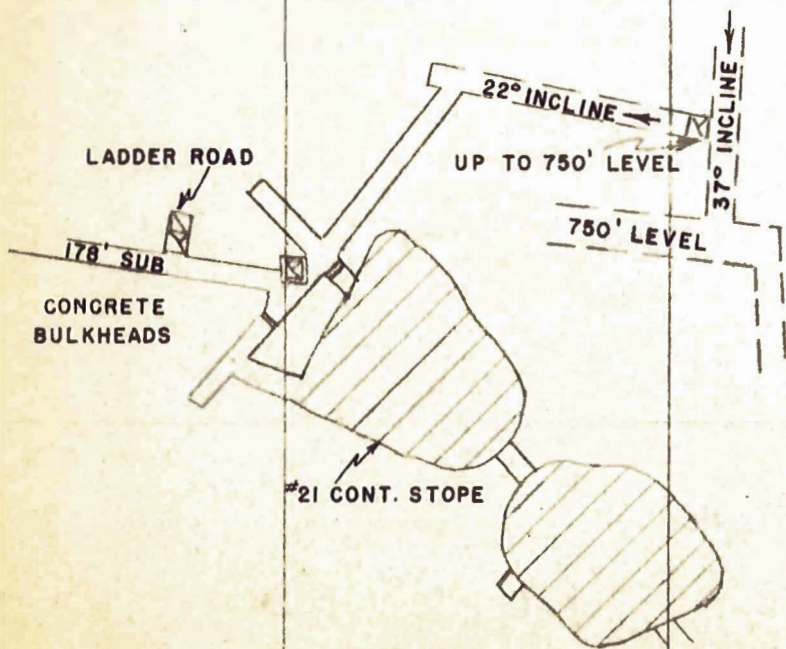
PLAN 750' LEVEL

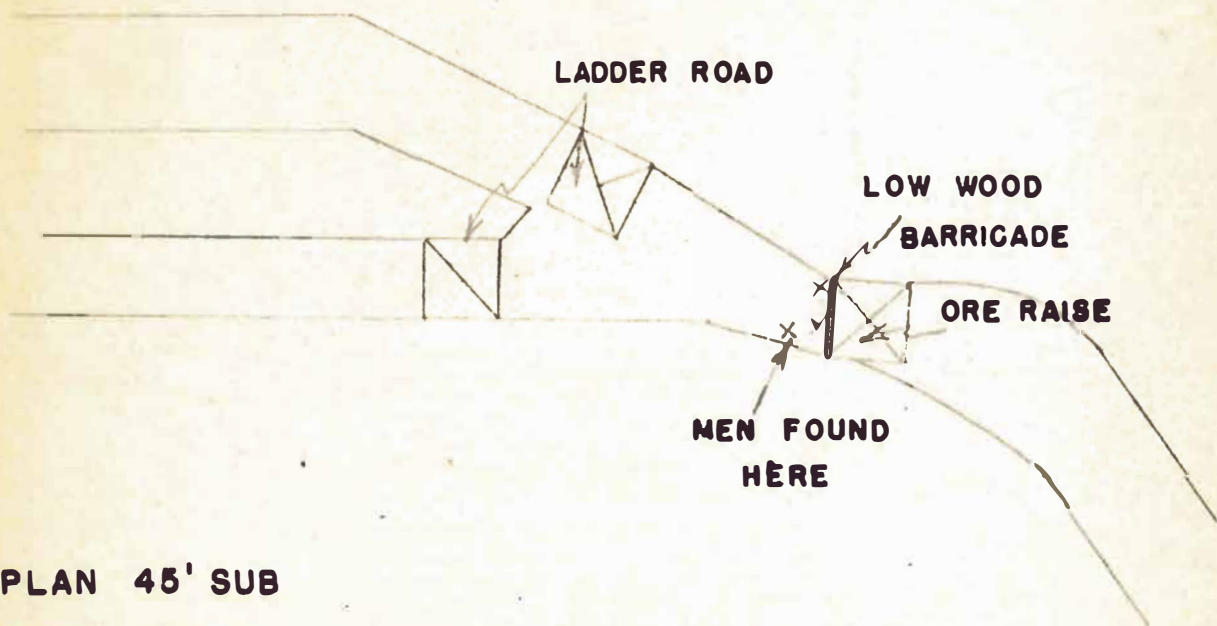
SCALE 1" = 50'



PLAN 178' SUB

SCALE 1" = 50'





PLAN 45' SUB

SCALE 1" = 10'