THE FAIRVIEW MINE, BRITANNIA.

by

E. A. Goranson.

Third Year Applied Science.

Summer Essay.

UNIVERSITY of BRITISH COLUMBIA.

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CONTENTS.

1. INTRODUCTION

The Britannia Mines are situated in the mountains east of Howe Sound, twenty miles north of Vancouver. The Jane Bluff, Fairview, Empress and Victoria are the individual mines included in the general term "Britannia Mines". The entrance to the bottom level of the mine is 2100 feet above sea level.

"The rocks in the vicinity of Britannia mine form part of a large roof pendant composed of Jurassic volcanic, sedimentary and plutonic rocks which occur along the south-west border of the Coast Range batholith of British Columbia".(1)

The Fairview deposits have been the principal source of ore. These deposits have a maximum mineralized area of 1500 feet in length and 500 feet in width. The ore has a known depth of 2200 feet with a strike of 80 degrees to the southeast and an average dip of 72 degrees south. The schist contains pyrite and chalcopyrite in veins varying in width from 10 to 70 feet. Zones of low grade schist occur between these veins or lodes. The foot and hanging wall of these zones are not clearly defined.

An Average Analysis of Fairview ore is:

Gold	0.01 Oz. per ton
Silver	0.24 Oz. per ton
Copper	2.99%
Zinc	.41%
Iron	6.6%

(1) "The Britannia Mines". by S.J.Schofield, 1926

The copper content of the ore is low, but owing to the extensive operations and low mining costs, the deposits can be worked.

2. DESCRIPTION OF THE MINE.

The Fairview Mine is developed by levels from 250 to 1,800 feet below the surface, with a rock distance interval varying from 100 to 200 feet. Five of these levels pass completely through the mountain. In addition to these tunnels there are surface workings near the portals of the 250 and 450 levels. The main shaft runs from the 2200 level to the 1050 level. This shaft is 10 feet by 20 feet and is divided into three compartments; two of them are 6 feet by 7½ feet, and the third, a manway, is 3½ feet by 7½ feet. Double decked cages operate in balance by an electric geared hoist in the two similar compartments. The cable drum is 6½ feet in diameter and the hoist is operated by a 350 H.P. motor. The shaft is timbered throughout by 12 x 12 timbers.

Natural ventilation is used throughout the mine. There are several raises connecting levels for ventilating purposes which and are also used as manways.

3. MINING EQUIPMENT.

Water Leyners are the most broadly used drilling machines. By means of compressed air water is fed through the centre of the steel. The drills used in the Leyners are cruciform steels of 1¼ inch in diameter. The length of the starter is 2ft. 6 in. with a 2¼ in. gauge.

The gauge decreases one eighth of an inch for every foot increase in the length of the steels. The longest commonly used steel is 9½ feet, with a 1¾ inch gauge. These machines are used both for drifting and stoping.

For drilling overhead vertical holes, hand rotated Waugh stopes are used. Each machine is equipped with a water spray, but the miner, as a rule, prefers to put up with the dust rather than going to the extra labour of keeping the spray working. These machines use steel with a square cross-section of 1¼ inch side. They are simple to operate and do not get out of order easily.

For sinking holes No. 60 Dreadnought pluggers are used. They take hollow round steel of 1¼ inch diameter. Small pluggers are used to drill ore jammed in chutes or large pieces of rock in stope raises.

4. MINING METHODS.

The overhead shrinkage method is used in the mine. On the footwall side of the drift along the vein, funnel shaped chute raises 33 ft. apart are driven. They are advanced at an angle of 70 degrees with the dip of the formation. The adjacent raises join together about 25 ft. above the drift, leaving strong wedge-shaped pillars of rock over the tunnel. When all the chute raises are connected in any particular section of the vein the stope advances upward leaving one chute at its end open for a time as an entrance and an exit. The stopes may run from 200 ft. to 400 ft. in length, and 10 ft. to 50 ft.

in width.

A manway raise to serve the stope is being driven from the same level to the next upper level along with the cutting of the chute raises. These manway raises are 6ft. by 10 ft. spaced 300 ft. apart on the drift cutting the vein at right angles on its dip. A rock pillar 10 ft. by 15 ft. entirely surrounds the manway along the vein. By passes are cut in the vein at 30 ft. intervals through this enclosing pillar to serve as entrances to the stope when the latter has been raised to that point.

The solid roof of the stopes is drilled by the miners from wall to wall, standing on the broken ore. A V-cut is first drilled, then parallel rows of uppers to break this cut. The uppers are six or seven feet deep and usually three feet apart. Seven or eight sticks of dynamite are put in each hole. The cut holes are always blasted first, and care is taken to see they are out clean before the other holes are loaded. The holes are drilled during the day and afternoon shift, and the blasting is done on the Graveyard shift (11 p.m. to 7 a.m.) by experienced blasters. Well shattered rock and holes broken to the bottom are wanted, so as to avoid large boulders in the raises, and to eliminate block holing in the stopes.

The underhand stoping or "Glory Hole" method is used on the surface. From a common point two hundred feet below the surface, two 50 degree untimbered raises 6 by 10 ft. are driven. One is driven east and the other is driven west along the strike of the vein, each going to

the surface. Other pairs of raises are driven along the vein. A vertical raise is then driven between the respective sloping raises into which the ore remaining in the pillar is mined. The width of the "Glory Hole" is determined by the width of the vein, and the length by the distance between the raises. The broken ore slides down the raises to the "bulldozing chambers" where the large pieces are blasted. It then falls through grizzly bars down to the transfer chutes.

Only one shift a day is maintained on these surface workings. The miners do their own blasting, using electric caps and a 100 shot battery. These operations can only be carried on for about seven months of the year, work ceasing for the remaining part of the year on account of the snow.

(5) HANDLING OF THE ORE.

The cars used for hand tramming have a capacity of half a ton or 26 cu.ft. The body of the car is pivoted at the centre so that it can be swung around at right angles to the frame, and dumped at the side of the track. They run on 24 inch gauge track laid with 12 lb. rails. The 24 inch gauge is the standard width of the track throughout the mine. Hand tramming is only carried on in the upper levels of the Fairview mine.

For general haulage purposes, storage battery and trolley locomotives are used on the lower levels. They pull cars having a cubic capacity of 33ft., or holding 2 tons. These cars automatically side dump without stopping, having a dump wheel attached to the side of the car which runs

why not a decent detailed description of these cars + a drawing

along an incline bar opposite the grizzly. The charging stations for the battery motors are situated near the main shaft on each level. Usually the motors are on charge during the graveyard shift, thus enabling them to be used during the entire next time of the two shifts. The trolley locomotives are used on the main transfer levels 1050 and 1600; they are supplied with 250 volt direct currentfrom a motor generator at the nearest hoist station. These latter motors run on 30 lb. track.

In the upper levels the ore coming down from the stopes falls into chutes and on to platforms. It is then shovelled into cars and hand trammed to the grizzly. A grizzly is placed at the opening of each raise and consists of parallel iron bars placed 20 inches apart resting on 12 by 12 timbers. The ore is then drawn out of the transfer raises by ore trains and taken to the main rock raise and dumped. On levels from 700 to 1700, the ore is, or can be, dumped directly into this main rock raise eliminating double handling.

A 24 by 26 Buchanan jaw crusher is situated on the 1700 level. It reduces all the ore coming down the main 68 rock raise to 6 inch size. The ore then drops to the 1800 level where two gyratory crushers are located. They further reduce the ore to 2½ inches,-the size required at the mill ore bins. The reduced product is by-passed into the main rock raise again, and falls to the loading chutes at the bottom of the raise on 2200. The ore is then loaded into

17 ton cars, and taken out of the mine. The crushers are each run by a 75 HP electric motor. A slope drift connects the 1700 and 1800 levels.

(6) LOADING CHUTES.

The chutes at the bottom of the raises are about 4 ft. wide and sloped sufficiently so the ore will slide down them. They are made of lumber, requiring usually 1000 board feet with the bottom and sides lined with plate iron. Above the chute is a 12 by 12 cap to prevent falling boulders from increasing the raise opening. three types of doors are installed in the chutes to regulate the flow of ore.

The most common door is the roller type, consisting of a checkboard halfway up the chute to stop large rocks, and a roller at the end to hold back the ore when a car has been filled. For wet ore the roller is not much use as a stop, the result is the rails usually get covered and the next car is pulled off the track. Two men are usually required to draw this kind of chute, one holding the roller up, and the other using the bar trying to make the "Muck" run.

The second type is the hand door and sandboard chute. The door is usually made of plate iron in the shape of an arc of a circle with a lever attached to it. The sandboard is a wooden plank 2in by 12 in by 4 ft. long, with a handle, and stops small rocks and silts from dropping on the track. One man can operate this chute except

when large wet rocks are coming down. Occasionally the door jams and the sandboard has to hold back the ore. Spills are quite common with this type.

The third type is the air door. This door consists of four to six fingers made of wood with steel wearing parts. These fingers can be attached to a horizontal bar by means of hooks so any desired pair may be lifted. The bar is connected by a link chain running over a pulley to an air piston. The fingersare quite heavy, so that when the air valve is shut off they fall and stop the ore. This chute is operated by only one man. The air door costs more to install than either of the other two, but it pays for itself in saving time and eliminating spills.

(7) MISCELLANEOUS.

There is an electrical shop, and a blacksmith shop on the 1050 level. The electrical shop repairs all the motors and electrical apparatus on this level. The blacksmith shop sharpens the steel for nearly all the levels in the mine. It has two steel sharpeners which use oil for fuel. The shop is also fitted with a mechanically operated punch for cleaning and enlarging the holes in hollow steel.

An incline raise, having two skips running in it, goes from the 1050 to the 500 level. This raise is at such an angle that the cars will just stay on the track. The hoist is electrically driven from 1050 and is used for taking steel, powder and equipment to the higher levels.

no details

All compressed air used in the Fairview mine is supplied by the compressor at the 2200 portal.

This covers in a general way the operation of the Fairview mine in the summer of 1925. Changes have taken place since then, but they are of minor importance except those of transportation.

250 "Glory Hole."

250 "Glory Hole."

250 "Glory Hole"
Shewing
top of one inclined
raise.

Britannia Townsite taken from
above 2200 Portal.
17 ton cars are coming out of
mine loaded with ore.

From the Summit of Britannia
mountain shewing old 1050 and
townsite Camps

Looking up towards the townsite shewing the bucket line.

Barbara Camp.
Men working on the upper levels of Fairview live here. The Camp is near the 500 portal.