

mining purposes, and the proposed reservoir will, if constructed, serve hereafter for irrigating the upper portion of the Ida Valley.

In connection with dredging operations on the Charlton Creek at Gore, and on the Waimumu Creek at Mataura, channels have been laid out and the necessary plans prepared for relieving the creeks of the flood-waters, and disposing of the tailings into the Mataura River. Arrangements have been made between the miners and the farmers of the district of a satisfactory nature, and the construction of both channels will probably be commenced at an early date.

Several claims having recently been taken up and worked on the Naseby side of the Hogburn Gully (in the "Maori bottom"), it has become necessary to increase the water-storage in Home Gully for working those parts of the field hitherto supplied direct from the Mount Ida Water-race. A moderate supply of water and an excellent site has been secured for a new dam in Home Gully; a survey has been made, plans prepared, and tenders called for.

REPORTS, ETC., FOR OTHER DEPARTMENTS.

Beyond finally deciding the amount of indebtedness of the Wairoa Harbour Board to the contractors on the construction of training-walls, &c., in the Wairoa River, no other work has been taken outside this Department.

I have, &c.,

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MINE-MANAGERS' AND BATTERY-SUPERINTENDENTS' EXAMINATION PAPERS.

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR CERTIFICATES.

SUBJECT A.—*The Laying-out and Construction of Shafts, Chambers, Main Drives or Levels, Adits, Uprises, and Stopes.*

1. A lode dips at an angle of 30° eastward, the outcrop of which is visible on the surface. State where you would sink a vertical shaft in relation to the lode, and give reasons for your answer.

2. An adit-level is driven 300 ft. to cut a vertical reef, and, allowing a fall of 1 in 12 in the drive, a straight line from mouth of adit to outcrop of reef is 500 ft. What depth would you require to sink a shaft from the outcrop to connect with the adit?

3. A drive is 6 ft. 6 in. high, 4 ft. 6 in. wide at the bottom, and 3 ft. 6 in. at the top, the whole being solid quartz. How many feet of driving would be required to provide ore for a forty-stamp battery for twenty-eight days, working full time—capacity per stamp 1 ton per eight-hour shift, and assuming 180 lb. as the weight of a cubic foot of quartz?

4. Compare the relative merits of rectangular and vertical shafts. Give an estimate of cost for sinking 100 ft. of each, having approximately equal areas.

5. Define the terms "winze," "stope," "pass," "adit," "drive," and "crosscut." What is the use of a pass, and what distance would you have them apart if you were working a 4 ft. reef?

SUBJECT B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of Timbering Mine, and also in Filling up Old Workings.*

1. Give the dimensions of timber for a main adit in heavy ground—(a) if for a double line of rails, (b) for a single line of rails. State how you would make each set, and what provision you would make if the ground was liable to swell. Give your reasons fully.

2. How far apart do you consider it most economical to have passes, and how would you timber them in heavy ground? Give dimensions of passes and size of timbers. Give your reasons fully.

3. State how you would timber a shaft with formed sets if the shaft were 12 ft. by 6 ft. in the clear: give the dimensions of timber you would use, and show by sketch how you fit the timber, and the distance you would place the sets apart if the ground was heavy.

4. How would you secure the ground in stoping out a lode 6 ft. wide—(a) timbering the stope, (b) to secure the ground after being stoped out—if the ground were liable to crush, and the lode underlying at an angle of 40° ?

5. Describe how you would secure the timber in the main adit so as to prevent more than two sets of laths coming down in the event of a cap breaking; also give your reasons why all empty spaces should be filled up on the top of the laths.

SUBJECT C.—*The Ventilation of Mines, and Composition of Gases.*

1. Under what conditions is CH_4 likely to be found in metalliferous mines? How would you detect it? State generally what you know about this gas.

2. Give the compositions, gravities, and characteristics of CO and CO_2 . Describe the conditions under which they are likely to be found in mines.

3. If in reopening an old filled-up shaft the men became overpowered by CO_2 , what steps would you take to promptly rescue them? Safety of rescues must be taken into consideration.

4. Explain the various methods for obtaining positive ventilation and the reason for splitting the air-currents.

5. A fan is exhausting 150,000 cubic feet of air per minute; water-gauge reading, 3 in.; engine cylinder, 24 in. diameter by 36 in. stroke; piston-rod (one side only), $3\frac{1}{2}$ in. diameter; revolutions, sixty per minute; mean steam pressure, 40 lb. per square inch. Allowing for 15 per cent. of the steam-power being absorbed by frictional resistances, &c., what percentage of useful effect does the fan yield?