

rainfall as before stated in my preliminary reports on water-conservation, being only 12 in. to 13 in.; under these circumstances, although the land is acknowledged to be good, farming is carried on at a disadvantage not known in other parts of the colony. In some cases, farmers (more enterprising than the majority), recognising the value of irrigation, have dammed up small streams and watered their crops by simply running plough-furrows.

REPORTS FOR MARINE AND PUBLIC WORKS DEPARTMENTS.

In addition to the above works pertaining to the Mines Department, the following reports have been prepared and designs formulated for the Marine and Public Works Departments: Protection to the Castlecliff Railway embankment at Wanganui, now nearly completed; advising and adjusting payments, &c., between Wairoa Harbour Board and engineer and contractors in connection with training-walls and river-improvements; inspection of protection-work at erosion of Wanganui River bank above Aramoho; examination of Opunake Bay relative to removing boulders from fairway to jetty; and advising Mokau Harbour Board relative to clearing Mokau River and designing wharf at heads.

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. Describe fully, and illustrate by sketches, the method you would adopt for sinking (a) a rectangular shaft and (b) a circular shaft through 50 ft. of soft, wet ground resting on hard rock. Show how you would secure the sides, and also how you would keep the water back after reaching hard ground.

2. Assume that a mine has to be opened out for an output of 300 tons of ore per day, winding during one shift only. Stopping will be carried on in three levels, the lowest being 600 ft. deep. Show necessary shaft arrangements, and sketch and figure the dimensions of compartments, cages, guides, chambers, &c., allowing space for a 16 in. pumping set and ladder-way. Describe the most economical method of dealing with the output named.

3. Describe fully, and illustrate by sketches, how you would deepen an existing shaft used for winding purposes without interfering with the output in any way; also show how you would deal with the water during sinking operations without disturbing an existing pumping plant. The safety of sinkers to be fully provided for.

4. Two reefs dipping west outcrop 650 ft. apart horizontally. The most easterly of the two has a hade of 60° from the horizontal; the other one has 75°. If a vertical shaft is commenced on the outcrop of the last-named reef, what depth would it have to be sunk so that a crosscut in each direction—both being of equal length—would cut the two reefs?

5. Show in detail how you would proceed in driving a main-adit tunnel through wet running ground. When finished, the superficial area to be 50 square feet in the clear. Give measurements.

6. Describe and illustrate your method of constructing and securing an uprise in swelling ground.

7. If you had 20 acres of alluvial ground to work out from a shaft, describe, and show in plan and section, how you would open the mine and take out the auriferous gravel, assuming the latter to be 2 ft. 6 in. thick and lying horizontally. Safety and economy to be considered.

SUBJECT B.—*The Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally the Systems of timbering Mines and filling up Old Workings.*

1. Sketch in detail the various methods of timbering a shaft having winding- and pumping-compartments, and describe fully the process of fitting timbers. Take both loose and solid ground into consideration.

2. Show fully how you would secure a level intended for endless-rope haulage (with two lines of rails) in heavy ground, and where the bottom is liable to swell. Give reasons for your answer.

3. Describe and illustrate how you would timber single and double passes, and the provision you would make for the safety of men travelling between the level and stopes.

4. It is required to reopen an old level which, although heavily timbered originally, has collapsed and remained closed for a considerable time. Describe how you would reopen same with safety and efficiency. Take all possible dangers into consideration.

5. The walls of a reef are of a puggy nature and the mine damp. Describe fully what your practice would be (under such conditions) to insure the safety of employes. Give reasons.

6. Show how you would timber the stopes in a 7 ft. reef having a pitch of 45°, assuming the hanging-wall to be jointy.

7. Illustrate your method of filling up the stopes referred to in the last question, and show how the timbers may be safely drawn for further use.

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

1. Enumerate the several gases met with in metalliferous mines; give their symbols and gravities; describe (a) the characteristics of each, (b) the conditions under which they are likely to be found, and (c) the means whereby they can be detected.