

3. Describe the auriferous lodes of any district in New Zealand with which you are acquainted, paying attention to the following points:—

- (a.) Dimensions of lodes ;
- (b.) Dip and strike ;
- (c.) Enclosing-rock (country) ;
- (d.) Minerals associated with gold ;
- (e.) Distribution of gold in lodes (shoots, &c.).

4. Give some account of the way in which payable deposits of auriferous gravels (alluvial gold) have been formed. Exemplify your remarks by reference to localities in New Zealand or elsewhere.

5. What is meant by "bedded veins," "fissure-veins," and "contact deposits"? Give examples of each from New Zealand localities.

#### QUESTIONS USED IN EXAMINATION OF BATTERY-SUPERINTENDENTS FOR CERTIFICATES.

##### SUBJECT A.—*The Different Modes of reducing and pulverising Ores.*

1. State where and by whom you were employed. Give the dates you were actually employed in a quartz-crushing battery where bullion was recovered by cyanide-of-potassium treatment. Also state in what capacity you were employed.

2. Show by sketch in plan and section how you would construct a battery of thirty stamps, with rock-breaker, ore-bins, ore-feeders, amalgamating-tables, and concentrators. Show the relative position of each by giving all the dimensions on the sketch in figures. Also give the speed of the different machines, and their capacity.

3. If thirty heads of stamps require 60-horse power to drive them at the greatest speed with safety, and a Pelton wheel 6 ft. in diameter is required to drive the stamps under a head of 200 ft., over which 300 cubic feet of water was discharged per minute, the wheel giving 80 per cent. of the theoretical power of the water, and the stamps requiring 66 per cent. of the power given out by the Pelton wheel, what would be the weight, drop, and speed of the stamps, the number of revolutions of the Pelton wheel to give its maximum power, and also the diameter of a nozzle required to discharge 300 cubic feet of water on to the Pelton wheel? Show by calculation how you arrive at the result.

4. If you required a compound steam-engine of 130 theoretical horse-power to drive the whole of the machinery in a crushing-battery, the initial pressure of steam in the high-pressure cylinder being 100 lb. per square inch, and the piston-speed of engine being 450 ft. per minute, show by calculation the diameter of the high- and low-pressure cylinders if steam were cut off the high-pressure cylinder at half-stroke.

5. How is the bullion recovered from the copper plates when the battery is working continuously? How is it prepared for market? Also, how do you ascertain its value?

##### SUBJECT B.—*Amalgamating-machines.*

1. State fully what descriptions of auriferous and argentiferous ores are best suited to amalgamation, and how amalgamation is produced.

2. Are there any auriferous or argentiferous ores from which in their natural state very little or none of the bullion can be recovered in amalgamating-machines? If so, give a full description of the ores, and the reason why the bullion they contain cannot be successfully recovered by amalgamation.

3. Describe the action of the McKay and the Watson-Denny amalgamating-pans, their capacity, the horse-power required to work them, the number of revolutions they require to be driven per minute, and how the bullion is recovered from them.

4. What effect has heat on amalgamation? How is heat applied to amalgamating-machines? and at what temperature is it so applied? Give reasons for your answers.

##### SUBJECT C.—*The Use of Quicksilver, and Methods of using it in connection with the Extraction of Gold and Silver from Ores.*

1. How do you know when quicksilver is sickened and unfit for amalgamation? What remedy would you apply to sickened mercury? and state fully what causes mercury to be sickened.

2. What quantity of quicksilver would you use in a Watson-Denny amalgamating-pan? How is the quicksilver drawn off? and how do you separate the quicksilver from the bullion?

3. How do you prepare copper plates for amalgamation? How are the copper plates laid down? Give the width and gradient of amalgamating-tables, and the position and use of amalgam-traps.

4. How is the bullion recovered from copper plates when the battery is working continuously? How is it prepared to be fit for market?

##### SUBJECT D.—*Cyanide, Chlorination, and other Chemical Processes of recovering Gold and Silver from Ores.*

1. Describe the class of ore most suitable for treatment with KCN solutions.

2. State fully how you ascertain the strength of KCN solutions most suitable for the ore you have to treat.

3. What effect, if any, have KCN solutions on raw concentrated ores? Give reasons fully for your answer.