

4. Explain the advantages of plotting by co-ordinates, and the simple method of check which can be applied to any point.

SUBJECT VI.—*General and Applied Geology.*

1. Define the terms *weathering, denudation, sedimentary rock, conformity, unconformity.*
2. Give a brief account of the geological work of streams and rivers.
3. Describe the general geology of any quartz-mining district in New Zealand with which you are familiar.
4. Briefly describe each of the following rocks, and state how it is formed: Sandstone, conglomerate, slate, quartz-mica-schist, granite.
5. What is a fault? With the aid of diagrams describe examples of faulting, in each case stating (if possible) the approximate amount and direction of movement.
6. How have mineral lodes been formed?
7. Where in New Zealand are found—Petroleum, iron-ore, tungsten-ore, antimony-ore, limestone suitable in quality and situation for cement-manufacture?
8. Give a rule for the recovery of a faulted lode. State clearly when this rule does and does not apply.
9. What are the chief conditions influencing the occurrence of water in mines? (If you wish, confine your remarks wholly or mainly to one mining district.)
10. What are the geological conditions favouring the accumulation of petroleum?
11. How have auriferous alluvial deposits been formed? Give an account of some New Zealand occurrences.
12. It has been said that the petrological microscope can be of great assistance to the miner. Discuss this matter, stating the case for (or against) the microscope.

QUESTIONS ASKED AT THE EXAMINATION HELD DURING DECEMBER, 1914, FOR BATTERY SUPERINTENDENTS' CERTIFICATES OF COMPETENCY.

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

1. Describe in detail how you would erect a crushing-battery of 40 heads of stamps, with rock-breakers, ore-crushers, concentration plants, and all necessary reduction and pulverizing machinery to reduce the ore to such a fine state of division that the largest percentage of the bullion in the ore can be extracted by the cyanide process.
2. Describe how you would construct a cyanide plant to deal with the ore in the foregoing question. Give full detail of the treatment and the process the bullion is subjected to before it is sent to market.
3. Give an estimate in detail of the cost of the construction of a crushing and cyanide plant as mentioned in the two foregoing questions.
4. If you found that a solid rock foundation could not be procured for a stamp battery, how would you construct a foundation for the stamp-beds? Describe fully.
5. If you had to light a battery electrically with 90 lamps of 16 candle-power and 15 lamps of 25 candle-power, what would be the power in kilowatts of the dynamo required? What volume and pressure would you recommend? Give your reasons for same.

SUBJECT B.—*Amalgamating-machines.*

1. What is the use of amalgamating-machines? Why are they required, and how is amalgamation effected?
2. Describe in detail what is meant by an amalgam-trap, also the use of the following machines: Watson-Denny pan, Fraser pan, combination pan and berdan. State their capacity and the speed they are worked at, and the quantity of quicksilver used in each machine.

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

1. State in detail where quicksilver is first used in a crushing-battery, and for what purpose.
2. How do you ascertain when quicksilver is in a pure state, and what effect lead, antimony, and copper has on it when used for amalgamation of gold and silver?
3. If quicksilver contains base metals, how would you render it again in a pure state? Describe in detail.
4. State fully the process by which bullion is extracted from quicksilver and made into a marketable commodity.

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

1. In recovering gold and silver from ores, how do you ascertain the best mode of treatment to get it extracted?
2. What is meant by the cyanide process? How is the bullion extracted from the ore? What class of ore is most suitable to be treated by KCN solutions and also by chlorination?
3. Give an intelligent sketch of a modern plant where ores are treated with KCN solutions, and also a modern chlorination plant. State in detail how the bullion is extracted.