

ANNEXURE B.

QUESTIONS ASKED AT THE 1914 EXAMINATION FOR FIRST-CLASS CERTIFICATES
OF COMPETENCY AS MINE-MANAGERS UNDER THE COAL-MINES ACT.

SUBJECT 1.—*Prospecting, Opening out a Colliery, Working Coal, and Timbering.*

1. Describe fully how you would sink a shaft, rectangular or circular, through quicksand to a depth of 100 ft.
2. If found necessary to open a roadway through ground recently worked by longwall, how would you secure same?
3. Give sketches and description of pit-bottom roadways and lines of rails therefrom in a seam of coal 8 ft. thick from which an output of 800 tons per eight-hours shift has to be raised.
4. Has the amount of cover overlying a coal-seam any bearing on the system to be adopted in working pillars? And, if so, explain fully in regard to 100 ft. and 500 ft. of cover respectively.
5. Why is coal-dust to be regarded as explosive under certain conditions? And state what these are.
6. Describe and show by sketches the systems of working coal with which you have had practical experience, and state what changes would in your opinion be an improvement on any one of the systems.
7. Show by sketches (a) what is meant by systematic timbering, and (b) sets of timber good for side and top weight, and (c) the application of sprags in the working-faces of a colliery.
8. Give sketches showing how you would lay out a longwall working with the coursing of the air from the downcast shaft through the faces and return to the upcast shaft, and state the conditions in which the longwall system is superior to the bord-and-pillar system.
9. Describe and show by sketches how you would carry drives intended to open up old workings, and all necessary precautions to be observed to prevent accident from (a) water and (b) noxious gases.

SUBJECT 2.—*Mine-gases, Spontaneous Combustion, and Ventilation.*

1. Name and describe the different gases met with in coal-mines, giving their specific gravity and their effect upon life and health.
2. With a fan developing 30 horse-power at the fan with a water-gauge of 2.3 in., but from which only 50 per cent. of useful effect is obtained, what quantity of air would be produced?
3. If appointed to the management of an important and extensively developed colliery worked with locked safety-lamps, having no previous knowledge of the colliery, how would you proceed to make yourself thoroughly acquainted with it in all departments?
4. Why should the circulation of air in mines be maintained continuously, and not during the day only?
5. What special precautions should be observed in the erection of a ventilating-fan in order that it may not be destroyed by an explosion? And state your experience of work done in mines where explosive gases were generated.
6. Given 50,000 ft. of air passing in two splits, how much circulates in each if one measures 7 ft. by 4 ft. and the other 7 ft. by 8 ft.?
7. If the volume of air be trebled, how much will the friction be increased?
8. State how you would proceed to deal with a fire in the workings of a coal-mine, and what experience you have had in dealing with such conditions?
9. Ventilate a mine-plan [not here reproduced] and show by conventional signs the position of air-crossings, doors, stoppings, &c., having due regard to the haulage-system from the face of working-places to the downcast shaft.

SUBJECT 3.—*General Mining, Steam Boilers and Engines.*

1. Give sketches with the dimensions (figured) of a dam which you would consider effective to resist a pressure of 60 lb. per square inch, and state material preferred to be used and dimensions of site.
2. Give sketches of Lancashire boiler of 200 horse-power, specifying all dimensions and strength of plates suitable for a working-pressure of 120 lb. per square inch.
3. With a mean pressure of 80 lb. and 300 ft. per minute piston-speed, what size cylinder is required to give 150 horse-power?
4. What is the breaking-strain of a 3-in.-circumference steel-wire rope?
5. Explain the meaning of the constant number 0.034 in the formula used in finding the diameter of a plunger to pump a given quantity of water.
6. What is the limit to the length of a single-lift pump, and what causes this?