Research.

Clay.—Work has been quietly continued on New Zealand clays, and by combining firing-tests with chemical analyses a large amount of valuable information is being steadily accumulated.

The best clays received were a light-coloured highly refractory clay resulting from the decomposition of rhyolite, Whangarei; a porcelain clay from Tadmor, Nelson; and clay with excellent moulding properties, yielding bricks and tiles of smooth exterior and pleasing appearance, from Mangawhero Stream, Otorohanga.

Quite a number were suited for the manufacture of ordinary bricks, if burned between certain limits of temperature. Several exhibited defects, as excessive shrinkage, development of cracks, swelling in the furnace, and ready fusibility.

Specimens of all samples received, and small bricks and tiles made from them, are kept in the laboratory, and may be inspected by any one who desires information on our clay resources. The work so far is of a preliminary nature only, and is capable of great extension. Grading and blending of the clays are subjects that remain practically untouched.

Muntz Metal.—This has been referred to under the heading "Public Works."

New Process for the Recovery of Mercury.—At the request of the Mines Department an investigation was undertaken into the recovery of mercury from Puhipuhi cinnabar-ore. An alternative to furnace treatment was desired, and a process was therefore proposed consisting of concentration of the ore by oil flotation, solution of the concentrates in sodium sulphide and caustic soda (Thornhill's solution), and the recovery of the mercury by electrolysis. Mr. A. H. V. Morgan, Director of the Waihi School of Mines, rendered valuable assistance in determining suitable conditions for oil flotation. The process has not been advanced beyond the laboratory stage.

Accommodation.

The number of workers at present employed, and the increasing variety of the work, make further accommodation imperative if reasonable efficiency is to be maintained. It is also very desirable from the standpoint of health. At the present time much urgent and useful work, including research, cannot be undertaken owing to the lack of room to accommodate the requisite apparatus and staff.

Staff.

All the members of the staff have taken a deep interest in their duties, and have loyally co-operated throughout the year in the work of the Laboratory.

REPORT ON THE ADMINISTRATION OF THE EXPLOSIVE AND DANGEROUS GOODS ACT, 1908, FROM 1st JULY, 1920, TO 30th JUNE, 1921.

Amended Regulations.—The following amendments have been made to the regulations during the year:—

Amendment No. 6—definition of "gelignite": During the war it was impossible for the explosive-manufacturers to obtain potassium salts, and the definition of "gelignite" was amended by the British Home Office to permit the replacement of potassium nitrate by the corresponding sodium salt. The latter is highly hygroscopic, and the explosive in which it was used gave much less satisfactory results in New Zealand than the potassium-nitrate gelignite. There are two factors contributing to this result. The climate of the country is, on the whole, decidedly moist—particularly in the mining districts—and, owing both to the distance of New Zealand from the manufacturing countries and also the peculiar difficulties of internal transport, it is necessary to hold large stocks of explosives in the country, and for considerable periods. Now that supplies of potassium nitrate are again obtainable it is considered that the two kinds of gelignite should be distinguished from one another, and the amending regulation provides that the name "gelignite" shall be used only in respect of an explosive containing potassium nitrate.

Amendment No. 7—conveyance of explosives in coastal boats: It was found that explosives were being carried by sea under conditions that were very unsatisfactory, and the regulation provides that before receipt of explosives a Surveyor of Ships shall examine the vessel to see that the provisions made for handling and stowage of explosives are satisfactory.

Amendment No. 8—conveyance of explosives in motor vehicles: In some districts horse-drawn vehicles have been almost entirely replaced by motors, and to meet these conditions the amendment provides that not exceeding 100 lb. of explosives may be conveyed in any type of motor vehicle, while for the carriage of larger quantities a vehicle of special construction is required to be used. The construction prescribed is that approved by the British Home Office as the result of the war-time experience in the conveyance of explosives.

Amendment No. 9—scale of fees for licenses: An examination of the accounts of the branch disclosed the fact that for the financial year ended 31st March, 1921, the receipts amounted to less than one-third of the expenditure. The fees charged for licenses are the same as in 1914, when the regulations under the Act came into force, and the charges for the storage of explosives in Government magazines have not been altered since 1907. In 1914 the scale of fees was estimated to provide sufficient revenue to pay the greater part of the cost of administering the Act, but the greatly increased cost of salaries, travelling, labour, and maintenance of buildings and plant due to the war has resulted in the unsatisfactory position shown. While it is recognized that the expenditure incurred in the preservation of public safety—which is the object of the work of the branch—is to some extent a legitimate charge against the public funds, it is considered that the explosives trade should pay a greater percentage of the cost of its own control. The Government accordingly decided to increase