

proved unsuccessful. It is essential, however, that an experiment of this kind should have a fair trial, and manufacturers should be required to find a contribution of amount sufficient, with any State subsidy, to pay the salary and expenses of one well-qualified man of science at the least, and to guarantee a continuance of the contribution for at least five years. I strongly recommend that the central organisation should press for a compulsory levy on the industry for this purpose, as is the practice in the dairy, meat, and fruit industries for marketing purposes, and that it should be very slow to accept voluntary contributions which it will be difficult to collect or to continue in times of bad trade.

36. For the rest, the State assistance to the secondary industries should be rendered by the work that it is hoped will be undertaken in the economical use of fuel, and by the work on the testing and standardization of materials and instruments, which is dealt with in Section V of this report. In addition, it should be possible for the new organization to give advice to industries as to the sources from which special information can possibly be obtained through a section of records which I shall recommend should be established; by the organization of the science libraries of the country, which should be undertaken as part of the duties of the central authority; and by its close liaison with the Research Department at Home and similar organizations in other dominions of the Empire.

37. The new central organization will need all the assistance it can obtain in forming a just estimate of the needs and attitude of the secondary industries if mistakes are to be avoided and useful work is to be done. For this help it will naturally look to the Department of Industries and Commerce, which appears to me to be getting into daily closer touch with the manufacturers and business men of the community. In a later paragraph I recommend the Secretary of this Department should, with other high officers from other Departments, be appointed as assessor to the Advisory Council of the new organization; but this does not seem to me to be enough. I suggest that the Department of Industries and Commerce should include upon its staff two or more well-qualified field officers of technical training and experience—one, say, on the engineering side, the other on the chemical—whose duty it should be to study the secondary industries of the Dominion at first hand and keep the Secretary informed of their technical difficulties and successes. The powers entrusted to the Department under the Act are so wide that some provision of this kind appears to me to be desirable in any case. If the industries are to be assisted scientifically by the new body, which will have many other scientific responsibilities upon its shoulders, this strengthening of the staff of the Department of Industries and Commerce appears to me to be necessary.

V. CERTAIN STATE SCIENTIFIC SERVICES.

A Laboratory for Standards and Tests.

38. The report by Dr. Marsden endorsed by the Committee on Scientific and Industrial Research recently appointed to consider the proposals submitted to the Government by the committee of the Canterbury Industrial Association (see Appendix A, Section (8)) expressed the view that "the real foundation for such help as the industrialists require should be the extension of Dr. MacLaurin's laboratory to include tests of a physical nature." In other words, the committee, with which I had the privilege of consulting on two occasions, recommended the establishment of the nucleus of a State laboratory similar in functions to those of the National Physical Laboratory at Home. Apart altogether from the demands of the manufacturers for help, I have been brought to the conclusion that the Government needs an organization of the kind suggested for its own purposes. The National railways have testing laboratories on which about £300 is expended annually, but when the new workshops in the Hutt Valley are finished the amount and scope of the testing will have to be enlarged. Similarly, the Hydro-electric Branch of the Public Works Department needs the assistance of a staff and equipment for the testing and investigation of electrical gear and apparatus, and has already made proposals, I understand, for the establishment of a laboratory for these purposes. It appears that the Public Works Department and Main Highways Board are spending some £800 a year on testing high-tension insulators, cement, road materials, and the like. Testing-work is also being done for public authorities and others in the laboratories of Otago University and Canterbury College, Christchurch, and to some extent also in the other two colleges. Yet there is no general supervision available either for the present work or the proposed developments, and it is difficult to discover how much the State is spending on these services.

39. There is general agreement that a start should be made in the foundation of a national laboratory for testing and investigating materials and scientific apparatus, and for the establishment of constants and standards in collaboration with the National Physical Laboratory and other great laboratories of the same kind, such as the Bureau of Standards in Washington, and the Chemisch-physikalische Reichsanstalt in Berlin. It may be noted in passing that Japan has established such a laboratory, and that Siam is in process of founding one. But institutions of this kind are expensive to build, equip, and staff, and in my opinion the right approach would be by the following steps:—

- (a.) To earmark a site of 10 or 15 acres in proximity to the new railway workshops in the Hutt Valley, for the purposes of the future laboratory, with convenient railway-siding accommodation, but at a sufficient distance from the shops where heavy work is done to avoid undue interference through vibration and noise. Care will need to be taken to prevent rover currents when the line is electrified.
- (b.) To build in the first instance only such laboratories and install the plant that is necessary for the work that must be done on the spot and cannot be done in one or other of the University laboratories.