

In the early part of the year the x-ray crystallographic apparatus was installed and put into operation. A considerable amount of work with the apparatus was done by an officer of the Soil Bureau, who used the powder cameras for the examination of the clay fractions of soils. The main work for the Laboratory was an examination of pigments of basic lead sulphate.

Some assistance was given to industrial firms on electroplating problems. Reports were prepared on nickel, silver, and chromium plating.

#### METALS AND CORROSION

The most notable feature of this work was the marked increase in the amount of work undertaken for industry. Of the 158 samples analysed, 54 were received through the Manufacturers' Research Committee from industrial concerns.

Analyses were made of cast iron, carbon steel, alloy steel, brass, tin, solder, type-metal, welding-materials, other metallurgical materials, and corrosion specimens. In many of these, metallographic examinations by microscope methods were made to determine their structure. This was considerably aided by the use of the Vickers projection microscope which was installed during the year.

Laboratory trials were made to determine suitable conditions for electrolytic polishing of nickel-silver articles being produced in New Zealand. The process was followed through to the production stage and recommendations were made for the finishing of the electroplated article by electrolytic polishing.

Weld metal was analysed and examined metallographically for homogeneity of structure in connection with the construction of hydro-electric plant on the Waikato River.

Cast-iron pots used for hydrochloric-acid manufacture developed holes. This was shown to be due to the poor quality of the castings. Regions where slag inclusions occurred were attacked rapidly by the acid mix.

Assistance was given to firms tinning copper and steel.

Corrosion problems included mould metal, brass refrigerator tubes, boilers, telephone-cable sheaths, and action of hot mineral waters on alloys used for brazing copper service pipes.

#### COAL SURVEY

The Coal Survey Laboratory co-operated with the field staffs of the Geological Survey and the Mines Department in a continuation of the physical and chemical survey of the coal resources of the Dominion.

Samples, including coals, mine airs, and other gases, were received from mine headings, outcrops, and boreholes throughout New Zealand, and special investigations proceeded in the Westport, Reefton, Grey mouth, Kaitangata, Mataura, and Ohai districts. Analyses of coal and residues from boiler tests were made for the Fuel Efficiency Service of the Chemical Engineering Section.

Other matters considered included an investigation of the efficiency of household grates, the storage of bore cores at central depots, the explosibility of coal-dusts, waxes in lignites and peats, material being sold to the public as "coal-saver," and the investigation of machinery used in Germany for the making of binderless briquettes. A scheme was prepared for the regular sampling of coal from all producing mines.

The following *Coal Survey Reports* were issued :—

161 : "Reefton Coalfield Analyses."

163 and 170 : "Proposed New Colliery at Rewanui: Estimated recoverable Coal, Geological Structure, and Analyses."

164 : "Briquetting of Mataura Coal in Australia."

165 : "Burning Low-grade Coal in Steam-raising Equipment in Australia."

166 : "Gasification of Low-grade coals, Australia."

167 : "Shale-works, Glen Davis, Australia."

168 : "Analyses of New Zealand Coals."

169 : "Pike River Coalfield: Reconnaissance Report."

171 : "Sampling Scheme for New Zealand Mines."