

An investigation was made as to the suitability of certain fuels for dust-firing. Float and sink tests were carried out to determine the washing characteristics of Liverpool coal. Twenty-one samples of Liverpool slack (minus  $\frac{1}{2}$  in.) from various parts of the mine were analysed to study variations in ash content. A number of ash-fusion-point determinations and ash-analyses have been made on various coals in an endeavour to investigate some of the factors responsible for clinker formation. A report was made on the distribution of sulphur in the products of carbonization.

Contact has been maintained with the Iron and Steel Department regarding supplies of coal suitable for making metallurgical coke. If supplies are to come from local sources, drastic conservation of the Dominion's low-sulphur coals would appear necessary.

Some work has been carried out relating to the fuller use of local coals in the gas industry, and cases of complaint investigated. The reactivities of charcoal and coke from various sources are being investigated in order to determine their suitability for use in portable producer plants.

#### *Gas-storage of Fruit.*

Investigations have been commenced this year on the gas-storage of apples of the Jonathan and Sturmer varieties. The results obtained have been very encouraging and indicate that gas-storage gives considerable improvement in the keeping-qualities of these varieties as compared with ordinary cool-storage. A fuller account of this work appears under "Fruit Cold Storage Research."

#### *Paint.*

Increasing use is being made of the facilities available at the Dominion Laboratory for the examination of paints and related materials. Numerous analyses were carried out for the Department of Housing Construction, the State Advances Corporation, Public Trust, Public Works, Post and Telegraph, and Railways Departments. Most of these Departments now purchase to specification, and it is satisfactory to note that, as a result of regular analytical control, there has been a very decided improvement, compared with the previous year, in the quality of the paints purchased.

The most severe handicap to the testing of paints is the lack of reliable methods for the analysis of the more modern types of vehicles, but information and experience in this direction are being gradually acquired. In this connection a standard brushing-out test was introduced during the year, and has proved very useful.

Several cases of paint failure were investigated. The examination of paint-scrapings in one instance led to the conclusion that the rapid "fading" of the paint film was a chalking effect, probably due to abstraction of oil from the finishing coat as a result of improper priming or undercoating treatment. Titanium, a notoriously bad chalking pigment, was present, but not in excessive amount, and could hardly have been responsible for the failure. The use of small amounts of titanium appears to be on the increase, and its use, in limited amount, is permitted by at least one Government Department, though it is usually not looked upon with favour owing to its chalking tendencies when present as a major constituent of ordinary linseed oil paints.

During the year a tentative "Specification for Ready-mixed Paints for Finishing Coats for Woodwork (Light and Cream Tints)" was decided upon, after consultation with several manufacturers, by the Wellington Interdepartmental Committee for Paint Investigation. Using this specification as a basis, house-painting trials upon several pigment-oil combinations were initiated, all the materials used in the investigations being subject to careful analytical control.

The Laboratory has co-operated with the Public Works Department in the development of priming and finishing paints for steelwork, and has examined aluminium paints and micaceous iron-ore samples of different origin for the Railways Department. It has again been possible to give assistance to the Standards Institute in the development of standards for paint material.

Several cases of gross adulteration of paint were met with, and in one instance the use of an inferior grade of linseed oil. Lithopone was found in several undercoating and finishing paints, but is not regarded as an ideal pigment for exterior use. The necessity for continued investigation into paint is fully demonstrated.

#### *Building and Constructional Materials.*

Investigations into materials used by the building and allied industries were continued during the year. For the Department of Housing Construction tests were made on roofing tiles, concrete, cement plaster, wallboard, distemper, galvanized wire, and roofing iron.

In connection with the issue by the New Zealand Standards Institute of a "New Zealand Draft Standards Specification for Reinforced Concrete Pipes," a comparison was made of the American, British, Australian, and New Zealand methods for the determination of water-absorption, as a result of which it was possible to make recommendations as to the best procedure to adopt. Preece tests on galvanized fencing-wire and on wire-netting were made for the Fencing-wire Sub-committee of the Standards Institute, while assistance was given to the Public Works Department in the development of a mandril test for the quality of the zinc coating on crimping wire.

A report on the condition of cement asbestos pressure water-pipes that had been in service for some years was made for the City Engineer, Christchurch. The work was made necessary owing to disturbing reports from elsewhere as to the deterioration of this type of material, but the investigation showed clearly that, from the chemical aspect at least, there was no evidence of appreciable deterioration of the pipe, either on the inside or outside.

For the Lyttelton Harbour Board samples of mud from the harbour-reclamation works were examined, with special reference to suitability for the manufacture of Portland cement or bricks. Work on the evaluation of clays and other ceramic materials was continued.