

*Nevis Oil-shale.*—The oil-shale deposit of the Lower Nevis Valley is large, a preliminary estimate suggesting an amount of the order of 150,000,000 tons. Thirteen samples were taken from different parts of the deposit and volatile and ash determinations made, the range in volatile matter being from 7 per cent. to 21 per cent., the average being 15 per cent. The sample lowest in ash and containing 17 per cent. of volatiles, on low-temperature carbonization, yielded 14.3 gallons of crude oil per ton. Seven samples taken many years ago were mixed and distilled, the yield being 13.2 gallons of crude oil per ton of shale. Another sample, not taken by an officer of the Department, contained 20 gallons of crude oil per ton.

The advantages of the Nevis deposit are its large size and the ease of working it open-cast and with no risk of flooding. The chief disadvantage is the low oil content, for the inaccessibility of the locality is not vital. In Scotland the oil-shale worked yields an average of 26 gallons of crude oil per ton. At Fushun, Manchuria, a large deposit mined open-cast yields only 16 gallons per ton, but the shale is not loaded with any of the mining costs, these being borne by a thick seam of coal worked with it.

Under present conditions there is no chance of the Nevis deposit being made to pay, but some further sampling may be worth while to ascertain if some parts are richer than others.

#### LABORATORY INVESTIGATIONS.

During the year the Dominion Laboratory again carried out a considerable amount of analytical and investigational work connected with the mining industry.

Prospectors' samples examined for gold and silver were again few in number and disclosed no fresh discoveries of important deposits. The increased demand for tungsten as a result of the war caused a notable rise in the number of determinations made of this metal in samples of ores and concentrates. A considerable number of analyses of serpentines were made in connection with the proposal to incorporate a proportion of this mineral in superphosphate fertilizers.

A survey of the sulphur deposits of the Dominion by the Geological Survey necessitated numerous analyses of samples of sulphur-ore from the thermal regions, and a process was also developed for the separation of sulphur from the associated pumice. The investigation of a recently discovered talc-magnesite ore in the Cobb River area required a number of analyses to be made, and laboratory experiments on the separation of the constituent minerals by flotation and other means were carried out. The systematic survey of the Onekaka iron-ore deposit was again responsible for a large number of determinations of iron being made.

Other laboratory work included the examination of samples of mine airs and gases, mine-dusting materials, clays, limestones, antimony ores, tinstone, nickel ore, the estimation of zircon in beach sands, and tests on locally produced soda-lime for use in mine-rescue apparatus.

The Coal Survey Laboratory, in addition to proceeding with the work of the systematic survey of coal resources, was engaged on a number of special investigations. The danger of a shortage of oil fuels arising as a result of the war necessitated the examination of possible substitutes. The search for fuels suitable for use in producer-gas-driven vehicles entailed much laboratory testing of locally-produced materials. These included activated gasworks cokes, carbonized Waikato coals, anthracites, and wood charcoals. Shales from Orepuki and North Otago were examined for their oil content.

The results obtained in the work of the coal survey during the year further emphasized the need for a comprehensive scheme of conservation of the resources of bituminous coal in the Dominion.

#### GEOLOGICAL SURVEY.

During the year ended 31st March, 1941, detailed geological mapping was continued in the Dannevirke and Orepuki subdivisions, both areas of economic interest. The principal work, however, was the examination of deposits of useful minerals on which the time of several officers was devoted in whole or in part.