Tidal Survey.

The tide-gauges at all of the seaports for which tide-tables are prepared by the Department are under the control of the Harbour Board authorities at the various places, and as they are attended to in a satisfactory manner it was considered unnecessary to make an inspection of the tidal stations each year, but only to check the levels between the standard gauges and the permanent bench-marks at intervals of from three to five years.

The tidal station at Lyttelton, however, was visited on account of the records from the automatic tide-gauge not being entirely satisfactory, and an inspection of the tide-gauge was necessary in order to discover the cause of the discrepancy. It was found that the total range of the recording-pencil differed from the time scale on the printed record sheet. Although this error can be corrected when the sheets are measured in the office, yet if the best results are to be obtained for the predictions at this important port it is essential that the automatic tide-gauge at present in use there should be replaced by a better one.

All the computations pertaining to the work required to evaluate the harmonic constants for the six standard ports have been completed.

The amplitudes (R) and the epoch (ζ) for the various components have been found for each station by an harmonic analysis of the measured hourly heights of the tide-gauge records extending over periods of 370 days each: from these have been deduced the values of H and κ, which are connected with R and ζ through the various astronomical quantities involved in the positions of the sun and moon, in such a way that H and κ should come out the same from the reduction of each period.

On account of the tidal observations not being exactly consistent from year to year it is necessary to extend observations over a number of years and to accept the mean of the values of H and κ from each analysis as the best result. Accordingly the data in the appended table were prepared and supplied to the Director, National Physical Laboratory, Teddington, England, for the purpose of having the curve for the year 1921 run off by the tide-predicting machine. The information was sent to England on the 1st July, 1919, and the tide-tables for 1921 were received in Wellington on the 17th January, 1920.

During the year under report the computation forms were revised and recast where experience showed that improvements could be made, with the result that fully a week's work is saved on the analysis of each period for each port, or a saving of the work of two computers for six weeks annually. The computations were carried out by Messrs. T. G. Gillespie and E. J. Williams from the beginning of the year until the 31st August, when Mr. Gillespie was promoted to the position at the Wellington District Office of Draughtsman in Charge of the Native Land Branch. Mr. Gillespie was a careful and reliable computer, and was continuously engaged on the tidal reductions for the last nine years. Since then the work has been carried on by Mr. Williams, who was appointed successor to Mr. Gillespie last December, with the temporary assistance of a cadet.

Complete and continuous records have been obtained at the New Plymouth tidal station of the tide curve from the self-registering tide-gauge, and other meteorological data, together with the surface temperature of the sea.

The mean values for each month of the temperature of the air, the height of the barometer, and the surface temperature of the sea, from the date when the observations were commenced to the end of the year under report, are given below:—

New Plymouth Tidal Station.—Mean Monthly Values.

Date.	Barometer.	Attached Thermometer.	Temperature of Air.	Temperature of Sea.
1918.	In.	Deg. (F.)	Deg. (F.)	Deg. (F.)
September	30·17	52·57	53·24	52·17
October	29·96	56·26	57·82	54·46
November	29·96	58·50	61·94	56·77
December	29·94	60·07	61·74	55·58
1919.				
January	29·95	62·07	62·42	57·42
February	30·22	65·86	67·46	61·11
March	30·13	61·32	62·77	58·94
April	30·18	56·33	57·00	56·37
May	30·25	53·00	51·77	53·77
June	29·99	51·90	50·30	52·40
July	30·11	50·03	49·07	50·42
August	30·03	51·65	50·32	51·00
September	29·95	52·50	52·60	51·53
October	30·07	56·42	57·13	53·19
November	29·99	57·57	58·03	54·37
December	30·10	60·71	61·90	55·55
1920.				
January	30·07	63·10	65·29	59·00
February	30·06	66·14	67·35	62·90
March	30·11	62·52	64·65	61·65