tide, and that the low level basin has just been emptied during the ebb tide, through the gates in the eastern dam.

Beginning with low tide we may at first leave gates (G) open and allow the water from the spillway to discharge directly into the tidal supply (Shepody Bay), but the head will gradually decrease as the tide rises, and at about 2½ hours rise the attendants close gates (G) and open gates (G¹), allowing the discharge from the spillway to enter the low level basin. Into this low level basin, the spillway will continue to discharge for about 6½ hours, or through the last 3½ hours of flood tide and through the first 3 hours of ebb tide, after which time the water in the low level basin will have so risen, and the water of the tidal supply will have so dropped, that it will now be profitable to close gates (G¹), and open gates (G), and once more allow the discharge to occur directly into the source of tidal supply and give the low level basin time to drain out again on the ebbing tide.

Tide is Very Regular

I think that from this the simplicity of the system itself is evident, but in order to study more fully one of the engineering problems involved, Fig. 4 shows the typical tidal cycle at Hopewell. This curve shows a copy, in per cent. of range plotted against time, of an actual tidal record obtained at the ordinary neap tides by the tide gauge established this summer at Hopewell by the Canadian Tidal Survey, and furnished to me by the courtesy of H. W. Jones of that department. You will note how exceedingly regular the tide is, and how little affected by estuary flow, and this is one of the great advantages of Bay of Fundy

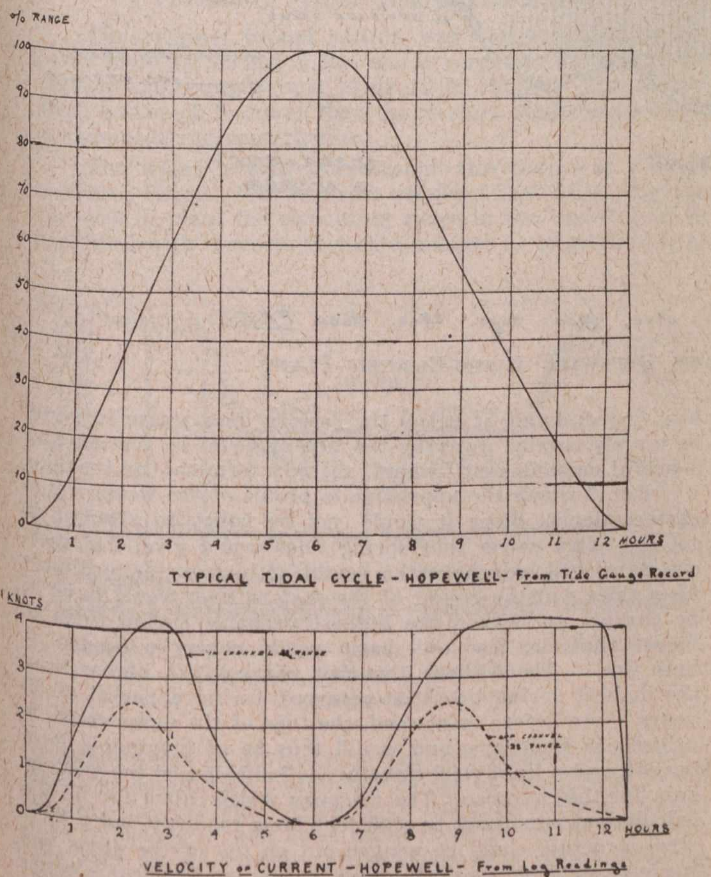

FIG. 4—TYPICAL TIDAL CYCLE AT HOPEWELL

tides, in general. At certain places in the world the diurnal inequality becomes so great that, for several days there is only one tide in 24 hours, and at Southampton there is a second high water occurring about two hours after the first.

In dealing with the question of tidal power at Hopewell, it must be remembered that although the tide is regular in type, nevertheless the *range* of the tide, and not the *rise* is the limiting factor of our power calculations, and it becomes necessary to establish and work on what might be called a "standard range." For this purpose I have analyzed approximately the ranges that will occur in the course of a year. I call spring tides those whose range exceeds 42 ft. They occur about 15% of the time, and I think no attempt should be made to utilize them especially. I call subnormal neap tides those whose range is less than 32 ft. They also occur about 15% of the time, and some means, which are discussed later, would need to be employed to avoid the impairment of our "standard" amount of power.

All other tides I call ordinary neap tides, with a range, at Hopewell of 32 ft. to 42 ft. They occur about 70% of the time, and its is the lower range of 32 ft. that I think

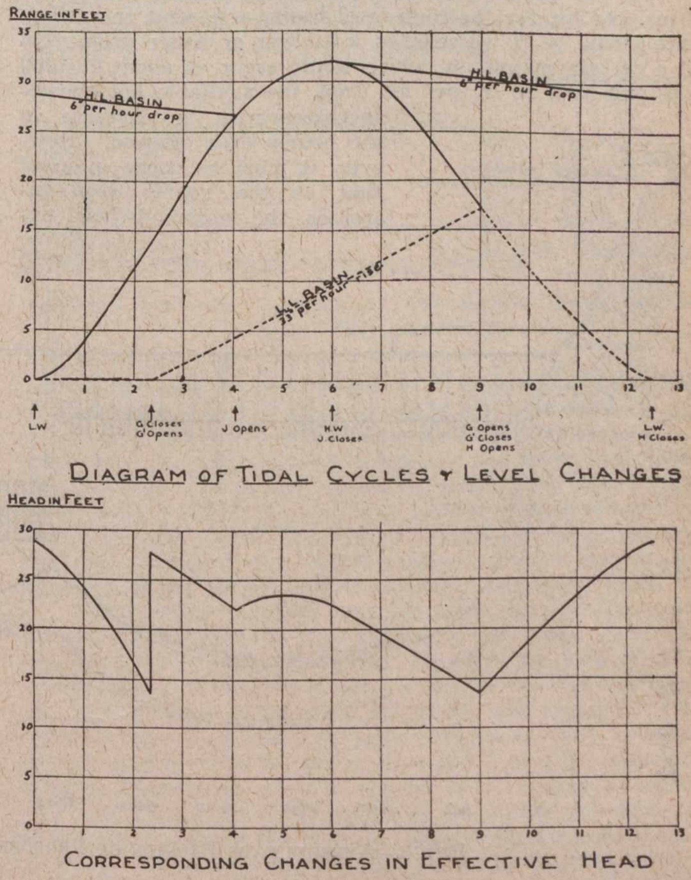

FIG. 5—TIDAL CYCLE AT STANDARD RANGE OF 32 FT.

we should adopt as our "standard range," and the curves and estimates that follow are based on this range of 32 ft.

Fig. 5 shows a tidal cycle at a "standard range" of 32 ft., with an assumed drop in the high level basin of 6 ins. per hr., the level change that will occur in the two basins with the operation of the plant as before described. If the conditions at Hopewell were absolutely ideal, the ratio of effective areas would be as 2 to 1 for the high and low level reservoirs, but unfortunately this is not the case, for the Petitcodiac contains an effective area of about 330,000,000 sq. ft. while the Memramcook has only about 60,000,000 sq. ft., so that the ratio is about 5½ to 1. While the water in the Petitcodiac is dropping 6 ins. per hr., the water in the Memramcook is rising 5½ times this, or 33 ins. per hr., and these level changes are illustrated in Fig. 5, while the changes in effective head on the turbines are plotted in the lower portion of the same figure.

Operation at "Standard Range"

Full lines show the level changes of the high level basin; dotted lines, those of the low level basin. Starting at low water, for 2.35 hours the level of water in the low level basin is unchanged, for the water from the spillway is discharging into the tidal supply direct, but during this time the head is decreasing from 28½ ft. to 13½ft., when it becomes expedient to discharge into the low level basin, when the head will at once rise to 27½ ft.

After this, for 6½ hours the low level basin will rise, but the high level basin will also rise after 4.1 hours (as the