extent during the late autumn, when rains are usually fairly abundant. February and March have been the months when water becomes scanty, particularly in those winters when the usual thaws did not occur. How to provide for low-water periods without reliance upon auxiliary steam plants is a problem that can be solved only when abundant storage is possible. The experience of the power plants on the Mattagami River has very definitely established this fact.

Pondage may be considered as the close-at-hand storage of water immediately available for use in the turbines. It is a necessary precaution in Ontario water powers in order to provide against ice troubles as well as to meet local fluctuations in power needs during the day. Three distinct types of ice are met with: surface or sheet, anchor, and frazil. The first, in addition to restricting the area of the channels, is liable to cause jams in the spring, cutting off the water supply or raising the tail water with a consequent loss of head. Anchor ice frequently rises in large masses, often carrying boulders and soil which are liable to damage the ice racks. Frazil ice, in the shape of needles, forms in rapids when the temperature is slightly below the freezing point. These needles or crystals gather in lumps and adhere readily to any surface with which they come in contact. Trouble from these latter sources is avoided when a long stretch of still water exists above the power house, while surface ice trouble is largely overcome by proper dam construction.

Prior to the erection of the large plant of the Abitibi Power and Paper Company, at Iroquois Falls, on the Abitibi River (see *The Canadian Engineer*, July 1st, 1915), the two power plants on the Mattagami River were the only ones in Ontario on the James Bay slope. Consequently, their experience is of value to other power developers and users. The James Bay drainage basin is very conservatively estimated as capable of developing 1,500,000 h.p., or 30 per cent. of the total potential water power of the Province of Ontario.

When the meter record of March 25-26, 1914, was taken at Wawaitin the total flow was 518 second-feet, of which 164 was drawn from a storage basin of 33,000 acre-feet. During the winter of 1914-15 a new dam was built at Kenogamisee Falls, increasing the storage capacity to 100,000 acre-feet. This reservoir should be ample to supplement the flow at low-water periods. Kenogamisee Lake, the original reservoir, is shallow, and the water available is considerably lessened in late winter by a two-foot covering of ice.

Floods and Forests in Relation to Storage.—Floods are reduced in magnitude and stream flow rendered more constant where the drainage basin at headwaters is forested. For the most part, Northern Ontario is a forested area, but, where such is not the case, reforesting, particularly at the sources of streams, as an aid to reliance upon storage reservoirs, seems a necessary precaution of the future in order to prevent disastrous floods, and to equalize as much as possible the stream flow throughout the year. Floods may do little damage at present except to power installations, so the ideal conditions will not receive much attention until some future time when a shortage of power makes their consideration urgent.

Sometimes the topography of drainage areas precludes the possibility of providing large storage reservoirs. In Northern Ontario, water storage above the natural high-water mark on streams and lakes is not desirable, as it results in killing the timber along the banks and shores, giving the country a most desolate and deserted appearance. The concensus of opinion favors storage at or near the sources of streams, thereby preventing a combination of conditions which usually occasion disastrous floods in the areas adjacent to the lower stretches of the river.

In the particular case of the Mattagami River, the present storage not only helps the power plants already in operation, but will improve the conditions for future developments farther down the river. At eight different points down stream where surveys have been made, the farthest of which is only 75 miles north of the Transcontinental Railway, it is possible to develop a total of 149,235 h.p. under natural conditions. In this estimate the coefficient used for minimum low-water discharge is 0.3 c.f.s. per square mile of drainage area. Records at Sandy and Wawaitin Falls indicate that 0.2 is the proper coefficient. This would reduce the estimate of undeveloped energy on the Mattagami River to 100,000 h.p. Storage facilities, with the exception of those already mentioned in connection with the Wawaitin development, are very meagre, and consequently the river cannot be described as well-regulated in its natural condition.

Power Storage.—In his statistical review, referred to above, T. W. Gibson points out some of the power difficulties that have been experienced, and refers briefly to the auxiliary steam plants that have been provided by the larger mines to meet emergencies resulting from electric power shortage.

During the winter of 1911-12, owing to extreme low water, there was a shortage of power for operating the Porcupine mines, but since that date the Wawaitin Falls development has been completed and the Sandy Falls plant improved and enlarged. Despite this increase of capacity there was again a decided shortage of water during the winter of 1914-15 that was not relieved until the second week in April, 1915, thereby seriously interrupting the work of the mines and curtailing the gold production.

In the Porcupine camp, provision has been made, to the extent of about 2,500 h.p., to meet periods of power interruption. This is notably the case at the Hollinger mine, where two new compressors, driven by synchronous motors, have been arranged so that they can be turned into steam engines and the motors used as electric generators supplying current for general use around the mine and mill or for driving other compressors.

Power Costs.—In the Cobalt silver camp where the Northern Ontario Light and Power Company operates, and also at Porcupine, where the Northern Canada Power Company supplies electric energy, a flat rate of $50 per horse-power per annum has obtained until recently. Many of the contracts are expiring and the power companies are proposing to introduce new schedules with a sliding scale of rates depending on the amount of power consumed and the load factor. In some cases the new rates work out at a higher figure than the old. The largest consumer in the Cobalt camp is the Dominion Reduction Company, which requires over 500 h.p. for operating its plant. The Dome and Hollinger mines are the largest consumers in the Porcupine camp. At the present time the former uses about 2,000 and the latter 3,500 electrical horse-power.

CHANGE OF NAME.

The International Acheson Graphite Company of Niagara Falls, N.Y., has changed its name, and hereafter will be known as Acheson Graphite Company.

Some tests of the weight of freshly cut woods have just been made by the Laurentide Company, of Grand Mere, P.Q. They show that brown ash weighs 50.26 pounds per cubic foot, yellow birch 64.40 pounds, white birch 55.62 pounds, elm 71.31 pounds, and sugar maple 73.36 pounds.