

The regulating of the flow to 18,000 c. f. s. would have required an average of 9,000 c. f. s. for 270 days. During that period the reservoirs would only give 6,859 and 705 c. f. s. respectively, say, a deficiency of 1,437 c. f. s. The river could not be regulated to that high figure in a year when the rainfall is very low.

The river could, however, be regulated at 15,000 c. f. s. at Shawinigan, leaving an over-supply of the stored water in a very low year. But the commission deem it advisable to provide for the loss in the volume of water from the storage reservoirs, especially in winter, while coming down the distance of 220 miles to Shawinigan. And the fact also is not overlooked that water may be needed for floating logs at a time when it would not be wanted for power purposes.

For these reasons the commission adopted a flow of 12,000 c. f. s. to compute the increased value of the water powers concerned. A scheme was accordingly worked out, as outlined below, for storage above La Loutre falls.

It should be remembered that at present 206,300 h.p. are being developed on the river; viz., Shawinigan, 163,000; Grand'Mère, 19,500; La Tuque, 3,500. In addition, the Shawinigan Power Company is adding two units of a capacity of 37,000 h.p., while the plant of the Laurentide Company at Grand'Mère is being added to, increasing the capacity of the plant to 120,000 h.p.

The present and future value (after regulation) of the water powers of the St. Maurice River are indicated in Table I.

The site of the proposed dam across the St. Maurice, $2\frac{1}{3}$ miles above the falls of La Loutre, is 120 miles from Escalona, 37 miles in a straight line north of Parent, a divisional point on the Transcontinental Railway, and 240 miles from the St. Lawrence, following the course of the river.

In its preliminary laying out, bench marks were established on all important lakes and at all falls. Two different level lines were run with the same instrument, one checking the other by means of the height of the instrument. A party under Mr. W. Thibaudeau, assistant engineer, starting from Escalona on the Transcontinental, proceeding to the site of the dam and from there by way of Manouan, back to the Transcontinental, completed the circuit of 180 miles. The allowable error was not to exceed 0.05 d where d was the distance in miles. The results obtained were found considerably less in error than that amount. These levels checked figures previously obtained respecting the elevation of various lakes forming part of the drainage basin whose waters it is proposed to store. Some 35 bench marks were established at the falls and on the various lakes during 1913.

Another party proceeded to the site of the dam to investigate the nature of the ground. Its borings were made with the use of a McKiernan-Terry core-drill mounted on a raft 20 ft. x 20 ft. and moored by cables and pulleys to a steel cable across the river. Each boring was located by triangulation and was carried down to a depth of 12 ft. to 15 ft. They were made at 20 points in the western and 8 points in the eastern channel of the river, the total length of rock examined being 233 linear ft.

Gaugings were recorded at La Loutre to supplement those available at Shawinigan, 220 miles distant. The flow of the river was measured by determining the velocity and the cross-section, the velocity being measured by a Gurley current meter. The average velocity was determined at 3 points; viz., 0.2, 0.6 and 0.8 of the depth as per the method commonly used. The maximum flow was observed to be 14,500 cu. ft. per sec. and the minimum

Table I.—Statement of the Water-powers on the St. Maurice River.

NAMES.	Distance from St. Lawrence, (miles.)	Head in feet.	Approximate area of drainage basin above (sq. miles.)	Actual minimum flow, 0.37 cu. ft. per sec. per sq. mile.	Present value 80% efficiency.	Regulated minimum flow of 12,000 c.f.s. at Shawinigan.	Value after regulation.	Increase in value through regulation.	Power installed.	Increased prime-ary power which will be used.	Increased power left unused.	Increased water-power yet unsold.	Present owner.
	Miles.	Ft.	Sq. M.	c. f. sec.	H.P.	c. f. sec.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	
La Gabelle	13	10	16,550	6,123	5,556	19,123	11,010	5,454	.....	.....	5,454	.....	Grès Falls
Les Grès	15.5	40	16,500	6,105	22,200	12,105	44,018	21,818	.....	.....	21,818	.....	"
Shawinigan ..	21	150	16,200	6,000	81,818	12,000	163,636	81,818	183,300	81,818	.....	.....	Shawinigan W. & P. Co.
Grand'Mère ..	33	75	15,860	5,870	40,022	11,870	80,931	40,909	19,500	40,909	43,636	.....	Laurentide Co.
La Tuque	103	80	12,000	4,440	32,291	10,440	75,927	43,636	3,500	.....	.....	.....	O. & St. Maurice Industrial Co.
Sans Nom	110	128	10,030	3,711	4,318	9,711	11,300	6,982	.....	.....	.....	6,982	Crown.
Vermillon	119	16	10,020	3,707	6,066	9,707	15,884	9,818	.....	.....	.....	9,818	"
Blancs	138	136	8,115	3,002	37,115	9,002	111,296	74,181	.....	.....	.....	74,181	"
Grands-Cœurs . .	171	90	6,425	2,377	19,448	8,377	68,539	49,091	.....	.....	.....	49,091	"
La Grâce	183	33	6,325	2,340	7,020	8,340	25,020	18,000	.....	.....	.....	18,000	"
De L'Île	191	44	6,225	2,303	9,212	8,303	33,212	24,000	.....	.....	.....	24,000	"
									206,300	122,727	70,908	182,072	