

## VERMILION RIVER BELOW LAKE VERMILION, NEAR TOWER, MINNESOTA.

*Location.*—Just below the dam at outlet of lake Vermilion in section 2, township 63 N, range 17 W, in St. Louis county, 4 miles above the mouth of Two Mile creek, which enters from the west.

*Records Available.*—May 17, 1911, to December 31, 1914.

*Drainage Area.*—507 square miles.

*Gauge.*—Vertical staff; datum unchanged.

*Channel.*—Practically permanent.

*Discharge Measurements.*—Made from car and cable just below the gauge section.

*Artificial Control.*—At the outlet of Vermilion lake, a few hundred feet above the gauge, there is a dam which is used to raise the elevation of the lake for aid in navigation. There are no gates in the dam, but on July 19, 1912, it was repaired. For a period after this date the flow was lower than normal, as there was less leakage. The lake had a greatly greater storage capacity, at the present time, so that the flow during the winter period of 1912-13 was somewhat larger than it would have been had not the dam been repaired.

*Winter Flow.*—Owing to the heavy fall at the gauge section, amounting to 20 feet in 200 yards, there is little or no backwater from ice during the winter months.

*Accuracy.*—Conditions are favourable for fairly accurate results, the only uncertainty being some inaccuracy in the discharge measurements, owing to the very rocky section.

*References.*—United States Geological Survey, Water Supply Papers Nos. 305, 325 and 355.

Table 98.—Discharge Measurements of Vermilion River below Lake Vermilion, near Tower, Minnesota.

[Drainage area, 507 square miles<sup>1</sup>]

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
1911.						
May 31	C. J. Emerson				1.94	518.0
June 30	"				1.88	486.0
July 30	S. B. Soule				1.32	262.0
Oct. 8	"				0.93	173.0
1912.						
Jan. 16	S. B. Soule				0.69	140.0
Mar. 7	"				0.52	97.6
" 7	W. G. Hoyt				0.52	103.0 <sup>1</sup>
Oct. 16	S. B. Soule				0.58	105.0
1913.						
July 2	S. B. Soule	47	154	5.90	2.63	908.0
" 2	"	47	153	5.95	2.62	912.0
" 2	"	24	53	1.39	0.32	73.0
Oct. 7	B. J. Peterson	24	52	1.40	0.32	73.0
" 7	"					
1914.						
May 20	S. B. Soule	128	754	1.42	2.91	1,070.0 <sup>2</sup>
" 21	"	144	959	1.03	2.85	991.0 <sup>3</sup>

<sup>1</sup> Open water, regular section.

<sup>2</sup> Measurement from boat about 4,000 feet below gauge. Control clear.

<sup>3</sup> Measurement from boat about 6,000 feet below gauge.