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 Chairman
 Silver Lake Sanitary District

Subject: Lake Irogami Weir Analysis of Flow Data

I reviewed the Lake Irogami flow data generated from measurements done by our Silver Lake Sanitary District personnel. A summary of these data are listed in Table I. The inlet water depth is the height above the lip of the weir. Because of the weir slide gate installed atop the weir, flow through the weir will cease when the inlet depth is below 2”.

During startup and early operation, a flow meter was used to measure the discharge velocity. The slide gate was maintained at a 100% open setting until the maximum allowed flow of 10 cfs was approached (9.7 cfs) on October 3, 2019. At that time the slide gate was reduced to a 50% open setting. As the inlet water depth decreased, the slide gate was returned to the 100% open setting on October 15, 2019. Weeds etc. accumulated on top of the slide gate were removed before recording the inlet water depth and flow velocity. As winter approached and weather conditions made flow measurement by meter difficult and dangerous, the use of the flow meter was suspended. The data clearly showed that inlet depth levels would have to be above about 8” before the 10 cfs maximum flowrate would be exceeded. Inlet depth levels continued to be recorded throughout the winter/spring months. These levels were used to estimate discharge flowrate using a correlation determined between inlet depth levels and discharge flowrate as measured by a flow meter. As expected, the correlation (R^2) was good at 91+%. The correlation is shown in Figure 1.

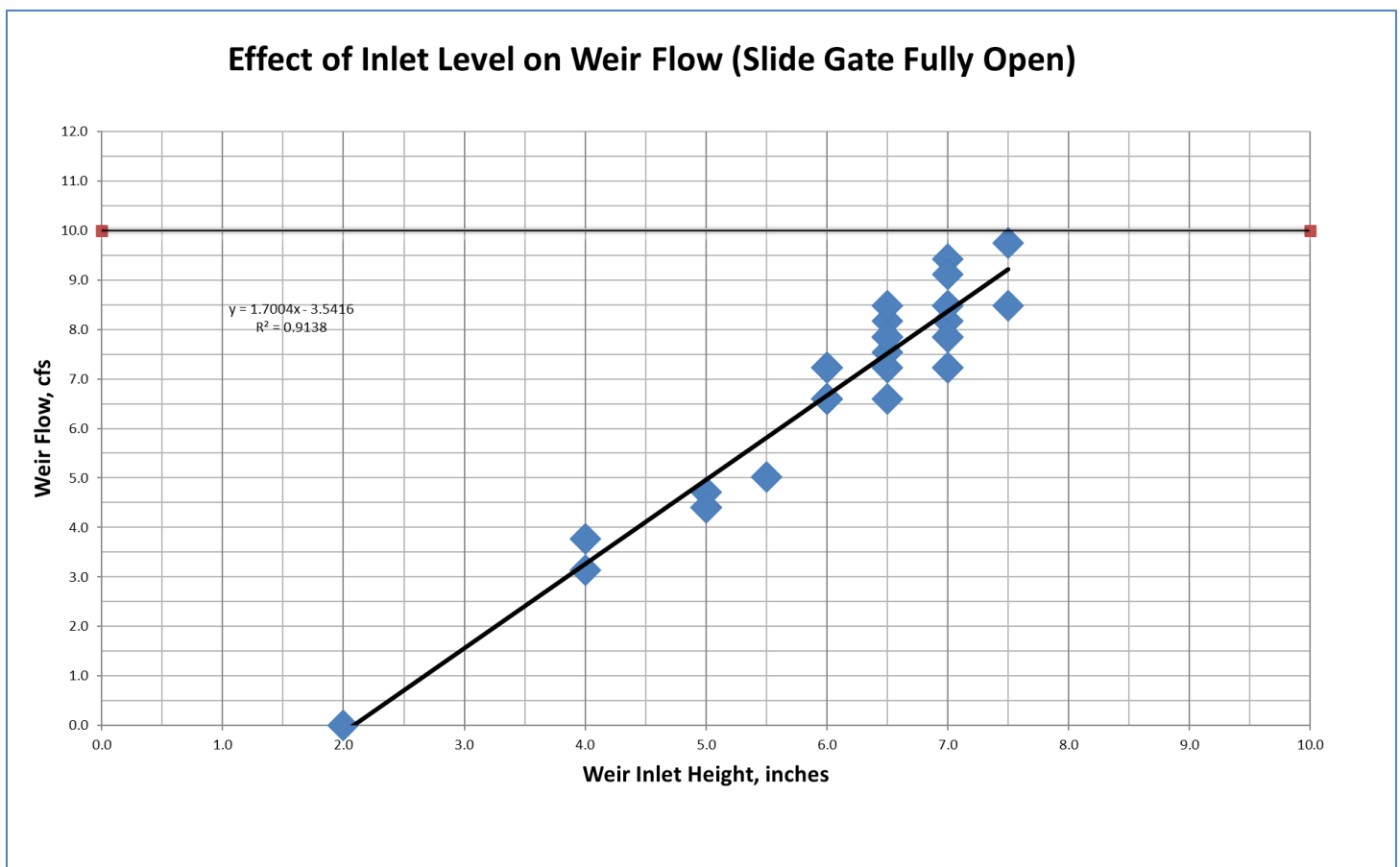


Figure 1. Correlation of Inlet Water Height and Discharge Flow (Discharge Flowrate Measured by Velocity Meter)

The equation used to calculate flowrate from inlet height is:

$$\text{Flow Rate (F)} = 1.7 * \text{Inlet Water Height (H)} - 3.54$$

Where F is cfs and H is inches.

The R² correlation of the two flowrate measurement techniques shown below is good at 91+%.

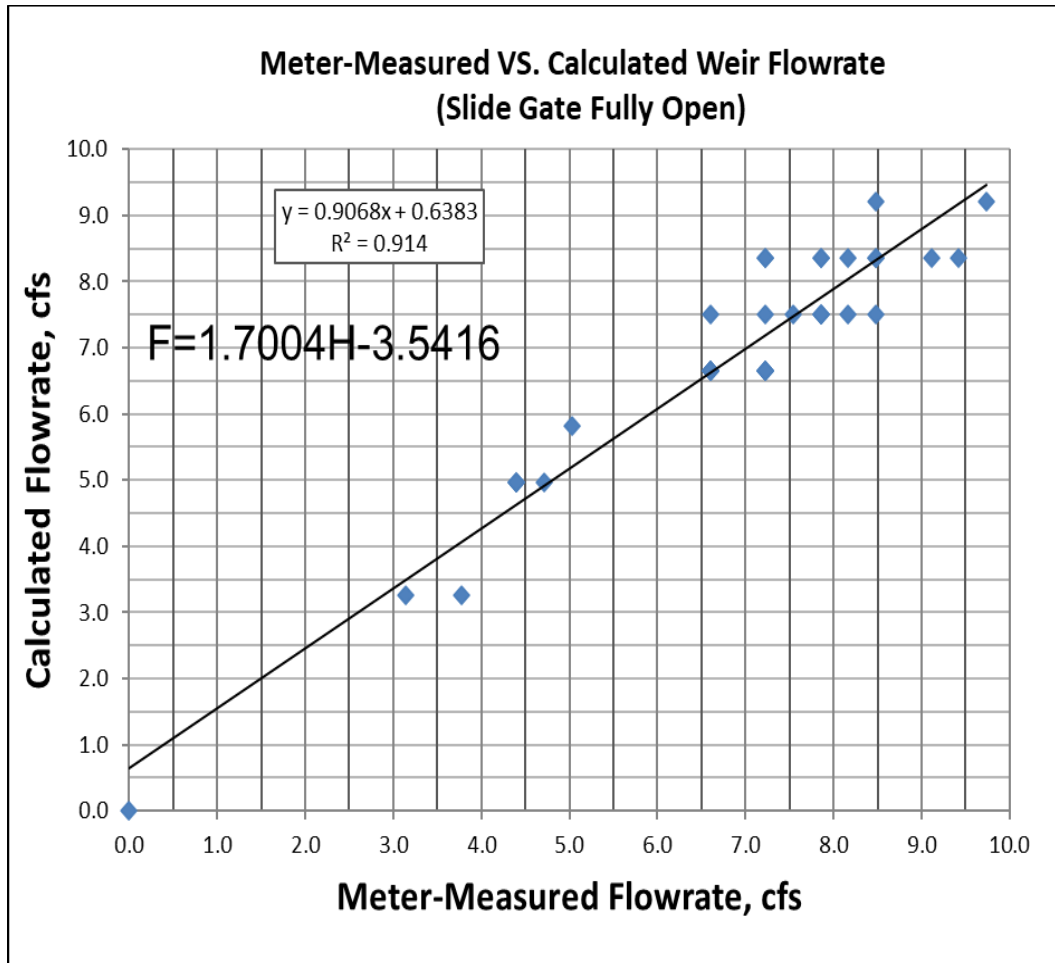


Figure 2. Correlation of Estimated Flowrate with Meter-Measured Flowrate

Summary

- With weir inlet levels below 8", the 10 cfs maximum-allowed discharge flow would not be exceeded even when the slide gate is set at 100% open.
- As expected, a good correlation exists between discharge flowrates and weir inlet depths.

Jim Schroeder
Commissioner

Table I. Lake Irogami Weir Flow Data

2019-2020 Date	Inlet Water Depth, inches	Slide Gate Opening, inches	Measured Velocity, ft/s	Method Used	Side Gate @100% Computed Discharge, cfs	Side Gate @100% Estimated Discharge, cfs	Side Gate @50% Computed Discharge, cfs
Start	2.0	24	0	Meter	0.0	0.0	
8/30/19	5.5	24	1.6	Meter	5.0	5.8	
9/3	5.0	24	1.4	Meter	4.4	5.0	
9/9	5.0	24	1.4	Meter	4.4	5.0	
9/10	6.0	24	2.1	Meter	6.6	6.7	
9/11	6.0	24	2.1	Meter	6.6	6.7	
9/12	6.5	24	2.4	Meter	7.5	7.5	
9/13	7.5	24	2.7	Meter	8.5	9.2	
9/15	7.0	24	2.6	Meter	8.2	8.4	
9/16	6.0	24	2.3	Meter	7.2	6.7	
9/17	7.0	24	2.3	Meter	7.2	8.4	
9/18	7.0	24	2.3	Meter	7.2	8.4	
9/20	6.5	24	2.3	Meter	7.2	7.5	
9/23	6.5	24	2.6	Meter	8.2	7.5	
9/24	6.5	24	2.5	Meter	7.9	7.5	
9/25	6.0	24	2.3	Meter	7.2	6.7	
9/26	6.0	24	2.3	Meter	7.2	6.7	
9/27	6.0	24	2.1	Meter	6.6	6.7	
9/30	6.5	24	2.1	Meter	6.6	7.5	
10/1	6.0	24	2.3	Meter	7.2	6.7	
10/2	7.0	24	3.0	Meter	9.4	8.4	
10/3a	7.5	24	3.1	Meter	9.7	9.2	
10/3b	7.5	12	2.7	Meter			8.5
10/4	8.0	12	2.9	Meter			9.1
10/7	9.0	12	2.9	Meter			9.1
10/8	8.5	12	2.7	Meter			8.5
10/9	9.0	12	2.9	Meter			9.1
10/10	8.5	12	2.7	Meter			8.5
10/11	9.0	12	2.7	Meter			8.5
10/14	8.5	12	2.7	Meter			8.5
10/15a	8.0	12	2.5	Meter			7.9
10/15b	7.0	24	2.9	Meter	9.1	8.4	
10/16	7.0	24	2.7	Meter	8.5	8.4	
10/17	6.5	24	2.7	Meter	8.5	7.5	
10/18	6.5	24	2.5	Meter	7.9	7.5	
10/21	7.0	24	2.5	Meter	7.9	8.4	
10/22	7.0	24	2.5	Meter	7.9	8.4	
10/23	7.0	24	2.7	Meter	8.5	8.4	
10/25	6.5	24	2.5	Meter	7.9	7.5	
10/28	6.0	24	2.3	Meter	7.2	6.7	
10/29	6.0	24	2.1	Meter	6.6	6.7	
10/30	6.0	24	2.1	Meter	6.6	6.7	
10/31	6.0	24	2.1	Meter	6.6	6.7	
11/4	6.0	24	2.1	Meter	6.6	6.7	
11/5	6.0	24	2.1	Meter	6.6	6.7	
11/6	5.5	24		Estimate		5.8	
11/13	5.5	24		Estimate		5.8	
11/15	5.0	24		Estimate		5.0	

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11/19	5.0	24		Estimate		5.0	
11/20	5.0	24		Estimate		5.0	
11/21	5.5	24		Estimate		5.8	
11/25	5.5	24		Estimate		5.8	
11/26	5.5	24		Estimate		5.8	
11/27	5.5	24		Estimate		5.8	
12/2	6.5	24		Estimate		7.5	
12/9	5.5	24		Estimate		5.8	
12/11	5.5	24		Estimate		5.8	
12/18	5.0	24		Estimate		5.0	
12/20	5.0	24	1.5	Meter	4.7	5.0	
12/26	4.5	24		Estimate		4.1	
12/27	4.8	24		Estimate		4.5	
12/30	6.0	24		Estimate		6.7	
1/2/20	6.0	24		Estimate		6.7	
1/3	5.8	24		Estimate		6.2	
2/3	5.0	24		Estimate		5.0	
2/14	5.0	24		Estimate		5.0	
2/19	4.8	24		Estimate		4.5	
2/25	4.5	24		Estimate		4.1	
2/27	4.0	24	1.2	Meter	3.8	3.3	
3/2	4.0	24	1.0	Meter	3.1	3.3	
3/6	4.0	24		Estimate		3.3	
3/9	4.5	24		Estimate		4.1	
3/12	5.0	24		Estimate		5.0	
3/26	7.0	24		Estimate		8.4	
4/2	6.3	24		Estimate		7.1	
4/10	6.0	24		Estimate		6.7	
4/13	6.0	24		Estimate		6.7	
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4/14	6.0	24		Estimate		6.7	
4/16	5.8	24		Estimate		6.2	
4/22	4.8	24		Estimate		4.5	
5/5	4.8	24		Estimate		4.5	
7/3	5.0	24		Estimate		5.0	
7/6	4.5	24		Estimate		4.1	
7/10	5.0	24	1.4	Meter	4.4	5.0	