

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

File No. Washington
Field No. 217
Revised Description Report 2-22-48
by S. R. Osborne

Description of Gaging Station on Kettle
Laurier State of Wash.

Prepare description in accordance with outline on back of Form 9-277. Plot cross section to scale. Use Form 9-213A for sketch and cross section. Initial and date all sheets.

Location. - Water-stage recorder, lat. 48° 58' 50", long. 118° 13' 00", in SW 1/4 sec. 11, T. 40 N., R. 36 E., in Ferry County. Station is about 2 miles by road below Laurier, and about 500 ft. below the mouth of Deep Creek.

To reach the station from Laurier proceed south about two miles to a long grade. About one-third of the way down the grade there is a small shack on the left of the road. In winter park your car here and take the trail around the hill to a group of farm buildings about one-half mile distant. The gage and cable are located about 800 ft. upstream. In dry weather, it is possible to drive to the farmhouse.

Drainage area. - About 1,300 sq. mi.

Records available. - Station was established Sept. 14, 1929 by D. A. Dudley, Assistant Engineer. Staff gage readings Sept 14, 1929 to Jan. 3, 1930. Water-stage recorder installed Jan. 3, 1930.

Gage. - Stevens continuous Type A-35 recorder, No. 4971-36, ratio 1:12, housed in a standard concrete well and shelter.

The well is equipped with three 2" galv. intake pipes, the two bottom ones of which have 2" riser pipes and brass gate valves for flushing purposes. It is also equipped with a 12" galv. shaft iron oil pipe.

The inside gage reads from 0.0 to 20.3.

The outside gage is in three sections. The low-water section is a slope gage fastened to rock immediately above gage well and reads from 1.0 to 9.6. The second section is enamel sections fastened to the downstream side of the well and near the streamward corner reading from 6.8 to 10.1. The third section consists of enamel sections, reading from 10.2 to 24.8 fastened to the shoreward face of the well and near the downstream corner.

Observer. - Mr. Charles A. Wallace, Laurier, Wash. He makes two inspections monthly to the recorder. Rate of pay is \$7 per month.

Discharge measurements. - Wading measurements and ice measurements can be obtained about 1,000 ft. below the gage or at ford about three-quarters of a mile below gage.

The channel is heavy gravel, free of vegetation and fairly permanent. One channel at medium and high stages. At low stages when wading measurements can be made there are two channels. Approximate depth of water at medium stages 4 to 8 ft., at high stages 8 to 20 ft. The last figure would be for very extreme cases. Water will be swift but smooth. Current at right angles to measuring section. Channel is straight for 100 to 150 ft. above cable and for about 200 ft. below the cable. Right bank is high and fairly clean, subject to overflow in extreme cases - such

Discharge measurements. - (Continued)

as 1894. It is from 2 to 3 ft. higher than the right bank.

Medium and high-water stages are measured from cable about 200 ft. below gage. The cable is 7/8", 6x7, galv. cast steel wire rope with a hemp core. The cable is supported on the left bank by an 18 ft. A-frame of cedar poles with 2"x3" cross bracing. On the right bank it is supported by a 20 ft. A-frame of similar construction. From the right A-frame the cable is carried 63 ft. across a narrow field where it is again supported by a 7 ft. A-frame and then down to the right anchor. Both right and left anchors are of similar construction. The anchorages are concrete blocks 3'3"x7'6" in plan. The front 4 ft. is 2'-6" deep while the back 3'-6" is 4 ft. deep. Six inches of this depth extends above the surface of the ground. In each concrete deadman there is embedded two U-bolts; one U-bolt of 1-1/4" round mild steel for the main cable, 7 ft. long with the ends hooked back 18 inches in a 180° bend. All bands on a 3-inch radius and the legs spread to 2 ft. at the end. The second U-bolt is of 3/4" round mild steel and is for the guy cable. It is 3 ft. long, and is spread 1 ft. at the end with the ends hooked back 9 inches in a 180° bend; all bends on a 2" radius. On the right bank the cable is connected to the anchor by means of an open socket. On the left bank it is connected by means of cable clamps and a 1-1/4" galv. turnbuckle with a 36" takeup. The total span of cable is 328.6 ft. I.P. is center of sheave bolt in right A-frame support.

Cable used is standard Lee-All gaging car.

Cable is marked at 5 ft. intervals.

A bar about 200 ft. above the cable may cause slight angles at some stages, but it is believed that good measurements can be obtained at this station. A 500 weight is left at station.

Control. - The low-water control is a slight riffle over a heavy gravel bottom, clean of vegetation about 500 ft. below gage. At higher stages the control will be a heavy gravel, cobble stone riffle about a quarter of a mile below gage. Both controls will be slightly shifting at high stages and subject to ice conditions most winters.

Ice. - There will be ice effect at this station most winters.

Extremes. - High water of 1928 at gage height of 16.3 ft., plus or minus 1 ft. High water of 1894 at gage height of 22.0 ft., plus or minus 2 ft.

Regulation. - No artificial regulation at present time. There is a power plant at Cascade, B. C., about 5 miles above the gage, but this has not operated for some time. Christina Lake near Cascade, B. C., affords a natural regulation. At low water the outlet to the lake flows into the river about 4 miles above the gaging station. At high-water backwater from the river flows into Christina Lake.

Diversions. - A few very small pumping plants along river. No diversions to speak of.

Cooperation. -

Reference marks. - B.M. No. 1 is a standard bronze marker set in solid rock about 5 ft. upstream and streamward from upper portion of slope gage. Elevation, gage datum, 5.56 ft.
B.M. No. 2 is a standard bronze marker set in solid rock 17.5 ft. upstream and 3 ft. shoreward from upstream, shoreward corner of gage well. Elevation, gage datum, 13.69 ft.