

BROUGHTON FLUME  
Hood River Junction on Columbia River at Washington/Oregon border  
Hood River Junction  
Skamania County  
Washington

HAER No. WA-170

PHOTOGRAPHS

PAPER COPIES OF COLOR TRANSPARENCIES

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
U.S. Department of the Interior  
1849 C St. NW  
Washington, DC 20240

HISTORIC AMERICAN ENGINEERING RECORD

BROUGHTON FLUME

HAER No. WA-170

Location: Columbia River Gorge, Skanania County, Washington State  
vic. Willard, WA/Bingen, WA

UTM:

Date of Construction: 1921-23

Designer/Engineer/Fabricator Drano Flume and Lumber Co.

Present Owner: Broughton Lumber Company

Present Use: abandoned

Significance: The Broughton flume was one of the last working cant  
flumes in the United States. Spanning nine miles from  
Willard to Hood, Washington, it operated from 1923 to 1986.

Historian: Richard O'Connor, 2000

Project Information: Two NPS units - Columbia Cascades Support Office and the Historic American  
Engineering Record - collaborated on this project.

The Broughton Flume was built between 1921 and 1923 by the Drano Flume and Lumber Co. to transport cants (rough sawn logs) from the Little Salmon River nine miles to Hood, Washington and the Columbia River. Leased on completion by Broughton Lumber, the company assumed ownership in 1927 and continued to transport cants over the flume until both the company and the flume closed in 1986.<sup>1</sup>

Most of the nine-mile long Broughton flume was built of wood sawn at the Broughton Mill at Willard. Wood portions were 16' long and consisted of 2" thick troughs of Douglass fir, which had the strength to withstand the relentless pounding of the cants. Troughs rested on bracing of cedar, which resisted rot. The Broughton Lumber Company, in a pamphlet issued by the company, described construction of the bents:

...starting with a 2 x 14" x 16' board with a Tongue on one side and square edge on the other, or in place of the groove. The flat side is then mated with the same kind of a board, which is 12", instead of 14: wide, to form a 90 degree angle. By continuing up each side with 2x 12" tongue and groove boards, the trough is completed. As such, the trough should measure approximately three feet on each side, and three and one half feet across the hypotenuse. This will make water run about two feet deep.

Inside the trough, a "V" is placed. The V is made by cutting diagonally through a 4" x 4", 6 x 6", 8 x 8" or 10 x 10" which is then installed point down with flat surface up. This will then allow any sinkers to slide along the bottom without causing the lumber to jam up or stop flowing. In addition, the V keeps the lower part of the trough from wearing out too soon and helps prevent leaking.

The trough then rests in a 4 x 6" cedar bracket, which is supported by three 4 x 6" x 18' cedar stringers. The stringers in turn, rest on a 6 x 6" cedar cap which is supported by 6 x 6" cedar legs cut on a slope (batter) of 8" for every 24" of length.<sup>2</sup>

Where the flume descended at a steep angle, it was made of metal. The following measurements were taken from a 31'6" segment on display in Bingen, Washington, town park. The trough was made of two 3'2" sections of 3/8" steel plate welded at the base and forming a hypotenuse 4'6"

---

<sup>1</sup>Information in this report came from a variety of sources, but the reader is encouraged to consult the fine, detailed article by Duane Ely and Tom Pomeroy, "The Broughton Lumber Company Flume and Railroad," appearing in *Narrow Gauge and Shortline Gazette*, vol. 14, no. 5 (Nov./Dec., 1988), 18-24. The authors also discuss the company's narrow gauge railroad, that ran from 1925 to 1941.

Note that discrepancies in flume construction dates exist among several sources. The company pamphlet gives a starting date of 1913, while the Ely and Pomeroy article lists 1923. During the HAER survey of the site in 2000, several sources indicated the 1923 date was likely correct.

<sup>2</sup>n.a., *Broughton Flume* (May 1, 1973), 2.

wide at the top. A 7" wide steel strip was welded near the bottom of the V, creating a flat bottom section similar to the wood segments. Along the top on each side, a 2-1/2" angle formed a lip running the length of the segment. Walls of the trough were supported by ten 6" x 3/8" channels at 3' intervals. The trough rested on a bed of ten I-beams, 4" x 2-1/2", 3/8" material, placed below each trough channel; this assembly was supported by two 6-1/2" x 6-1/2" I-beams running the length of the trough. The two I-beams rested on two leg assemblies, one at each end, consisting of 8" x 8", 3/8" I-beams reinforced with 4" x 2" channel 1/8" thick.<sup>3</sup>

The flume was an efficient and cost-effective method of transporting rough lumber to Hood on the Columbia River. A dam built by the Pacific Power & Light Company on Little White Salmon river above Willard, Washington, provided head for the flume at approximately 30 cubic feet per second. From the Little White Salmon river, cants moved at approximately 9 mph, completing the trip in 55 minutes over terrain that necessitated trestles up to 80' high. The flume was capable of transporting 40/50 million board feet of lumber/year, or 125,000 to 150,000 board feet/day, in lengths of less than 32'. Anything 32' and over was trucked to the mill.<sup>4</sup>

Flume design accommodated monitoring and maintenance. A 12" wide walkway, resting on the flume's leg bracing, ran parallel to the trough for the full length of the flume to facilitate repairs. The flume was patrolled weekly on Friday by a worker wearing special "calk" boots - with sharp points on the soles. In addition, a 7-volt warning system, running from the terminating point at the mill up the flume approximately 4-1/2 miles, sounded a warning bell that would, at least in theory, permit the release of flume water into Drano Lake in the event of a break. According to Broughton, "This is done because the water crashing into a break may wash away more of the hillside than a small slide."<sup>5</sup> Repairs used the flume and a small amount of water to float materials to the site of the break.

V-shaped flumes were common and necessary equipment in the timber industry in the early twentieth century. The abundance of mountain runoff water and the great, sometimes difficult distances between wood source and mill encouraged their construction for a wide variety of products, including "cord wood, posts, poles, mining timber, lumber, and logs."<sup>6</sup> Unfortunately, no comprehensive inventory of wood flumes, past and present, exists. Given their ephemeral nature, it should come as little surprise that few artifacts of these large-scale transport systems exist, either. At Broughton, only scattered concrete remnants of the dam remain today. The

---

<sup>3</sup>Measurements taken by author during visit to flume, September, 2000.

<sup>4</sup>"Broughton Lumber Company Flume," 22.

<sup>5</sup>*Broughton Flume*, 2.

<sup>6</sup>Ulysses B. Hough, "Logging Flumes," *Transactions of the American Society of Civil Engineers*, Vol. 92 (1928), 498.

flume is partially dismantled and portions were auctioned off after closing; scattered segments exist along its original path and in a town park at Bingen along the Columbia River.