

Project: Rocky Reach Total Dissolved Gas Exchange Study

PI: Mike Schneider

Branch/Group: Inland Hydraulic Structures Branch, Environmental Hydraulics Group

Project Description/Activities/Capabilities:

To describe and quantify dissolved gas transfer over a range of spillway and powerhouse operation at Rocky Reach Dam; describe dissolved gas mixing, transport, and exchange processes in the Rocky Reach tailwater and downstream for several spillway/powerhouse operational scenarios representing the range of operating conditions; characterize and evaluate the functional operation of the present fixed monitoring systems in the tailwater and forebay of Rocky Reach Dam.

Sponsor: Chelan Co. Washington Public Utility District (CCPUD), POC George Valaquez

Personnel: Mike Schneider (CHL) Calvin Buie (CHL), Joe Carroll (EL), Carolyn Schneider (EL), Kathryn Barko (Dyntel Corp.), George Velazquez (CCPUD), Robert McDonald (CCPUD), and Waikele Hampton (CCPUD)

Project Location and Description:

Rocky Reach Dam (RRD) is located at river mile 473 on the Columbia River about 7 miles upstream from the city of Wenatchee, WA. RRD impoundment extends 41.9 miles upstream to Wells Dam and typically contains 346 kacre-ft of storage. As a run-of-the-river hydroelectric facility, the Rocky Reach Project has limited water storage capacity (35 kacre-ft) as the forebay water-surface elevation ranges from 703 to 707 ft. The tailwater elevation is normally about 619 ft above sea level and varies primarily in response to total river flows. Rock Island Dam is situated about 19.9 miles downstream of RRD and receives flow from operations at RRD and from the Wenatchee River. RRD is owned and operated by the Chelan County Public Utility District No. 1. The dam is an L-shaped reinforced concrete structure 2,010 ft in length consisting of a powerhouse oriented parallel to the river banks and angled about 95 degrees to the spillway section. The powerhouse is 1,090 ft long and consists of 11 adjustable-blade Kaplan turbines with a rated output of 1,213 MW and a hydraulic capacity of 220 kcfs. The turbines are numbered consecutively from south to north with the higher numbered units closest to the spillway. The Kaplan turbines and governors for units 8-11 are of larger capacity than the original turbines in units 1-7. Turbine 11 was not operable during the testing period. The maximum discharge through the higher capacity turbines is 21 kcfs compared to 17.5 kcfs for the older units. The spillway has a total length of 740 ft and consists of 12 bays, each of which is controlled by a 56-ft radial gate. The nominal width of each bay is 50 ft and the adjoining piers are 10 ft in width. The spillway crest is located at el 650 or about 55 ft below the water-surface. Spill bays 2-12 have a notched nappe deflector that is a horizontal bench beginning at el 645 but transitioning to a slightly negative angle from horizontal. The notched section, about 12 ft in width at the end of the bench, is a continuation of the gradually increasing slope defining the spillway face. The notched section for bay 2 has a raised wedge resulting in a shallower centered step. Aeration wedges, small triangular blocks located adjacent to the spillway piers, were located at piers 2, 4, 9, 10, and 14. The first spill bay does not have a nappe deflector but has a positive sloped deflector located at the base of the spillway face.

Facilities: Field Study

Related Topic Areas: Hydraulic Structures, Environmental Studies, Spillway Flow Deflectors, Total Dissolved Gas, Hydropower, reservoir

