

Project: SYSTDG Workbook

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

Project Description/Activities/Capabilities:

SYSTDG is a spreadsheet model developed by the ERDC, designed to characterize gas production resulting from spill operations at the Columbia and Snake River mainstem dams. The SYSTDG worksheet determines an hourly ledger of TDG pressures approaching and leaving major main stem dams in the Columbia River Basin. The SYSTDG estimates the TDG pressures resulting from project operations on the Columbia River from Grand Coulee Dam to Bonneville Dam, on the Snake River from Lower Granite Dam to the confluence with the Columbia River, and from Dworsak Dam on the Clearwater to its confluence with the Snake River. The model uses empirically derived equations to estimate the TDG exchange associated with spillway releases. The powerhouse operations are assumed to pass forebay TDG pressures. In some cases, a portion of the powerhouse flows encounter the highly aerated spillway releases and experience elevated TDG exchange rates. The entrainment of powerhouse flows will increase the effective discharge of the spillway and reduce the amount of powerhouse flow available for dilution during mixing zone development. The average flow weighted project TDG pressures are determined at each dam and routed through the downstream river reach. The worksheet uses a simple hydrologic routing procedure to transport water from dam to dam that takes into account changing pool volumes and unsteady project flows. The influences of in pool heat exchange on TDG pressure can be accounted for through the application of the observed temperature differences between projects. The surface exchange of TDG pressures can also be estimated through a first order process where the exchange rate is based upon surface wind conditions.

Sponsor: Northwestern Division, POC Nancy Yun

Personnel: Mike Schneider, Laurin Yates

Facilities: Spreadsheet Model

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