US Army Corps of Engineers ®
Walla Walla District

FACT SHEET
ADVANCED TECHNOLOGY TURBINE

ICE HARBOR DAM • Eastern WASHINGTON

The U.S. Army Corps of Engineers Walla Walla District is pioneering some of the world's finest advances in turbine technology at Ice Harbor Lock and Dam on the lower Snake River near TriCities, in eastern Washington.

A new advanced technology turbine is being installed at Ice Harbor Dam in Eastern Washington.

Ice Harbor Lock and Dam, located on the lower Snake River near Pasco, Washington, was constructed in the late 1950's. Its first three hydro-turbine units were brought on-line in 1961 and three additional hydro-turbines became operational in 1976. Ice Harbor consists of the dam, powerhouse, spillway, navigation lock, two fish ladders, a removable spillway weir and a juvenile fish bypass facility.

Ice Harbor Dam is a valuable site for developing technical innovations aimed at raising survival rates of endangered and threatened fish in the region and the process to develop the new turbine designs is a model for future modernizations planned at McNary Dam and other Federal dams in the Northwest.

As a trio of 1961-vintage hydroelectric turbines approached the end of their design life, the Bonneville Power Administration and Walla Walla District recognized a window of opportunity to improve passage conditions for fish.

"After 50 years of operation and increasing maintenance requirements, the need to replace the existing turbine runners at Ice Harbor presented the opportunity to pursue new turbine designs with fish passage improvement as a priority," said Kevin Crum, project manager for the Turbine modernization project.

The Corps spearheaded an effort to partner with the hydro-turbine industry, power providers and oversight entities to develop improved turbines designs. The design process combined U.S. Army Corps of Engineers expertise in physical hydraulic modeling and fish passage, Bonneville Power Administration's economic expertise, and NOAA Fisheries' knowledge of anadromous fish biology, with Voith Hydro Inc.'s industry expertise in designing large-scale hydro-turbines. The collaboration developed an adjustable-blade turbine that improves hydraulic conditions for juvenile salmon and steelhead passing through the turbines.

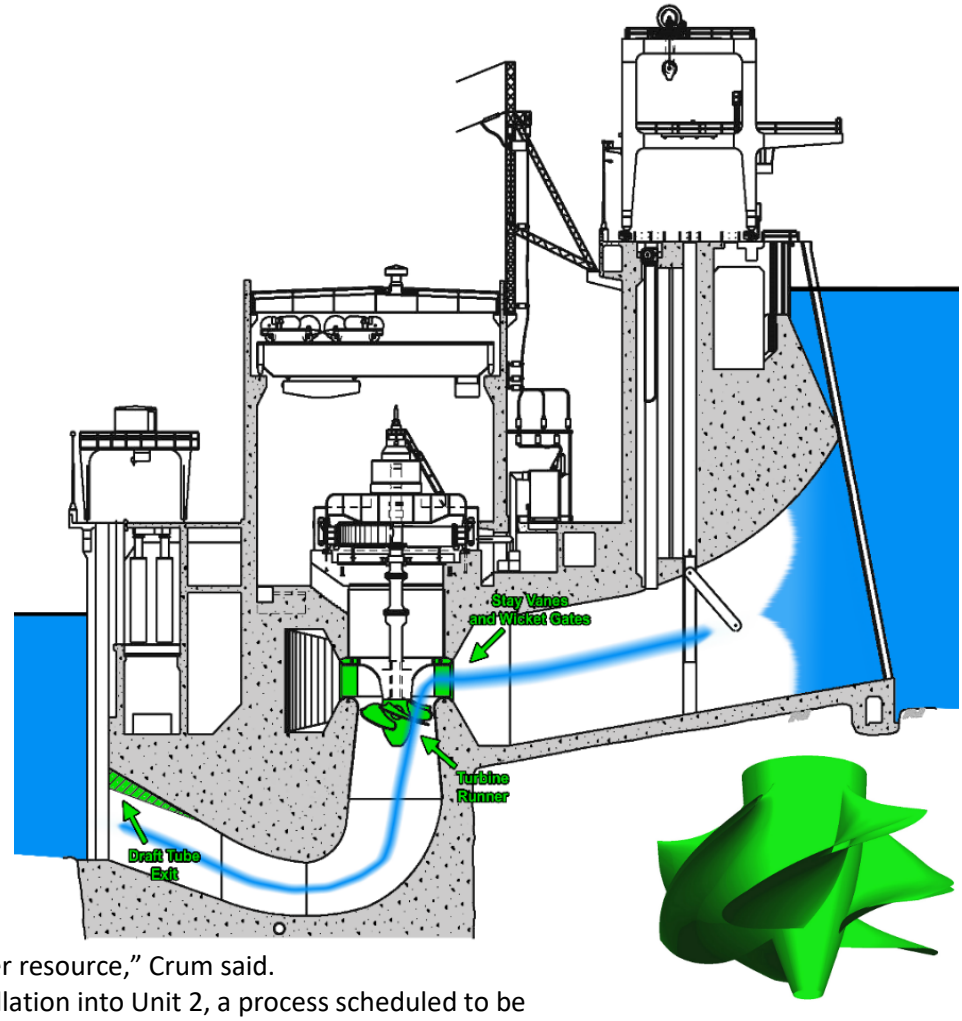
The $73 million contract, including options, calls for the installation of new runner replacements on three turbines -- one fixed-blade runner into Unit 2, plus two adjustable runners into Unit 1 and Unit 3 -- along with fish passageway improvements at Ice Harbor during the next few years.

The runner is similar to a propeller that spins to produce hydroelectric power. The fixed-blade turbine runner was fabricated with stainless steel hub and blades, which better resists cavitation and corrosion caused by water forces than the original carbon steel turbines. All 3 turbine units utilized greaseless bushings in the turbine gates to reduce oil infiltration into the river.

Corps operations officials anticipate the improved design will help reduce maintenance costs, and based on scale-model testing, the improved flow conditions are anticipated to increase both fish survival and also may increase power generation by 3 to 4 percent.

"We are creating meaningful improvements to the environmental performance of a critical Northwest power resource," Crum said.

It was assembled at the dam for installation into Unit 2, a process scheduled to be completed in the fall of 2018. The adjustable blade designs for Units 1 and 3 are scheduled to be completed over the next three years.



Advanced-design Fixed-blade Runner

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