

ST. GEORGE HYDRO PLANT REDEVELOPMENT

J. D. Irving Ltd.

St. George, New Brunswick, Canada



The new 15 MW St. George Hydroelectric Station is located in the town of St. George, New Brunswick, Canada at the confluence of the Magaguadavic River and a tidal estuary of the Bay of Fundy. The project is owned and operated by Saint George Pulp and Paper (SGPP), which is a subsidiary of the J.D. Irving Corporation of Saint John, New Brunswick. The project is the culmination of years of studies and planning to upgrade an aging 3 MW 1902 vintage facility.

Kleinschmidt began working with SGPP in June 2001 to assist in obtaining governmental approval, address rock tunnel design conditions, and water to wire equipment selection. Working with SGPP and the Canadian firm of Jacques Whitford, the project subsequently received provincial approval to proceed in December 2001. Concurrently, Kleinschmidt's subconsultant, Haley and Aldrich of Cambridge, Massachusetts began lithographic and geological mapping as well as the site borings. These studies showed the project could proceed with a significantly less costly unlined tunnel.

In February of 2002, Kleinschmidt began final design of the entire new facility. The civil/structural features designed by Kleinschmidt included a new post-tensioned forebay dam and gated spillway, downstream fish sampling and passage system, an intake with a mechanical trashrack raker, and two 11 ft diameter buried steel penstocks. A new 66 ft wide by 84 ft long reinforced concrete powerhouse set 124 ft below grade with the discharge through a 22 ft diameter by 425 ft

long bifurcated rock tailrace tunnel complete this project's challenging civil features. The tunnel construction costs were lowered by implementing a unique reinforced rock plug at the tunnel exit that eliminated costly cofferdamming.

Kleinschmidt's mechanical engineering services included assisting SGPP select the water to wire equipment, consisting of two identical 7.5 MW horizontal double-regulated turbines purchased from GE Hydro. Kleinschmidt provided design of other ancillary mechanical equipment such as the powerhouse dewatering system, turbine and generator bearing cooling water system, and the HVAC system.

To reduce the capital costs and facilitate future maintenance, SGPP elected to purchase switchgear and station controls equipment from a local supplier. As a result, Kleinschmidt designed the integrated turbine and station service logic that governs the inter-related gates, alarms, and turbine equipment. Kleinschmidt also designed the project's new substation, electrical power relay metering and control systems, lighting, grounding, and station service.

Project construction began in April 2002 and was completed in March of 2004 when the project entered commercial operation. The new project increases the existing station's average annual energy generation from 20,000 Mwh/year to 44,000 Mwh/year.



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