Managing Kilowatt-Hours by the Drop

Solomon Lake Dike and Spillway; illustrates a full lake with water overtopping the spillway.

While the rest of Valdez is praying for easy winters and dry summers, the employees of Copper Valley Electric are praying for snow and rain. The Glennallen team members are, of course, first in line to do the rain dance for Valdez and the Valdez employees join in, although reluctantly, because they know only too well how important water is for the member-owned utility and its members.

Water is important for CVEA members because it is water that fuels the electric generation at the Solomon Gulch Hydroelectric Plant on Dayville Road in Valdez. Solomon Gulch began using water to make electricity in 1982. It has since been CVEA's primary power source and today provides roughly 50% of the Co-op's annual generation requirement.

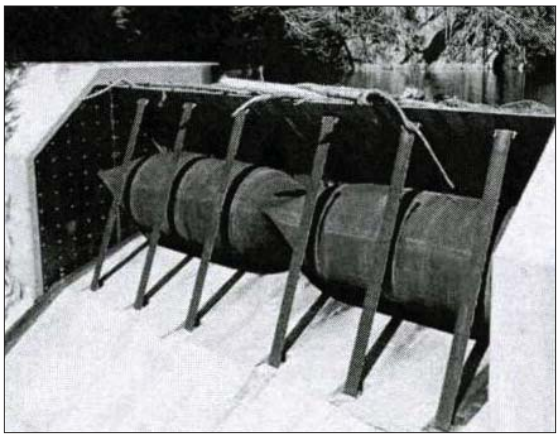
Water is conveyed from Solomon Lake via two 48 inch penstocks to two Francis water turbines located in the powerhouse near tidewater. The water pressure, at roughly 300 pounds per square inch, spins the turbines which drive the generators to produce electricity. Each turbine produces 6,000 kilowatts, at 10,100 horsepower.

The Solomon Gulch plant produces 45.6 million kWhs on average each year. In the past ten years, annual energy generation has been as high as 52.8 million kWhs and as low as 34.5 million kWhs in 2007.

In a normal year, nearly 100% of CVEA's generation during the summer months is hydro, which translates to cheaper power for the members. In normal years snowmelt and rain are sufficient to fill the reservoir while at the same time generating enough electricity to meet system loads. When the Co-op finds itself in a low water year, hydro generation must be supplemented with alternate sources.

Snow melt and rain are the major sources of water for power generation each year (in addition to a small amount of glacial melt). Hot sunny days help melt the snow and glaciers, but foggy, drizzly days do not, nor do they contribute enough water through rainfall.

Snow depth is a big factor in producing water for power generation. CVEA conducts monthly snow surveys during the winter. These surveys determine depth of the snowpack and how much water content the snow pack has. With this data, operators are able to compare, in conjunction with the Natural Resources Conservation Service, to historical infor-



Above Left: Snowpack in the Solomon Lake Watershed in April 2009. Top: Low water level at the Face of the Solomon Lake Dam. Above: Typical Obermeyer Gate Installation. This alternative was studied by CVEA in 2010.

Photo courtesy Hatch Acres

mation and determine what kind of water year lies ahead.

In 2010, with a goal of increasing the amount of hydro generation, the Co-op evaluated raising the Solomon Gulch Reservoir by adding a 'bladder' structure, called an Obermeyer Gate, to the top of the spillway. Such a project has the potential to raise the level of the reservoir by five feet, which would capture enough water to add two million kwhs of generation to the project. With a first year cost of power estimated at 49.1 cents per kWh, it was determined that the bladder project was not economically feasible.

In years gone by it was not unusual to spill water at Solomon Gulch because summer system energy sales were not adequate to use the full summer output of the project. In recent years however, filling and not spilling water has been a greater concern for two reasons. First, higher summer energy sales have increased hydro generation and reduced the potential to spill water. Second, and of greater concern, is finding ourselves in a low water year. Solomon Lake reservoir can only store so much water. When spring and summer inflows cease, all we have going into winter is what is in the lake. Since the project came online in the early 1980s the strategy has been to go into winter with a full reservoir.

Filling the reservoir this summer is expected to be problematic. Snowpack and water content in the snowpack are significantly below normal and, of greater concern, are below 2007 levels which was the lowest hydro generation year in the project's history. Snow surveys tell us the Solomon Gulch watershed snow pack is 56% of normal. As of March 2011, water content in the snow was estimated to be 12% below 2007 levels.

These climate caused conditions have significant budget and power generation impacts for CVEA's customers. These circumstances mean that the cost of power produced at Solomon Gulch might need to increase on a kWh basis and that CVEA will likely run some fossil fuel generation in addition to hydro in hopes of filling the reservoir before winter. Both of these actions will raise the cost of summer electricity compared to prior years.

At the end of the day, despite careful planning, the amount of electricity the hydro project can produce is dependent on weather. Back to the opening paragraph of this article, let's hope for rain.

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