CASE STUDY

Clearwater Power Company—Lewiston, Idaho

Rural Idaho Electric Cooperative Saves Restoration Time With SEL Recloser Controls and Remote Communications

In a 2008 annual meeting video for Clearwater Power Company (CPC), longtime customers like Gene Esser of Genesee, Idaho, reminisce about when electric power, through the cooperative, first came to their part of rural Idaho in 1937. He recalls the excitement of watching the CPC line coming closer to his home.

"Before electricity came, we lived in the kitchen, because we didn't have a hook for the lamp in other rooms," he said. "After we got electricity, of course, that opened up the whole house."

Dolores Corey of Avon, Idaho, has the refrigerator—still working—that her mother bought in 1937 for the occasion of CPC connecting the electricity.

"We got ice cream every day," she said with a laugh. "We couldn't wait for that electricity, oh boy, snap that light on, wonderful!"

Figure 1—Dolores Corey of Avon, Idaho, reminisces about when Clearwater Power Company first connected electricity to her family's home in 1937.

Today, the company that started with a group of farmers who wanted to bring electricity to their rural neighbors and friends in northern Idaho during the Great Depression supplies power to more than 7,750 members. CPC operates 12 substations and maintains 2,800 miles of power lines over some of the most rugged terrain imaginable.

Many rural electric associations like CPC have the unique challenge of providing reliable power to their consumers with aging equipment and small staffs. They require protective relays that keep the power flowing and simplify their work, and for CPC, the choice is SEL.

Doug Pfaff, CPC manager of engineering for ten years, has overseen the cooperative's move toward replacing its old equipment with SEL relays and controls, specifically the SEL-351R Recloser Control and SEL-651R Advanced Recloser Control and remote communications devices.

SEL recloser controls are applied with existing three-phase G&W Viper-ST® reclosers in four substations. CPC has about 300 oil-circuit reclosers on its system and will replace many of those over the next few years with 20 three-phase G&W reclosers and SEL recloser controls.

CPC was an early adopter of the SEL-351R. The cooperative installed a prototype unit in 1998 for evaluation and was so satisfied with its performance that it was left in service for several years, according to Pfaff. CPC continues to use the product for fault

location, data collection, and as a remote terminal unit. He especially values the EZ recloser control settings, a list of about 40 important settings that can be custom-set for rapid installation through ACSELERATOR QuickSet® SEL-5030 Software. These include the following:

- Control identifier
- Current transformer (CT) and potential transformer (PT) ratios
- Minimum trip pickup
- Curve type
- Reclose interval
- And more

Figure 2—The SEL-351R Recloser Control.

Pfaff customizes the settings because he wants instantaneous protection, he says, and that ability to customize protection sets the SEL recloser controls apart. Rural electric associations like CPC are often "one-man" operations with that person doing everything from specifying equipment to setting it, so simpler is better.

"You couldn't [customize] with a Cooper [control]," he says. "I think the EZ settings are a really good system."

Fault locating on the CPC power system is something of a challenge, given the geography and distances covered. Power lines traverse thickly wooded areas, solid rock, and steep canyon walls; in some places, CPC has built new lines in country so remote, a helicopter is sometimes needed to place power poles. On average, one mile of line serves about 3.6 customers.

Figure 3—Some of the terrain in CPC's service territory is so remote, a helicopter is used to place power poles when the cooperative builds new lines.

Fault currents are not high in CPC substations, Pfaff says, but they do experience difficulties with voltage drop. Pfaff says linemen get very accurate fault locating with SEL relays. In one case, an SEL-351R pinpointed a fault during a heavy winter to within one-fifth of a mile of its actual location, ten miles past rural Potlatch, Idaho, in remote country accessible only by foot. Line crews snowshoed into the area and easily located the fault.

"The main reason we went with [the SEL relay] was because we knew it would save us a tremendous amount of time," Pfaff says. "The guys were able to walk right to the fault."

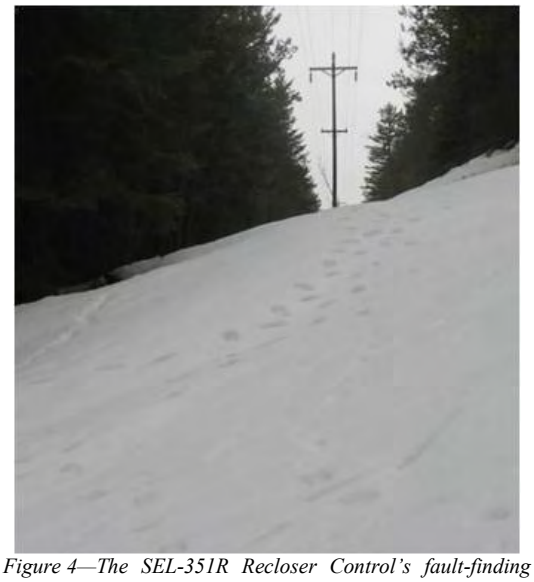

Figure 4—The SEL-351R Recloser Control's fault-finding capability is so accurate that the control pinpointed a fault on a CPC line to within one-fifth of a mile of its actual location in heavy winter conditions.

In another case, CPC received complaints of two blinks one evening at about 6:15 p.m. Pfaff, on call that night, established an interactive Telnet connection with the SEL-351R and found the fault location about six miles out of the substation above Lewiston, Idaho. He sent two linemen to investigate the blinks in snowy weather. Directed by Pfaff, the linemen drove to the last section of navigable road, then took a four-wheeler in another two miles and drove right to the fault. The linemen discovered the crossarm tilted over (because a bolt had fallen out) and the conductor touching the pole. When it became wet enough, it would fault.

CPC decided to set up an outage and contacted the local TV channel, whose broadcast tower fed off of the line. The crew scheduled the outage for 11:00 p.m., after prime-time TV, but it did not wait. The fault finally opened up the line at 10:15 p.m., and with the linemen right on the scene, they restored power by about 11:30 p.m.

"If we had waited until the fault finally opened up the line, as we would have before communication and fault locating, [the outage] would have lasted most of the night," Pfaff says. "We easily saved six hours of outage time."

Another benefit of the SEL equipment for CPC is in tracking harmonic distortion events on the system. A lumber mill the cooperative serves switched to variable-frequency drives, which has created harmonics problems with residential consumers. CPC charges for power factor, so the mill installed capacitors on the line as a solution. But this only caused more distortions. With the cooperative tracking sag, swell, and interrupt data and harmonic metering through the SEL-651R event reporting capabilities, CPC could show its customers that the problems did not originate at the substation.

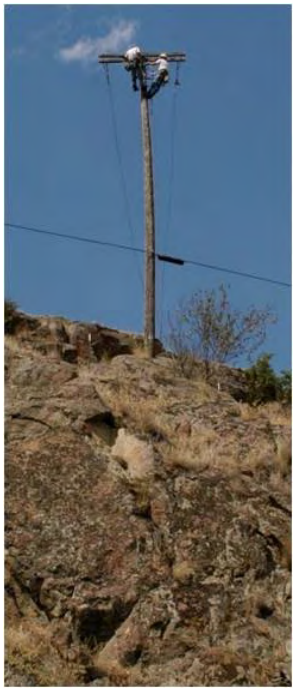

Figure 5—CPC linemen work on a pole overlooking a steep rock face. Highly reliable SEL equipment saves the cooperative hours of outage time by finding faults accurately and communicating exact location information back to the control center.

CPC also uses SEL Ethernet transceivers connected to the serial ports on relays and recloser controls to simplify its communications and to help with remote closing and opening of its substations. SEL Ethernet transceivers enable economical communication remotely, rather than going through costly leased or dial-up lines. In the case of CPC, the information from the equipment is brought back over its radio and satellite

system to the main control center. From there, data can be collected, viewed for status, and sent on for control commands, all from one terminal in the office.

"We've done some pretty neat things with that on a pretty low budget," Pfaff says.

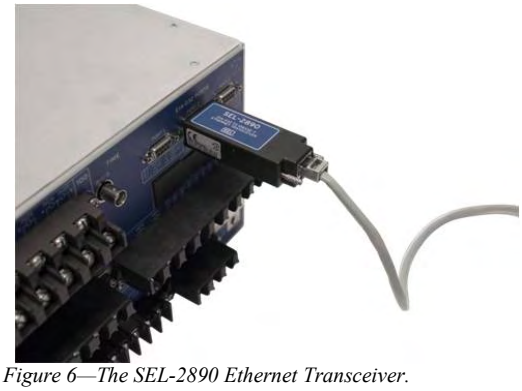

Figure 6—The SEL-2890 Ethernet Transceiver.

When asked about the time savings with remote closing, Pfaff estimates a 25 to 50 percent improvement—half an hour for a straightforward outage and several hours for more complicated outages. A typical two-hour outage could easily stretch to four hours without the remote communications.

"The line crew doesn't go to the substation; they go directly to the place they think the problem exists," he says. "You're saving time all the way around."

Saving time for a small electric cooperative with a large service area is paramount. Of the 2,800 miles of power lines CPC maintains, only 200 miles are for transmission at 69 kV. Owned by its members and governed by a nine-member board, CPC employs about 50 people working out of three Idaho district offices: Lewiston, Princeton, and Orofino. For each district except Lewiston, which has eight linemen, four-man crews keep the power running to rural power users and a few larger consumers, including lumber mills, a garnet mine near Fernwood, Idaho, and the Clearwater River Casino and Resort just east of Lewiston. The cooperative has grown about 1 to 2 percent a year and, remarkably, utilizes much of the same equipment it installed in the 1960s.

"It's old equipment, but we maintain it as best we can and target what we can for replacement," Pfaff says.

# # #

About CPC

Established in 1937, CPC is an electric cooperative that serves more than 7,750 members in 11 counties in 3 states (Idaho, Washington, and Oregon). The mission of CPC is to provide its member-consumers with safe, reliable, cost-based energy, and related services. For more information, visit www.clearwaterpower.com, or contact CPC by phone: +1.888.743.1501 (toll free); fax: +1.208.746.3902; or mail: P.O. Box 997, 4230 Hatwai Road, Lewiston, ID 83501, USA.

About SEL

SEL has been making electric power safer, more reliable, and more economical since 1984. This ISO 9001:2000-certified company serves the electric power industry worldwide through the design, manufacture, supply, and support of products and services for power system protection, control, and monitoring. For more information, visit www.selinc.com, or contact SEL by phone: +1.509.332.1890; fax: +1.509.332.7990; or mail: 2350 NE Hopkins Court, Pullman, WA 99163, USA.

SCHWEITZER ENGINEERING LABORATORIES, INC.
2350 NE Hopkins Court • Pullman, WA 99163-5603 USA
Tel: +1.509.332.1890 • Fax: +1.509.332.7990
www.selinc.com • www.selindustrial.com
Email: marketing@selindustrial.com

LCS0025