CASE STUDY
IMPROVING RELIABILITY

S&C ELECTRIC COMPANY
Excellence Through Innovation

Series 2000 Circuit-Switcher Goes To “New Heights”To Provide Protection For A Critical Load

S&C Featured Solution: S&C Series 2000 Circuit-Switcher

Location: Northeastern Thailand

Customer Challenge

The Provincial Electric Authority (PEA) in the Phimai district of Nakhon Ratchasima Province in Northeastern Thailand needed to upgrade protection for a critical load—the Pimai Salt Mine. The mine is located on a branch feeder between two separate transmission substations. Downstream from the salt mine on the branch feeder was a series of smaller less-critical residential loads. If a fault occurred at one of these residential loads, the protection scheme between the substations and the branch feeder would take the entire feeder offline, dropping the salt mine. Because the mine’s process requires pressurized steam, a significant outage could take the mine 1 to 2 days to recover from… losing revenue for both the mine and the utility.

S&C Solution

The utility looked for a solution that didn’t rely on the upstream substation circuit breakers for load-break capability. Initially PEA planned to use a mobile substation between the mine and the residential load to isolate the salt mine from downstream outages. But due to zoning and local land management policies, purchasing land to install a permanent switching station would have been difficult and costly… as would be negotiating a new right-of-way to reconfigure the way the residential load is supplied. They considered circuit breakers, but the size of a circuit breaker, plus the structure for a separate isolating disconnect would also require a permanent land-based switching station.

Figure 1. Switching station using Series 2000 Circuit-Switcher.

Figure 2. Series 2000 with voltage and current sensors.

Results

The solution was an S&C Series 2000 Circuit-Switcher, Model 2010. See Figure 1. Using the existing right-of-way and transmission structure, a 115-kV Series 2000 Circuit-Switcher was modified by S&C’s Switch Products Division’s Technical Services department for installation six meters off the ground on a custom built “floating” switching platform. The Circuit-Switcher was installed with a coordinating set of voltage and current sensors and a relay cabinet with distance relays for fault monitoring along the branch feeder. See Figure 2. The Series 2000 Circuit-Switcher with integral disconnect has the full load-break rating the utility required, and is lightweight and compact enough to mount on the transmission structure. And the Series 2000 is a significant cost-savings over both the real estate requirements for a land-based substation and equipment costs of a circuit breaker.

The utility is considering revising their specifications to use the Series 2000 Circuit-Switcher and associated sensing and relaying as one of their standard design “modules” when a transmission sectionalizing station is needed, and is also considering specifying Series 2000 Circuit-Switchers in their “mini-substation (50 MVA or lower) module” to help improve the reliability of their system.