



## Providing Safety, Security and Reliability for Nuclear Plants

### A Case Study

Controlling access to radioactive materials is more than a public safety priority - it's a matter of national security. Exposure to radiation poses serious, widespread health hazards depending on the level of exposure, which is why the Nuclear Regulatory Commission was formed to strictly regulate the various commercial and institutional uses of nuclear materials. In this way, the NRC helps to ensure adequate protection of public health and safety, the common defense and security of the nation, and the environment.

It is also why the Nuclear Regulatory Commission imposes, under federal regulation 10-CFR-73.55, extraordinarily high standards of reliability on the security systems at nuclear power plants. While a team of NRC inspectors is stationed full-time at each facility to monitor the handling of nuclear materials, it is common practice for commercial nuclear generating stations to call in independent, high-level security consultants to make sure the plants meet and exceed the federal security regulations.

Nuclear Security Services Corporation of Clarendon Hills, Illinois, is an international leader in evaluating and strengthening the security processes at nuclear power plants. Trained in counter terrorism, low-intensity conflict and high-level military special operations, NSSC personnel are responsible for ensuring the highest levels of security at commercial nuclear power plants as well as other stored, spent and operating fuels. NSSC has also been called in by various entities to conduct similar defensive strategic analysis at places that store weapons of mass destruction around the world. Staffed by many veterans of United States military special operations units, NSSC goes to great lengths to verify security network integrity, employing techniques similar to those used to test the security of U.S. Army, Navy and Air Force bases.

It is in this field of high-level security that Control-By-Light[™] has emerged as the leading provider of fault tolerant, tamper proof fiber optic networking and router components that can help to ensure the most ultra reliable security systems in the world. When installing new or upgraded security systems at nuclear plants that communicate on a fiber optic backbone, NSSC uses the FTR Fiber Optic/Twisted Pair LonWorks Router, a Control-By-Light product that meets the NRC's demand for redundant or even "tri-redundant" electronic access control systems.

CBL Systems is a leading supplier of fiber optic-based distributed sensing and intelligent automated control solutions. Because CBL's patented bi-directional technology lets a single fiber optic cable communicate in two directions, there is no single point of failure and therefore no security lapses even if or when a part of the system is interrupted or is damaged by either accident or sabotage. And, CBL's patented transceivers continuously monitor the amount of optical signal received, and can be programmed to warn operators when there is the slightest decrease.

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The Control-By-Light router has other qualities that led NSSC to make it part of the company's NSMART<sup>TM</sup> access control system when it is installed at nuclear facilities that have fiber optic backbones and fiber optic links between buildings. CBL fiber optic routers are highly reliable, capable of handling a large volume of data in the harsh environment of a power plant. But if a fiber link breaks down or is damaged, it can be detected immediately and replaced quickly and easily using CBL's "plug and play" routers that work right out of the box.

"We're in a business where if one of our security systems were to fail, that facility must rectify the situation immediately or face consequences from the Nuclear Regulatory Commission," according to William Hayes of Nuclear Security Services Corporation. "We cannot afford to have anything but the best for these systems, and Control-By-Light products are the most reliable we've found and are very easy to install. We use CBL products whenever and wherever it's absolutely critical that there is no failure."

Nuclear Security Systems Corp. has been in business for 18 years, installing systems and advising facility operators and government leaders worldwide, with projects as far away as Kazakhstan in the former Soviet Union. In the United States, NSSC has used CBL routers at nine different sites since 1996. But many aging nuclear power plants are now updating systems that are 15 to 30 years old, and increasingly using fiber optic networked security systems. According to nuclear industry data, approximately one-third of the nation's nuclear plants now communicate over fiber optic backbones and could accommodate a security system using CBL products.

The NSMART access control system designed by NSSC includes a control center that can communicate via fiber optic cable to computers in the field, which process information from hundreds of sources - such as microwave, motion sensors, and passive and active infrared - in the area around the nuclear facility. Data from the sensors and field computers travel over copper wire or twisted pair, and CBL routers convert that data seamlessly into the LonWorks fiber optic communications system. According to Hayes, the volume of message traffic handled by the CBL routers is enormous - data from more than 1,000 sensors in some cases, traveling constantly through each router to the central computer, which reads and analyzes the information flow for security breaches at the plant or breakdowns in the system itself.

CBL routers are often mounted inside power plants, where they are bombarded by electromagnetic interference from massive turbines, tremendous vibration from the steam-generating process, and temperatures sometimes exceeding 130 degrees. "The equipment has to stand up to a lot of physical volatility," Hayes said. But those external factors do not impinge on the security system data or cause the CBL routers to malfunction, Hayes said.

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