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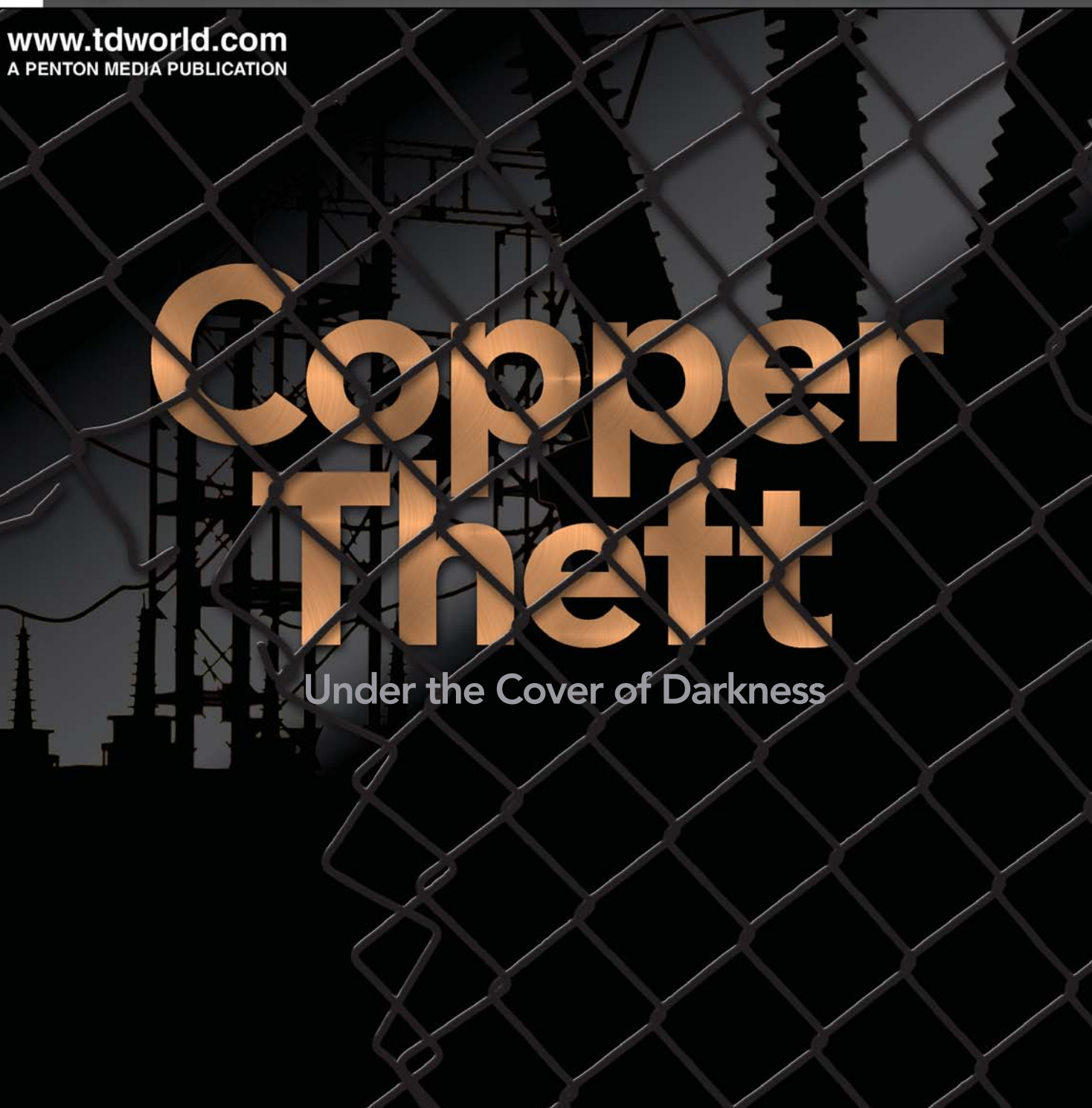


# Copper Theft

## Under the Cover of Darkness

# Copper Theft

## Utilities use an affordable, easy-to-deploy system to aid in apprehending copper thieves.

*By* **Scott W. McKenzie**, *Northeast Utilities, and* **Brian K. Smith**, *Progress Energy*

As copper prices plunged in late 2008, the theft of copper from many utilities was all but eliminated. Over the last several months, however, utilities have seen a resurgence in reports of copper theft that parallels the recovering commodity markets valuation of copper.

### Problem Scope

From August 2009 to October 2009, Progress Energy received 19 reports of copper theft totaling more than US$25,000. In fact, in the five years prior to the decline in prices, Progress Energy experienced more than 400 copper thefts, with losses and repair costs exceeding $1 million. Northeast Utilities estimates its losses associated with the theft of copper are in the range of $250,000 over the last three-and-a-half years. This includes the cost of material and labor to repair the damage caused by the thefts.

Locations impacted by these thefts ranged from individual distribution poles (i.e., ground wires removed) to storage facilities to unmanned substations. These thefts have the potential to impact service and reliability. But, the public and worker safety issues introduced by these thefts are even more important. If copper thefts continue to parallel the current rise in copper prices, utilities could see their losses from these events increasing dramatically. Based on rising commodity prices, the copper theft epidemic is back!

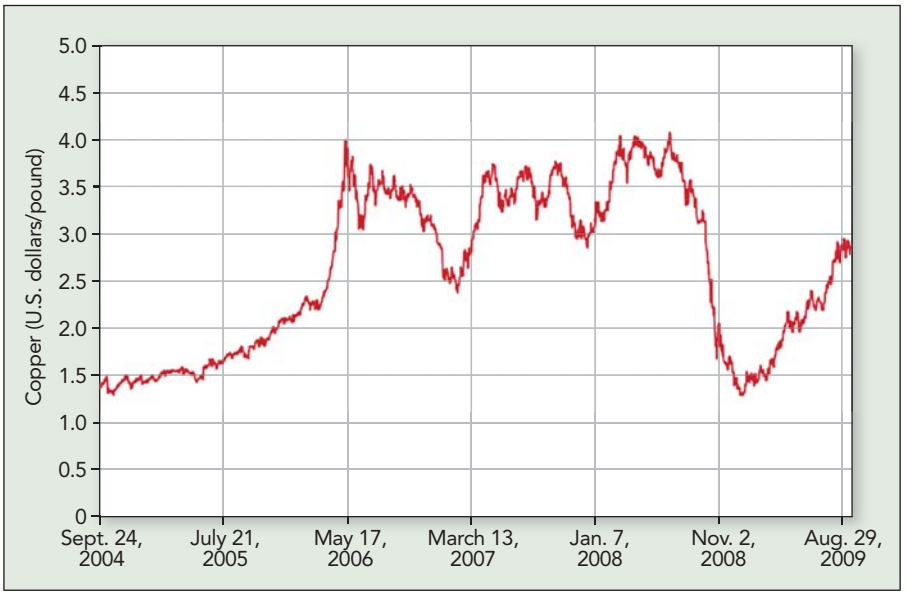
### Overall Prevention

There are many commonsense best practices to follow to minimize copper theft, such as always storing copper in highly secure areas when feasible. Where these methods are not available, copper is highly vulnerable. High-risk areas include work center storage yards, remote storage yards and substations. The number and remote location of these sites makes physical security difficult and costly.

In most cases, the only security is a 6-ft (2-m) chain-link fence and a padlock on the gate. At some locations, video surveillance with closed-circuit television (CCTV) and digital video recorders (DVRs) have been used. However, these systems cost $20,000 for a basic substation and much more for larger facilities. They also require access to power and a network, which are not always accessible.

As if to compound the problem, today's security budgets are shrinking, not growing. Replacing ground wires that are

Thieves will steal coils of copper wire if they can get them; otherwise, they will go after the copper making up the grounds (left). Often, the criminals will just cut the sections off (right). The more enterprising thieves will tie the ground to a truck and see how much can be exposed before cutting.




The price of copper over a five-year span.

stolen from a substation can take a crew a few days, depending on the damage involved. And, the cost to repair the problem can be several thousand dollars, not counting the risk of service interruption.

Beyond direct costs, there are also significant safety issues. Copper theft is sometimes unnoticed by maintenance personnel, putting them at serious risk.

In addition to employee safety, there are public safety ramifications. Typically, copper thieves gain access by destroying a gate lock or cutting fences. In the event an unmanned site is accessed, it could be days before the theft is discovered, leaving the method of entry open. Additionally, utilities have been sued when thieves have died or been injured while attempting to steal copper.

Both Northeast Utilities and Progress Energy have been exploring ways to combat copper theft. As would be expected, each utility has a different approach, some of the methods are portable and some are permanent. While their needs varied, both utilities were looking for a solution that was affordable and effective.

## Northeast Utilities' Early Experience

While copper thefts at substations have not historically been a problem for Northeast Utilities — like so many other utilities — it has a long history of copper theft at various locations, including work center storage areas and remote construction storage sites. These remote sites are typically located next to substations and consist of a 6-ft fence and barbed wire around construction trailers, vehicles and supplies. The targets are mostly spools of copper wire on trucks or in storage. Northeast Utilities considered CCTV, but these sites were mostly temporary and the installation of this level of equipment was too expensive to justify the cost.

In 2008, thieves hit a temporary storage site at a building being leased in Connecticut, and Northeast Utilities decided to look into a temporary security system. The utility's manager of system security had spoken to a colleague who was having success with a new wireless system called Videofied from RSI Video Technologies. Videofied is a cordless, wireless video security system built around its MotionViewer, a device the size of a coffee cup that combines passive infrared motion detection with a video camera and infrared illumination for nighttime vision.

The concept is simple. The MotionViewer detects and sends a 10-second video clip of the intrusion over the cell network to a monitoring station. The clip can then be reviewed in real time, and if indicated, police can be called to the site for an apprehension. MotionViewer is much different than other video surveillance systems where recordings are archived and usually reviewed after the fact.

When Northeast Utilities was hit a second time at the same location with significant losses, the utility contacted Clayton Kemp of USA Security Group (now Universal Monitoring) to test Videofied and its MotionViewers. Two MotionViewers were installed on site, one by the door the thief had used as an entry point and another overlooking the wire storage area. Within a week, the same location was hit again at a $4000 loss. The crew working out of the site had forgotten to arm the system before leaving. This prompted use of the system auto-arming feature.

A couple of days later, Northeast Utilities had a fourth hit, and this time the utility had video footage of the thief coming in the door and footage of him approaching and picking up the wire. Police were dispatched by the monitoring station and the individual was caught in the building red-handed — the utility's first apprehension. Operators liked that the system was entirely cordless and wireless. It could be moved wherever they needed instant security.

Northeast Utilities purchased a second system to secure a substation grounding grid being installed at a new substation under construction in Connecticut. Two teenagers entered the job site one night. USA Security saw the video alarm and dispatched police who chased the intruders off the site before anything was taken.

## Northeast Utilities' Continued Use

As its confidence with the system grew, Northeast Utilities became proactive and began involving local law enforcement in its efforts. The utility's goal was to educate the local police about the new system, demonstrate what it could do and have them commit to providing priority response to its video-verified alarms. The utility's experience has been that every time it informs the local police of the new system and what it is doing with the system, the police go out of their way to work with them. The police like arresting thieves. They know when the monitoring center calls, a thief is actually there.

Recently, Northeast Utilities installed a system at a remote

construction storage site where it had experienced ongoing thefts. Shortly after installing the system, a video alarm went off when two individuals approached the fence at the point of previous entries. USA Security dispatched police immediately. Apparently, the arrival of the squad car scared off the individuals. During their investigation, the police were informed by a witness at a location near the site that as soon as the squad car left, two individuals had come out of the woods and were picked up by a car. But even if the thieves flee before the police arrive, police know it isn't a false alarm.

USA Security provided Northeast Utilities the video alarms from that night, including video of the responding police officers at the yard. The utility showed them to the police the next day to demonstrate how the system works, and the officers were very impressed. Being able to demonstrate the effectiveness of the system helps in building a relationship with local law enforcement.

At the end of August 2009, in conjunction with the rise in copper prices, Northeast Utilities saw a dramatic rise in copper thefts at its substations in Massachusetts. Thieves were removing the copper grounding wire on equipment. These types of thefts had occurred at Northeast Utilities' facilities before, but never so many in such a short period of time. Seven stations were hit within a week. The utility decided to order additional systems to combat these thefts. And, before the systems arrived, it was hit six more times, twice at new sites and

The cameras are easy to set up. In this case, mounting posts are secured to the station perimeter fence with the cameras attached. Since the system is wireless, it can be deployed and re-deployed to suit changing circumstances.

Images such as these are captured by the MotionViewers. Infrared illumination allows the devices to detect motion and then provide a video clip of the action. This is transmitted to a manned monitoring station, which then places a call to the police to report a robbery in progress. Video clips of the apprehension have also been recorded.

repeats at four others. There had been 13 thefts in less than three weeks.

With about 50 substations in the area, Northeast Utilities deployed most of the Videofied security systems in substations that had already been hit and the rest in locations near that activity. The utility's own staff installed the systems, including one site with five MotionViewers in less than two hours. Apparently, news of the systems got around, because since deployment, the thefts have stopped. From a cost-benefit perspective, deterring one theft pays for the system. Northeast Utilities has had thieves apprehended or flee at the approach of the police. In either case, the utility now has an affordable mobile temporary solution to protecting its copper.

## Progress Energy's Experience

Progress Energy's concerns regarding copper theft were focused on areas that did not previously have some sort of security system or oversight. It had experimented with CCTV and DVRs but decided against them for two reasons. At around $20,000 each, these systems were expensive and they did not detect and notify. After thefts were noticed and reported by field personnel, sometimes a week after the fact, security would have to begin an investigation using whatever evidence was at hand. In some cases, through the use of a CCTV system, the incident was captured on a recording, but the utility was unable to identify the perpetrator.

Progress Energy was introduced to Videofied by another

"Copper thieves are threatening U.S. critical infrastructure by targeting electrical substations … The theft of copper from these targets disrupts the flow of electricity … and presents a risk to both public safety and national security."

A recent FBI Criminal Intelligence Assessment

A typical perimeter security breach. Photo courtesy of BC Hydro.

utility. Progress Energy contacted that utility's integrator, Intelligent Access Systems, to arrange a demonstration system utility. Progress Energy contacted that utility's integrator, Intelligent Access Systems, to arrange a demonstration system to be installed at one of its troubled substations. The price was a fraction of the cost of a CCTV system, about what it cost to replace the ground wires when a substation was hit. Along with the benefit of being more cost effective, the Videofied system was an ideal application because it did not need the infrastructure required of CCTV. It was truly portable. These sites do not typically have business network, low-voltage cable raceways or ac power outlets in areas where cameras need to be installed. Videofied MotionViewers will run for up to four years on batteries and transmits the alarms and video footage over the cell network.

The night after Progress Energy had the demonstration system installed, there was an attempted theft. Local law enforcement responded and the perpetrator fled. There was no apprehension, but site damage and losses were prevented. This quick success made it easy to decide to purchase the demonstration system and leave it in place. The return on investment happened in less than 48 hours.

In working with the system, Progress Energy noticed that responding law enforcement oftentimes alerted perpetrators of their arrival, and the suspects would flee without being apprehended. Therefore, the utility found it was key to work with the local law enforcement and educate them on the use of the system. This meant inviting local police to the sites, conducting a demonstration and providing them a means to access the secured site, which was accomplished by installing combination locks on substation gates that are dedicated to the law enforcement agency. This made all the difference. Responding officers were now able to enter the property on foot, without the noise and lights of a vehicle, and catch the thieves in the act of removing copper.

## Progress Energy Today

Intelligent Access Systems has been Progress Energy's security systems integrator for several years. Intelligent Access is more than just an ordinary security systems vendor, it is a security systems resource that partners with the utility's corporate security department to provide industry expertise. Intelligent Access has designed an easy-to-install gimbal mount that Progress Energy personnel use to do their own installations. It has two stainless-steel clamps that are installed on poles in the substation. The first system the utility installed worked right out of the box. The early false alarms were due to failing to disarm the system. After a short learning curve, this is no longer a problem.

Progress Energy has installed many Videofied systems throughout its three-state enterprise. Thanks to these systems, significant damage and loss have been averted. The bulk of these systems are installed permanently at high-risk sites, but the manner in which they were installed allows Progress Energy the option to quickly remove and relocate any system.

This mobility is beneficial to construction crews who can deploy systems to protect equipment and copper at sites that have no infrastructure. Some of these systems are installed to complement existing CCTV systems. By adding MotionViewers in key areas, the overall surveillance system is dramatically improved. When the Videofied system detects an intruder, there is an alert and a log entry into the surveillance cameras in real time to coordinate a response. TDW

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**Brian K. Smith** (brian.smith@pgnmail.com) is a lead security specialist at Progress Energy. He has more than 18 years of experience in security system design, security system installation/service, security management and security consulting. Since 1999, he has worked directly with power/utility clients throughout the East Coast. He is a Certified Protection Professional and member of the American Society for Industrial Security.

**Editor's note:** For more information, visit www.coppertheft.info.

**Companies mentioned in this article:**
Intelligent Access Systems **www.iasnc.com**
RSI Video Technologies **www.videofied.com**
Universal Monitoring **www.universalmonitoring.com**