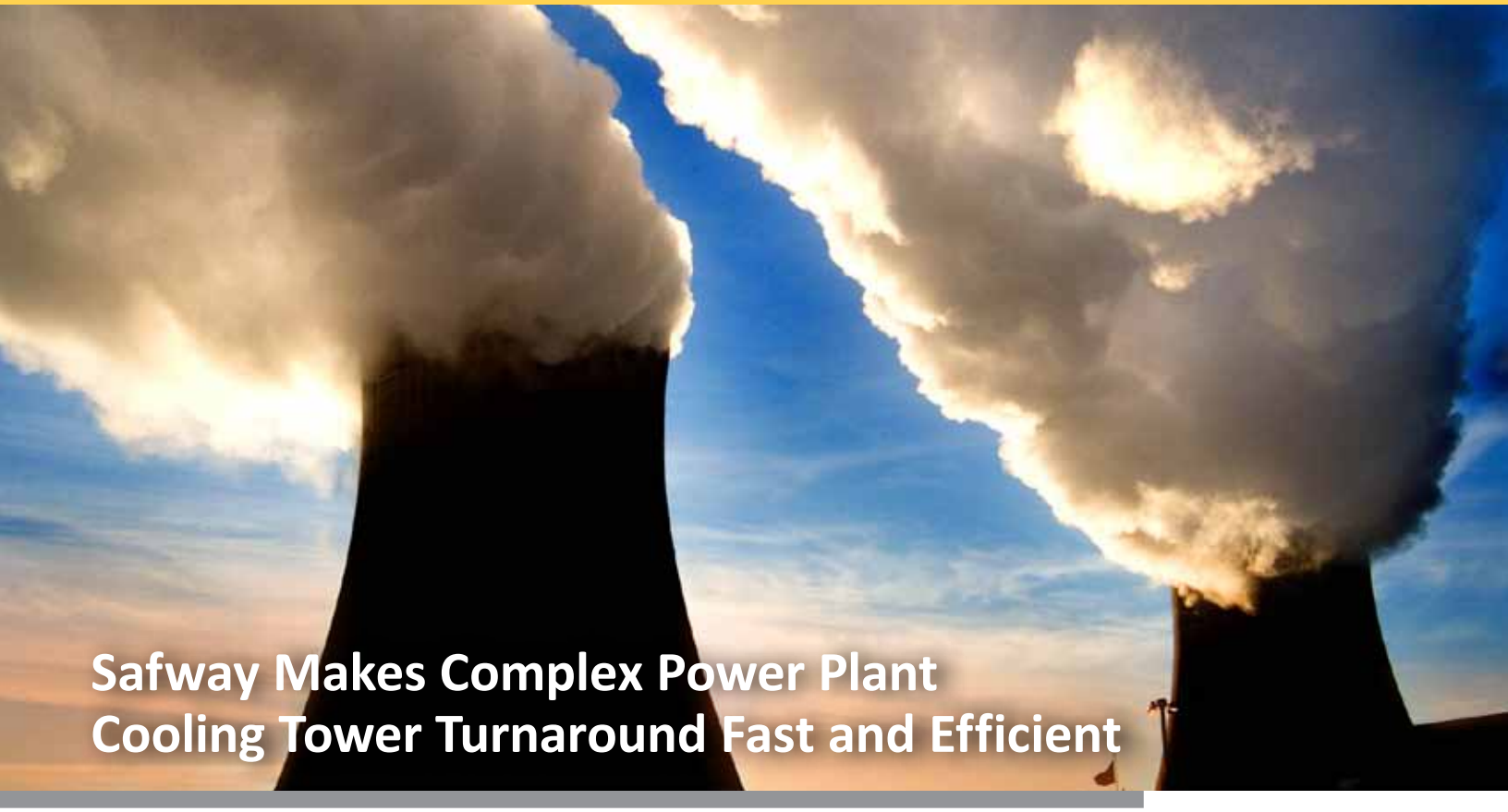

# Safway Makes Complex Power Plant Cooling Tower Turnaround Fast and Efficient

It started when Exelon engineers found heat-transfer fill packs in the pool of cool water 45 feet below their normal perch at the Byron Generating Station nuclear power plant in Byron, Ill. Over years, the fill packs, which weigh less than 100 pounds new, had bulked up to about five times their original weight, due to the accumulation of silt and microorganisms. Occasionally, the fill packs became so heavy that they would break off and fall from their attachments – which they are designed to do to ensure they can't damage the internal tower structure with their additional weight.

Exelon decided to completely replace all the fill packs and drift eliminators (companion devices in the cooling process) in both of the Byron plant's towers – more than 5,000 components in all – in consultation with SPX Cooling Technologies, Exelon's cooling tower manufacturer. And because the plant can't operate without the cooling towers, the work had to be done within two three-week windows, six months apart, while reactors were shut down for routine scheduled refueling. Planning was critical. Surprises, delays or complications would affect Exelon's ability to deliver electricity to Northern Illinois.

## Working quickly and safely

SPX's first challenge was getting access to the fill packs in a way that would allow them to work quickly and safely. SPX has a longstanding relationship with Safway Services, the national access and industrial services company. So long before the project start date, SPX enlisted Safway's expertise at the Byron Generating Station. Safway specializes in complex industrial environments where planning, efficiency and safety are all critical to success.

Duane Krehbiel, director of MCT Services Construction at SPX and the project manager for the job, said the tight timeframe meant SPX needed a very reliable access partner, with not only the ability to provide equipment for the unusual environment but also the experience and skills to plan and manage the installation intelligently to minimize the risk of delays.

"We know Safway has the right equipment, and we know they have the design (engineering) services we need for an environment like this," Krehbiel said, adding, "With a job like this there's a lot of work up front, and we know Safway will do it right."

"SPX knew about scaffolding so they had a good starting point," said Jim Waichunas, Safway Tracking System coordinator for Safway's Eastern Division. "From there, we looked at

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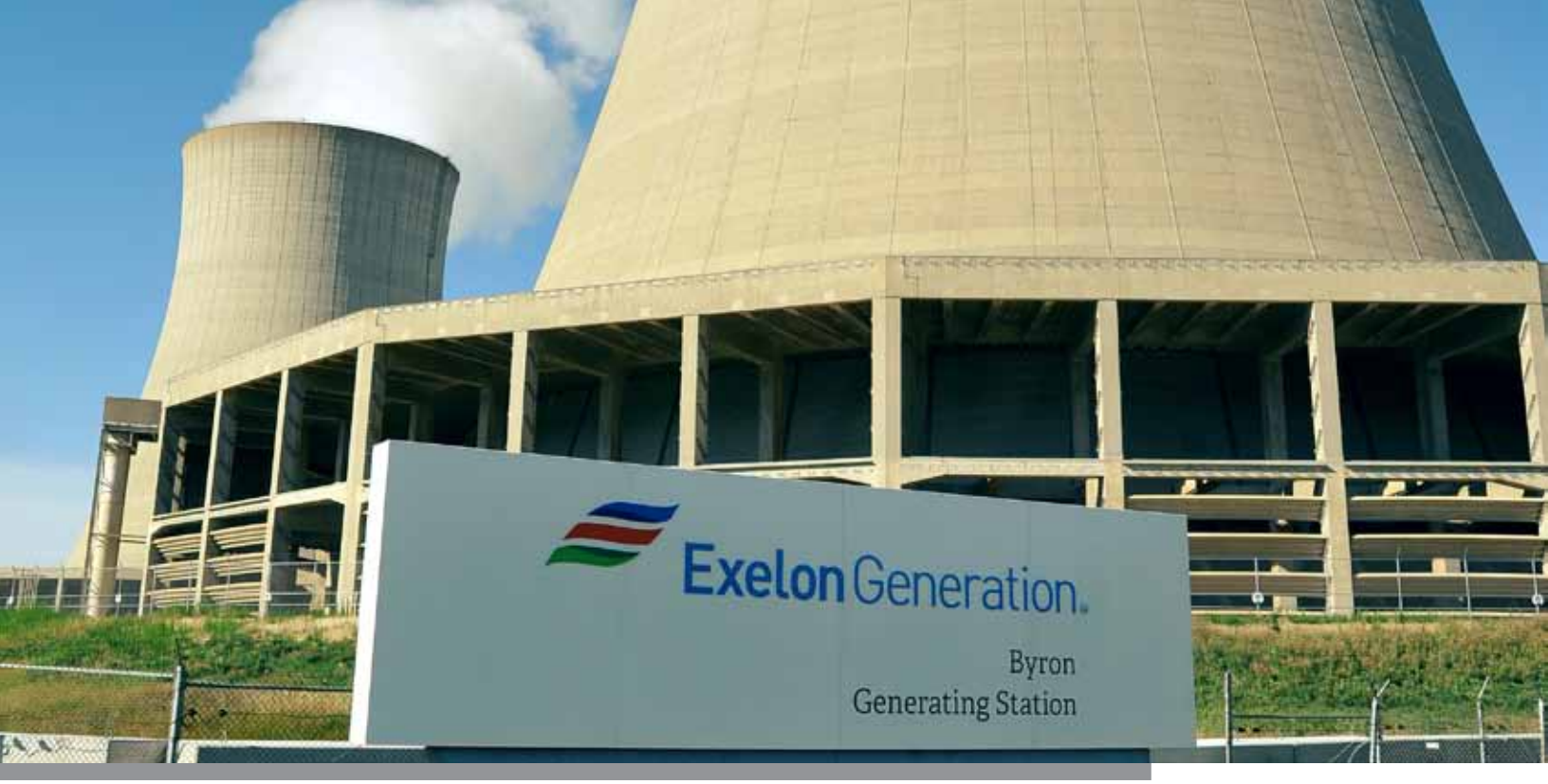


"We know Safway has the right equipment, and we know they have the design (engineering) services we need for an environment like this."

*- SPX Cooling Technologies*

the site needs and all the options, and provided them with a plan, ranging from engineering, management and safety, through delivering equipment and scheduling an experienced team to erect it all.

"As for equipment, we landed on our Systems™ Scaffold for the Exelon site," he said, noting, "Systems can take the shape of concave or convex circular surfaces, making it uniquely suited for large industrial vessels, tanks and towers like the Byron project." He added, "It's also easily adapted to sloping floors and irregular, difficult-to-reach spots like ceilings and balconies."

Additionally, Systems Scaffold is quick to erect and dismantle, making it ideal for turnaround projects. Systems has a proven safety record in a wide range of work environments, has passed all seismic qualification tests of Class 1E equipment and is in full compliance with the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE) Std 344. In addition, Safway's seismic qualification test input was also greater than any other known seismic qualification test of scaffold in its class.

The Safway Tracking System, a proprietary software program to manage all the resources for a project – from time and materials to inspections – was used to monitor every aspect of the job. "The Safway Tracking System provides a clear picture of costs and bottlenecks and helps us to stay on top of other key performance indicators in real time," said Waichunas.

## Installation begins

Two weeks prior to the first Byron outage in August 2012, Safway's crew began erecting the Systems Scaffold ramps in an outer ring of the cooling tower that was not under the water spray.

"Our crew of about 12 went in before the outage and erected access ramps," Waichunas said, noting that this was no standard scaffolding erection.

"The bottom of the tower was still filled with eight-and-a-half-feet of water," he said. "Exelon couldn't drain the water until the outage began."

**“The bottom of the tower was still filled with eight-and-a-half-feet of water. Exelon couldn’t drain the water until the outage began. So Exelon brought in divers – as in, underwater workers – who, directed by a Safway team, erected the Systems™ Scaffold base underwater. It required good planning because there was a pretty strong current moving through the water.”**

*- Jim Waichunas, Safway Services*

So Exelon brought in divers – as in, underwater workers – who, directed by a Safway team, erected the Systems Scaffold base underwater.

“It required good planning because there was a pretty strong current moving through the water,” Waichunas added.

Once the reactor outage began, the Safway team quickly built the ramps up to about 45-feet high, 90-feet long and 21-feet wide, so the SPX crew could reach the eliminator packs at the top of the apparatus.

Only after the ramps were fully erected did most of the Safway crew depart, and the SPX personnel got to work on the fill pack and eliminator change-out. Using roller racks on the ramps, the materials were lowered down for disposal, and new ones were brought up. Throughout the job, a small Safway team stayed on site around the clock to monitor safety and meet any immediate maintenance needs.

Krehbiel said SPX and Safway actually had worked out a plan B to allow work in wet areas with a partial shut-down of the spray system, if the job went longer than three weeks. Fortunately, they didn’t need it.

The second tower was done about six months later, following a similar schedule.

In both cases the SPX team accomplished its mission in the allotted three weeks, after which the Safway crew finished removing the scaffolding – about a two-week job.

“The take-down was actually done in phases, because our crew dismantled sections of scaffolding where the replacement of materials was finished,” Waichunas, said. “Systems Scaffold is also simple to take down, which makes things more efficient.”

SPX was able to finish the entire project on time with no major incidents, allowing Exelon to keep juice flowing to millions of Illinois businesses and homeowners right on schedule.

Through **SMART Safety** practices, **SMART Planning** methodologies, **SMART Process** discipline and **SMART Technology** advancements, our **SMART People** come up with ideas every day to deliver **THE SMART WAY™** The result? Safe, productive work sites – and the lowest total installed cost.

# **Science 101:** Cooling Towers

Nothing says energy like a couple of massive hyperbolic curved towers rising on the horizon, with little clouds lingering at their tops. But while power plant cooling towers may seem permanent and impassive, they require skilled attention and ongoing maintenance.

At most large electrical generating plants, water is boiled to make steam, which drives a generator. Electrons flow, and the lights stay on. But in fact, all that steam needs to be turned back into liquid water to complete the cycle. This may not be as exotic as splitting atoms, but it's no less important.

To do this, outside cooling water is circulated over the steam pipes. And in the process that cooling water gets hot. So just as in a car engine, the cooling water needs to get rid of its heat. But whereas a two-liter car engine might produce 150 kilowatts, a generating plant may produce 2 million kilowatts or more on a good day.

That's where the curvy towers come in. Inside the tower, the hot cooling water is pumped up about 45 feet and sprayed over packs of plastic film material that diffuses the water. Above are drift eliminators, which reduce misting from the spray, and under those are fill packs, basically cubes, several feet on a side, that are made of a series of thin plastic surfaces arranged vertically. It's sort of a giant oblong honeycomb structure. The water pours down through the fill packs and rains out the bottom. The water cools as it falls, and the air around it gets warmer. This warm air rises. The tower is open around the bottom, and its distinctive shape creates an upward draft – which is why you can often see those little clouds at the top.

Under the tower is a large pool of now-cool water, which is piped in to the plant to cool the steam coming off the turbines. (This is done with a heat exchanger, so the outside water never mixes with the water going through the turbines.)

The problem, however, is that water from the outside environment contains small amounts of silt or other natural debris that can collect on the fill packs. A film of biological microbes also grows on the surface of the fill. So over many years, the fill packs clog up and gain weight. Eventually many of the fill packs, which weigh less than 100 pounds new, bulk up to about five times their original weight – and become so heavy that they can collapse and fall from their attachments.

This is exactly the issue Exelon was facing at the power plant in Byron, Ill., when they brought in SPX Cooling Technologies.