



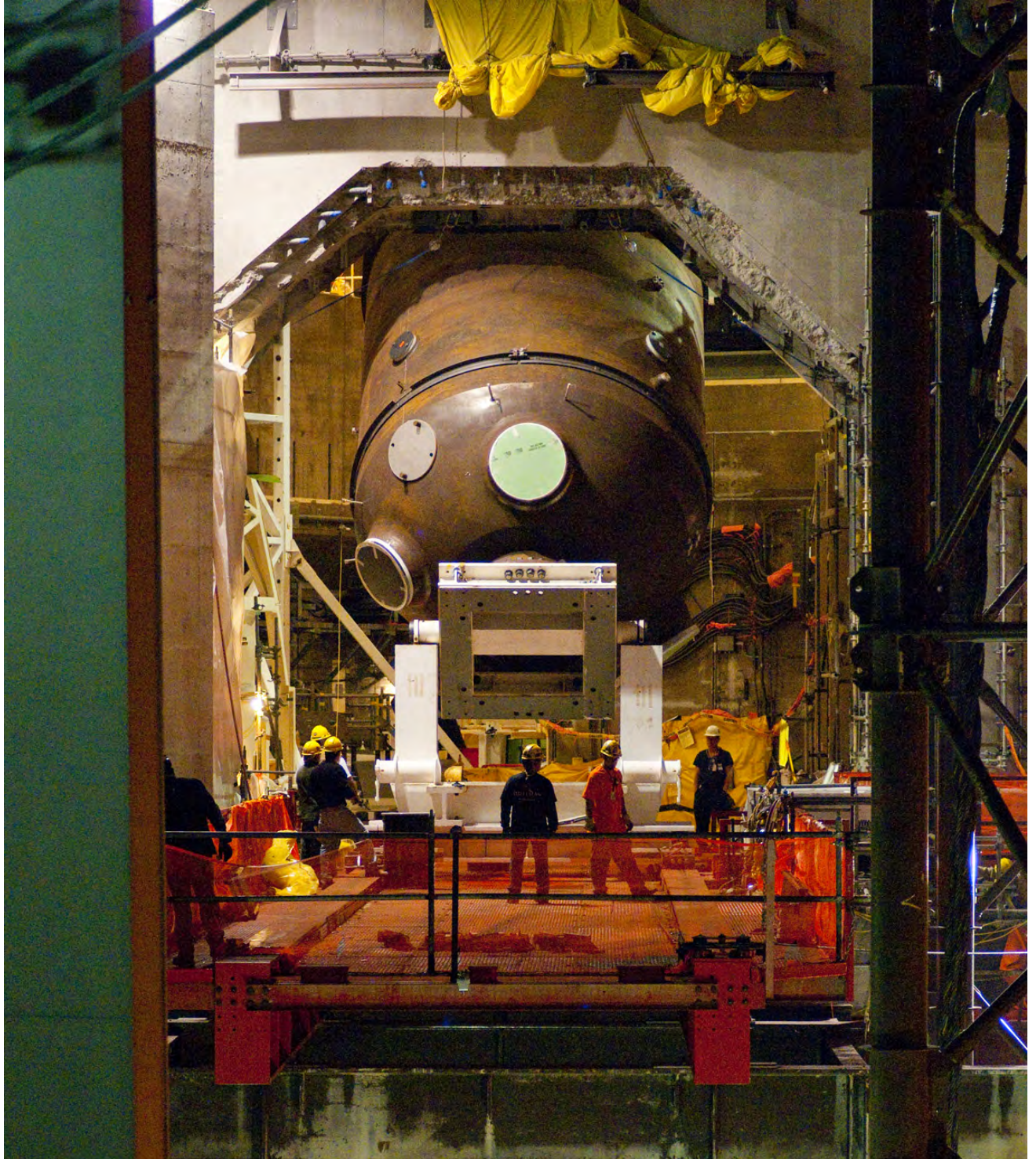
How Bechtel makes short work of replacing steam generators in nuclear power plants.

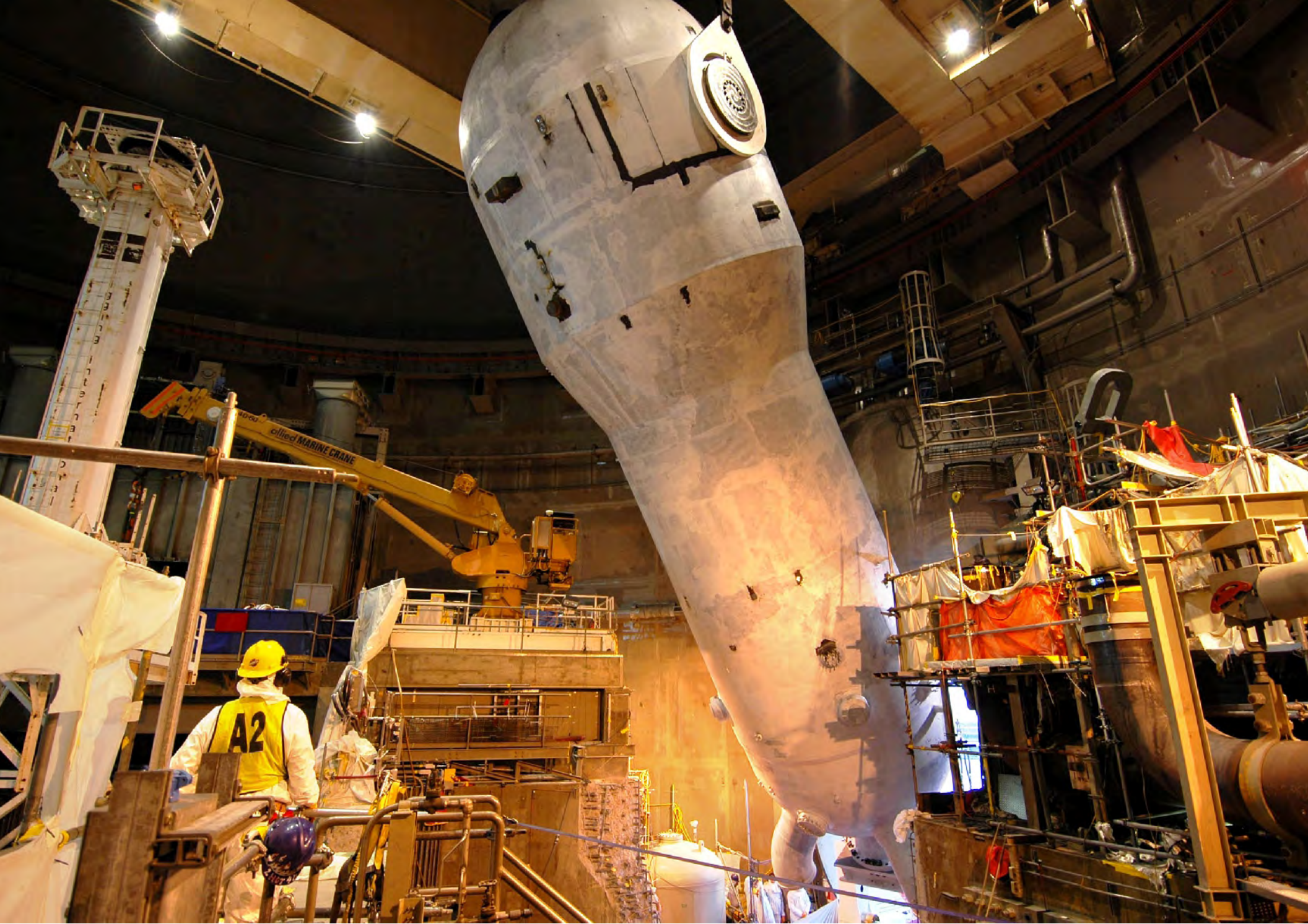
A CUT ABOVE

As things get older they need maintenance. Cars need new transmissions, roads need resurfacing, houses need painting. It's no different for nuclear power plants. Some of their components begin to wear out over time and must be replaced—especially the steam generators that transfer reactor heat to produce nonradioactive steam that drives the plant's turbines.

A typical steam generator in a pressurized water reactor has more than 3,000 alloy tubes, through which radioactive water is pumped under high pressure. The tubes were expected to last for 40 years, but metallurgical reactions and chemicals in the water can shorten their lives. As individual tubes wear out, they're plugged shut, but when about 15 percent of the tubes have corroded, it's time to replace the generator.

Although swapping an old steam generator for a new one seems straightforward, the process is not exactly plug-and-play. Replacement generators can be more than 66 feet (20 meters) tall and weigh more than 770 tons (700 metric tons), making them difficult to lift into position and install. They aren't exactly identical to the aging generators they replace, so they require new piping and connections. And the only way to gain access to the old generators in many big





plants is to cut a hole in the wall of the containment building that houses the reactor, because the maintenance doors are too small and there is little room to maneuver equipment inside.

As if that weren't challenging enough, the job also must be completed as quickly as possible to minimize downtime for the plant. Utilities usually try to schedule maintenance work during an SGR project, but that doesn't mitigate the loss of power generation—and revenue—that accompanies an outage.

It takes expertise and vast experience in the nuclear power industry to pull off a successful steam generator replacement. That's why plant owners turn to Bechtel. We designed and built many nuclear plants in the 1960s, '70s, and '80s, and since the 1990s, we have performed more than 30 SGR projects, helping extend plant life in the United States and elsewhere.

Currently, we are finishing the first of two SGR projects at San Onofre in Southern California, and we recently signed a contract to perform a similar job at Davis-Besse in Ohio. Bechtel was the architect engineer for both San Onofre and Davis-Besse when those units were constructed in the 1970s and '80s. We also performed a reactor pressure vessel head replacement at Davis-Besse in 2002.

Carl Rau, president of Bechtel Nuclear Power, called the latest Davis-Besse project "another opportunity to



meet our customer's expectations through our ability to deploy high quality experienced teams and our in-depth knowledge of the work."

If you're looking for a textbook SGR project, consider Comanche Peak, a 2,300-megawatt, two-unit power

plant in Glen Rose, Texas, where Bechtel replaced the four steam generators and reactor head at Unit 1. The plant's owner, TXU, challenged us to match or beat the time of previous SGR outages, despite the fact it was more complex than comparable projects.



Following 2 ½ years of planning, the project began with the shutdown of the unit on February 24, 2007. On April 20—55 days later—the job was complete and the unit went back online, beating the previous world-record for brevity of an outage by more than a week.

On the project's first day, the worst dust storm in 20 years hit north-central Texas, darkening the sky amid winds reaching 50 miles per hour—and effectively idling most of the project's equipment, including cranes and people lifts. When the dust settled, other challenges took center stage. The containment building at Comanche Peak is exceptionally tall at 260 feet (79 meters), and the steam generators are unusually high within the building. That meant workers had to cut the access hole, swap the generators and repair the hole nearly 100 feet (some 30 meters) above ground, higher than any previous wall access on a Bechtel SGR project. A special lifting device, called an outside lifting system, was used to lower the retired generators to the ground. The same device was used to raise the new equipment.

Not every SGR project gets named a Top Plant of the year award by Power magazine—an honor accorded to Comanche Peak. But Bechtel has gotten pretty good at completing such projects on time, and doing it safely. At Comanche Peak, the team completed the million-job-hour outage with no lost-time accidents.

By replacing steam generators and other aging components, Bechtel will continue to bring new life to older nuclear power plants. We also are poised to lead in the design and construction of a new generation of nuclear plants that will revitalize the industry, reducing dependence on fossil fuel, and helping fight climate change.