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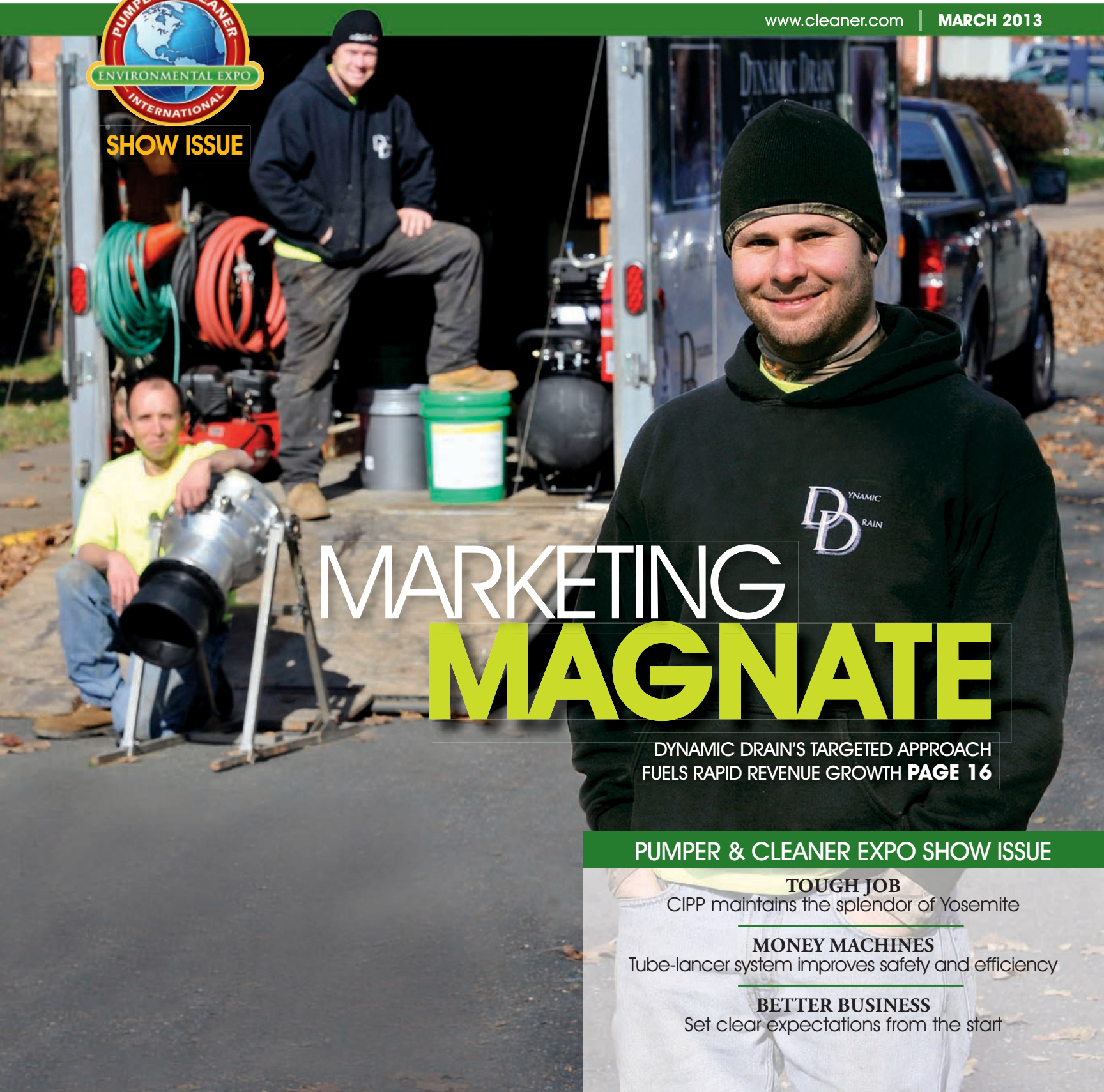
PUMPER & CLEANER ENVIRONMENTAL EXPO INTERNATIONAL

SHOW ISSUE



MARKETING MAGNATE

DYNAMIC DRAIN'S TARGETED APPROACH FUELS RAPID REVENUE GROWTH **PAGE 16**

PUMPER & CLEANER EXPO SHOW ISSUE

Workers from Express Sewer & Drain in Sacramento, Calif., manually lower 520 feet of cured-in-place pipe lining material 30 feet over a boulder and hand-feed it into a continuous manhole-to-manhole Top Gun inversion unit. (Photos courtesy of Express Sewer & Drain)

Shooting Star

CONTINUOUS CURED-IN-PLACE LINING PROCESS HELPS A CONTRACTOR RESTORE A WATER MAIN AND PRESERVE A NATIONAL PARK'S SPLENDOR

BY SCOTTIE DAYTON

tough job

PROJECT:	**Rehabilitate small-diameter steel water pipe on a tight deadline**
CUSTOMER:	Yosemite National Park Service
CONTRACTOR:	Express Sewer & Drain, Sacramento, Calif.
EQUIPMENT:	Top Gun continuous lining system, Perma-Liner 866/366-2568 www.perma-liner.com
RESULTS:	Water flow restored, deadline met

A deteriorated 700-foot-length of 8-inch steel water main feeding the private water treatment plant for the south side of Yosemite (Calif.) National Park was leaking.

The National Park Service had replaced all but this section of the 95-year-old line with C900 pipe. It was encased in a 4-foot-square block of concrete embedded with river stones the size of bowling balls. The massive aboveground structure paralleling the Tuolumne River prevented the pipe from washing away in spring floods.

The 8-inch steel water main is encased in concrete and decorated with river stones to blend into the landscape. The structure prevents spring floods from washing away the pipe.

Excavating the main would disturb the environment, cost millions of dollars, and wasn't an option. The prime contractor for federal projects looked for a subcontractor to rehabilitate the main, but no one would touch it until he approached Express Sewer & Drain in Sacramento.

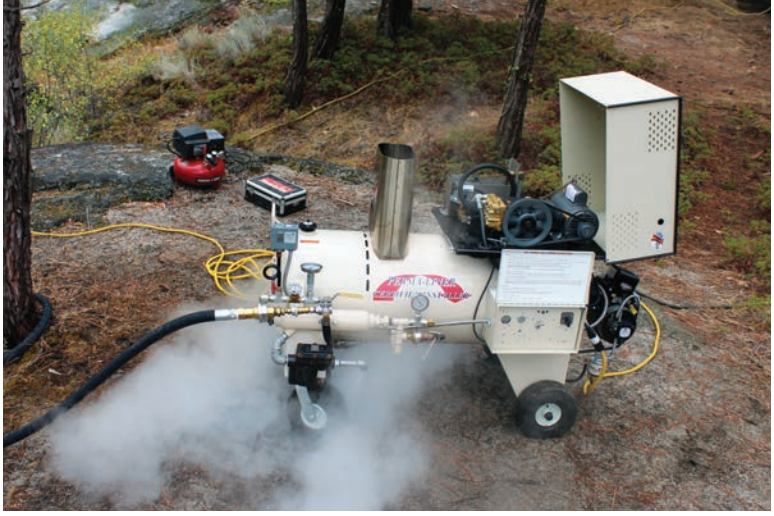
"The site – elevation 6,192 feet – was 1.5 miles off a paved, one-lane private road going up the mountain," says company owner William Heinselman. During the walkthrough, he had no idea how to get the necessary equipment that far into the wilderness.

"We've done some nasty projects before, but this was the most difficult," says Heinselman. Despite multiple challenges and a three-day deadline before the water plant would exhaust its reserves, the crew lined the main and finished on time.

GETTING THERE IS HALF THE FUN

The job needed a combination sewer truck, refrigerated truck, camera inspection van, air compressors and generators, and a manhole-to-manhole continuous cured-in-place lining system from Perma-Liner Industries. The eight-member team spent 10 hours mobilizing tools and equipment.

"The area was so remote that we packed a backup for everything except the 2012 Vac-Con V309 sewer truck," says Heinselman. Before leaving the



The black hose to the right of the Viper compact steam unit goes 100 feet down the hill to the steam manifold. The black water hose going off to the left supplies water to the boiler from a modified 300-gallon 4018 trailer-mounted jetter from US Jetting.

"We've done some nasty projects before, but this was the most difficult."

William Heinselman

company's warehouse on Sunday, they wetted out two liners using a nontoxic, volatile organic compounds-free resin supplied by the park service, then transported it in a rented refrigerated box truck.

Traveling the last 1.5 miles to the site took two hours. After leaving the private road, they bounced slowly over a fire road for one mile. The last half-mile had no road, and the park service forbid them from cutting trees.

"We found remnants of a temporary road built in 1916 when they encased the pipe," says Heinselman. "We could still see bits of it here and there in little clearings." Drivers squeaked through spots so tight they broke a mirror on the sewer truck, which was carrying a 9-cubic-yard debris tank and 3,000-gallon freshwater tank. Often only an inch of clearance separated vehicles from rocks on one side and massive trees on the other.

LAY OF THE LAND

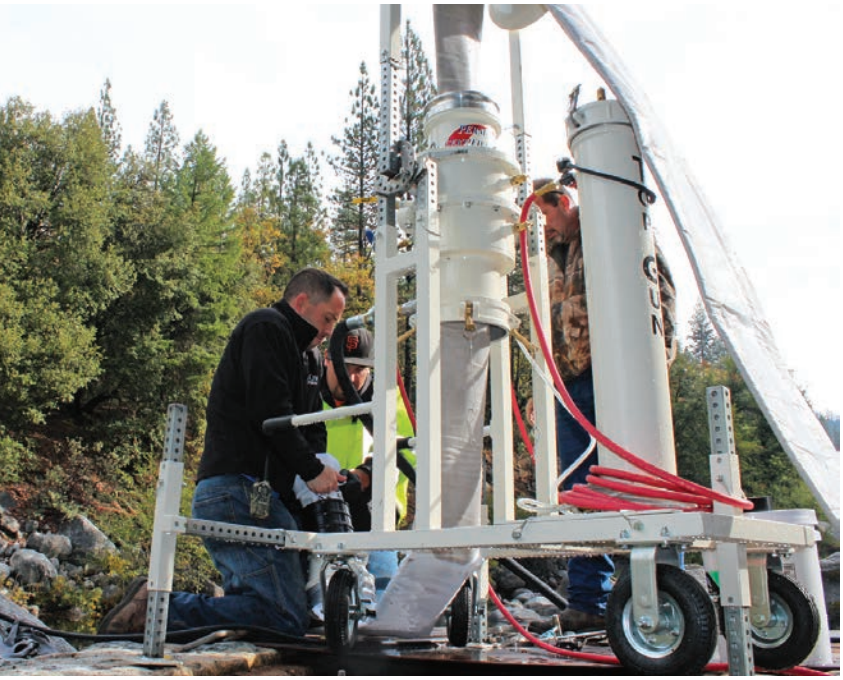
A downstream concrete junction box housed the water main where it intersected with the C900 pipe. Another concrete box 520 feet upstream protected the water intake pipe's juncture with the main. The steel pipe ended another 185 feet downstream from the junction box at a depth of 18 inches.

"We got the sewer truck as far as the downstream box from which we'd clean the pipe, but we were still 15 feet above it," says Heinselman. Temperatures hovered around 38 degrees and rain fell most of the first day, making footing treacherous.

Workers removed the steel plates covering the downstream box, then cut out the 4-foot length of C900 at the bottom to access the steel main for cleaning using 50 gpm/3,000 psi and a Bulldog rotating nozzle from Enz USA. They monitored the process with an OZIII zoom-pan-tilt camera and the K2 Summit power control system from CUES.

"The guys struggled to feed that much 3/4-inch hose down the slope and up 700 feet of pipe," says Heinselman. "Our inspection found numerous cracks and pinholes, but no major sections were missing."

Required to capture every drop of waste, the sewer truck operator made three trips to the park's wastewater treatment plant to empty the debris tank. They finished prepping the pipe in four hours, then retired to a hotel for the night.



William Heinselman, left, struggles to force the stiff lining material over the inversion head before clamping it.

TUESDAY: DAY TWO

The next day, the crew maneuvered the remaining vehicles to the intake box, but they were 30 feet above it. A flat, moss-covered granite boulder sat behind the box, and behind it the steep canyon wall.

When Heinselman first walked the job, it was dry, sunny, and 70 degrees. "None of us believed we were in any danger of slipping or falling, and we were comfortable that together we could set up the compact lining system," he says.

But temperatures had fallen to the mid-20s on Tuesday, and the accompanying dampness created slick conditions. "We held a safety meeting while eating breakfast and I made sure everyone knew what he would be doing," says Heinselman. Work began at 9 a.m.

Although the 250-pound inversion unit had legs and wheels, controlling it going downhill was a Herculean task. "At one point, every guy was hanging on," says Heinselman. "We never realized going down the slope and over a granite boulder would be so difficult."

With the inversion unit positioned over the open intake junction box, workers pitched a 10- by 10-foot canopy shelter to keep the manifolds controlling steam and air pressures dry. They wheeled the Viper compact steam unit with 1-inch hoses onto the top of an adjacent boulder, then attached the water line to a modified 300-gallon 4018 trailer-mounted jetter from US Jetting.

Meanwhile, the park service exposed and removed 6 feet of C900 and the compression fitting joining it to the steel main at the upstream end.

ANYTHING BUT NORMAL

To shoot the 520-foot-long 8-inch liner to the downstream box, a worker attached to a tree by a safety line inched the material over the side of the boulder. "The smooth moss was great for moving the liner, but not good for traction," says Heinselman. Three workers then carried the liner to the inversion unit, hand-fed the material onto the tower roller, and shoved it down into the gun's diaphragm bladder.

Heinselman struggled to force the stiff material over the inversion head before clamping it. "Normally, the liner unfolds out of the refrigerator truck, feeds over the roller and into the gun," he says. "It takes probably 15 minutes to shoot 520 feet. This time, it took two hours because we fed every inch by hand."

A 400 cfm air compressor held pressure on the bladder at 15 to 20 psi, but it required every unit of volume the device had to send the liner through the pipe. Curing took six-and-a-half hours with one worker controlling the steam and air pressures and another with a walkie-talkie at the exit box to relay temperatures from a thermocoupler. "The wire was about a foot inside the host pipe and on the bottom of the liner," says Heinselman. "We collected data every 10 minutes throughout the cook time."

After the liner cured out, the manifold operator shut off the steam, but maintained air pressure at 7 psi for about an hour to cool the material. As darkness fell, flashlights, head lamps and halogen lights powered by four generators illuminated the area. Once the liner neared ambient temperature, workers cut away the protruding material at both ends and replaced the removed section of C900 with stainless steel pipe.

Near midnight, they shot the 185-foot-liner upstream. Two hours later, it arrived at the opening in the C900 pipe. From 2 a.m., the crew took turns monitoring the steam gauges as the liner cooked for three hours. The others slept in the trucks. "I wanted everyone there in case something went wrong," says Heinselman.

GOING HOME

Satisfied with the job, the park service connected the upstream C900 piping and started the water pumps. Visitors in hotels, local residents, and most of the park service in staff housing never noticed the difference.

The area had no space for a three-point turn, so the drivers reversed 800 feet to a clearing large enough for the maneuver. "I had two men behind a vehicle and two in front, and we just kept going forward and backward and forward again until we wiggled out," says Heinselman. "At one place, we couldn't envision how we had gotten in because it was so difficult." c