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## The man behind the miracle

By Jeff Goodell

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**SOMERSET, Pennsylvania (CNN) --Just hours after the rescue, the drill site already looks like Disneyland. Tourists jam the road beside the place, snapping pictures, posing with the cranes in the background.**

State troopers guarding the site are bombarded with questions. Truck drivers hauling out the drill bits and generators wave like Super Bowl champions. Even forklift operators are treated like holy men.

This is, after all, the site of a bona fide miracle.

Above the crowd, in the shadow of one of the barns near the site, the man who is as responsible for that miracle as anyone leans against his red Chevy Blazer. Bob Long, 37, is an engineer technician for Civil Mining Environmental Engineering Inc. in Somerset. He's a modest guy, dressed in shorts and Nike sandals, with three gold chains around his neck.

In the back of his Blazer is about \$60,000 worth of high-tech surveying equipment that Long used in the early hours of the rescue operation to decide exactly where to drill the first hole that located the miners. It was a crucial decision -- and it may well have been the turning point of the entire rescue operation.

"If we would have been wrong," Long says, "this might have been a recovery operation, not a rescue."

Long had just gone to bed last Wednesday night at his home in nearby Boswell, Pennsylvania, when he got a call from his boss, Sean Isgan, who told him about the accident.

"We need you and your GPS stuff down there right now," Isgan told him.

When Long arrived at the scene, it was chaos. The rescue team quickly decided that the first step would be to drill an exploratory hole, both to try locating the miners and to begin blowing compressed air into the tunnel to create an air bubble to keep the flooding waters at bay.

"The key question was, 'Where exactly were these guys?'" Long recalls. "And we were going to get them out by drilling a rescue shaft, where exactly do we drill it?"

The miners who had escaped had told mine operators the general vicinity of their operations, but where the men had gone to escape the flooding waters was unknowable.

Even if they knew where they were, locating the spot from above was extraordinarily difficult. An error of a few feet either way or they might miss the tunnel entirely.

Drilling even a 6-inch hole 300 feet down took hours, and they did not have the luxury of poking around until they found the men.

## First hole had to be right

If they wanted to get these men out alive, the first hole had to be right.

The first step was to consult mine maps. Working with Joe Scaffoni of the state Department of Environmental Protection and other mine rescue experts, they noted the general slope of the mine, figured out the high ground the workers might retreat to, and picked a spot on the map to drill.

It was up to Long, with help from Isgan, to translate the spot on the map to a spot on the ground. To add even more risk to the operation, a closer look at the mining map revealed that an underground gas line ran very close to drilling spot.

If that map was off, or Long made a mistake in his calculations, there could be some real fireworks when the drill bit hit the gas pipe.

Working frantically, Long set up his GPS surveying equipment. Global positioning satellite systems are a high-tech device used in everything from minivans to smart bombs. They work by triangulating radio signals between a low-orbit satellite, a fixed point, a third (and often moving) point.

The better the GPS system, the more accurate it is, and Long's equipment is top-of-the line -- essentially the same one used by the U.S. military.

"It's accurate within less than a centimeter," Long said.

He set up some general coordinates in the field nearby and took some readings to get oriented. Then he entered the mine map coordinates into his laptop and translated them to his GPS system.

He then grabbed a small hand-held device called a "rover" and began walking in the general direction of the spot they had picked out.

The satellite beamed down information to the transmitter he had set up on a tripod, which relayed the signal to the rover, eventually guiding him to a spot very close to an access road near the highway.

At about 1:15 a.m. Thursday -- not much more than an hour after he had arrived -- Long held his breath and drove a stake into the ground: that was the spot they would drill.

## Anxious moments

As the rig positioned itself over the spot, Long was nearly unwound by anxiety.

"What if we'd have been off by three feet, and hit one of the mine pillars? We'd have had no idea it was a pillar, or if we'd missed the tunnel by an inch or a mile.

"Basically, we'd have had to just throw all the maps into the trash and just drill 10 feet this way, 10 feet that way, until we found the tunnel. Who knows how long it might have taken?"

As the drill bit began chewing into the earth, Long left to do some more surveying in another area.

About an hour and a half later, he returned, just in time to hear that the drill bit had broken through to the tunnel.

He was thrilled, but not as thrilled as he was about five minutes later, when he heard nine distinct metallic clangs -- the sound of the trapped men pounding on the drill bit with their mining hammers.

"It was the sweetest sound I've ever heard," Long said, smiling broadly.

*Jeff Goodell is the author of "Sunnyvale: The Rise and Fall of a Silicon Valley Family." He is working on a book about coal and energy in the United States.*

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