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EXTREME CONSTRUCTION

Four-Year Effort Succeeds in Establishing Land Route To South Pole

Haul trail for modern wagon trains is blazed by intrepid team

02/20/2008

By Tom Sawyer

Brian Wheeler had no hint of the luck he was about to have as he rumbled across Antarctica's Ross Ice Shelf in November 1990 on Linda, a Caterpillar D8 LGP bulldozer. He was in the middle of a three-machine convoy dragging a huge sled of gear toward the foot of a glacier for a round of seismic testing. The machines tracked a few hundred feet apart. Hills and troughs regularly hid them from each other as they traced a route declared safe by visual inspection from a C-130 days before. "It was like rollers on a lazy ocean," Wheeler recalls. He didn't know it at the time, but that was a huge warning sign.



Traverse Crew, USAP/NSF  
Tearing down a drive track for a bearing replacement on the Leverett Glacier.

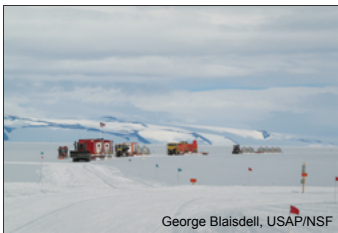
Wheater and Quintin Rhoton, at the dozer's controls, were in the heated, glazed cab when suddenly the world exploded. The 140,000-lb dozer vanished through an 8-ft-thick cap of snow spanning a huge crevasse. It smashed through the snowbridge. The windows imploded and snow and ice rammed inside. "It entombed us," Wheaton says. They would have been dead, but for a stroke of luck.

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"It happened so fast and the Cat is so big there was no sensation of falling," Wheeler says, but as they launched into blade-first freefall it ended in a jerk that sent the contents of the cab vomiting through the windshield. Wheeler and Rhoton had the good fortune to smash into the dashboard and tangle up in the thicket of controls and levers. The Cat's fall into the 300-ft-deep crevasse had been arrested by the trailing sled and its load of 30,000 lb of dynamite.

"The sled went clear across and wedged into the other side of the crevasse," Wheeler says. The towbar hung the Cat by its tail.



George Blaisdell, USAP/NSF

Fortunately, they had gone in near the head of the crevasse, just before it really widened. "It was enormous. If we had been 20 or 30 feet to the left the sled would have gone right in and we would have still been falling," Wheeler says. On the other hand, "The walls were beautiful, like mirrors," he says. They went from light blue to medium blue, to dark blue, to the abyss. "It's black. There is no way to get out of one if you go in."

The men had sprains and bruises but



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Brian Wheater

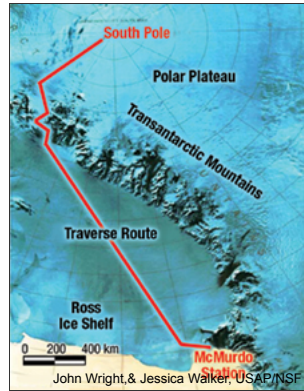
Waters, bottom, signals rescue team from hanging dozer cab during rescue of Wheater and Rhoton from crevasse in 1990; Year-4 "Proof of Concept" convoy returns triumphantly to McMurdo Station from 2,000-mile traverse to South Pole in 2006.

no broken bones. They also had about 15 minutes to try and climb up the wreckage before the hot machine frosted over and became too slick to climb. Wheater says Rhoton couldn't manage the climb so they sat and watched the dozer turn white. On the surface, the rest of the convoy was frozen in place, afraid to budge. Wheater now knows what the rolling terrain means. "You're in a crevasse field and by the time you see it, it's too late," he says.

Three hours passed and then Wheater heard a woman's voice saying help

was on the way. It was Maryanne Waters, head of a New Zealand search and rescue team based at McMurdo Station. She was rappelling in to save them.

A lot has changed since then. On Feb. 7, at 18:30 hours McMurdo-time, a seven-machine convoy of blade-equipped Case International STX 450 Quadtrack tractors and Caterpillar-AECO MT-865s, led by a Kässbohrer Pisten Bully scout vehicle with a boom-mounted ground penetrating radar sliding ahead, dragged a train of huge cargo sleds safely into McMurdo Station. They were returning from a 2,064-mile traverse to the South Pole and back. It was only the second time in history such a feat had been accomplished, and it marks the first "production run" of a dream to find a safe haul route between the port at McMurdo Station and the research station at South Pole. The only other cargo link is by LC-130 aircraft, whose capacity is very limited and hugely expensive.



The traverse followed the path of a successful proof-of-concept project that quietly concluded its first cargo-hauling round-trip in January 2006, culminating decades of icecap science, steady advances in development of exotic remote sensing technologies and four years of painstaking route-proofing, equipment trials, crevasse-bridging and courageous exploration.

**The Mission**

The prime support contractor for the National Science Foundation's United States Antarctic Program is Raytheon Polar Services, Centennial, Colo. In 2002 Raytheon asked geologist and explosives engineer John Wright to serve as project manager on the traverse project.

As he considered, Wright turned to his friend, Brian Wheater, to ask about "institutional, programmatic and expeditionary influences" that contributed to Wheater's near death with Linda a decade before. Wright thought the answers revealed a prevailing blasé attitude about the dangers. He vowed any...

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...a project he ran would stand on foundations of uncompromised planning, systematic trials and intense safety management. At the start of each construction season of the four-year project, which began in late October and ran through the brief Antarctic summer, he returned to Wheeler for a "reality check" before heading back to the ice.

"John is just the right kind of person for certain situations and exactly the wrong kind of person for others," says George Blaisdell, the National Science Foundation's representative at McMurdo Station. "He has a very clear personal vision and a very inquiring mind, but in certain things he is very rigid. Some people are not able to work with him. He gives huge attention to detail, he thinks of ways to do things safely and smartly, and I think he was ideal for this job. But on a production traverse, not only would he not be interested, he wouldn't be chosen. He's much better at pioneering."

Blaisdell says Wright has many of the qualities that set the early Arctic and Antarctic explorers apart from others. As Wheeler puts it, in an earlier age, "He would be called a hero."



**Wright**

Wright wouldn't agree. He speaks of teams and friends and working together, but he also reveals a wariness of institutional hubris and unearned trust. "There is some kind of menace working in this system," he says. "To protect the lives of my crew I have to identify this strange menace that I can't quite define but I have to say 'there it is,' when I see its shadow."

The route Wright followed goes 640 miles across the Ross Ice Shelf before climbing 6,560 ft in 70 miles up the Leverett Glacier for the last 300-mile trek to the South Pole. The last part had never been crossed before. The most recent attempt of a round-trip traverse was in 1912. The bodies were never found.

The plan was to edge out from McMurdo a few hundred miles further each season, using satellite imagery and remote sensing data and scouting by vehicle to analyze the terrain. They would go in a column, proving a path 20 to 40 ft wide and 1,032 miles long. When they could not avoid crevasses they would dynamite the bridges and push snow in until they had a solid crossing. The mantra was "no air."



George Blaisdell, USAP/NSF

Wright, top, picked his team as if it were a long-duration space crew. Average age was 511/2.

**Success**

They gradually refined the fleet as tractor and sled performance was analyzed by Wright's crew and researchers from the U.S. Army Corps of Engineers' Engineer Research and Development Center and its Cold Regions Research and Engineering Laboratory. They got about 120 miles in Year 1, spending much time blowing and filling 32 crevasses to make a crossing through the McMurdo Sheer Zone, a crevasse field near McMurdo Station. In Year 2 they hit unexpectedly soft snow that held them to 425

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miles. Equipment changes in Year 3 helped, but finding a path through another crevasse field took so much fuel they had to turn back 300 miles from the Pole. But each season, performance improved.

By Year 4 Wright's team of men and women was poised for success. "I very carefully selected my team over the four years," Wright says. "The average age was 51½. I am not remotely interested in hurting myself or injuring my family. I also knew we were done with silliness. We were old and we were smart and we weren't going to get hurt."



John Wright, USAF/NSF  
A Cat D8 wintered over at the foot of the Leverett Glacier, 640 miles out, between Years 3 and 4. It took digging out.

It took a month of high-risk plodding at 7 mph or less each way, with days lost waiting out blizzards. The team slept in a tiny life-support module and tracked a nearly invisible trail of proven safety last crossed a year before, aware that it was shifting seaward 1,000 ft a year and more in places, with the moving ice shelf. They tested the path the whole way, as crevasses shifted and expanded, supporting each other through the ordeal.

When they reached the last 300 miles of the route, they fought for 97 miles, extraordinarily rough ice called sastrugi with ridges as tall as 8 ft that had to be knocked down by the D8 to avoid wrecking sleds. Then they found a vast snowswamp the icy equivalent of quicksand 100 miles from the Pole. It added days to the trek, as they lightened loads to shuttle through it.

When the Proof of Concept crew rolled back into McMurdo on Jan. 14, 2006, after 65 days in the field, it marked a mission accomplished in the most hostile terrain on earth, with "zero accidents or injuries and zero environmental incidents" over the entire four years, according to Wright's final report.

"The significance is that we needed to show that it could be done, and done safely," says Blaisdell. "Without it being proven, it was just a theory. It is 'The Proof' that allows us to continue."

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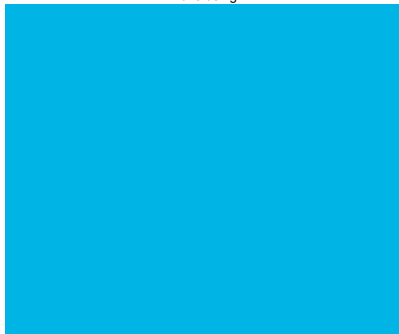
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