A totally COOL job!

Last summer, a team from Satellite Operations and Ground Systems at Integrated Defense Systems installed and integrated a new Iridium Satellite Telemetry Tracking and Control ground station in far northern Norway. Here, an antenna radome is transported to the Earth Terminal site. The radomes had to be constructed in a protected area to avoid being damaged by high winds.

KEN MCCUE PHOTO

How a Boeing team braved blizzards, polar bears to install a satellite ground station above the Arctic Circle

By Bill Seil

What did you do last summer to beat the heat? A group of Boeing employees from Arizona and Virginia found an unusual way to stay cool: They took a challenging job north of the Arctic Circle.

The team from Satellite Operations and Ground Systems (SOGS) at Integrated Defense Systems was given the task of installing and integrating a new Iridium Satellite Telemetry Tracking and Control ground station in the archipelago of Svalbard, Norway. The station needed to be relocated from Iceland to Svalbard to provide better coverage for the Iridium satellite constellation, which serves the Iridium satellite telephone system.

Working in an Arctic climate is no picnic, even in the summer. The team had to contend with snowstorms, freezing temperatures, and even the threat of polar bears. Although 24 hours of summer daylight permitted long workdays, team members sometimes found it difficult to sleep. And the daily commute to the work site involved a steep van ride up a narrow, winding road to a plateau above the town of Longyearbyen, famous as the northernmost town in the world.

Despite encountering these and other obstacles, the team met its July 6 deadline. In fact, members adopted the motto "No problems, only challenges and solutions." They put into practice the Boeing leadership attribute that challenges employees to "find a way" to overcome setbacks and succeed.

FROM 115 TO ZERO

Tom Valentine, the team's interfacility communications lead, said that the six employees who traveled to Svalbard were all engineers and technicians from the SOGS Ground Systems Services group. In addition to Valentine, they were Ken McCue, systems integration lead; Shawn Feeney; Kevin Proffitt, project coordinator; Robert Rossing; and Curtis Webster. They maintained frequent contact with their team lead, Dave Vohs, who coordinated the mission from Arizona.

Valentine, based in Chandler, Ariz., found the climate change dramatic. Arizona temperatures often hover around 115 degrees Fahrenheit (46 degrees Celsius) during the summer months. In Longyearbyen, thermometers in summertime sometimes dip down to zero (-18 C). The team had considered getting Arctic survival training, but decided against it, given the nearness of the town to their site and the relatively mild summer conditions.

Longyearbyen has about 1,800 people, primarily Norwegians. But there are also people from Russia, Ukraine, Poland, Sweden, Denmark, Germany, Thailand, and the United States. Unfortunately, there are limited guest accommodations. During the summer, the town is crowded with tourists enjoying the scenery and wildlife and with people attending academic programs at the University Center in Svalbard.

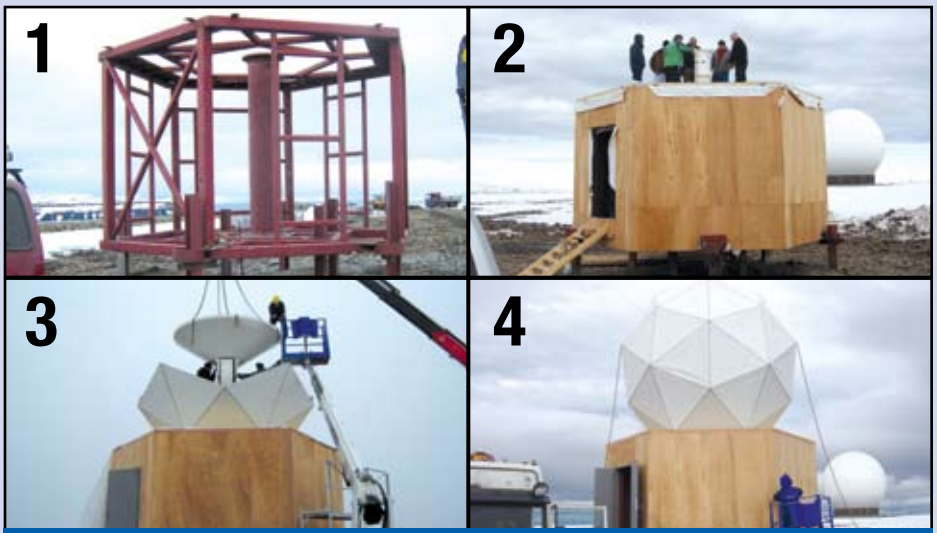
Because of uncertainty about the arrival date of equipment, the Boeing team was not able to make advance reservations. So hotel hopping became part of the adventure.

"During the three weeks we were there, I don't think we stayed in one place more than two nights in a row," Valentine said. "Hotel space there is very sparse and often rustic. Since we couldn't book in advance, it left us out in the cold—so to speak."

Before joining Boeing, Valentine had spent five years in Alaska designing and installing satellite telecommunications systems. Be-

TOM VALENTINE PHOTO

Among the challenges the Boeing team faced during this installation: polar bears, as indicated by this sign on the road to the work site from Longyearbyen, Norway, where the team stayed.



As shown in this sequence of photos documenting the installation of Earth Terminal 1, the Boeing installation team made sure and steady progress.

We're just *chillin' in Norway*

Team members from Satellite Operations and Ground Systems (SOGS) at Integrated Defense Systems who installed and integrated a new Iridium Satellite Telemetry Tracking and Control ground station in northernmost Norway had a full work schedule and little time for sightseeing.

But during their three weeks in Norway, they did get a chance to meet many residents and experience daily life in Longyearbyen, the town where they stayed. Had they arrived during the Arctic winter, they would have found 24-hour darkness. But the extra daylight of June and July allowed them to get a good view of their surroundings and snap some photographs.

cause he had experience driving in frigid climates, he was selected to make the daily uphill drive to the work site—in a beat-up Toyota van and over a hazardous route.

"The real danger was the drive up the mountainside," Valentine said. "To get to the plateau, you had to go up this winding road that went back and forth across a sheer cliff face."

The team made the daily commute without mishap, but the Boeing people saw spots along the way where vehicles had plunged over the side. In poor weather, visibility could be as short as 20 feet (6 meters). Sometimes the road was snowy or icy. Sometimes they drove over a fine powder that turned to mud when it rained. But despite the hazards, all agreed that the view was tremendous.

"I enjoyed the ride up every day," Valentine said. "The scenery was so dynamic. It constantly changed from crystal-clear days to low-hanging clouds. The sun filtering down to the Arctic glaciers was definitely a sight to see."

MOUNTAINS IN THE DISTANCE

The work site at the top of the plateau was a section of Kongsberg Satellite Services' (KSAT) Svalbard facility called SvalSat. Various organizations maintain equipment at this strategic location, including NASA and the U.S. National Oceanic and Atmospheric Administration. KSAT staffs a main communications facility around the clock, seven days a week. The communications building also provides shelter for workers and a big-screen television for those who find time for a break.

From SvalSat, the team had a tremendous view of the distant mountain ranges, glaciers and the Arctic Ocean. The terrain of the site itself was ice and volcanic rock, with no vegetation of any kind.

The equipment to be installed by the Boeing team had been disassembled at its original location in Egilsstadhir, Iceland, by another Boeing team led by Ken McCue. It was then packed by subcontractors and shipped to Svalbard. The primary units were two 3-meter antennas used in the tracking and control operation. With the equipment moved farther north, operators will have far better access to the 66 Iridium satellites, circling above in six low earth orbits. Svalbard is ideal because all six of the orbital planes can be seen from the same site.

The installation project is the first phase of an effort to enhance Iridium satellite telemetry tracking and control. Boeing plans to return to Svalbard this summer to install three more antennas. This will increase the technological capabilities of the system and add redundancy. Proposals to build a similar Iridium ground station in Antarctica in the near future are also being considered. A station to the south would provide more continual contact with the satellites, which will become more important as the system ages.

To get the equipment to its new site at the top of the plateau, the subcontractors had to remove it from its cargo containers and use various types of vehicles to haul it up the narrow road. The construction of antenna buildings and shelters was not completed before the team arrived, so the antenna project got off to a slow start.

"That first week was especially difficult because we were all quite sleep-deprived," Valentine said. "This was compounded by the fact that we had to jump from hotel to hotel every night. And even though the hotels had darkening curtains, the sunlight would still shine in. It was difficult to get a decent night's sleep."

At the site, the team had to work in varying weather conditions, occasionally taking shelter in the communications building. "The weather in that area can

A view from inside the Earth Terminal looking out across the arctic tundra.

TOM VALENTINE PHOTO

Although Longyearbyen has several thousand polar bears in the surrounding area, animal life near the town includes reindeer and arctic foxes. Ptarmigans are the most prominent birds. It's not uncommon for local wildlife to wander into town.

"You can be sitting in a restaurant and suddenly you'll see three or four reindeer pass by," said Tom Valentine, the team's interfacility communications lead.

He noted that the local food, generally very good, included reindeer steaks, whale, seal, fish and a variety of dishes common at home.

When members of the Boeing team finally got one full day off, they didn't rest. They used it to explore. One member went on a sightseeing expedition to the ocean, where he saw glaciers, polar bears, and other wildlife. Others went hiking or took drives on the dirt roads around the island.

Other than a few restaurants and pubs, entertainment venues in Longyearbyen are few. But the people are friendly, and a stay in the town can be enjoyable. Valentine said one of his most enjoyable moments in Longyearbyen came when someone loaned him a Harley-Davidson motorcycle.

"He handed me the keys and said, 'Here, take it for a drive,'" Valentine recalled. "So I actually got to go for a Harley-Davidson drive at 78 degrees north latitude, which is probably the farthest place north where you can drive on a road. That was fun."

—Bill Seil

KEN MCCUE PHOTO

Boeing employee Tom Valentine, the installation team's interfacility communications lead, is based in Arizona—where the summer weather is drastically different from that in northern Norway.

change from hour to hour," Valentine said. "Within an eight-hour period, we would experience everything from sunny skies to complete whiteout blizzard conditions."

BEAR DOWN

Then there's the threat of polar bears. Valentine said there are about 3,000 polar bears in the Svalbard area. Fortunately, summer is the season when polar bears head east to hunt seals on the ice floe. The Boeing team was working on the west side, but during this large migration, a number of hungry ursine adolescents get left behind.

"They feed off whatever they can to survive," Valentine said. "They can be quite dangerous and quite aggressive." Signs were posted around town to remind everyone about the dangers of these foraging polar bears. Local residents often carry rifles for protection. At the work site, local contractors hired by the Boeing team patrolled, always alert for signs of danger.

"When we were up on top of the plateau, the clouds would roll in and the whole area would vanish in haze and mist," Valentine said. "Those were the most dangerous times, because the polar bears take advantage of those conditions to sneak up on their prey."

Mother Nature's doings weren't the only obstacles the team encountered. When the team needed additional equipment, there was no possibility of receiving it in time. So team members found themselves rooting through a local salvage yard for alternatives.

One of the most difficult setbacks came when a subcontractor drilled several alignment holes on the antenna pedestal that were too large. The team spent half a day finding pieces and parts that could be adapted to correct the error. If they had not succeeded, they would have had to return home without completing the job.

"There were several times where obstacles could have prevented us from completing the project on time—if we hadn't found a way to overcome them," Valentine said.

The ultimate test of their work was whether all systems in the ground station would operate accurately. Alignment was critical. A surveyor was brought in to make sure the equipment was installed according to plan. Antenna alignment off by as little as a half degree would impair satellite tracking and control.

The team put in 24-hour days in early July to prepare the equipment for its July 5 operational test. This involved a "first pass" tracking exercise focused on the orbiting satellites. That test was a clear success, and the team celebrated completion of the assignment.

"There was a great feeling of satisfaction," Valentine said. "Everyone had stepped up and met all the challenges. While we each had our own jobs and areas of expertise, we worked well together and made a cohesive team. In fact, we had a good time up there. Our focus was on doing a good job and meeting our deadline, but we also found moments where we could joke around." ■

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