The Antarctic Sun

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February 2, 2003

Moving up and out of the dome

Photo by Melanie Conner/The Antarctic Sun

Night shift carpenters take a break from work to look out onto the polar plateau through the windows of the new dining room. Parts of the new station, including the dining area, are scheduled to open later this month. Unlike the dining room in the dome, this one is lit by natural light during the summer.

By Mark Sabbatini
Sun staff

If all goes as planned, South Pole dwellers will get to indulge in unlimited ice cream and control their own thermostats during those minus 100 degree days this winter.

Many will also say goodbye to quirky, if sometimes nostalgic, living arrangements such as co-ed community bathrooms, battered furniture and industrial-size doors rattling the halls every time someone enters or exits. Instead they'll sleep in dorms with computer data ports and eat in a spacious dining room with windows overlooking the plateau.

This season's winter staff is scheduled to be the first to inhabit the Pole's new elevated station, as the dining hall and one set of dorms is considered complete enough for use. There are enough dorms for 50 people, so some of the

See Construction on page 20

Blazing a snow trail to the South Pole

By Kristan Hutchison
Sun staff

The South Pole traverse team has started its journey of 1,000 miles and its first step was to cross a crevasse field blocking the way.

The safe road the team built across the treacherous terrain is the first piece of what may someday be a regular surface route from McMurdo Station to the South Pole, freeing up ski-equipped LC-130 airplanes for other missions. Over the next two years the traverse team will go the rest of the way, proving tractors pulling heavily loaded sleds can be a viable way to move fuel and other cargo.

If successful, it will be the first over-snow, heavy-equipment traverse by the U.S. Antarctic Program since 1968, said National Science Foundation Representative Dave Bresnahan, who has been instrumental in developing the traverse route and plans.

"The shear zone is the single, unavoidable obstacle that any traverse outbound from McMurdo contemplating travel on the Ross Ice Shelf must face."

— John Wright,
South Pole traverse project manager

"I kind of think we are opening an old book and writing some new chapters," said Bresnahan.

Driving directions to the South Pole are simple on paper – head east from McMurdo then angle across the Ross Ice Shelf; jog up the Leverett Glacier and head due south to the Pole. It's about 1,000 miles (1,600 km) one-way, a bit longer than the 825 miles (1,320 km) the LC-130 fly, but potentially more reliable and cheaper.

Jeff Scannielo set out markers in early October for the begin-

See Zone on page 16

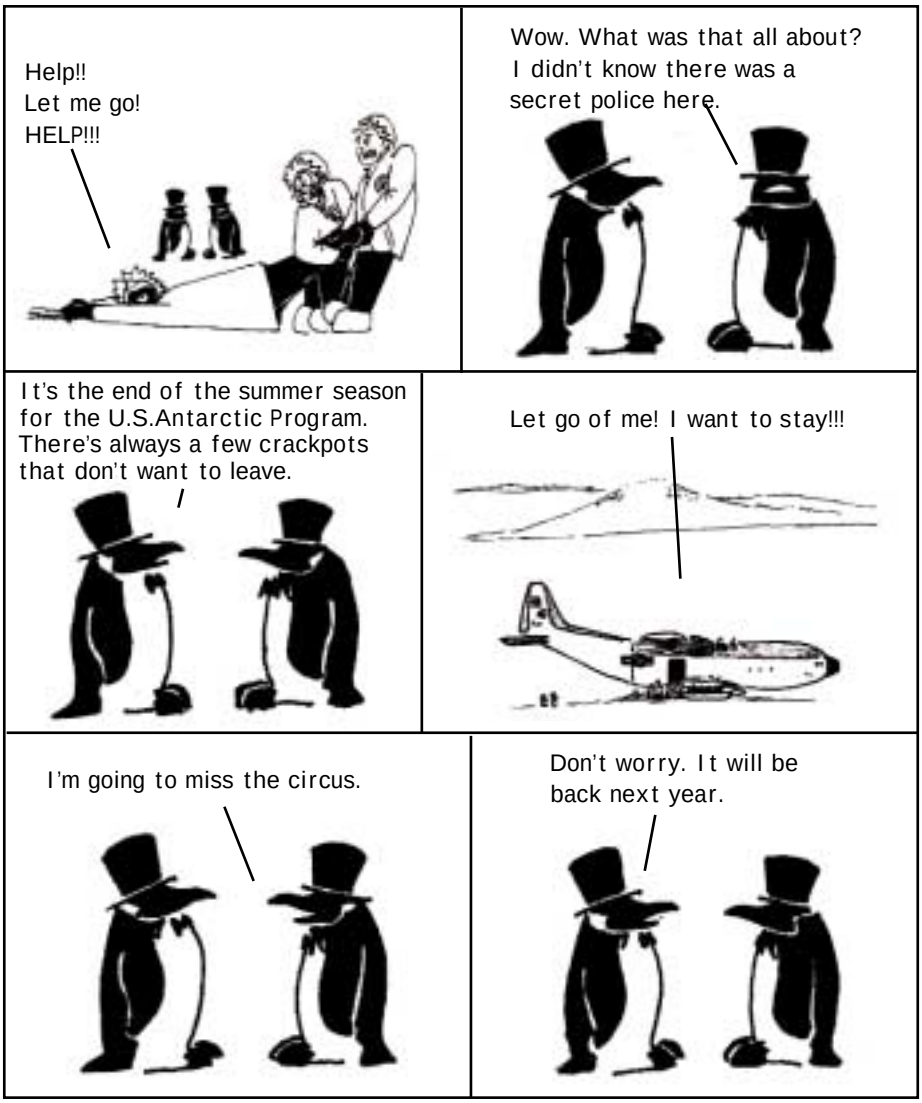
INSIDE

Quote of the Week

"I'm not stopping until I'm station manager."

— A 20-year-old general assistant planning to work multiple seasons

Ross Island Chronicles By Chico



Cold, hard facts

The Antarctic Sun

Predecessor to *The Antarctic Sun*: **A McMurdo-only Navy paper called *The Sun-Times***

When it became *The Antarctic Sun*: **In 1996, when it went civilian and global.**

Number of issues produced this year: **16**

Average pages per issue: **18**

Total pages for the season: **286**

Average words per issue: **13,348**

Number of science stories this year: **34**

Number of pages the *Sun* copier had printed this season by Jan. 31: **182,345**

Number of times the copy repairman had to fix the copier: **11**

Percent of *Sun* staff returning from last year: **100 percen**t

Number of hours worked per week: **More than we'll admit to**

Rank of *Sun*'s Web site among visitors to www.polar.org: **1**

Number of monthly hits during 2001: **More than 1 million**

Number of people known to have the *Sun* logo tattooed on their leg: **1**

Source: *Sun* files and Glenn Gordon

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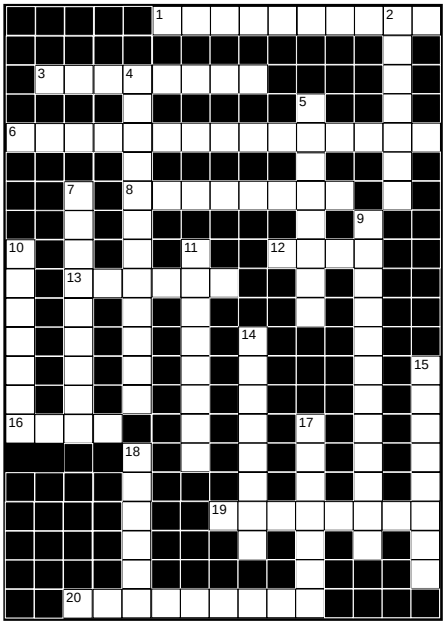
Web address: www.polar.org/antsun

Katabatic Krosswords: Words of winter

Across
1. What happens to trash at the end of the summer
3. The USAP term for a winter employee
6. Sky light show seen only by the winter folk
8. Polies will occupy the _____ station this winter
12. Number of scheduled winter flights
13. A verb for spending the winter in Antarctica
16. Dominant feature of an Antarctic winter
19. What departing workers often experience upon reaching places with trees and plants
20. Main winter science activity at South Pole

Down
2. The McMurdo winter doctor has this mouthy role
4. Unofficial extreme temperature club at Pole
5. Freezing of pack ice into fast ice
7. A milestone event that is a winter social highlight
9. Primary nonscience work activity during winter
10. Slang for burn-out after months on the Ice
11. Vessels perform this duty just before winter
14. The month of the first McMurdo sunset
15. Pay in advance, since it can't be mailed in April
17. Extra pounds of baggage winter workers get
18. Only one of these to ride off into at the Pole

Solution on page 4



Squares too small? No pencil to erase your mistakes? Try our interactive online puzzle at www.polar.org/antsun

High and higher at the South Pole

By Melanie Conner
Sun staff

When Holly Carlson landed at the South Pole in early November and stepped off the plane, she felt a shortness of breath and light-headedness, as though she had just landed on top of a mountain peak.

Coming from Park City, Utah, Carlson was accustomed to living at 7,000 feet above sea level. Landing on the polar plateau, located at 9,300 feet should have been easy. But Carlson and others at the South Pole are breathing air that is like an 11,000-foot peak in Utah or Colorado.

At the South Pole the barometric air pressure is on average about 20 percent lower than expected for an elevation of 9,300 feet (2,800 m). This is the result of cold weather patterns in Antarctica that create the effect of "thinner" air at an equivalent elevation.

To understand weather and altitude changes related to pressure, first it is important to understand atmospheric pressure.

"Think of pressure as simply the weight of the overlying column of air," said Thomas Parish, professor at the University of Wyoming, Dept. of Atmospheric Science in Laramie. "It is no more than the weight of fluid above you."

Atmospheric pressure changes with altitude. As altitude increases, pressure decreases. Under less pressure, oxygen molecules are more widely dispersed throughout the atmosphere, making the air feel thinner.

Similar to the North Pole, the Antarctic region already has relatively low surface pressure. McMurdo Station, located at sea level has an average surface pressure of approximately 990 millibars (a measurement for barometric pressure), compared to the standard atmospheric pressure at sea level of 1013.2 mb.

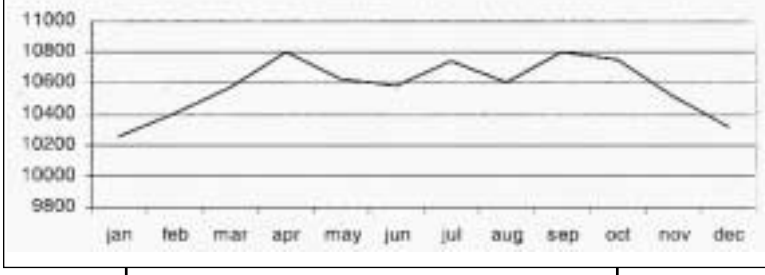
"That's a bit less than average sea-level pressure in the mid-latitudes and is a consequence of the circulation of our atmosphere," said Parish.

Pressure altitude, while it exists near polar coastal areas, is even more pronounced on the polar plateau, where the physical altitude is well above sea level.

"The second part to understanding pressure altitude is related to how fast pressure changes with height. It always decreases with height, but how fast it decreases depends on temperature," said Parish. "In the winter when it's cold, the pressure decreases faster with height. Because it's cold in Antarctica all the time, the pressure is lower at an elevation such as the South Pole than at a similar elevation in the middle latitudes."

An area located in the mid-latitudes at 9,300 feet (2,800 m) in elevation with an average temperature of about 42 F (6C), would have an atmospheric pressure of approximately 716 mb. However, at the same elevation at the South Pole, located at 90 degrees south in latitude, an area that is much colder, an average temperature of minus -4F (-20C) produces a pressure of 691 mb.

South Pole physio-altitude based on average pressure by month



A commonly mistaken explanation of pressure altitude is that it is the result of the centrifugal forces of the Earth's spin that draws the atmosphere toward the equator to form an "equatorial bulge."

The equatorial bulge is a result of centrifugal forces and represents the Earth's physical shape, not that of the atmosphere, Parish said.

"Our atmosphere is thermally driven, not mechanically driven," said Parish.

Atmospheric pressure creates weather patterns in order to maintain thermal equilibrium over the globe. High atmospheric pressure is associated with fair weather while low pressure is generally associated with cold weather. Pressure fluctuates throughout the globe in relation to atmospheric weather conditions.

"The poles are cold and the tropics are warm. The reason we have weather is because the atmosphere is trying to distribute heat. Otherwise the tropics would keep getting hotter and hotter and the polar regions would get colder," said Parish. "The weather, coming from pressure, transports heat."

The pressure altitude at the South Pole fluctuates seasonally as well, but these changes are more pronounced in the cold region.

"There is a 25 mb difference in pressure at the South Pole between summer and winter," said Parish.

The average pressure over a one-week period in mid-summer at the South Pole ranges from about 670 to 675 mb, resulting in physiological altitudes of 11,034 to 10,790 feet and about 35 percent less oxygen than at sea level. Monthly pressure averages over the past 45 years indicate that barometric pressure usually peaks during January at 690 mb, simulating an altitude of 10,200 feet. Atmospheric pressure usually plummets to around 675 in the winter months of April, July and August.

The largest pressure change for one month ever recorded was in August 1974 when the physiological altitude jumped from 9,284 to 11,484 feet. The lowest pressure ever recorded was at 614 mb. in July 1985, rendering a physiological altitude of 12,107 feet. Such fluctuations can affect the health of the community.

A higher altitude may affect a person arriving at the South Pole from sea level, by making acclimation more difficult.

"Healthy, new arrivals to the South Pole will have an oxygen saturation in their blood of 88 to 90 percent. Those in danger of Acute Mountain Sickness have levels of 82 to 85 percent," said South Pole physician Will Silva.

"A key to understanding physiologal reponses to high altitude is represented by the shape of the graph of hemoglobin oxygen satuaration against partial pressure oxygen, explained Silva..

"At sea level, we're in the shallow sloping part, where a small drop in pressure makes little difference in saturation. At Pole, we're on the cusp of the point of inflection, where a slight hit makes a big difference in oxygen delivery. We have little room to spare."

Once acclimated, a person won't deacclimate during daily fluctuations, said Silva. Instead they might feel sleepier than usual or have a slight headache.

"A lot of times, people will have a funky day and they'll come in my office and say, 'I feel terrible, what's the pressure today?'" said Kathy Hill, South Pole meteorologist.

"Sometimes it's hard to know why you're really tired," said Carlson, materials person in the Facilities Engineering and Maintenance Center. "It feels just like when you're climbing a peak and you're getting higher and higher, except that you are staying in the same place."

Perspectives

A day in the shear zone

By Shaun Norman

Today was a really good day in the shear zone. We breakfasted around seven and then drove two miles to crevasse number 21 which, like all the others, lay like a giant tank trap across and under the South Pole road. I harnessed up, asked Allen O'Bannon to check rope, harness and carabiners, and then slowly took that nerve-tautening step from dead flat to deadly vertical.

A free 80-foot rappel landed me on snowy white blocks and fine powder debris from the prospect hole blasted above — all this enclosed by vast steep blue-white walls, smooth into the darkness hundreds of feet either way.

Cold. I could feel it. The camera froze yesterday, so today I put a hand warmer in the case, kept the battery warm and got shots. In November a thermometer reading showed minus 35 degrees F down here. Even now, in mid-summer, it did not feel any warmer.

After radioing measurements up to John, I used rope clamps to climb out. I stopped lots for pictures and froze my fingers. I sat suspended on an 11mm thread, 40 feet down and 40 feet up, center space in a white hidden world. Beautiful, but forbidding, this place felt ancient, like the huge rime crystals under the crevasse roof.

Photo by John Wright/Special to The Antarctic Sun

Photo by Shaun Norman/Special to The Antarctic Sun

Shaun Norman, at left, walks out of crevasse five after it has been partially filled in. Above, Allen O'Bannon rappels into crevasse 21.

Emerging into warmth and sunshine, I swung my numb hands and relished our world's diversity: Vast Mount Erebus and the crevasse; Ross Ice Shelf and the rime crystals.

Our next task was to drive the radar tractor out of the shear zone southwards into the Ross Ice Shelf desert. We had to check the road for crevasses. Allen watched the computer whilst I drove, with GPS, sastrugi and wind to help me steer.

East White Island flattened; Minna Bluff grew; and Mount Discovery towered. I thought of Scott, Shackleton, Crary, Fuchs and Hillary. Mount Terror, Erebus and Observation Hill were their beacons too. I thought also of Spenser-Smith, Scott, Wilson and Bowers, lying not so far away. This great shelf is hallowed ground.

For more than seven jolting miles our screen showed no holes, so we turned west, hunting the shear zone. Four miles and still we found nothing. Our road line is safe so far.

We headed back to the shear zone in hot summer sun through wet, slow, clinging snow, our deep yawing track hard on both engine and fuel supply. We found Brandon hot water drilling our crevasse roof full of holes. We took turns with the steaming hose and probe, and shoveling the hot bath full of snow to melt.

Next we threaded fat orange sausages of explosives onto bright yellow detonator cord. John connected all together with delays and detonator, and then walked back 100 yards to us and the hand-crank firing box. "5-4-3-2-1 Fire in the Hole!" preceded a mighty "Whoomph" a seismic shake underfoot and a yellow, billowing cloud as we opened yet another monster hole.

We took a careful look in, and then fenced the hole. Tomorrow Kim will doze it full of snow with our giant D8. Finally, we took a slow drive westward to camp for a beer whilst we cooked our evening meal. It was a good day.

Shaun Norman, a professional mountaineer who has led many ascents, was a field safety expert for the South Pole traverse project crossing the shear zone. To read more about that project, see related stories on page 1, 17 and 19.

Answer to page 2 Katabatic Krossword

around the continent

SOUTH POLE

End of a Pole season

By Anne C. Lewis
Pole correspondent

In less than two weeks the bustling South Pole Station summer season ends and the winter staff will take the helm for the upcoming nine months. Science groups, field camps and summer employees are packing up their gear for the LC-130 flights north to McMurdo and on to Christchurch. Redeployment is knocking loudly on our doors. LC-130s are in full swing, flying out the summer crew in shifts and offloading the last of the cargo and fuel loads. On Feb. 15, the 18 remaining Raytheon summer employees will board the giant Hercules and wave goodbye to the 60 people staying the winter. They won't see any more flights until the summer crew arrives in late October. And our bright sun, which blessed us 24 hours each day through the summer, will set March 22, not to reappear again until October. Darkness will descend upon the station, and the wondrous world of aurora australis will commence, as will temperatures too low to even imagine.

Reentering the "real world" is a bit daunting. Certainly, our sensory deprivation down here at 90 degrees south will be curtailed quickly. Upon arriving in McMurdo, the stopover between Pole and New Zealand, the sight of dirt will be overwhelming. Yes, I said DIRT. It sounds ludicrous, but what we see here at Pole is white snow and ice. The South Pole is a vast, white, flat tundra, beautiful in its own right, but the mountains, volcano and the coastline in McMurdo will be a welcome sight. New Zealand, a land known for its lushness and beauty, will be a shock, indeed. A trip to Christchurch's botanical gardens is in order. Ahhh…it will be a beautiful day.

Polies are filling out the "Dinner List," a contact list compiled to help us keep in touch after we disperse. Many new bonds were created this season that will last a lifetime. It is impossible to explain to non-Polies the overwhelming emotions that emerge as one prepares to depart this magical place.

The snow that once totally blanketed the inside of the dome has mostly fallen now, exposing the aluminum ceiling, and temperatures have reached their warmest for the season. Earlier in the season the snow coating occasionally fell on an innocent passer-by on their way to the dining room. Sometimes spirited Polies would even trigger the snowshower onto their unsuspecting target with a snowball thrown at just the right angle. Simple fun here at Pole.

This has been a season of ambitious goals in science, construction and airlift schedules. A number of impressive accomplishments have been attained. Thanks go out to National Science Foundation representatives Jerry Marty and Dr. Vladimir Papitashvili for their continued support and efforts towards South Pole construction and science success. Area Director B.K. Grant and Winter Site Manager Bill Henriksen deserve gracious appreciation, as well, for a smooth summer season. We wish the winter staff a healthy, productive and memorable season. Let's all savor the fact that we spent time on the highest, driest, coldest continent on Earth with some amazing people. Breathe in your last of that cold, crisp Antarctic air. We leave the South Pole to those brave souls that stay the winter.

Photo by Tom Cohenour/Special to The Antarctic Sun

Moss grows thickly over the rocks and remains of Old Palmer.

PALMER

Visit to Old Palmer

By Tom Cohenour
Palmer correspondent

As the Zodiac slowly pulled away from the pier, a voice came over the radio.

"Palmer Station, this is boat 99. We're headed to Old P."

"Copy that," was the reply.

Nobody questioned their destination. After all, it's a popular spot to watch elephant seals, ski, go sledding, hike around, search for the ice cave, admire the abundance of green moss, paint pictures or go camping. Nobody has lived there since 1969, when it became known as Old Palmer with the construction of present day Palmer Station less than a mile across Arthur Harbor.

The British originally occupied the Old Palmer site from 1954 thru 1958 in a hut they called Base N. In 1965 the U.S. Navy erected a prefabricated T-5 building in eight days at the same location and named it Palmer Station. Five 10,000-gallon fuel containers, a storage building, and a Jamesway tent were added. They used British hut Base N as a scientific lab.

"Palmer Station, this is boat 99, do you copy?" crackled the radio.

"Go ahead 99," responded Palmer.

"We've arrived at Old P and we're dropping off Jim Woodside," replied boat 99.

"Copy that," was the response.

Woodside hiked the short distance up the mossy hill to the Scott tent he's been camping in for several days. Virtually nothing remains of the Old Palmer structures. Only by careful surveillance of the land can one pick out old building perimeters by low lying moss covering berms of earth, or snaking trails that were once roads. Charred remnants of wood and a few half buried rusty nails speak of the fire that leveled the British hut Base N.

Around Woodside's tent are remnants of the concrete footings that once supported the Navy's T-5 building.

"This place has just everything," said Woodside.

History, art and the Antarctic environment are deeply important to Woodside. As an oil painter, he arrived in Antarctica

See Palmer on page 6

the week in weather

McMurdo Station
High: 36F/2C Low:18F/-8C
Wind: 31 mph/50 kph
Windchill: -17F/-27C

Palmer Station
High: 48F/9C Low:31F/-0.5C
Wind: 32 mph/52 kph
Melted precipitation: 1.7mm
Snowfall: trace

South Pole Station
High: -14F/-26C Low:-30F/-35C
Wind: 20mph/32kph

Palmer From page 5

from the Boston, Mass, area for a four-week visit sponsored through the National Science Foundation's Antarctic Artists and Writers program.

From his campsite on the bluff overlooking Arthur Harbor, Woodside is experiencing the essence of the Antarctic peninsula. He has a clear view of the ocean dotted with several rocky islands, odd shaped mountainous floating white icebergs, crimson sunsets and the silhouetted backdrop of the distant Cape Renaud mountain range across the Bismarck Straits. His only close neighbors are four thousand cackling Adelie penguins on Humble Island, the bellowing congregation of elephant seals on Elephant Rocks, graceful crabeater seals along Norsel Point and a few dozen skua birds that swim in the glacial meltwater pond in back of Old Palmer.

The history surrounding Woodside at his campsite also inspires him.

Photo by Tom Cohenour/Special to The Antarctic Sun

Artist Jim Woodside stands at his camp at Old Palmer, where he is painting.

Camping in an historical-style Scott tent at former British Base N and the original site of Palmer Station helps bring it all together for him.

Other people occasionally visit Old P to ski or slide on the steep snow-covered slopes. It's an exhausting hike up, but a fast, exhilarating ride down.

Some visitors stop by just to hike the area and walk in the soft sands by the glacial pond. The torrent of crystal clear meltwater coming off the glacier face streaming over the rocks looks like a small, fast-running stream. One would almost expect to see trout jumping in the air, struggling to get upstream to spawn.

Perhaps it's the combination of the sun's heat and the moisture present around Old Palmer that creates such a good medium for moss to grow. Various shades of green blanket the area like a soft carpet. Small, protected valleys contain the thickest growths of moss, which stand in brilliant contrast to the stark rock walls.

Photo by Tom Cohenour/Special to The Antarctic Sun

Jim Woodside skis down the hill at Old Palmer.

Higher up, rock slopes appear terraced with hanging gardens of rich green moss. Humans are not welcome in that area because of the numerous giant petrel birds nesting there. With a wingspan of 6 feet, they can be an intimidating sight. Get too close to the fledglings and they spit out a vile-smelling orange colored bile to protect themselves.

Again the radio sounded, "Palmer Station, this is boat 99, do you copy?"

"This is Palmer, go ahead."

"We're departing Old P and heading back to station."

As the Zodiac pulled away from Old Palmer, Woodside stood by his tent on the bluff and watched the boat cut a path across the sunset reflected in the calm waters of Arthur Harbor.

SHIPS

Polar Sea

By LTjg Lance W. Tinstman
Polar Sea *correspondent*

The Coast Guard icebreaker *Polar Sea* recently ended two weeks of nonstop icebreaking, which successfully brought open water from 34 miles from Hut Point down to 7.5 miles. *Polar Sea* then reopened the last 7.5 miles which had partially refrozen and been covered with up to a foot of fresh snow. The snow hindered the ship's ability to break the ice, which resulted in backing and ramming for the greater part of 7.5 miles. The ice channel was almost indistinguishable from the surrounding snow-covered fast ice, except for the bumps and grooves created by the previously chopped ice rubble. Transiting the channel proved extremely difficult and was a reminder of the work still to be accomplished.

On Sunday, Jan. 26, *Polar Sea* pulled into McMurdo for a port call. Monday was a half workday where the ship took on 300,000 gallons of fuel and offloaded trash. Most of the crew was given the afternoon off; some watched the Super Bowl or hiked the numerous trails around the station. Tuesday the ship went back to the open water. The plan now is to continue running the length of the ice channel, crushing the ice into smaller pieces, straightening and widening for the three ships scheduled to arrive during the first half of February.

The *Nathaniel B. Palmer* will work science-related cargo and take fuel. Then the cargo vessel *American Tern* will arrive with supplies. Lastly, the oil tanker *Richard G. Matthiesen* will refuel the McMurdo Station and the *Polar Sea*. *Healy*, the Coast Guard's newest icebreaker, is also due to arrive about the same time as the *Tern*. This is *Healy*'s first trip to Antarctica.

Once the *American Tern* leaves, the *Polar Sea* will go back to the Ross Sea to support the final leg of the Interannual Variability in The Antarctic-Ross Sea Nutrient and Seasonal Productivity Study (IVARS). This will entail collecting numerous water samples and recovering buoys that were deployed earlier. After the science and the channel escorts are completed for Deep Freeze 2003, *Polar Sea* will head back to her homeport of Seattle.

N.B. Palmer

By Chris Kenry
NBP *correspondent*

This week researchers concluded their seismic work in the area where B15 originally broke off of the Ross Ice Shelf. As in weeks past, ice was a problem, and that kept the marine techs very busy deploying, retrieving and re-deploying the seismic gear. On Monday, the guns and streamers were pulled in for the last time and the focus shifted to taking core samples from the sea floor and acquiring sidescan sonar with a small electronic "fish," towed behind the boat.

The social highlight of the week was a small "Tupperware" party two students organized, requesting that everyone wear something plastic. Most of the costumes made innovative use of office supplies or garbage bags, but one clever patron fashioned a tuxedo jacket from Saran Wrap. A disco ball twirled above the TV lounge while Donna Summer blared from a boom box. Since the ships are alcohol-free, the scientists and crew enjoyed as much soda pop as they could consume.

The first cruise of 2003 comes to an end this week.

Two ways to paint Palmer

By Kristan Hutchison
Sun staff

From broad brushstrokes to delicate detail, two painters are at Palmer Station expressing the beauty of the Antarctic Peninsula in their own ways.

One works with oil, the other prefers watercolor. One paints the landscape. The other hones in on tiny objects within it. One finishes a painting outside in a day; the other can take a week in a studio.

Even apart from their art, Jim Woodside and Scott Kelley clearly have different styles. Woodside arrived at a pre-season meeting at the National Science Foundation headquarters in Arlington, Va., in a crisp plaid shirt, his hair military-short. Kelley came dressed all in breezy white, with dark hair almost to his shoulders.

"We're both after the same thing, we just go after it in different ways," Kelley said in a nearby café.

Both NSF-invited artists are in some ways minimalists, seeking simplicity in a landscape that turns the concept itself into an art form. Kelley focuses in, painting small items he finds on the beach against a blank background. Woodside portrays the landscape in geometric shapes and bold colors.

"For me Antarctica represents a kind of simplicity that I see as a natural goal of art anyway," Woodside said. "I try to break things down into simple shapes, geometric."

Both of them were drawn to Antarctica by books they'd read. Woodside started reading about the early Antarctic explorers 10 years ago and found it was full of landscape.

"It was just sort of a natural blending of things that I care about – history, art and the Earth," Woodside said.

Kelley read Sara Wheeler's book about her more recent experience as an NSF Artist and Writer program participant.

"I got to about page 25 and knew I just had to go," Kelley said.

Testifying to the landscape

Most days Woodside walks a short distance from the station and sets up his easel, standing outside for hours to paint the view. He layers the oil paints thickly onto small pine or masonite panels, building up a texture as the landscape emerges in bold geometry.

"There is no 'capturing' the landscape in a painting, testifying to its power is all I can hope to do," Woodside said.

After several weeks, he's a passionate convert to the Antarctic's pristine beauty.

"You want to bear witness to something that is still like it was," he said.

Since arriving at Palmer Station Jan. 4, Woodside has testified daily, producing a painting a day. One of the paintings was done on Dream Island, where Woodside set up his easel between three Adelie colonies.

"It was humbling, to say the least, but I think sublime is a better word," Woodside said. "I was speechless throughout the entire day."

He also paints at other nearby locations, including the old Palmer station and he's finding plenty of material to work from.

Photo by Dan Grossman/Special to the Antarctic Sun

Jim Woodside works on a landscape painting on Dream Island near Palmer Station.

"There's a lifetime of views right here," Woodside said.

Before coming, Woodside assumed there would be all kinds of difficulties to face painting outside in the Antarctic. He imagined frozen fingers and winds blowing over his easel.

"A part of landscape painting, especially when you're outdoors, is problem-solving and improvising," Woodside said. "I actually enjoy that."

So far it's been easier than he expected. He keeps his hands warm with glove liners and sometimes hand warmers. The weather has cooperated and even 48-knot winds didn't blow over his easel.

"It's worked great. The subject matter is magnificent," Woodside wrote in an e-mail. "It's been greater than I could've imagined in my wildest (dreams)."

Woodside will return to Natick, Mass., in February to share his experiences and paintings with students at the Walnut Hill School where he teaches and other schools in the area.

Bits of beach

While Woodside goes out to paint, Kelley brings bits of the outside in. Most days he hitches a ride with someone, boating out to a new beach where he walks along collecting things – "small bones, wings, feathers, rocks and manmade flotsam that washes up" – then takes his time painting them later.

"For my work in particular, it's always been about time, about finding things on the beach that if I'd been there a week later it wouldn't have been there," Kelley said.

His finds around Palmer are very different than the shells he picks up on the beaches near his home in Montauk, N.Y. He's collected bones with a "strange bluish violet patina that are just aching to be painted," a penguin egg pecked open by a skua with

See Art on page 8

Photos by Scott Kelley/Special to The Antarctic Sun

Scott Kelley collects stones, bones and other treasures from the beach to paint, left. His "studio" is a lab bench at Palmer Station, right, where he has painted his finds, including a pair of penguin feet, above left.

Art

From page 7

a blue tint inside and rocks from Dream Island, where generations of nesting penguins polished them smooth with their feet and tail ends.

"I found an amazing range of color that I wouldn't have ordinarily expected to find in Antarctica," Kelley said, "so the people who told me to bring lots of white paint will be very disappointed."

A few of the items he's collected border on gruesome, like a pair of penguin feet one of the scientists brought him after he mentioned how hard it is to paint bird feet. He also boiled up a penguin head to get the skull, which smelled bad, but turned out well, he said.

At Palmer Station he's set up a small "studio" space in the science lab, where he can spread out his treasures and consider them.

"I tend to really have to hold things in my hand for a while and turn it around, trying to figure out the best way to look at it," Kelley said.

Kelley works with "Victorian slowness," meticulously creating watercolors that have the precision of scientific illustration but with a watery delicacy. Sometimes he paints the objects directly onto maps of the area where they were found.

What he doesn't paint in Palmer, a permit allows him to take home to paint later.

"It takes a while when you get to a place to understand how to approach it," Kelley said.

Continental Drift

What's the best skua item you've ever found?

"A broken eggshell I left in situ, oh, wait, you mean old clothes? I get mine from Goodwill."
Rob Edwards
Palmer Station lab supervisor from Denver, Colo.

"I've found a number of books that were worth reading."
Martin Lewis
South Pole operations support supervisor from Denver, Colo.

"A padded, leopard print bra."
Sophie Collins
McMurdo Station janitor from Denver, Colo.

Dome C
Towering over and drilling deep

By Lucia S. Simion
Special to The Antarctic Sun

San Gimignano, the tiny Tuscan village built in the Middle Ages and world-famous for its stone towers, has a rival in the heart of the Antarctic.

The place is Dome C, the many-towered base run by the French and the Italian Antarctic programs on the East Antarctic plateau. It is quickly becoming an international research station, with scientists from the U.S., Britain, Denmark, Switzerland, French Algeria and Australia working there.

After the long polar night, when the temperatures dropped to -70°C, the tiny village was reinhabited Nov. 9. Plumes of smoke from the generator again heralded the presence of construction workers, ice drillers and glaciologists. Voices and skidoos animated the silent plateau and twice a day the base shook as a Caterpillar filled the snow melter to make water.

Compared to the 2001-2002 season, this field campaign was blessed with bright sun shining day and night over the plateau, a horizon of pure white all around and a delicate blue-sky overhead. In the evening hours, "diamond dust" often blew in on a gentle breeze.

Photo by Lucia Simion/Special to The Antarctic Sun

A wooden platform at Dome C holds equipment to test the quality of data that can be gathered from the new station site.

The many towers

This season Dome C campsite looked almost like a "San Gimignano of the Antarctic," with towers, big and small, rising out of the flat landscape.

The largest are the ivory-and-coral colored twin buildings of the French-Italian Concordia station. After four years of construction, the new station will be ready to be occupied in a year, making it only the third year-round station on the plateau, along with Amundsen-Scott South Pole (U.S.) and Vostok (Russia).

By the end of December, both the "quiet" building, where the rooms and labs are located, and the "noisy" building, where the kitchen, dining room and storage rooms are, were sealed with panels. The "noisy" building was heated and a crew started working on the internal construction.

"The assembling of the ceilings of the noisy building are almost completed," said Serge Drapeau of the French Antarctic program and Concordia building manager, "and the internal subdivision as well. We are now ready to start mounting the ceilings in the second tower as well."

But completed or not, at 52-feet (16 m) high, the station towers are not the tallest at Dome C.

A much taller tower stands 2,624 feet (800 m) from Concordia. Its 105 feet (32 m) tall aluminum frame holds equipment to track the movements of the sun. Close-by there's a 20 foot (6-m) high aluminum tower with an instrument to validate the Atmospheric Infrared Sounder mounted on a NASA satellite, which passes over Dome C in its polar journey.

Last but not least, a wooden platform 20 feet (6 m) high designed by French architect Jean Dubourg was assembled in early December to hold the first of two 1-foot (30-cm) optical telescopes. The telescopes are part of a project to test the Dome C site by measuring the effect of the extremely stable air on the sharpness of a star.

The telescope has been monitoring the star Canopus for very long sequences, more than 300 hours altogether. It can focus on Canopus even during the very bright Antarctic daylight thanks to the exceptional transparency of the air at –30°C, the average temperature this season.

"The turbulence is even weaker than we expected," said Karim Agabi with the Department of Astrophysics at the University of Nice, which is leading the Concordiastro site-test project.

"Just looking (at) the star through the eyepiece is spectacular," said Agabi. "Nowhere else on Earth you can see such a stability and we now expect that it will be much better during the polar night."

During the first winter season many radiosoundings will be done to confirm the absence of turbulent winds at any altitude, said Agabi. The stellar image quality of the telescope focus will be tested during several months by means of three such telescopes working together in what is called a Generalized Seeing Monitor. A second identical platform will be assembled next season for a specific study of the bright star Alpha Centauri, which will be conducted by two independent telescopes.

Several other instruments are also assessing the quality of data that can be obtained from Dome C. Two of them will gather data for a full year at an automated laboratory set up by three Australian astronomers from the New South Wales University. The laboratory is called the AASTINO and looks like a "tomato hut," except the color is brilliant green.

Two experiments will sit on the AASTINO during 2003. One measures the transparency of the sky at sub-millimeter wavelength. The second is an acoustic radar that measures the turbulence in the lower atmosphere by bouncing pulses of sound from it. Both instruments have operated at South Pole for over a year and their operations at Dome C will provide important comparative data between the

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two sites.

In addition to the two AASTINO instruments, there are two other instruments that independently measure the amount of cloud cover at Dome C during the wintertime. In the future, additional site-testing instruments will be installed on the AASTINO.

Americans in polar Paris

Dome C is thus becoming one of the international stations of the Antarctic. The atmosphere is multicultural, friendly and cooperative and its French-Italian food is already famous from McMurdo to Dumont d'Urville. The location is considered exceptional for astrophysics and astronomy studies, for aeronomy research, glaciology, geomagnetism, climate study, seismology, search for micrometeorites and study of 14 subglacial lakes. The largest of the lakes is called "Concordia" and is surveyed by Italian geologist Ignazio Tabacco of the University of Milan.

During the 2002-2003 field season Dome C has been a sought-after place by scientists and technicians from the U.S., Britain, Denmark, Switzerland, French Algeria and Australia. Of course Italian and French make up the largest part of the population, which averages 50 to 60 people, since Dome C is their "polar hometown" on the plateau.

For the first time since the camp opened seven years ago, six Americans spent time at Dome C performing experiments, drilling ice cores or being part of the "Raid," the Caterpillar truck convoy bringing supplies to the station from Dumont d'Urville three times a year.

"They have a lot of experiential knowledge just from doing it so long," said Ralph Horak, one of two Americans who accompanied the 25-day, roundtrip supply traverse. Even on the long road trip, the culture of the traverse was apparent, Horak said. The French drivers drank wine with lunch and ate escargot for Christmas.

"They cooked them with a lot of garlic butter and I figure you cook anything with a lot of garlic butter you can eat it," said Horak, who gave the French delicacy a try, but said "I wouldn't order it at a restaurant."

Several of the Dome C towers were put up in collaboration with American researchers. The tallest tower holds a Cimel sun-photometer, the first to be used on the polar plateau. It is a joint effort of Richard Brandt with the atmospheric science department at the University of Washington in Seattle and Dephine Six, a French researcher with the Laboratoire de Glaciologie et de Géophisique de l'Environnement in Grenoble.

Photo by Lucia Simion/Special to The Antarctic Sun

Drillers at Dome C examine some of their deepest and oldest ice core yet, taken from 9,840 feet (3,000 m). It is thought to contain ice at least 700,000 years old.

The sun-photometer is a portable and automatic tracking device, measuring sun and sky luminance to near infrared wavelengths. The instrument automatically computes the position of the sun and tracks its movements, which is useful for calibrating satellite borne-sensors.

Nearby, a much shorter tower houses an instrument, called the Polar Atmospheric Emitted Radiance Interferometer, which also is used to validate satellite instruments. The interferometer was built by Von P. Walden and Brad Halter of the University of Idaho in Moscow. They collaborated with Bob Stone from the Climate Monitoring and Diagnostic Laboratory at the NOAA in Boulder, Colo.

Drilling deep

Like a true European village, Dome C also has "The Cathedral" – in this case a large white tent that is the headquarters of the EPICA ice core drilling operations. The drilling operations had restarted in late November at the depth of 9,416 feet (2,871 m), with the goal of reaching the bedrock at 10,824 feet (3,300 m). It was there, about midday on Dec. 12, the drillers extracted an ice core from the depth of 9,849 feet (3,000 m). This 10-foot (3-m) section of core was dated using an electrical profiling technique as being 700,000 years old. In comparison, the ice core taken from over Lake Vostok goes deeper, to about (3,623 m), but contains a climate record going back about 400,000 years.

To witness such an extraordinary event, all the people of Dome C flocked inside The Cathedral, including Bill Mason with the Space Science and Engineering Center at the University of Wisconsin in Madison. Mason spent two months in Dome C as part of the team of eight drillers who contributed to the great success of EPICA in the 2002-2003 season.

In the days following the 3,000 meter mark, the drilling operations sped up and the depth of 10,168 feet (3,100 m) was easily reached. Then suddenly the ice refused to be drilled again, as if it was a living thing.

The Cathedral was desperately empty and silent, its door shut. No more drilling, no more cores, nothing. We were used to passing by from time to time and asking the drillers, "How's the ice core?" Usually they answered, "Brilliant, a nice core of three meters with huge ice crystals," but now all was over.

Many attempts were made to continue the drilling operations: the drilling device was changed, the blades as well, the speed of rotation was varied, etc. A test of the temperature, pression and inclination of the hole was made. Then drilling restarted successfully on December 23, to stop the following day.

Finally alcohol and a fiberglass tube for a reservoir were both provided by the Americans at McMurdo station and delivered by Twin Otter to Dome C. On Jan. 7 the drilling resumed using an alcohol solution and by Jan. 21 the drillers reached 10,398 feet (3,170 m), said EPICA Chief Driller Laurent Augustin, with the Laboratoire de Glaciologie et Géophisique de l'Environnement in Grenoble.

"We had to design and build a special heated reservoir that allows us to downpour a solution of water and alcohol at the bottom of the hole, without having the solution freeze before reaching the bottom," said Laurent.

"This allows us to drill for 2-3 days in fairly good conditions," explained Laurent.

"I don't think it will be possible to reach the bedrock this season," he said, "but I am confident that we are on the right way to go deeper and deeper."

Lucia Simion is a freelance journalist and photographer based in Paris. This was her third visit to Dome C.

It's all a'drift

Blowin' snow piles up at the Pole

By Melanie Conner
Sun staff

As winter sets in over Antarctica, the sun slowly sinks into the horizon, temperatures fall, and winter snow accumulation begins.

During the winter months, snow blows in from higher elevations and gets deposited at the South Pole, forming massive drifts capable of burying a tractor and temporarily blocking entrances to buildings.

Behaving more like desert sand than snow, the tiny flakes build on themselves to form massive mounds. Unlike snowdrifts along highways and streets in Colorado, the snow at the South Pole doesn't melt away and recede under the warm sun. Instead the snow continues to accumulate, while laborers haul much of it away every summer.

"For over 45 years people have been moving the snow for years, the only difference is now there are more buildings and obstructions so as a result the scope of the job or work load has increased," said David Sandison, heavy equipment foreman at the South Pole.

Each summer is spent making piles of snow from the winter and mid-summer storms and dumping the snow downwind on the featureless plateau.

"We had a two-day blow at the beginning of the season that created a drift at the new station that we are still removing," said South Pole Meteorologist Kathy Hill in early December. "It's like you take the drift, move it around until it is eventually moved out and left there."

The extremely arid environment limits annual snowfall over the South Pole; however, snow originates in the highest parts of the polar plateau, which reach 13,000 feet (4,000 m). Most winds in Antarctica also originate on the plateau and are caused by heavy cold air from the high elevations falling under gravity toward coastal areas. These katabatic winds traverse the continent, gaining speed and depositing snow along their journey to the sea.

The relatively constant wind speed at the South Pole of 6 to 17 mph (9-28kph) deposits the snow that accounts for an average annual accumulation on a flat surface of about 9 inches (23 cm).

"If there is an obstacle, it will change the drift. You either live with it or remove the snow," said Frank Brier, facility engineering projects manager for the National Science Foundation's Office of Polar Programs.

Nine inches doesn't seem like a lot, but when an obstacle protrudes from the snow or causes a bump in the surface, the drift that is created on the downwind side is massive.

"For every one foot of rise, the snow will drift 20 feet out behind the structure," said Sandison.

While annual drift around structures is hard to quantify, in the mid-1970s it buried the original South Pole station built in the 1950s and now threatens the geodesic Dome.

"It is important that anything non-essential not be out there. Everything must be made flat," said Sandison.

The area experiencing the most drift at the South Pole is the Dark Sector, an area with three small science buildings that remains free of artificial light. Upwind of the Dark Sector is the skiway and a slight mound created by the submerged old South Pole station.

"Out in front of the MAPO building, there is a hump from the old station," said Paul Sullivan, science support manager. "Wind comes over it. It is a windbreak, it disturbed the wind and deposits snow near MAPO."

To compensate for snowdrift in the Dark Sector, engineers designed the three science buildings to rest on stilts above ground that are capable of being raised several feet.

"That's why we went to elevated buildings," said Brier. "The idea of the el building is that the wind scours the underneath of the building, preventing it from accumulating on the

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Photo by Melanie Conner/The Antarctic Sun

Top, Michael Holstine, South Pole science technician, clears snow from his doorway so he can exit the building. Above, a tractor moves a pile of snow that accumulated during the winter.

Photos by Melanie Conner/The Antarctic Sun

Every winter snow drifts accumulate around structures, threatening the entrance to the dome and other building. When summer comes, workers spend the season clearing it away. Like the original South Pole station that was buried by snowdrifts in the mid-1970s, the dome is threatened by snow that builds up faster than it can be removed.

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other side."

The concept of elevated buildings evolved after the original station succumbed to the snow in the '70s and years of drift studies dating back to the International Geophysical Year in 1957-58.

In January 1958, the first known snowdrift study at the South Pole began. A pentagon was established with the center located two miles (3 km) windward of the old South Pole station, with 42 poles positioned along the lines of the pentagon to measure annual drift. The poles were located about 975 feet (300 m) apart, but the exact orientation of specific poles with respect to the station is unknown. Measurements were made at least once a year until November 1964.

Ellen Mosley-Thompson, from Byrd Polar Research Center in Ohio, is now one of the leading drift researchers for the South Pole, basing her work on modifications of the earlier studies. Previous studies show that annual accumulation has increased by more than 20 percent since the '70s.

Older accumulation data contain flaws. The lines studies were too short at about four miles (6 km) and too spatially restricted to provide a statistically sound baseline for annual accumulation at the South Pole, wrote Mosley in a report.

Hesitant to confirm the earlier conclusions of increased annual accumulation, in 1992 Mosley launched a more extensive study for long term monitoring. An array of 235 poles in six 12-mile (20-km) long lines, was established. The poles were buried into the snow and extended every few years. The spacing in between the poles is about 1,640 feet (500 m) and initially 72 inches (183 cm) in height, above the snow surface and marked with orange and green flags.

Using global positioning systems to locate the poles in deep snow, volunteers at the South Pole travel along the six lines and measure the height of the poles each November. Then they fax the results to the Byrd Research Center in Ohio.

"We take a GPS unit with us. That helps us stay oriented on the line to find the next pole," said Hill. "It's hard to see, it's a just a tiny little orange dot on the horizon."

When measuring the poles, volunteers are instructed to measure the poles from top to bottom, stay on the downwind side and leave snow vehicles parked 100 feet away. The project allows people in the community to become involved in a research project and take a trip off station.

"We need at least two people to go each time. It's kind of a boondoggle for people. We go out much farther from station than most people will ever get," said Hill. "Each line takes about six hours and we try to do one line a day, but not always consecutively."

Instead of hunting for poles on the plateau, other people spend their season removing the snow.

Every year the snow drifts in and is hauled away. A skeletal winter crew does some snow management, but most of it will be left for the arrival of the main body summer crew to remove over the course of the summer.

"I have people working day and night moving snow in addition to our science support projects and skiway maintenance," said Sandison. "We are here to support science, so we have to just keep moving snow."

Thank you… to our readers on the Ice and off, to all who have given an encouraging word or sent a kind note, to those who have contributed writing, thoughts, photos and story ideas, to those who have caught a mistake before it went into print or forgiven it after, to the friends who have stayed friends even when we were too busy to reciprocate, to the few deserving names we remember and the many more we've forgotten…we couldn't have done it without you!

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Deneb Karentz
Scott Borg
Guy Guthridge
Winnie Reuning
Peter West
Erick Chiang
Karl Erb
Zac Willette
Sally Lyon
Mike Blachut
Phil Jacobsen
Andrea Baer
Kelly Brunt
Pat Gilliam
Jerod Clausen
Steve Alexander
Karla College
Melissa Rider
Alex Brown
Ilko Major
Stefan Pashov
Jordan Dickens
Joni English
Bob Farrell
Weather ops at all stations
The Rec crew
Mark Buckley
Eric Sturm
Elaine Hood

THE MIDNIGHT SUMMER

JOURNAL OF A SOUTH POLE WINTER

Writing by Judith Spanberger

Photos by Jonathan Berry

March 10, 2002

We are three and a half weeks into the winter and the sun is low in the sky. He moves along a track mere fingers above the horizon and parallel to the Earth, like a hairline on a monk's head. Like 9 p.m. on a summer's day. The shadows are amazingly long and feel foreboding, sending word of the coming dark and cold. Soon the sun will die, and then the real winter will begin.

Ending the summer was unexpectedly emotional. Each day of that last week a plane took more of our comrades. We would all gather on the flight deck to hug and say goodbye. We'd eaten together, partied together, worked and functioned in the same small spaces for four months. Once you've lived so closely to someone they are part of your world, and now they were going away, leaving little holes in your heart.

The day the station began its winter isolation the last flight of the season circled overhead, bidding us farewell. That night we gathered in the big heavy-machinery garage and watched both versions of "The Thing" projected onto several large sheets sewn together and hung from the ceiling. The first version takes place in the Arctic and is extremely silly. The second version takes place in Antarctica and is even more ridiculous. We were wondering who the consultant was for that movie, or if John Carpenter even thought he needed one... I mean, who would know whether his facts were correct or not? Who actually goes to Antarctica? We got a pretty good laugh out of it. It was a great way to start a winter. Now we're ready for anything...We just need to find the flame-throwers.

The temps are around minus 50, and I can stay outside for two hours before I have to come in and thaw. It amazes me that I can survive this. I eat everything that isn't nailed down and I'm sure that helps. Some of the adjustment to the cold has come from experience. I made the mistake once... OK, twice, of putting my pencil in my mouth while I readjusted my clipboard. It's surprising to have a pencil freeze to your tongue by the lead.

When I'm not on foot I drive an ancient Caterpillar track forklift named Felicia. She helps me deliver the materials needed

to continue work on the new elevated station and fulfill my duties as the construction materials person. She's a beast whose tracks clack and bang their way across the polar plateau, but I love her. There's a peace in trundling across "the long, flat white" alone with my thoughts and the nighttime sky.

The atmosphere is more relaxed now. The community is jelling and we often laugh together when we gather for meals or parties. A settling-in is taking place. As one of my fellow winterers said, "The winter is the reward for living through the summer." Amen.

May 14, 2002

The sun set March 20. We had our sundown party in the new elevated station so we could look out the windows as the evening went on and see the giant yolk, sitting on its vast white, sinking lower and lower. It looked like a radioactive egg glowing sunny-side up. The clouds were pink around the edges as they nestled in the darkening blue, much like a Georgia O'Keefe painting. A month later, it's as though we've never seen the sun at all. I feel I've lived half my life here already and I still have six months to go.

The temps have been minus 80 or colder. Unreal. Breathing is like sucking in

baby bee stings. I frostnipped my tongue (no joke). Everything fogs up at those temps and I find it easiest to get around without eyewear. I pull my hat low and my neck gaiter up to my eyes, leaving a slit to look through, then put one foot in front of the other and hope for the best. I fall once in a while but with 50 pounds of clothing on I barely feel it. Getting back up is the hard part.

Sometimes as I walk out to get materials I wonder at how lucky I am to be here, despite the hardship of moving around outdoors. Other times it seems so incredibly difficult, this life, and I want to shake my fist at the gods for this place. So I do. And it all snowballs into bigger questions of life and pain and hunger in the world, and children born into unloving situations and mean people and, and, and…

And what could I possibly do about it all from here? Those were the times I sat on my knees and wept, frustrated I couldn't overcome this place. Broken-hearted at not just the pain of the world, but the pain in my own heart. Will I ever find my answers? Is the healing in learning not to want them anymore?

We see auroras now almost daily - sometimes they are painted across the sky as if with a broad sweep of God's paintbrush. Sometimes they are the smoke curling off a giant cigar and they shimmer high up in the heavens. Other times they drip down on us like animated chandelier crystals, dipping so low I feel I could reach up and grab one. And if I could grab one would I touch the face of this southern God who challenges me so?

The moon rose this month and came up full. I wasn't expecting it, but coming out of the dome that day there she was. Full, big and low on the horizon with her light spreading out from her like the dress of a princess in the depth of a curtsy. A moving sight.

Our community continues to grow and develop, and I'm finding I take a deep pleasure in this. We had a wonderful time at the Cinco de Mayo party. We had homemade piñatas, margaritas in the juice machine, and great food. We decorated the galley, the band played and we sang, danced, laughed and grew easier with each other. By the end of the evening the place

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was a mess and everyone was happily chatting or dancing in it.

June 27, 2002

We're still here. It's still dark.

We just passed the solstice, our halfway mark. Four months down, four more to go. It's tempting to start counting days. Must resist.

Mid-winter is a time of reflection and celebration. We've received mid-winter greeting cards via e-mail from probably every station in Antarctica with a picture of their winter crew and good wishes for safe travels home. We took our mid-winter picture just outside the dome entrance. It was minus 84. When it was time for the flash to go off we all held our breath so faces wouldn't be obscured by the fog from breathing.

Our mid-winter dinner was an elegant affair. We brought out the linen, china and

wine glasses. We dined on Beef Wellington, chicken Florentine, homemade rolls and a real salad, thanks to the greenhouse staff. It was an evening of memories and plenty of warm and sincere toasts. A reminder that we are in this together and we're doing fine. What a wonderful group of people I am here with. After dinner many of us sprawled out in the library like a happy litter of puppies to watch *The Shining*. There were plenty of jokes about Jack Nicholson losing it due to a little cold and isolation. Weenie.

Temps are in the minus 90s and, despite the cold, yesterday I went for a long walk. The two circles of frostbite that sit under my eyes, and have for the last few months, are an accepted hazard of being here. The moon was full and the winds were low. I went towards what used to be the skiway. It's been reclaimed for the polar plateau by the winds. The berms and buildings were well behind me and before me was a moonscape, created by the lighting of the moon herself. I felt I was in another place and reality. A very peaceful, deeply certain place. A place that had seen so much come and go that nothing would be a surprise, it all simply was. Sometimes I feel like the gods are walking beside me. This beautiful and isolated place is showing me how to crawl around inside my own head and find comfort there.

The low temps are cooling off the polar plateau to the point that we're getting little "ice quakes." The ice contracts due to the colder temps and makes noises like rail cars slamming into each other. Usually it sounds like the rail yard is about a mile away, but sometimes it can shake a building.

The frost-cicles that fascinated me in October are once again hanging off the dome. The ceiling is full of fuzzy stalactites. They don't have a strong hold and as they fall from 50 feet up they break up. What falls on your head is akin to snowfall. South Pole: the only place where it snows inside, but not out.

The barometric pressure altitude jumps around quite a bit and last week it leapt to

> I have this place in my heart, a soft area very close to me, that holds a deep fondness for the dark and all I gained from it. How it brought my world right up to the tip of my nose...

11,400 feet (physically we're at 9,600). Breathing was difficult, and everyone was moving slow. This place continues to challenge and amaze me. I wonder if life won't be boringly easy when I leave here. What will I do when simply getting around won't feel like I'm trying to function under water?

August 20, 2002

We have light on the horizon and it's not aliens. It's the sun coming back for us! It was beginning to feel that nothing would ever change here, one dark day after another until it seemed the world had never been any other way. But there is a beacon now, although faint, that change is on its way. Time to wipe the hibernation from our eyes. It's hard not to begin packing my bags, even though we still have two months to go before the first flight arrives.

During the dark time I was feeling the effects of living in total darkness for four months. I lacked motivation and was barely able to compose a complex thought, much less keep it in my head. It was everywhere... people forgetting the names of their family members, why they walked into a room, etc. And what was so important that it couldn't be left till tomorrow? Nothing. Life boiled down to a very simple existence for me: put one foot in front of the other. Now do it again. Scientists call it T-3 syndrome and it has to do with the lack of a hormone that is produced with the help of sunlight. Or something like that. It was explained to me at one point, but of course I promptly forgot it. What was interesting is the lack of motivation and focus didn't really bother anyone. It was as though we were all drugged and that was fine with us. Nothing was worth getting worked up over. It was all getting very dreamy.

We had a July 4 BBQ that felt weird in the cold and dark. What made more sense was the "Christmas in July" party. We decorated the galley and bar and had a nice sit-down dinner. We made a snowman

that's six feet tall. The snow here is so incredibly dry that it took six hours of heating and wetting the snow and then packing it onto our snowman. But he's gorgeous and now sits under the dome next to one of the housing buildings. That was July for the most part, or what I remember of it.

Earlier in August we hit minus 100. Time for the 300 Club induction ceremony. First heat sauna to 200 degrees. Sit in said sauna until eyeballs are just about to boil. Drop towel and walk naked (running not recommended) to geological pole marker, whoop and holler. Hobble back indoors and back into sauna. You betcha I did it, and I must admit being a member of the 300 Club is a proud distinction for me.

Even with the sun coming back, my life has its routines. Band practice, knitting, movie night and working out. It keeps me busy and happy, but there are times I will blow it all off to shower and crawl in bed early with a book or my knitting. It's so safe and predictable here. What will it be like to leave here? I try to remember the smell of the woods after a rain.

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Winter From page 14

September 27, 2002

Sunglasses.

Today I needed sunglasses for the first time in six months. The sun has been up for a few days, but under clouds most of the time. Today the clouds cleared and there he was in all his glory several fingers above the horizon. Not a meek orange ball just barely waking up, still groggy and blinking from his long sleep, but a wide-awake bright yellow, powerful and glowing force that filled up more of the sky than I can remember a sun ever doing. Was it always this amazingly captivating and beautiful? Has it really been so long for me that I again can be completely enchanted with the sun? Wow. I stared at it for far too long, but seeing spots for the next hour was worth the price. Warmth and light and shadows and yellow on the snow and... "we're outta the woods, we're outta the dark, we're outta the night..." It feels like heaven on my face. I tilt my head toward the glow and drink it in.

Although, funny thing... I'm loving the sunlight and the fact that my winter is almost over, but I have this place in my heart, a soft area very close to me, that holds a deep fondness for the dark and all I gained from it. How it brought my world right up to the tip of my nose... there was nothing to see beyond it. I struggled with all that came into focus as I wandered around in the dark and found the darkness a soft place to land. Sometimes literally as I sat on my knees and wept out that which needed to go. I'm finding it harder in some ways to get around outside now that I can see. The light is flat, goggles fog and it's distracting. In the dark I went by feel. I think I understand blindness a little more.

We had our second coffee house and it was as much fun as the first. We had cappuccino drinks and Bailey's made from scratch (we ran out of the bottled version several months ago.) There were also homemade chocolate-almond biscotti and treats people donated from their private stashes. We enjoyed music, poetry and one-act plays. The talent in this small community of 51 is impressive. I found myself appreciating people so much more once I'd seen their creative side.

We had a sunrise party in the new station building. It marked something for us to view the return of the sun through the same windows we'd watched him go down six months ago. The band played and we were on track and tight on every song except one.....When the drummer's girlfriend came out onto the dance floor in a sexy red dress he completely forgot what he was doing and started playing the drum part to a different song. I will miss playing music with these people. Rehearsals were usually a time of creativity and silliness and drinking a mixture of Crown Royal and brown sugar we dubbed "the elixir of life" (good for the throat). What a great balance to the chores of everyday life.

I helped launch weather balloons this month. We would float the filled balloon outside carefully so as not to puncture it, attach the sonde (the data collection device) and gently let it slip towards the heavens. It's really cool to hold onto a giant balloon and then release it to it's own destiny. The first time I launched one I couldn't stop holding on. I was attached to that big white gentle floaty orb. Let it go? I'd watched it grow up! But then I did and whoooosh, up she went bee-lining for the heavens, never once looking back.

November 2, 2002

This morning was the last time I will have to put on my South Pole work clothes: heavy duty long underwear, giant gray socks, two poly-pro shirts, turtleneck, sweater, insulated Carhartt bibs, bunny boots, coat, hat, neck gaitor, goggles, hand liners, mittens. Whew. I'm due to fly out of here on Nov. 4. A day after that I will wake up and put on this: tank top, shorts, sandals.

The first plane arrived Oct. 26. We were all at the flight line fuel pits waiting and watching, taking pictures, smiling, being nervous and anxious. I felt out of my body when I saw that first plane fly overhead, making their approach. As it taxied to the fuel pits we couldn't see it for all the fog the engines created. Then the plane emerged out of the fog like a dream and we erupted in cheering and spontaneous hugging and lots of comments like "We did it! We really did it!" "Can you believe it's over?" Then the plane stopped and we stood still and watched. Soon a face appeared around the nose of the plane, the first new face we'd seen in 8-1/2 months. And then there were

many more new faces pouring off the plane, and it struck me - the cocoon had been split wide open. The dark and familiar nest of our winter was gone.

It's been a busy week since the station population grew from 51 to 138 in one day. The methodical routines have been replaced by projects and busier schedules. It's also been an adjustment having so many people in our spaces. The galley is usually full and there is more often a wait for the bathroom. I miss our old routines and the pleasure of seeing only familiar friends in their usual places. But it's hard to feel the loss too deeply when I know in a few days I'll be gone and what I'll take with me is what matters the most.

I leave behind many of the old griefs, sadnesses and disappointments, along with the deep gratitude that this wonderful place was willing to take it from me and dispose of it. I leave behind my love for this experience. I take with me the strength from this year, the confidence and pride in myself, the joys of comfortable friendships and wonderful memories. I leave here happier and less judgmental, more grateful and calmer.

It struck me most one night in the galley about two weeks before the first plane was due. I went in for a snack around 9:30pm and found no one there, which wasn't unusual, but this time the silence stopped me. I was aware that the energy and love of all those before me was in the walls. I felt their presence and fondness for this place, their awakenings and appreciations, just like my own. I felt their joy and reluctance at having to leave. I felt the parts of themselves that they had left behind. And I became one of them. No longer was I a mere visitor to this place. I too had put myself into it, just as all those before me.

Photos courtesy of John Wright and Shaun Norman/Special to The Antarctic Sun

At left, John Wright works on the snow bridge above a crevasse nicknamed Mongo which the South Pole traverse team discovered and blasted open, above right, then filled with snow, as they did all crevasses in their way. At lower right, Kim Uhde pushes snow across crevasse six while Russel Magsig, left, Tom Lyman, center and Shaun Norman, right, watch.

Zone

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ning of the intended route, carefully chosen to be the safest, shortest and most fuel-efficient.

Entering the zone

The first 30 miles (48 km) were easy, turning off the Black Island road and heading east to the location that soon became Shear Zone Camp, with a Jamesway and a few tents. The next 3.1 miles (5 km) took two months, as project manager John Wright and a rotating team carefully crossed the shear zone.

"The shear zone is the single, unavoidable obstacle that any traverse outbound from McMurdo contemplating travel on the Ross Ice Shelf must face," said Wright.

The shear zone is deceiving, "a vast, flat, featureless plain of snow," Wright wrote in one of his weekly reports. But that seemingly solid ground has swallowed vehicles whole. In 1991, Brian Wheater and Quentin Rhoton were driving a tractor across the shear zone when the snow gave way and the D8 tractor plummeted into a crevasse. They were rescued several hours later, but the tractor remains buried north of the road Wright's crew built.

Under the snow, a belt of crevasses runs about 75 miles (120 km) from Minna Bluff to Cape Crozier. The crevasses occur where the McMurdo Ice Shelf and Ross Ice Shelf meet. The Ross Ice Shelf moves faster than the McMurdo Ice Shelf, so the ice in the four miles between them has one end held back while the other is pushed forward, causing it to angle and crack open in a series of crevasses.

While someone on skis or a snowmobile might make it across the snow bridges hiding the crevasses, making the route safe for an 83,000-lb. (182,600 kg) bulldozer took work. The philosophy was simple, Wright said. Find and fill every crevasse on the route.

"We're going to take any crevasse head-on and we're going to gut it and we're going to fill it and we're going to cross it," Wright said.

The route across was selected to meet crevasses at close to a 45-degree angle. It was also one of the narrower points of the shear zone, being three miles (5 km) across, but with the final "miracle mile" nearly crevasse-free.

"It was just like the land of milk and honey if you get there," Wright said.

A jeep-sized tracked vehicle, called a Pisten Bully, led the way, scouting the route with ground-penetrating radar 20 feet (6 m) in front of it on a boom. Moving 3 mph (5 kph), the drivers could stop the Pisten Bully within 2 feet of recognizing a crevasse on the screen inside the cab.

Once a crevasse was found, an access hole was opened up for a mountaineer to descend into it on a rope and judge the dimensions.

"It's pretty amazing, just the expanse of ice you see, the really blue layers," said Erik Barnes, one of the mountaineers. "It's a pretty serene environment down there. You are this little tiny speck in the middle of this huge cavern and you look up and you just have one tiny ball of light

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above you."

After the mountaineer climbed out, sticks of dynamite were lowered through holes in the snow bridge and the crevasse was blown open. Crossing the shear zone took 5,700 pounds (2,565 kg) of dynamite, Wright said.

The gaping crevasses then had to be filled, which meant finding safe areas to the sides of the route to mine snow.

"That was the hardest part of the job," Wright said. "You find out there are crevasses everywhere….Our fill-gathering areas were never straightforward. We had to mine snow from fields that looked like kidneys or had islands in them."

Rich Vaitonis, Brad Johnson and Kim Uhde maneuvered bulldozers through the odd-shaped borrow pits, carrying snow just to the marked edge of the crevasse and dumping it into the hole. They took the biggest risk out there, Wright said.

"They were the cat skinners who built the road across the shear zone. They were the ones who brought the 83,000-lb. piece of equipment up to the edge," Wright said.

The snow dumped into the crevasse compacted itself, leaving a solid, safe plug for the dozers to smooth over and cross. Each crevasse took one to six hours to fill, depending on its size, plus an hour afterward to prepare the road across.

The team found and filled 32 crevasses, some earning names – Hummer, Strange Brew, Personal Space and Mongo. About five were of a substantial size, the largest about 26 feet wide and 110 feet deep. The large crevasses took about 12,000 cubic yards of snow to fill.

The road they've left is a little like a safe-road through a minefield. Step off it and there could be trouble.

"You'd never know there was a crevasse there if there weren't a sign saying there was a crevasse there, but you damn sure better not get off the road," Wright said. "The place is full of crevasses."

The entire shear zone moves north toward the sea at the rate of up to a meter a day, so the road will have moved significantly in a year. Flags mark the road and form a grid around the shear zone road.

"That will tell us how the road is bending or deflecting according to the motion of the shear zone," Wright said.

Even though the road won't be in the same place next year, Wright expects it will be basically intact and ready to cross.

The next step

The crevasses are crossed, but the trip isn't over, and Wright forged a little farther this season. He and three others continued across the Ross Ice Shelf with a Pisten Bully and Challenger 95 pulling two sleds to see

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Searching out crevasse danger

Driving cross-country in Antarctica depends on being able to find or avoid crevasses before they find you.

Many ways have been tried over the years, including a long vehicle the Russians put in front of their traverses.

"Their solution was to use this huge machine that looked like a rocket ship on wheels, the theory being that it's so long there's no way it could all fit in a crevasse," said Steve Arcone, a ground-penetrating radar expert at the U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, N.H. (CRREL).

Early attempts at radar crevasse detection systems were often flawed and could not sense a crevasse until the vehicle or sensor was directly above it, because the radar only saw into the ice directly below it.

Ground-penetrating radar on 20-foot boom in front of a Pisten Bully warns of crevasses.

When pushed along the ice surface, ground-penetrating radar can see crevasses coming about 65 feet (20 m) ahead of the antenna. It even works from a helicopter, Arcone said, as long as the helicopter stays below about 35 mph (55 kph) and within about 20 feet (6 m) of the surface.

Ground-penetrating radar was originally developed to detect tunnels along the Ho Chi Minh trail during the Vietnam War. Its development and production were then taken over by Geophysical Surveys Systems Inc. in New Hampshire. It became commercially available in 1972 and there are now several manufacturers. Its first use in polar regions was to detect permafrost. In 1975 it was brought to Antarctica. Since 1995 it has been an essential component in developing the South Pole traverse route.

The radar works by sensing reflections from the layers of snow. If the display suddenly shows a gap or more likely a sag in the layers, that's a crevasse. This has been well known for more than 25 years, said Arcone. What is original in their application is that they exploit the fact that radar waves travel sideways, along the surface, as well as at shallow angles. This allows them to see waves scattered back from a crevasse or snowbridge starting about 65 feet (20 m) away. At 3 to 7 mph, that gives several seconds warning to stop the vehicle.

Though the radar works well, it takes some practice to learn to read. Four members of the South Pole traverse team went to New Hampshire before the season to learn to use the radar, visiting both the manufacturer and CRREL. They used two ground-penetrating radar systems in the shear zone, an area where the McMurdo and Ross ice shelves meet that is riddled with hidden crevasses. The radar detected crevasses along the planned traverse route and in areas alongside the route where bulldozers scooped out snow to fill crevasses.

"We all know that crevasses are dangerous and we all maintained justifiable skepticism (of the radar)," said John Wright, project manager for the traverse. "We were all thinking people and we learned and became proficient and in the end we wouldn't go anywhere without it."

Even so, it was tricky to focus and interpret the radar display, and coming exploratory work should include ground penetrating radar experts from the start, Wright said. The crew had been working in the shear zone for two weeks when another radar expert from CRREL, Allan Delaney, arrived and adjusted their radar settings, showing some questionable areas were indeed crevasses.

Because it is on an ice shelf constantly moving toward the sea, the shear zone moves north up to a meter a day, changing as it goes. Glaciologist Tom Lyman rappelled into one of the crevasses and saw signs of an older crevasse aligned in a different direction which had since closed up.

"The ice is constantly swirling around as it moves along," Arcone said. "It remains to be seen whether radar will be effective in the ensuing years, because we've changed these crevasses so much."

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how far they could get in the soft, deep, late-season snow.

"It gives us a good opportunity to see what the snow conditions are like and how the equipment works," Bresnahan said.

They made it more than 100 miles out, and then back again, in four days without running into any crevasses. That will just be a taste of the year to come.

Next year a larger line-up of tractors and trailers will set out for the Leverett Glacier, the chosen route through the Transantarctic Mountains.

"We think that we'll run into no crevasses until we run into the Leverett Glacier, but as Hamlet would say 'That's a consummation devoutly to be wished,'" Wright said. "That in no way says that you let down your guard."

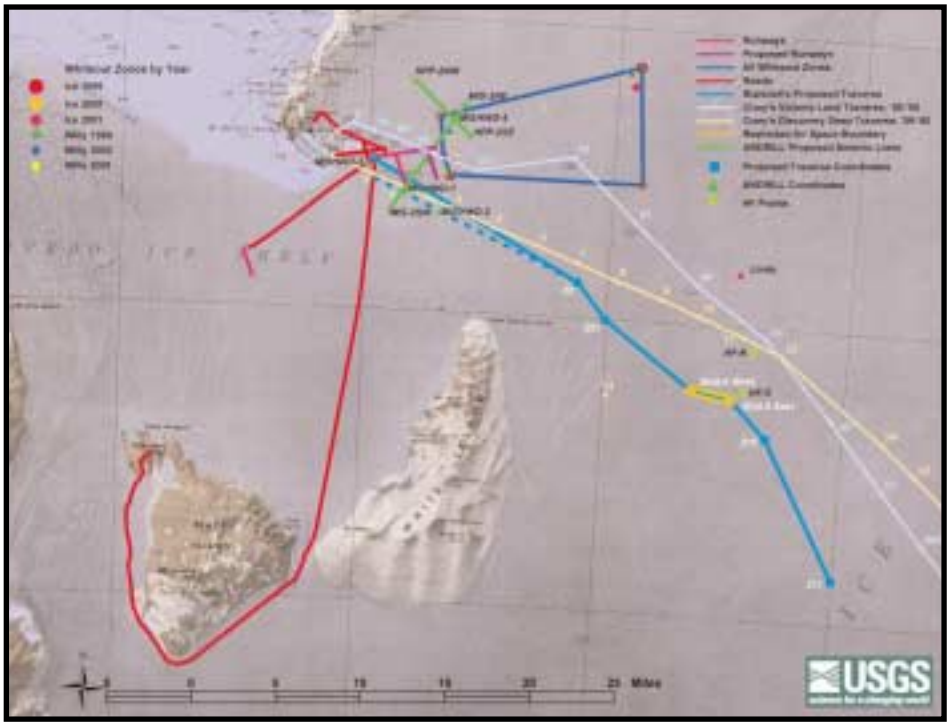
Leaving nothing to chance, next year they will bring a bulldozer to fill any crevasses they find, as they will on the initial proof-of-concept traverse the following year.

Climbing from the Ross Ice Shelf up to the polar plateau, an elevation gain of 6,500 to 9840 ft. (2-3 km), is the next challenge for the traverse. After looking at 40 glaciers, the Leverett Glacier was chosen as the easiest access to the plateau, with a steepness of 4 percent or less, firm, dry snow conditions and minimal crevassing. It also has the advantage that heavily-loaded convoys will spend the maximum amount of time first crossing the flat Ross Ice Shelf, becoming lighter as they burn and cache fuel for the return. By the time they have to climb the glacier they will have dropped a significant amount of weight.

In 2004-05 the convoy will go the full distance to the South Pole and back, carrying cargo to demonstrate it can be done.

"The idea is to forge this trail, not a road, but a trail, that may become a snow road in future years," Wright said.

If the trial-run goes well, supply traverses could become a regular part of the Antarctic program. The NSF plans to evaluate the environmental impact of routine use of the traverse route before the Antarctic program begins regular traverses to resupply South Pole station.



A convoy or "swing" of Challenger 95 tractors pulling full trailers could deliver fuel to the South Pole without using as much fuel as the LC-130s do, according to a report by George Blaisdell at the U.S. Army Cold Regions Research and Engineering Laboratory in Hanover, N.H. (CRREL). The actual supply traverses would consist of three swings, each consisting of six tractors and a mix of 21 sleds and tracked trailers, according to Rick Campbell, a planner for the South Pole traverse.

Of course, it would take longer – 30 days instead of six hours – but fuel and some other cargo doesn't need to be delivered as quickly as fresh food or people. According to one scenario CRREL recommended, over the course of a season six roundtrip traverses could deliver 243,500 gallons of fuel to the South Pole, about half the station's needs. The cost of delivery would be from $0.63 to $0.84 a pound, compared to more than $13 per pound by plane from McMurdo, according to the CRREL reports.

But this time cost savings is just a side benefit. The primary reason for the traverse is to make the LC-130s available for other missions, Bresnahan said. During the construction of the new South Pole building, the number of LC-130 flights available to support science around the continent was cut from 150 or more a season to about 70. Some of the planned flights also end up canceled because of weather, which would have less effect on ground traverses.

"Once the route's established, we can travel in weather we might not be flying in," Bresnahan said. "Low ceiling is not going to stop the traverse."

All roads lead to science

Many researchers hope the South Pole cargo traverse will succeed because of the opportunities it would open up. South Pole traverses could replace from 90 to 100 flights, making those LC-130 flights available for science, Bresnahan said. The flights could support research in the deep field or bring more scientific cargo to the South Pole.

"I think the traverse is the greatest thing that ever happened," said Bob Morse, one of the researchers involved in IceCube, a giant neutrino detector planned for the South Pole. "The traverse could provide a big relief in flights."

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Photo by Ralph Horak/Special to The Antarctic Sun

A caravan of tractors pulling specially designed cargo sleds on the French traverse this season.

Le traverse sud

By Kristan Hutchison
Sun staff

French do it. Russians do it. Even the Australians and Japanese traverse supplies across Antarctica. Now the U.S. Antarctic Program is learning from their experiences.

"A lot of this is based on experience the French had," said National Science Foundation Representative Dave Bresnahan, referring to details of a planned traverse to the South Pole.

The American traverse will use similar sleds and equipment to those tested by the French over eight years of traverses from Dumont d'Urville to Dome C and back. The French also have successfully used stadium lights mounted on their vehicles to illuminate the path when visibility is poor, an innovation the Americans may adopt.

"It's like going four-wheeling on a really bumpy road."

— Ralph Horak, participant-observer on the French traverse

"We're actually utilizing a lot of their designs they've proven over the years," Bresnahan said.

To learn more such tips, Bresnahan and four others went to France in July. Then two Americans, Steve Carr and Ralph Horak, accompanied French traverses this year. The 650-mile traverse takes about 25 days roundtrip, going 4 to 7 mph (7-11 kph) when fully loaded and 6 to 8 mph (10-13 kph) coming back empty, said Horak, one of the participant-observers.

"They do a lot of good things," Horak said. "They have a lot of expertise just from doing it so long."

The South Pole traverse will be longer, about 1,000 miles, but it has the advantage of starting out flat instead of climbing at the beginning, as the French must do coming out of Dumont d'Urville. Other than that, the terrain will look much the same.

"It's flat and white all the way. You have to come up with creative ways of keeping yourself from getting bored," said Horak, who listened to music and read books while driving. "It's kind of a Zen thing. It's not like you're driving in 50 mph traffic."

The French traverse drove on a strict schedule, with no days off and stopping only one hour early on Christmas for a meal that featured snails. For all meals, to minimize preparation time, they used the equivalent of TV dinners for 10, reheating dishes that had been pre-made in Australia.

Though terrain was flat, the going was rough and driving for 11 hours a day turned out to be quite rigorous, Horak said.

"It's like going four-wheeling on a really bumpy road," Horak said.

Everything had to be secured before the driving started each day, much like a ship, with latches on the cupboards to hold them closed. The rugged terrain was equally hard on the equipment. The traverse included two Pisten Bully and seven Challenger tractors, with one driver per vehicle. Several of the drivers were also mechanics, a necessity since they had several breakdowns along the way, including a leaky radiator, a broken sled frame, blowing an engine and having to change the final drive sprocket. One of the caravans being pulled along on the traverse was a small shop full of spare parts.

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The ability to bring more cargo to the South Pole is critical to the IceCube project, which will need to bring in the equivalent of 280 LC-130 loads of drilling equipment, science instruments and fuel to build the detector. Though the IceCube flights would be spread out over several years, there had been concerns that there wouldn't be enough flights to go around.

"I hope they manage to get this traverse going, so we're not sort of taking over all the transport," said Per Olaf Hulth, a professor of astro-particle physics from Stockholm University who is also part of the new IceCube project.

The traverse itself could also carry scientific instruments to the South Pole that don't fit through the 10 foot by 10 foot (3 m by 3 m) door of the LC-130.

"It will be a shift in mentality," said Sridhar Anandakrishnan, from Pennsylvania State University, who was the point person on a paper by the McMurdo Area Users Committee supporting the traverse for scientific reasons. "Right now everybody thinks about what can you do within the confines of the LC-130."

Science would probably want to tag along on the traverse itself, adding weather stations along the route or observations the drivers could take, Anandakrishnan said. Eventually researchers might use the traverse as a resupply system for summer field camps in the area surrounding the route.

"The sort of geophysical work we do would benefit from having a traverse route along which you know there are regular depots," Anandakrishnan said. "Having the traverse would allow you to do science along larger areas."

I swam 250 miles for your dinner, and all you can say is "Ooo, I hate stinky fish puke!"

By Karen Joyce

Photo by Jerry Marty/Special to The Antarctic Sun

Photo by Mark Sabbatini/The Antarctic Sun

The windows at the new South Pole Station, seen at left from the outside and from inside the new dining area during construction work in late December, are generally the most popular feature. Below, Jake Spencer, front, Ian Guptill, back and Doug Forsythe, at wall, work on the interior of the new building.

Photo by Melanie Conner/The Antarctic Sun

Construction

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station's estimated 60 winter workers will continue living in the landmark dome that the new station is replacing.

"We're in a transition period where we have two cities," said Jerry Marty, the station's National Science Foundation representative.

The old and new stations are linked by a tower that resembles a grain elevator, so many workers and researchers may not need to set foot outside during their normal workday. Furthermore, the interior of the new station is heated, unlike the dome where the space between the buildings it covers is at or near the same temperature as outdoors.

A group of inspectors from various agencies is at the Pole determining if the new station meets safety requirements for occupation. Marty said some incomplete work will be addressed during the winter and next season, but all safety requirements will be completed before the move-in occurs.

"The A1 (winter-over housing area) and A2 (dining and mechanical area) will be occupied upon completion, testing and assurance that all fire/life/safety systems are functional, as well as basic infrastructure utility systems being functional," Marty wrote in an e-mail from the Pole on Friday. "We are targeting Feb. 10 as the date to have these items completed. Actual move-in would occur during the weeks of Feb. 10 and Feb. 17, with the majority occurring during the week of Feb. 17. Based on this and making sure the kitchen equipment has been 'tested and burned in for usage,' the first meal will probably be served around Feb. 14."

The dome has outlived its design life, necessitating the $153 million elevated station scheduled for completion in 2007. Construction workers, who make up 28 of the Pole's winter occupants, will spend the season working on the inside of section A3, which houses the medical and computer labs, with the goal of occupying it next year.

Dining room with a view

The first major part of the transition to the new station will be the closing of the dome's dining hall, a windowless facility designed for 60 people that now feeds more than 200 during the summer. Different people are excited about different things in the new dining hall – the walk-in freezer, the always-available ice cream machine, something called a tilting skillet – but one feature seems to stand above all others.

"The views are unbelievable," said "Cookie" Jon Emanuel, head of food service at the South Pole station. "The natural light floods over into the cooking area. It's going to be nice to look out the window every once in a while."

Just outside the windows are the international flags that surround the ceremonial South Pole and behind them is the skiway where airplanes arrive and depart. Beyond that view – which captures some of the most colorful moments of visitors and private expeditions – is the polar plateau that can be seen for miles on a clear day.

Those preparing and eating some of their final meals in the old dining hall said there are some things they will miss, but generally the new facility is a significant upgrade.

"This place is really nice and cozy, but…it just felt really spacious over there," said Stefanie Kerr, a first-year prep cook who has a storage unit in Whitefish, Mont.

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At left, prep cook Stefanie Kerr slices vegetables while Suzanne Same, the station's winter chef, background, prepares tempeh in the station's current kitchen, scheduled to close in mid-February. Below, South Pole Area Director B.K. Grant helps herself to food from the serving line in the old dining hall.

Photos by Mark Sabbatini/The Antarctic Sun

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The differences go beyond cosmetic. The cooks can recite a long list of equipment and design improvements they say will make their job easier. One of the first things Emanuel mentioned was that tilting skillet – a standard in the food industry if not necessarily the average household kitchen.

"We made pot roast a few weeks ago where we had to use three large roasting pans and three ovens," he said. "You can do pot roast for 150 in one of those (tilting skillets)."

Among the other devices favored by cooks feeding large crowds is an Alto-Shaam oven that can cook prime rib at one temperature and keep it warm at another, and the steam-jacketed kettle that delivers gentle heat up the sides.

"You can't burn things in it," Emanuel said.

Diners in the larger serving area will also be able to collect food from a BBQ grill before heading to tables that, unlike the current kitchen, are far enough away they don't contribute to the logjam during busy periods. Emanuel said the new dining room is designed for 150 people, so "it'll still be cramped, but not nearly as terribly" during the busiest periods.

The kitchen is also bigger and more efficiently designed, making it easier for cooks to move around and prepare their large pans and trays of food. Access to many of their ingredients will also be simpler due to a walk-in refrigerator and freezer. Getting perishables at the old kitchen means going outside to another building within the dome.

"You don't have to put on your bunny boots," said Suzanne Same, a first-year winter chef from Boulder, Colo., who has more than 30 years of professional cooking experience.

Not everybody wants to see the old kitchen go dark. Drew Logan, a Seattle resident, said the new dining hall is too sterile and prefers to keep his old room under the dome because it's located right above the office where he works. There's also the attachment that comes after years in the old digs.

"I helped build these lights," he said, pointing to the dining room ceiling. "My wife helped build the thing that holds the cereal."

Michael Holstine, a first-year science technician, said he likes the new dining

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Photo by Kristan Hutchison/The Antarctic Sun

Photo by Melanie Conner/The Antarctic Sun

The inside of the new South Pole station kitchen and dining rooms receive final touches at right. Above, carpenter's apprentice Jake Spencer of North Berwick, Maine, trims the wall covering in the new dishroom. The kitchen and dining area are scheduled to open in mid-February.

Photo by Melanie Conner/The Antarctic Sun

Photo by Melanie Conner/The Antarctic Sun

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hall, but will miss the old one because "it's a lot closer to my office." Also, he said he'll miss the exposure to outside temperatures while making the walk between buildings.

"The cold hits you like a breath of fresh air," he said.

Some traditions will make its way over to the new station. Emanuel said one priority is finding a location for the "whiner bell," which cooks ring when somebody in line gets nitpicky about something.

"The Polies are trained to boo and hiss – the entire dining room," he said. "It's a beautiful thing."

"The views are unbelievable. The natural light floods over into the cooking area. It's going to be nice to look out the window every once in a while."
—"Cookie" Jon Emanuel, South Pole head chef

A step up in living

Current housing ranges from portable canvas buildings with curtain walls to rooms resembling well-worn college dorms. Some old-time Polies find the housing acceptable, but nobody mistakes their rooms as luxurious. Also, the housing does not confirm to safety codes and uses large amounts of fuel for heat.

"The classic quote is they do not meet the minimum federal requirements for a prison cell," said Chris Martin, a scientist who is spending this winter at the Pole as

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Top, people eat lunch in the soon-to-be-obsolete dining room in the dome. Originally meant for 60 people, over 200 people eat in the dining room every day. Top right, cereal jars line makeshift shelves below the serving line in a dining room that is overcrowded with people, goods, pots and pans. The crowded kitchen will soon be abandoned for one in the more spacious new station. Right, a man walks down the hall inside the new station.

Photo by Melanie Conner/The Antarctic Sun

Photo by Kristan Hutchison/The Antarctic Sun

Photo by Mark Sabbatini/The Antarctic Sun

Above, Chris Martin, a scientist spending the upcoming winter at the South Pole, inspects one of the new dorm rooms that are scheduled to be used for the first time starting in mid-February. At left, carpenters Eric Daigh and Paul Smulow work on the sauna.

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part of the AS/TRO project.

Exaggeration or not, it's a characterization unlikely to survive in the new rooms. Every room comes with a set of modular furniture, including a bunk with a set of drawers underneath, a desk and a portable closet. The decorative atmosphere isn't the only big change: there's also improved ventilation and every room has its own thermostat.

About 10 of the rooms have removable walls so couples can share quarters. Safety features also get an upgrade, including fire walls, fire detection and fire safety equipment.

"You're dealing with a 30-year difference in design," said Bill Henriksen, the station's winter manager.

Men and women will have their own communal bathrooms, with one of each on both floors. Storage cubes are provided for personal items, but there is only one shower per bathroom – the long-standing policy of two 2-minute showers per person per week is not changing.

Workers who have gotten a sneak preview of the rooms generally said they are inclined to ask for a room on the lower of two levels available. The upper level is where the new dining hall is, likely meaning more noise and crowding in the bathrooms as the station's population flocks to meals.

Logan, happy in his old room, said there are still enough improvements at the new facility to be attractive.

"I would be tempted if I could get a windowed room over the winter," Logan said.

Henriksen said rooms with windows will be assigned by seniority. Rooms on the inner side of the building lack windows, but so do the rooms in virtually all of the current Pole housing buildings.

The room improvements and extras, such as hook-ups for the Internet and televisions, may appeal to Pole residents, but they may also have an unintended cultural effect. Tim Dye, an anthropologist studying social behavior in Antarctica this season, said taking people away from centralized computer labs and other facilities may cut down on the social interaction at what is frequently characterized as a close-knit community.

"I see it happening," Henriksen said. "I see it happening at McMurdo."

But designers of the new station took pains to make sure some vital parts of South Pole culture are preserved. An adjustment was made to the sauna, for example, to raise the automatic shutdown temperature above 200 degrees so that the popular – if unofficial – tradition of the 300 Club (exposure to the sauna, followed by exposure to –100F temperatures outside) could be preserved.

"That'll be up and running," Henriksen promised.

Not quite complete

Assuming a team of architects, engineers, NSF officials and others give the section of the new station a temporary certificate of occupancy, there still is some work remaining before the wing is complete. But station officials are talking about the move this month as if it's a done deal.

"Right offhand I don't see any big red-ticket items that are going to stop it," Henriksen said.

There will also be some non-essential portions of the station wing not fully completed, Marty said.

"In more cases than not it's something that didn't get here," Marty said, noting a bathroom, for example, might have six clothing hooks instead of eight.

A list of questions regarding living arrangements is also being addressed. It appears the bunks may be difficult to join together for couples. A smoking lounge has not yet been built - but will in the future - a problem since occupants can't realistically go outside and light up when it's –100F. And there are issues such as how to keep the station as clean as possible.

"People in the garage shop will come up to eat," Marty said. "What do we do with their greasy boots?"

Some of the problems are proving easy to solve, such as installing bins in the hallway for people to put their boots. But feedback is expected to continue as people move into and get used to their new home.

"Once the team is in for the winter the list will continue to grow," Marty said.

Profile

By Mark Sabbatini/*Sun staff*

Remote doctoring...

Small town medicine meets modern technology

Photo by Mark Sabbatini/Antarctic Sun

Christian Otto, McMurdo Station physician, discusses his workd during a busier-than-expected season at the clinic.

When Christian Otto discusses his medical practice, the word "remote" takes on different meanings.

The most obvious comes from working and researching in isolated places like Antarctica, the Canadian Arctic and Alaska's Mount McKinley. Another is getting or providing medical data via telemedicine with others far away. Then there's his talk of where technology is heading, such as controlling robotic arms to operate on someone thousands of miles away.

The McMurdo Station doctor is focusing his career on advanced medical care in remote environments. Part mountain climber, medical expert and technology guru, Otto has to combine the do-everything skills of a country doctor with the know-how of a computer engineer.

"I think this is just sort of the evolution of the program," he said. "Ten years ago we didn't have the Internet."

Otto is an emergency physician for the Queen's University Department of Family/Emergency Medicine in Ontario, Canada. He has worked there since completing his medical education in 1999, which took him to some of the most remote parts of the world.

Otto said he has long been interested in athletic activities such as cross-country skiing and cycling, and the study of medicine was a natural progression from there for him. At about the same time he became interested in mountain climbing in 1996 he and a climbing friend organized an expedition to Mount Logan, Canada's highest peak.

"Being a medical student at the time I thought 'What a great opportunity to do some research,'" he said.

They ventured into the realm of telemedicine by using the trip to monitor the body's cardiovascular control at high altitude, then sending that data via satellite to the University of Ottawa Heart Institute 2,400 miles (4,000 km) away.

The hookup was a mere 9.6 kilobytes per second – about one-sixth the speed of a modern-day modem – but "we were able to demonstrate the potential power of remote communications," Otto said. Also, they made it a point to post their findings and pictures from the field on a Web site.

"Now everyone's doing it," he said.

The data was of mixed quality, Otto said, but better results were obtained the following year when they repeated the study while climbing Mount McKinley, he said.

Otto graduated from the University of Ottawa Medical School in 1997 and spent the next two years doing his residency work at Queen's University, focusing his training on small, rural communities. He spent five months practicing on Baffin Island, home to 13 Inuit communities in the Canadian Arctic. Health care there generally was provided by nurse practitioners, so Otto helped assess the needs of the area and the telemedicine possibilities.

He also spent a month in 1999 doing research at the Johnson Space Center in Houston. He described the experience as "just like being a kid in a candy store" because of all the equipment and research at the facility, and said participants had to consider unusual problems.

"How are you going to do CPR in zero gravity when you and your patient are floating around?" he said.

Otto's range of experience in unusual environments was a key reason he was hired, stated Ron Shemenski, director of medical operations for Raytheon Polar Services Co., in an e-mail from the company's Denver headquarters. Otto said he had been interested in coming to Antarctica since the mid-1990s and tried unsuccessfully to work at Great Britain's Rothera station and with a private tourist operator before applying on "a total whim" to the U.S. Antarctic Program.

He began his year-long deployment in October, with his diverse background proving useful during what turned into a busy summer season. All participants in the program go through an extensive physical qualification process, but … patient visits to the clinic last summer totaled 3,249; this year, with a few weeks left, the total is about 3,700.

"You sort of come down here with the anticipation that you're going to treat aches and sprains for a year, but that has not been the case," he said. "We've had some very challenging cases."

Among this season's notable incidents are: broken bones, ailments such as cardiovascular and pancreatic problems, and two people injured in a recent helicopter crash in the McMurdo Dry Valleys.

Furthermore, in a small community like McMurdo doctors often perform tasks they might delegate at larger facilities such as Xrays, specimen collections, IV feeds and lab work, Otto said.

"We would never be doing that at a medical center in North America," he said. "It's almost like you're stepping back 100 years."

The difference, of course, is Otto and other Antarctic doctors can rely on real-time help from medical experts in the U.S. or elsewhere when emergencies occur.

He said improvements in equipment and the speed of data transfers to and from the Ice will play a large role in determining what other types of help might be possible. A big enough boost could actually allow telesurgery, he said, where somebody at a remote site would control robotic arms that perform medical work on someone on the Ice.

At present, however, the workload has consistently resulted in 12-hour shifts with only three days off a month, Otto said. He said he expects that to change when winter sets in.

"Certainly there should be more time to enjoy where you are," he said. "It's been hard to find time to hike or ski so far."

He also plans to study for his masters degree in medical science, with a focus on telemedicine, at the University of Texas during the winter. He hopes to obtain a doctorate in the field, as well as return to Antarctica, possibly putting in a year at the Amundsen-Scott South Pole Station.

"I came down here for the challenge of remote medicine and I think that the Pole really represents all of the challenges of remote medicine," he said.