

ing. At an altitude of 2,835 metres, the atmosphere is thin enough to allow for intense sunlight in the summer months. For almost a third of the year, the South Pole is the sunniest place on Earth. However, the rays arrive at nearly horizontal angles, making rooftop solar panel almost useless. Although boxy, vertical-sided structures have little of the dome's aesthetic appeal, they are far better at collecting solar heat. Wayne Tobiasson, director of the CRREL project, believes that air-filled solar collectors on vertical walls could heat the station virtually on their own in the summer months.

Some of the students proposed wind turbines to provide electric power all the year round. But Tobiasson says practical concerns may prohibit such innovations, despite the temptation of nearly constant winds at the Pole. "We've looked at wind power, and it's appealing", he says. "But it's tough to make mechanical devices that can spin at 100 degrees below zero."

## Science

Research at the South Pole generally falls into three broad categories: atmospheric, astronomical and geological. Each science category requires environmental conditions that are often incompatible with other normal activities at the station.

Most design proposals assign each field of research a special 'sector' where it would be isolated from interference. The Metcalf and Eddy design, for example, features an 'upwind sector' for atmospheric studies that require absolutely clean air, a 'dark sector' for astronomy, a 'quiet sector' for geological studies that might be disturbed by vibrations, and a 'downwind sector' for balloon launches.

## Safety

The South Pole, with less than two inches of precipitation each year, is the world's driest place. Dry air and a lack of liquid water makes fire a constant threat. Most of the proposals would physically separate buildings to keep any fire from spreading to the entire station.

## Aesthetics

The geodesic dome at the Pole was originally selected partly for its aesthetic appeal, a decision some NSF officials soon began to regret as construction of the complex structure took a year longer than planned. Nevertheless, NSF still believes that an attractive and thoughtful structure should symbolize the human presence at the Pole.

The agency is willing to make some practical concessions, on matters such as cost and construction complexity, for appearance. But function still dominates form on the Pole. "You can talk about the poetics of architecture until the cows come home", says AIA competition coordinator Kevin McGillycuddy, "but unless it keeps the cold out, it won't work."

**Christopher Anderson**

# Coping with it all

## Palmer Station

"Did you see the guy in the dress?" Antarctic veterans like to ask visitors these kind of questions. It makes the newcomers blush, especially when the answer is yes (although, in this particular case the "dress" turned out to be more of a simple tan robe with a sash, worn over bare legs and tennis shoes). Compared to average city dwellers, the residents of Antarctica lean towards the extremes, and they know it. The kind of person who signs up for nine months of darkness, sub-zero temperatures and near-isolation is not cut from the standard cloth.

Polar psychology has fascinated researchers for decades. In the 1960s and 1970s, psychologists studied thousands of enlisted Navy personnel who overwintered in Antarctica to see how they handled stress. The National Aeronautics and Space Administration (NASA) has conducted studies on Antarctic researchers and support crews to learn more about behaviour in space-like conditions. Navy psychologists examine overwintering residents to learn how to exclude future candidates who may not be able to cope with the pressure.

Despite all this research, psychologists are hard pressed to define the polar 'type', at least when it comes to specifics. "Basically it's the sort of person who doesn't get too many highs and doesn't get too many lows", says Frederic Glowgower, chairman of the psychology department at the Navy Hospital of San Diego, where he runs the Navy's polar screening process. "We're looking for people who can keep themselves amused with a lot of books and movies."

Glowgower and several other Navy psychologists interview all overwinter Antarctic applicants to spot those who may have trouble with polar life. They look for an ability to handle stress, people and regulations, of which there are many, given the risks of winter conditions.

They have good reason to be concerned, for problem cases are not uncommon. Every year some researchers or support crew leave early, when they find they can no longer stand the life. Depression is common, as is alcohol abuse. Liquor is rationed and closely monitored at US stations. McMurdo base offers racks of brochures on how to control anger and depression. And sometimes even the precautions are not enough. The doctor at one Argentine base burned his own station down. And a British team member apparently killed himself by one day walking out onto the ice, never to return.

Between 10 and 25 per cent of the US applicants are eliminated in the psychological screening. Unlike Antarctic residents from some other countries, US applicants who are escaping difficult situations at home are not encouraged. "If you're someone whose life circumstances are hanging from a thread, that's a problem", Glowgower says. Simi-

larly, people who value their privacy are told to expect the worst. Gossip travels fast in cramped surroundings.

Loners, on the other hand, often do well. People who do not depend on a large social network are not likely to be disappointed when they realize that they are going to spend the next nine months with a dozen companions. (In Antarctic tradition, even being a loner is sometimes taken to the extreme. One particularly reclusive resident of McMurdo base prompted the printing of special T-shirts to be issued on rare occasions. They read: "I saw [his name], the Mystery Man of McMurdo".)

Given the stress of Antarctic life, a winter-over would seem likely to have lasting psychological consequences. That turns out to be true, says University of California San Diego psychologist Lawrence Polinkas, but not in the way one might expect.

Polinkas studied the 20-year-old records of 327 Navy personnel who overwintered in Antarctica and compared them with 2,396 personnel from the same period who also passed the psychological screen, but for various reasons did not actually overwinter. He followed the subsequent medical histories of the two groups, and discovered that the people who actually spent a winter in Antarctica had significantly fewer hospitalizations for tumours, disorders of the endocrine, nervous and metabolic systems, and for back problems and other musculoskeletal diseases.

"It's called stress inoculation, Polinkas says. "When individuals go through uniform stressful situations together, they seem to become better at handling stress in general." He says winter-over veterans report increased feelings of autonomy and self-reliance. "They think 'If I can handle this, I can handle anything'."

Polinkas also found an increased use of avoidance and denial to handle stress among those who overwintered. Head-in-the-sand coping methods may not seem very practical, but "in Antarctica, where you can't always escape the stress, there may be no alternative", he says. "It teaches them to cope with limited resources. What would be considered maladaptive in our society may be adaptive on the ice."

At Palmer Station, some coping mechanisms are more obvious. A visitor is quickly briefed on the rules: "You can talk about yourself, but not other people. And respect privacy." Among the 50 researcher and support staff at Palmer there has developed a unique descriptor of one's psychological state: toast. Residents toast bread to a darkness appropriate to their mood. They hang the symbol on their doorknobs. The blacker the bread, the more eager they are to leave Antarctica. Says one: "When all I have is a mound of charcoal at the foot of my door, I'm out of here. I'm toast." **C.A.**