MANAGEMENT OF SMALL GROUPS IN ISOLATION

by

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(1966)

Submitted to the Alfred P. Sloan
School of Management
in Partial Fulfillment of the
Requirements of the Degree of

MASTER OF SCIENCE IN MANAGEMENT

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 1983

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ABSTRACT

Small isolated work groups are often expected to accomplish important objectives for their sponsoring organizations. But, these groups face unusual external and internal stresses acting counter to their development as an effective work force. The manager of such a group must be concerned not only with difficult operating conditions, but also with the effects of these additional stresses.

This thesis examines the problems of management in such an adverse setting using material drawn from experience with the United States Antarctic Research Program and current isolation and organizational studies literature. The emphasis is on aspects of organizational development as they apply to the unusual conditions of an antarctic winter setting.

Antarctic operations and conditions are described as background to the stresses of winter isolation. A summary of events from the 1975 winter at the South Pole is presented, followed by the results of various studies on antarctic wintering and other isolated groups.

Comparisons are made between the general and isolated work setting in areas of culture formation, socialization, individual normalization of the work setting, interpersonal relations and group dynamics. Some ideas for improving management in isolation and the situation of the isolated manager are proposed.

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CHAPTER I

INTRODUCTION

Individuals with differing backgrounds assembled to temporarily pursue specific objectives in an isolated and harsh environment (such as the research station at the South Pole) face severe obstacles (and golden opportunities) to organize as a cohesive and effective group. The obstacles are primarily comprised of inherent situational uncertainties, adverse environmental factors, exposure to an uncommon and threatening format for personal interactions, and problems of time (too little for stable culture formation and socialization, too much for daily activities and social contact during enforced isolation). As a consequence, familiar group processes such as organizational culture formation and socialization, and individual attempts to provide "situational definitions" occur under decidedly atypical conditions and often produce uncommon results. As the period of operations for such a group is generally short, there is ample reason for concern about the effects of the abnormal conditions on group dimensions such as cohesiveness, perspective, standards, concerted effort and the ability of the group to achieve its objectives quickly and economically (effectiveness).

While this paper will deal primarily with the many problems of extreme isolation, it should be understood that those who risk exposure to these problems can reap great benefits as well. The individual in an isolated workplace has uncommon opportunities to learn a great deal about himself and others and the qualities demanded to accomplish group goals under severe conditions. This process can also be a very revealing self-testing experience with both satisfying and valuable results.

A significant complication that exists in the study and solution of problems facing small groups in isolation is the uniqueness of each group and the specific relationships developed by each in dealing with internal and external operations. Because each group is small, it is subject to significant influence from any individual member; because the environmental conditions are severe, anxiety over survival and potential catastrophe high, and social demands uncommon, the solutions selected by any particular group are difficult to pattern. Thus attempts to manage such a group based on a particular general model would yield unpredictable results compared to a more flexible management approach based on an informed perspective and sensitive observations.

The purpose of this thesis is to promote "informed perspective" on the management of small, isolated groups whether they are at antarctic stations or in other similar

situations such as underwater laboratories, deep sea fishing vessels, mineral extraction facilities, defense outposts, or eventual space research and exploration stations. Information is drawn from documentation and reports related to antarctic research operations; studies conducted on man in isolation; organizational studies literature covering such areas as culture, socialization and social interaction; and personal experience. This last category consists of eight years of experience with the United States Antarctic Research Program including program administration, work toward completion of the new station at the South Pole and residence there during its first year of operation, and subsequent overall management of an antarctic research system consisting of a coastal station and research vessel.

Organization

My approach to providing some insight on management of small groups in isolation begins with general background information on Antarctica and its conditions, and the United States' current involvement in research there. The following chapter recounts specific aspects and occurrences of the 1974-75 wintering party at the U.S. Amundsen-Scott South Pole Station to provide a look at experiences typical of such a setting (and those which are formative of my views on this subject).

A review of literature based on antarctic wintering and

other isolation research makes up Chapter IV to provide some perspective and comparison of findings related to various groups and settings. Chapter V briefly summarizes some current thinking from organizational studies literature and then compares the problems of the more conventional work setting with similar processes viewed from isolation.

Finally, some ideas are presented on aspects of improving the position of the manager of an isolated group. The objectives of such ideas are to provide both the manager and group with the tools to increase effectiveness and satisfaction through more informed development as a stable and cohesive group.

CHAPTER II

ANTARCTIC BACKGROUND

> Admiral Richard E. Byrd broadcasting from Antarctica in the nineteen thirties, conveyed through the static a vivid sense of the breathtaking excitement of an enchanted place - deadly, indeed, but also indescribably interesting and beautiful.
>
> - Malcolm W. Browne, New York Times, 1974

Introduction

Antarctica, for all its size and prominence as the great "weather machine" of the southern hemisphere, is a little known continent, especially by those people inhabiting the northern hemisphere. It is interesting that the three ships' captains credited with first sighting the continent were piloting vessels of northern nations on commercial pursuits, an activity that may again attract the interest of those to the north.

This chapter briefly covers Antarctica's unusual characteristics and man's recent history in the area including a description of the United States' current research activities on the continent. It is intended to provide the general setting in which antarctic winterover personnel encounter isolation.

Characteristics/History

Antarctica is the world's highest, driest, windiest and coldest continent. It has an area of 5.5 million square miles, greater than that of the 48 contiguous States and Mexico combined. Its altitude is the result of a polar ice cap averaging 1.5 miles in thickness and estimated to contain 90% of all the world's fresh water. At the South Pole, relative humidity is generally no more than 5%, with local precipitation equivalent to less than one inch of rain per year. Its ability to cool large air masses over its interior has resulted in katabatic winds of up to 200 mph along areas of its coastline. The lowest natural air temperature ever recorded on earth, -127°F., occurred high on the polar plateau at an inland research station.

Exploration, research and living in the Antarctic are all part of recent history as the first positive sighting of the continent did not take place until 1820 by Nathaniel Palmer of Stonington, Connecticut, or Bransfield of Great Britain, or Bellingshausen of Russia, depending on which version of the story one finds most credible. All three were on ships, of course, and none cared to spend any time ashore. The first group to spend a winter in the area did so rather unwillingly, beset in the sea ice aboard the ship, Belgica, in 1899. Heroic tales of exploration on the continent abound from the early 1900's on, the most familiar of which involve

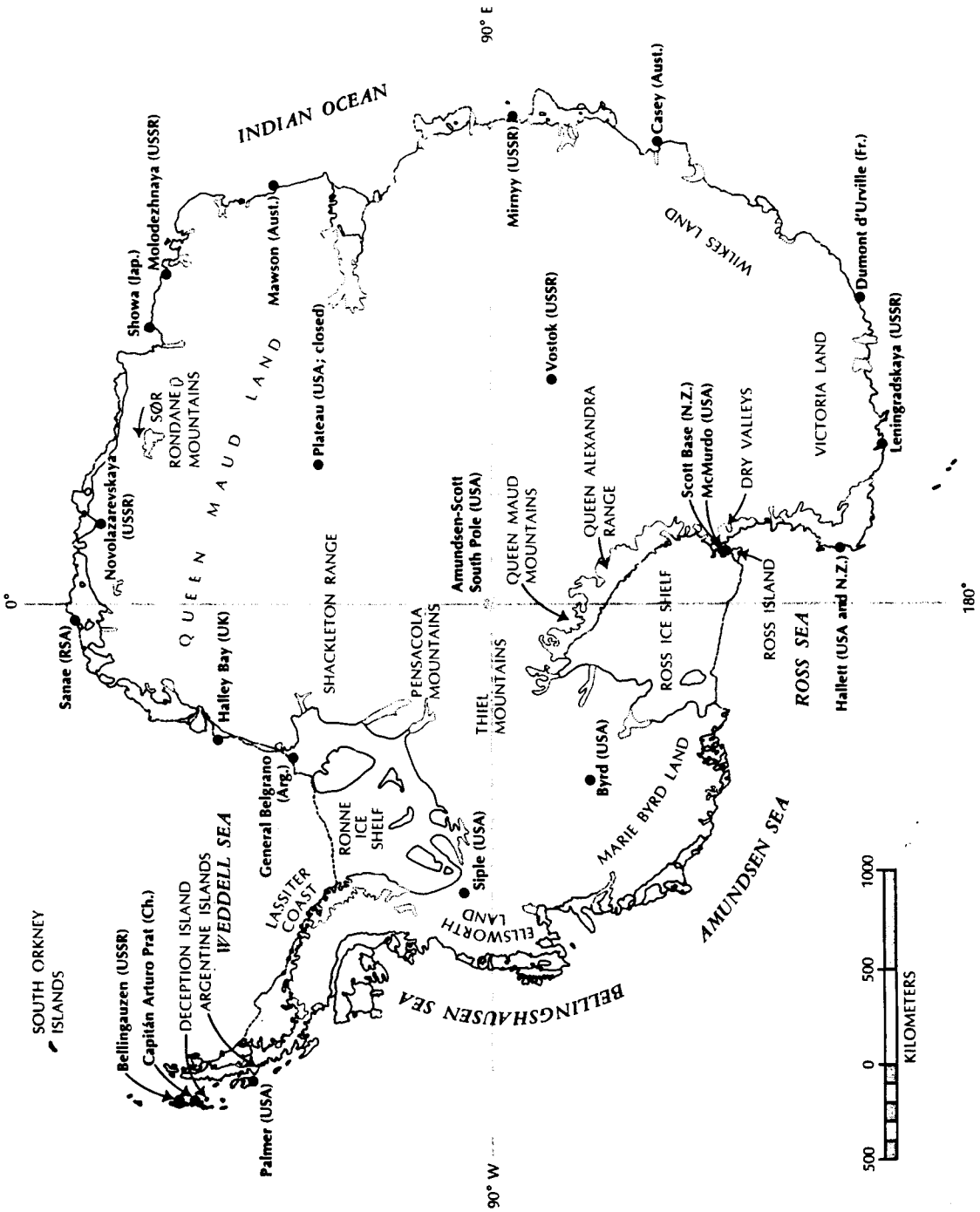
Shackleton, Amundsen and Scott. The latter two made it to the geographic pole during the summer of 1911-12, but only Amundsen and his party made it safely back. With the Pole attained, the area saw much less activity. Admiral Byrd conducted expeditions in the 1930's as did various other explorers in that and subsequent decades.

Antarctica was designated an area of particular emphasis for research to be conducted during the International Geophysical Year (IGY) of July 1957-December 1958. This action greatly increased interest and activity in the Antarctic starting in the mid-1950's. Stations on the continent were planned by twelve nations, with the United States planning one for the South Pole itself. Thus, in 1956, an American aircraft carefully set down at 90 degrees south latitude with the first humans to set foot at the site since the Scott party in 1912. The station eventually built there was intended to be temporary, a location from which a group of eighteen could conduct research during 1957, to be followed by a second group in 1958.

The success of the IGY stations and the enthusiasm of the Antarctic participants led to the International Antarctic Treaty, adopted by twelve nations in 1961. This treaty essentially preserved the continent for scientific research by setting aside claims of sovereignty, maintaining open access for all treaty participants (now twenty-one nations), and

FIGURE 2-1

ANTARCTICA - Selected Stations and Physical Features



limiting any forms of military influence, threat of weapons, nuclear contamination, or environmental impact on the natural flora and fauna. The Treaty further promotes international cooperation in scientific projects, exchange of data and operations information, and open inspection privileges for all.

To many, the greatest product that has resulted from work in Antarctica since the mid-1950's has been the success of the international political experiment that the Treaty represents. The future of this experiment now faces the effects of global interest in mineral assets and marine food resources potentially available in the area.

United States Antarctic Research Program (USARP)

The U.S. Antarctic Research Program provides the structure for the United States' participation in antarctic research in accordance with the Antarctic Treaty. USARP is sponsored and managed by the National Science Foundation, an independent agency of the U.S. Government with offices in Washington, D.C. Program scope includes basic research in many disciplines including glaciology, geology and other earth sciences, marine biology and biomedicine, upper atmospheric physics, meteorology, and environmental sciences. Particular emphasis is, of course, on the unusual regional characteristics that make research in Antarctica unique or more advantageous than at other areas on the globe.

USARP is a relatively fragmented program, drawing participants from diverse groups and institutions nationwide. Scientific investigators are selected through the NSF Grant System under which specific financial grants are made to the presenters of competitive proposals. Investigators typically represent universities, government agencies (NASA, National Oceanic and Atmospheric Administration, National Weather Service, U.S. Geological Survey, etc.), independent research foundations, commercial research facilities (Bell Laboratories, McDonnell-Douglas, etc.), or foreign nations (exchange scientists). Operational and logistic support for the program is handled on a contract basis. Chief among these "contractors" has been the Department of Defense. The U.S. Navy, whose involvement began with the explorations of Admiral Byrd, has played a major role in supporting USARP. The Navy provides transportation, both air and sea, for program cargo and personnel. Until recently, its men provided operations and maintenance personnel for all year-round U.S. antarctic stations, and still performs this function at McMurdo Station, the largest on the continent. The U.S. Air Force's Military Airlift Command also plays a part in the program as does the U.S. Army through such groups as its Cold Regions Research and Engineering Laboratories, and Natick Research Laboratories.

Another of the program's government-based contractors is

the Department of Transportation which provides U.S. Coast Guard icebreakers, key elements in making seaborne resupply of the Antarctic program possible each year. Coast Guard ships have also historically provided platforms for the conduct of research at sea for oceanographers and marine biologists. Finally, a civilian contractor is employed to operate research and field equipment facilities at McMurdo Station, operate and maintain program facilities located elsewhere on the continent, provide engineering and construction support, and generally coordinate and facilitate provision of equipment, supplies, special clothing, instruments, transportation and summer field support to participating scientists.

USARP currently consists of four permanent year-round stations and a research vessel which operates in antarctic waters from Palmer Station and Tierra del Fuego, South America. McMurdo Station is the largest station on the continent, located approximately 2200 miles south of Christchurch, New Zealand, on the edge of the Ross Ice Shelf. From McMurdo, two inland stations are supported: Amundsen-Scott South Pole Station at the geographic pole, and Siple Station, a center for upper atmospheric studies (in coordination with a "conjugate point" station at Roberval, Quebec). The support of two inland stations (and various inland field camps during the summer) is a monumental task unique to the American program. Of all the research stations on the continent, only one other,

the Russians' Vostok Station, is located away from the coastline. The U.S.'s ability to support their significant inland program is based primarily on its heavy lift air capability provided by LC-130 Hercules aircraft (ski-equipped).

McMurdo, Siple and South Pole Stations are grouped under the portion of the program that is air supported with off-continent support provided through Christchurch, New Zealand. The remainder of program facilities consist of Palmer Station on the Antarctic Peninsula, and the Research Vessel Hero (a namesake of Nathaniel Palmer's 1800's sealing vessel). This portion of the program is marine in nature with off-continent support provided through South America (primarily Argentina and Chile). The Hero is a unique, 125 foot, ice-strengthened wooden vessel, capable of sail or diesel operations and specifically built to deal with ice clogged polar waters.

Programs within USARP are generally considered to be either "summer" or "winter" (year-round) programs. By far, the greater number are summer efforts, taking place while somewhat regular transport to and from the continent is available. At the coastal stations, the summer period lasts for 4-5 months (October-February at McMurdo, December-March at Palmer), while little more than three months are available at the inland stations. Summer field camps supported by Navy helicopters or Hercules aircraft from McMurdo have also proven an efficient means to accomplish summer program objectives.

Winter programs are operated by much smaller groups of researchers, especially the on-site variety. Summer populations that have gone as high as 900 at McMurdo, 100 at South Pole, 40 at Siple, and 45 at Palmer, typically drop to fractions of those numbers during winter (McMurdo: 65-80, South Pole: 18-22, Siple: 5-8, Palmer: 8-12). The wintering groups are essentially isolated during the winter months, the duration and totality of isolation varying with the station. Coastal stations are typically on their own for 6-8 months with occurrences of transport in or out taking place only when sufficiently justified by extreme emergency. The two inland stations face 8-10 months of isolation with no history of interruption for any reason and little likelihood that it would be attempted.

The station complement at each wintering antarctic facility consists of two distinct groups, those representing scientific programs and those the support element. National Science Foundation's approach to dealing with this natural division is to have both a scientific leader and a station leader theoretically overseeing research and operations in tandem. Lest this system foster two-headed dangers to the station, it is clearly stated that the station leader has priority when dealing with matters thought to concern physical safety or survival of the station or its inhabitants. The U.S. program has generally discouraged participants from spending more

than one year in succession at an antarctic station, so twelve month stints are most common for both scientists and support workers.

U. S. Amundsen-Scott South Pole Station

One of the more well-known descriptions of the geographic south pole from the era of exploration came from Robert Scott's diary entry shortly after he arrived at the spot on 17 January 1912, "Great God! This is an awful place." The site that Scott and his party had struggled to on the polar plateau was nearly 9,600 feet above sea level (all but about 300 feet of that accumulated ice and snow), with a pressure altitude of approximately 11,500 feet. The area's average year-round temperature is -60°F., ranging generally from -5° to -110°F. The place is a polar desert with extremely dry air and little more than six inches of dry snow accumulation annually. The nature of its position at 90° south latitude causes it to have a "pure" light/dark cycle of one sunset and one sunrise each year. Between these events, the sun is either constantly present or absent from the sky. When present, it circles daily overhead.

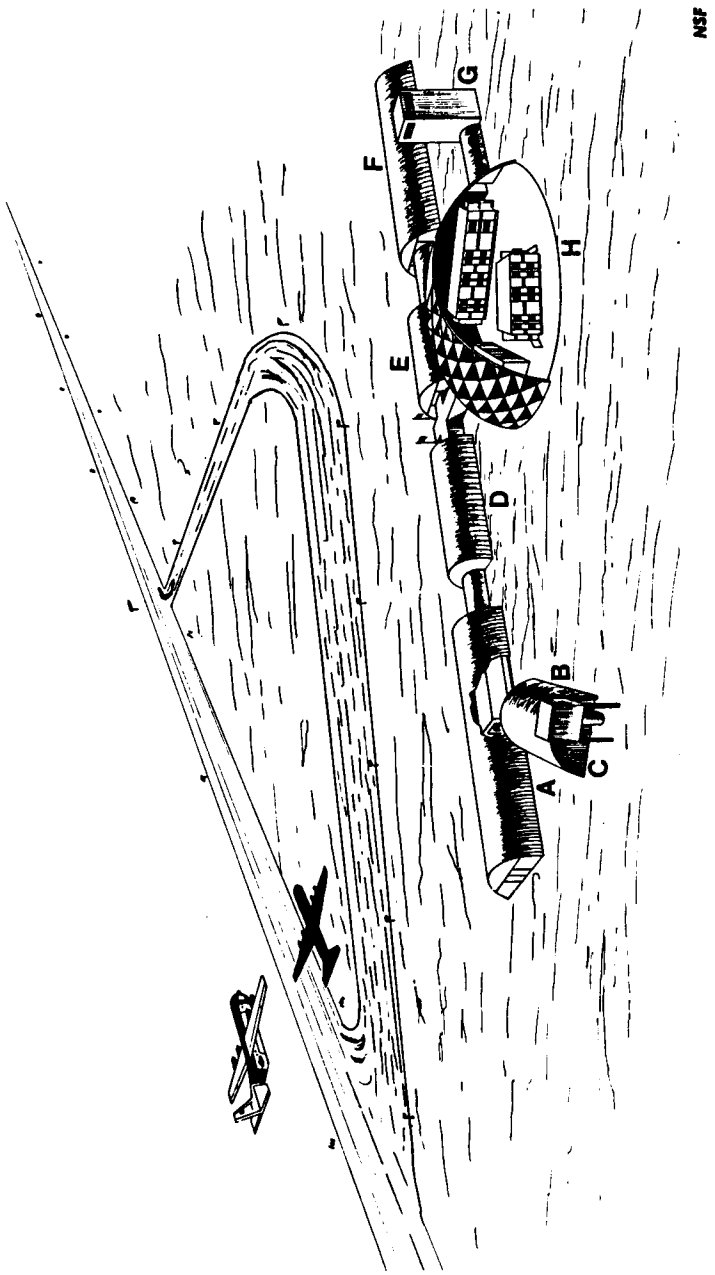
The United States has maintained a research station at the South Pole since 1957, shortly before the start of the International Geophysical Year. Its decision to do so was indeed a bold one as there was little information at the time of man's likely reactions to, or ability to deal with, the

winter conditions expected. Dr. Paul Siple, a veteran of several Byrd Expeditions (and originally the "Boy Scout in Antarctica" with Byrd), was selected to be the first scientific leader at the station, and later commented, "When I had first considered going to the Pole, I had questioned how much scientific work would actually be accomplished. I had felt it would require almost all the combined efforts of the station's personnel merely to stay alive."

The first station consisted of pre-fabricated buildings built on the snow surface with some protective tunnels built between structures. Because of the polar conditions and short summer building season, construction was relatively basic with much of the material and equipment air dropped to the site. This "temporary" station (designed originally for two years' use) was expanded and added to over the years, but suffered greatly from the constant make-do approach and the crushing weight of drifted snow (and eventually ice) accumulating above the buildings and tunnel-like walkways. The design of the new station thus emphasized the placing of all buildings and work areas under protective cover. (See Figure 2-2) This cover consists of an aluminum geodesic dome, 164 feet in diameter by 52 feet high, framed in 5-inch I-beams; and, approximately 900 linear feet of "Wonder Arch," steel corrugated arch of semi-circular cross-section, with a radius of 22 feet. The dome houses three two-story buildings,

FIGURE 2-2

The New Station at the South Pole (Artist's Concept)



Artist's concept of the new station's design. A. Garage, mechanical shop, and gymnasium. B. Helium storage. C. Weather balloon inflation and launching tower. D. Diesel-electric generators and maintenance shop. E. Biomedical and medical facilities. F. Fuel storage. G. "Skylab" tower for all-sky photography and other atmospheric studies. H. Geodesic dome enclosing three buildings: building 1 (clockwise from the top), science facilities and quarters; building 2, communications equipment, store, lounge, and library; building 3, kitchen, dining hall, post office, photographic laboratory, and meeting hall.

while the adjacent arch shelters three additional one-story buildings and an area for nine 25,000 gallon diesel fuel bladders. The station's construction took place over several years with dedication targeted for January 1975. Its completion came none too soon as concern for the safety of the old station, then thirty feet below the snow surface, was a major source of anxiety during its final 1974-75 summer season. A visiting writer at that time (Alexander, 1975) commented, "The subsurface station has all the appearance of an old coal mine and almost as much danger. Between the weight of the overhead snow and ice and the inexorable movement of the underlying ice, the huts are being crushed. Floors bulge upward, ceilings sag and walls are separating at the corners."

While the new station would obviate concerns such as those reflected above, it would not be anxiety free, especially in its first year of operation. Experience had taught that such a station should not be of space age complexity. That is, it was important that life support systems should be of basic engineering design and easily accessible so that repairs could be accomplished by available personnel, equipment and spares during extended isolation. Nonetheless, the station's design sought a reasonable level of sophistication and efficiency, using waste heat from station generators to melt snow and heat buildings, and providing circulating pumps to avoid diesel fuel freezing, as well as other improved systems.

Cost of materials for the station had been six million dollars. It was expected that the debugging period for mechanical systems would probably provide some interesting moments. Even assuming that point when operations would smooth out, there were many who did not consider the station overdone. A scientist interviewed by the New York Times (Browne, 1974) commented, "You may think this new station is too much of a palace to squander on 15 years of research at a God-forsaken hole like the South Pole. But if you'd ever wintered over in Antarctica, you'd know it's worth every penny."

Wintering at the Pole

Wintering at the South Pole allows a strictly defined use of the word "unique." The nearly nine months of total isolation includes six months without direct sunlight; the temperature range during most of the period is -70 to -105°F., well below the guideline of -50° (or warmer) designated for the operation of aircraft to the site; storms of 8-10 days duration occur causing constant blowing snow and wind chill to -180° and lower; and, station occupants can look only to each other to ensure maintenance of all life support requirements (power, water, heat, food, communications), not to mention group sanity.

As alluded to previously, the cold and darkness of winter, combined with uncertain surface conditions and limited navigational aids, effectively rule out winter flights for

any purpose. It is this aspect of the inland antarctic station that makes it decidedly different from many other isolated work places. It has few parallels short of our expectations of the future manning of lunar or orbiting space stations.

Means of communication at the station consist of SSB voice radio and radio teletype with other antarctic stations, the nearest of which is about 850 miles away. These links are reasonably reliable, but periodic blackouts due to atmospheric conditions do occur (especially during the winter period). Far more valuable in a psychological sense, but also far less reliable, is use of amateur radio for direct contacts with amateurs in the United States. This link offers the possibility of radio-telephone "patches" with family and friends. Unfortunately, at South Pole, conditions allowing for effective use of this system are erratic and not at all dependable during much of the winter.

Food, while an important factor to the understimulated wintering group, can easily be disappointing without the unflagging efforts of an imaginative cook. Once end-of-summer supplies of fresh foods are exhausted, only frozen, canned and dried products are available for the remainder of winter.

In considering psychological health at the station, one must start with a look at the basic conditions: an environment of extreme cold and darkness, unchangeable isolation with

a fixed group, high altitude causing various hypoxic effects and limiting capabilities whenever intense effort is required, and extremely low sensory stimulation. On this last point, the place seems specially designed for limited sights, sounds and smells. Only horizon in every direction is available during the six months of daylight; often nothing but blackness during the six months of night. Psychiatrist Jay Shurley has concluded that, "...Antarctica during winter is a strange, strange environment, and everybody reacts to it to some degree - if not with insomnia, then maybe depression or anxiety - but everyone reacts. Profoundly." (Gannon, 1974b)

Another area of concern possibly related to cold, isolation and altitude is the rate of healing at the station. It has been observed that, "...the healing of such things as cuts, broken bones and sores...is slow, for reasons not yet understood but possibly related to the atrophy of the immunity system."

Of course, there are also some factors working on the positive side as well. A volunteer for this experience generally takes pride in surviving at the Pole and in participating in the "adventure" of it all (for however long that view might last). There is also the beauty of the polar aurora and clear star-filled sky, plus the interesting observations of unusual physical phenomena in such a cold environment.

Observations of one's self under these conditions are

also highly interesting, though not always encouraging. "Some find in Antarctica what they want; others don't. But nobody who hasn't been there really knows what it's like." (Gannon, 1974b) For always there is the isolation and the knowledge that it will continue until the end of your term. South Pole Station has been aptly described as, "... the big league of isolation." (Reinhold, 1982)

All men at the station are specialists in some area. While this is a generally positive factor, there are offsetting concerns. A community of specialists finds no one particularly interested in the personal performance of menial but necessary tasks like cleaning, waste disposal and other mundane functions. Generally a system of shared tasks must be worked out.

Since not many people make wintering a regular pursuit, the experience is often the first for all concerned. This lack of specific experience serves to heighten the anxieties of all in attendance, unable to extract assurances from anyone present that all is going reasonably well.

CHAPTER III

A YEAR AT THE POLE, 1974-75

> ...your group will be different from ours, and completely different ways of doing things may suit you. One of the gratifying aspects of life and work here is the freedom to do things as you think best and in a way that most suits the group and circumstances....The biggest difference between life here and elsewhere is the necessity to be totally self-sufficient during the winter, providing for all life support and science operations through local assets of personnel and equipment.
>
> -from: Turnover Information for Station Manager
> South Pole Station, 1975

Introduction

As stated earlier, the experiences of small isolated groups vary widely depending on the specific individuals that make up the group, the environmental factors affecting their setting, the particular turn of events that occur during their isolation, and their interactions with, and perceptions of, activity in the outside world. In this chapter, I describe many of these factors as they related to my experience at the South Pole during the period November 1974 to November 1975. In addition to personal recollection and my daily journal from that period, sources of this information include: weekly situation reports prepared at the station; monthly science reports; meteorological reports maintained by National Weather Service personnel; various National Science Foundation program

documentation for 1974-75; the station physician's annual report for 1975; turnover reports prepared by various station personnel for their successors; various operations memoranda and messages; and, assorted magazine, journal and newspaper articles written during the time of our residence at the station.

What follows, then, should provide some familiarity with the unique aspects of one particular year in isolation and will set some background for comparisons with more common work place circumstances in the chapter that follows.

Preparation for Deployment

For most of the group participating in the initial winter at the new South Pole Station, significant events leading to that end began in the middle months of 1974. At that point, the eight various employers responsible for selecting group personnel (four universities, three government agencies, and a support contractor) were soliciting or reviewing applicants, interviewing and training as appropriate. As selections were made, more specific activities ensued for some. Support team members reviewed historical files in their areas or attended conferences and meetings held to coordinate particular projects or disciplines. Graduate students increased their involvement in their Principal Investigator's research in preparation for undertaking responsibility for field activities.

The motivations of those who eventually were part of the '75 winterover group were varied, but with recurring themes. Several saw the assignment as a positive means of career or academic advancement with the concurrent opportunity to save money for particular objectives (such as further schooling). Other common interests were in overseas work or continued work in polar areas. The uniqueness and adventure of life at the South Pole, especially as part of the first group to operate the new station, was also highly regarded.

An important aspect of candidate selection consisted of completing unscathed the various medical and psychological requirements prescribed by the Navy for winterover participation. Consequently, those destined for Pole typically spent a day at one of four designated Navy hospitals to undergo a very complete medical examination and a (probably) less effective attempt at psychological screening. This latter function consisted of a battery of psychological type questionnaires and brief interviews (20-30 minutes) with a psychologist and psychiatrist.

Topics of special concern at this stage included ensuring the physical completion of the new station and the adequacy of its design and construction to survive the stresses of winter, and, the changeover in support responsibilities from the Navy to a civilian group.

The pace quickened in September with the annual Antarc-

tic Orientation Conference sponsored by the National Science Foundation at Skyland National Park, Virginia. This conference spends most of its time concerned with austral summer activities, the period that is of primary importance to most attendees. However, it also offers potential winterovers their first opportunity to meet and assess the others with whom they've agreed to winter (and perhaps to reflect some on their decisions to date).

To facilitate possible interaction among winterovers during the four days of the conference, a brief social gathering for station groups was held on the first afternoon. More specific information on the group and the wintering experience, however, was available three days later when winterovers alone participated in an extra day of meetings intended to emphasize the positives and negatives of the wintering experience (especially the latter).

One particularly memorable session featured a speaker who had wintered at South Pole a few years before and who had apparently not been too happy with the interaction of (Navy) support and (civilian) scientific personnel. In addition to speaking of problems, both personal and social, arising from prevailing conditions and typical situations, he also strongly emphasized the inevitable science/support conflict and the heavy toll it would take on group stability.

The following morning's meeting between this speaker and

the new South Pole group elicited some discussion on this point, and the feeling that it was not necessarily so inevitable in the upcoming year. This was based on the expectation that the civilian support crew would be much closer in background, age and interests to the science contingent, and that the support crew would be smaller in number than the science group, a situation that had not been true under previous manning. In any case, it was evident that members of both groups were interested in as little conflict as possible along group lines, and did not consider such conflict inevitable in the existing situation.

With the end of the conference, the South Pole winter group went off in many different directions and would not be together again until some time after Pole Station opening in early November. Support crew personnel maintained a somewhat unified schedule as they all returned to southern California briefly and departed for Christchurch, New Zealand, during the first half of October. The latter half of October found the eight members of the support team assembled at McMurdo Station on the antarctic coast for further program familiarization and practical training. This training included such areas as fire fighting, heavy equipment operation, welding, equipment maintenance, and cold injury treatment and prevention. Equally important pursuits were preparation of food order lists, packing of needed supplies and materials, and

scavenging for nice-to-have items recommended to us during radio conversations with soon to be relieved counterparts at the South Pole. Coordination of communications schedules, air operations procedures, and medical practices were also accomplished. Despite the relevance of much of the activity at McMurdo, it was clear by the end of October that the extended period awaiting departure for our new home was somewhat taxing.

The air operations meeting of November 1st determined that no attempt to open Pole Station would be made prior to 9:00 AM on the 3rd. Consequently, it was not unusual for typically unpredictable summer operations when early on the morning of the 2nd, we were told to have our baggage ready to go by 9:00 that morning, and to expect a 1:00 PM launch for Pole that day.

The 1974 wintering group at the old South Pole Station consisted of a science party of eight and a Navy support crew of thirteen. They all seemed quite happy to see the thirty new arrivals that struggled off the Hercules on that clear day at -42^{o}F. The arriving group included biomedical samplers, Navy air operations support personnel, construction personnel to complete the new station, and ten prospective winterovers for 1975. These last included the entire support crew of eight and two of the science team (National Weather Service). The remaining eight of the science contingent

would arrive between November 6th and December 15th (those replacing 1974 winterovers were all on site by November 11th).

Changeover and Summer Operations

The initial period of changeover at an antarctic station is hectic, confusing and often aggravating. The outgoing crew is anxious to be outgoing, and it's not long before the new crew is ready to see them leave. Small groups within each specific area (scientific programs, mechanical, supply, food service, medical, community services, communications) exchange questions and answers, run through demonstrations and simulated malfunctions (or, at times, the real thing), inventory supplies, equipment and tools, and discuss the lore that makes operations at the Pole unique. By November 5th, another aircraft was enroute to the station and changeover was complete with the departure of the 1974 Navy support personnel.

With the moratorium on outside interference now lifted, the intensity of summer operations at an inland antarctic station made itself felt. More construction workers arrived daily to get on with the task of finishing the new station before the scheduled dedication date of January 9, 1975. Aircraft with cargo, fuel and passengers arrived around the clock demanding immediate attention. Summer program scientists arrived expecting adequate support to complete their objectives as quickly as possible.

After three days of discussing seemingly all the possible problems that could arise with the station, problems began to arise that defied expectation and resisted solution. In our case, power outages started occurring and one of our three generators appeared useless; 4000 gallons of diesel fuel disappeared into the snow when a fuel bladder nozzle was inexplicably ejected from its connecting hardware; and, personnel problems started to become apparent. One of the support winterovers was being noticed for his excessive use of alcohol before the first ten days was completed. Another's work attendance was becoming erratic and his performance inconsistent. After two weeks, thoughts of the upcoming winter took on very positive overtones, if only because winter would surely mean a slower pace.

By the end of November, various events of note had occurred. The new station was nearing completion and its power and heating systems were being tested; one member of the support crew for the '75 winter had departed, himself aware that he was not controlling his drinking or subsequent behavior well; a summer scientist, enthusiastic and interested in accomplishing much while at Pole was evacuated with pulmonary edema (an altitude related problem) after only two days of working harder than was advised; and, some of the tunneling in the old station was showing significant deformation and required additional shoring to avert catastrophe.

Through all this, however, Pole residents maintained some reasonable perspective. On the day before Thanksgiving, the station physician, surgically gowned, masked and gloved, had sutured the stuffing into two turkeys for the next day's dinner. A Thanksgiving Day football game at -30^{o} provided some additional tasks for the medical department, and the newly formed South Pole Station Symphonic Stationary Marching Band performed at various aircraft arrivals riding their organizational trash sled and carrying banners to "Stop Antarctic Whaling." Station population had gone from 21 during the previous winter to 99 during November, nearly as high as it would be at any time during the summer.

December provided more of the same problems and breakneck pace that had characterized November. Distinguished visitor groups were becoming more frequent (Commander in Chief, Pacific Fleet; Under Secretary of the Air Force; U.S. Ambassador to Australia; news media group), and aircraft arrivals more numerous (days with 4-6 arrivals were a more common occurrence). This last item was significant as arrivals occurred any time in the 24-hour day, and required constant flight following support from communications personnel and immediate fuel or cargo offload attention once on site (aircraft offloading took place without shutting down engines and return flights to McMurdo were initiated directly upon completion of necessary ground operations).

The last of the winterovers arrived early (12:03 AM) on the morning of December 16th along with the station's new computer. Additional departures occurred around this time as well. The "erratic performer" of November from among the support winterovers continued his decline both in work and social acceptability. He left before Christmas. Another expected winterover was now displaying questionable behavior with periods of depression and disturbingly anxious behavior. His anxiety, unpredictable behavior, insistence on tinkering or operating equipment while moody, and complaints that others weren't careful or concerned enough caused increased observation and discussion to focus on him. During December, another medical evacuation had been necessary for a member of the Navy air operations crew due to acute appendicitis.

Social life at the station continued as best it could considering the work load and schedule. Christmas was celebrated with parties and tournaments in available games. The year ended on a down note when the flight carrying beer to reinforce the dwindling local supply passed overhead on December 31st, but declined to land due to an obviously damaged nose ski.

The events of January were both numerous and significant. A "last supper" at the old station marked the changeover of the center of operations from the labyrinth of the old to the dome of the new station. The new station construction was

essentially completed for the dedication ceremony on January 9th attended by various dignitaries from the United States, Norway, the United Kingdom and New Zealand. The same day, 24 additional summer scientists arrived requiring various elements of support for their programs which had to be completed in less than four weeks.

Despite this, winterovers started preparing in earnest for the isolated months ahead. Greater emphasis was placed on acquiring the materials intended for winter use. Flight schedules to insure the completion of station fueling to its capacity of 225,000 gallons were replanned. A mass movement of supplies, food, equipment and tools from the old station to the new took place, and by month's end, all personnel had been relocated from its depths. Emergency food and fuel caches were relocated and readied.

An event that was to be significant both to the early and late stages of winter at the station also occurred. An aircraft mechanical malfunction and fire at a field camp on the polar plateau left one of the program's five aircraft lacking part of its starboard wing. A second aircraft, diverted to assist the stranded crew, suffered landing gear collapse attempting to take off from the rough surface and was likewise stranded indefinitely.

The result was an immediate 40% reduction in aircraft assets at a time when inland stations required final provi-

sioning for winter, and the program's summer participants required redeployment to New Zealand. Plans for both these requirements were hastily revised. It was expected that South Pole could make do comfortably with 180,000 gallons of fuel for the winter (saving 15 flights for fueling), and redeployment was accelerated, reducing Pole's population to 55 by the 1st of February.

More changes occurred in February. The prospective winterover whose behavior was suspect in December was still a source of disturbance in late January. The closeness of winter resulted in grave concern among many of the wintering group relative to this individual. A meeting was held to present the feelings of the group to the individual. He stated that he wished to remain, but agreed that the group opinion had merit. Two days later he departed on an amicable basis. A significant aspect of this departure was its lateness. While replacements had been secured for the two earlier departees, it was understood by the group that replacement was unlikely in this case. As it happened, a likely candidate for the job was hustled through med/psych requirements only to be viewed as suspect in his overall suitability and personal motivation. Thus, the expected group of eighteen was reduced to seventeen with the possibility of more shared work load for all in keeping up with the vagaries of the new station.

A party was held for the 38 persons still at the station

on the last Saturday of the summer, and the following Thursday (February 13th), in the restricted visibility of a polar ice fog, the wintering group saw its last aircraft for the upcoming 8-9 months fade into the distance. The party of seventeen ranged in age from 19 to 49; six were married.

Winter

The first few days of winter were spent doing little but unwinding and enjoying the relative calm at the station. A station meeting was held on the first Sunday to discuss schedules, policies, shared work and procedures. Peer rating questionnaire forms, provided to the Station Physician by the Navy (who had used them in previous years), were rejected by the group. The feeling on this subject was that such a system would be more disruptive than helpful, and not conducive to good relationships at the station. It was suggested that anyone that really wanted to know what the winter was like could be accommodated in one of the spare rooms.

Early work emphasis was on completing outside tasks. The average temperature for February had been a reasonable -39^{o}, but its trend was reflected in the average -58^{o} during the last six days of the month. Also, sunset would occur on the autumnal equinox in the latter half of March, further hampering ability to accomplish major outdoor work.

Dismantling of the skiway markers was soon accomplished as was the movement of still more equipment and supplies from

the old station. Acquisition of new skills and experiences was commonplace: fog in the dome under particular conditions; additional people learning to operate snow melter filling equipment to replace the efforts of departed summer workers; ever lower temperatures (-80 by March 11th); and, "aluminum thunder" in the dome when winds exceeded 20 knots and sent the thin dome panels to rumbling.

Observations and data collection were being conducted for eighteen research programs (see Figure 3-1). As was typical of all antarctic operations (by Treaty convention), all scientific work was unclassified and available for dissemination to participating nations. One of the research programs involved the wintering group itself. On a regular basis, the Station Physician collected blood and saliva samples plus the saline solution from nasal washes for eventual analysis to determine possible biomedical effects of isolation.

Other programs required such activities as constant monitoring of satellite tracking equipment, collection and analysis of atmospheric echo sounder and lidar data, operation of the South Pole seismic station, air sampling, and measurements of cosmic ray and auroral intensities. Meteorological work included the daily preparation of an upper air radiosonde package and weather balloon for noon launching; the launch was followed by a period of instrument tracking, and finally data reduction and analysis.

FIGURE 3-1

South Pole Research Programs, 1974-75

Geophysical Monitoring for Climatic Change - National Oceanic and Atmospheric Administration (NOAA)

Climate Alterations in the Antarctic Thermal Radiation Budget - NOAA

Atmospheric Electric Five Year Measurement Program for South Pole Station - NOAA

Meteorological Monitoring in the Antarctic - National Weather Service

Atmospheric Echo Sounder at South Pole Station - NOAA

Measurement of Submicron Particulate Matter in the Antarctic Stratosphere - University of Wyoming

Ice Crystal Precipitation in the Antarctic Atmosphere - University of Alaska

The Origin of Ice Crystals in South Pole Precipitation - University of Nevada, Reno

Atmospheric Processes & Energy Transfers at the South Pole - University of California, Davis

Automatic Meteorological Station Development - Stanford University

A Study of Midday Auroras at South Pole and Siple - University of Alaska

Cosmic Ray Intensity Measurements - Bartol Research Foundation

Solar Electric Power Monitoring - Solarex Corporation

Biomedical Aspects of Human Adaptation to South Polar Stresses - Oklahoma Medical Research Foundation

Observations of Earth Tides & Free Vibrations at South Pole - University of California, Los Angeles

Seismic Measurements at South Pole - U.S. Geological Survey

FIGURE 3-1 (cont.)

Doppler Research in Antarctica - U.S. Geological Survey

Dual Air Density Twin Satellite Experiment - NASA

Additional Programs (Summer Operations Only)

Trace Metals & Halogens in the Antarctic Atmosphere - University of Maryland

The Relation Between Aerosols and the Atmospheric Radiation Field in Antarctica - University of Alaska

Aerosols & Ice Crystals - State University of New York, Albany

High Latitude Ionospheric Absorption - University of California, San Diego

Geochemistry at South Pole Station - Centre des Faibles Radioactivites, Grenoble

Radio-Echo Sounding Experiment, South Pole Station - Bristol University, England

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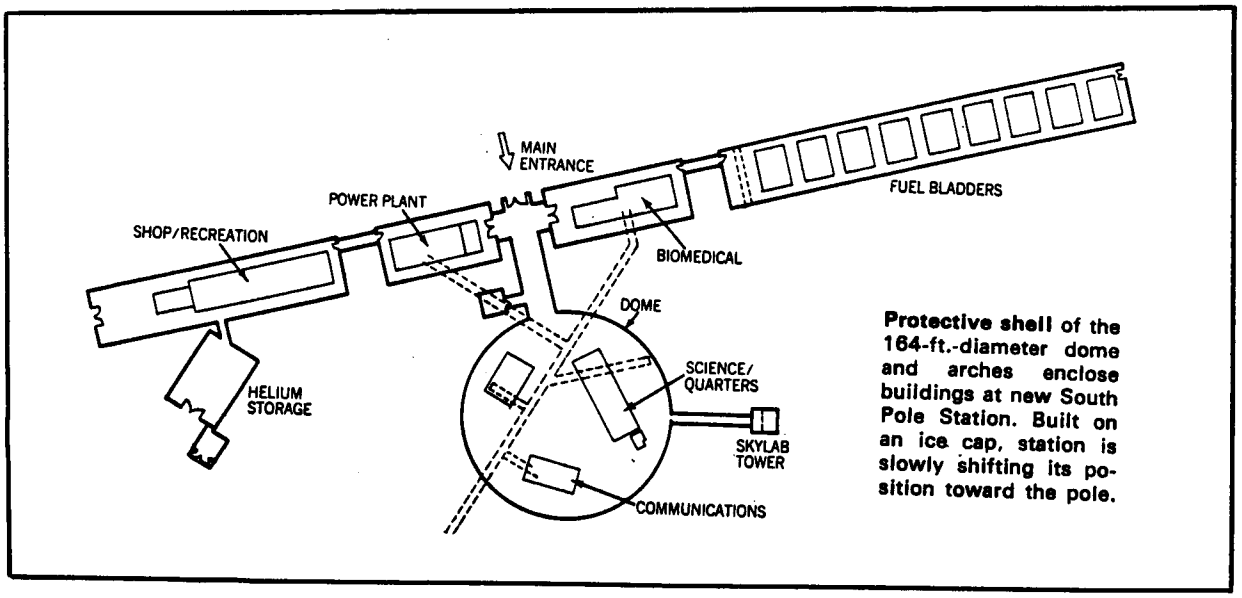
FIGURE 3-2

New South Pole Station - LAYOUT



For the first time, members of the support element at South Pole shared in direct responsibility for scientific work. In addition to the previously described sampling by the Station Physician, the Communications Coordinator had responsibility for conduct of NASA's Dual Air Density Twin Satellite Experiment. A byproduct of these assignments was some degree of softening of the otherwise distinct line between science and support groups.

As expected, the amateur link with the outside world was ebbing in usefulness, and the polar night would further reduce its capabilities. Sunset occurred with clear skies trimmed in pinks, purples and oranges. A party to mark the occasion was held in the skylab tower. Shortly after, the first of our mechanical "disasters" occurred in the power plant. An exhaust stack blockage caused by built up rime ice had choked off the Nr 2 generator damaging its exhaust scrubber and filling the plant and surrounding archway with smoke and soot. Once it was determined that the problem was not catastrophic, the restoration of power was attempted with questionable success. The Nr 3 generator refused to crank, and when Nr 1 was on line, it was found to have a small leak. As it turned out, this was accurate foreshadowing of problems that would continue throughout the winter.

The power plant, as the heart of the station's mechanical survival, was both relatively complex and relatively un-

tested. Unexplained power outages had occurred during the summer, but it was hoped that their source was only temporary, the result of settling in of the systems. While this was perhaps essentially true, we found that the systems took a lot of settling in, especially as the deepening winter conditions kept demanding a higher standard of the power, heat, water and sewage components. Consequently, we were constantly having to deal with power outages caused by malfunctioning shutdown mechanisms, overheating due to faulty cooling systems, and general problems of untested designs.

Each time the average temperature over a one to two week period was 10-15 degrees lower than previously, new portions of various systems would freeze. Often, this affected the water transfer pumps or piping, and once the overall sewage system. This latter "disaster" was particularly perplexing until its cause was determined and eliminated.

The winter eventually started having effects on the men of the station as well. Typical wintering problems such as sleeplessness started appearing. An "outrider" began to emerge among the group by mid-April, an individual who was feeling harassed by others, not sleeping well, complaining of various physical and dental ailments, and drinking more than usual. Most incidents concerning this individual were minor. However, before the end of April, there was already one occasion of drunken shouting over the "poor treatment" he was re-

ceiving from others at the station.

Some physical ailments were definitely not psychosomatic. One member of the group broke his foot playing the station's version of paddleball, while another was extremely ill with abdominal symptoms, thought initially to be acute appendicitis. His positive response to strong antibiotics after three days did not end the problem in March, however. Second and third occurrences of the same problem took place in June and September respectively. Each time, he seemed to respond to antibiotics, but for one uncomfortable period in September, surgery was planned to drain an expected abdominal abscess. Fortunatly, that route was avoided, and the individual was sent north on the first available aircraft at the end of October. Other minor physical problems did arise, some the result of a new craze for dome sliding, the process of riding drifted snow from the top of the station dome, a fairly thrilling recreation.

The first half of winter moved along reasonably well. Aurora photography became a common pastime and interpersonal conflicts were minimal. A major milestone was passed on 23 May when the temperature dipped to -100; it would have been a distressing experience to have spent the winter at the Pole and not have witnessed such an event. The cold of May also brought on our second major "disaster."

On May 25th after four days that averaged -93^{o}, both wa-

ter and fuel pumps were refusing the urgings of the power applied to them. The uncirculated diesel fuel, although a special arctic variety, took on the appearance of lemon jello. More long work in extreme cold fixed or modified most these problems, but some questions were raised about the 6+ months remaining.

A new problem occurring at this time resulted from the hastily designed and rigged snow melter system that was being nursed along. Water from the melter was finding its way into the subsurface "utilidor," the culvert-like pipe that contained power, heat, water and sewage distribution lines. The result was ice built up in this tunnel to as much as 23-inch thickness threatening electrical wiring and piping in the vicinity. The only solution to this problem was the hand (hammer and chisel) chipping of the ice and removal from the utilidor in nylon mail bags hoisted out of available manholes.

Despite all that, however, the long awaited Midwinter's Day (the winter solstice) approached quickly with a three-day weekend planned in celebration. The midwinter observation included partying and tournaments and general thankfulness that the sun was on its way back. From there to the Fourth of July was a relatively pleasant time despite continuation of various station mechanical problems related to June's -80^{o} average temperature.

But the cold days provided for new recreations as well.

On June 12th with the temperature at -100°, twelve of the station complement participated in the first formal "300 Club" run. Club membership was simple on such days, requiring only a rapid jaunt from the +200° temperature of the station sauna to the outdoor temperature 300° colder (the wearing of shoes was permitted). A short period of picture taking outside was generally followed by the nearest means of warming available.

July and August were the most difficult months of the winter. There was little to mark their passage, temperatures were colder than ever, and the last sunlight experienced was quite some time past. Early in that period, the Independence Day holiday provided some entertainment to the amateur chemists who experimentd with surgical glove balloons filled with an explosive oxygen-acetylene mixture. As a service to the station, this group also "test fired" some of the station's emergency flares. A holiday greeting was dispatched to President Ford in response to his Midwinter's message (and perhaps to remind him of where we were).

But, mostly the period just challenged one's staying power and anxiety levels. Generator problems continued on a fairly regular basis, and another snow melter pump died a violent death calling for more imaginative means of rigging another in its place.

The station's behavioral deviant developed back and throat problems, went through various drinking bouts, and was

generally thought manipulative of others. July ended on the tenth successive day of blowing snow with atmospheric pressure down to 19.46 in. Hg.

August was more of the same with little to recommend it except the hope that some horizon light would be apparent once the month was over. As a final test of our resilience, the sewer stoppage mentioned previously occurred on August 20th. Following the rapid formulation of contingency plans to get us through the winter, the resolution of the problem occurred late on the 21st.

September 1st was our coldest single day of the year, with a 24-hour average temperature of -100.5°. The event was noted with two more forays of the 300 Club, the opening of the main entrance of the dome to appreciate the advent of light on the horizon, and the showing of our traditional holiday movie, "American Graffiti." While there were still two months before station relief, it was evident that spirits were rising with the natural light level. Aircraft from New Zealand had already arrived at McMurdo Station with additional personnel to ready that station for summer operations. For us, this was not particularly significant save for the new voices with which we could converse when radio conditions would allow. The remaining weeks at the Pole were increasingly disruptive in the necessity to change to end-of-winter priorities. Generally, this requirement was accepted

graciously.

Sunrise and Relief in Sight

The return of daylight was exhilarating, though almost contrary to expectation, so prevalent had the darkness become. Our heaviest drinker was now seen partaking of soft drinks and busily preparing turnover materials for his replacement. On the down side was the possibility of surgery for the on-going abdominal problem, but again that situation righted itself. Full scale operations were underway at McMurdo in early October with extensive plans to repair the two damaged aircraft abandoned the previous summer. South Pole skiway preparations were begun, but proved slow going in the days-long wind storms experienced through much of October.

The Navy's aircraft repair task force was extremely anxious to get their work under way. Their plans included altitude acclimitization at South Pole prior to beginning work at the crash site, so Pole's opening was critical to their progress. Consequently, we had our first aircraft by October 25th and our hopes were high that many of us would be ready to depart before month's end.

In actuality, departure did not occur for most of the '75 winterovers until November 10th. Although the station was officially turned over to the replacement crew on October 31st, the outgoing group now had to contend with weather delays and the priorities of the aircraft repair effort taking

place elsewhere on the continent. When another aircraft was damaged at the repair site on November 4th (now there were three inoperative at that location), it became clear that flights to Pole would be few and far between. The ultimate arrival of an aircraft on November 10th, therefore, was happily received.

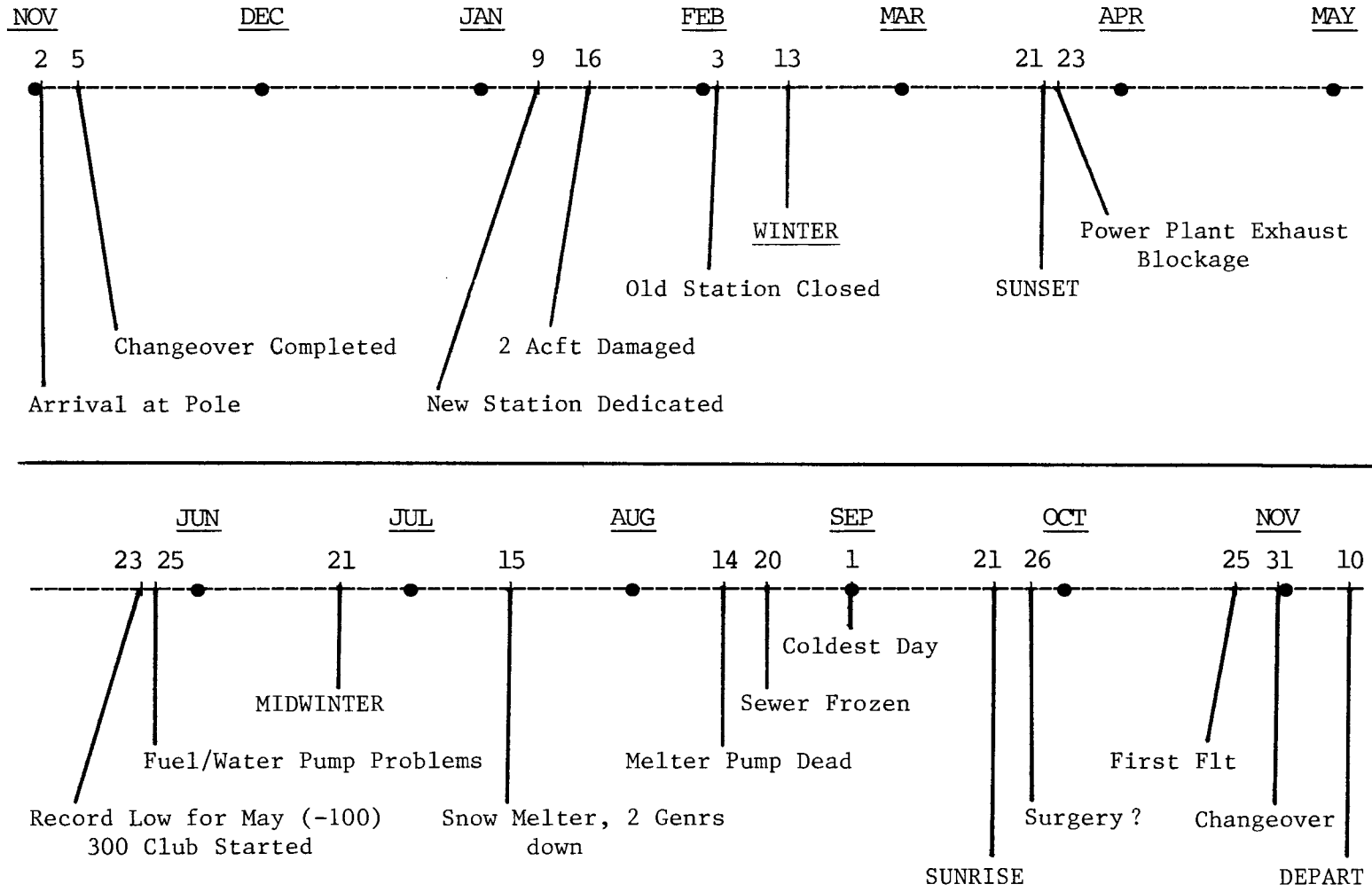


FIGURE 3-3

Summary - Sequence of Events, 1974-75

CHAPTER IV

ASPECTS OF ISOLATION AND WINTERING IN ANTARCTICA

Introduction

In 1957, several nations established year-round stations in Antarctica as part of their involvement in IGY, and it was not long after that a program of study into the human effects of wintering was undertaken. Refinement of the selection process for winterover candidates was a primary objective, as was adding to the body of knowledge pertaining to human adaptation to isolation, stress and severe environments. More recently, information from antarctic studies and other similar research involving such isolated settings as underwater laboratories have been of interest because of their presumed similarities to what will be encountered in space travel, exploration and work settings.

William Smith and Marshall Jones (1962) in considering procedures for selection of astronauts felt that the Antarctic situation, with its isolation, hazards and sense of exploration, presented as similar conditions to the astronauts' situation as was likely to be found on earth. In the following sections, I will cover other published observations on the characteristics of environmental and isolation stress, manifestations of that stress, factors promoting human ad-

justment to Antarctic or similar experiences, and some elements of effective leadership under isolated/stressful conditions.

Isolation Stress and the Antarctic Environment

There seems to be relative agreement among researchers that adaptation to the physical environment in Antarctica is of significance, but eventually becomes secondary to the psychological stress of long term, enforced isolation. In his comments on the similarities of antarctic duty and long duration space flight, Harding (1981) quotes one source as follows:

> Both environments are novel and unique, and involve potential danger from both individual accidents and the failure of life support sysems. Once established, the daily routine in both may become monotonous. However, due to the nature of these environments individuals may be required to suddenly shift from a state of boredom into their very highest level of physical and mental activity to cope with an emergency. A certain type of individual is required to successfully meet these requirements to remain alert to potential hazards over an extended period of time and to maintain psychological adaptability under the influence of environmental stresses. Life in a high-risk environment requires an individual with psychological strength, an ability to learn quickly under unexpected conditions, tolerance for lone-

liness and anxiety, and an excellent functioning central nervous system.

Strange and Youngman (1971) agree that the greatest adaptive effort is required for social and psychological stresses. They list the three basic stresses of antarctic wintering parties as (1) the isolated group; (2) the sameness of the environment; and, (3) the absence of customary sources of satisfaction and gratification. In pinpointing the most serious problem faced, they cite adjustment to the enforced intimacy of a closed, isolated group for the long polar winter.

Other writers that have delineated trios of stressful factors include Palmai (1963) who in a paper on Australian antarctic experiences summarizes main psychological stresses as: (1) problems of individual adjustment to the group; (2) relative sameness of the milieu; and, (3) absence of many accustomed sources of gratification, both sexual and gastronomic, and lack of variety of companionship. He further states that the monotony of the situation may be the most important factor causing stress. Sells (1973) in his work on man in enclosed space notes the three dimensions of isolation as social isolation, confinement, and sensory restriction. Gunderson (1966) similarly points to prolonged confinement, space limitations, reductions of work loads for some members, absence of usual outlets for emotional tensions, and social-cultural differences as sources of stress. Gunderson (1973) comments on "so-

cial-cultural differences" and their origins, "The wide range of skill requirements in Antarctic groups results in heterogeneity in social backgrounds, interests, and values. The individual's adjustment problems are complicated by these differences, and interpersonal conflicts are more likely where viewpoints and attitudes are so varied."

The problems of interpersonal relationships and the aggravating effects of isolation have received some attention. Germaine de Montmollin (1973) points out a primary difficulty in small isolated groups is that unrewarding interpersonal relationships cannot be suppressed. Haythorn (1973) adds that the common ego defense mechanism of displacing aggression is realistically not available since there is no one outside of the group to whom it can be displaced. Consequently, aggression tends to be suppressed (due to recognition of group interdependence), and this suppression becomes a probable source of increased psychosomatic complaints in Antarctica.

A psychological debriefing of a recent wintering group at the South Pole (Slater, 1977) elicited the comment from the Station Physician that, "Wintering over at Pole is an exercise in psychological stamina and stability." Another paper based on personal experience in wintering at the Pole (Natani and Shurley, 1974) speaks of the often extensive problem of use of available leisure time.

Additionally, though less emphasized in isolation liter-

ature, there are significant environmental stresses that are especially prevalent at antarctic stations like South Pole. Law (1963) felt that the mental stresses are aggravated by physiological factors resulting from the disturbance of diurnal rhythms in the body during periods of continuous daylight or darkness. He added comments on the depressing effect of high winds, dull cloudy weather and intense cold. Shurley (1970), who has studied both physiological and psychological aspects of wintering at Pole has found the acute and chronic hypoxia undergone by Pole party personnel plays a significant role among the several identifiable sources of stress. Shurley is quoted elsewhere (Gannon, 1974b) on the discovery of significant hypothermia (loss of temperature) in most subjects that increases as time goes on, and a mild but continuous and even progressive systemic alkalosis (increased blood alkalinity). In the same article, Shurley likens the wintering situation to that of a prison. "Like prisoners everywhere, they have to cope with the dragging of time....Each man comes to terms with the long winter in his own way, and if he doesn't, he'll not retain his personal integrity, stability, functional efficiency and identity."

Manifestations of Isolation/Wintering Stress

It is obvious that men subjected to the unusual environmental and social stresses attributed to isolation and antarctic wintering should exhibit problematic behavior as a direct

result. Strange and Youngman (1971) have identified the four most common symptoms of the "winterover syndrome" as sleep disturbance, depression, irritability (hostility, anger - generally passive in nature), and impaired cognition (difficulty in concentration and memory, absentmindedness, and general slowing of intellectual activities). These authors cite Gunderson's studies indicating that "all of these symptoms - sleep disturbance, depression, irritability, and impaired cognition - increase as group motivation, satisfaction, and cooperation decrease."

While these symptoms are not generally disabling in themselves, it has been further established (Strange and Klein, 1972) that for individuals who may be susceptible because of personality disorder or psychoneuroses, emotional illnesses (depression, alcohol abuse, paranoid reaction, psychosomatic disorder) may occur. Haythorn (1973) supports the impaired cognition observations in his studies noting that sustained cognitive activities are not well supported in isolation.

Activity and motivation levels seem generally to be subject to alteration. Gunderson (1966) indicates that emotional and motivational changes frequently occur during the long winter along with consistent deterioration in group cooperation and accomplishment. Gunderson (1973) felt that individuals with several hobbies and need for high activity levels were frustrated in these pursuits and had difficulty adjusting to

antarctic wintering. Slater (1977) noted in his report that, "As has been noted in the past, most (men) experienced considerable lethargy during the year and often could not become motivated to do things they had long planned on completing."

It is especially noticeable that value systems during the winter at antarctic stations are greatly modified from those subscribed to in more normal settings. Little value is attached to a person's standing with respect to wealth, education, influential friends, women, cars, or any other such status providing associations. Nelson and Gunderson (1962) indicate that job performance is given great emphasis as part of overall evaluation of peers (even more so than social compatibility). They also speculate that willingness to work is more critical than sheer proficiency of work.

Typical wintering group dynamics (Strange and Youngman, 1971) include initial sizing up (with some pair formations), followed by clique formations along varying lines (age, work, drinking habits, music preferences, etc.) and of varying formalities, and eventually coalescence as the experience nears completion. They further point out the almost inevitable occurrence of at least one deviant individual (or small group) isolated from the core group.

Group morale is a variable parameter starting off high when station responsibilities are undertaken, generally deteriorating during the long winter night (various parties and

special events offering changes to this trend), and rising again with the sun and preparations for completion of assignment (Law, 1963). Gannon (1974b) similarly notes that a sense of adventure may be experienced that lasts until the last plane leaves and the reality of isolation sinks in.

Once on their own and genuinely responsible for all aspects of their survival and accomplishments, the group develops a very independent nature. Natani and Shurley (1974) speculate that, "the more severe the isolation, the more likely attempts at control will be resented and the greater will be critical concern by the isolates over the empathy of their outside superiors and their competence at providing support."

Various studies have also sought to determine patterns in stress effects. Rivolier (1974) purports correlations between psychomedical manifestations and the biometeorological environment (e.g. wind velocity, changes in weather and periods of characteristic weather) in studies of European and Japanese antarctic expeditions. Palmai (1963) wrote that seasonal fluctuations appear in certain psychophysical variables, notably headache and insomnia.

Slater's (1977) recent report on a wintering group included:

> Depression to one degree or another seemed a fairly constant companion of the station. Certainly there were times when, as a group and individually they were excited or elated about

> some particular event or accomplishment. However the endless days, one on another, seemed to take their toll in terms of boredom, loneliness, interpersonal stress and depression. I would think almost everyone experienced some severe stress and responded, at least for him, with some unusual behavior and affect. One individual commented, "I learned to hate here." This referenced his reaching his limit and being totally unable and unwilling to stand the interpersonal relationships with one or two other station members.

Slater concluded that section of his report commenting that, "Wintering and, in some cases Summering, provide more than enough stress to test the stability of most everyone."

Natani and Shurley (1974) interpret the negative aspects of life in Antarctica as the normal responses of healthy men to unusual and extreme stresses. Nonetheless, I have come across one documented instance when a man at a U.S. antarctic station left a room of his mates during the winter night, walked outside and was never seen again, apparently an example of a not so healthy response.

Elements of Adjustment

A common objective of most the work cited thus far is, of course, to determine elements indicating ability to adjust or promoting adjustment of man in isolation. Nelson (1965) relates the judgment of his subjects on the most important aspects of a man's adjustment as (1) his enthusiasm and ability

to carry out his work as well as to help others, (2) his considerateness and friendliness when among others, regardless of whether he is essentially outgoing or somewhat introverted, and (3) his capacity to control emotions so as not to be disruptive in either task or social situations. Nelson felt that the men who have adapted best seem to be those who are most experienced in their fields and who have a history of successful work performance. These men would certainly fare well in the typical antarctic value system previously noted. Shears and Gunderson (1966) found three significant factors in effective individual and group functioning, namely, social compatibility, personal motivation, and group accomplishment.

A common thread found in determining overall satisfaction of an individual was "occupational role" (Gunderson, 1974), or "vocational effectiveness" (Nardini, Nermann and Rasmussen, 1962). Gannon (1974) quotes a source who confirms, "The more an individual is able to occupy himself working, the better he is able to adjust to isolation." Consistent comments appear in Strange and Youngman (1971) that, "a sense of usefulness and self-esteem is the single greatest factor in successful adjustment and that this is most often related to one's job (Gunderson, 1966a). If a man cannot obtain this from his job, it is vital that he obtain it from some other activity or interest. Persons who feel useful adjust to other deprivations and problems remarkably well."

The same authors also comment on the paradox of persons in isolation who both work diligently to become part of the core group and at the same time work to remain independent of it. In seeking to fulfill these conflicting needs, "Most persons achieve a balance between these two needs and are able to work with and gain support from the group, yet at the same time to withdraw from it when necessary." Natani and Shurley (1974) comment on another technique of need satisfaction observing that men in a closed environment tend to avoid conflict by withdrawing from face-to-face contacts. Palmai (1962) would generally agree with this as he found that adaptation to isolation and small community life is best effected by withdrawn and shy individuals.

Creativity, apparently, can also be a big help. Harding (1981) found in his experience over two winters that, "The small group finds that in a closed system it can organize itself and experiment anywhere along the political spectrum.... In a successful wintering scenario it appears that a type of "creative anarchy" emerges...." On the question of finding diversion where little seems to exist, the National Science Foundation's booklet, "Survival in Antarctica," in its section on Wintering Over advises, "Your ingenuity in providing that which seems to be missing is important for successful adaptation, high morale, and productivity."

Elements of Leadership

It is reasonable to expect that an isolated group faced with harsh conditions, hazards, intragroup stresses and any number of uncertainties would desire effective leadership. Wilkins (1973) in his research on isolation considered leadership as a really critical aspect of adjustment to novel or unusual conditions.

Strange and Youngman (1971) devote a section of their paper to important characteristics and qualities for leadership in isolation and speculate on successful leadership techniques. They agree with Gunderson on positive characteristics of "emotional control, flexibility, concern for the individual, neutrality toward controversial issues and a nebulous quality called 'likeability.'" Their own sense is that, "...the leader of a small station must possess...(1) ability to tolerate intimacy and leveling of status without losing authority and the respect of the group, and (2) self-reliance in the lonely responsibility of command. He must have great inner security, self-confidence, and flexibility. Even with these assets, he is prone to significant depression and other symptoms...."

On style, these authors conclude, "Successful leadership techniques vary, of course, and experience proves how little we actually know about group performance. Nelson (1965) has observed, however, that the smaller the station, the more successful seems to be a democratic style of leadership. The ri-

gid and authoritarian methods of a large military command are usually unsuccessful at small stations." In earlier studies, Nelson (1962) found that esteemed leadership in small, primary, living-working groups under confining and isolated conditions was of the democratic type and, "...style characterized by leader participation with the men, by a personal man-to-man relationship between leader and men, and by a leader who respects and seeks the opinions of his men in matters which directly concern them."

CHAPTER V

THE WORK PLACE: GENERAL VS. ISOLATED

Background

The temporary group in isolation may be viewed in terms of processes and findings described in current organizational studies literature. It is interesting and worthwhile to do so as comparisons to more normal work settings provide the contrast necessary to appreciate the problems faced on both group and individual levels.

Before specific comparisons are made or incidents examined, I will briefly describe some of the major organizational concepts applicable to group development and adaptation.

"Organizational culture" is a relatively familiar term that Schein (1981) has described as follows:

> Culture is the set of basic assumptions which members of a group invent to solve the basic problems of physical survival in the external environment and social survival in the internal environment. Once invented these basic assumptions serve the function of helping members of the group to avoid or reduce anxiety by reducing uncertainty and cognitive overload. Once invented, those solutions which work are passed on to successive generations as ways for them to avoid the anxiety which may have motivated the invention in the first place.

In a less formal description, culture has been said to consist of "...long standing rules of thumb...shared standards of relevance...matter of fact prejudices...and a sort of residual category of some rather plain 'horse sense' regarding what is appropriate and 'smart' behavior within the organization and what is not." "...cultures arise and are maintained as a way of coping with and making sense of a given problematic environment." (Van Maanen and Schein, 1979)

"Organizational socialization" is linked to culture, but is concerned more with the processes by which a "newcomer" to an organizational role becomes an effective member of that organization. Van Maanen and Schein (1979) have provided the general definition that, "...organizational socialization is the process by which an individual acquires the social knowledge and skills necessary to assume an organizational role. Across the roles, the process may appear in many forms, ranging from a relatively quick, self-guided, trial-and-error process to a far more elaborate one requiring a lengthy preparation period of education and training followed by an equally drawn out period of official apprenticeship."

They further note that the problems of socialization apply not only to newcomers, but to any members undergoing a transition or passage in the organization and that typically such transitions are anxiety-producing situations. Katz (1980) also comments on this subject of problematic sociali-

zation:

> Regardless of their potential differences, socialization for both the newcomer and veteran denotes a clear and discrete break in the normally smooth and continuous flow of daily events. As such, they represent distinct, interruptive transitions or what Van Maanen (1977) has conveniently labeled as breakpoints, that is, changes which thrust one from a state of certainty to uncertainty, from knowing to not knowing, or from the familiar to the unfamiliar. These breakpoints essentially represent disjointed junctions in the sense that one must forsake and replace one's former assumptions, relationships, responsibilities, and established patterns of behavior. Almost by definition, therefore, breakpoints require one to attend to those parts of the environment that have become equivocal.

Finally, there is the concept of "situational definition" which refers to the individuals attempts to understand his roles and relationships in both his work setting and social environment. The individual does this through processes such as "normalizing" his settings, discovering a "theme," and determining his degree of "ownership" of that theme. "Summarily, situational definitions provide an individual with a practical theory for "what's going on" in concrete situations. Such a theory includes notions of what typically occurs in such situations (normality) and when it should occur (themes). Furthermore, the probability of an

event's occurrence in the situation is tied to its normality structure in roughly the same manner as an event's timetable tests a particular theme. Situational definitions also include beliefs regarding why things occur as they do (causality) and the amount of control people believe they have over these things (ownership)." (Van Maanen, 1977)

Van Maanen further suggests that a likely consequence for the person who cannot reasonably determine what is going on about him is a condition of "anomie," or normlessness. "The situation will be viewed by the person as senseless, without purpose." He concludes that, "...role taking fails when people are unable to discover where they are located in space and time. Unless persons can deduce what is normal in the setting from what is not, they are incapable of entering into the concerted action patterns of a given social order. Indeed, without such understandings, people cannot construct realistic themes to guide their participation in the organization. Anomie and alienation are therefore always present to some degree whenever persons enter novel surroundings." (Van Maanen, 1977).

Comparative Work Settings

Uncertainty is the primary factor contributing to the group and individual difficulties experienced at an isolated and temporary work setting such as the South Pole. Indeed, uncertainty is considered significant even in much better de-

fined situations. "People will not accept uncertainty. Regardless of the materials at hand, people will make an effort to interpret, understand and organize the world of their experience." (Van Maanen and Katz, 1979) In the same vein, Katz (1980) further notes, "...employees are not especially receptive to disorder and uncertainty but will endeavor to structure, interpret and redefine their work settings."

Consider then the problems for individuals in a setting where uncertainty is the norm. Uncertainty about other members of the group, about work content and routines, about interpersonal relationships, about mechanical life support systems and communications with the outside world, about the harsh environmental conditions, and about the cumulative effects of altitude, cold and prolonged darkness. As described earlier, our winter included ongoing uncertainty along many lines in the form of troublesome generators, freezing water and fuel systems, a severe recurring medical problem, and the deviant behavior of one member of the group.

Formation of an organizational culture for a South Pole group is problematic. There is no question that one is needed if we refer to Schein's definition of culture as the solution to problems of external adaptation and internal integration. This group on its own in highly uncertain surroundings must certainly provide some structure to cope with its environment. While the lack of group history and impermanence of

membership do not favor culture formation, it will surely emerge. As might be expected, however, the group culture changes regularly as individual members of the group exert differing influences, and it provides, at best, a questionable basis for socialization and situational definitions.

A typical facet of such a culture is group independence. It is soon recognized that for all the uncertainty that must be dealt with, the group is still totally dependent on local resources. The emerging independence makes the statement that, "We may struggle at times and not know all we should, but the consequences are ours and we're a lot better informed than outsiders."

Examples of reactions to this inside/outside perception come easily to mind. I have already described the rejection by the group of the winterover peer rating questionnaires that occurred early in our isolation. About the same time, one of the researchers received a message from his supervisor who had recently resumed work in the U.S. following a short stay with us at South Pole during the summer. His subject was time conversion; the message stated:

> We have reviewed method for converting South Pole local standard time to Greenwich Mean Time and find that correct conversion method is to add twelve hours to LST to obtain GMT. As I recall, this is not the method you used in January. If any questions remain, please

> check your GMT times against NWS clock. Also please advise what past data are affected, if any.

Coming early in the winter, this was an educational (and humorous) experience for the station as to the degree to which we could depend on outside assistance. The correct method to do the conversion was, of course, to subtract twelve hours as had always been done at the station. The researcher's reply was patient in suggesting that perhaps additional review might be worthwhile on this matter. It added that if their new method was in fact correct, then there remained the problem that all of the data of the past 18 years were affected!

Another instance occurred on the subject of proper communications procedures. A comment had been made in a South Pole weekly report that we were having some measure of success on a difficult radio link by using an antenna normally used for amateur radio communications. An unsolicited (and very official) response stated that, "Implication is that amateur frequencies are being used to transmit official message traffic." There followed a short discourse on the regulatory aspects and impropriety of such conduct despite the difficulties of winter operating conditions. Our reply pointed out that available official frequencies were also compatible with the antenna in question and that this was the manner in which we were using it. We further assured that, "No implications need be attached to statements made in South

Pole messages. Credit only what is stated. Any other information available upon request." Our response concluded that the lecture on amateur communications that had been provided was not really necessary as that information was already available at the station.

The summation of our experience relative to outside versus independent action was covered in station turnover materials:

> Don't expect to rely too heavily (if at all) on outside assistance during the winter. It's possible to obtain straightforward information or data via TTY, but obtaining qualitative information for the solving of problems, or asking for a problem analysis from someone in the States usually doesn't work out too well. Generally, they won't really be able to understand the problem very well, or will tell you to try things you tried long before you contacted them. Nothing wrong with asking; sometimes it may be well worth it. But, for the most part, you're on your own, and will have to make the best of local assets, both mental and physical.

Socialization processes are understandably of very limited formality at South Pole. Overlap with the previous wintering group is typically only 2-4 days and most the information passed is designed to allow the new group to quickly take over immediate operations. Very soon the only remnants of this previous group are written reports and advice that,

if learned and remembered, are applicable provided the new group and its specific experience turn out to be reasonably similar to their precedents. Although the support members of the group have spent some time together in general training prior to assuming their roles at the work site, the majority of their "socialization," that is, the learning of all that is necessary to effectively fulfill their part in the group, can only take place at the station and specifically during the winter. Consequently, this socialization generally favors a "content innovative" response, that is, it promotes "...effort to locate new knowledge on which to base the organizationally defined role or improved means to perform it..." (Van Maanen and Schein, 1979) Van Maanen and Schein proposed that such a response would likely follow a socialization process which, among other dimensions, is (1) collective, (2) disjunctive (lacking immediate role models), and, (3) formal. Although formality is lacking, it is clear that dimensions (1) and (2) are in strong evidence.

To a great extent, the group socializes itself according to its own unique characteristics, often establishing by trial and error its "rules of thumb, standards of relevance and shared prejudices." "Boundary passages" (in the form of environmental changes or significant events such as sunset, midwinter, severe cold or storms, completion of slow months, sunrise) are experienced as a whole group. While transitions

in socialization are generally considered a period of particular stress for the individual, the sharing of these passages by the entire isolated group appears to modify potentially high anxiety levels. The more likely response is an increased level of awareness at these times and a "we'll get through this together" attitude.

To be an effective and productive member of the group, however, each individual must first provide some basic order to his own situation. Van Maanen (1977) has suggested, "...that when novel organizational settings are encountered the individual must construct a definition of the situation suitable for day-to-day use. To the newly recruited, the organization is alien territory, full of unforeseen surprise. As James (1892) observed long ago, 'knowledge about' and 'experience of' a phenomenon imply quite different levels of understanding. Entrance into an organization upsets one's everyday order. Matters concerning self, friendship, privacy, time, competence, demeanor and the future are suddenly made problematic. The individual - if for no other reason than simple epistemic curiousity - searches for commonsense theories to explain and make meaningful the myriad of activities going on in the workplace."

Once again, if such problems can be said to exist in the common work setting, how much more so will they upset those in a strange and isolated work place. A wintering antarctic

station has often been compared to a laboratory situation for its freedom from outside effects. In his medical report on the year at South Pole, our physician labeled the wintering process a "psychologist's dream come true" for its unique characteristics and observability. But another aspect of laboratories and related experiments is the high degree of "situational control" inherent in them, and to a great extent this is also true at South Pole. On the subject of sociological experiments, Katz (1980) observed, "To the subjects, the experiment is a new and uncertain situation, for they are commonly placed in an unfamiliar setting to engage in unfamiliar behavior. As a result, their normal modes of behavior and customary supporting mechanisms are not particularly helpful or even relevant. Nor can they rely to any great extent on their previous experiences to construct a meaningful situational definition."

Fortunatly, there is no "experimenter" present in the isolated polar work place to maintain absolute control over meaning. So, while certainly in the earlier stages, "matters concerning self, friendship, privacy, time, competence, demeanor and the future are...problematic," for most, over the long run, definitions compatible with the setting do evolve.

The evolution is not without problems however. "Normalizing" the setting takes some time since this process includes providing oneself, "...a situationally specific defi-

nition of just who one is and what one is doing (or supposed to be doing) in the organization," and learning "...the actions that are representative of persons in the locale and the enforced limits of such actions." (Van Maanen, 1977) Here again, the uniqueness of each group is a factor. It is typically some time after the start of winter before one can get much of a picture of what is to be normal, how one fits in, and what will be expected in each role. In our experience, the first few months of winter saw many changes in structuring of work and meal schedules, assignment and duration of shared task responsibilities, and use of space made available by the departure of summer personnel. As would be expected, the matter of territoriality was also being settled at this time (fortunately, not a big problem due to the new, larger station and relatively small group).

Two other aspects of situational definition were likewise not easily solved. Van Maanen's (1977) comments on "theme" characterize it as the "...pattern by which people link the activities in their experienced past and expected future together." He further states, "If one has little idea of what tomorrow will bring, understanding of today's activities will be difficult." That is, the individual values explicitness in his theme as well as ownership. "Ownership refers...to the individual's control over his own fate - whether it be real or imagined."

It's understandable that settlement of these dimensions is difficult at the South Pole. It is an area which holds little connection either with one's past or one's future. Since the year spent there represents but one great cycle in its light/dark and weather pattern, it is genuinely difficult to be sure of what is to be experienced even in the near future. Working within that uncertainty, the group can feel that their fate is in their hands...but there is always the uncertainty of just what will have to be dealt with.

Within our group, the adaptation to the situation was varied, but overall it was better than I had expected. A meaningful and relatively high work requirement was a very significant factor in adapting well and solving the problem of time use. For the seven member support element, the smallest such group at Pole either before or since, keeping up with the capricious systems of the new station often took time use decisions out of our hands. This applied as well to the researchers who regularly responded to the needs of limiting mechanical deviations and assisting in repairs. In many cases, their scientific instruments or systems also displayed symptoms of being recently installed or relocated.

Of nearly equal significance with ability to work well was a self-sufficient nature allowing for individual leisure time pursuits, a trait that allowed for equal comfort whether relaxing with others or alone. This ability served a dual

role. In social settings, it allowed the group to assure itself that the individual was healthy and coping well enough to be relied upon. But, since "the group" was never changing, it allowed the individual needed relief from the same faces and characteristics while still maintaining satisfaction with his activities.

The behavioral deviant who I described earlier had some problems in both these areas. He was often unhappy with his work situation. It seemed to me that at times he was personally concerned with his ability to keep up with problems in his area and probably felt that others were quietly critical of him for this reason as well. He claimed publicly that his work responsibilities were too great, too undefined, and too subject to the tampering of others making it difficult for him to keep up. I responded at that time with the draft version of an understanding to be agreed upon between us. This agreement was to specifically list the work items for which he was directly responsible, but also stated that the listing did not relieve him of general assistance to others at the station nor cut him off from the general assistance of others (that is, his status in the group would remain unchanged). He took a copy of the draft to "further consider" appropriate contents of the list and I did not hear of it again. The same individual seemed more accustomed (and interested) than most at the station to use leisure time for small group con-

versations or general "hanging out." The seeming rejection by the others of his preferred form of recreation compounded the negative work effects just described.

In addition to the eventual settling of various schedules and structures, it seems that situational comfort was advanced in two other ways, replication of familiar pursuits despite the unfamiliar setting, and participation in activities unique to the area as a means of heightening the satisfaction in being there for the winter. Examples of the familiar included such things as the holiday football games previously mentioned and a traditional celebration on July 4th. Also among these were the building of a court that allowed a form of paddleball in the recreation area; the design of a small transmitter to allow the broadcast of music over "KOLD-FM" around the station; and the showing of a full-length college football game complete with television commercials (all on a 16-mm film that had been found at the old station) on a winter Saturday afternoon along with hot dogs and beer. Activities unique to the area included dome sliding, the 300 Club, and auroral photography, and another event that, like the whitewashing of Tom Sawyer's fence, accomplished a transition from the mundane to the sought after. Trash removal from the station was typically done once every eight weeks at the time of the full moon, generally at -90 or colder. Riding the tractor pulled trash sled a mile-and-a-half to the downwind

burial site, then offloading and returning to the station, became a highlight of the station social calendar and a much awaited occasion.

So far, I have primarily focused on the individual's attempts to satisfy himself as to "what's going on" and what part he might play in the action. Perhaps of greater importance to the effectiveness of the group are the development of interpersonal relationships and subsequent group dynamics. As noted earlier, in this area the participants in an isolated work setting face most uncommon circumstances. The primary coping and defense mechanisms normally used in dealing with interpersonal relations are not generally available. For instance, Van Maanen (1979) has noted:

> Since social situations are potentially dangerous to our sense of well-being in the world, we have developed an almost infinite variety of ploys to minimize the minimizable risks. Foremost among these is the situational selectivity we employ when deciding where we are to interact, with whom and the sort of performance we shall present in such situations. We gear ourselves into some interactions and, when possible, out of others. We decide how much of our private selves to lodge in any given situation thus arranging to present certain performances only in front of certain audiences. Because of the vast number of interpersonal dealings we have in everyday life, we cannot become fully involved in all of them. To do so would be en-

> feebling and lead quickly to cognitive overloads. Impression management is hence both necessary and practical.

In the same paper, Van Maanen later comments on the use not only of situational selectivity but identity selectivity, "The structure of modern life seems to be one in which social contacts are usually brief and somewhat superficial wherein each individual carries a range of identities (public and private) which are not cohesive but are easily altered to be in line with whatever the demands of a particular situation turns out to be." The problem to the isolated group participant here is obvious.

The existence of situational selectivity is minimal and in any case always includes the same locations and the same small group of people. The work group is also the dining group, and the recreation group and all other formal, semi-formal and informal groups. Reeves (1970) in discussing one's relationship to various group memberships said, "For most people, the major trauma is associated with the formal work group. The knowledge that we are effectively its prisoner...puts tremendous pressure on our entire being. We have little if any control over our group goals, our leadership, our working conditions, or the members of the peer group at work." He later points out that, "Many workers in less than desirable surroundings are able to leave their work problems behind them and make a pleasant life among their

semiformal and informal groups."

The freedom and relief we normally experience from being able to be quite different at our motorcycle club than at work or to play some other variation when bowling or with family is not a luxury enjoyed at a South Pole-like setting. There is the problem of striking but one image for one group with hope that it will satisfy the group's needs for your role and your own personal needs for feeling adequately respected and worthy. This inability to use "masks" in everyday life may have severe consequences as suggested by Van Maanen (1979), "This dramaturgic view of modern people has been taken by some to be a somewhat disturbing one for it suggests that behind one mask lies another and that when all masks are stripped away there may be nothing left except a thoroughly empty, discredited, and terrified being."

Despite all these grave possibilities, men do seem to attain reasonable adjustment to interpersonal relationships. There are exceptions, of course, usually in the form of smoldering dislikes, loud verbal altercations, and at times, physical confrontations of varying intensity. But for the most part, people seem to realize that the problems they face are similarly faced by all others and generous leeway is permitted. It typically seemed that frictional contact that would be expected to escalate in more normal settings would end with one or the other of those involved deciding to leave

the potential battlefield. There seemed an awareness that altering one's impulses in the interest of long term harmony was an intelligent choice when many months of isolation remained. There also seemed some allowance made for the general lack of privacy inherent in our setting. This problem had certainly been far worse during the crowding of summer, but our experience from that period carried over to the winter. Except for the requirements that each person be physically accounted for each day and that responsibilities to the community be met, each group member was allowed to marshal his activities as he saw fit with little outside pressure or attempts at influence.

Thus, it appears that an adaptive nature is highly valuable in isolation. In this regard, the "weeding out" process that had occurred during the summer months proved of great value during the winter. It is likely that those who were visibly less adaptable at that time could not have been expected to weigh their actions very carefully under the greater stresses of winter. As it was, the physician's report noted, "Any gratings of personalities during the summer naturally grew during the winter because of the inability to avoid contact...." After the experience of winter, my own feelings toward critical observation of personnel during summer encompassed the possibility of not receiving a replacement for someone considered unsuitable. Turnover information

for my successor included, "Overall, I would say better to do without a position totally than to have someone who will make the winter miserable for everyone else, despite what he might have added to the station operation."

While a reasonably well adjusted group seems to adapt the tools to avoid major conflict, the more common problems of constant, close interactions with a small, static group will probably always remain. Haythorn (1973) has noted the problems of men becoming, "...overexposed to each other. That is, they reportedly reveal personal information about themselves, tell their favorite stories, and display their personal idiosyncracies to the point of boring and irritating each other (Byrd, 1938; Smith, 1969)." This phenomenon was apparent to many of us early in our stay at the Pole.

The "erratic performer" described in Chapter III who subsequently departed before Christmas was a "life of the party" sort whose routines, even during summer, quickly turned people away. His deterioration in work and attitude reflected his recognition that the extroversion that usually maintained his social status was not appreciated in his current surroundings. It has been a reasonably common observation that on the personality spectrum, those on the introverted side of center seem to fare better in antarctic isolation.

In their description of the winter vigil at South Pole, Natani and Shurley (1974) comment, "Palmai reported that so-

cial withdrawal is associated with positive adjustment in Antarctica. Social withdrawal may be related to the observation made by Altman and Haythorn that, when isolation subjects make exploratory probes into intimate personal information over time, the high revealers come to dislike one another." This "wearout" factor relative to personalities or idiosyncracies often played a part in the pattern of social interactions at the station, especially during the long months of July and August when the always low stimulation levels of the setting were at their minimum. Again, the self-sufficient individual could react best to this situation aided by available physical space that was large relative to group size.

The evolution of an "effective" group during our year at South Pole proceeded reasonably well. Assisting the evolution was our makeup as an all civilian group and the more direct (assigned) involvement of support personnel in the science effort greatly relieving us of the sharp contrast in support/science groups that had existed in the past. Our success in this regard caused me to advise my successor, "...your purpose is to support the science operation as well as life in general. Try to maintain a 'whole group orientation,' recognizing each person as a member of the station complement with equal rights and interests, rather than 'science' or 'support.'"

During the 1975 winter, the formation of strongly aligned cliques as has been observed before and since (Slater, 1977) occurred only in the form of unstructured "interest groups" whose membership was open and variable. On the subject of grouping, the Station Physician (Hummer, 1976) observed:

> Probably the only grouping with any form of continuity was that occurring during meals. There were four tables of four and the bar in the dining room. The tables were arranged in a diamond shape. The two furthest poles were usually occupied by the same groups. At one of these tables were members of the support crew and at the other pole were members of the card playing club, both support and science people. The two nearer poles were more inconsistent. One of these tables was usually occupied by some of the science personnel and the other, nearest the serving line, was open for the late-arriving. As there were seventeen crew and only sixteen seats, this made for an interesting game of musical chairs at many meals. Often, the entire crew was not present simultaneously, and nothing transpired. The 'extra' person, when all were present, usually wound up sitting at the bar. This chair seemed to become occupied more frequently by the same person as the year progressed, whether he arrived late or early. This person was our only more-than-social drinker and our only cigarette smoker. Whether he felt rejected by the group

> or whether the group rejected him is not entirely possible to answer as each side has probably equal arguments. I must point out that this was no major problem during the year. The main problem was the uneasiness that everyone felt about the situation. Perhaps having one or more people "out of the group" serves a function for the well-being of the rest of the crew.

The appearance of a "group plus one" structure is not uncommon as pointed out in Chapter IV. Reeves (1970) refers to this separate individual as a group deviant and states, "Because of man's infinite capacity for variability, it is seldom possible to find a group in which there is total conformity to all norms. One or more members will observe certain norms to a greater or lesser degree than standards specify. The matter of deviance is of great importance to both leaders and members, since it represents a major internal threat to group security. Once established, group objectives must be rigidly adhered to or the group is in trouble." This is in line with the "uneasiness" that our Station Physician referred to in his report.

Concern escalated during the winter when our sometimes loner resorted to such actions as putting padlocks on his room door and in areas of his work space. This was highly out of place in surroundings where the norm was total unconcern for valuables left in any place for any period of time.

Reeves points out later in his discussion that the "...deviant is responsible for more than a little of the cohesiveness of his group....," and emphasizes the effect of deviance in causing group reappraisal. He sees this latter effect as positive, as it leads to refinement of the group's objectives, norms and defining qualities. In our case, it is likely that group cohesiveness and definition were enhanced by the contrasting behavior with which we had to deal.

It would appear that the primary danger of the emergence of deviance is its extension to individual isolation. The "isolate" in Reeves (1970) thinking represented an extreme extension of the deviant who displayed deliberate and continued flouting of a major group norm. While the deviant remains a member of the group (though in low status), the isolate is expelled and all communication with him cut off.

For a physically isolated group to which safety and continuity are of paramount importance, an isolate can be a severe threat. To the group's leader who is responsible for life support and accomplishment of group objectives, resolution of a group isolate problem ranks with any of his other serious concerns. Fortunately, during our winter, due in great part to the interest of most in maintaining long term harmony during the period of isolation, continuous communications were maintained among all members of the group.

CHAPTER VI

IMPLICATIONS FOR MANAGEMENT OF ISOLATED GROUPS

Introduction

While the incidence of small, isolated groups in the Antarctic is limited to only three per year, the occurrences of such groups in other parts of the world are much more numerous. Among them are defense outposts, mineral extraction operations, deep sea fishing vessels, underwater laboratories, and eventually an expanding number of such groups in space. As the mission of these groups is almost invariably important, and their logistic support difficult and expensive, efforts to improve the consistency and effectiveness of isolated group operations are of value. The following comments represent some subjective thoughts on raising the probability of successful functioning of small groups in isolation.

Group Uniqueness

Germaine de Montmollin (1973) discounted the possibilities of building a general model for behavior in a small isolated group due to the "unique properties" of each such group, and the unpredictable specific relationships between space, time and people that would evolve in each circumstance. She felt that the problems of the small group must be viewed on

the level of specific group interdependence, and considered that, "As isolated small groups are in a situation of mixed cooperation-competition, with a high probability of interpersonal conflicts, and their mission is important and their survival difficult and essential, it is necessary to help them quickly achieve a hierarchical order of common goals and interpersonal relationships.....the problem is not to understand but to manage the psychological life environment of actual and present groups."

The emphasis of de Montmollin's commentary is on the development of specific group isolation training as a means of preparing a group for their actual period of operations. While this would likely be most effective, its use would probably be limited to programs of extremely high importance and value (such as a lunar station) and then, perhaps only in the prototype stage. For most other situations, especially those that are commercial in nature, the time and expense required for extensive group training in simulated isolation would probably not pay for itself in increased productivity.

Isolation Management Training

While the training of entire groups would probably not be practical on a long term basis, I believe more could be done for the training of managers bound for such an assignment. Such training would draw upon many sources from psychological and sociological theory to specific accounts of

successes and failures of groups and individuals under isolation stress. Among theoretical topics could be such basics as Maslow's hierarchy of needs and their relationship to the evolution of values in uncertain conditions; basic group dynamics; assessment of group characteristics; and deviant behavior. The collected reports and studies on actual isolation experiences would highlight the importance of particular individual characteristics to adjustment; the value of maintaining a meaningful workload and promoting individual self-worth; and, the critical aspects of selecting personnel. On this last subject, Slater (1977) recalled from his observations at South Pole, "Seeing first hand the intimate relationship between life support systems and possible catastrophe taught me the single most important lesson learned: To successfully convey to those involved in screening the critical necessity of selecting responsible and stable Winter Over personnel."

Isolation Library

Given the high level of uncertainty faced by most isolated group participants and the general lack of experience that most bring to the assignment in isolation, I believe "enlightening" information should be available at isolated work places. This information would be in the form of easily understandable "digests" covering unique characteristics of the work place and its operations, differences in social

interactions imposed by isolation, possible effects of specific environmental or social factors, and mechanisms available to counter negative aspects of one's experience. Such a resource would be an educational tool for participants at the outset and a valuable reference for understanding later manifestations of isolation related phenomena. It would help counter the common concern of most people facing difficulties that somehow their problems are unique and an indication of individual weakness to be hidden from others. For the manager, such information would provide an impartial source of authority toward which to direct an individual who might otherwise view his supervisor's advice as an attempted "con."

Reduction of Uncertainty in Management

The manager at an isolated work place is crucial to accomplishment of group objectives and the overall well being of the group. To other participants, he represents a vital link to control elements in the outside world, an authority on the overall operation of which the group is a part, and an interpreter of the communication process with the outside. Unfortunately, this characterization is often not true of the manager who, like everyone else, has been hired for the temporary isolated assignment and whose knowledge of the big picture is minimal.

I experienced the advantages of the way it should be done because I had worked in the Antarctic Program for over

two years prior to wintering at Pole. I was well acquainted with the organization and division of responsibilities among National Science Foundation personnel, the support contractor, and scientific investigators. More importantly, I had observed and participated in operations in the U.S. during two antarctic winters and knew of the problems and concerns experienced there. I was aware, for instance, of the alarm and speculation that attended the receipt of equivocal or bitter sounding messages from Pole. I also knew that the concern for those wintering was not always strongly evident in typical southbound traffic. As my background was known, my interpretations of the outside were accepted at Pole during the winter. Likewise, my ability to control precipitous remarks in northbound traffic was also enhanced. In subsequent years I have observed cases where the manager of an antarctic station maintained less control and the increased level of consternation that resulted at both the station and in the U.S.

My point is that a prospective manager of an isolated facility should be provided a high degree of experience with overall operational matters. This background substantially increases the effectiveness of the manager providing him controlling knowledge in the midst of general uncertainty. Thus his ability to get through the initial group assessment period when the worthiness of his leadership role is evaluated

is greatly increased. The alternative, in which the manager's knowledge is little greater than the remainder of the group, will perhaps unify the group in its uniform ignorance, but overall results will be unpredictable (and given the potential for negative outcomes, this is not a desirable situation).

Maintenance of Work Levels

It is very clear from available literature and experiential sources that a most important factor in the process of isolation adaptation is a feeling of personal self-worth based on meaningful work. At South Pole, I observed to my successor, "If an individual is made to feel that he's excess baggage here during the winter, he will surely become dissatisfied, probably in a very unpleasant way. Don't be afraid of assigning work. Keeping busy can be a great boon and really makes the time pass more quickly."

But, determining the manning level for an isolated station is a difficult matter. A small group will insure that most everyone will remain busy, but may not provide for handling the unforeseen (and, of course, no emergency support crew can be sent in when needed). The "small" group might also (in advance) look upon their work load as exploitive with manning levels held down in the interest of saving someone else's money. On the other hand, a "large" group will cover both of the above problems, but will set up the known

problem of time use and its attendant evils.

Again, perhaps education is the answer. Most people are not aware of how much time is available for productivity when all commuting, shopping, paying bills, making arrangements, satisfying bureaucracies, etc., etc. are removed from one's schedule. If it can be shown that this can be used to cover all realistic contingencies, and even add to overall satisfaction with the assignment, then perhaps manning levels that do not include potential "excess baggage" can be worked out. This goal has other problems, as well. Current technological complexity and specialization challenge the organizer of a "small" group to adequately cover all skills required for effective operations. Whether this problem can be solved (by the provision of technical cross-training, for instance) will probably be dependent on the assets of a particular program.

Personnel Selection

Much has been written on the characteristics and qualities required for successful adaptation to work in isolation. I can probably add little new material to that already published. My experience would argue most strongly for confident, self-sufficient types who are competent in their work and satisfied with their roles. A person with a broad perspective and successful experience in many settings (adaptive) is also a strong candidate. Some studies have promoted the

positive aspects of a rural background, presumably for the experience of long, independent hours of work with a broad spectrum of tasks. This certainly seems relevant, and if combined with adequate perspective and social skills would provide good background for work in isolation. I believe persons of reasonably high intelligence who are creative and not easily bored will also adapt well and feel their time is being well spent. At least one study felt that those under the age of 25 tend not to be sufficiently mature to do well in isolation. While this might be generally true, the member of our group who turned 20 during the winter seemed one of the best adjusted of the group.

In recent years, the employment of small numbers of women at wintering antarctic stations has been tried. I have little specific information on the results of this change, but believe most of the problems are probably recognized. The potential for disruptive conflict at an isolated work place is always high even when sexual competition is not a factor. The introduction of this factor, especially if accompanied by injudicious behavior by various group members, could lead to levels of conflict not otherwise probable.

Women selected for isolated duty with a largely male group should be carefully screened for evidence of maturity, and should be fully informed of the potential problems of new social dimensions in the isolated group. At least two women

(rather than one) should be assigned at any one station, and preferably three (to cut down on potential "overexposure" among them). The use of stable couples in an isolated environment would probably work out well as this would theoretically eliminate the problem of sexual competition.

A Final Look at the Positive Side

Despite all the negative potential inherent in an isolated work place, if approached with some measure of understanding and preparation, the experience can be distinctly positive. Shurley (Gannon, 1974b) has observed that, "Many people cite that winter period as the peak experience of their lives. You suffer some. You get lonely. You get depressed. And you hurt much of the time. But you also have learned something important about self discipline, tolerance, understanding, adaptability. It's a total emersion thing, you know, and a very profound one. You can get to know what you are really like."

The difficulties encountered during an antarctic winter, or in space, or at whatever lonely outpost must be balanced against the unique insights and observations afforded and the satisfying life experience gained.

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