SELECTION FOR ANTARCTIC SERVICE

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REPORT NUMBER: 66-15

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Report Number 66-15, March 1966, supported by the Bureau of Medicine and Surgery, Navy Department, under Research Task MF 022.01.03-9001.

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Environmental conditions, group composition, and work roles at Antarctic scientific stations are described, and possible sources and effects of stress in these environments are indicated. Cultural and psychological characteristics of various Navy and civilian occupational groups represented in wintering-over parties are compared. and the selection problem and procedures are outlined. Personal history, clinical, and self description variables which correlated significantly with three performance criteria are presented for Navy enlisted and "Seabee" groups, providing a summary of characteristics that distinguish the successful Navy man at small Antarctic stations.

Introduction

The U.S. Navy has provided the principal logistic support for this nation's large-scale research efforts on the Antarctic continent over the past decade. During this period the Navy's Bureau of Medicine and Surgery has conducted physical and psychiatric evaluations of all applicants to aid in selection of suitable military and civilian volunteers for service at Antarctic scientific stations. Due to the potentially hazardous or stressful nature of Antarctic service and the need for systematic information concerning the effects of such duty, a research program was initiated by the Bureau of Medicine and Surgery to evaluate psychological and environmental factors in adjustment and performance. This report summarizes findings from that research program which appear most relevant for personnel selection and provides current information concerning the Antarctic environment.

The United States presently maintains five year-round stations on the Antarctic continent where scientists conduct basic research in physics, geology, glaciology, biology, and related disciplines. During the months of winter darkness, disciplines which do not require field work, such as meteorology and upper atmospheric physics, are emphasized. The scientific programs are funded and administered by the National Science Foundation. The U.S. stations are constructed and maintained by Navy volunteers from a variety of occupational specialties.

The Antarctic Environment

The Antarctic station sites are in the most inhospitable environments inhabited by man. The Amundsen-Scott Station at the geographical South Pole is located at an elevation of approximately 9,500 feet above sea-level on an ice cap more than 8,600 feet thick. The mean annual temperature at the South Pole is -57°F and during the winter months the extremely low temperature of -110°F has been recorded. At the South Pole, there is but one day and one night each year. The station

is completely isolated and inaccessible from the outside world from February until November. except for intermittent radio communications. Environmental conditions at the new Polar Plateau Station are even more extreme than those at South Pole. Conditions at Byrd and Palmer stations are less extreme, but all groups are completely isolated and confined to close quarters for several months.

Table 1

Station Descriptions

	BYRD	SOUTH POLE	MC MURDO	PALMER	PLATEAU
Location:					
Terrain	On Inland Ice	On Inland Ice	On Volcanic Ash	On Bedrock (near S.Amer.)	On Inland Ice
Latitude	79°59'S	90°S	77°51'S	64°45'S	79°30'S
Air Distance from McMurdo	885 miles	820 miles	--	2,360 miles	1,350 miles
Feet above Sea-level	4,971	9,184	102	25	12,000 approx.
Method of Supply:	Air	Air	Air, Sea	Sea	Air
No. of Buildings:	15	11	70	2	8
Mean Annual Temp.	-19°F	-57°F	0°F	+20°F	--
No. of Winter Personnel (approximately):					
Civilian	9	7	7	5	4
Military	17	13	260	4	4

Essential features of the five Antarctic stations currently occupied year-round are shown in Table 1 above. The largest station, McMurdo, is staffed by approximately 250 winter personnel (Navy). This base, except for extreme climatic conditions, is much like any military establishment with experienced line officers in charge, and with a medical officer, supply officer, CEC officer, and chaplain carrying out the tasks normally associated with their professions. There is an in-patient dispensary, a large messhall, several separate barracks for officers and enlisted men, an EM Club and an Officers' Club.

The four small stations -- Byrd, Palmer, Plateau, and South Pole -- are strikingly different from McMurdo. The buildings at Byrd and South Pole are completely under the ice. Space and facilities are very limited at all of the small stations. Station members live and work in close proximity, and the sharp status and role differentiations characteristic of normal military groups are much less likely to be present at the small stations.

The new Byrd Station consists of prefabricated buildings placed in long tunnels 40 feet deep, roofed over with steel arches overlaid with packed snow. The station is designed to give individual scientific laboratories freedom from interferences, such as radio or electrical noises generated within the station itself. Laboratory facilities are maintained for seismological, meteorological, ionospheric, auroral, and radio noise research. The station is resupplied by air during the summer months and is maintained during the winter period by about 20 Navy men; the wintering scientific party consists of about 10 men.

Palmer Station on the Antarctic peninsula area near South America can be reached only by ship. Four Navy men and five scientists make up the small wintering-over party. Because of its coastal location, biological studies are emphasized.

The new Plateau Station, established during Deep Freeze 1966, will consist of a main complex of five vans linked together. The station will accommodate four naval personnel who will operate the station and four scientists who will conduct projects in aurora, airglow, geomagnetism, VLF propagation, and radiation climatology. The station site will be at an altitude of approximately 12,000 feet above sea-level. Temperatures at Plateau Station will probably drop below those at South Pole (-110°F) and possibly below the world's record (-126.9°F) established at Russia's Vostok Station.

The Amundsen-Scott South Pole Station described earlier typically has 13 Navy men and seven scientists in the winter party and carries out scientific programs in aurora, airglow, ionospheric studies, meteorology, and seismology.

During the summer months, that is, approximately early November to late February, personnel at all stations are heavily burdened with construction, repairs, and storage of supplies for the long winter ahead. These tasks demand hard work and the ability to withstand long hours, little sleep, very cold temperatures, and, at some locations, high altitude. During the six to eight months of most severe weather and darkness, wintering-over personnel are forced indoors and activities are very limited. Undoubtedly, the most critical aspect of life at any small station is the fact that after the onset of winter there is no possibility of evacuation or of obtaining outside help. Contact with the outside world is restricted to radio communication, and at times even radio communication is not possible. The men are confined to the physical boundaries of their camp and the social boundaries defined by their particular associates at the station. Furthermore, there is little possibility of withdrawing from the station community, even temporarily, since opportunities for privacy are infrequent and brief.

Composition of Small Groups

The typical composition of the groups at the four small outlying stations is shown in Table 2. Even the smallest station must have at least one man in each of the following occupational specialties: medicine, radio communications, electronics or electrical repair, heavy equipment operation and repair, and cooking. Additional technicians and "Seabees" (Construction Battalion personnel) are utilized at the various stations, depending upon particular projects, equipment to be operated or maintained, and living space.

Table 2

Approximate Numbers in Various Occupational Specialties Assigned to Small Stations

Occupation	Byrd	Plateau	Palmer	S. Pole	Total Selected	Total Applicants[a]
Medical Officer	1	1	-	1	3	--
Hospital Corpsman (HM)	1	-	1	1	3	42
Radioman (RM)	2	-	1	2	5	55
Cook (CS)	1	1	1	1	4	20
Electronics Tech. (ET)	1	1[b]	-	1	3	16
Electrician (CE/EM)	3	-	-	2	5	40
Mechanic (CM/EN)	2	1	1	1	5	27
Carpenter (BU)	4	-	-	1	5	19
Plumber (UT/SF)	2	-	-	1	3	9
Equipment Operator (EO)	2	-	-	1	3	36
Storekeeper (SK)	1	-	-	1	2	--
Weather Bureau	3	-	-	3	6	--
Scientists	6	4	5	4	19	--
						264
Totals (Approximate)	29	8	9	20	66	

[a]Deep Freeze 1966, petty officers only.

[b]Responsible for communications.

Except for radiomen and meteorologists, only one specialist from each occupation is typically present. Each man has a particular task which makes a unique contribution to the group's mission. In addition, individuals may be required to assume duties outside their occupational specialties, and each must take on his share of the general housekeeping chores. As a

consequence of the variety in occupational specialties, cultural, social, and educational backgrounds of group members also vary considerably.

Selection ratios differ for the various Navy rates; as can be seen in Table 2, most selectivity could be exercised in the screening of Hospital Corpsman applicants and least in the screening of Electronics Technicians in Deep Freeze 1966.

Work Roles

Among military personnel the cook is one of the busiest persons at any station. He does all the cooking and baking for each of the three meals and in addition usually allows access to certain food supplies and his galley around the clock. He will be working in the messhall area which is usually a social center during free time; therefore, he is likely to have others around him almost all the time and in many instances will have others coming in and out of his immediate work space. Needless to say, he is likely to encounter a range of comments about his proficiency as a cook, but generally cooks are held in higher esteem than any other occupational group in the Antarctic.

The two radiomen at Byrd and Pole stations characteristically work individually on a 12-hour on and 12-hour off schedule during the summer but change during the winter to 24-hour on duty and 24-hour off duty. The location of the communication shack varies with the station, but it is likely that the radioman (particularly the senior radioman) will be apart from others in the camp for extended periods of time. During the winter months when radio blackouts often occur due to weather conditions, the radioman is likely to experience long periods of constant alertness with little reward for his efforts. In addition, there is periodic interference with his radio caused by equipment operated by other persons at the station.

The electronics technician has his own workshop, but frequently performs his work in other work spaces, such as the communications shack. He, therefore, is likely to have task interaction with others, particularly with the civilian electronics technician who may receive much higher pay for doing the same type of work. He is often the focal point of interaction between military and civilian personnel because of his contact with both.

The mechanic probably experiences the greatest difference between his summer and winter work schedules. During the summer he is constantly at work keeping the equipment operating under heavy loads. During the winter months he works on equipment either inside a garage area or outside in the severe weather preparing for the summer. During the winter period, the work load is likely to be light in relationship to the summer load, but when faced with a shortage of parts he may be somewhat frustrated in his attempt to complete the necessary repair work. At

Palmer and Plateau stations, the mechanic probably will be responsible for generators and electrical equipment as well as for the maintenance and operation of tractors and vehicles.

The electrician, builder, and utilitiesman are also subject to seasonal variations in work load. However, they are perhaps less able to pace their work in a scheduled manner for, should an emergency arise, regardless of the hour they are required to take care of it. During the summer, they are usually involved in station construction and maintenance. These men are likely to have the most extensive contact with other areas of the station and the personnel occupying them. Their work exists where they find it.

The hospital corpsman has perhaps the least well-defined role at the station. There is little need for his technical training throughout the year, especially during the winter, and, because of his seniority and probable exposure to administrative duties, he sometimes is assigned collateral duties in the administrative or supply fields. However, most of the time he works at odd jobs and assists other personnel in their work. His motivation and feelings of usefulness decline over the year. A mature, flexible, and self-sufficient individual is particularly needed in this role because group esteem and approval may be harder to achieve than in other jobs at the station.

In addition to carrying out their designated work roles, all small station personnel regularly participate in messcooking, hauling ice for the snow melter, or clean-up detail. During the summer months station personnel must pull together to haul supplies from the airstrips into camp. In sum, there are multiple role demands made upon everyone, and there is a great likelihood that status leveling will occur. If one's status needs are too great or too rigid, there is a potential adjustment problem.

Interpersonal difficulties between military and civilian personnel are not intrinsic to the situation of having both types of personnel aboard a small station. There are probably as many interpersonal difficulties within each of these groups as between them; however, the presence of the two different occupational groups, whose members come from different educational and social backgrounds, tends to increase the likelihood of significant differences in goals and value systems. One recurrent issue, for example, is the importance of cleanliness and neatness in work and living spaces. The presence of extreme or rigid points of view on any subject of general interest or concern at the station might well lead to tension and conflict.

In screening Deep Freeze applicants particular attention is given by the psychiatric assessment team to petty officers (1st Class and Chiefs) who are likely to assume leadership roles in the small stations. There is often a tendency to equate self-confidence, assertiveness,

and achievement motivation with leadership. These are desirable but insufficient qualities for a man to possess if he is to be an effective leader. At small Antarctic stations the effectiveness of a leader can be judged not only by his ability to motivate individual accomplishments, but also by his ability to generate and maintain group spirit among his men. Data from several small station groups indicate that the more effective leaders (as judged by the station supervisors and the men themselves) exhibit more emotional control, flexibility, and greater interest and concern for the problems of individual station members than do the less effective leaders (Nelson, 1963). On the other hand, the more and less effective leaders tend to be characterized equally by greater self-confidence and achievement orientation than are the non-leaders (Nelson, 1964a). The task for the psychiatric assessment team then is one of evaluating the potential small station leader in terms of his capacity for positive emotional and social relations with others. The man who is overly demanding of others, inflexible, and explosive in temperament will likely encounter difficulty -- particularly if he assumes a leadership role.

Navy Volunteers and the Selection Problem

The Bureau of Naval Personnel every year issues a notice to all naval ships and stations which gives information concerning Operation Deep Freeze and solicits volunteers from more than 25 Navy occupational specialties to participate in the program. To be eligible for consideration, the volunteers must have 24 months of obligated service remaining (or agree to extend their enlistments), no history of domestic problems or indebtedness, positive recommendations from their commanding officers, and the capacity to meet rigorous physical standards. From among the many who meet these minimum requirements, those best suited for the Antarctic wintering-over parties must be selected.

Various studies have shown that Navy Deep Freeze volunteers are above the Navy average in GCT (intelligence), education, and past military performance (Gunderson, 1964a; Gunderson, 1964b). The average Deep Freeze candidate has had more than six years of naval experience, often including duty overseas. Thus, all evidence indicates that the overall quality of Navy volunteers for Antarctic service is high.

There were about 1,500 Navy applicants for Deep Freeze 1965 which provided a very favorable selection ratio in almost all of the required rates or occupations. The numbers of volunteers has diminished for Deep Freeze 1966 and 1967, making it difficult to fill all positions at all stations. Regardless of the numbers of candidates available, however, the essential screening task would appear to be the rank ordering of applicants in the various occupations in terms of their aptitudes and abilities to work and live effectively under the social and environmental

restrictions of the Antarctic small stations. Clinical evaluations have been found to contribute significantly to prediction in three important performance areas (based upon evaluations by station leaders and by peers): emotional stability, task effectiveness, and leadership ability. Best results were achieved when examiners were provided with detailed information concerning rating procedures, assessment objectives, and the Antarctic environment (Gunderson and Kapfer, in press).

Cultural and Psychological Differences Among Antarctic Occupations

Men in the various occupations represented at Antarctic stations differ as groups on many attributes (Gunderson and Mahan, 1966). Variations in a number of cultural background characteristics are shown in Table 3.

Father's occupation was highly related to the man's own occupation. Scientists most often had fathers who were in "white collar" occupations (professional, technical, and managerial) and cooks least often -- 59% and 11%, respectively. Men in Navy construction jobs (carpentry and plumbing) had a relatively high proportion (62%) of fathers in skilled trades, and so on.

Parents' education also varied considerably among the occupational groups and the differences closely paralleled those for father's occupation.

Urban-rural residence, region of residence, and interest in hobbies varied moderately among groups. Differences in college attendance were very large.

Distinctive patterns of cultural characteristics emerged from the major occupational categories. Extreme differences were frequently found between scientists and officers on the one hand and Navy enlisted "blue collar" occupations and cooks on the other. Differences among the Navy enlisted occupations tended to be moderate to slight, but differences presented consistently favored the Technical and Administrative groups.

Large variations also were present among occupational groups on psychological measures. As expected, the most extreme differences were between scientists and cooks, but there also were small but consistent differences between Navy enlisted "blue collar" (mechanical, construction, and electrical) occupations and Navy "white collar" (administrative and technical) occupations.

Differences among occupational groups in their social roles at Antarctic stations were examined by means of sociometric data. Cooks had more social relationships than any other occupational group as indicated by the average number of friendship choices given and received. Radio and electronics technicians were lowest in the number of friendship relationships while "blue collar" enlisted men (carpenters, plumbers, electricians, etc.) were high in number of

friendships.

Table 3

Differences Among Occupations in Cultural Characteristics

	Civilian		Navy						
Variable	Scien.[a]	Tech.	Off	Admin.	Tech.	Mech.	Constr.	Elec.	Cook
Father's Occupation:									
% White Collar	59	37	56	26	28	20	13	21	11
% Skilled	22	29	23	42	41	39	62	18	44
% Farm, Forest	8	16	10	15	12	23	14	44	22
Father's Education:									
% No High School	23	34	24	45	40	56	48	48	65
% High School Grad.	62	47	58	26	38	25	23	31	22
Mother's Education:									
% No High School	18	24	19	31	25	37	37	34	4(
% High School Grad.	68	56	67	46	49	37	32	35	4(
Urban-Rural Residence:									
% Rural	17	23	22	31	32	46	33	36	33
% Large City	43	30	42	30	34	26	37	28	34
Region of Residence:									
% Northeast	32	38	43	32	29	26	38	30	24
% South	16	15	21	25	21	33	24	36	38
Education:									
% College	99	65	89	20	16	7	7	14	5
Hobbies:									
% More than One	67	56	56	30	38	27	19	25	13
N	170	135	157	120	272	273	123	100	35

[a]Scien. - Scientist; Tech. - Meteorology and electronics technicians; Off. - Officer; Admin. - Hospital Corpsman, Storekeeper, Yeoman, Personnelman; Tech. - Radioman, Electronics Technicians, Aerographer; Mech. - Construction Mechanic, Equipment Operator, Engineman; Constr. - Builder, Utilitiesman, Shipfitter; Elec. - Electricians.

The differences in social and work roles among occupational groups appear consistent with certain differences in values expressed in the psychological tests at screening. The cooks and the Mechanical group scored relatively high on the Study of Values Social and Political scales, were high in social conformity and conservatism (caution) as indicated by the Survey of Interpersonal Values and Friend Description scales, and preferred traits of sympathy and warmth in friends. (See Gunderson and Mahan, 1966, for a comprehensive description of the Deep Freeze

test battery.) Occupational groups more concerned with technical tasks and problems (scientists and Navy technical personnel) and presumably less concerned with interpersonal relationships, scored higher than cooks and mechanics on the Theoretical Scale and Achievement Need and lower than the same groups on the Social and Sympathy scales.

Cultural and value differences may affect group compatibility in such settings as Antarctic small stations where persons in very dissimilar occupational roles must interact to achieve common goals. If differences are too great, or if attitudes toward cultural differences are too rigid, reductions in group harmony and effectiveness might be expected (Nelson, 1964b).

Sources and Effects of Environmental Stress

There is no doubt that prolonged isolation in a restricted environment places unusual stresses upon small groups. Precise knowledge concerning the sources and effects of stress in such a setting is lacking, however. The particular features of Antarctic station environments that are most productive of stress are not known with certainty. It is known that reductions in physical activity and social stimulation inevitably occur in Antarctic groups. Our test data have shown that not only are individual emotional and motivational changes common, but that some deterioration in group harmony and cooperation also typically occurs (Gunderson and Nelson, 1965a).

Reactions of persons to variations in environmental stimulation are assumed to be related to their personality structures and past histories and probably involve exaggeration of characteristic adaptive mechanisms. If this assumption is true, it is more important for prediction to know the personality characteristics and behavior patterns of the individual than to know the particular kinds of stress that he will experience.

A study was conducted of the relative stressfulness of Antarctic small station duty as perceived by psychiatric examiners for the Antarctic program (Gunderson and Nelson, 1964). Eleven different duty assignments were rated by psychiatrists and psychologists as being more, less, or equivalent in stress to Antarctic small station duty. For the psychiatrists, only astronaut training and underground intelligence were seen as more stressful than Antarctic small station duty, while for psychologists only astronaut training was more stressful. Thus, Antarctic duty was perceived as generally more stressful than most other duty assignments. Comments given by the screeners to support their ratings of high stress included reference to the threat of death, continuous necessity of being alert, being alone or with the same small group over prolonged periods of time, and having to cope with the unknown.

Stressful attributes of Antarctic small station duty as seen by screeners were grouped into areas as follows:

(1) Confined Isolation: Geographical, social and emotional remoteness with limited space and absence of an opportunity to withdraw or escape from the situation.

(2) Continuous Presence of Same Associates: Continuous proximity of others with lack of interpersonal choice; knowing that one must get along with others.

(3) Tension Control: Necessity of controlling aggressive and emotional impulses; inability to relieve anxiety; lack of heterosexual objects.

(4) Boredom, Monotony: Sameness of physical surroundings, faces, work tasks, conversations; lack of stimulus variety.

(5) Physical Hardship: Hard and heavy work; cold weather, darkness; certain food deprivations; having to work to attain minimal standards for health and safety.

(6) Status Limitations: Status leveling, role overlap; lack of immediate status rewards.

Studies have been conducted of sources of stress as judged by station members in one expedition. Participants have reported that inadequacy of heat or light has not been a particular problem. Because water must be made from snow and ice with considerable expenditure of labor, water generally is in short supply and personal cleanliness tends to become a serious concern to many individuals after several months of isolation. Food generally is abundant and of good quality and represents a major source of gratification, although shortages in certain food items may be present. Recreational facilities are generally reported to be inadequate and represent a significant problem to many individuals. Space is very limited, largely due to the enormous expense of heating living and working areas; crowding was considered a problem by about one-third of the station members. Fire was a constant concern to a large majority of the station members. Worry about maintaining communication with family was expressed by many. The physical condition of the station and the need for improving facilities was of concern to most station members. Inadequacy of pay was a frequent complaint by naval personnel but not by the civilians. Naval personnel receive no special compensation for duty in the Antarctic.

It is apparent that as a consequence of prolonged confinement and restriction in activities, many of the usual modes of dissipating emotional tensions are not available. Active sports, many common social diversions, and sexual outlets are not available. The Antarctic situation confronts group members with a number of problems that have no possibility of solution during the long winter confinement period. Men with strong needs for activity and achievement might be expected to suffer more in such an environment than men with lesser needs for mastery over the environment. Considerable data supporting this hypothesis has been gathered for Navy personnel.

Examination Procedures

In predicting personal adjustment and on-the-job effectiveness in unusual or stressful settings, personality characteristics as well as intellectual and technical abilities must be taken into account. Psychiatrists and psychologists in military settings are routinely called upon to assess strengths and weaknesses of healthy individuals, and clinical assessment by means of a flexible interview technique has proven effective in the Deep Freeze situation.

Deep Freeze psychiatric screening consists of two parts, paper-pencil testing and clinical interviewing. The testing is designed to provide some relevant and standardized information concerning the subject's personal history, motivations and values, and personality self-descriptions. The clinical interview affords an opportunity for more focused evaluation of past and present psychological adjustment.

The objectives of the psychiatric examination are: (1) to identify those few candidates who manifest significant psychopathology and recommend their disqualification; (2) in those men considered qualified for wintering-over duty, to describe and evaluate attitudes and motivations, personality traits, defense mechanisms, and behavior patterns which may be associated with borderline or unsatisfactory work motivation, disruptive social influence, or personal anxiety and suffering in an isolated small group. In reference to the first objective, it is obvious that if an applicant manifests homosexual tendencies, paranoid symptoms, much anxiety, or a high overt hostility, he should not go to the Antarctic. The second objective is difficult to attain and can be only partially fulfilled through careful clinical evaluation. Ideally, with proper weighting of the various rating items used, it will be possible to rank-order members of a particular subgroup, for example, radiomen, in terms of the two examiners' independent evaluations.

Examination of the item content which contributes most to prediction of Antarctic adjustment suggests that control of hostile and aggressive impulses has special significance in small Antarctic groups. Aggression, Emotional Control, Direction of Hostility (Self), Conforming, and Paranoid were among the better clinical predictors. Special attention directed to this area in the assessment interview is indicated.

Within the brief time allotted for the interview, the examiner must concentrate on those few areas that he considers most important and relevant. The Personal History Booklet, which is a biographical questionnaire filled out by the subject prior to his interview, is usually of some assistance to the examiner. A quick survey of the contents before or during the interview saves time by eliminating the necessity for many routine factual questions and in some cases suggesting useful areas to explore during the interview.

Psychologist's Examination: In his interview the psychologist focuses upon past interpersonal relationships and adjustment in family, school, marriage (or dating), and military service. The interview is not standardized and only sufficiently structured to provide a brief overview of the subject's personal and social history. From impressions of possible strengths or weaknesses, the individual's methods of handling various problems or crises, such as finishing or quitting school, death or illness in family, marriage and children, staying in or getting out of the Navy, and so on, are explored as appropriate. An interpretation or evaluation of the man's adequacy in meeting typical life problems is attempted, and probable strengths and weaknesses for living in a small confined group are indicated.

Psychiatrist's Examination: The psychiatrist evaluates the subject's present psychological status and effectiveness, including environmental pressures, sources of anxiety or tension, typical defense mechanisms, and adequacy of impulse controls. The individual's last military assignment, marriage relationship and wife's status, family and friendship ties, goals and aspirations including motivation for Deep Freeze are explored as a basis for estimating the individual's stability and adequacy in personal relationships. Unusual attitude and behavior patterns, inappropriate intensity or quality of affect, etc., are noted, and apparent inconsistencies in motives and behavior patterns are clarified, if possible. For example, if a young petty officer with an emotionally dependent and pregnant wife volunteers for Deep Freeze, his motivation (and maturity) would be of some concern.

After conducting separate interviews, the psychologist and psychiatrist independently fill out evaluation forms summarizing their findings, and finally make a joint rating and recommendation for each applicant. The independent ratings by the psychologist-psychiatrist examining teams are of major importance in selection decisions. The discriminations made by the examiners, though difficult with such limited knowledge of the applicant, have proven effective.

Correlates of Performance

Age, naval experience, and rank were found in earlier Deep Freeze studies to be related in a linear fashion to performance ratings by supervisors at the McMurdo Station (Gunderson, Nelson, and Orvick, 1964). At small stations, however, these variables have not proven consistently discriminating for the five major performance criteria -- Emotional Stability, Task Motivation, Social Compatibility, Overall Effectiveness, and Leadership Ability -- with the exception of Leadership. Years of service is positively related to Leadership Ability (as rated by supervisors and peers) for Navy personnel, particularly for Seabees.

Evidence of repeated nonconformity, as indicated by a delinquency-truancy record, has been

consistently predictive of less satisfactory performance at both large and small stations (Gunderson and Nelson, 1965b).

A large number of biographical and psychological variables, including ratings by clinical examiners, have been related to the various performance criteria. Some of the more significant relationships for three of the criteria, Emotional Stability, Task Motivation, and Leadership Ability, are shown in Tables 4, 5, and 6. Data are presented separately for All Navy Enlisted and for only the Seabee group from three expeditions combined, and the differences on some of the items indicate that certain characteristics are more relevant for performance in one Navy occupational subgroup than another.

Table 4

Correlates of Performance: Emotional Stability

Predictors	All Navy	Seabees Only
Personal History:		
Age	10	13
Hobbies:		
Number of hobbies	-22*	-13
Movies (Dislike)	17	41*
Books (Like)	-29*	-31*
Hotrods (Neutral)	25*	18
Hike-Camp (Neutral)	23*	3
Clinical Evaluation:		
Excitable	-22*	-13
Personality Scales:		
Motivation	-19*	-18
Confidence in Medical Care	-21*	-35*
Wanted Affection	-15	-13
Attitude Items:		
I prefer the job I will have on this expedition to any other job I can think of.	-29*	-27*
I like other people to tell me how well I've done on a difficult job.	27*	11
The success or failure of the Antarctic expedition will depend as much on me as on anyone else.	-27*	-18
The harder the job, the better I like it.	-20*	-28*
Hard (Self-description)	19*	33*
Conforming (Self-description)	13	32*

*Product-moment correlations significant beyond .05 level.

Tables 4 and 5 show that age and years service are not predictive of Emotional Stability or

Task Motivation while Table 6 indicates that Leadership Ability is partly predictable from length of naval experience.

Table 5

Correlates of Performance: Task Motivation

Predictors	All Navy	Seabees Only
Personal History:		
Years of Service	9	0
Religion (Other than Protestant or Catholic)	-13	-21
Hobbies:		
Models (Dislike)	12	19
Popular Music (Like)	19*	16
Hotrods (Dislike)	-20*	-18
Clinical Evaluations:		
"Acts Out"	-23*	-20
Paranoid	-19*	-23
Acceptable to Peers	20*	18
Personality Scale:		
Motivation	-20*	-28*
Attitude Items:		
I enjoy returning to a problem which I have consistently been unable to solve.	-18	-29*
Most of the men who go to the Antarctic will probably wish they had stayed in the U.S.	20*	28*
I like for people to offer help when I'm having difficulty.	-25*	-28*
I like to keep records of continuous details or events.	-15	-27*
Hard (Self-description)	19*	24*
Slow (Self-description)	-12	-25*

*Product-moment correlations significant beyond .05 level.

The variable "number of hobbies liked" correlates negatively with the Emotional Stability and Leadership criteria. This result is highly consistent with earlier small station studies which indicated that expressed interest in hobbies and an activities score (based upon club membership, sports participation, and hobbies) were negatively correlated with performance. At McMurdo Station the opposite was true; participation in many avocational activities was positively related to performance ratings. It seems clear that at small stations, where opportunities for avocational activities are very limited, preferences or needs for many such activities tend to be related to poor adjustment (Gunderson and Nelson, 1965b).

Preference for reading books as a hobby is negatively correlated with the Emotion criterion.

Even more significant, however, is the relationship between neutrality (neither strong like nor dislike) toward certain activities (Painting or Drawing, Working on Hotrods, and Playing Cards -- about which group opinion may be sharply divided) and Leadership ratings. Generally, moderate rather than extreme attitudes appear to be consistent with adjustment.

Table 6

Correlates of Performance: Leadership Ability

Predictors	All Navy	Seabees Only
Personal History:		
Years of Service	34*	43*
Religion (Other than Protestant or Catholic)	- 5	-20
Hobbies:		
Number of hobbies	-23*	-25*
Painting, drawing (Neutral)	20*	19
Hotrods (Neutral)	34*	23
Cards (Neutral)	33*	34*
Clinical Evaluations:		
Emotional Control	32*	17
Flexible	29*	25*
Alert	21*	9
Excitable	-28*	-20
Persevering	26*	16
Orderly	27*	15
Likable	31*	28*
Conforming	21*	9
"Acts Out"	-21*	-28*
Overall Effectiveness	34*	24
Acceptable to Peers	32*	21
Personality Scale:		
Wanted Affection	-16	-20
Attitude Items:		
Most of the men who go to the Antarctic will probably wish they had stayed in the U.S.	24*	28*
Being part of an Antarctic expedition will be the highlight of my career.	-29*	-18
I like to keep records of continuous routine details or events.	-27*	-35*
Accepts discipline (Self-description)	19*	19
Slow (Self-description)	-15	-33*

*Product-moment correlations significant beyond .05 level.

Clinical evaluations (psychologists' and psychiatrists' ratings summed) are very relevant for prediction of Leadership but are less effective for the Seabee group.

A high level of expressed motivation for the assignment tends to be negatively correlated

with Emotional Stability and Task Motivation. It appears that men with unrealistic expectations are disappointed in the Antarctic; scepticism and even a slight degree of pessimism seem to be more appropriate. The Wanted Affection Scale of the FIRO-B Test (Schutz, 1958) tends to be negatively correlated, although not significantly, with the Emotion and Leader criteria; these and other data suggest that self-sufficiency and satisfaction with a low or moderate amount of interpersonal interaction is desirable. (It has been noted previously that cooks apparently need and receive a relatively large amount of social interaction.) Strong emotional dependency upon others will almost certainly meet with frustration in the Antarctic setting.

Attitude items that are discriminating tend to reflect scepticism (or realism) about the expedition and one's own job. Describing himself, the successful Seabee is "Hard" and "Conforming"; he "Accepts Discipline"; and he is not "Slow."

The correlates of performance shown in Tables 4, 5, and 6 provide an outline of the kinds of characteristics that distinguish the successful Navy man at small Antarctic stations. These and other attributes, such as GCT scores and past performance marks, can be combined by multiple linear regression methods to provide the most efficient set of predictors for each of the five major criterion measures. Combinations of six to nine variables drawn from personal history data, clinical ratings, and attitude inventory items have yielded multiple correlations with the five performance criteria ranging from .64 to .75 in a sample of military personnel drawn from two expeditions. Emotion, Task, and Leadership criterion scores for a new sample of Navy personnel in another expedition were significantly predictable from the regression weights based upon the previous sample. New and more stable regression weights have been obtained from a three-year military sample to aid in future Deep Freeze selection.

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Acknowledgment

The assistance of Mr. F. A. Thompson and Mr. J. L. Mahan is gratefully acknowledged.

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1 ORIGINATING ACTIVITY (Corporate author)

U.S. Navy Medical Neuropsychiatric Research Unit, San Diego, California 92152

2a REPORT SECURITY CLASSIFICATION: UNCLASSIFIED

2b GROUP

3 REPORT TITLE

Selection for Antarctic Service

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Interim

5 AUTHOR(S) (Last name, first name, initial)

Gunderson, E. K. Eric

6 REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1966	20	12

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. MF 022.01.03-9001	66-15
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. AVAILABILITY/LIMITATION NOTICES

(1) Qualified requesters may obtain copies of this report from DDC.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Bureau of Medicine and Surgery Navy Department Washington, D.C. 20390

13. ABSTRACT

Environmental conditions, group composition, and work roles at Antarctic scientific stations are described, and possible sources and effects of stress in these environments are indicated. Cultural and psychological characteristics of various Navy and civilian occupational groups represented in wintering-over parties are compared, and the selection problem and procedures are outlined. Personal history, clinical, and self description variables which correlated significantly with three performance criteria are presented for Navy enlisted and "Seabee" groups, providing a summary of characteristics that distinguish the successful Navy man at small Antarctic stations.

DD FORM 1 JAN 64 1473 0101-807-6800

UNCLASSIFIED

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Selection Unusual Environments Work Roles Navy Personnel Occupational Differences						

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