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DEPARTMENT OF THE AIR FORCE
71st AEROSPACE RESCUE AND RECOVERY SQUADRON (MAC)
APO SEATTLE 98742



REPLY TO
ATTN OF: DOPJ/752-4888

5 MAR 1976

SUBJECT: 1976 ARRS Mt McKinley Expedition

TO: 71ARRS/CC
ARRS/SG
IN TURN

1. Military rescue capabilities in mountainous terrain at altitudes above 14,000 feet are virtually non-existent. The steady increase of human activities at high altitude entails the occurrence of accidents by increasing numbers. Aircraft incidents at high elevations are a reality to predict. The need for organized rescue to be mobilized on short notice becomes an obvious requirement. East-block nations have established such capabilities; it must be obvious to them to realize its military value. The USA should not lag behind.
2. A high-altitude rescue plan must be developed. It must include selection criteria for suitable personnel, equipment and training requirements, appoint responsible ARRS units, and a directive sequence of required actions to mobilize and effect high-altitude rescue operation.
3. Prior to the compiling of such plan, knowledge and experience must be gained as a foundation to sound and efficient high-altitude rescue capabilities. Motivation and dedication to such undertaking is also a factor which is of prime importance to assure success. Essential knowledge of high-altitude mountaineering procedures, its hazards and its various aspects, is available through numerous individual and scientific reports and studies. This is tremendously helpful in planning high-altitude rescue operations. However, actual experiences of organized rescue activities are underdeveloped and unsatisfactory in documentation. Experienced mountaineers and expeditioners reflect in numerous reports the need for organized high-altitude rescue teams, but recognize the difficulty of organizing such teams due to the widespread locations of individuals and the logistic problems involved.
4. Consequently, the experience gained by pararescuemen in the proposed Mount McKinley Expedition closes the gap and provides essential data for compiling a workable high-altitude rescue plan. The benefit of first-hand experience is not only to collect valuable data on procedures, equipment, and environmental considerations, but also establish factors of team limitations, the recognition of symptoms and signs of high-altitude sicknesses, travel and acclimatization problems, and personal limitations.
5. I urge the approval of the proposed expedition.

Udo C.J. Fischer
UDO C.J. FISCHER, SMSgt, USAF
NCOIC, Pararescue Section

1 Atch
SSgt LaPointe's Plan and all atchs

DEPARTMENT OF THE AIR FORCE
7th AEROSPACE RESCUE AND RECOVERY SQUADRON (MAC)
APO SEATTLE 98747



REF ID: A77777
DOPJ (SSgt Robert L. LaPointe, 752-4888)

4 MAR 1976

SUBJECT: 1976 ARRS Mt. McKinley Expedition

71 ARRS/CC
10 HQ, ARRS/SG
IN TURN

1. Enclosed is a plan for the proposed 1976 ARRS Team to ascend Mt. McKinley. It will be noted that this plan is of a smaller scale than that submitted by MSgt Robert Watkins of the 303rd ARRS. The purpose of a smaller team is to allow easier coordination between team members before the climb and better command and control of the team while on the mountain. While the loss of MSgt Watkins presence during this climb is regrettable, it should not be construed that his participation was essential to the safe completion of this project. We have within the pararescue force other individuals who have the necessary knowledge, experience, and mountaineering background to safely and successfully carry through this proposed project.

2. The objectives of this expedition would be as follows:

a. Climb to the top of Mt. McKinley (20,320') if it is safe to do so. At any time that safety is compromised (i.e. bad weather, trouble acclimating, etc.) we will back off and regroup until it is safe to continue. Everyone on this team will understand that our primary responsibility is to ensure that each of us return safely from this project.

b. Sub-arctic living in an extreme cold weather environment.

c. Glacial travel and mountain cross country navigation.

d. Construction of snow shelters.

e. Testing of pararescue equipment in extreme temperatures:

(1) Clothing

(2) Equipment

f. Use of climbing gear on varying terrain (e.g. ropes, screws, pickets, jumars, etc.)

g. The beginning formation of a group of ARRS climbers who have climbed together as a team using standard pararescue equipment for the purpose of forming the nucleus of a high altitude SAR team.

h. Upon completion of this exercise, the compiling of a report on a high altitude operation giving future recommendations on team compositions and equipment.

3. The approval of this project would have the following beneficial effects on the mission of ARRS.

a. The primary benefit of this trip would be that a nucleus of active duty supervisory personnel within the pararescue field would have had experience working together on a high-altitude mission using equipment off the shelf from their sections. This would allow ARRS HQ to have a resource to use to organize any future high-altitude SAR missions. These individuals could be used in the future to train other Pararescuemen in high-altitude operations.

b. This ascent would be the first time that an all USAF team climbed to the summit. The resulting publicity of this climb during our bicentennial celebration could be most favorable.

c. Also not to be overlooked would be the effect that this sort of project would have on the morale of the pararescue force. There are many within the field who believe that the days of an elite pararescue force, capable of completing unusual and difficult tasks, is slowly eroding. The approval of this sort of project would add credibility and pride to the entire career field.

Robert L. LaPointe

ROBERT L. LAPOINTE, SSgt, USAF
Pararescueman

9 Atch

1. Equipment Listing
2. Menu Listing
3. National Park Service's Application to Climb
4. National Park Service's Physician Certificate
5. State of Alaska Bicentennial Commission Letter
6. National Park Service Mountaineering Environmental Ethics
7. Medical Problems
8. High Altitude Medical Kit
9. Sgt LaPointe's Trip Report

CLIMBING PROBLEMS ON MT. MCKINLEY



INSTITUTE OF ARCTIC BIOLOGY
UNIVERSITY OF ALASKA
FAIRBANKS 99701

Mt. McKinley, the highest mountain in North America, offers mountain climbers some of the most severe conditions found anywhere on earth. As Terris Moore points out in his book "Mt. McKinley: The Pioneer Climbs" when the Quartermaster Corps was searching for a place on the North American Continent where temperatures of at least -20 to -25 degrees F. could be found, dependably, during the summertime, it chose the high basin between the North and South Peaks of Mt. McKinley. Cold, lack of oxygen, and windstorm here provided conditions found only thousands of feet higher in other parts of the world. The combination of these factors with long exposure create severe hardships and pose unique problems for climbers on Mt. McKinley that are not encountered elsewhere in this country. In most cases climbers return from McKinley physically weaker than when they left. While trips to lower mountains may help build a climber's strength, a McKinley expedition may drain his strength and lead to deterioration of body functions.

This brochure presents problems, inherent in Mt. McKinley climbs, which affect the physiology of the climbers. It also presents a brief introduction to the research program being carried on at the University of Alaska to investigate these problems. It does not attempt to duplicate material presented in the National Park Service brochure (M-87) which gives requirements and suggestions of the Park Service regarding equipment, clothing, food, radio communications, climbing season, climbing routes, and reference material.

PHYSIOLOGICAL IMPAIRMENT

These responses to a prolonged and severely hostile environment constitute an interaction within the area of human ecology which is the subject of a continuing research program at the Institute of Arctic Biology of the University of Alaska. Every mountaineer preparing to climb Mt. McKinley is aware that at high altitude he will be physically weaker. He will move more slowly and not be able to carry heavy loads. There are also other results of activity at high altitude less commonly known but potentially as dangerous, such as mental impairment, dehydration, lassitude, loss of cold resistance, and lack of recuperative powers. A major environmental variable responsible for some of these effects is the lack of oxygen (hypoxia) associated with high altitudes. Terris Moore has recently pointed out (Proc. XVII Alaskan Science Conference, In Press) that because of its greater distance from the equator, an altitude on Mt. McKinley may be physiologically equivalent to a 2,000 feet higher altitude in the Himalayas. Physiological responses to these environmental stresses are under investigation at the Institute of Arctic Biology and it is hoped that such studies will contribute to the success and safety of future high altitude mountaineering expeditions.

Mental Function:

Bradford Washburn has estimated that above 18,000 feet on Mt. McKinley a person is reduced to roughly 50% of his mental capacity. In the winter assault of 1967 three McKinley climbers required approximately twice as much time to answer a series of subtraction problems after remaining at 18,000 feet for six days as they did at 7000 feet on the Kahiltna Glacier. In retrospect most high altitude climbers can recall situations in which their thinking was impaired and their judgement poor. These effects are insidious, the disability being commonly inapparent at the time. A controlled exposure in a low pressure chamber is often necessary to convince a climber (or flier) that hypoxia affects him. Many high altitude climbing accidents may be attributed to such lack of judgement. Thus, it is important that climbers realize in advance that their mental functions will be impaired. Planning should be thorough and complete to avoid a critical situation which poor judgement and slow thinking would magnify. For example, sudden impulsive decisions to go on or to return must be considered carefully.

Simple tests can be given to detect changes in mental function through effects on memory, time estimation, and calculation ability. Changes in other brain functions can be estimated by tests of balance and coordination. These tests, first administered in an altitude chamber prior to the climb, may give some indication of how a reduction in oxygen supply will reduce a climber's efficiency when he is high on the mountain.

Lassitude:

At high altitude motivation can diminish greatly. Thus, Joseph Wilcox, leader of a 1967 McKinley party, wrote in his diary "With five people crammed in the tent morale decreased rapidly. There was no interest in cooking meals and by the next day no one was even interested in melting drinking water. We found ourselves very apathetic -- not caring whether or not we got enough to drink or eat or if our gear was wet -- we just lay there and waited with little or no sleep ... By morning the cold had taken its toll -- Jerry Lewis and I had numb feet and I had numb fingers." Here the motivation to do even the simplest camp chores almost disappeared; yet these tasks -- melting snow for water, cooking a hot meal, drying clothes in the wind -- will help determine the success and safety of a party. The will to survive and succeed must not be sacrificed to lassitude. Inactivity during tent-bound stormy days can itself be devastating to morale, and as tiring and debilitating as climbing. Washburn stresses how some systematic activity during stormy days such as a short walk, weather permitting, or building a latrine with snow blocks can help to keep

the body limber and the mind alert. Physiological testing can be used to alleviate boredom on days of enforced inactivity.

Leadership and Interpersonal Relationships:

Irritability can easily spring up between even close friends during a stay at altitude. A nagging fear, doubt or feeling of guilt can easily grow in a person's mind and prove mentally exhausting as well as potentially dangerous.

Leadership characteristics may undergo drastic change because of the stressful situation. Drastic personality change may bring out latent domineering tendencies in anyone which can be extremely upsetting to group relationships. Being on the mountain may precipitate a variety of phobias, including claustrophobia from living in close quarters, which can lead to panic with an overwhelming desire to run away. In extreme cases a single climber may even leave the group and attempt to ascend or descend by himself, which can lead to fatal consequences.

By testing mountaineers before a climb it may be possible to detect areas of phobic preoccupation and glean personality traits which cause harmful reaction tendencies to assert themselves. A maximal understanding of these problems is essential for the smooth leadership and interpersonal relationships necessary for a successful stay on the mountain.

Work Capacity:

The capacity to carry out strenuous physical work at high altitude is an essential factor in the successful climb of any mountain. Work is limited by the ability to extract oxygen from the thin mountain air and to deliver it to the brain, muscles and other tissues. In the 1967 winter climb, for example, it was notable that the three climbers who reached the summit were those judged most physically fit at the start on the basis of standard exercise tests.

Simple step tests done in and out of an altitude chamber can give some indication of how a climber's work capacity changes with altitude and may make possible more efficient planning of the work schedule on the mountain. Tests which are done in the laboratory prior to the climb may be repeated on the mountain if a proposed high altitude laboratory is established there. This would give greater insight into what happens to a climber physically when he is on the mountain.

Acclimatization to Altitude:

S. M. Tenney emphasizes the importance of acclimatization in climbs over 15,000 feet. The McKinley Park regulation requiring climbers to begin at the Park Boundary and prohibiting air drops

inside the Park may appear hampering to an eager mountaineer. In actuality this regulation has undoubtedly contributed to the success of many expeditions, because of this necessity for the climber to gradually acclimatize to the thinner air. Carrying loads at gradually increasing altitudes is accepted as the best way to acclimatize. Some McKinley expeditions have found it very helpful not to "push" when they move above 14,000 feet but allow themselves a day or two at each high camp to adjust before moving higher.

Dehydration:

Dehydration is a major hazard of high altitude mountaineering. Dehydration compounds the problems of any illness or injury, making recovery more difficult. The chances of frostbite are believed to be much greater when a climber's body is dehydrated.

Climbers rarely drink an adequate amount of liquid above 14,000 feet. Fuel for melting snow is not difficult to carry, yet the tendency is to take only a minimum rather than an adequate amount. A party should always carry an extra week's reserve of fuel when high on McKinley. It is inviting tragedy not to have at least seven days supply of fuel if one plans to spend even one night above 17,000 feet on Mt. McKinley. This fuel must be used to provide each climber with at least three quarts of liquid each day.

The principal mechanism of dehydration is evaporation through breathing. Moist warm air is exhaled while very dry cold air - with the average humidity of a desert - is inhaled. The very large ventilation volumes needed to supply the oxygen necessary to carry heavy loads up steep inclines in the thin mountain air increases the loss to many times that under ordinary circumstances.

Water is also lost to clothing through sweating. Temperatures which can range from 60 above to 40 below zero Fahrenheit are conducive to sweating and chill when combined with the work performed and the severe winds encountered on the mountain.

Dehydration causes a reduction in blood volume and an increase in blood viscosity. Further, it upsets the body electrolyte balance which disturbs the acid-base balance of the blood. These changes affect both the muscles and the mental functions of a climber.

Illness or Injury:

It is virtually impossible for the body to recover from many illnesses and injuries above 14,000 feet. Hypoxia and dehydration seriously impair the body's recuperative powers. A sick person should if possible be taken immediately below 14,000

feet where he will have a better chance of recovery.

Altitude nausea and dizziness will often disappear if a climber goes to a lower altitude. Even after one night below 14,000 feet the climber may feel fit and subsequently be able to climb to 20,320 feet.

Diarrhea can be fatal when climbing above 14,000 feet. Dehydration is further aggravated and with impaired absorption the body receives little nourishment and is further weakened. A person suffering from diarrhea above 14,000 feet should be taken below 14,000 feet while he can still make the trip down. He should not go up again until his gastro-intestinal function returns to normal.

A person with wheezing, gasping, and coughing, suggestive of pulmonary edema, should be immediately taken to as low an altitude as possible. Some relief from pulmonary edema can be obtained on the mountain if the climbers are able to use proper medical treatment and have had instruction from a physician on this matter. Cardiac and pulmonary dysfunction are grave dangers on the mountain, and their debilitating effects increase exponentially. Therefore, action must be taken immediately. Waiting under hypoxic conditions can be fatal. Death can come only hours after the first symptoms appear. The best therapy is to transport the climber to below 10,000 feet as quickly as possible.

Cold Resistance:

One of the major hazards of a McKinley climb is frostbite. Mt. McKinley presents a combination of long exposure, severe weather, high altitude, low temperature and low humidity which makes it one of the most severe climates on earth. Mountaineering literature contains numerous vivid accounts of frostbite on Mt. McKinley such as Bradford Washburn's excellent article which can be obtained from the American Alpine Club. With proper protection, however, this complication need never occur. Adequate clothing, food and water are essential at all times. Three 1967 winter McKinley climbers had their feet frostbitten while they were in their sleeping bags primarily because they had little to eat and were dehydrated. Subsequently two of these climbers lost portions of their toes. It should be pointed out, however, that they were living at 18,000 feet for six days with temperatures of -50 to -60 degrees Fahrenheit and winds of 90 - 100 mph. If they had not kept calm and retained a degree of awareness of the major problems, or had let panic or unreasonable fear overwhelm them, they might have fared far worse. It is believed that cold resistance may be impaired by altered nervous or metabolic regulatory control.

A measure of cold resistance is gained in the laboratory by analyzing functional efficiency as it changes in the presence

of cold exposure. Such things as rapid, successive finger movements, sensitivity of fingers, alteration of peripheral nerve conduction, and ability to perform useful work can be measured. These measurements can give one some idea of ability to be expected under certain conditions of cold.

It should be unnecessary to reiterate the probable deleterious effects of smoking tobacco on a high altitude climber. Not only may physical endurance be decreased but peripheral circulation is likely restricted so that cold injury is more likely to occur.

FATIGUE:

Another aspect worthy of note is that virtually all of the difficulties outlined above may be preceded or compounded by over fatigue - usually by one member of the party before the others. When such indications are first observed the party should stop, rest and recuperate.

To a considerable extent, Mt. McKinley represents a problem in logistics and weather so that climbers often feel that they must make the best use of good climbing conditions even though it may over extend the physical and emotional capabilities of some or all of the party. If violent weather overtakes them in this condition, tragedy can follow. Climbers must maintain a physiological margin of safety against fatigue and cold just as they do for food and fuel. In this connection it has been suggested that the extra effort of preparing igloos or snow caves for shelter at high altitude rather than putting up tents, is well worth while in terms of the greater protection and rest afforded.

MOUNTAINEERING SCIENCE AT THE U OF A

Alaskan Mountaineering Center:

A proposed Mountaineering Center at the University of Alaska would provide housing for the climbers while they are being tested prior to and after their climb. It would also provide a necessary staging area where they could repack and distribute their equipment and supplies, and make last minute preparations and repairs before the climb. Climbers could also take advantage of maps, photographs, diaries of previous climbs, journals, and research in general or on details of the specific climb they intend to attempt.

Research in Human Ecology:

The Alaska Mountaineering Center would be integrated into the ongoing research program of mountaineering science at the Institute of Arctic Biology. As an aspect of Human Ecology

this program has passed through a developmental phase to emerge as one of the major interests at the Institute. A considerable professional and technical staff - some of them mountaineers themselves - are involved in conducting research into the stress responses due to cold and altitude as seen both in subjects in the controlled altitude chamber and in mountaineers while climbing. Added to this "in house" staff are visiting scientists who come from other parts of the United States and the world for this opportunity to study stress responses to extreme conditions of cold and/or altitude made possible by the contiguity of modern laboratory facilities, specialized professional staff, and high mountains and other environments in Alaska.

Direct Advantages to Mountaineers:

By previous contact with mountaineers it has been found that these highly motivated young men see considerable advantage to participation in mountaineering research for themselves as mountaineers, and they have come to appreciate the many aspects of basic research as well. Their participation in previous studies has resulted in scientific collaboration and major improvement in testing techniques.

All of the tests administered are designed to increase knowledge in the area of physiological stress due to altitude and adjunct stresses and thereby assist mountain climbers in making their climbs safely and more assured of success. The fact that, as valuable experimental material, injured mountaineers will receive specialized medical and physiological evaluation is a direct advantage to the climber. A long term advantage is the contribution that the results of these testing programs will make to future mountain climbing expeditions. A good knowledge of the limits and scope of the problem faced is essential to the successful traverse of that problem as an obstacle.

Institute personnel contributing to this brochure were:

A. Davidson, V. Hoeman and H. Marshall (mountaineers); P. R. Morrison, J. Nava, J. H. Petajan and G. Schumacher (Physiologists, scientists). We are indebted to T. Moore, S. M. Tenney and B. Washburn for helpful review and suggestions.

Cover shows Mt. McKinley across Chena Ridge looking south from the Institute of Arctic Biology and the Arctic Health Research Laboratory on the University of Alaska's West Ridge Campus.

1 April 1976

SUBJECT: Mount McKinley

The following information is provided to you for your utilization in preparation for the 1976 Air Rescue Mount McKinley Expedition.

Mount McKinley (20,320 feet) is the highest mountain in North America. Rising almost 3,000 feet above its highest nearby neighbor, it is the undisputed monarch of the Alaska Range. The range has only been "circumnavigated" once (in 1903) and traversed only twice--south to north in 1954 and east to west in 1963.

The longest glaciers, except the Muldrow (41 miles), are therefore all on the southern side of the range; The Kahiltna (46 miles), the Ruth (38 miles), a huge unnamed glacier south of Mount Foraker (34 miles), the Eldridge (30 miles) and the Tokositna (26 miles). The rain fall at Talkeetna, 60 miles south of the range, averages about 30-35 inches per year, and at Wonder Lake barely a third of this amount. The weather on the northern approaches to these mountains is therefore much better than that on the coastal side.

Grass extends to an altitude of about 4,000 feet and the treeline is only 2,000 feet high. Even mosses are only found in any profusion up to about 5,500 feet, and then only on the warm, sunny south-exposed slopes. Snow falls down to an elevation of about 4,000 feet in every month of the year, giving McKinley one of the world's greatest vertical extents of snow-cover (16,000 feet).

Despite the fact that the ascent of Mount McKinley via its two classic routes--the Muldrow and the West Buttress--involves no major technical difficulties for experienced climbers, the peak presents some remarkable qualities which must be understood and remembered by all those, experienced or inexperienced, who may wish to climb it.

Firstly, McKinley is a subarctic mountain. It is 35 degrees of latitude further north than Everest (63° 04' 10.5"), and this 2,400 mile difference results in a climate around its summit which may well present the most severe year-round average of any non-Polar spot on earth. The warmest night encountered at the 18,000 foot camp in July on our 1942 expedition was 18° below zero Fahrenheit and minimums to -24°. were recorded on this trip at the same spot. In May and June, temperatures frequently drop to 30 below zero or colder and are often accompanied with furious winds of 100 or more miles per hour from the southwest (prevailing) or northwest, making the peak a veritable inferno of evil weather. In recently describing Denali Pass, the 18,200 foot notch between McKinley's twin peaks, I have been frequently tempted to repeat Sir John Hunt's vivid words on Everest's famous South Col:

"A desert of rock and ice where the wind rules supreme." I know of no spot where wind and temperature can be more powerfully combined than on McKinley's upper ridges--and I am referring to the summer months. The upper reaches of this peak in the great winter storms present conditions almost indescribably fiendish. The summit has only been reached once in midwinter and then, in perfect weather at 7 p.m. on March 1, 1967, the thermometer stood at -58°F . giving just a slight clue as to what is to be found up there in bad winter weather!

Although McKinley's weather can at times be almost unbelievably gentle, even at the summit, one must be prepared for superlative extremes even in midsummer whenever one climbs above the 12,000-foot level.

Secondly, Mt. McKinley is a big isolated mountain. It rises out of level lowlands to north and south which are but 2,000 and 1,000 feet high respectively, making it one of the world's greatest isolated uplifts out of low country. The steep mass of the peak itself rises 15,000 feet from its base at the head of Ruth Glacier on the south and almost exactly the same from Peters Glacier on the north. McKinley's two most effective bulwarks against the climber over the years have been its distance from the road on the north (29 miles) and the railroad on the south (45 miles)--(both airline distances, far, far less than the winding walking routes require)--and the regulations of the government which for many years prohibited ski-plane landings or airdrop of supplies anywhere on the peak or its approaches, except by scientific expeditions. Since 1956 the progressive relaxing of these regulations has resulted in an ever-increasing stream of ascent--two through 1940, six through 1950, 70 through 1960 and 89 through 1970! McKinley, indeed, is a wilderness mountain. The shortest no less than 36 miles of walking one way, and not taking into account any relaying or zigzagging--all in addition to 18,500 vertical feet of climbing!

Last, but not least, Mount McKinley presents a remarkable cross section of subarctic terrain as well as climate, forcing a rather careful selection of clothing and equipment. Again referring to the Muldrow Route, the climber leaves the highway near Wonder Lake and starts walking through beautiful spruce forest with moss underfoot and trees 50 feet or more high. The temperature here is almost constantly above freezing in the summer, day and night, and frequently rises over 80 above zero (F .) on clear calm June, July and August days. One must soon plunge waist deep into a wide icy glacial torrent (the McKinley River) after which several miles of swampy mosquito-ridden treeless uplands must be crossed--really hot in clear summer weather, cold and miserable if it is rainy and windy. Thence, eight miles of barren rocky valley lead to the edge of lower Muldrow Glacier at McGonagall Pass (5,720 feet). Here, the almost crevassless ice is deeply covered with wet slush in June, bare and excellent walking from July to September.

Temperatures range from 14 to 20° above zero on a clear summer night to at least 80°F . on a clear, hot summer day--but with typical alpine extremes of snow, sleet or icy rain in bad weather.

Next comes a belt of substantial crevasses from 7,000 to 10,000 feet altitude, where snow is always loose and deep except in the winter, and where the crevasses from, seemingly bottomless slush, and the hot midday

sun can be really exasperating and alpine at times,-----and although it is broad daylight all night in June and July, it only reaches a noonday altitude of 51° on the longest day of the year.

Almost constant dry-snow conditions are reached at the head of Muldrow Glacier below the great Harper Ice Fall at 11,000 feet. Melting does occur up to about 12,500 feet in warm mid summer weather, but extreme slush is passed around 10,000 feet and winter reigns the year-around above 14,000 feet.

At this 14,000-foot level an abrupt change in climate takes place. High winds (which are rare at lower altitudes during the summer) are frequent, and sub-zero (F) weather is encountered nearly every night. The snow above 14,500 feet is almost constantly hard and wind-packed, except after occasional windless July storms, and sub-zero temperatures occur day and night alike above 16,000 feet. I have never seen melting snow above 15,000 feet on Mount McKinley, except around rocks. The climate from 17,000 feet to the summit of the summit of the mountain is downright arctic at all times of year. In fact, the warmest that I have ever seen the thermometer in Denali Pass (18,200 feet) was +8° on a hot, calm, clear day in June, 1947. Storms up here appear rapidly and can be extremely violent, as will be described later. Even the most powerful and experienced alpinists must approach the upper part of McKinley with deep respect for its weather, even on the easiest climbing route.

Although the last few paragraphs have, in a way, resembled a climbing description of the Muldrow Route, they have basically been intended to show the great extremes of the weather and terrain that are encountered on this peak and for which it is justly renowned.

MCKINLEY ' S WEATHER

A clear understanding of Mount McKinley's weather can prove of great value to the climber. Unlike climbs in the Alps or the Rockies, it is impossible to have good weather throughout the entire ascent without incredible luck. The lower half or two-thirds of the peak may be climbed under almost any conditions if one is willing to put up with a certain amount of discomfort. On the other hand, the weather is king on the upper reaches of McKinley--all of your movements above 15,000 feet depend on good, or at least reasonable, weather. Few parties have experienced long spells of clear calm skies on McKinley and most other high Alaskan peaks. The best climbing strategy has always proved to be to maneuver one's party as high as humanly possible in bad or mediocre weather; then to move fast both up and down when the clear break comes. At least one competent party completely failed in the ascent by moving forward only in reasonably good weather. Their food, fuel, and patience gave out just above the halfway point! A disregard of the weather or a lack of knowledge of it can result in an infinite amount of unnecessary misery and possibly serious trouble or difficulty.

The weather on Mount McKinley follows two markedly different patterns: one, the succession of storms that pass over the peak; the other, the weather generated by the great mountain itself. This is typical of all high ranges of the world, but it is particularly pronounced on McKinley because the mountain rises, almost completely isolated, to an altitude of 20,320 feet out of level lowlands. It is also located only 130 miles from tidewater at the head of Cook Inlet and therefore receives, without the slightest obstruction, the full force of all the coastal storms which pass its way.

The big storms, except for an occasional northerly or northeasterly windstorm in the winter months, usually bring "warm" weather to the mountain. At 18,000 feet where we lived for three weeks in 1947, the average clear weather nighttime temperatures were approximately 25° below zero Fahrenheit. During the southwesters this temperature rose to zero or on occasion even a bit higher.

These southwesters are preceded by the usual warnings of a warm front: high cirrus clouds and increasing winds. Usually about twelve hours pass from the time the first 30,000-foot cirrus streamer appears until the peak is actually enveloped in overcast and precipitation begins. Disturbances of this sort arrive slowly and methodically and are therefore of no great danger to the climber, despite their ultimate violence.

MCKINLEY ENJOYS VERY LITTLE REALLY CLEAR WEATHER.

It is generally agreed that the practical climbing season on McKinley begins in May, lasting through the end of July, however, it is during July itself that the conditions on the upper part of the mountain are mildest and most stable.

Most dangerous to the climber of all McKinley's storms are those created by the peak itself during the summer months. It is also likely to be relatively moist. If the wind aloft is reasonably brisk (20-50 miles per hour), this air, when it hits the peak and streams up, over and around it, creates a lenticular cloud-cap which rapidly varies in size and tendency to precipitate, depending upon the temperature and humidity of the air mass. Storms of this sort, while the entire region about the peak is cloudless, can appear or disappear with incredible swiftness (15-20 minutes) and often bring fierce blizzards of short duration.

These storms almost invariably clear away in the evening when the air around the mountain chills. Their unpredictable character makes them something constantly to be watched and respected by even the most experienced climber. A sound knowledge of this type of weather contributed directly to the success of our ascent of July 10, 1951. We reached an altitude of 18,200 feet at Denali Pass around noon, and saw that the peak above 18,500 feet was completely enveloped in a lenticular cirrus streamer. The lowlands below were clear except for a few scattered clouds--the normal fractocumulus and cumulus of fair weather. There was a 25-30 mile-per-hour westerly breeze and the temperature stood at zero in the sun.

We knew McKinley intimately and elected to go slowly ahead into the overcast, climbing "blind" for four hours to an altitude of 20,000 feet. We were certain that late in the afternoon this local storm would dissipate as soon as the sun became lower and the air began to chill. This did happen, and we reached the summit at 5 p.m. under beautiful conditions with scarcely a cloud anywhere.

Weather can be a powerful factor in the success or failure of any expedition to a peak higher than 14,000 feet situated in any latitude. And this is particularly true on a high subarctic peak. If one learns the local phenomena and watches their development closely, a knowledge of the weather can prove a highly valuable asset--one which is often essential to success, as we have repeatedly learned from experience on Mount McKinley. There is little doubt that a lack of appreciation of the length and violence of McKinley's storms, as well as the insidious effects of the lack of oxygen, were the two key factors leading to the great tragedy of July 1967, when seven young climbers lost their lives simultaneously in a great summer storm on the summit cone of the South Peak.

S U M M A R Y

The ascent of McKinley is a curious paradox. Under certain conditions it can be disarmingly easy, while under others it can be fiendishly difficult. It is just near enough to the higheay so that a strong, experienced party will someday make the round trip to the top in less than two weeks, given good breaks with the weather. Yet, it is far enough away and its weather so fickle and violent that even the most powerful group of climbers may be forced to take a month or more to make the ascent by the easiest route--or, indeed, fail - if weather and conditions do not cooperate properly.

The ascent of Mt. McKinley might well be described as a short polar expedition in three dimensions! This is a surprisingly fair appraisal of the Muldrow and West Buttress Routes -- routes which scarcely have more than 1000 of climbing more technical than on the Grands Mulets route on Mont Blanc, yet where the potential dangers of enormous snow-covered crevasses, bitter arctic cold, violent storms and 20,000' altitude make it a peak that must be approached with care and respect by even a strong group of climbers. The mere fact that, even with radio, rescue parties are a long, long way off should have a sobering effect on those who wish to take too many chances on McKinley. It is this lack of major technical difficulties which has repeatedly made the climb possible for parties with minimum mountain experience, but with a maximum of fortitude, care and persistence - particularly when the weather has been kind. In addition, it is this same technical simplicity which is certain to lure more and more groups onto this peak.