

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

USAPO/bas
Serial 60
18 June 1959

MEMORANDUM FOR THE DISTRIBUTION LIST

SUBJECT: Forwarding of Observer Report

The enclosed report prepared by a member of this staff, Dr. Henry M. Dater, is forwarded for your information and retention.

DAVID M. TYREE

John Cadwalader

JOHN CADWALADER
By direction

Copy to:

OCB
OCB/Antarctic Working Group
OSD (Special Operations)
R&D/Army
ACSI/Army
SIPRE/Army
TransTraComd/Army
CNO (Op-33)
DNI
Hydro
Hydro (Attn: Code 5430)
ONR/Bio. Sci. Division
QM Intel. Agency/Army
ComNavSupFor, Antarctica
Dir R&D/AF
AF/AFCIN-1B
CIA
Board on Geographic Names
USARP
U.S. Army Map Service
U. S. Naval Academy
Commandant, U. S. Coast Guard
State Department
Mr. Taylor, Committee on Interior
and Insular Affairs
Dr. Siple

DEPT. OF THE ARMY
LIBRARY & ARCHIVES

JAN 25 1960

ACC. NO.

G
860
.037
1959-1960

National Oceanic and Atmospheric Administration

International Polar Year (IPY) 2007-2008

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages

Faded or light ink

Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). To view the original document contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or Library.Reference@noaa.gov.

HOV Services
12200 Kiln Court
Beltsville, MD 20704-1387
February 25, 2008

UNITED STATES ANTARCTIC PROJECTS OFFICER
728 Jackson Place, N. W.
Washington 25, D. C.

USAPO/bas
19 June 1959

MEMORANDUM FOR THE UNITED STATES ANTARCTIC PROJECTS OFFICER

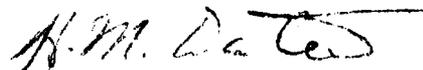
SUBJECT: Report of a Journey to the Antarctic, October 1958-April 1959

The enclosed informal report is submitted for your information.

As directed by your predecessor, I went to the Antarctic to obtain firsthand acquaintance of the area and its problems. From this point of view the trip was completely successful. The knowledge thus gained will be of continuing value in the historical interpretation of events and in my other work for this office.

While in the Antarctic, I rendered such assistance as lay in my power to the task force and task group commanders and to the officers, men, and civilians of the expedition. In this endeavor, I gave a number of talks on Antarctic history, helped to draft press releases, reports, and dispatches, and furnished historical and current information as requested.

The report itself gives a narrative of the events which I witnessed and in which I participated. Attached are a number of detailed appendixes on matters that appeared to me to be of general interest.



H. M. DATER
Staff Historian

Enclosure

X-16503

JAN 20 1960

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N.W.
Washington 25, D.C.

OPERATION DEEP FREEZE IV
(1958-1959)

Report of

U.S. Antarctic Projects Office Observer

Henry M. Dater

PART I

20 OCTOBER - 1 NOVEMBER 1958

Part I covers the period of flight from Washington, D.C., to Christchurch, New Zealand (20-24 October) and eight days spent in New Zealand (24 October - 1 November).

The flight out was long and uneventful. Aboard the aircraft were the Deputy Assistant Secretary of the Army, Mr. Edward A. Bacon; Deputy Commander, U.S. Naval Support Force, Antarctica, Captain Edwin A. McDonald; the Operations and Plans Officer of the same force, Captain John Cadwalader; and the field representative of the National Science Foundation, Mr. Philip M. Smith.

On arrival at Christchurch, I received instructions to proceed to Wellington. While in that city from 25 to 29 October, I had the opportunity to discuss Antarctic matters with the United States Ambassador, Mr. Francis H. Russell, and the United States Military Attaché, Colonel John B. Lanterman, and to leave with the Embassy a memorandum concerning the foreign observer program. It has come to my attention indirectly that Ambassador Russell later gave a reception for the distinguished observer from the United Kingdom, Sir Raymond Priestley. The Ambassador proved most cooperative and helpful and gave an informal cocktail party at which I had the pleasure of meeting and talking with Professor F. L. Wood of Victoria University and Dr. R. A. Falla of the Dominion Museum, a veteran of the British-Australian-New Zealand Antarctic Research Expedition of 1929-31.

The principal purpose of my visit to Wellington was to become acquainted with representatives of New Zealand organizations actively engaged in Antarctic affairs and particularly those with whom an exchange of publications had been arranged. Largely through the cooperation of Dr. Trevor Hatherton of the Department of Scientific and Industrial Research, I was able to discuss matters of mutual interest with Mr. Arthur Helm and Mr. Lester Quartermain of the New Zealand Antarctic Society, and Mr. Peter Jeffery and Mr. Roger Peren of the Ministry of External Affairs, as well as with members of Dr. Hatherton's own department.

The conversations revealed some interesting pieces of information. Mr. Helm, who served as Secretary of the Ross Sea Committee, the official New Zealand organization for administering its part of the British Commonwealth Trans-Antarctic Expedition, is currently engaged in editing the expedition's technical reports. He agreed to forward the reports as they appear to the United States Antarctic Projects Officer. Mr. Quartermain has under way a history of the Ross Dependency, i.e., the Antarctic area claimed by New Zealand. I suggested that our office would be most happy to help him with material on United States activities in this part of the continent.

In discussing the future of Antarctica with New Zealanders, both those in official positions and those interested in the area, I found unanimous agreement for a solution along the lines suggested in President Eisenhower's statement of 3 May 1958. Dr. Hatherton expressed the opinion that a land-based airfield built by the United States at Marble Point would greatly assist New Zealand in maintaining a permanent scientific program in the area. There was so far as I could determine no opposition to such a project. While I was in New Zealand, the press also commented favorably on the introduction by United States of an atomic reactor into the Antarctic.

Material sent by this office through the New Zealand Embassy in Washington has arrived at its destination. Because the New Zealand Antarctic Society has a postal address but no headquarters building, there seemed to be some question as to what members had actually received the maps and publications. In the spring, the Department of Scientific and Industrial Research had asked for U. S. naval photography of the Victoria Land Coast for the use of the New Zealand Geological and Survey Antarctic Expedition. As these photographs were desired for planning this year's expedition, the United States Antarctic Projects Office made every effort to expedite processing and delivery to the New Zealand Joint Staff Mission in Washington. For some reason, however, the Joint Staff Mission sent the material by ship rather than by air so that much of it arrived too late for use in planning the program.¹

Upon my return to Christchurch, 29 October, I was able to pass on information from Ambassador Russell to the Commander, U. S. Naval Support Force, Antarctica, on the progress of negotiations in Wellington for new office and living accommodations for United States personnel.

¹For information on the New Zealand mapping program, see Appendix I.

PART II

1 NOVEMBER - 8 DECEMBER 1958

Part II covers the first period passed aboard USS GLACIER, which was, until early December, the only United States ship in the area. From New Zealand, it proceeded to McMurdo Sound and thence to Little America. After a second stop in McMurdo Sound, it made a reconnaissance along the Victoria Land Coast as far north as Coulman Island.

GLACIER sailed from Port Lyttelton on 1 November 1958 with Captain McDonald, Commander Task Group 43.1, and his staff on board. Among the passengers were representatives of the Bureau of Ships, Naval Electronics Laboratory, Army Signal Corps, the Snow, Ice, and Permafrost Research Establishment of the Corps of Engineers, the New Zealand press, and the Port Lyttelton Harbor Board.

GLACIER, after crossing the Antarctic Convergence, where the ship was slowed to permit oceanographic work, first encountered pack ice on 5 November at approximately 65°S., 178°E. The ship remained almost continuously in ice until McMurdo Sound was reached on 10 November. During this time, representatives of the Bureau of Ships and the Naval Electronics Laboratory, with the cooperation of the helicopter unit aboard GLACIER, tested the use of television for ice reconnaissance. Despite difficulties encountered in making the gear function properly, enough was learned to indicate the feasibility of this method of relaying ice information to the bridge of a ship.

From 11 to 14 November, GLACIER off-loaded cargo and fuel oil at RAF, McMurdo Sound, including material for the South Pole Station. Air Force Globemasters were waiting to carry these items to the Pole and took off promptly on the last airdrop flights of the 1958 season.

No area of the Antarctic has more historical associations than McMurdo Sound. Discovered by Sir James C. Ross in 1841, Ross Island was later the site for the Scott and Shackleton expeditions and currently has not only the United States Naval Air Facility at Hut Point but also the New Zealand Scott Base at nearby Pram Point. While waiting for GLACIER to complete unloading, I visited Shackleton's hut at Cape Royds, Scott's at Cape Evans, and the New Zealand base, as well as the Naval Air Facility. Of the older bases, the one at Cape Royds is in a particularly good state of preservation both inside and out. Sleeping bags remain on the bunks, provisions on shelves, kitchenware on the original hooks, and items of clothing on wall pegs. Scott's hut at Cape Evans has unfortunately filled with snow so that the inside can no longer be visited. Around both huts lie the debris of a polar expedition: coils of rope, nails, bits of harness, broken sledges, magazines and books, jars of pickles, cans of meat and vegetables, boxes of preserves and biscuits, tins of fuel, sacks of coal, glass photographic plates, and other items of all sorts.

Of all the Antarctic bases that I have visited, the New Zealand Scott Base has the smartest appearance both inside and out. Intelligent use of color has relieved the monotony which seems so characteristic elsewhere. Skillful design has provided each man with a private cubicle in an amazingly small space.

At 0800 on 15 November, having completed the off-loading of fuel and cargo the previous evening, GLACIER got under way to shift its position closer to Marble Point. At that place, a Seabee reconnaissance unit, for the second successive summer, was studying the problem of building a ground-based airfield. GLACIER had on board 54 tons of supplies and equipment for the support of this unit. Unable to approach closer than 20 miles because of heavy bay ice, the ship discharged this cargo by helicopter. Operating around the clock, three pilots flying an HU4S and an HUL lifted the 54 tons in 40 hours.

Early in the evening of 17 November, GLACIER, with Rear Admiral George J. Dufek, Commander, Task Force 43, aboard, departed from McMurdo Sound for Little America, arriving two days later. It was planned to suspend operations at this station at the end of the International Geophysical Year, but nevertheless to leave it in stand-by status, so that it will be available either for emergency use or by summer-season scientific parties. First, GLACIER put ashore 65,000 gallons of fuel oil to be stored against future contingencies. Second, she took on approximately 150 tons of equipment and a deck-load of vehicles for transfer to McMurdo Sound, where many of the scientific activities carried on at Little America during the International Geophysical Year will be continued.

The decision to close down Little America necessarily requires a change in the logistic support of Byrd Station. Built and resupplied during its first two years of existence largely by tractor train, Byrd in the future will have to depend entirely upon air drop to obtain supplies, equipment, and personnel. Because the flight from McMurdo to Byrd is longer even than that from McMurdo to the South Pole, an installation was required along the route to provide weather information and emergency landing and fueling facilities. The location chosen is at mile 160 on the tractor trail from Little America to Byrd Station. Although no personnel will occupy the site until October 1959, two of the four wannigans, which will provide living and working space, and an emergency fuel tank had been put in place by mid-November 1958. Admiral Dufek took advantage of his visit to Little America to put the facility into commission. On 20 November, two aircraft made the flight from Little America. At approximately 1300 that day Admiral Dufek with appropriate ceremonies commissioned the United States Naval Auxiliary Air Facility, Little Rockford. Except for the isolated wannigans and the little group of people, the snows of the Ross Ice Shelf stretched lone and level to the far horizon.

GLACIER made the return journey to McMurdo Sound between 21 and 23 November. On this, as on other trips in and out of the Sound, heavy concentrations of pack ice were encountered in the vicinity of Beaufort Island. The ship resumed its former mooring place about 12 miles from Hut Point. On 25 November, Admiral Dufek moved ashore. The following morning, he struck his flag at NAF, McMurdo Sound, in a simple ceremony and immediately afterward left by airplane for New Zealand, departing for the last time from the continent where, under his direction, so much has been accomplished during the last four years.

Within a few hours GLACIER got under way for a scheduled meeting with STATEN ISLAND along the Victoria Land Coast. This second icebreaker sailed from Port Lyttelton on 25 November 1958 with the personnel of the New Zealand Geological and Survey Antarctic Expedition under the leadership of Dr. H. J. Harrington.¹ The two ships, using their helicopters, had the mission of putting the New Zealand party ashore between Coulman Island and the Mawson Glacier.

Moving in leisurely fashion up the coast, GLACIER took oceanographic stations every 20 miles and conducted helicopter reconnaissance of Terra Nova Bay and Coulman Island. Much valuable oceanographic information was obtained and many specimens of marine life lifted from the depths for preservation and future study. On 30 November, in a helicopter piloted by LCDR Ross W. Russell, Captain McDonald and I had the good fortune to discover two islets and an ice tongue in the northern reaches of Terra Nova Bay, one of which had been previously reported.²

In reaching the rendezvous point to the east of Coulman Island the ship passed through part of the area designated on existing charts as being within Lady Newnes Ice Shelf. Helicopter flights on 2 December determined that about two-thirds of the shelf had disappeared. Photographs of the remnant of the ice shelf and the entire coast line of nearby Coulman Island were taken from the air. In the course of this flight Captain Cadwalader sighted what he believed to be an emperor penguin rookery. This observation was confirmed the following day by Captain Cadwalader and Mr. John Dearborn, marine biologist from Stanford University. The population was estimated

¹A brief description of the geological and survey work being carried on along the Victoria Land Coast by New Zealand is contained in Appendix I.

²It was later recommended by Captain McDonald that the islets be named for LCDR Russell in recognition of the fine work performed by helicopters on this and previous expeditions to the Antarctic.

at not less than 50,000 birds, making this one of the largest rookeries yet discovered.³

STATEN ISLAND arrived late on 6 December and the following morning tied up alongside GLACIER in a polynya south of Coulman Island. Commander Task Group 43.1 had boarded STATEN ISLAND as it approached on 5 December, and I followed him three days later. What we expected to be a short visit of perhaps four or five days until the New Zealand survey party had disembarked was turned by events into a stay of almost six weeks.

³Captain Scott in The Voyage of the Discovery reported a colony of penguins in this vicinity but was unable to determine what kind, nor did he discover that it was a rookery.

PART III

8 DECEMBER 1958 - 19 JANUARY 1959

This portion of my stay in the Antarctic was, except for the last three days, spent aboard U.S.S. STATEN ISLAND. The principal activities of the period were directed at the relief and resupply of United States stations in the Ross Sea. The successful conduct of these operations during the period under consideration must in large measure be attributed to the work of STATEN ISLAND. Coming to the Antarctic with little or no experience in the difficulties of polar navigation, officers and men possessed the spirit and intelligence to overcome all obstacles. They lived up to the rather trite motto of their insigne, "If it can be done, we will do it."

An interesting feature of STATEN ISLAND's cruise to Antarctica was the number of scientific activities being carried out on board. In addition to the oceanographic program, identical to that sponsored by the Hydrographic Office on all icebreakers in the area, various civilians busied themselves with the incidence of respiratory ailments, acclimatization to cold conditions, bird banding and penguin physiology, and cosmic ray research.¹ Added to these were projects devised by the ship's company, such as bringing Antarctic fish back alive and making collections of geological specimens for presentation to American universities.² In the course of STATEN ISLAND's wanderings about the Ross Sea, numerous passengers, including newsmen of five nationalities, were welcomed aboard, given cordial treatment, and sent on their way with a better understanding and appreciation of the United States Navy and of the American character.

On 8 December when I boarded STATEN ISLAND, she was tied up to GLACIER in a polynya south of Coulman Island. As a blizzard in its second day was blowing itself out, the ships waited until helicopters could recover a party put ashore to investigate the emperor penguin rookery discovered by Captain Cadwalader and Mr. Dearborn a few days previously. With the return of the penguin fanciers, the two ships got under way at 1945. A conference between Captain McDonald and Dr. Harrington resulted in a decision to work south as close to the coast as possible until latitude 74°10'S. was reached. At that position it was intended to launch a helicopter to search Wood Bay for a suitable landing spot for Dr. Harrington and his men.

³ More detailed descriptions of some of these projects may be found in Appendix II. Officers and crew good-naturedly volunteered their assistance whenever requested to do so.

² For scientific activity on board STATEN ISLAND during the later part of the season see dispatch 061715Z/Feb (1959) in Appendix II.

By the next morning, the two ships had made little progress. On the way up the coast, GLACIER had encountered relatively heavy pack a few miles south of Coulman Island. The storm of 7 and 8 December had put this ice under heavy pressure and made it virtually impassable. While maneuvering on the morning of 9 December, GLACIER broke a blade on each of its two propellers. This accident forced a reconsideration of plans, since the damaged vessel would have to return to New Zealand for repairs; and, as she was in no condition to handle heavy ice, it was necessary to move eastward where the ice situation was known to be easier. Before leaving the area, Dr. Harrington made a helicopter reconnaissance of the Lady Newnes Ice Shelf and, because of hazardous terrain, rejected the idea of going ashore in that region. For the time being, he surrendered the possibility of landing anywhere in the originally designated part of Victoria Land and agreed to accompany STATEN ISLAND to McMurdo Sound.

When GLACIER broke still another blade on the morning of 10 December, the ships again came to a halt in the ice, this time to the northeast of Coulman Island. The staff of Commander, Task Group 43.1 seized the opportunity to transfer from GLACIER to STATEN ISLAND as of 0001 on 11 December. After a day of rest, during which the pack started to lessen, STATEN ISLAND began the arduous task of breaking out the crippled GLACIER, a job which it completed early on 12 December. After a few hours the ships parted company, GLACIER northeastward for Wellington and Christmas, STATEN ISLAND southeastward for McMurdo Sound and a period of hard, grueling work.

Having arrived at McMurdo, 14 December, STATEN ISLAND disembarked the New Zealand survey party the next day, and on 16 December commenced preparing a ship channel through the fast bay ice. Already, the icebreakers, USCGC NORTHWIND, had left Port Lyttelton with the cargo vessel, USS WYANDOT, and the tanker, USS NESPELEN. The task, which was to occupy STATEN ISLAND until the day after Christmas, consisted in breaking a channel wide enough for ships to turn from a position off Cape Royds to as close to the station at Hut Point as time would permit.

At the outset, the officers and men showed some apprehension at the difficulties before them. Experience on DEEP FREEZE I had led many persons to believe that it was beyond the capacity of Wind-class icebreakers. Locally, the channel had become known as GLACIER Channel, because that ship had been assigned this task on the three previous expeditions. Fortunately, during the first days that STATEN ISLAND worked, the wind blew from the south, thus clearing the fragments of ice from the channel almost as fast as they were cut. It soon became obvious that the task, while long and arduous, could with reasonable fortune be accomplished. STATEN ISLAND continued to bang away without let-up right through Christmas until the cargo ships and their escort arrived off Beaufort Island on 26 December. By that time the channel extended to within seven miles of the station from which point it was possible to unload both fuel and cargo.

On 22 December, I accompanied Commander Task Group 43.1 and Captain Cadwalader and LCDR Griffin of his staff to Marble Point. The Construction Battalion officers conducting the survey at this location expressed the opinion that it was possible to build an airfield on ground together with supporting facilities. After an extremely interesting tour of the area, we returned to the ship.

The good fortune which had attended STATEN ISLAND earlier seemed to desert her when she sortied from the channel to assist NORTHWIND in bringing WYANDOT and NESPELEN through the ice. On the night of 26 December, a strong north wind filled what had been open water north of Cape Royds with heavy pack. Unable to clear a way for WYANDOT to follow, STATEN ISLAND tied up to that ship on the afternoon of 27 December.

Four days were to elapse before STATEN ISLAND could lead WYANDOT into the ship channel. So as not to delay scheduled activities any more than necessary, helicopters from STATEN ISLAND and NORTHWIND transferred summer support personnel to the Naval Air Facility along with their gear and some emergency cargo. WYANDOT had also brought to the Antarctic Rear Admiral David M. Tyree, designated successor to Rear Admiral Dufek as United States Antarctic Projects Officer and Commander, U.S. Naval Support Force, Antarctica; and three of the four foreign observers assigned to Operation DEEP FREEZE IV, Sir Raymond Priestley, United Kingdom;³ LCDR Jorge LeMay Delano, Chile; and LT Alberto Gonzales Riesco, Argentina.

While the ships waited to approach the channel, NORTHWIND departed for a quick journey to Little America where it continued the work, commenced in November by GLACIER, of transferring personnel, equipment, and vehicles from this soon-to-be closed station. When the wind changed and the pack loosened, STATEN ISLAND on 31 December led WYANDOT to its berthing space. The following day she also escorted NESPELEN and HMNZS ENDEAVOUR into the channel in two trips. Before STATEN ISLAND left McMurdo Sound to take her turn in the deactivation of Little America, a meeting of United States, New Zealand, and British scientists was held on board. From the discussion of mutual problems⁴ emerged informal arrangements for cooperation and the exchange of data.

On the way to the present Little America V, STATEN ISLAND crossed NORTHWIND, and the two ships tied up to one another for a brief period of discussion and conference. On 4 January, a visit was made to the site of

³The fourth observer, LT Herve Hutse, Belgium, was aboard NORTHWIND. Further information on the activities of these observers is contained in Appendix III.

⁴Photographs and a brief description of this meeting were sent to USAPO for forwarding to the United States Information Service.

four earlier Little Americas. The first two, established by Admiral Byrd in 1929 and 1934, respectively, have long since disappeared beneath the surface, and are now inaccessible. Only about four feet of radio towers raised on the first expedition still protrude above the snow. Little Americas III and IV, built in 1940 and 1947, can be reached vertically through a shaft that ends beside a Quonset hut containing communications equipment from Operation HIGHJUMP. From the hut, a series of tunnels leads through part of the storage area of Little America IV to a flight of stairs that carries the visitor into Little America III. Stores from these earlier expeditions still line the tunnel sides. Although many delicacies have been removed over the last couple of years by the inhabitants of Little America V, great quantities of food remain together with many varieties of equipment.

STATEN ISLAND arrived in Kainan Bay that same evening, remaining only about six hours to pick up passengers and 25 tons of cargo, most of which was intended for Cape Hallett. The return trip proved uneventful. A group of scientists went ashore to band Adelle penguins at Cape Crozier on Ross Island. The ship remained in McMurdo Sound just long enough to discharge passengers and cargo before leaving early on 7 January to escort NESPELEN through the pack and, after meeting ARNEB, to conduct that vessel to Cape Hallett. On 10 January STATEN ISLAND and NESPELEN parted company, and the following morning STATEN ISLAND made rendezvous with ARNEB. At 1800 the two ships were overtaken in the pack west of Cape Hallett by NORTHWIND, which, in the meantime, had escorted WYNDOT out of McMurdo Sound. The three ships, after several hours of strenuous icebreaking, entered Moubray Bay and anchored off Hallett Station at 2230 that evening.

In addition to relief personnel and supply stores to be unloaded from ARNEB, this year's plans called for the establishment of a communications center at Hallett Station. This project comprised construction of a building, erection of two rhombic antennas, and installation of equipment, some of which had formerly been in use at Little America. Unloading was quickly accomplished, the only difficulty encountered being with the ice that moved in and out of Moubray Bay with the tide. One evening, in order to prevent a cessation of cargo activity, STATEN ISLAND escorted landing craft back and forth between ARNEB and the beach, the whole resembling nothing so much as a family of mechanical ducks.

Work on the communications center took somewhat longer than the unloading. While it was still going on, using station personnel and work parties from the ships to do the actual building, events in other parts of Antarctica caused a rearrangement of plans. For some days it had been known that an Argentine party of five was on Robertson Island, awaiting removal. The Norwegian sealer, Polarhav, chartered by the Belgians, had become beset in the ice at about 23° E., and the Japanese ship, Soya, was unable to find passage through the ice to Syowa Base and might also ask for help.

On 15 January, word arrived that Commander, U. S. Naval Support Force, Antarctica, had ordered GLACIER, then on its way from New Zealand to McMurdo Sound, to proceed directly to the aid of the Argentines and, if necessary, to that of the Belgians and Japanese. Commander Task Group 43.1, to adjust his plans to the new situation, ordered STATEN ISLAND to escort ARNEB to McMurdo Sound by way of Little America and to remove in passing the last personnel and cargo from that station. NORTHWIND was to remain at Cape Hallett as long as possible to continue work on the communications facility and then to meet GLACIER in the Ross Sea.

STATEN ISLAND and ARNEB left Cape Hallett on 16 January. At that time I accompanied Commander Task Group 43.1 and LT Miller of his staff aboard NORTHWIND. Later the same day Task Unit 43.1.1 was activated under Captain Cadwalader to wind up operations in the Ross Sea. On 17 January, with work on the communications facility advanced to the point where station personnel could finish it, NORTHWIND also took her departure. After a smooth trip through the Ross Sea, she made contact with GLACIER at 70°8'S., 166°11'W. Captain McDonald, LT Miller, and I once again changed ships and set off aboard GLACIER to engage in rescue operations along the Palmer Peninsula and in West Antarctica.

PART IV

18 JANUARY - 3 MARCH 1959

When Commander Task Group 43.1 boarded USS GLACIER for the second time, it was expected that the ship would proceed directly to the rescue of a party of Argentines down on Robertson Island and then, if needed, to the assistance of Belgian and Japanese expeditions unable to reach their respective destinations. As events in the unpredictable Antarctic turned out, the Argentine icebreaker GENERAL SAN MARTIN reached Robertson Island and evacuated the downed personnel as GLACIER was still rounding the tip of the Palmer Peninsula, while the Japanese reopened their base by the use of cargo-carrying helicopters flying from their expedition ship Soya.¹ The subject matter of Part IV therefore deals principally with assistance rendered the Belgian Antarctic Expedition and its ship MV Polarhav. No attempt will be made to go into Belgian activities in detail because of the presence of a United States observer with that expedition.

Before setting down a narrative of events, I would like, however, to take the opportunity to point out the many services rendered by this observer Mr. Oliver S. Crosby of the Department of State. Caught by circumstance in an unexpected situation, he acted as liaison officer between the Belgians on the one hand and the United States officers and men aboard GLACIER on the other. Much of the smoothness with which the operation was carried off and the good will engendered on both sides are owing to Mr. Crosby's never failing tact and good humor. It may also be said in passing that the communications received from GENERAL SAN MARTIN and Soya seemed to bear evidence of an acquaintance with United States procedures and phraseology, and it is assumed that the United States observers on these ships had at least been consulted in their composition.

When Commander Task Group 43.1, followed by his staff, crossed the few feet that separated NORTHWIND from GLACIER, they found that by some strange alchemy, time turned backward in its pace. Because of their destined operating areas, these two ships were a hemisphere apart. What had been 19 January on NORTHWIND became 18 January on GLACIER.

From that date until 2 February, GLACIER rounded the Antarctic Continent from west to east, from 70°W. to 16°E. longitude. The trip was comparatively uneventful. This reporter devoted part of each day to observation of the birds flying about the ship at the request of Dr. W. J. L. Sladen of the Johns Hopkins University.²

¹Full accounts of Argentine and Japanese operations, including the effective use of helicopters by Soya, will be found in the reports from United States observers aboard those ships.

²Copies of this amateurish piece of ornithological observation are available from the author.

Evidence of bad ice conditions was obtained when the western entrance to the Bransfield Strait was found choked with ice. GLACIER detoured to the northward and passed through the Drake Passage instead.³

Information was received on 27 January that the Argentines were taking their party off Robertson Island and on 29 January that the Japanese were successfully off-loading. GLACIER, therefore, directed its course toward the Belgians beset in the vicinity of 16°E. On 2 February, GLACIER entered the pack some 90 miles north of the Polarhav's reported position.

As GLACIER advanced southward, the pack increased in intensity and thickness. By midnight of 2 February, the distance between the two ships had been reduced to 20 miles. Having reached helicopter range, it was possible to establish personal communication and about 0200 the United States observer, Mr. Crosby, was brought aboard GLACIER for the first of several visits. It was learned from him that Polarhav had been caught in the ice since 24 December and that it had been gradually drifting westward with the pack until, at the present time, it was about 140 miles from its destination in King Leopold Bay.⁴

The plight of Polarhav was amply demonstrated during the next 24 hours. By 0800 of 3 February, only eight miles separated the two ships, but at 2200 there still remained three and a half miles to go through heavily pressured ice, and GLACIER had broken a blade on the port propeller while maneuvering in the pack. From this point progress slowed still further so that it was not until 1330 on 4 February that GLACIER plassed Polarhav to starboard, turned, and began to lead the way northward out of the pack, helicopter reconnaissance having previously confirmed that open leads did not lie to the east in the direction of the base.

The cheers, which had accompanied the encounter of the two ships, soon came to seem premature. The area of extremely heavy pack that had for so long held Polarhav yielded its captive only reluctantly. Slow progress was made through 5 and 6 February, while steady east winds increased the pressure. With GLACIER's remaining helicopter down for repair, it seemed advisable to wait for better conditions.⁵

³A year previously at this same time, USCGC WESTWIND had transited the Bransfield Strait from east to west without encountering significant concentration of ice.

⁴King Leopold Bay is the name given by the Belgians to a small embayment or iceport in large Breid Bay.

⁵GLACIER had left the other of its two helicopters in New Zealand to which the ship did not return as originally scheduled.

As the ships lay to, the pack seemed only to consolidate and the pressure ridges to rise more than ever. The decision was then taken to transfer the personnel and cargo of the Belgian expedition to GLACIER so that this ship would not be delayed by the necessity of escorting Polarhav during the run into the base. This activity occupied the crews of both vessels from 10 to 12 February, left GLACIER's decks with the appearance of a floating supply dump, and rendered wardroom and crew spaces bilingual. Even the public address system spouted occasional admonitions in French as well as in English.

While the transfer was under way, GLACIER's helicopter, which had been repaired, crashed, fortunately without injury to the crew. The machine itself, except for instruments and some parts, could not be recovered. Consequently, when the ship got under way at 2200 on 12 February, she lacked the means for effective ice reconnaissance. It was possible to remedy this default the morning of 13 February by borrowing a helicopter from USS EDISTO. This ship, having completed the relief of personnel at Ellsworth Station, had been bound for Buenos Aires when it was called to assist GLACIER. The importance of helicopters in icebreaking can seldom have been more conclusively demonstrated. The course which GLACIER had been following since the previous evening was seen to be far more difficult than one that, at first sight, lead away from the direction in which it was desired to go. With information from air reconnaissance, GLACIER, closely followed by Polarhav, broke into a series of open leads. That evening the two ships came alongside EDISTO from which GLACIER obtained badly needed aviation fuel.

When the ships pulled away EDISTO took Polarhav under escort to lead ⁶ the latter to a point at the fringe of the pack north of the Belgian base. GLACIER took a course first eastward and then southward toward Breid Bay where it arrived at 1330 on 15 February. Bad weather with snow, fog, and generally low visibility prevented flying and made it otherwise extremely difficult to find the off-loading area in King Leopold Bay until the evening of 17 February, when the weather improved. During the entire day, it was possible to talk with the wintering-over party ashore, but radio bearings proved unreliable and visual sighting impossible. It was later figured that in groping through mist, fog, and snow, GLACIER had passed the entrance to King Leopold Bay twice and possibly three times.

As the ship approached the end of the bay, from which the fast ice had departed only that afternoon, the Belgian party drawn up on the ice shelf gave three cheers. A few moments later, as GLACIER butted the barrier, their compatriots on board ship were scrambling over the bow to touch that land they had waited so long to reach. While the happy Belgians exchanged greetings, GLACIER tried in vain to come alongside this natural ice dock and tie up. Strong winds pouring down the shelf held it off, and "deadmen" pulled out almost as soon as buried. About midnight, the Belgians resorted themselves into their original ship and shore components, and GLACIER got under way to try another one of the many iceports running off Breid Bay.

⁶EDISTO, at first ordered to stand by, was released after a few days with instructions to proceed to Buenos Aires.

This change of location took about twelve hours of heavy icebreaking, mostly conducted under conditions of nearly complete whiteout. By 1230 the next afternoon, GLACIER was moored in fast bay ice, preparing to unload. With slightly improved visibility, the task of moving ashore the 22 men and 320 tons of supplies and equipment of the 1959 Belgian Antarctic Expedition was begun at 0200 on 17 February. Since to transport this volume of stores the full ten miles from ship to base would have produced many delays, a depot was established five miles from GLACIER and two miles back from the edge of the ice shelf. All but perishable and urgently needed items were temporarily stored at this point.

With cargo operations continuing, I accepted an invitation to visit King Baudouin Base on 19 February and to remain the night. Suffice it to say that I had a most pleasant experience, especially the opportunity to renew my acquaintance with Captain Xavier de Maere, second in command, and to meet the leader, Commandant Gaston de Gerlache, with whom this office has had considerable correspondence.

As the United States observer with the Belgian expedition will report fully on the base and its programs, I shall confine myself to general impressions. Because the buildings and much other equipment were purchased in this country, King Baudouin Base looks like any small United States station built on the ice shelf. The most noticeable differences are the presence of sled dogs, allowed to run loose without bad effect on dog or man, and the serving of wine at meals. The scientists with whom I talked felt that their projects had been successfully carried out. Morale appeared high among those who had wintered over despite the long delay in their departure caused by Polarhav's troubles in the ice. Naturally, they were glad to see us and had decorated their lounge with a homemade American flag and an inscription in English, "Welcome to our liberators." Among stations, both United States and foreign, that I have visited over the past two years, I would consider King Baudouin Base among the best in appearance, efficiency, and morale. From my few days with the members of the 1959 expedition, I believe that they will be able to maintain the standards set by their predecessors.

On 21 February, Commandant de Gerlache, Captain de Maere and the others who had wintered over boarded GLACIER along with their gear and records. After a party to celebrate the successful completion of a mission, the ship pulled away at 1830. On the ice stood a small group of figures with their vehicles growing smaller and smaller against the white backdrop of a vast continent until, still waving, they disappeared from sight.

The next morning GLACIER and Polarhav met for the last time. The Belgians and their gear were quickly transferred. At about 1130, the ships cast off from one another and made their way toward the open sea with GLACIER in the lead. Two hours later, with the once formidable pack reduced to brash, they parted company, each ship setting a course that would lead toward home.

As GLACIER moved northward in the direction of South America, one problem of assistance still hung in abeyance. As early as 31 January, the Governor of the Falkland Islands had indicated that RRS John Biscoe was experiencing difficulty reaching Falkland Islands Dependency Survey bases on the west coast of the Palmer Peninsula and inquired how long GLACIER and EDISTO expected to remain in the vicinity. The request foreshadowed in this first dispatch acquired definiteness, when a message dated 11 February was received from the Chief of Naval Operations outlining the situation and requesting that John Biscoe be given all possible aid. Four bases were involved, located as follows: Base J, 66°00'S., 65°24'W.; Base W, 66°52'S., 66°48'W.; Base Y, 67°48'S., 67°17'W.; and Base E., 68°11'S., 67°00'W. The approaches to all these bases were blocked by year-old, fast bay ice. While awaiting assistance, John Biscoe had returned to the Falkland Islands for fuel and expected to be back in the operating area about 24 February.

Even if they had not been engaged in the relief of the Belgians, neither GLACIER nor EDISTO could have been made immediately available. Both ships needed fuel and provisions, while GLACIER had a broken blade on one propeller and EDISTO had an engine down, the spare parts for which were in Buenos Aires. Commander Task Force 43, therefore, rearranged operating schedules for the Ross Sea area so as to free NORTHWIND. On 20 February, he placed Commander Task Group 43.1 in charge and ordered NORTHWIND, GLACIER, and EDISTO to report to his operational control.

During the last week of February, EDISTO and GLACIER, with the former having several days' headstart, were on their way to a rendezvous off the mouth of the Rio de la Plata. NORTHWIND at the same time steamed steadily toward the Palmer Peninsula. John Biscoe, having arrived first in the area, worked its way into Base J and, unaided, carried out the relief and resupply of this station, while awaiting the arrival of the icebreaker.

On 3 March GLACIER met EDISTO off Rouen Bank, but sea conditions prevented the ships tying up to one another for transfer of persons and cargo. I accompanied Commander Task Group 43.1 and a small staff aboard EDISTO, arriving by helicopter sling. That same day a dispatch from NORTHWIND, which had had opportunity to survey conditions off the Palmer Peninsula, stated that EDISTO's assistance would probably be required. The following morning, the helicopter previously borrowed from EDISTO by GLACIER was flown to Buenos Aires.

PART V

3 MARCH - 10 APRIL 1959

The last section of this report covers the time passed aboard EDISTO and concerns principally the operation to assist the British along the Palmer Peninsula. In this effort, NORTHWIND had the leading role, while EDISTO in a sense played the part of a much needed reinforcement. The enemy, if there can be said to be one, was the Antarctic weather, which brought many of the hero's efforts to no avail.

On 3 March, when I accompanied Commander Task Group 43.1 aboard EDISTO, that ship was headed for Buenos Aires, Argentina, to pick up parts for an engine, to obtain fuel and other supplies, and to put ashore the aircraft from Ellsworth, which had made her flight deck unusable. When she arrived on 4 March, it was believed that three days would suffice to accomplish these logistic activities. A mix-up over the specifications of the fuel used by EDISTO, however, prolonged this period for several days.

During this delay, a dispatch was received from NORTHWIND indicating that EDISTO's assistance would probably not be needed. Having arrived off Matha Strait on 1 March, NORTHWIND had effected a meeting with John Biscoe. The two vessels, after putting emergency supplies into Base W by helicopter, then proceeded to Marguerite Bay, where Bases E and Y are located. About 30 miles from Base Y, they reached the limit of the fast bay ice. As the lateness of the season rendered inadvisable an effort to break through this barrier, the Falkland Islands Dependencies Survey determined to evacuate Base E by dog-sled to Base Y and to maintain the latter on a reduced scale. Helicopters from NORTHWIND resupplied Base Y with sufficient fuel, food, and other necessities to support four men for the coming year and removed the excess personnel. There then remained Base W to be relieved and resupplied. NORTHWIND believed that it could accomplish this task in about eight days, which was about the same time that EDISTO could make the trip from Buenos Aires under the most favorable conditions.

Visions of home began to dance through the minds of those aboard EDISTO. Commander Task Group 43.1, however, directed that the ship should remain in Buenos Aires until NORTHWIND completed operations and cleared the area. The time in waiting was taken up with official functions,¹ including a most informative visit to the Argentine Antarctic Institute.

¹ A summary of this visit may be found in Appendix IV.

During the evening of 12 March, when many of us felt that we were settling down as long-time residents of the Argentine capital, another dispatch arrived from NORTHWIND. Attempts to get under way from Marguerite Bay had been frustrated until 10 March by high winds and swirling snow, and then after proceeding about 40 miles, the two ships were again stopped by heavily pressured ice, the result of steady northerly winds. It became evident that if Base W were to be resupplied during the remaining days of the 1959 operating season, more airlift than available aboard NORTHWIND would be required. Assistance of EDISTO and its helicopters was requested.

Visions of home disintegrated as EDISTO prepared to get under way. About 1000 on Friday, 13 March, a date about which even the non-superstitious felt a little uneasy, the ship cast off from the jetty in Buenos Aires and headed south once again. The trip to the Antarctic was made in good time and was quite uneventful. On 17 March, the Falkland Islands were passed in good visibility on the starboard beam, and two days later at about 64°S., the first ice was encountered, thus showing that the northern limit of the pack had receded considerably since GLACIER had traversed this same area in late January.

As EDISTO progressed toward its goal, the entrance to Matha Strait, ice conditions grew worse, and the weather deteriorated. Except for a few hours during the afternoon of 23 March, when the mountains of the Palmer Peninsula could be clearly seen, visibility was generally poor. Much of the time snow fell, and EDISTO passed many days amid an impenetrable veil of white. Under these conditions, the ship lay to awaiting improvement on 22 March and again from the evening of 24 through 28 March.

The type of ice encountered was very similar to that found by WESTWIND the previous year in the Bellingshausen Sea. With the northerly winds, the pack consolidated into ten-tenths coverage, although there did not appear to be heavy pressure. A snow cover of two feet or more, however, reduced the effectiveness of the icebreaker by cushioning the blow of the ship as it rode up on the floes.

In the meantime NORTHWIND, escorting John Biscoe, had taken advantage of a break in the weather on 23 and 24 March to escape from the heavy pack in Marguerite Bay and to regain a position in the Matha Strait from which Base W was within helicopter range. By the evening of 24 March, the situation looked fairly good, as EDISTO was close enough so that its helicopters could participate in the lift of persons and cargo even though ice conditions prevented the ship from moving.

Suitable weather conditions for air operations simply did not come. Even with a change in the wind, snow and poor visibility continued to prevail. With time growing short, it was agreed that Base W, like Base Y, should be placed in reduced status. Instead of 12 persons with 40 tons of stores and equipment, it was planned to put in a crew of four with five tons of cargo. The helicopters available could carry out this limited replenishment in two or three days of good flying. Not even this time was allowed

by the stern Antarctic weather.

The end came quickly. On 30 March, Commander Task Group 43.1, during a brief period of clearing, transferred to NORTHWIND by helicopter. There he had the opportunity to discuss the situation with the Commanding Officer of NORTHWIND and the British authorities on John Biscoe and at Base W. In the hours that followed his arrival, all signs pointed to a renewal of bad weather with its northerly winds and resulting consolidation of the pack. During the morning of 31 March, the decision was taken to evacuate Base W by dog-sled, since flying was impossible. As soon as the party from the base reached NORTHWIND, that vessel, followed by John Biscoe, would begin to work its way northeastward through the coastal leads. EDISTO, which, as southerly winds loosened the pack, had resumed progress on 29 March, was instructed to head for those same leads in order to make a rendezvous with NORTHWIND and John Biscoe sometime on 1 April.

On the appointed day, the ships arrived within sight of one another but remained separated by several miles of stubborn pack. Commander Task Group 43.1 took the opportunity of proximity and favorable weather to return aboard EDISTO. It was not until three days later, however, that by devious routes through such slender openings as might from time to time appear in the shifting ice EDISTO broke into a broad polynya off the southwest tip of Renaud Island where it was shortly joined by NORTHWIND and John Biscoe. The difficulties encountered in this simple endeavor underlined the necessity for remaining with John Biscoe while it supplied Falkland Islands Dependencies' bases slightly farther north along the peninsula. Normally, this sturdy little vessel sailed up to these stations in open water, and, if it had been earlier in the year, might have been left to work its way through the ice by a combination of patience and skill. The operating season, however, was waning rapidly, the daylight hours diminishing, and new ice several inches in thickness forming in quiet waters.

To reach Base F, located on one of the Argentine Islands, the three ships, with EDISTO in the lead, sought to force their way through French Passage. Sunset of 5 April found them about fifteen miles from the goal. Unfortunately, helicopter reconnaissance the following morning showed several giant floes blocking the way. While the two icebreakers, given time, could probably have beaten a path through these remaining obstacles, it was just that element of time which was lacking. The ships, therefore, regretfully withdrew, on this occasion NORTHWIND taking the lead, to seek an approach route farther north through the Bismarck Strait.

At evening, as the ships lay to in the ice, bitterly cold, high winds blew up from the southwest, forcing the ice northward and with it the three vessels. In the first daylight hours, Commander Task Group 43.1 went aloft, as he had on previous days, to reconnoiter the situation and to direct from on high the operations of his little armada. Along the coast, which trends northeastward in this area, the winds had opened long leads running parallel to the shore but paradoxically had filled the Bismarck Strait with solid

pack. The ships, therefore, took off once again toward the north to seek their objective by passing north of Anvers Island and then following the inside channels back south. This choice of course led to the curious computation that, whereas we had been some fifteen miles from Base F on the morning of 6 April and 50 miles the evening of the same day, the morning of 7 April found us 150 miles away.

Again, Commander Task Group 43.1 had chosen the longest way round. From this time forward, the good fortune which had seemed to desert us from the time NORTHWIND entered Marguerite Bay returned. The weather, which had so often frowned upon our efforts, turned to smiles. Antarctica, like a lovely woman, having held us in durance long enough, decided to surrender her favors abundantly. Under clear skies, EDISTO led NORTHWIND and John Biscoe up the west side of Anvers Island into Dallman Bay and through the Swallaert Channel to the inside passageway.

At this point, the itinerary was changed to visit Base A at Port Lockroy, Wiencke Island, before going to Base F. The ships, therefore, after proceeding south down the de Gerlache Strait for a short distance, turned off into Neumayer Channel, a narrow fiord that runs between the precipitous cliffs of Anvers and Wiencke Islands. At the southern ends of the channel the Falkland Islands Dependencies has a meteorological station set at the end of a small, rocky bay known as Port Lockroy. As the sun went down, EDISTO plowed a channel into the harbor so that John Biscoe might enter and unload.

First light saw John Biscoe standing out of Port Lockroy ready for the journey to Base F some 35 miles away. The ships followed leads across the inshore edge of the Bismarck Strait while crew members gazed at the ice, which the day before had blocked their way. Except for occasional patches of loose ice, hardly more than brash, which the breakers swept aside like chaff, the entire inner passage was ice free. Before arriving at their destination, the three vessels traversed the Lemaire Channel, even more narrow and precipitous than the Neumayer of the day before.

It came as something of a surprise when the local Falkland Islands Dependencies representatives informed us that the Admiralty would not permit British naval vessels to follow these narrow passages. The Argentine charts, which we had acquired in Buenos Aires, furnish sufficient information for navigation, which, in our case, was supplemented by the presence aboard EDISTO of a British liaison officer with five years' local experience. The local British authorities expressed their intention to forward to the Admiralty photographs of United States ships in the Lemaire Channel. Parenthetically, it may be said that those persons aboard our ships, and the number seems to comprise all the passengers and practically all crew members, who regard picture-taking as virtually an additional duty, had a field day during this sparkling journey.

Base F was reached at 1030 on 8 April. John Biscoe moved inshore and commenced unloading without delay. While the British were busily at work, I accompanied Captain McDonald and Captain Davison of EDISTO to the station. At Base F, the Falkland Islands Dependencies has one of its larger installations, eleven men during the 1958-59 season, and conducts programs in solar radiation, ozone, geomagnetism, and seismology, as well as meteorology. The buildings consist of a main living hut which also contains scientific equipment and communications gear, an inflation shed for meteorological balloons, a magnetic building, and a new hut housing electric generators. It was noted that, unlike the Royal Society Base at Halley Bay visited last year and the New Zealand Scott Base at McMurdo Sound, the men slept in a dormitory rather than in individual cubicles. Unloading was completed shortly after nightfall so that John Biscoe was ready to start the return trip as soon as light permitted on the morning of 9 April.

Little more remains to be said. After the Lemaire Channel, the ships passed inside of Wiencke Island entering the de Gerlache Strait at its southern end and thus omitting the detour past Base A followed on the way down. About halfway up the strait, Commander Task Group 43.1 released NORTHWIND and ordered it to commence its homeward journey by way of Valparaiso. Upon receipt of this word, NORTHWIND pulled out from behind EDISTO and took off like a horse that has caught a familiar scent drifting down wind. It turned away from the strait, exiting through the Schollaert Channel. EDISTO and John Biscoe continued up the de Gerlache until it ran into the Bransfield Strait south of Trinity Island. Passing through these waters once sailed by Bransfield, Palmer, Davis, Bellingshausen, and a host of others, awakened the historian in me and set me to musing on the discovery of this continent, without, it must be admitted, arriving at any new conclusions.

During the night, EDISTO slowed so as to arrive at Deception Island by daylight on 10 April. It entered the harbor early and lay to off the British base in Port Foster at 0730 in company with the Falkland Islands Dependencies Survey ships John Biscoe and Shackleton. The principal business of the day consisted in the transfer from EDISTO of fifteen stray Britishers who had originally been taken by NORTHWIND from the abandoned bases in the south. While this was being done, helicopters were launched and Deception Island inspected and photographed from the air. In order to take advantage of the continuing good weather to cross the Drake Passage before that body of water could regain its customary ugly temper, it was decided to make the visit to Deception as brief as possible. For that reason, the time available would not permit visits to the bases established on the island by Argentine, Chile, and Britain. Since it was desired not to offend any, visits were made to none.

At a few minutes past noon, EDISTO left Deception Island and set course for Buenos Aires. During the afternoon, the South Shetlands faded slowly from view under leaden skies, until the descending sun found a crack in the overcast close by the horizon and lighted the mountain peaks with one last touch of golden glory. Soon darkness hid those last sentinels of that enchanted land to the south. DEEP FREEZE IV had come to its belated end. The thoughts of those on board the last ship to clear the area turned towards home. The Antarctic lived in memory.

APPENDIX I

New Zealand Geological and Survey Antarctic Expedition, 1958-59 ("Wood Bay Expedition")

Currently, New Zealand is engaged in a program of geological study and mapping of the Victoria Land Coast from Cape Adare to the Beardmore Glacier. This extended effort traces its origins to the British Commonwealth Trans-Antarctic Expedition. From the start of expedition planning, it had been determined to abandon the classic route to the polar plateau by way of the Beardmore Glacier used by Shackleton and Scott and later followed by United States aircraft engaged in support of the South Pole Station. It was therefore necessary to search out other feasible approaches.

A preliminary reconnaissance carried out during Operation DEEP FREEZE I indicated the Ferrar Glacier as a possible way to the plateau. The following year, however, it was determined that tracked vehicles could not ascend the Ferrar, and the search was extended southward to the Skelton Glacier. After aerial reconnaissance, four members of the expedition ascended the Skelton Glacier with dog teams and found it suitable for tractors. Later, a three-man party man-hauling their equipment on two sledges carried out the first geological investigation of this area.

During the 1957 spring season, a number of short journeys were undertaken primarily to afford practice to men and dogs and to try out equipment. The opportunity was taken on these test runs to do some geological work and to lay down depots for journeys planned for the summer months.

While Sir Edmund Hillary and his companions were engaged on the main objective of the New Zealand phase of the Trans-Antarctic Expedition, the laying down of depots to be used by Dr. (now Sir) Vivian Fuchs on his dash across the continent, other members of the group hoped to carry out geological and mapping journeys through the mountains that edge the plateau. For this work, the New Zealanders intended to use dog teams of which six were available at Scott Base. To save time in reaching the objective areas, they made use of airlift for both dogs and equipment to the extent that this form of transport was available. Air resupply of units was also employed with good results in extending the time spent in the field. This combination of old and new methods of exploration greatly aided in the penetration of otherwise inaccessible mountain areas thus adding greatly to our meager geographic and geologic knowledge.

Three parties from Scott Base carried out the planned journeys with great success. By the end of the season, two groups had covered the region from the Mawson Glacier to the Barne Inlet, and the third investigated the area between Shackleton Inlet and the Beardmore Glacier. While awaiting the working-up of the material collected, it can safely be said that much will be revealed about geologic structure and that existing maps are already obsolete. Aerial photography available from former expeditions and any that may be taken in the future can now be used for accurate charting. Of the southern portion of the Victoria Land Coast, only the section separating the Barne and Shackleton Inlets remains unexplored.

While the parties from Scott Base were busy in the field, an eight-man Geological Survey Expedition was operating out of Hallett Station. Approved by the New Zealand Government on 1 July 1957 and assured of support by the United States Navy, this expedition supplemented the topographical and geological work being carried out further south. Under the leadership of Dr. H. J. Harrington of the New Zealand Geological Survey, the eight-man team departed Lyttelton aboard the USS ATKA on 22 November 1957. Because the ice off Cape Hallett proved impenetrable, ATKA proceeded to Little America, where the New Zealanders transferred to USS GLACIER for transportation to McMurdo Sound. From the latter station they were flown to Hallett in two flights of a Navy R4D on 16 and 17 December.

Basically, the Geological Survey Expedition depended upon man-hauling. Support in the form of Weasels, however, was received from Hallett Station in laying out depots and in assisting a field party that went north across Moubray Bay to link up the new survey with the work carried out on the second Scott Expedition by Sir Raymond Priestley.

The main effort of Dr. Harrington and his colleagues took place south of Cape Hallett where the Tucker Glacier made a splendid highway to the polar plateau. Including the journey around Moubray Bay, some 100 miles of coastal area was charted, **covering**, with the hinterland, more than 6,000 square miles. Although better knowledge of the coastal ranges from Cape Adare to the Lady Newnes Ice Shelf thus became available, full coverage was given primarily to the sectors adjacent to the Tucker Glacier. More thorough investigation of both northern and southern portions would be justified at a later date.

The Geological Survey party returned to Hallett Station on 8 February 1958, where they were picked up for return to New Zealand on 19 February by the USS GLACIER.

The success achieved by activities of both the International Geophysical Year and the Trans-Antarctic Expedition was reflected in the announcement on 27 February 1958 that New Zealand bases in the Antarctic would continue in operation. On 15 April, the Prime Minister announced the formation of the Ross Dependency Research Committee to coordinate and supervise future activity in the area.

Among the programs coming under the auspices of the new committee was the geologic and topographic investigation of the Victoria Land Coast. The actual work was to be performed by the New Zealand Geological Survey Branch of the Department of Scientific and Industrial Research and the Lands and Survey Department. Dr. Harrington was again asked to assume leadership of the expedition which was to be organized into two six-man parties, each staffed by geologists and surveyors supported by experienced mountaineers.

Before a final directive was issued for Dr. Harrington's guidance, a request for support by the United States Navy was sent to Commander, U. S.

Naval Support Force, Antarctica, who forwarded it to the Chief of Naval Operations with a request for approval. On 1 August, the Chief of Naval Operations indicated that the Navy was prepared to furnish transportation for twelve men and approximately seven tons of gear by a helicopter-equipped icebreaker to arrive off the Victoria Land Coast not later than 15 December. There, two six-man parties would be landed on separate glaciers and food caches established. Later in the season, the two parties, if it proved operationally practicable, would be picked up and relocated so as to extend the area covered. Finally, transportation home would be provided by United States or New Zealand ships as available. As is customary in such commitments, performance was contingent upon the vagaries of the Antarctic climate and the need of other planned operations.

Through the United States Antarctic Projects Officer, the New Zealand Government also placed a request for aerial photography taken during previous DEEP FREEZE operations and asked the United States Navy Hydrographic Office to prepare a report indicating the best locations for establishing geodetic control points for the use of this photography. This request was approved by the interested Government departments, and the material prepared and shipped to New Zealand, the last of it arriving just before the expedition sailed.

With naval support assured, planning, collection of stores, and choice of personnel went ahead. On 14 November 1958, Dr. Harrington received his directive in final form. His mission was succinctly set forth as follows:

During the 1958-59 summer season your expedition will carry out a geological and mapping survey of the Victoria Land Coast between Mawson Glacier and the Tucker Glacier to a depth of approximately 80 miles inland. The expedition will comprise two 6-man parties of geologists, surveyors, and support personnel equipped with man-hauling sledges.

The official title given to this continuation of the previous year's effort was the New Zealand Geological and Survey Antarctic Expedition, 1958-59 ("Wood Bay Expedition"). The Ross Dependency Research Committee made arrangements with representatives of Commander, U. S. Naval Support Force, Antarctica, for the expedition's four tons of equipment, rather than the seven tons originally estimated, to be loaded aboard the USS STATEN ISLAND at Fort Lyttelton. With the members of the party on board, STATEN ISLAND departed New Zealand on 25 November 1958.

While STATEN ISLAND was moving southward, another icebreaker, USS GLACIER, moved northward along the Victoria Land Coast from Richard Sound, taking oceanographic stations and carrying on a reconnaissance of the coast as it went. With Commander Task Group 43.1 and his staff on board, GLACIER headed for Terra Nova Bay which it reached on 29 November. The following day helicopter flights were made over the northern part of the bay, searching for spots where the New Zealand expedition might possibly be landed. The

difficulties in reconciling observations with existing charts and the discovery of hitherto unmapped features, including an ice tongue and two islets, underlined the desirability of completing the topographic portions of the planned survey. On 1 December GLACIER proceeded north from Terra Nova Bay to the rendezvous point with STATEN ISLAND off Coulman Island.

On the way north the ship passed through part of the area where charts indicated the Lady Newnes Ice Shelf to be, but neither shipboard observation nor helicopter reconnaissance confirmed the existence of any land where the Key Islets had been reported. While awaiting the arrival of STATEN ISLAND, further helicopter flights were made on 2 December. One crossed the top of Coulman Island which was found to reach a height of about 7,500 feet. Another carrying an aerial camera plotted the island's coast and investigated Lady Newnes Ice Shelf, which was estimated to occupy about one third the area shown on the map. Along the west side of Coulman Island a large emperor penguin rookery was seen.¹ The next day, Captain John Cadwalader, accompanied by two biologists, John Dearborn and Hugh Dewitt, visited the rookery and calculated the number of birds as in excess of 50,000.

GLACIER remained in the vicinity of Coulman Island awaiting STATEN ISLAND, which finally arrived on 6 December at 2230. During the night the two ships maneuvered off the south end of the island. The following morning they tied up to one another so that STATEN ISLAND might refuel GLACIER. Advantage had been taken of the refueling period to fly a party of six from the STATEN ISLAND, led by Dr. J. J. L. Sladen, a world authority on penguins, to the newly found rookery.

A storm blew up on 7 December, accompanied by heavy snow, and continued through the morning of the eighth, preventing the recovery of the party at the rookery. Fortunately, they had shown the foresight to take emergency gear, supplied by the New Zealand Survey group, so that they suffered no discomfort beyond that of crowding six persons into a two-man tent. On the third attempt, the helicopters succeeded in reaching the rookery and bringing off the scientists. The ships parted and got under way at 1945.

During a conference aboard STATEN ISLAND with Commander Task Group 43.1, Dr. Harrington stated a preference for being put ashore somewhere in Wood Bay so that this year's survey might begin at the southern limit of the area covered in 1957-58. Since little was known about Wood Bay or the location of landing sites, it was determined to proceed as close to the shore as possible until 74°10'S. was reached. From this point, Captain McDonald and Dr. Harrington intended to reconnoiter the area by helicopter.

¹Captain Scott in 1902 visited Coulman Island but was prevented from visiting the west side of the island by ice. From a distance, he noted the presence of penguins but failed to realize that he was looking at a rookery, one of the largest yet found.

On the way north, GLACIER had encountered a band of heavy but passable pack south of Coulman Island. The storm of 7 and 8 December had greatly aggravated conditions by putting the pack under heavy pressure. While maneuvering in the ice on 9 December, GLACIER lost a blade from each propeller. This accident led to a decision to return to Coulman Island and to try to work to the eastward where, it was believed, lighter pack would be found. Because of the damage, GLACIER had lost much of its icebreaking capability which could only be restored by sending it to New Zealand for repairs, and an eastward course would start it on its way to drydock.

The loss of GLACIER necessitated a revision of plans. STATEN ISLAND had to take over GLACIER's duties, most particularly the opening of a ship channel at McMurdo Sound for the cargo vessels that were scheduled to arrive on 22 December. No time could be lost in working southward. On the evening of 8 December, Commander Task Group 43.1 and his staff discussed the situation with Dr. Harrington. It was pointed out the STATEN ISLAND could not wait for the pack to loosen sufficiently for it to proceed to Jood Bay or Terra Nova Bay. If Dr. Harrington so desired, his party could, however, be put ashore anywhere within helicopter range, defined as thirty miles from the point where the ships were stopped in the ice off the south end of Coulman Island. Otherwise, it would be necessary to take the New Zealand expedition to McMurdo Sound.

At Dr. Harrington's request, a helicopter reconnaissance of the land around Lady Newnes Ice Shelf was carried out that evening. He was accompanied on this flight by Captain Cadwalader and LCDR Griffin of Task Group 43.1. Upon his return Dr. Harrington indicated two reasons for not wishing to put his men ashore around the Lady Newnes Ice Shelf. First he found no really suitable route to the interior within range of the helicopters. Second he feared that in case of emergency, such as a serious injury, rescue might be extremely difficult, if not impossible. The decision was then made to take the survey party to McMurdo Sound, which STATEN ISLAND reached on 14 December.

The members of the New Zealand geologic and survey party, together with much of their gear, left STATEN ISLAND by helicopter for Scott Base on the following day. The remainder of the equipment and stores were off-loaded on the bay ice on 26 December.

For a time, at least, Dr. Harrington and his party worked out of Scott Base, conducting surveys along the east side of Ross Island. Ascents of Mounts Erebus and Discovery were also planned. It is not known at the time of writing how much work in this area was accomplished during the current season.²

² A preliminary narrative has been recently received (17 April 1959) indicating accomplishments during the 1958-59 season. The parties were confined to the vicinity of McMurdo Sound, but did much to complete topographic and geologic surveys of this important area. Included were successful ascents of Mounts Erebus, Terror, and Discovery, the last of which had not previously been climbed.

Sources

A.S. Helm, New Zealand Activities in the Antarctic (Extract from the New Zealand Official Year-Book 1958), Department of Statistics, Wellington, 1958.

H. J. Harrington, Circular No. 2: N. Z. Geological and Survey Antarctic Expedition, 1958-59 ("Wood Bay Expedition") Mimeo. underlining as in original, 30 September 1958.

Wood Bay Geological and Survey Expedition, 1958-59 (Leader: Dr. H. J. Harrington, 14 November 1958, signed by E. I. Robertson.). Mimeo., underlining as in original.

Notes taken aboard USS GLACIER 26 November - 6 December 1958, and aboard USS ST. TEN ISLAND 7-14 December 1958, including those taken after attendance at the conferences of 8 and 9 December 1958 and discussions with Dr. Harrington on board ST. TEN ISLAND.

APPENDIX II

SCIENTIFIC PROJECTS ABOARD USS STATEN ISLAND, 1958-59

This observer was impressed during the past season in the Antarctic by the scientific projects carried out aboard United States naval vessels. In the publicity naturally directed toward the accomplishments of the International Geophysical Year, these smaller, but nevertheless significant, projects have tended to be overlooked.

A number of them are mentioned in the text. It is believed to be of some interest to indicate, as an example, the projects carried out aboard a single ship. For this illustration I have chosen the USS STATEN ISLAND, an icebreaker, because I had sufficient opportunity while aboard this ship to acquaint myself with the nature of the projects and the personnel engaged in carrying them out.

Not included is the oceanographic program regularly carried on by representatives of the Hydrographic Office aboard all icebreakers in the Antarctic, or the routine observations of meteorological and other phenomena conducted aboard naval vessels.

Obviously these scientific projects depend upon the support of the Navy Department. It is also a pleasure to report that they receive constant assistance from the officers and men of the ships on which they are placed.

(1) "OPERATION SNUFFLES"

"Operation Snuffles" is the name given to an inquiry into the incidence of respiratory infections and an attempt to isolate the responsible organisms that was begun during the 1958-59 season in the Antarctic. This project was approved as part of the continuing United States Antarctic Research Program by the National Academy of Sciences through its Committee on Polar Research. Funds for this and other projects in the biological and medical sciences come from the National Science Foundation. Logistic support is furnished by the Navy, and its doctors and other personnel are cooperating in insuring the project's success.

For the 1958-59 season, field work was carried on aboard the icebreaker, USS STATEN ISLAND, and at three shore stations, NAF McMurdo Sound, Hallett, and Wilkes. A small laboratory was installed on board STATEN ISLAND before departure of that ship from the United States in October 1958. Medical materials collected during the voyage were forwarded upon return to the National Institutes of Health and to Johns Hopkins University for further study.

Field work was under the direction of Dr. William J. L. Sladen of the School of Hygiene and Public Health, Johns Hopkins University, assisted by Dr. Rainer Goldsmith of the Medical Research Council, London, England. Both

Dr. Sladen and Dr. Goldsmith have had previous Antarctic experience. The laboratory analysis of materials collected for types of virus will be performed under the supervision of Dr. Robert Charock of the National Institutes of Health.

That groups of people at isolated stations become relatively free of respiratory infections has long been recognized, as has the fact that, when the isolation is broken, an epidemic of these very infections almost inevitably occurs. These phenomena offer an opportunity to study the causes and epidemiology of these infections without many of the complexities present in populated areas.

Aboard STATEN ISLAND a group of volunteers reported at intervals to the "Snuffles" laboratory. Swabs were taken of their throat and nose and transferred to culture media favorable to the storage of virus and bacteria. Blood samples were also collected from which the sera were extracted by centrifuge. These sera will later be examined for the presence of antibodies. With the cooperation of the ship's doctor, similar samples were also collected from persons developing respiratory infections en route. To preserve the cultures and sera for future study at the National Institutes of Health requires their being kept at a temperature of 60° below zero. For this purpose two freezers were installed in the laboratory on the STATEN ISLAND.

With the help of the doctors at the different stations, it was planned to make similar examinations of the personnel at the time of STATEN ISLAND's arrival in order to obtain cultures and antibodies that may exist after a period of isolation. When the ship's coming provoked the almost inevitable epidemic of respiratory infections, Drs. Sladen and Goldsmith would be present to take the necessary samples and process them for return to the United States.

Because of the arrival of ships and aircraft during October and November, 1958, the project outlined above could not be carried out at MAF, McMurdo Sound. Equipment, however, was landed for installation in the biological and medical laboratory being set up at this station. It is expected that a resident physician will be assigned to winter-over in 1960 to carry out a full program of periodic sampling.

Although Cape Hallett's isolation had been interrupted during October 1958, when an aircraft brought rescue crews to the station, it was expected that significant results could still be obtained. Although an Australian vessel might arrive at Wilkes Station a few days before STATEN ISLAND, it was believed that with prior arrangements to have the local doctor assist in the program it could be carried out as planned.

When STATEN ISLAND completed its Antarctic activities and left Wilkes Station, it had on hand 900 virus and bacteria cultures and 600 sera samples.

This year's activity represented only a beginning, in part a pilot effort to set the stage for the future. It is believed, however, that, when the materials have been subjected to laboratory analysis and compared with information obtained elsewhere, this pioneering effort will of itself yield significant results.

(2) BIRD-BANDING PROGRAM

As an integral part of the United States Antarctic Research Program, biologists assigned to United States stations and ships are cooperating in a project to band Antarctic birds. The objectives of this activity are to develop information on movement and migration, longevity, life histories and ecology, and behavior. Close cooperation is being given by the Fish and Wildlife Service of the Department of the Interior and by Mr. Carl Eklund of the Department of the Army. Mr. Eklund, while station scientific leader at Wilkes, organized an international inquiry into the distribution of skua, gulls, which is being continued as part of the present project. The United States program in bird-banding, as in other scientific fields, is closely coordinated with similar programs undertaken by other nations active in the Antarctic.

Opportunity was taken by the biologists and medical men aboard USS *STATEN ISLAND* to band penguins along that ship's route. Active in this project were Drs. W.J.L. Sladen and Rainer Goldsmith, whose primary duty was with "Operation Snuffles", a study of respiratory diseases, and Mr. Richard Penny, a zoologist on his way to winter-over at Wilkes Station. Enthusiastic support in capturing penguins for the application of bands came from members of the ship's company and particularly from the helicopter pilots who frequently furnished the transportation to and from the bird colonies.

During the early part of *STATEN ISLAND*'s stay in the Antarctic area, the bird-banders visited the newly discovered Emperor penguin rookery on the west side of Coulman Island and the Adelia colonies at Capes Royds and Crozier on Ross Island. A number of individual Emperors found on the bay ice of McMurdo Sound were also captured and banded. This work was continued during the visit of *STATEN ISLAND* to Hallett Station.

After leaving the Ross Sea, a stop was made in the Balleny Islands where five new penguin rookeries were identified. The discovery that chinstrap, or ring-neck, penguins breed at this location, extends the known range of this species completely around the continent. By the time *STATEN ISLAND* left Wilkes Station 6 February 1959, over 1,000 Adelies had been banded, as well as numerous other birds, including over 100 emperors and a like number of giant petrels.

(3) COSMIC RAY RESEARCH ABOARD THE USS STATEN ISLAND, 1958

Since 1951, Professor Mayer of the California Institute of Technology has been engaged upon the study of cosmic ray intensity as related to variations in sunspots. Support for this project has been provided by the Office of Naval Research. As cosmic rays come under the influence of the earth's magnetic field, they are deflected toward the geomagnetic poles so that the greatest intensities are found in the polar regions. As these areas are not accessible by ordinary means of transportation, Professor Mayer and his assistants have received help from the Navy and Air Force in the form of transportation for men and equipment.

The contract from the Office of Naval Research provided for investigations in the northern hemisphere. Because of the project's close relationship with the objectives of the International Geophysical Year, The National Science Foundation through the United States National Committee for the IGY provided funds for Professor Mayer during 1958 to extend his investigation to the Southern Hemisphere in order to test the theoretical belief that cosmic ray phenomena were the same in the two polar areas.

In obtaining the desired measurements, Professor Mayer has to deal with two variables, one resulting from the geographical location at which the observation is taken and the other from differences in number of cosmic rays bombarding the earth's atmosphere caused by sunspots. To obtain a profile of the relative intensities of cosmic ray activity from the geomagnetic equator to the geomagnetic poles, it is necessary to eliminate fluctuations caused by sunspots. One way of neutralizing this factor would be to take simultaneous observations from stations located at regular intervals of ten degrees of latitude. This method, however, would be expensive and has therefore been regarded as impracticable. Instead, Professor Mayer has taken advantage of the movement of United States naval vessels and the location of military installations to make observations as normal operations permitted. To eliminate intensities caused by other than the geographic factor, he has used a control point. For the control point a normal intensity has been established, and on a given day departures from that norm can be calculated. To determine the geographic influence, observations are taken simultaneously at the control point and aboard ship or at a military installation. If intensity at the control point is found, for example, to be ten per cent above normal, the reading obtained at the observation point is reduced corresponding to eliminate the factor of sunspot occurrence.

The actual equipment used for measurement is relatively simple. A device that measures cosmic ray intensity in terms of electrical resistance is carried aloft in a balloon. Results are radioed back to ship or base and recorded automatically on tape. The material taken from the tape is finally represented graphically. No special installation is required, and the entire observation can be carried out in a short space of time.

When extending the project to the Southern Hemisphere, Professor Mayer obtained the consent of the Navy to have observations made every ten degrees from Seattle to the Ross Sea aboard the icebreaker, USS STATTEN ISLAND, proceeding to McMurdo Sound. Aboard the ship he placed two representatives, Mr. Hugh Anderson, a graduate student, and Mr. Donald Barelli, a technician, both from the California Institute of Technology. Professor Mayer went to Invercargill, New Zealand, where he established the necessary control point. In addition to providing transportation, STATTEN ISLAND also carried the helium and balloons and assisted in their inflation and launching.

Anderson and Barelli carried out their program of observations, completing the last flight at McMurdo Sound in December 1958. They then transferred to USS WYANDOT for transportation to New Zealand. The results of this season's work will not be available until Professor Mayer has had opportunity to analyze the data collected and to compare it with what has been previously obtained in the Northern Hemisphere. The complete study, of which the 1958 effort in the Southern Hemisphere forms a part, still has several years to run and will be completed only with the expiration of the eleven-year sunspot cycle that began in 1951.

(4) PHYSIOLOGY

In addition to participating in the study of respiratory infections, Dr. Rainer Goldsmith carried on a program of physiological research. His aim was to seek objective measurements for the often subjectively affirmed fact of human acclimatization to cold.

Because it is believed that a certain time of exposure is required to become acclimatized, Dr. Goldsmith provided selected individuals with a new time exposure clock. By measurements of skin temperature and of heat and radiation balance, it is hoped to determine whether men, as they are exposed, do, in fact, cool down or whether they retain their normal microclimate.

As there also exists subjective evidence that men acclimated to cold can tolerate lower indoor temperatures, Dr. Goldsmith proposed to investigate this problem using Bedford's comfort vote technique. Indoor temperatures and comfort votes were recorded from men aboard ship for later comparison with wintering-over personnel who would accompany the vessel on its return journey to the United States. This study also involved the relation of feet temperatures to comfort votes. A common sight in STATEN ISLAND's wardroom was Dr. Goldsmith persuading people to thrust a thermometer inside their shoes, while he questioned them on their clothing and degree of comfort.

As the basis of interesting comparisons, Dr. Goldsmith also made temperature measurements of penguins. These birds are remarkable for their ability to withstand a great range of temperature and to maintain their body temperatures through long periods of fasting and inactivity during the breeding season. Wherever possible, it was hoped to carry out the experiments on young birds to study the development of temperature control as part of the process of maturing.

Dr. Goldsmith also intended to test new items of polar clothing for their effectiveness under field conditions.

These investigations in physiology were a personal venture carried on without cost to any government agency. They enlisted only the assistance of people aboard ship and at Antarctic bases either as the subjects of experiment or as the catchers of penguins. Cooperation came freely in both fields.

(5) LATE SEASON SCIENTIFIC WORK

USS STATEN ISLAND dispatch 061715Z/Feb (1959):

CTG43.1 021945Z X DEPARTED PACK ICE 061700Z AT 65S 110E X REPORTING YOUR
OPCON X FOL ITEMS ACCOMPLISHED SINCE DEP MCMURDO X 8 OCEAN STATIONS 4 BOTTOM
TRAILS 5 BOTTOM SEDIMENT SAMPLES 2 CARBON 14 SAMPLES 10 INDRIPI 2400 MILES
SOUNDING TRACK X FIXED POSIT OF ISLANDS IN BALLENY GROUP CMM CHARTED DISTIN-
GUISHING FEATURES OF EASTERN EDGES BUCKLE AND YOUNG ISLANDS PLUS AIR PHOTOS
CMM FIRST LANDING BUCKLE ISLAND X NUMEROUS GEOLOGICAL SPECIMENS TAKEN FROM
CAPE ADARE CMM BALLENY AND WINDMILL ISLANDS X BIOLOGICAL RECON DONE OF HEARSON
ISLAND CMM 130 FISH SPECIMENS TAKEN X OPERATION SNUFFLES NOW HAS NEARLY 600
SERA SAMPLES CMM OVER 900 CULTURES FOR VIRUS AND BACTERIA INCLUDING HALLETT
AND WILKES PERSONNEL X HUMAN AND PENGUIN PHYSIOLOGY WORK INCLUDING 30 PENGUIN
EXPERIMENTS AND 250 INDIVIDUAL COMFORT VOTE DATA COLLECTED X CONTINUING SURVEY
OF WILDLIFE POPULATION HAS REVEALED FIVE NEW PENGUIN COLONIES IN BALLENY CMM
DISCOVERY THAT CHINSTRAP PENGUINS BREED THERE THUS EXTENDING ITS RANGE EN-
TIRELY AROUND CONTINENT X OVER 1000 ADELIES BANDED CMM NUMEROUS OTHER SPECIMENS
OF BIRDS INCLUDING 100 GIANT PETRELS ON FRAZIER ISLAND X 2500 FEET USARP
MOVIE FILM X 130 ADELIES ALREADY BANDED AT WILKES X EMIL SCHULTESS OBTAINED
24 HOUR SUN SHOTS AT WILKES PLUS COMPLETE AND EXCELLENT COVERAGE ALL ASPECTS
VOYAGE X ALL SHIPS EQUIPMENT OPERABLE NO VOYAGE REPAIRS REQUIRED PRIOR CONUS X

APPENDIX III

FOREIGN OBSERVERS IN THE ROSS SEA AREA

All four foreign observers on DEEP FREEZE IV visited the Ross Sea sector of Antarctica. Three confined their observations to that area. One, Sir Raymond Priestley, United Kingdom, accompanied USS STATEN ISLAND to Wilkes Station.

The table below summarizes briefly the activities of these observers:

<u>COUNTRY</u>	<u>N. ME</u>	<u>SHIPS</u>	<u>STATIONS</u>
Argentina	LT Alberto Gonzales Riesco	WYANDOT NORTH WIND	McMurdo Little America
Belgium	LT Herve Hutse	NORTH WIND	McMurdo Little America Hallett
Chile	LCDR Jorge <u>LeMay</u> Delano	WYANDOT NORTH WIND	McMurdo Little America
United Kingdom	Sir Raymond Priestley	WYANDOT STATEN ISLAND	McMurdo Little America Hallett Wilkes

During my stay in the Antarctic, I had an opportunity to talk with each of the observers and spent seventeen days aboard STATEN ISLAND with Sir Raymond Priestley and three days aboard NORTH WIND with LT Hutse. All expressed their gratification at the welcome they had been given and the cooperation they received from the officers and men of the ships to which they had been assigned. From the cases that I had occasion to observe, I can confirm these statements. The observers also indicated their satisfaction with what they had seen.

The packets of publications furnished to observers by this office proved satisfactory in giving them general background material. LCDR LeMay and LT Riesco suggested that a copy of the operation plan would have been valuable, and they would also have liked to have had one or two charts of the area on which to record ice observations. It was originally planned to include the unclassified portions of the operation plan among the materials furnished observers but sufficient copies were not available after official distribution had taken place.

Gonzales

LCDR LeMay and LT Riesco made only a brief stay in the Antarctic. They arrived aboard WYANDOT and returned to New Zealand on that same ship, with only a short ~~period~~ on NORTH WIND during a quick trip from McMurdo to Little

APPENDIX IV

ARGENTINE ANTARCTIC INSTITUTE

On 12 March 1959, a visit to the Argentine Antarctic Institute was arranged through the good offices of Lieutenant Alberto Arruiz, Argentine Navy, who had been assigned as liaison officer with Commander Task Group 43.1, and Commanding Officer, USS EDISTO. In the visiting party, besides Captain E. A. McDonald, Commander Task Group 43.1 and Commander H. D. Davison, CO, were this reporter, Dr. H. M. Dater, United States Antarctic Projects Office; Mr. W. H. Littlewood, U. S. Navy Hydrographic Office; and Lieutenant Arruiz. The party was met at the door of the Institute by Captain A. J. Oderra, Deputy Director; Captain C. A. Berticari, Head of the Technical Division; Mr. Enrique Levin, Geophysicist of the Scientific Division; and other members of the Institute's staff. The Director, Rear Admiral Rodolfo N. Panzarini, was at the time in Australia, and Dr. Otto Snyder, Head of the Scientific Division, had left that morning for Europe.

Mr. Levin conducted us on a tour through the Institute's building. It contains a museum, small lecture room, library, and laboratories devoted to the principal scientific fields being investigated in Antarctica, as well as offices for the administrative staff. An opportunity was also presented to inspect the cold weather clothing issued to Argentine scientific personnel. As the many members of the staff taking part in this year's Antarctic expedition had not returned to Buenos Aires, activities were at a low point. The laboratories themselves appeared small and modestly equipped, but are probably adequate for the level of work now being carried on. The library, while somewhat larger than that of the United States Antarctic Projects Office, is still in the process of formation.

After the tour of the building, refreshments were served. This interlude gave an opportunity for informal discussion with members of the staff. After extending an invitation for five persons from the Institute to lunch aboard EDISTO the following Monday, Captain McDonald, Commander Davison, and Lieutenant Arruiz withdrew because of other official engagements. Mr. Littlewood and I remained to discuss with individuals certain matters of particular interest.

While Mr. Littlewood talked with members of the scientific staff, I went over the technical files with Miss Gesine, who has charge of this activity. At my request, it was agreed that a guide should be prepared and forwarded for the information of this office. I also examined the picture files which are in the process of formation.

It was my intention to look further into the library and also to check on the status of the publications exchange between our office and the Institut. As a typical Argentine lunch period, three hours, was then beginning, the clerical personnel who could produce the necessary records had departed. I,

therefore, joined Mr. Littlewood, who was discussing scientific programs with Mr. Levin and others. Among the interesting things we learned was that the Institute was an autonomous organization within the Ministry of Marine and was empowered by law to receive funds from private as well as public sources. Argentine Antarctic expeditions are staffed much as are those of the United States. The military forces set up the bases and furnish logistic support, while the Argentine Antarctic Institute selects the scientists. Besides members of its own staff it draws upon the universities for this purpose.

At my request, Mr. Levin agreed to provide a diagram showing the staffing of the Institute at the present time. It appears unnecessary to go into the organization of the Institute as this subject has been covered in the reports made to this office by the United States official observers during the past few years. The basic laws, a statement of objectives, and plan of organization may also be found in the Boletin del Instituto Antartica Argentino, vol. 1, no. 1, May 1957, copies of which are available in this office.

To complete our investigations, Mr. Littlewood and I arranged to return to the Institute the following Monday morning. Unfortunately, a sudden change in plans caused the unexpected departure of EDISTO from Buenos Aires on 13 March and this second visit had to be delayed almost a month.

On the way back to the United States from the Antarctic, Captain McDonald and I passed through Buenos Aires for a second time. Unfortunately, our stay in the city coincided with a week end so the opportunity to re-visit the Argentine Antarctic Institute was confined to the morning of 20 April, the day of our departure. We did, however, find a few minutes in which to pay our respects to Admiral Panzarini, who had not been present on our previous call.

Admiral Panzarini discussed current operations, commented upon his difficulties in obtaining adequate funds, and pointed out the reliance of the Institute upon naval personnel for carrying out activities that might be better performed by civilian scientists. He did not add significantly to the information furnished by members of his staff.

The reports for which I had asked on my previous visit had been mailed to Washington and have now been received by this office.

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

LIBRARY & ARCHIVES

JAN 25 1960

USAPO/bas
Serial 100
14 August 1959

MEMORANDUM FOR THE DISTRIBUTION LIST

SUBJECT: Forwarding of Report of U. S. Observer with Australian Expedition to Macquarie Island, 1958

The enclosed report, prepared by Mr. William K. Braun, United States official observer with the Australian Expedition to Macquarie Island, 1958, is forwarded for your information and retention.

D. N. TYREE

H. M. Dater

H. M. DATER
By direction

DISTRIBUTION LIST:

OCB	1	USARP	1
OCB/Ant. Working Gp.		U.S. Army Map Service	1
Capt. Kefauver-CNO	1	U. S. Naval Academy	2
Dr. Wexler-WB	1	Commandant, U.S. Coast Guard	1
Dr. Joyce-NSF	3	State Department	2
Mr. Goodwin-USIA	1	Dr. Taylor, House Committee	
Mr. Dykes-CIA	1	on Interior & Insular	
Mr. Owen-State	1	Affairs	1
Mr. Coote-Interior	1	Dr. Siple/Army R&D	1
OSD/Special Operations	1	U. S. Geological Survey	1
R&D/Army	1	Chief, BUSHIPS	1
ACSI/Army	1	Director of Naval History	1
SIPRE/Army	1	OSD/ISA	1
TransTraComd/Army	1	ChTrans/Army	1
CNO (Op-33)	3	DCNO/Logistics	1
DNI	2	Surgeon General/AF	1
Hydro	1	JAG/Navy	1
Hydro (Attn: Code 5430)	1	JCS	1
OMR/Bio.Sci.Div.	1	Dir., Weather Bureau	1
OM Intel/Army	1	Chief, BUPERS	1
ComNavSupFor, Ant.	2	Hon. Edward A. Bacon/Army	1
Dir R&D/AF	6	AEC	1
AF/AFCIN-LB	5	Mr. Ross Peavy/MAS	1
CIA	1	Mr. John H. Jones/MAS	1
Bd. on Geo. Names	1	CDR John Mirabito/FWC	1

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C..

A U S T R A L I A N E X P E D I T I O N
T O
M A C Q U A R I E I S L A N D
1 9 5 8

Report of UNITED STATES
OFFICIAL OBSERVER
WILLIAM K. BRAUN

FOREWORD

The following report was received in the form of a dispatch from the United States Information Service in Melbourne to the United States Antarctic Projects Officer via the Department of State. It records observations made by Mr. William K. Braun on a trip from Melbourne to Macquarie Island and return between 26 November and 19 December 1958. The original has been slightly edited to make it suitable for distribution as a report.

H. M. DATER
Staff Historian

The reporting officer was designated as the official United States observer with the Australian expedition to Macquarie Island, which departed from Melbourne on 26 November 1958 and returned on 19 December. The purpose of the expedition was the annual changeover of personnel on the island and the provisioning of the station for the 1959 party.

The present report will concern itself with general observations of the changeover expedition and the Australian effort at Macquarie Island. It should be noted that the American observer is not a scientist and is not qualified to comment on the scientific equipment or the scientific contributions of the operation at Macquarie.

Macquarie Island is Australian territory and a dependency of the State of Tasmania. The only inhabitants of the island are the teams of men sent each year by the Antarctic Division of the Department of External Affairs to man the station there. The Macquarie Island Station is administered by the Antarctic Division, as are the annual changeover activities.

The expedition was under the leadership of Mr. Don Styles, the Assistant Director of the Antarctic Division. His second in command, and the man who handled most of the details of the unloading of material at Macquarie, was Mr. Richard Thompson, Administrative Officer of the Division.

Macquarie Island is not typical of the Antarctic Division stations. It is completely ice-free at all times and, although there is a great deal of precipitation throughout the year, the 1958 party which returned with the observer from the island reported that in only three or four days had there been enough snow to provide some skiing. Most of the precipitation takes the form of icy rain and sleet that, because of the high winds which usually accompany it, is particularly uncomfortable for personnel. Icebergs are observed rarely, and those familiar with the island indicated that the iceberg which passed the island during the changeover this year was rather an unusual sight.

The Antarctic Division has set up two bases on Macquarie - one at the north end of the island near Buckles Bay, and the other at the southernmost tip, called Hurd Point. The Buckles Bay camp is the principal one. Fifteen of the seventeen men on Macquarie occupy the Buckles Bay camp at all times. Two men stay at the Hurd Point camp and are rotated frequently - at times as often as every two weeks. Because of the existence at Hurd Point of the auroral radar, the scientists involved with this aspect of the program spend longer periods at Hurd Point than do other members of the group. At Green Gorge, a point on the east coast about midway between Buckles Bay and Hurd Point, a camp has been established to provide overnight accommodations for men travelling between the two bases. The only means of travelling from one base to the other is by foot, a hike of about twenty miles over rugged and often dangerous terrain, and the Green Gorge camp exists only to provide a haven between Buckles and Hurd. Buckles Bay, Hurd Point, and Green Gorge

are equipped with two-way radio transmitters to provide means of communication among the camps.

Two routes are normally followed by men travelling between Buckles and Hurd. The shortest route is over the plateau, and is marked by stakes to lessen the chance of becoming lost when frequent and heavy fogs or low clouds settle upon the high ground. The stakes also lessen the danger of falling into bogs which are spotted along the plateau, and are covered with innocent-looking grass. As another precaution the men at Macquarie travel most often in teams of two.

The alternate route followed is along the east coast. It is longer and involves some detouring around high rocks and large concentrations of elephant seals, but has the advantage of being sheltered by the mountains from high winds and the fog. It is generally considered safer because the shingle beach is not as treacherous as the grass-covered plateau.

It is not known whether anyone has ever traversed the west coast on foot. The west coast is exposed to the prevailing winds, and is not considered safe for these trips.

In general, the programs carried out at Macquarie each year are as follows:

1. Weather observations and reporting.

This concerns the usual temperature, precipitation and wind velocity information both at the surface and in the upper air. Each day upper air soundings are made through the use of balloons which are tracked by radar.

2. Cosmic ray observations.

The equipment was installed in 1956 and consists of trays of geiger counters (20 cms. square). The number of mesons are recorded as hourly counts. The normal count has been about 3600 per hour.

3. Aurora australis.

The intensity, position, and duration of the aurora is studied when it is visible at Macquarie. The auroral radar was set up a year ago at Hurd Point, but due to lack of replacement parts it has only operated for a short and unsuccessful time. Spare parts were brought to Macquarie this year, and it is hoped that the radar will be more useful. During the changeover, one accurate base-line measurement was made between the aurora observation points at Buckles Bay and Hurd Point in order to calculate the height of the aurora by use of the two different angles observed at both points.

4. Earth magnetism.

Constant observation is made at Buckles Bay of:

- a. the absolute measurements of strength and direction of the earth's magnetic field;
- b. the fluctuations which occur in absolute values.

For the expedition to Macquarie Island (and also for the later expedition to Mawson and Davis Stations in Antarctica), the Antarctic Division chartered the Thala Dan, a 2,130-ton Danish polar vessel owned by the J. Lauritzen Lines of Copenhagen. The captain of the ship was H. C. Peterson. The Thala Dan is new and was designed for operation in arctic waters.

Because all personnel, equipment and provisions must be off-loaded into smaller craft at Macquarie, the expedition brought along three DUKW's, United States amphibious vehicles of World War II vintage, which had been borrowed from the Australian Army for this purpose. The Army also provided two officers and four driver-mechanics.

In addition to the three DUKW's, the expedition brought with it a Trans-Australian Airways (TAA) helicopter, and a TAA pilot and mechanic. This is the first time that a helicopter was brought to Macquarie Island, and its purpose was both to observe the possibilities of the usefulness of such an aircraft, and to assist in the surveying of the island by surveyors from the National Mapping Office. The stern of the ship was fitted with a temporary wooden platform for landing and take-off operations.

The voyage from Melbourne to Macquarie Island took approximately five days, and unloading operations began on Monday morning, 1 December. There are no docking facilities at Macquarie Island, and it was necessary for the relief ship to anchor about half a mile offshore on the eastern side of the island and to unload personnel and provisions into the amphibious craft mentioned above. This year's relief expedition to Macquarie apparently was somewhat more fortunate than expeditions in the past, because the extremely unpredictable weather at Macquarie Island did not quite live up to its reputation, although it was bad enough. Throughout the three or four days of major unloading operations, the weather did vary a great deal, but rarely became so bad that landing operations had to be suspended. The sea swells provided the biggest obstacles to the unloading of equipment and provisions from the Thala Dan into the DUKW's. The use of cargo slings was never easy nor without danger to the personnel in the DUKW's.

A greater portion of the provisions were unloaded at the north end of the island (Buckles Bay), where the main camp is situated. Smaller amounts of provisions were unloaded at the southernmost tip of the island (Hurd Point).

where a subsidiary base is located. At Green Gorge, about midway between Buckles Bay and Hurd Point, some provisions were landed and stored for use by personnel who might desire to stay overnight at that point during one of the many trips between the northern and southern camps that must be made during the year.

In general, it can be said that landing operations at Macquarie Island are apt to be almost always difficult, not alone because of fog and pounding surf, but also because of the giant kelp which grow along the eastern shore, and the presence of many jagged submerged rocks which make small boat operations rather hazardous. When the sea is rough it becomes almost impossible for craft such as DUKW's to maneuver with any degree of certainty among the dangerous rocks. Despite the lack of maneuverability which can be expected with amphibious landing craft of the type used, the unloading operations would have been quite a bit more laborious without their use. By using DUKW's, the provisions could be pulled up into the main camp and unloaded at the most advantageous points. Without the DUKW's, it would have been necessary to unload at the shore and transport the provisions about 400 to 500 yards to the camp.

With the exception of Hurd Point, all of the unloading operations were carried on on the east coast. The prevailing winds at Macquarie are westerly and are consistently strong enough to discourage any landing on the western coast of the island. It should be noted that although the anchorage at Buckles Bay seems to be safe enough as long as the western wind is blowing, it can become dangerous with a shift of the wind to the east. With one such wind shift it became necessary for the Thala Dan to leave the anchorage and go to sea in order to eliminate the danger of being blown onto the rocks.

The use of the helicopter at Macquarie Island was moderately successful. Actually the wind was too strong and gusty to allow the helicopter to operate more than an hour or so a day. Despite this serious restriction in the flying time of the helicopter, its maneuverability allowed the surveyors and their equipment to be transported quickly to many points on the island. These points would not have been easily accessible by transporting the equipment overland, and would have required the use of more men.

Prior to the changeover operations this year, Macquarie Island had never been accurately measured. Because of the attempt by the Australians to measure the height of the aurora, it became necessary to obtain the exact distance between the two aurora observation stations on the island. This distance now serves as a base line from which computations of altitudes may be obtained by the scientists. Despite the fact that the changeover operations took in all twelve days, the measurement of this distance was not completed until the day before the ship departed from Macquarie, because of the delays caused by weather conditions.

The weather and the nature of the coastline at Macquarie are the biggest difficulties in any operation there. The reporting officer was told that this year's changeover was one of the smoothest in history because the weather was unusually good. It should not be understood from this, however, that the weather was ideal. The expedition leader, Mr. Styles, although he had previously planned out in detail the whole operation at Macquarie, had consistently to change his plan of attack on the problem in order to take every possible advantage of breaks in the weather. Because this changeover is a yearly affair, it apparently has not seemed profitable to the Antarctic Division to make permanent improvements in landing facilities at Macquarie, which would eliminate some of the more serious difficulties. The best landing beach is at Buckles Bay, and if there were more activities at Macquarie probably some arrangements would be made for clearing the landing beach of the kelp and also for removing the more threatening rocks.

The Thala Dan departed Macquarie Island on the morning of 14 December, and arrived at Melbourne on the evening of 19 December. The voyage to and from the island was uneventful, and the sea was moderate.

During the voyage this observer assisted in gathering plankton at various points along the route. Each sample dredging was labeled for future comparisons of type and intensity. The observer also assisted an Australian naval officer, Lieutenant Commander Burnside, in making soundings along the approach to Macquarie at those points where depth of the ocean is not known. Lieutenant Commander Burnside will also accompany the next expedition to Wilkes. He is doing observation work for the Navy and particularly for the Hydrographic Office.

At Macquarie this observer served on two working parties. He assisted in the demolition of two small sheds, and the beginning of the building of a new recreation room. In addition he was assigned to the stand-by rescue party for the helicopter operation, but fortunately his services were not needed in this capacity.

Comments on the Macquarie Island Station:

1. Personnel,

In addition to the officer-in-charge, the medical officer, and several maintenance men, each group at Macquarie Island includes a number of young scientists who spend the year recording data obtained from the scientific equipment there. Actually these men are normally fresh from university with little or no practical experience, who apparently are attracted to Macquarie, both because of the opportunity to enhance their careers through the experience offered, and because of the lure of adventure in what they consider one of the frontiers of science. None of the scientists at Macquarie have been men of any standing for two reasons:

a. established scientists are unwilling to spend a full year at the station;

b. the Macquarie station's prime purpose is to report data to the various scientific agencies in Australia where the actual work of correlation is done. Under the circumstances, alert young science graduates can perform the job of recording data adequately enough.

The handling of personnel at Macquarie is apparently not easy. Between the yearly visits of the changeover ship, the only communication between Macquarie and the Australian mainland is by wireless. Radio reception is good, but even on the short thirteen-day stay by this observer the feeling of isolation was obvious. Several of the men of the new 1959 party confided to the observer that they were not so certain that they could "take" this isolation for the whole year, despite the fact that they had known the situation before they agreed to come. In the interest of economy the men send groups of five-letter code words to the Antarctic Division in Melbourne which are decoded and forwarded to their respective families. A rather impersonal and public way of communicating with home.

In addition to the feeling of having cut all familiar ties for a year, there are apparently quite a few personality clashes throughout a normal year. Despite popular belief that there are many applicants for jobs at Macquarie, the Director of the Antarctic Division told this observer that he has very few men to choose from, and that although these are carefully screened men are sent there who are too often psychologically unfit.

Few of the men at Macquarie expect to remain permanently with the Antarctic Division. They are seconded to the Division from other Government Departments such as the Army or the Meteorological Office or Commonwealth Scientific and Industrial Research Organization, and return there after the year at Macquarie. There is no way of disciplining these men, with the result that the job of officer-in-charge at Macquarie is considered an unenviable one. Mr. Phillip Law, Director of the Antarctic Division, has been denied the right, by the Public Service Commission, to deduct amounts from pay checks or to lower salaries as disciplinary measures to back up his officer-in-charge. The men, of course, can not be discharged during the year, nor is there any way to make them work should their interest begin to lag.

The above should give an indication of some of the difficulties of administration at Macquarie. The officer-in-charge is a responsible officer with little but the power of respect and persuasion to help him get the job done. For this reason, the Division concentrates on the quality of the ability to handle men when choosing an officer-in-charge. The last two have been Army men. The leader of the 1958 party, Major Fred Baines, will now return to the Army. The 1959 leader, Mr. Tom Harwood, is retired from active

duty and expects to remain with the Division after his return. Major Baines told the observer that his most difficult job was to forget his Army techniques and to become companion and chaplain and amateur psychiatrist during the year.

In addition to the Macquarie Island personnel administration problem, the Antarctic Division is too small to provide promotion opportunities for good men with experience in Antarctic work. Mr. Dick Thompson, the administrative officer who was second in command during the changeover activities, has firsthand knowledge of Antarctic work, but will be leaving the Division shortly because of the promotion problem. The relatively smooth operations this year during the changeover were largely the result of Thompson's experienced hand, and he will be hard to replace. This is also the opinion of Mr. Law, and he is quite concerned particularly because administrative burdens will be increased with the assumption of administrative duties at Wilkes this year.

2. Living and working conditions at Macquarie.

In some ways closely related to personnel problems at Macquarie are the living and working conditions.

Of necessity the year is spent in close living conditions. With the exception of the officer-in-charge and the medical officer, all the men at the main camp live in one long but rather narrow wooden building which was started a year ago and completed during 1958. Each man has a cubicle about seven feet by six feet in size with a curtain for a door. The single bunk rests on top of an open-front storage chest about six feet from the floor. A writing table has been built into a nook formed by the storage chest on one side, the wall on the other and the bunk on top. There is a small window about the size of a ship's porthole over the bunk, and a slightly larger one over the desk.

Although the single cubicles are an improvement over the days when each man had only a bunk in a common room, some of the men still believe that more privacy is desirable for morale.

At the main camp at Buckles Bay the men eat together in a rather disreputable hut attached to an equally disreputable kitchen. This too is a wooden building, but has not been kept in good repair because it is scheduled to be replaced in 1960, and the men's spare working time has been spent in building, and in repairing buildings which will not be replaced in the near future.

A new recreation room, which will serve as a poolroom, movie house, lounge, and cardroom, was started during this changeover and its completion will be the building project for 1959. A small library, which is at present in the old recreation room attached to the mess hall, will be moved to another small building which will serve as a reading room. Presumably, the

old recreation room will be torn down, but might be retained as a sort of common room where those who wish can gather over their daily beer ration without disturbing those who wish to read or attend a movie. The yearly movie supply is exhausted usually during the first month, and the rest of the year is spent in replaying the favorites, a practice which has frequently split the camp into pro- and anti-movie groups, with some arguments resulting as long as only one general recreation room was available.

Because of the daily recording and reporting tasks at Macquarie, there are really no holidays during the year. Arrangements are made where possible to shift personnel temporarily to allow occasional days off. This is within the prerogative of the officer-in-charge, and probably varies depending upon the versatility of the year's personnel and the extent of their cooperation. The scientific equipment is housed in individual wooden or painted galvanized-sheathed huts spotted about the peninsula at Buckles Bay. According to the men who have been working there, the whole camp could be better placed in the lee of one of the hills on the northeast coast. At present it is strung out along the peninsula and open to the west wind which makes work needlessly difficult. It would probably be better also to enclose the camp in some way to prevent having to pick one's way through hundreds (and during the breeding season, thousands) of elephant seals which live in the camp. The stench is considerable, and the wallows which these beasts make are not pleasant places to fall into in the dark.

The above comment was made to illustrate a criticism of the Macquarie station by some members of this year's party. The lack of personnel to handle construction and maintenance has given the camp a temporary look which is deceptive. There is nothing temporary in the thinking of the Antarctic Division about the station, but several members of this year's party commented that the low budget made it look as if the whole project was about to be abandoned. This accounts in part for the first disappointed remarks by the young scientists observing their home and workshops for the year. A noticeable improvement in their attitude became apparent before the Thala Dan left Macquarie for the return trip. This was after they had taken over their duties and established their routines.

The comments on living and working conditions made above might create the wrong impression unless it is remembered that the problem is one of budget rather than uncertainty of purpose or unconcern of the Director and his staff in Melbourne. The Antarctic Division budget is spread thinly among its stations, and scientists must double as stevedores, rock breakers, builders, and maintenance men. Under the circumstances, the Antarctic Division apparently accomplishes a great deal at Macquarie from a small outlay of money. An appraisal of the physical make-up of the station there, without taking this into consideration, would give a false impression of the Antarctic Division itself. The reporting officer does not know the size of the budget allotted to the administration of Macquarie. The budget for the operation of the Antarctic Division is, of course, part of the whole problem of financing all Government Departments.

3. Equipment.

All equipment used in the changeover was borrowed from the Army and Trans-Australian Airways and will be returned. At Macquarie the only piece of movable equipment is a bulldozer fitted with an earth-moving blade. It has no attachments such as winches which would be invaluable during the unloading operations each year. The bulldozer is kept at the main camp, and there would be no way of getting it to Hurd Point or to Green Gorge except by sea. Even this would be quite a job with the condition of the beach and sea at those points. Its main use at Buckles Bay is to pull sleds of provisions or equipment about the camp, and to level the sandy soil for building sites.

The generators which provide electric light and power are diesel-operated, and the powerhouse at the main camp is new.

Part of the camp is centrally heated, and includes the recreation room, the bunkhouse and the mess hall. The more isolated scientific huts are heated by kerosene heaters, but all storage huts are unheated.

The food freezer at Buckles Bay holds enough fresh meat for about six months' operation for the fifteen men normally living at the main camp. If the meat were prepared and waste removed, it would probably last almost all year, but the freezer each year is loaded with whole legs of lamb. The frozen meat and bone supply is supplemented by tinned meat, and the 1958 party seemed very content with the quantity and quality of the food. The other camps must rely on tinned food alone.

4. Clothing.

The weather at Macquarie is such that the clothing must be very versatile. There are no deep snows nor dangerously cold temperatures, but the island is noted for its quick changes in weather conditions. High wind is common, and with it can come most uncomfortable and blinding rain, sleet, or hail and driven snow. Special snow equipment and clothing are not needed even for those days during the year when snow occurs.

The sudden changes in the type of weather has caused the Antarctic Division to abandon any clothing that cannot be lightened easily during a walking tour of the island. Two types of outer garments are issued. One is a two-piece heavy waterproof outfit consisting of a treated pullover and trousers, which is worn over a sweater and either khaki shirt and trousers or a blue one-piece coverall. The waterproof is popular in that it does keep the men dry, but some complaints have been heard from those who find it too warm for normal hiking operations and useful only when the weather is at its worst. The other outer garment is a lightweight but tightly woven cotton windbreaker, also of two pieces. The jacket of this one opens by means of

a zipper, and allows more ready changes with weather conditions. It is a very efficient windbreaker, but not successful in keeping out the wet weather. This observer wore this type and was soaked through on several occasions. It would be better to have a lightweight windbreaker treated to withstand the rain and sleet, but which could be opened easily when the wearer became warm. Both waterproof and windbreaker were fitted with hoods which are indispensable.

The shoes used are black leather high-tops with heavy composition soles. They are waterproofed and most successfully so. They are heavy enough to allow walking along rough shingle beaches or rocky ground without bruising the feet. The heavy leather tops which rise above the ankle are good protection from the danger of twisted ankles, and the hard toe is excellent protection from falling weights. Relatively soft calf-length boots issued in previous years have been abandoned. The observer found that the worst terrain could be travelled with some confidence with the shoes provided him. The shoes are so heavy and inflexible, however, that two pairs of heavy woolen socks were needed to prevent blisters.

Absolutely no snow or ice equipment or clothing exists for working purposes at Macquarie Island. Several pairs of skis are there for recreation purposes only, but were not used at all during 1958.

Listed below are the names and designations of the members of the 1959 party at Macquarie. This list will indicate the normal staffing pattern there.

Officer-in-Charge	Thomas R. Harwood
Medical Officer	Stefan Csordas
Physicist	John Munro
Physicist	Philip R. H. Sulzberger
Geophysicist	John Hollingsworth
Senior Weather Observer	Ian Black
Weather Observer	Noel D. Foley
Weather Observer	George Casayas
Weather Observer	Ortwin Bode
Senior Technical Officer (Radio)	Deryk W. Smith
Technical Officer (Ionosphere)	Corporal Brian G. Bell
Radio Supervisor	Clive H. Cooke
Radio Officer	Keith R. McDonald
Radio Officer	David O. Keyser
Diesel Mechanic	Harry Redfearn
Carpenter	Adrian B. Dean
Cook	John O'Keefe

Dr. Csordas, who was medical officer at Macquarie Island in 1955 and 1957, is the only member of the party with previous Antarctic experience.

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

COAST & GEODETIC SURVEY
LIBRARY & ARCHIVES

JAN 25 1960

USAPO/bas
Serial 102
18 August 1959

MEMORANDUM FOR THE DISTRIBUTION LIST

SUBJECT: Forwarding of Report of U. S. Observer with Chilean Antarctic Expedition, 1958-59

The enclosed report, prepared by Mr. Neil Hinckley, United States official observer with the Chilean Antarctic Expedition, 1958-59, is forwarded for your information and retention.

D. M. TYREE



JOHN CADWALADER
By direction

DISTRIBUTION LIST:

OCB	1	USARP	1
OCB/Ant. Working Group		U. S. Army Map Service	1
Capt. Kefauver - CNO	1	U. S. Naval Academy	2
Dr. Wexler - Weather Bur.	1	Commandant, U. S. Coast Guard	1
Dr. Joyce - NSF	3	State Department	2
Mr. Goodwin - USIA	1	Dr. Taylor, House Committee on	
Mr. Dykes - CIA	1	Interior & Insular Affairs	1
Mr. Owen - State Dep't	1	Dr. Siple/Army R&D	1
Mr. Coote - Interior	1	U. S. Geological Survey	1
OSD/Special Operations	1	Chief, BUSHIPS	1
R&D/Army	1	Director of Naval History	1
ACSI/Army	1	OSD/ISA	1
SIPRE/Army	1	Chief of Transportation/Army	1
TransTraComd/Army	1	DCNO/Logistics	1
CNO (Op-33)	3	Surgeon General/AF	1
DNI	2	JAG/Navy	1
Hydro	1	JCS	1
Hydro (Attn: Code 5430)	1	Director, Weather Bureau	1
ONR/Bio. Science Division	1	Chief, BUPERS	1
QM Intel/Army	1	Hon. Edward A. Bacon/Army	1
ComNavSupFor, Antarctica	2	AEC	1
Dir R&D/AF	6	Mr. Ross Peavy/NAS	1
AF/AFCIN-1B	5	Mr. John M. Jones/NAS	1
CIA	1	CDR John Mirabito	1
Board on Geographic Names	1		

FOR OFFICIAL USE ONLY

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

C H I L E A N A N T A R C T I C
E X P E D I T I O N
(1958 - 1959)

Report of UNITED STATES
OFFICIAL OBSERVER

NEIL HINCKLEY

FOR OFFICIAL USE ONLY

TABLE OF CONTENTS

	<u>Page</u>
I. ABSTRACT	1
II. SCOPE AND ACCOMPLISHMENTS OF THE EXPEDITION	2
A. Purpose of the Expedition	2
B. Organization and Forces Assigned	2
1. Responsible Organizations	2
2. Organizations and Personnel of Task Force	3
3. Forces Assigned	5
C. Scope of the Expedition	6
D. Accomplishments of the Expedition	6
1. General Accomplishments	6
2. Construction and Installations	7
3. Scientific Work	7
III. EXPEDITION NARRATIVE	9
1958	9
1959	12
IV. BASES AND EQUIPMENT	23
A. Illustrations	23
B. General Information	23
C. Description of Bases and Facilities	23
1. Arturo Prat Naval Base	23
2. General Bernardo O'Higgins Army Base	30
3. Presidente Pedro Aguirre Cerda Air Force Base	36
4. Presidente Gabriel González Videla Air Force Base	41
D. Other Installations	46
1. Radio Beacon, Telefon Bay, Deception Island	46
2. Summer Emergency Shelters	47
3. Navigational Aids	48
V. USE OF EQUIPMENT	49
A. Ship Operations	49
B. Air Operations	50
C. Trail Operations	50

	<u>Page</u>
VI. EXPEDITION SCIENTIFIC PROGRAM	52
A. Chile's Scientific Program in the Antarctic	52
B. Chilean IGY Disciplines	53
1. Aurora and Airglow	53
2. Seismology Recordings	54
C. Chilean Non-IGY Programs	56
1. Hydrographic and Oceanographic Work	56
2. Tide Observations	57
3. Meteorological Observations	57
4. Geography and Topography	58
5. Collection of Flora and Fauna	58
VII. MISCELLANEOUS EXPEDITION SIDELIGHTS	59
A. 1957-58	59
1. Loss of Two Officers on Exploration Party	59
2. The Fire at O'Higgins Base	59
3. The Loss of Risopatron Base	60
B. 1958-59	60
1. Visit of Chilean Tourist Ship, <u>Navarino</u>	60
2. Fire on Board LIENTUR	61
3. Chilean Antarctic Training Program	63
4. Recreational Facilities	65
5. Amateur Radio Information	66
6. Chilean Antarctic Clothing	66
7. Chilean Antarctic Budget	66
VIII. ANTARCTIC MANAGEMENT	67
A. The Antarctic Statute	67
B. Chilean Antarctic Institute	68
C. Chilean Antarctic Commission	68
D. Rights of Chile in the Antarctic	70
1. Historical Proofs	70
2. Geographic Proofs	71
3. Legal Proofs	71
4. Diplomatic Proofs	72
5. Administrative Proofs	72
E. Fraternization with the British and Argentines	73
F. Chilean Trends in Antarctica	73

	<u>Page</u>
IX. OBSERVER REQUIREMENTS	75
X. EXPEDITION BIOGRAPHIES	76
A. Malcolm Kevin BURKE	76
B. Captain Ramón BARROS González	76
C. Capitán de Fragata Luis GAUCHE Délano	77
D. Colonel Hector MARTINEZ Amaro	77
E. Colonel Eduardo SAAVEDA Rojas	78
F. Base Leaders	78
XI. APPENDICES	80

FOR OFFICIAL USE ONLY

I. ABSTRACT

This report contains the observations made by Mr. Neil Hinckley, who accompanied the 13th Chilean Antarctic Expedition as United States observer. The information was obtained between 3 December 1958 and 1 April 1959.

The report presents material on the purpose, scope, and accomplishments of the 1958-59 expedition; discusses the logistical, scientific, technical, and political aspects behind the operation; and includes a condensed observer's journal. Photographs and bibliographical information have also been attached to the report.

Since a United States observer accompanied the 11th Chilean Antarctic Expedition (1956-57), details submitted in that report will not be repeated but only supplemented by this text. Highlights of the 12th Chilean Antarctic Expedition (1957-58) will, however, be given when pertinent, as no United States observer accompanied that expedition.

NOTE: Photographs and other material submitted with the original manuscript are on file with the United States Antarctic Projects Officer.

FOR OFFICIAL USE ONLY

II. SCOPE AND ACCOMPLISHMENTS OF THE EXPEDITION

A. Purpose of the Expedition.

The 13th Chilean Antarctic Expedition (La XIIIa Comisión Antártica) was commissioned to accomplish the following tasks:

1. To reprovision the four permanent Chilean Antarctic bases, and to relieve the 1958 wintering-over personnel at these locations.
2. To inspect, repair, and improve the four bases, seven emergency shelters (refugios), and one radio beacon installation.
3. To conduct hydrographic and oceanographic studies for the verification and amplification of regional navigation charts.
4. To continue scientific study in the fields of geography, geodesy, seismology, and meteorology, as a contribution to the international effort in the Antarctic.
5. To perform various functions and explorations in support of the sovereignty claim to the Chilean sector (53°W. to 90°W.) of the Antarctic.
6. To service and repair Chilean navigational aids in the Antarctic.

The degree of accomplishment in the performance of the preceding tasks will be discussed in detail in subsequent chapters of this report.

B. Organization and Forces Assigned.

1. Responsible Organizations.

The organization of La XIIIa Comisión Antártica was under command of the Ministerio de Defensa Nacional, which delegated all operational responsibility to the Commander in Chief of the Navy who assigned the responsibility for all logistical support and the execution of the Antarctic operation to the Antarctic Naval Task Force.

FOR OFFICIAL USE ONLY

2. Organization and Personnel of Task Force (División Antártica).

a. Commodore and Staff:

Capitán de Navío Ramón BARROS González	Commodore
Capitán de Fragata Víctor VARELA Lamas	Operations
Capitán de Corbata Roberto SALDIVIA Muñoz	Cargo
Capitán de Corbata Carlos WERNEKINCK Armstrong	Dentist
Teniente 1° Lorenzo MORALES González	Surgeon
Teniente 2° Gonzalo RAMIREZ Zepeda	Communications
Teniente 2° José MAYORAL González	Electronics
Teniente 2° Carlos MONCKBERG	Chaplain

b. AO MAIPO (Flagship):

Capitán de Fragata Luis GAUCHE Délano	Captain
Capitán de Corbata Gastón GUTIERREZ Gallegos	Executive
Teniente 1° Germán GUESALAGA Toro	Secretary & ships pilot
Teniente 1° Gustavo VIRGILIO Oddó	Chief Engineer
Teniente 2° Guillermo GARCÍA Lemaitre	Electronics
Teniente 2° Antonio MAZZEI Fernández	Assistant Navigator
Teniente 2° Gastón SILVA Cañas	Supply Officer
Subteniente Raúl MONSALVE Poblete	Engineer
Teniente 2° Julio PRINCE de la Barra	Deck Watch

c. ATA LIENTUR:

Capitán de Corbata Hugo ALSINA Calderón	Captain
Teniente 2° Gabriel TRONCOSO Daroch	Executive
Teniente 2° Jorge FELLAY Fuenzalida	Watch
Teniente 2° Raúl FLORES Veas	Watch

d. ATA LAUTARO:

Capitán de Corbata Pedro SALLATO Pouchocq	Captain
Teniente 2° Miguel MENDEZ Ravanal	Executive
Teniente 2° Mariano SEI'ULVEDA Mattus	Watch
Teniente 2° Gustavo PFEIFFER NieIdbalski	Watch

d. Delagaciones (Staff representatives of Armed Forces):

(1) Estado Mayer de las Fuerzas Armadas:

Teniente Coronel Alfonso REYES Varas	Representative of the Joint Chiefs of Staff
--------------------------------------	--

(2) Ejército (Department of Army):

Teniente Coronel Osvaldo ARRATIA de la Jara	Representative of the Commander in Chief of Army
Teniente Coronel Hernán ESPINOSA Bobadilla	Chief of Army, Antarctic Section
Major Enrique GILLMORE S.	Geographer
Capitan Ricardo CEPEDA N.	Geologist
Capitan Gastón CESPEDES A.	Electronics Officer
Teniente Suigo LOPEZ F.	Cargo and Construction Officer

(3) Fuerza Aérea (Department of the Air Force):

Comandante de Grupo Renato L. NISZIEWSKI Ciudad	Representative of the Commander in Chief, Air Force
Teniente Vicente RODRIGUEZ Bustes	Chief Secretary, Air Force, Antarctic Section
Capitán Guillermo NAVARRO V.	Flight Engineer
Teniente Nelson SEPULVEDO B.	Helicopter Pilot

f. Bases Antártica:

(1) Ejército (Army base):

Capitán Tarcisio ROSAS Thomas	Base Commander - "O'Higgins"
-------------------------------	------------------------------

(2) Armada (Navy base):

Teniente 1° José DELIZ Salinas	Base Commander - "Arturo Prat"
--------------------------------	--------------------------------

(3) Fuerza Aérea (Air Force Bases):

Comandante de Grupo Enrique M. URIN Costa	Chief of Antarctic bases - FACH
Capitán de Bandada Hernán ROJAS Lemn	Base Commander - "González Videla"
Capitán de Bandada Silvestre M. HUSIER Peña	Base Commander - "Aguirre Cerda"

g. Civilian technicians:

Luis ESPINOZA L.	Heating Unit Engineer	Navy Contract
Luis PIZARRO A.	Construction Engineer	Navy civilian employee
Cipizano MOLINA F.	Cargo Handling	Navy civilian employee
Millan TORO S.	Chief Meteorologist	Air Force civilian employee
Ivan GONZALEZ J.	Meteorologist	Air Force civilian employee

h. Additional personnel:

Tomas AMENABAR V.	Representative from the Chilean Ministry of Exterior Relations
Neil HINCKLEY	United States observer
Malcolm BURKE	United States free-lance writer and reporter from Peru

3. Forces Assigned.

a. Expedition Ships:

<u>Type</u>	<u>Name</u>	<u>Size</u>	<u>Remarks</u>
Fleet Oiler (AO)	MAIPO	7,562 T	Flagship of the Expedition
Patrol Ship (ATA)	LIENTUR	600 T	Former ATA of U. S. Navy
Patrol Ship (ATA)	LAUTARO	600 T	Former ATA of U. S. Navy

b. Additional Relief Ships:

Patrol Ship (ATA)	LEUCOTON	600 T	Towed crippled LIENTUR back from the Antarctic
Frigate	IQUIQUI	1,100 T	Failed to accomplish the assigned task of transporting 1958 wintering-over personnel back to Chile.

c. Expedition Aircraft:

One two-seater Bell (47DI) helicopter, Chilean Air Force aircraft assigned to and operated from MAIPO, used for ice reconnaissance and for the ship-to-shore transportation of supplies and personnel.

d. Expedition Personnel:

Approximately 491 men took part in the 1958-59 Chilean Antarctic Expedition. This number includes:

(1) 44 Air Force personnel, 52 Army personnel, and 370 Navy personnel.

FOR OFFICIAL USE ONLY

(2) 22 Civilian technicians and construction workers.

(3) Two representatives from the United States (an observer and a reporter).

(4) One representative from the Ministry of Exterior Relations.

37 men remained to winter over at the four permanent bases.

C. Scope of the Expedition.

The first unit of the expedition, comprised of MAIPO, LIENTUR, and LAUTARO, sailed from Punta Arenas, Chile, on 25 December 1958, and arrived at Discovery Bay, Greenwich Island, on 1 January 1959. The zone of operations of the three ships was in the area of the South Shetland Islands and along the west coast of the Palmer Peninsula. The flagship MAIPO operated in the vicinity of either Discovery Bay, Greenwich Island, or Pendulum Cove, Deception Island, while LIENTUR and LAUTARO operated in the Bransfield and de Gerlache Straits from King George Island on the north to Anvers Island on the south. All of the work of the expedition was completed by 8 March 1959, when the three ships, accompanied by LEUCOTON, departed from the Bransfield Strait, arriving at Punta Arenas on 13 March 1959.

D. Accomplishments of the Expedition.

The 1958-59 Chilean Antarctic Expedition accomplished all of the objectives which had been planned with the exception of the exploration cruise which was to have established sovereignty for the country in the Marguerite Bay region. The crippling of LIENTUR in the early part of February had placed additional burdens on the remaining ships, curtailing endeavors to that end. The inability of IQIQUI to penetrate the ice field and return the 1957-58 wintering-over personnel to South America forced LAUTARO to make an unscheduled, mid-season run to Punta Arenas in order to perform the task.

In spite of these unforeseen obstacles and the occurrence of several periods of high winds, the program which was planned was satisfactorily fulfilled with a high degree of efficiency and morale.

1. General accomplishments included:

- a. Relief of personnel and reprovisioning of the four permanent bases.
- b. Re-supplying and renovating the two temporary shelters at Yankee Harbor, Greenwich Island, and Coppermine Cove, Robert Island.
- c. Re-lighting and servicing five channel beacons (faros): the Pilot Pardo and Arthur Prat beacons on Robert Island; Leucoton and Carlos Condell beacons in the de Gerlache Strait; and the Andressen beacon at Pendulum Cove, Deception Island.

FOR OFFICIAL USE ONLY

d. Operating and re-servicing the radio-beacon at Telefon Bay, Deception Island.

e. Escorting the tourist ship Navarino (Chilean) during its visit to the Antarctic.

2. Construction and Installation.

a. Construction of a new emergency supply shelter at O'Higgins Base (named after Teniente Oscar A. INESTROZA).

b. Construction of an additional wing (50 by 20 feet) to the main building at Prat Base in order to provide for larger storage and working area.

c. Installation of a central hot-air heating system at Prat Base (contracted by Soclima Company, Viña Del Mar).

d. Installation of three additional diesel oil storage tanks (35,200 liter capacity each) at Prat Base to provide fuel for heating system.

e. Construction of an enclosed wooden storm porch (6 by 8 feet) at the main entrance to Aguirre Cerda Base.

f. Installation of a reservoir tank (2000 liter capacity) for the collection of fresh water from the snow-melt streams at Aguirre Cerda Base.

g. Installation of two 20,000 liter diesel oil storage tanks; one at each of the two Air Force bases, Aguirre Cerda and González Videla.

h. General interior and exterior renovations at the four permanent bases - Prat, O'Higgins, Aguirre Cerda, and González Videla.

3. Scientific Work.

a. Geodetic and geographic observations were conducted in the areas of O'Higgins and González Videla Bases by personnel of the Instituto Geografico Militar, Major Gillmore and Capitan Cepeda.

b. Three daily meteorologic observations were conducted on board MAIPO and at the four permanent bases, for recording and transmitting once daily to the Air Force Meteorological Center in Santiago, Chile.

c. Daily seismological observations were conducted at O'Higgins Base. Any sign of disturbance in the earth's surface was recorded and the data immediately radioed to the University of Chile and then relayed to the United States.

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

d. Hydrographic rectification of the east coast of the de Gerlache Strait from Trinity Island south to Cape Anna.

e. Detailed sounding of Pendulum Cove, Deception Island, and amplification of soundings in the area of the de Gerlache and Bransfield Straits.

f. A total of eleven oceanographic stations (bathometric observations) were made in the Drake Passage, Bransfield Strait, and in Pendulum Cove, Deception Island.

g. Tidal observations were conducted in Pendulum Cove, Deception Island, during the month of February.

h. Collection of flora, fauna, and geological specimens were made in the vicinity of the four permanent Antarctic bases.

III. EXPEDITION NARRATIVE

The following is a log covering the activities of the expedition and the role of this observer from 28 November 1958 to 2 April 1959.

During the expedition this observer was able to travel on each of the three ships assigned to the Chilean expedition, as well as to visit each of the four permanent Chilean Antarctic bases. These journeys also included visits to both British (Base B) and Argentine (Primero de Mayo) bases, as well as to the various emergency huts and light beacons maintained by the Chilean expedition.

The area of travel extended from Punta Arenas, Chile, to Paradise Harbor (on the west coast of the Palmer Peninsula at 64°52'S., 62°54'W.). The area of operations included parts of the northwest coast of the Palmer Peninsula, islands of the South Shetland Island Group, as well as the de Gerlache, Bismarck and Bransfield Straits.

1958

28 November - Departed Washington, D. C., for Santiago, Chile, via Pan American Flight No. 701.

29 November - Arrived Santiago. Was met at airport by Lieutenant Commander Bruce E. Prum, USN, Assistant United States Naval Attache at Santiago, and Capitán de Fragata (Commander) Víctor BUNSTER del Solar, Chilean Naval Liaison Officer, who assisted me in clearing customs and in obtaining accommodations at the Hotel Carrera. Arranged official appointments with both on Monday, 1 December.

30 November - Busy getting re-acquainted with Santiago.

1 December - Santiago: Checked in at United States Embassy. Reported to Captain A. M. Savage, United States Naval Attache at Santiago, and LCDR Prum, and in turn was introduced to Malcolm K. Burke, United States freelance writer from Peru, who, at the request of the Chilean Navy, would also accompany the 13th Chilean Expedition to the Antarctic. Visited Commander Víctor Bunster and paid my respects to Admiral Jorge BOLARESQUE Buchanan, Chief of Staff of the Chilean Navy, who welcomed me officially as the United States observer. Arranged to meet the Commodore of the 13th Chilean Expedition and the civilian chief of the Antarctic Section of the Ministry of Foreign Relations on 3 December.

2 December - Santiago: Visited with Dr. Larissa LOMNITZ, head of the Department of Geophysics at the University of Chile and was told by him that no civilian scientists would accompany the 13th Chilean Expedition. He also said that the plans for a Chilean Antarctic Institute had been

FOR OFFICIAL USE ONLY

temporarily abandoned, due to lack of funds, and that the Chilean Antarctic International Geophysical Year Program would be disbanded as of 31 December 1958.

- 3 December - Santiago: Visited with Capitán de Navío (Captain) Ramón BARROS González, newly appointed Commodore of the 13th Chilean Antarctic Expedition and was informed that the expedition would depart from Valparaiso on or about 15 December, and that I would be given accommodations aboard the MAIPO, flagship of the expedition. Commander Bunster introduced me Señor Tomás AMENABAR Vergara, Chief of the Ministry of Foreign Affairs, and I was told that he would accompany us on the expedition. Left a request for certain information to be compiled by his office staff during my stay in the Antarctic. (At this time General Gregoria RODRIGUEZ Tascon, President of Chile's International Geophysical Year Committee and head of the nation's Foreign Relations Affairs Commission, was attending a boundary claims conference in Buenos Aires and I was unable to pay my respects to him.)
- 4 December - Santiago: At the invitation of Mr. Philips, United States Information Service Chief in Santiago, I reviewed a Chilean film on the Antarctic and obtained from his office a quantity of film and several books for the expedition.
- 5-8 December - Santiago: Holiday weekend.
- 9 December - Santiago: Talked with Major Saldia, assistant to General Rodríguez, and arranged a meeting with Colonel Eduardo Saavedra, director of the Institute of Military Geography (Instituto Geográfico Militar). Obtained an official letter of introduction from the United States Embassy and circulated it through the various Chilean offices contacted.
- 10 December - Santiago: Visited Colonel Saavedra, who presented me with an autographed copy of his book, Base O'Higgins, published in 1948. My request for certain printed material and bibliographic information was favorably received, and I was promised that it would be available when I returned from the Antarctic. (General Cañas Montalva, President of the Institute of Geodesy and Geophysics (Instituto de Geodesia-Geofísica) was on leave at this time and therefore unavailable for an interview.) Visited with Colonel Hector Martinez, Chief of the Antarctic Section of the Chilean Navy, and was presented to General Bernardino PARADA Moreno, Chief of the Joint Staff of the Armed Forces (Jefe del Estado Mayor de los Fuerzas Armadas). Had an informal visit with Señor Carlos VIÁL Trijantre, Minister of National Defense, in the company of Lieutenant Colonel Alfonso REYES Vares, a member of the joint staff of the Armed Forces. (Colonel Reyes was also accompanying the expedition to Antarctica.)

FOR OFFICIAL USE ONLY

- 11 December - Santiago: LCDR Prum informed me that MAIPO was to leave Valparaiso on 15 December and that arrangements had been made to take me to Valparaiso in the morning. Made the necessary preparations for leaving.
- 12 December - Valparaiso: Traveled by car from Santiago to Valparaiso, accompanied by LCDR Prum. Reported to Captain Beeche, Chief of Staff, First Naval District (Zona). Met with Capitán de Navío Alberto ANDRADE, Director of the Department of Navigation, who offered his assistance in securing needed information for my report. Checked in at Hotel Prat for the weekend.
- 13-14 December - Weekend in Valparaiso and Vina Del Mar.
- 15 December - Valparaiso: Checked out of Hotel Prat. Reported to Commander Luis GAUCHE Délano, Commander of MAIPO, and was assigned quarters. Witnessed the official farewell ceremony at the Valparaiso Navy pier alongside the flagship. Left Valparaiso for Punta Arenas; ATAs LIENTUR and LAUTARO were to join MAIPO in Punta Arenas.
- 16-21 December - MAIPO enroute from Valparaiso to Punta Arenas via the inland waterway. Relief personnel, supplies, and equipment for O'Higgins Base and Prat Base on board.
- 22-24 December - Punta Arenas: Relief personnel, equipment and supplies for Aguirre Cerda Base and González Videla Base taken on board. (Relief personnel were flown to Punta Arenas in two Air Force C-47s.) LIENTUR and LAUTARO were relieved of other assignments and joined the expedition at Punta Arenas.
- 25 December - MAIPO: Enroute from Punta Arenas to Port Williams.
- 26 December - Arrived Port Williams. Lumber and building supplies taken on board MAIPO. Accompanied Commodore Barros ashore while he paid his respects to Commander Aragay, commanding officer at the port.
- 26-31 December - MAIPO: Accompanied by LIENTUR and LAUTARO, crossed the Drake Passage and arrived at Discovery Bay, Greenwich Island. (This bay is called by the Chileans Bahía Soberanía - Sovereignty Bay.) A large field of heavy pack-ice encountered by the ships 90 miles north of the Shetland Islands group had to be skirted, lengthening the estimated time of crossing by three days.

1959

- 1 January - MAIPO: Anchored at Discovery Bay with LIENTUR and LAUTARO alongside - the day was declared a holiday for all personnel. Accompanied the first party ashore to visit Prat Base. 1957-58 Base Commander Teniente 1° (DC) (Lieutenant) Octavio CHILO Moya conducted me on a tour of the base and the surrounding area, obtained photos of the base and its personnel at various activities.
- 2 January - MAIPO: Anchored at Discovery Bay: MAIPO off-loading onto the LIENTUR with cargo for Air Force base, González Videla; LAUTARO receiving cargo for Army base, O'Higgins. The Chilean Air Force's "Panga" (personnel landing launch) off-loaded from MAIPO and was used to transport supplies, building materials, and a summer construction crew to Prat Base. MAIPO's helicopter made a flight to Coppermine Cove, Robert Island, to check the condition of an emergency hut (refugio). The British Antarctic supply ship SHACKLETON (FIDS) entered the Bay, anchoring near MAIPO. Attended a dinner party at Prat Base, given in honor of the Commodore and the 13th Chilean Antarctic Expedition.
- 3 January - Aboard MAIPO anchored at Discovery Bay: LIENTUR left from alongside with supplies and relief personnel for González Videla Base. LAUTARO completed round-trip to O'Higgins Base with supplies and personnel. Visited Prat Base and chatted with Lieutenant Sergio STOCK Araya, second in command at Prat, about the various base activities performed during the wintering-over period. Summer construction crew began work at Prat - laying the foundation for a new south wing that will be added to the main building.
- 4 January - Aboard LAUTARO visiting O'Higgins Base: Accompanied LAUTARO on its second supply run from Discovery Bay to O'Higgins Base. Spent the day at O'Higgins, visiting with base personnel and taking pictures while LAUTARO off-loaded supplies. During the stay at O'Higgins Base, LAUTARO received orders from the Commodore to take on a supply of fresh water at Aguirre Cerda Base, Deception Island, before returning to Discovery Bay. At 1530, LAUTARO got underway for Deception Island. Experiencing heavy seas in the Bransfield Strait, the ship arrived at the entrance to Deception Island at 2400.
- 5 January - Aboard LAUTARO at Deception Island: At 0030, LAUTARO penetrated a small ice field blocking the entrance to Aguirre Cerda Base at Pendulum Cove, Deception Island. The ship anchored 50 yards from the beach, with stern lines leading to mooring chains located on the beach. Commenced taking on fresh water by means of a fire hose leading from the ship to source of water at the base - a storage tank fed from snow-melt streams. Took advantage of layover to tour base and obtain photos. At 1300, LIENTUR entered beside LAUTARO, and began replenishing her fresh water

FOR OFFICIAL USE ONLY

supply before returning to Discovery Bay for another load of supplies. (On board LIENTUR were four students from the Catholic University, Santiago, Chile, who had wintered over at González Videla Base as aurora observers, and were now on their way back to Chile.) After taking on 97,000 gallons of water, LAUTARO got under way for Discovery Bay, arriving there at midnight.

6 January - Aboard MAIPO, anchored in Discovery Bay: After taking on more cargo from MAIPO, LAUTARO left for another supply trip to O'Higgins Base. At 1300, LIENTUR returned from Deception Island and began taking on supplies for Aguirre Cerda Base while discharging fresh water to MAIPO. At 1830, LIENTUR left for Aguirre Cerda Base with supplies and relief personnel. The 1957-58 wintering-over personnel from Prat Base had moved on board MAIPO to make room at the base for the summer construction crew.

7 January - On board MAIPO, Discovery Bay: The Prat Base official relief ceremony scheduled for today was cancelled because of a forecast of bad weather. At 0800, LAUTARO returned from her supply run to O'Higgins Base and began taking on cargo for Aguirre Cerda Base. At 1400, she got under way on the trip to Deception Island. The afternoon was spent on board MAIPO interviewing the four International Geophysical Year students about their aurora work at González Videla, and in obtaining hydrographic information from MAIPO's navigation officer.

8 January - On board MAIPO, Discovery Bay: Concentrated ice-floes in the vicinity of the Prat Base landing beach prevented the use of small boats for moving cargo. Therefore, MAIPO's helicopter made five trips to the base with essential cargo and personnel. At 1530, LIENTUR returned from Aguirre Cerda Base and began discharging 30,000 gallons of fresh water into MAIPO while taking on cargo for González Videla Base. At 2330, LAUTARO returned beside MAIPO after discharging cargo at Aguirre Cerda Base.

9 January - On board LAUTARO at O'Higgins Base: At 0230, joined Commodore Barros and his staff aboard LAUTARO to attend the official relief ceremony at O'Higgins Base. At 1130, LAUTARO arrived at O'Higgins and the Commodore officiated at the change of command at the base. During the dinner party at the base following the program, I chatted with two British (FIDS) surveyors from Hope Bay, Don McCallhan and Denis Wildridge, who, while working in this area with dog teams, had stopped to visit the base. At 1545, I departed O'Higgins on board LAUTARO with the Commodore, his staff, and all of the O'Higgins Base personnel who had wintered over during the past year. At 2330, LAUTARO arrived alongside MAIPO at Discovery Bay.

10 January - On board LIENTUR, González Videla Base: At 0030, I joined the Commodore and his party on LIENTUR, and we departed for González Videla Base at 0130. At 1630, LIENTUR arrived at González Videla Base and the

FOR OFFICIAL USE ONLY

- Commodore officiated at the relief ceremony. After the ceremonial dinner, LIENTUR left for Deception Island.
- 11 January - On board LIENTUR: At 1030, LIENTUR arrived with the Commodore's party at Aguirre Cerda Base, after having saluted HMS PROTECTOR, which was at anchor in the harbor. At 1130, the Commodore officiated at the relief ceremony at the base. I chatted with Williams Clemens, a visitor from the British base. At 1640 departed Deception Island on board LIENTUR with the Commodore and his party. At 2130 we tied up beside MAIPO at Discovery Bay.
- 12 January - At Discovery Bay, on board MAIPO: At 0700, LAUTARO departed to deliver another load of supplies to González Videla Base, and to service light beacons in the de Gerlache and Bismarck Straits. MAIPO was continuing to off-load supplies and building materials for Prat Base, using the "Panga" and the ship's motor boat as carriers. Although a heavy concentration of ice-floes in the vicinity of the Prat landing area was slowing up the transfer of supplies from the ship to the base, the construction of the new building wing and the installation of the hot-air heating system were on schedule, thanks to continued mild weather.
- 13 January - On board MAIPO, Discovery Bay: Blizzard conditions halted the work of loading cargo into LIENTUR and the transferring of cargo to the base by small boats. Obtained the Commodore's permission to accompany LIENTUR when she reprovisions the emergency hut at Coppermine Cove and services the two light beacons on Robert Island.
- 14 January - On board LIENTUR at Robert Island: Went with LIENTUR to Coppermine Cove, Robert Island. Emergency hut at Coppermine cleaned, reconditioned, and reprovisioned. After servicing and relighting Pilots Pardo and Prat light beacons on Robert Island, LIENTUR returned to Greenwich Island, arriving beside MAIPO at 1945. Taking advantage of a calm clear day, the three auxiliary diesel fuel tanks had been off-loaded from MAIPO and taken ashore in the "Panga."
- 15 January - Ashore at Prat Base, Greenwich Island: Went ashore to visit Prat Base with the first working party on the "Panga." Ice-floes near the landing beach made the off-loading slow and difficult. Foundations for the new building extension at Prat had been completed and the air ducts for the new heating system installed. At 1530 LIENTUR left to obtain water at Deception Island. At 1830, storm warnings were received at the base and the boats were recalled to MAIPO. At 1930, MAIPO was in a state of emergency, with the pressure from a large field of pack-ice driven by a 40 to 50 knot wind, and the incoming tide causing her to drag both anchors, and forcing her toward the beach. The Commodore radioed LIENTUR to return to assist the flagship in freeing herself from the ice. At 2330 two large icebergs, caught in ice pack ahead of MAIPO,

FOR OFFICIAL USE ONLY

ran aground, preventing any further movement of the ice pack and relieving the pressure on the ship, thus preventing her from drifting any nearer shore. (At this time she was only 80 yards from going aground.) At 2400, LIENTUR arrived on the scene and proceeded to break up the ice field, relieving MAIPO of further pressure from the ice. The flagship moved clear of the area of ice and anchored again beside LIENTUR.

- 16 January - On board MAIPO, Discovery Bay: LAUTARO was at Pendulum Cove, Deception Island, taking on fresh water, after servicing light beacons Leucoton and Carlos Condell, located in the de Gerlache Strait. Interviewed Capitan de Bandado Eduardo FORNET Fernandez, 1957-58 Commander of Aguirre Cerda, about the various activities at the base. At 1630, at the invitation of the pilot, took a flight in the ship's helicopter, obtaining pictures of the Discovery Bay area from the air. Received word from the skipper of MAIPO that the frigate IQUIQUI had departed Punta Arenas on its way to Greenwich Island to pick up the 1957-58 wintering-over personnel, now on board MAIPO awaiting the arrival of the frigate.
- 17 January - MAIPO, Discovery Bay: LIENTUR beside MAIPO; LAUTARO on her way to Discovery Bay from Deception Island with a fresh supply of water. Today IQUIQUI cleared the Magellan Strait and entered the Drake Passage.
- 18 January - Ashore at Prat Base, Greenwich Island: Spent the day at the base, taking photos and observing progress of construction. The three auxiliary diesel tanks are now in place, and the framework of the additional wing is up and being roofed over. The base leader reported that the two Siberian huskies, kept at the base as pets, had broken loose from their chains and had killed four of the 36 sheep at the base before they had been subdued and recaptured. LIENTUR left for O'Higgins Base with supplies and the expedition's doctor and chaplain aboard as passengers. LAUTARO was alongside MAIPO, having returned from González Videla. (IQUIQUI is expected to arrive at Discovery Bay on the 20th.)
- 19 January - Ashore at Prat Base, Greenwich Island: Attended official relief ceremony at Prat Base conducted by the Commodore. Participated in a dinner party at the base in his honor.
- 20 January - On board MAIPO, Discovery Bay: Received news that IQUIQUI is encountering heavy ice pack conditions ninety miles north of Robert Island and has been forced to travel northwest in order to skirt the ice field, thus delaying her expected arrival date by two days. LIENTUR returned from O'Higgins Base; LAUTARO is alongside Maipo. In spite of a fall of wet heavy snow and moderate southerly winds, the new construction at Prat Base and the repair work at the other three bases are progressing on schedule.

FOR OFFICIAL USE ONLY

- 21 January - On board MAIPO, Discovery Bay: LAUTARO left for Admiralty Bay, King George Island, to escort IQUIQUI through the Shetland Island channels into Discovery Bay. IQUIQUI was experiencing increasing difficulty with the ice pack about 120 miles northwest of Greenwich Island, and unable to find a lead through the field, was forced to travel even further northwest to avoid the ice. The ship is nearing an acute fuel shortage, for she had expected to refuel from MAIPO before this time. Meteorologists on board MAIPO predict a strong storm to pass through the Greenwich Island area tomorrow. MAIPO and LIENTUR are alerted and are maintaining sea details.
- 22 January - MAIPO, Discovery Bay: MAIPO anchored with LIENTUR alongside, and spent the day riding out a storm of hurricane force but was unmolested by ice floes. LAUTARO waited out the storm at anchor in Admiralty Bay, King George Island, while IQUIQUI, still unable to work her way through the pack ice, is now 180 miles northwest of Greenwich Island. Fortunately, the storm center passed southeast of her, and she experienced winds up to only 20 knots.
- 23 January - On board MAIPO: IQUIQUI, short on both fuel and fresh water and unable to penetrate the ice pack, was forced to return to Punta Arenas without having picked up the 1957-58 wintering-over personnel. This group will remain on board MAIPO until further word is received from Naval Headquarters in Punta Arenas as to their disposition. The storm is now clear of the Greenwich Island area, traveling northwest and leaving snow flurries and light, 20-knot, northeasterly winds in its wake.
- 24 January - On board MAIPO enroute from Discovery Bay to Deception Island: At 1200 MAIPO, in the company of LIENTUR, departed for Pendulum Cove with the intention of anchoring near Aguirre Cerda Base for the duration of the expedition. At 1830 MAIPO, escorted by LIENTUR, entered the Deception Island area, and with flag hoists and ship's whistle, acknowledged the presence of CHIRIGUANO (ATA), an Argentine vessel, at anchor in Whalers Bay taking on fresh water from the British base. At 2000, MAIPO anchored in Pendulum Cove with her stern moored to beach chains and LIENTUR alongside. LAUTARO, returning from Admiralty Bay, will remain anchored in Discovery Bay until word is received from Punta Arenas on the final disposition of the 1957-58 wintering-over personnel.
- 25 January - On board MAIPO, Pendulum Cove: Visited Aguirre Cerda Base and the Chilean radio beacon at Telefon Bay. MAIPO was unloading supplies and materials for Aguirre Cerda. The Air Force summer working party of six men was busy installing a new fresh-water storage tank and building a storm porch at the main entrance to the central building.
- 26 January - On board MAIPO, Pendulum Cove: At 1330, LIENTUR left with cargo for González Videla Base. On board was Lieutenant Guesalaga, pilot and

FOR OFFICIAL USE ONLY

navigator of MAIPO. On the return trip to Deception Island, he will conduct hydrographic operations in the de Gerlache Strait from Trinity Island to Cape Anna. I requested permission to accompany LIENTUR but no accommodations were available. Commodore Barros received orders from the headquarters of the Third Naval Zone in Punta Arenas, instructing LAUTARO to return the 1957-58 wintering-over personnel to that port. At 2300 LAUTARO arrived from Discovery Bay.

- 27 January - On board MAIPO, Pendulum Cove: At 1630 LAUTARO departed for Punta Arenas with 1957-58 wintering-over party on board, consisting of 37 men, 16 officers, 4 students, and a Ministry of Foreign Relations representative. The meteorologist reported that the weather in the Drake Passage was favorable for crossing. Word was received by radio that the Air Force would fly a plane from Punta Arenas to check the ice conditions in the area north of the Shetland Islands where IQUIQUI had been forced to turn back. This aerial reconnaissance would aid LAUTARO in making its trip to Punta Arenas.
- 28 January - MAIPO, Pendulum Cove, Deception Island: At 0917, an Air Force Grumman left Punta Arenas to check the ice conditions on the course of LAUTARO. At 0800 LAUTARO had entered the area of pack ice, and at 1100 was clear of the pack, heading due north for Punta Arenas. At 59°S., she was intercepted by the aircraft which, upon finding that the ship was clear, returned to Punta Arenas. During the flight the radio beacon at Telefon Bay was operating and the aircraft radio frequency was monitored, although there was no direct communication between the radio beacon and the aircraft or between MAIPO and the aircraft.
- 29 January - On board MAIPO, Deception Island: Spent the greater part of the day translating into Spanish a section from United States Sailing Directions for Commander Gauche, Captain of MAIPO. At 1530 a British Sikorsky helicopter from HMS PROTECTOR (which was cruising somewhere in Bransfield Strait) landed at Aguirre Cerda Base with a gift of Scotch for Commodore Barros from Captain Butler. During the day two Britishers from Base B, Clemens and Mathews, visited MAIPO, remaining on board as guests of the ship's officers.
- 30 January - Base B, Whalers Bay, Deception Island: Spent day visiting the British base as guest of the base personnel. At 2400 LIENTUR tied up alongside MAIPO in Pendulum Cove after finishing hydrographic work in de Gerlache Strait.
- 31 January - MAIPO, Pendulum Cove: LAUTARO arrived Punta Arenas with wintering-over personnel.
- 1 February - On board MAIPO, Pendulum Cove: HMS PROTECTOR entered the harbor at Deception at 1400. Captain Butler came on board MAIPO for a short visit with Commodore Barros. At 1800 PROTECTOR left Deception Island.

FOR OFFICIAL USE ONLY

The crew of MAIPO commenced taking soundings and tide recordings of Pendulum Cove.

- 2 February - MAIPO, Deception Island: LAUTARO left Punta Arenas on return trip to Deception Island. At 0500, EL YAPEYU, an Argentine tourist ship, accompanied by the Argentine ATA, CHIRIGUANO, entered Deception Island, anchoring at the Argentine base at Primero de Mayo. Spent the day visiting the Argentine base and EL YAPEYU. Of the 254 tourists, 22 were from the United States (12 of whom were from the Washington, D. C. area). During my visit on board, I met and chatted with John Sieburth, a United States bacteriologist working with the Argentines on board CHIRIGUANO. At the invitation of the captain of EL YAPEYU, four officers from MAIPO attended the evening's festivities on board the tourist ship.
- 3 February - On board MAIPO: LIENTUR left with cargo and supplies for the O'Higgins and Prat Bases. At 0600 hours, EL YAPEYU left Deception Island for Ushuaia and Buenos Aires. CHIRIGUANO remained at anchor off the Argentine base.
- 4 February - MAIPO, Deception Island: Peter Woodall, British meteorologist from Base B, came on board the flagship to have a tooth pulled by the ship's dentist. At 2040 MAIPO received a distress signal from LIENTUR, stating that she had a fire in her engine room and was in need of assistance. At 2050 the ship's helicopter flew to the Argentine base at Primero de Mayo, asking CHIRIGUANO to assist LIENTUR. At 2130 the Argentine ship got under way. MAIPO was at this time preparing to leave.
- 5 February - On board MAIPO, Dransfield Strait: At 0300, MAIPO got under way to LIENTUR. At 0330 CHIRIGUANO radioed that she was alongside the distressed ship, 38 kilometers west of O'Higgins Base, and was aiding in fighting the fire. At 0900 MAIPO met CHIRIGUANO towing LIENTUR. The three ships continued back to Deception Island, anchoring at 2130 in Pendulum Cove.
- 6 February - MAIPO, Deception Island: Spent the day taking photographs of the damaged LIENTUR and interviewing various people involved in the fire. Took John Sieburth on a tour of Aguirre Cerda Base. At 1830 we attended the funeral services conducted for the two casualties of the fire. The bodies were to be returned to Chile for burial. LAUTARO got under way from Port Williams on her return trip to Deception Island.
- 7 February - On board MAIPO: LAUTARO is now in Drake Passage, headed for Deception Island. The crew of LIENTUR remained on board ship, which was obtaining its power and water supply from MAIPO. The crew was busy cleaning up remnants of the fire. The operations officer of the expedition, Commander Víctor Varela, conducted a board of inquiry concerning the causes and responsibilities of the fire. At 1830 CHIRIGUANO left for King George Island.

FOR OFFICIAL USE ONLY

- 8 February - Ashore at British Base B, Deception Island: Accompanied by a Chilean officer from MAIPO, I revisited Primero de Mayo and Base B, staying overnight at the British base. The installation of the fresh-water reservoir tank and the storm porch were completed at Aguirre Cerda Base.
- 9 February - Ashore at British Base B: Spent the day with the British at Base B and at the penguin rookery nearby. At 0400 LAUTARO arrived at Pendulum Cove with mail, having completed her round trip from Punta Arenas. MAIPO was at this time off-loading the winter supply of oil to the Aguirre Cerda Base.
- 10 February - On board MAIPO, Deception Island: Obtained permission from Commodore Barros to accompany LAUTARO on her last trip to Prat and O'Higgins Bases. Captain Arriagada, second in command at O'Higgins, accompanied by Corporal Silva, came on board to hunt for seals to be used to feed the dogs at their base. At 1730 LAUTARO departed for Discovery Bay, arriving at 2130. Mooring close to Prat Base, she began pumping 100,000 gallons of diesel oil into the base storage tanks, using 400 yards of fuel hose stretching from the ship to the shore. I accompanied Captain Arriagada and Corporal Silva on their search for seals in the vicinity of the base, where they netted two.
- 11 February - Prat Base, Greenwich Island: Aided Captain Arriagada in his hunt for seals along the shores of Greenwich Island. LAUTARO discontinued discharging the diesel oil to Prat Base and moved to a more protected anchorage in Discovery Bay because of storm warnings. Captain Arriagada, Corporal Silva and I were invited to remain at Prat Base during the storm.
- 12 February - Ashore at Prat Base: LAUTARO remained at anchor in Discovery Bay. Strong easterly winds developed, with the barometer falling rapidly. We took part in Prat Base's eleventh anniversary celebration. The work at the base was confined indoors where the installation of the hot-air calefaction system was completed. The new building extension lacks only inside trimming for its completion. The construction crew is transferring the water pipes from underneath the building to the attic. The Chilean A.T. LEUCOTON, sister ship to LIENTUR, arrived at Deception Island from Punta Arenas in order to tow LIENTUR back to the continent.
- 13 February - Waiting out storm at Prat Base.
- 14 February - Ashore at Prat Base, Greenwich Island: With LAUTARO moored near the base and the ship's diesel tanks coupled to the base storage tanks by 400 yards of fuel hose, the ship at 1600 resumed pumping the 100,000 gallons of diesel fuel into the base tanks. Captain Arriagada returned with 16 carcasses after a successful seal hunt. Navarino,

FOR OFFICIAL USE ONLY

Chilean tourist ship, was reported about 180 miles north of Robert Island; she is expected to arrive at Prat Base on 16 February.

- 15 February - On board LAUTARO, O'Higgins Base: LEUCOTON left Deception Island enroute to González Videla Base, and would be the last ship to visit the base during this year. At 0500 LAUTARO finished pumping fuel to Prat Base and got under way for O'Higgins Base. At 1100 she took on board a boat found drifting in the Bransfield Strait (the boat had gone adrift at O'Higgins Base during the past storm). At 1230 LAUTARO anchored at O'Higgins with the ship's personnel invited to the base for lunch. The seal carcasses and cargo were off-loaded.
- 16 February - Ashore at O'Higgins Base, Schmidt Peninsula: At 0100, LAUTARO left O'Higgins to escort Navarino to a safe anchorage in Discovery Bay. Upon the arrival of Navarino, she granted 26 passengers two hours shore leave to visit Prat Base. At 2315, escorted by LAUTARO, Navarino departed Discovery Bay for Pendulum Cove. I assisted the O'Higgins Base personnel in preparing the seal meat for the dogs and recorded the action on film.
- 17 February - O'Higgins Base: Captain Rosas, the base leader, gave me a detailed account of the seismographic work which had been conducted at the base. I assisted the Captain in the construction of a double radio antenna. Then I took several telescopic and panoramic views of prominent land features in the vicinity of the base to aid Major Gillmore and Captain Cepeda with their geodetic work. Navarino departed from Deception Island, after having completed the last trip to González Videla Base for the current year. A malfunctioning rudder on LIENTUR prevented LEUCOTON from towing her to Punta Arenas at this time.
- 19 February - O'Higgins Base: Spent the day exploring the base and taking various photographs. Work about the base at this time consists of general repair and maintenance. The construction of a new emergency hut beside the main building constitutes the only new construction. Plans for a trip to Hope Bay by dog sled were postponed because of evidence of a storm building up over the plateau; O'Higgins Base to Hope Bay is a three-day trip by sled.
- 20 February - O'Higgins Base: The base personnel and the summer working party were busy repairing the pier (every spring a section goes out with the ice and has to be repaired). I took a number of telephoto shots to aid Major Gillmore and Captain Cepeda in their geodetic work.
- 21 February - O'Higgins Base: Low pressure area building up from south with winds up to 70 knots. Base activities are confined to the buildings.

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

- 22 February - O'Higgins Base: Storm conditions continue. LAUTARO, returning from last trip to Gonzalez Videla Base, was forced to seek refuge in Discovery Bay; storm conditions prevented her from entering Deception Island. MAIPO, LIENTUR, and LEUCOTON are anchored in Pendulum Cove, riding out the storm in safety.
- 23 February - 6 March - O'Higgins Base: During this period thirteen low-pressure cells, moving from the south, passed across the western side of Palmer Peninsula in the Bransfield Strait and South Shetland Island areas. Winds of 60-90 knots prevented any movement of ships, and activities at the four bases were limited to essential housekeeping tasks. The expedition's original departure date of 28 February was postponed until more favorable sailing conditions develop. During this period the radio antennas at O'Higgins Base were blown down and replaced four times.
- 7 March - O'Higgins Base: Weather conditions are improving, and the Commodore radioed that LAUTARO was on her way to relieve the base of its summer working personnel. At 1830 LAUTARO arrived at the base and began loading the gear and personnel who were returning to Chile.
- 8 March - On board LAUTARO, Bransfield Strait: At 0130 LAUTARO said her farewells to the O'Higgins Base and departed to rendezvous with MAIPO in the Bransfield Strait. At 0500 I transferred to the flagship and, in company with LAUTARO, LIENTUR, and LEUCOTON (LEUCOTON was towing LIENTUR), we proceeded north to Punta Arenas.
- 9 March - 12 March - On board MAIPO, enroute to Punta Arenas from Bransfield Strait.
- 13 March - Arrived in Punta Arenas, Chile.
- 14 March - Punta Arenas: Attended official dinner at the home of Rear Admiral Jorge B.L. RESQUE Buchanan, Chief of the Third Naval Zone, in honor of the expedition's return.
- 17 March - Punta Arenas: Attended ceremonies relieving Commodore Barros of his Antarctic command and disbanding the 13th Chilean Expeditionary Force. MAIPO was assigned to fueling operations in the Third Naval Zone; LEUCOTON was ordered to tow LIENTUR to Talcahuano for repairs; and LAUTARO was sent to repair and resupply the inland water navigational aids while enroute to Talcahuano for her periodic overhaul.
- 18 March - 25 March - On board LAUTARO, enroute from Punta Arenas to Talcahuano: At invitation of the Commanding Officer, accompanied LAUTARO on her trip north. During this voyage LAUTARO serviced three lighthouses and 12 buoys in the channels between Punta Arenas and the Gulf of Peñá.

FOR OFFICIAL USE ONLY

- 25 March - On board LAUTARO, Talcahuano, Chile: Arrived Talcahuano at 1530, leaving for Santiago by train at 2015.
- 26 March - Santiago: Arrived Santiago and checked in at the Carrera Hotel. Reported to the United States Embassy for debriefing sessions with the Naval Attache.
- 27 March - 30 March - Santiago: Easter Holiday.
- 31 March - Santiago: Visited with and said goodbye to the various Chilean contacts in the Army, Navy, and Air Force who were instrumental in my participation in the Antarctic expedition.
- 1 April - Santiago: Had breakfast with two officials from the Ministry of Foreign Affairs. Left Santiago at noon on Panagra Flight No. 700 for Washington, D. C.
- 2 April - Arrived in Washington, and reported to the United States Antarctic Projects Officer.

IV. BASES AND EQUIPMENT

A. Illustrations.

Captioned photographs (black and white prints and color transparencies), plans, diagrams, and personnel records of the Chilean Antarctic installations are on file at the Office of the United States Antarctic Projects Officer, 718 Jackson Place, N. W., Washington 25, D. C.

B. General Information.

Details are submitted in this report concerning the construction, facilities, and activities at the Chilean Antarctic installations consisting of: four permanent bases, seven emergency shelters, and one radio beacon, but is supplementary to the information contained in Chapter V of James O'Neal's report of the 1956-57 Chilean Antarctic Expedition.

Of the four permanent bases, only one, the Army base O'Higgins, is located on the continent. The other three bases are located on adjacent islands.

In actuality, the bases are radio and meteorological stations, one of whose primary reasons for existence is the maintenance and strengthening of the sovereignty claims of Chile in its sector of the Antarctic (53°W.-90°W.).

The Chileans completed the construction of their first Antarctic base, Arturo Prat, on 16 February 1947. The last major installation erected was the radio beacon hut at Telefon Bay, Deception Island, on 3 February 1957.

C. Description of Bases and Facilities.

1. Arturo Prat Naval Base:

a. Location:

Greenwich Island, South Shetland Islands, 62°29'S., 59°38'W.

b. Date established:

16 February 1947.

c. Environment:

This base is located on a flat, talus-formed peninsula of glacial deposits and juts out from the northwest side of Greenwich Island into Discovery Bay. The base sits on the eastern side of a peninsula facing an ice-locked lagoon. It is ten feet above high tide. This gravel peninsula, resting under the shadow of Mount Diaz, is free from snow and ice by February.

Discovery Bay, free of ice early in the summer, is protected from high winds and seas by the crescent shape of the island. Its gravel bottom and ease of access makes it a good anchorage area for ocean-going vessels.

d. Buildings:

There are four buildings at this base: a main central building; a meat house; a storehouse for combustibles; and an emergency shelter.

New construction during 1958-59: (1) a prefabricated wooden wing, 20 by 50 feet, was added to the main building. The new addition is insulated with four inches of spun glass fibre between the walls. The building rests on a concrete foundation two feet high, and is reinforced with 4 inch by 16 inch wooden braces, six on each side. This addition replaced an old warehouse and will house the infirmary, the carpenter shop, the radio shack, a meteorological observatory, a photo laboratory, fodder storage, and chicken house. (2) Installation of a central hot-air heating system in the main building (Contractors - Soclima Cia., Viña Del Mar, Chile). Air, controlled for humidity, is heated by a diesel-oil-burning furnace and is circulated throughout the building by a series of ducts and blowers. The temperature is controlled by a thermostat located in the officers' quarters. The contractors guarantee that the system will maintain an indoor temperature of +18°C. throughout the winter. (Comment: The system cost the Navy 11,000,000 pesos (\$11,000.00) to install, and if it proves satisfactory, the other three bases may install similar units.)

(3) Construction of a solarium extension (8 by 8 feet) adjacent to the furnace room, built of reinforced double-panel plate glass. (Comment: Twelve ten-kilogram sacks of soil and various plant seeds were brought from Chile for purposes of experimentation and diversion. The base leader is an amateur horticulturist.)

(4) Installation of three additional diesel-oil storage tanks (35,200 liters each), on concrete foundations adjacent to the main building. This makes a total of five storage tanks of 35,200-liter capacity now at the base. The fuel from these tanks will supply all the power, heat, and cooking needs of the base. Personnel at the base expect to use 105,000 liters of the diesel fuel during the 14 months of isolation, leaving two tanks, or 75,400 liters in reserve.

These tanks are exposed to the elements and the fuel lines leading to the base are above ground and are not insulated. In 1958, during the months of June and July, the extreme cold stopped the gravity flow from the tanks and fuel had to be hand-carried from the tanks to a 220-liter reserve tank indoors next to the engine room.

(5) General base renovations included the replacement of broken and cracked windows, the overhaul of radio and fire-fighting equipment, the transfer of the plumbing system from underneath the base of the building into the attic in order to take advantage of the heat generated by the new heating system.

e. Facilities:

(1) Landing Facilities:

The base utilizes the west side of the peninsula for loading operations. The area is a gently rising (1:4 gradient) pebbled beach, 150 yards from the base. The movement of ice floes near the exposed section of the beach frequently disrupts operations. Cargo has to be run up onto the beach in small boats and then hand-hauled to the base. Ten yards in front of the base a small boat pier, built of rail ties and rock, extends out into the lagoon. Because the ice did not melt in the lagoon before 16 February, it prevented the use of this dock for loading operations.

(2) Storage facilities:

The addition of the new wing will enable supplies and equipment to be stored within the main building out of the weather and with easy access. This will include such items as the food and wine supply (two years), livestock (20 sheep and 60 chickens) and their fodder, and other items essential for normal daily living. The livestock is the base's source of fresh meat and the last sheep is usually butchered during the Christmas and New Year's holiday. The livestock is under shelter only during the coldest months (June, July, and August). A thirty-six cubic foot electrical deep-freeze is an added precaution against food spoilage during the summer months. The base has two auxiliary storage buildings separated from the main building: (a) a meat house, used to store seal meat to feed the dogs, and (b) a galvanized iron building (12 by 16 feet), used to store combustibles. Both of these buildings are approximately 30 yards from the main building.

(3) Heating system:

Prior to the installation of the new central hot-air heating system, the base relied on oil-burning Coleman space heaters for warmth. These stoves were located in the officers' quarters, the crew's lounge, the dining room, and the carpenter shop. Portable electric heaters were used wherever needed.

(4) Sanitation system:

Toilet facilities at the base are equipped with modern standard equipment. The two officers have their own bathroom with shower, wash basin, and toilet. The crew's bathroom is equipped with two showers, two wash basins, and two toilets. Sewage from these systems flows into the lagoon (fifty feet away) through an eight-inch pipe buried two feet below the ground. An auxiliary water tank with 150-liter capacity, located over the heating stove in the crew's lounge, furnishes fresh water by gravity feed.

FOR OFFICIAL USE ONLY

Water is pumped to this tank from a well located eighty feet from the base during the summer and from the kitchen water tank during the winter by means of an electrical pump. An electric hot-water tank of 25-gallon capacity furnishes the necessary hot water. (Base personnel report that the sewage system remains open throughout the year. As an added precaution, however, the system is cleaned out every summer.)

(5) Kitchen:

The kitchen is equipped with an oil-burning stove equipped to heat a 450-liter copper water tank adjacent to it. Water is pumped from the well to the tank by an electric pump. A standard kitchen sink is connected to the fresh water and the sewage system. Garbage and waste are thrown into the lagoon and when the ice breaks up, it is carried out into the bay. Five months out of the year, the fresh-water well freezes and ice has to be hand-hauled and melted in the kitchen water tank to fill the water needs of the base. The tank has to be filled twice daily.

(6) Laundry:

Adjacent to the carpenter shop is the laundry room equipped with two electric centrifugal washing machines and one electric dryer, all of German manufacture and installed in 1957. A laundry basin is connected to the water system. Each man does his own laundry.

(7) Medical Facilities:

The sick bay, adjacent to the crew's lounge in the main building, is adequately equipped for general first-aid, but there are no facilities for laboratory analysis or surgery.

(8) Photographic Laboratory:

The base has a room set aside as a darkroom with materials and chemicals to develop black and white prints. No facilities for movie film or color transparency reproduction are available. The laboratory also has a Leiz enlarger capable of producing satisfactory enlargements up to 24 square inches. The base has only one official camera, a Leica F-2 with one 50mm Simmocron lens and no filters.

(9) Carpenter and/or Machine Shop:

The combination machine and carpenter shop is housed in the main building. Sufficiently lighted by two large windows and overhead lights, it is well stocked with hand tools essential to base maintenance. The only power tool is a small electrically driven steel lathe, capable of handling 24-inch stock. The shop has a large working area and during the winter months, the room serves as a recreation hall.

(10) Fire-fighting equipment:

The majority of the fire-fighting equipment is kept in the main passageway and consists of: four fire-axes; an oxygen respirator; ten W. D. Allen 2.5-gallon capacity extinguishers; eight foam extinguishers (2-gallon capacity); 250 feet of fire hose; and a rack of twenty carbon tetrachloride glass fire bombs. In addition, every room has a carbon dioxide extinguisher of United States manufacture. All equipment is serviced and checked every four months. Extinguishers are replaced every summer.

(11) Power Source:

The main building uses two generators and diesel engines to furnish electricity for lights and communications. Engines are alternated each day and shut down during the night from 2230 until 0600.

Generators: KAYO-LIGHT (Mankato, Minnesota, USA), Model 53MP54, AC-16 kw, 230-400V.

Diesel Engines: POWER-CHIEF (Norberg, Milwaukee, Wisconsin, USA), 6 cylinder, Model 4FS20E.

Power for radio communications at night is supplied by an auxiliary diesel power plant:

WISCONSIN AIRCOOLED, Type AKD, Model E1500, 6~~0~~ cylinder - 1800 RPM with an OKEEFE & MARRIOTT generator.

For emergency use, the base has two portable diesel-electric power units:

ONLD, 12-15V, 400 watts.

For lights in the living quarters after the main power plant is shut down, the base uses four WILLARD six wet-cell batteries in a series. Six spare batteries are held in reserve. Batteries are recharged during the daylight hours. Numerous dry-cell flashlights and lanterns were in evidence throughout the base.

f. Base equipment:

The island location of Arturo Prat Base limits the maneuverability of its personnel and its potential as a center for exploration. Transportation equipment is extremely limited.

(1) Boats:

The base has two ^eclinker-built rowboats equipped with sail and oars, and a 15 horsepower A. B. ELEKTROLUX outboard motor that can be

FOR OFFICIAL USE ONLY

used in either boat. These boats are used principally for recreational purposes and to hunt for seals in the vicinity of the base.

(2) Sleds:

There are two bulky, hand-haul sleds, with steel frames and runners, used for hauling equipment and materials from the landing beach to the base. The weight and size of these sleds make them impractical for long hauls.

(3) Tractors:

None. A rubber-tired wagon is used to transport equipment and supplies about the base during the snow-free months.

(4) Dogs:

The base has two, two-year-old male Siberian Malamutes which are kept as pets. There is no sled or harness equipment for these dogs.

(5) Aircraft:

No aircraft facilities exist here; only the helicopter from MAIPO visited here during the ship's summer visit.

(6) Radio equipment:

All radios at the base are United States Bureau of Ships surplus radio equipment. To contact stations in South America, the base uses two transmitters (Model OPT-750, Technical Material Corporation, New York), four receivers (HRO Sixty's, NATIONAL CO.), and one oscillator (Model 1, Series 218). For contacting the ships of the expedition and other Antarctic stations, the base uses two TM-28M Hammerland Super Pro, SP-440-X sets. The emergency shelter has a portable 25-watt set (KCUP-544 Series, United States Bureau of Ships) with a 40-foot antenna. The set is powered by three wet-cell batteries, which are recharged by a 4 ampere, diesel-run generator.

<u>Frequencies KCS</u>	<u>Power KW</u>	<u>Type of Emission</u>
2716.5	0.04	A1-A3
7965.0	0.5	A1-A3
9335.0	0.5	A1-A3
10712.0	0.5	A1-A3
13415.0	0.5	A1-A3

FOR OFFICIAL USE ONLY

(7) Antennas:

Base has three 22-meter high, steel towers arranged in an "L" shape, with a directional single side-band Dipole antenna which beams directly to Santiago, Chile. (The Chilean Navy expects to install a rhombic system of antennas at the base during next year's operations.)

(8) Cold Weather Gear:

The major part of the clothing worn is of Chilean design and manufacture and was purchased by the Navy from private companies. From all appearances and the various comments of the wintering-over personnel, it seems adequate for the needs of the personnel confined to living at the base. There is no trail equipment at this base although there is adequate ski equipment for recreational purposes.

(List of gear is included in appendices available at the United States Antarctic Projects Office.)

g. Scientific Programs:

Scientific programs carried on include: meteorological observations and the collection of flora and fauna specimens.

(1) Scientific instruments include meteorological equipment consisting of:

- (a) psychrometer
- (b) wet bulb and dry bulb thermometers
- (c) aneroid barometer and barograph
- (d) wind vane
- (e) cup anemometer

h. Base Personnel:

(1) Wintering-over Personnel, 1958:

Lt. Octavio ILLIJO Moja, Base Commander
Lt. Sergio STOCK Araya, Second Commander
Sgt/1st Elias ROJAS Valencia, Radioman
Sgt/2nd Luis ESTAY Estay, Electronic mechanic
Sgt/2nd Ernesto RILLERS Rivero, Pharmacist mate
Sgt/2nd José ORTIZ Cuevas, Motor mechanic
Cpl Luis ALFREDO Alfaro, Radioman
Cpl Arturo ESPINOZA Espinoza, Cook
Marine Pvt Eliseo CAGIORO Espinoza, Cook

FOR OFFICIAL USE ONLY

(2) Wintering-Over Personnel, 1959:

Lt. José A. DIAZ Salinas, Base Commander
Lt(jg) Julio ALARCON Johnson, Second Commander
Sgt/1st Julio PEDREROS Valencia, Radioman
Sgt/2nd Oscar CARRILSCO Candia, Electronics mechanic
Cpl Carlos URIBE Pincheira, Radioman
Sgt/1st Caupolican PALMONIOS Araya, Motor Mechanic
Sgt/2nd Jorge FERNANDES Leiva, Pharmacist
Cpl Juan GUZMAN Sepulveda, Cook
Marine Pvt Arnulfo DIAZ Sandoval, Cook

i. Comments: Arturo Prat Base, established in 1947, is the largest, best maintained, and most comfortable Chilean base in the Antarctic. Its isolated location on Greenwich Island limits its potential as a base for extensive explorations or for future field programs. It exists as a weather station and as a manifestation of Chilean sovereignty in the South Shetland Islands. This observer was unable to obtain the reasons for the selection of this spot as a base site, other than its relatively easy access by ship and its close proximity to British and Argentine bases in this area.

2. General Bernardo O'Higgins Army Base:

a. Location:

Cape Legoupil, Northwest Coast, Palmer Peninsula, 63°19'S.,
57°54'W.

b. Date established:

18 February 1947.

c. Environment:

The base is located on a rocky promontory at Cape Legoupil at the base of Mt. Jacquinet and is fairly free of snow and ice during the summer months. The base is twenty feet or more above high tide, and is separated from the northwest coast of the Palmer Peninsula by a small sea passage which at low tide is two to three feet deep and five yards wide at the narrowest point. During the summer, sea currents and tidal changes keep this passage cluttered with ice bits (which serve as the source of fresh water). Access to Palmer Peninsula is by small boats or in sleds, depending on the season. Cape Legoupil's rocky bottom and its exposure to easterly winds makes it an unreliable anchorage for deep draft vessels.

d. Buildings:

There are four buildings at O'Higgins, a standard living-quarters and three emergency hut-storerooms. New construction during the summer of

FOR OFFICIAL USE ONLY

1958 includes:

(1) An emergency hut-storeroom was built in January by the summer Army work crew. It is an 8 x 15 feet non-insulated, wooden shed set on a concrete foundation and is located about 50 yards from the main building. It was built as a storeroom for six-months' emergency food supplies, consisting principally of canned goods and dried stores.

(2) The only other construction at the base consisted of general repair and renovation of existing buildings including the replacement of a chicken coop that had been destroyed.

(3) Comment: Risapatron (IGY station) and the officers' wing of the main building, which were destroyed by fire in March 1958, were not restored this year.

e. Facilities:

(1) Landing Facilities:

At the foot of the base, facing the Palmer Peninsula, the Chileans have constructed a pier for small boats. The pier (6 x 10 feet) has been blasted out of bed rock, and built of railway ties, extends out into the water to a depth of about three feet during low tide. The pier is equipped with a one-and-one-half ton wooden boom and chain hoist to facilitate the loading and unloading of small craft. A 60-foot-long two-foot gauge railway with a 1:3 gradient extends from the pier to the main building.

Comment: Each year a section on the pier moves out with the breaking up of the ice and has to be replaced. Plans have been made for the construction of a swing or draw pier that could be lifted clear of the ice during the winter.

(2) Storage Facilities:

One wing of the main building is set aside for the storage of foodstuffs and supplies. Fuel and combustibles are stored in a fuel dump fifty feet from the base, while emergency supplies are kept in the three emergency shelters. Adjacent to the main building is a shed for the storage of seal meat and a pen for the one sheep and 26 chickens.

Comment: Unusually warm weather during this observer's stay at the base caused 50 per cent of the quartered fresh meat hanging in the warehouse wing to spoil. The remaining part had to be cooked and preserved in fat, because there are no refrigeration units at O'Higgins.

(3) Heating System:

For heat the base depends on diesel-oil-burning Coleman space heaters. The stoves are located in the dining room and the workroom of

the main building. Portable electric heaters are used when needed. As a precaution against fire, stoves are turned off during the night.

(4) Sanitation System:

The base's only source of fresh water is from the daily collection and melting of ice. Water from the kitchen tank is hand-pumped to an overhead tank leading to the crew's and officers' bathrooms, both of which have standard bathroom fixtures. A 25-gallon electric water heater supplies hot water for both bathrooms. Sewage from the kitchen and the bathrooms is piped into a ten-inch square viaduct leading into the sea. The exhaust lines from the generator engines run along the length of the viaduct producing enough heat to prevent the system from freezing in the winter.

Comment: On two different occasions during this observer's stay at the base, the pipeline leading from the bathrooms to the viaduct became frozen and had to be opened by flushing with hot water and applying a blow torch.

(5) Kitchen:

The cooking for the base is done on a small four-plate coal-burning stove which is cracked and buckled in the middle. The stove also furnishes heat for a 350-liter galvanized iron water-tank. Ice is hand-fed to this tank from an ice chute leading into the kitchen from the adjacent ice storage room. For ease of access the pantry and general storage room are beside the kitchen.

Comment: For experimental purposes a small "Gasco" butane-burning stove, with a supply of eight bottles, was left at the base this summer to determine the practicability of cooking with gas. One bottle of "Gasco" is supposed to last about five months. The problem here is that "Gasco" has a high freezing point.

(6) Laundry:

The laundry room is adjacent to the engine room and has two centrifugal-type washing machines (United States manufacture, 1953 models) equipped with wringers. There is no dryer, and clothes are hung in the engine room. Cold water is tapped in from the melt-tank in the kitchen, while hot water has to be brought to the washers in buckets.

(7) Medical Facilities:

This base is unique, for in addition to being adequately supplied for general first aid needs, a dentist has been assigned to winter over at the base (1959) with sufficient dental equipment and supplies to extract and fill teeth.

(8) Photographic Facilities:

A small darkroom has been set up in a closet in back of the bar located in the dining room. Equipped with a 24-inch enlarger and the necessary materials and chemicals for black and white print reproduction, the darkroom has no sinks, however, and water has to be brought from the kitchen.

(9) Carpenter and/or Machine Shop:

A carpenter's work bench and shelves for miscellaneous hand tools are located in the warehouse wing. The motor mechanic has a small work bench equipped with hand tools and an electric power sander, located in the engine room.

(10) Fire-fighting System:

Located in the general workroom are four sea-water tanks of 350-liters each. These are filled from a three-inch pipeline leading to the sea, and are maintained as a source of water for fighting fires. They are kept from freezing by adding anti-freeze. In the hallway leading from the engine room to the main quarters are eight fire buckets filled with sand, four fire-axes, a fire-pole and hook, a rack of ten carbon tetrachloride fire bombs, and four two-gallon foamite extinguishers. All other rooms have one-gallon carbon dioxide fire extinguishers. In addition the base has 330 meters of fire hose (eleven 30-meter sections) and one gasoline-driven 25 horsepower water pump.

During the expedition, O'Higgins was the only Chilean base to conduct fire drills.

(11) Power Facilities:

The base depends on three, two-year-old diesel engines for production of 220 AC current: two NORDBERG six cylinder diesel engines with KATO, 16 kw, 200-400 volt generators; one HERCULES power unit, RA 4880, three phase, 5kw, with a 400 volt capacity.

The engines are alternated each day and are shut down from 2100 until 0600. Three, 12 volt wet-cell batteries connected in series supply a light source for any after-hours use. These batteries are recharged during the day and an additional three, 12 volt wet-cell batteries are kept in reserve. There is no emergency power system at the base. Flashlights and candles are used for emergency lighting.

FOR OFFICIAL USE ONLY

f. Equipment:

(1) Boats:

The base has two four-meter plywood outboard runabouts, and one ^cKlinker-built rowboat. All are equipped to use either the 15 horsepower EVINRUDE or JOHNSON outboard motors which are available. These runabouts are used principally to hunt for seal in the nearby islands. The rowboat is used to transport men and materials between the base and the mainland. The runabouts, although light and easy to launch, are of flimsy plywood construction and can be easily damaged by the ice.

(2) Sleds:

The base has three nine-foot dog sleds of Chilean design and construction, and one man-hauled plastic sled of United States manufacture. The Chileans are somewhat dissatisfied with these dog sleds. They are heavy, flimsy, and too short for safe travel in crevassed areas. They would prefer the 12 to 15 foot models used by the Argentine and British.

(3) Tractors:

There are no tractors at this base.

(4) Dogs:

The base has eight Siberian Malamutes and ten Siberian huskies. Seven of the dogs are females. These animals range in age from two to five years. Base personnel estimate that approximately two hundred seals are needed each year to feed the dogs. It has become increasingly difficult to obtain this amount of meat each year. No pemmican is used at this base for dog food.

(5) Aircraft:

There are no airplanes at this base.

(6) Radio equipment:

All communications equipment is of United States manufacture (1948 vintage) and consists of:

Transmitters: One MARK HALLICRAFTER, BC-610-E, 350W.
Two COLLINS, 32V2, 200W.

Receivers: One COLLINS, 51 J4
One HALLICRAFTER, 5X90

One RCA set, single side-band (four crystal channel), is rigged for direct communications with the Antarctic Section of the Department of the Army in Santiago, Chile.

FOR OFFICIAL USE ONLY

For field and emergency use, the base has three ANGR-9 field units. One is kept at the emergency hut on the peninsula, the other two remaining at the base. (During this observer's visit at the base, these units were field tested and found to be in good working order.)

(7) Antennas:

Four tubular steel 20-meter towers support three directional antennas: (a) one Dipole Plegado; (b) one Doble; and (c) one Marconi. Each system is set up for 16 megacycle and 21 megacycle bands. (During this observer's three-week visit at O'Higgins, these antennas were blown down and re-stored three different times during 50-80 knot winds.)

g. Scientific Program:

Meteorology, seismology, exploration (surveying and mapping), and the collection of flora and fauna make up the scientific program at this base.

(1) Scientific Equipment:

Basic standard meteorological equipment consisting of a psychrometer, wet and dry bulb thermometers, aneroid barometer and barograph, wind vane, and a cup anemometer. This base also has a seismograph.

h. Base Personnel:

(1) Wintering-over Personnel 1957-58:

Captain Jorge SANHUEZA Romero, Base Commander
Lt. Oscar FEHRMANN Schafer, Base executive officer; in charge
of exploration
Lt. Francisco PARADA Campusano, Meteorologist
WO Francisco BAHAMONDES Vega, Assistant
Sgt Eimo CARRILLO Antunez, Engine mechanic
Cpl Daniel ARELLANO Candia, Cook
Cpl Hector SILVA Caroca, Medical officer
Cpl Ernesto DEL C. Contreras, Radioman

(2) Wintering-over Personnel, 1958-59:

Captain Tarcisio ROSAS Thomas, Base Commander
Captain Carlos ARRIAGADA Paschuans, Communications officer
Lt. Luis PEDROSA Alonso, Exploration officer
Lt. Guillermo VERDUGO Yañez, Dentist and sanitation officer
Sgt Lino DAVILA Arcos, Assistant to exploration officer
Sgt Jorge BARAHONA Hernandez, Radio operator

Cpl Jorge CARRILLO Antunez, Motor mechanic
Cpl Luis SILVA Bustamente, Medical officer
Cpl Oscar GUILLERMO Angulo, Radio mechanic
Soldier Domingo MORALES Jara, Cook
Soldier Evaristo MARDONES Vergara, Steward

i. Comments:

O'Higgins Base, although the poorest and the least comfortable of the Chilean bases, will be the most active of them. Besides conducting meteorological observations, the personnel will also do work in seismology and exploration. It is the only Chilean base accessible to the Antarctic continent. A gently sloping crevasse-free snow field leads from the base to the Louis Philippe Peninsula, a distance of approximately 18 miles. This year's plans call for several exploratory field trips, by dog sled, to Duse and Hope Bays, and then along the west coast of Palmer Peninsula. The procurement of accurate 1:35,000 British maps showing feasible routes and the location of British and Argentine food caches will aid them in this endeavor.

The high morale experienced at this base is worthy of comment. Every man at the base possesses and plays a musical instrument, and all are amateur photographers and radio hams.

3. Presidente Pedro Aguirre Cerda Air Force Base:

a. Location:

Pendulum Cove, Deception Island, 62°56'S., 60°36'W.

b. Date established:

18 February 1955.

c. Environment:

The base is located on the northwestern shore of Pendulum Cove, on this island of the South Shetland Group. The island is a sunken tertiary volcano, and the buildings rest on an ash and cinder shelf at the base of Mt. Pond and are between 10 and 15 feet above high tide. In the summer Deception Island is a well protected natural harbor for ocean-going vessels with a mud bottom for anchorage and numerous melt-streams, which furnish ample fresh water for ship and base needs. The narrow entrance at Neptune's Bellows is, however, difficult to navigate in strong winds and high seas.

d. Buildings:

There are three buildings at Aguirre Cerda, a standard living-quarters, an additional one-room hut storage building, and an Argentine emergency hut adjacent to, but not part of the base.

FOR OFFICIAL USE ONLY

New construction during 1958-59 includes:

(1) During the summer of 1957 a prefabricated wooden extension was added to the main building to house generator engines. A 30-foot wooden passageway connects it with the main building. The area formerly occupied by the engines is now being used as a general utility and ski room.

(2) In February 1959, a 6 by 8 foot enclosed wooden storm porch was added to the front entrance of the main building.

(3) In February 1959, a makeshift fresh-water reservoir was replaced by a 2000-liter galvanized tank.

(4) In February 1959, the Chileans completed the installation on a 20,000-liter diesel fuel storage tank.

(5) General renovation and repair at the base.

e. Facilities:

(1) Landing facilities:

The ash and cinder beach has a 1:5 gradient with a rapid fall-off at the water's edge, and is excellent for small boat landings. During the summer there is no ice in the harbor to hinder the activities of small boats. The base does not have any pier or dock facilities.

(2) Storage facilities:

One wing and a section of the main building are set aside for the housing of livestock, including 12 sheep, 36 chickens, and one cow, along with fodder, food supplies, and equipment. Combustibles and fuel supplies are kept in storage dumps located 250 feet from the base. During the winter all canned and bottled goods are moved into the engine room to prevent freezing.

(3) Heating facilities:

Diesel-oil-burning Coleman space heaters are located in the dining-living room and in the radio room. Electric portable heaters are used in bedrooms and where needed. Stoves are turned off during the nights as a fire safety precaution. (The 1958 Base Commander told this observer that at certain times during the winter the temperature in his room had fallen to -20°Centigrade).

(4) Sanitation system:

All bathroom and kitchen facilities drain into an eight-inch sewage pipe buried two feet under the surface, which leads into a ten-foot

FOR OFFICIAL USE ONLY

deep cesspool 50 feet from the base. Garbage is collected and thrown into a ravine 200 feet from the base.

The volcanic crust of Deception Island has numerous "warm spots" near the surface and Pendulum Cove is in such an area. Therefore, the sewage systems is never endangered by freezing and remains running throughout the year.

(5) Kitchen:

A four-plate, coal-burning stove is used for cooking and for melting water; a 400-liter copper melting-tank is adjacent to the stove. During the summer months water is piped from the reservoir to the tank by gravity flow. In the winter the tank is filled daily with ice. The personnel of the base consume approximately 300 liters of water daily during winter months. From the melt-tank, water is piped to the bathroom, and a 10-gallon electric hot-water tank located there furnishes enough hot water for bathing. Hot water for cooking and other uses is obtained by heating water on the stove.

(6) Laundry:

Located in the general utility room is a centrifugal electric washing machine of United States manufacture, a 1956 model. Cold water is piped from the kitchen melt-tank to a laundry sink beside the machine.

(7) Medical facilities:

Sick bay is equipped to handle only general first aid. (This year a medical doctor is wintering over at the Argentine base, Primero de Mayo, three miles from the Chilean base.)

(8) Photographic facilities:

Adjacent to the sick bay is a darkroom equipped with a Liez 24 inch photo enlarger and the necessary supplies and chemicals for black and white reproduction. There are no official cameras at the base and each man is responsible for his own camera. There are no sink or water facilities.

(9) Carpenter and/or machine shop:

A carpenter's bench and rack of hand tools is located in the general utility room. There are no power tools.

(10) Fire-fighting system:

Every room in the main quarters is equipped with a two-gallon carbon dioxide fire extinguisher. In the passageway leading to the engine

FOR OFFICIAL USE ONLY

room are six two-gallon foam extinguishers. This year the base received a mobile two-cycle, two-cylinder, gasoline-driven rotary water pump and enough fire hose to reach from the beach to any part of the buildings.

Comment: Warm underlying currents of water keep the shore line in Pendulum Cove free of ice throughout the year, offering the base an unlimited source of sea water for fire fighting.

(11) Power facilities:

As a source of power for lights and for radio communications the base uses: two diesel NORBERG engines, Power Chief, Model 4FS1-02 (2500 horsepower each); and two KATO generators (Mankato Company, Minnesota), 220V., 1500 rpm. These power units are alternated each day. At night, after the engines are shut down, four six-wet-cell batteries, in a series, are used as a light source. There is no emergency power source.

Comment: The 1958 base leader reports that in fourteen months the base consumed 12,000 liters of fuel oil, leaving 8,000 liters in reserve.

f. Equipment:

(1) Boats:

The base has one new four-meter plywood runabout equipped with a 15 horsepower JOHNSON outboard motor and one Klinker-built rowboat. (Two days after the runabout was placed in the water, it rammed M.I.P.O., staving in the bow. The base personnel expect to repair it during the winter.)

(2) Sleds:

There are no sleds at this base.

(3) Tractors:

There are no tractors at this base.

(4) Dogs:

There are no dogs at this base.

(5) Aircraft:

None at this base. A radio beacon was installed at Telefon Bay in 1958 for use of future air operations in this area. The base has a steel-mesh ramp and hand-winch for beaching sea planes. However, there are no aviation fuel reserves, spare parts, tools, or hangar facilities at the base.

(6) Radio equipment:

The communications facilities at this base consist of two RCA-91 receivers and two Westrex transmitters, 350W., 220V (AC). There are no emergency radios, other than radio beacon equipment located at Telefon Bay.

(7) Antennas:

Six, 25-meter steel grid towers in a diamond arrangement support a rhombic, doublet aerial system inverted toward Santiago.

(8) Cold weather gear:

The trail equipment consists of skis and snow shoes.

g. Scientific Programs:

The scientific programs at this base are meteorology, the collection of flora and fauna, and the recording of tidal information.

(1) Scientific equipment:

The basic standard meteorological instrumentation consists of:

- (a) psychrometer
- (b) wet and dry bulb thermometers
- (c) aneroid barometer and barograph
- (d) wind vane
- (e) Bendix anemometer
- (f) egrotermograph Thermograph
- (g) Tide scale (spring tension)

This is the only Chilean base that has a room set aside as a meteorological laboratory. Speed and direction of the wind can be determined by means of a gauge mounted on a panel in the room without going outside.

h. Base Personnel:

(1) Wintering-over personnel 1957-58:

Captain Eduardo FORNET Fernandez, Base Commander
Lt. Rodolfo MATHEI Aabel, Executive or Second Officer
WO Jorge SILVA Araos, Radio operator
Sgt/2nd Mario TORRES Espinoza, Radio mechanic
Cpl Oscar MEDINA Diaz, Motor mechanic

Cpl Eleazar ESPINOZA Molina, Radio mechanic
Cpl Jorge ALZAMORA Lobos, Cook
Soldier Miguel LOPEZ Yevenes, Cook

(2) Wintering-over personnel 1959-59:

Captain Silvestre MAHUSIER Peña, Base Commander
Lt. Benjamin OPAZO Brull, Second Commander
Sgt/2nd Mario GARRIDO Caroca, Radio operator
Cpl Uladislao DURAN Martinez, Radio operator
Sgt/1st Elio Hernan RODRIGUEZ Cortez, Motor mechanic
Sgt/2nd Custodio FRANCO Fuentealba, Electronic mechanic
Sgt/2nd Juan CASTANEDA Polite, Medic
Cpl Ramon Lui POBLETE Goichochea, Cook

i. Comments:

The proximity of Aguirre Cerda to the Argentine weather station, Primero de Mayo, and the British weather station at Whalers Bay makes its meteorological value rather questionable. The free interchange of visits and materials among the three bases, and the numerous visits of deep-draft ships of various nationalities that anchor in Port Foster during the summer, make living at this base pleasant and sociable. Although each of these bases maintains emergency shelters, the short distance between bases limits their value and use.

The Chilean Air Force is making long range plans to build up Aguirre Cerda as a sea plane base to match the Argentine facilities at Primero de Mayo.

4. Presidente Gabriel González Videla Air Force Base:

a. Location:

Paradise Harbor, de Gerlache Strait, 46°49'S., 62°52'W.

b. Date established:

12 March 1951.

c. Environment:

The base is located on a rocky promontory of the Danco Coast, fairly free from snow and ice, that juts out into Paradise Harbor between Lemaire Island and the continent. During low tide, men can cross from the base to the mainland on foot. The base is about ten to fifteen feet above high water. The Danco Coast, facing the base, is made up of outlet glaciers

and ice cliffs 150 to 200 feet high that calve periodically.

The constant movement of ice in this area throughout the year prevents the ice from freezing over, even in the winter months. Deep draft vessels can anchor close to the base in the lee of Lemaire and Bryde Islands. However, swift tidal currents, a rocky bottom, and constant movement of ice require anchored ships to maintain alert sea details at all times.

d. Buildings:

There are five buildings at the base, a standard living quarters, a combination storage shed and barn, a wooden sky camera enclosure, a boat-house, and an emergency shelter.

New construction during 1958-59 includes:

- (1) No new major construction or installations at this base.
- (2) Patched roof with asphalt paper and tar.
- (3) Converted a storage room adjacent to the darkroom into officers' quarters.
- (4) General renovations and repair work throughout base.

e. Facilities:

(1) Landing facilities:

There are no docking facilities at the base. The rocky shoreline acts as a natural pier for small boats, but care must be taken that the boats are not imprisoned by the movement of ice.

(2) Storage facilities:

Dry stores and food supplies are housed in the pantry and storeroom of the main building. Heavier equipment, fodder, and livestock (one cow, 32 sheep, and 100 chickens) are kept in the combination warehouse and barn during the winter months. Fuel and combustibles are stacked in fuel dumps approximately 100 yards from the main buildings. Six months to one year emergency supplies are kept in the emergency hut.

(3) Heating system:

For heat, the base depends on kerosene stoves located in the living room, radio room, workshop and dispensary. Portable electric heaters are used in areas where needed.

(4) Sanitation system:

Sewage from the kitchen and the bathroom facilities flows into an eight-inch sewer pipe leading to the bay. This freezes and backs up every winter and has to be cleaned out during the summer. Garbage is collected daily and thrown into the sea. Every man is responsible for his own laundry. There are no restrictions on bathing or use of water as long as sufficient ice is melted to meet the daily needs of the base. (The base is located in the center of a rookery of adelic penguins, whose hygenic habits leave something to be desired.)

(5) Kitchen:

The base depends on a coal-burning stove for cooking and for melting ice for water. A 350-liter galvanized melting-tank is beside the stove. Water is piped from the tank to the kitchen sink and to the bathroom facilities. Hot water has to be heated on the stove.

(6) Laundry:

An electric centrifugal washing machine with six-liter capacity is located in the bathroom. The base does not have a clothes dryer or laundry sinks.

(7) Medical facilities:

Sick bay is equipped to handle general first aid. This is the only Chilean base with a sick bay equipped with a bed and sufficient facilities to isolate one patient from the rest of the group, if necessary.

(8) Photographic facilities:

Located in the attic above the workshop, the darkroom is adequately supplied to develop black and white still reproductions. The only source of water, however, is the kitchen. This year a photo-enlarger was added to the equipment. Film and cameras are the responsibility of the individual.

(9) Carpenter and/or machine shop:

A combination carpenter and mechanic's shop is located adjacent to the engine room, equipped with two work benches and adequate wood and metal-working hand tools. An electric drill press and an electric grinder are the only power tools.

(10) Fire-fighting equipment:

Every room in the main building is equipped with a two-gallon carbon dioxide fire extinguisher. This year the base received a

FOR OFFICIAL USE ONLY

mobile, two-cycle, two-cylinder, gasoline-driven, rotary water pump having a 60-gallon a minute capacity, and equipped with enough two-inch fire hose to reach from the beach to any part of the buildings. An open seaway insures constant supply of fire water throughout the year.

(11) Power facilities:

For communications and light power, the base uses the same type of system as is at Aguirre Cerda: two diesel engines, six-cylinder NORBERGIS; and two 220V KATO generators. Four six-wet-cell batteries furnish the base with lights after power units are shut down for the night.

f. Equipment:

(1) Boats:

The base has two ^cKlinker-built rowboats and a plywood run-about, equipped with a 15 horsepower JOHNSON outboard motor.

(2) Sleds:

There are no sleds at this base.

(3) Tractors:

There are no motor vehicles at this base.

(4) Dogs:

There are no dogs at this base.

(5) Aircraft:

There are no aircraft at this base.

(6) Radio equipment:

Radio equipment at this base is similar to that at Aguirre Cerda Base, consisting of: two Westrex transmitters, 350W, 220V (AC); and two RCA-91 receivers.

No emergency radios were seen during this observer's brief two-hour visit. The radio operator reported, however, that an emergency radio unit was kept at the emergency hut, but he was reluctant to give a description of the equipment.

(7) Antennas:

Three 22-meter steel grid towers in an "L" shape arrangement support a hydro-rhombic, doublet system of aerials inverted to Santiago.

g. Scientific Programs:

The scientific programs at this base include meteorology, the collection of flora and fauna, and the recording of tidal information. Aurora observations have been discontinued **this** year. The four Catholic University student observers who wintered over at this base to study the aurora phenomena in 1957-58 have not been replaced. The skycamera was sent back to Chile on the MAIPO.

(1) Scientific equipment:

The base is equipped with the basic standard meteorological instruments, consisting of: a psychometer; wet and dry bulb thermometers; aneroid barometer and barograph; a wind vane; and a cup anemometer.

h. Base Personnel:

(1) Wintering-over personnel, 1957-58:

Captain Tulio VIDAL Corvalan, Base Commander
Captain Luis VALDES Valdes, Second in Command
Lt. Luis OLCESE Liva, Radio mechanic
Sgt/1st Victor NUNEZ Catejo, Medico
Sgt/2nd Luis OSSES Guinez, Radio operator
Sgt/2nd Ramon FAGARDO Oyarzun, Radio operator
Cpl Elias TORO Aros, Motor mechanic
Cpl Miguel TALA Moreira, Cook
Señor Sergio MERINO, Catholic University student aurora
observer
Señor Sergio CISTERNIA, Catholic University student aurora
observer
Señor Cesar BUROTTO D., Catholic University student aurora
observer
Señor Leopoldo BENITEZ H., Catholic University student
aurora observer

(2) Wintering-over personnel, 1958-59:

Captain Francisco H. ROJAS Lemn, Base Commander
Lt. Sergio CONTARDO Flores, Second in Command
Sgt/1st Alvaro A. ROJAS Rojas, Radio operator
Sgt/2nd Gabriel ESCOBAR Contreras, Radio operator
Cpl Robustiano FAJARDO Oyarzun, Motor mechanic

FOR OFFICIAL USE ONLY

Sgt/2nd Jorge Rene AVALOS Avalos, Electronics mechanic
Soldier Jorge ZAMORANAO Riveros, Medic
Sgt/2nd Italo A. SAAVEDRA Vergara, Cook
Group Captain Enrique MAURINO Costa, Special representative

Group Captain Maurino is on a special assignment to study (1) possibilities for future Air Force flights to Antarctica, and (2) reaction and needs of the men wintering over at Air Force bases. He will not be responsible for care or maintenance of this station.

i. Comment:

Videla, isolated from the Danco Plateau by 150-to-200 foot cliffs and glaciers, is limited in its value as an operations base for any mapping and surveying program. The British base, "O", located five miles north on Danco Island, was abandoned this year for the same reason.

Chilean Air Force officials give the following reasons for maintaining the two Air Force bases in the Antarctic:

(1) The Air Force had money and was willing to maintain an extra base in a region of interest.

(2) The base will serve as part of long range plans for future flights to the Antarctic.

D. Other Installations.

1. Radio Beacon, Telefon Bay, Deception Island.

a. Date established:

3 February 1958.

b. Environment:

The buildings are set back fifty yards from the shore at Telefon Bay and rest on a volcanic knoll approximately 150 feet above sea level. The area is about three kilometers from Aguirre Cerda Base. The installation is directly opposite Bellows Entrance and has an unobstructed view of Port Foster.

The installation can be reached from Aguirre Cerda Base by walking along the shore, or small boats can be landed on the gently sloping beach facing the buildings. There are no dock facilities.

The installation has two buildings, a radio hut and a storage hut. The buildings are made of wood and are insulated by fibre glass. The large building contains a kitchen, bunk room, bathroom, and radio room on

the main floor, with a small observation tower on the second floor. Adjacent is a smaller one-room building, used to store equipment and reserved as an emergency shelter.

The maintenance of the buildings and the servicing of the radio equipment is performed by personnel wintering at Aguirre Cerda. The buildings are occupied only during the serving or activation of radio equipment. The main building can house four persons comfortably. Supplies are brought from Aguirre Cerda as needed.

On an average of every fifteen days, radio equipment is checked out by radiomen at Aguirre Cerda. The equipment consists of:

- (1) Transmitter: JOHNSON BEACON (one), 100 Watt;
- (2) Power plant: B. W. ONAN, 230V generator (50 cylinder, gasoline-driven);
- (3) Receiver: One RCA-91;
- (4) Antennas: Radio beacon antennas supported by three 15-meter steel grid towers.

Comment: The radio beacon is in good working condition. The beacon was in operation during the Chilean Air Force ice reconnaissance flight on 28 January 1959. It was reported that LAUTARO received its signal as far as 125 miles from Deception Island.

2. Summer Emergency Shelters (Refugios).

At the present time, Chile has seven refugios, emergency shelters, in the Antarctic, three belonging to the Navy, two to the Army, and two to the Air Force.

These huts are reserved for emergency shelters with the exception of the two Navy huts located at Yankee Bay, Greenwich Island (62°37'S, 59°50'W), and Coppermine Bay, Robert Island (62°23'S, 59°52'W), which on occasion have been used as bases to carry out summer scientific projects. The Army emergency hut, located five miles inland from Duse Bay, Palmer Peninsula, will serve as a field station during sledding explorations in that region. The other four shelters, located in the vicinity of the permanent bases, are maintained as emergency shelters.

The two Navy huts on Greenwich and Robert Islands are serviced and maintained by the ships of the Chilean expedition, the remaining five huts being the responsibility of their respective bases. All are supplied with sufficient equipment and food to support eight to eleven men for a period of six to twelve months. The shelters at Prat Base and González Videla are the only ones equipped with emergency radio units.

3. Navigational Aids.

a. Lights and Beacons:

Chile has five light beacons (faros) operating in the Antarctic as well as seventeen other navigational markers (balizas). These navigational aids were in operation prior to 1957 and the characteristics and descriptions of each may be found in James O'Neal's report. The names and locations of these faros are:

Faro Punta Andressen, Deception Island, 62°56'S., 60°34'W.
Faro Piloto Pardo, Robert Island, 62°23'S., 59°41'W.
Faro Prat, Robert Island, 62°28'S., 59°31'W.
Faro Condell, Lautaro Island, Paradise Bay, 62°49'S., 63°06'W.
Faro Leucoton, Guesalaga Islet, 64°15'S., 62°00'W.

(For further information, consult the Chilean hydrographic publication, Listo de Faros, 1958.)

b. Charts and Sailing Directions:

The following Chilean publications contain listings of Palmer Peninsula and Shotland Island areas, available charts, and the sailing directions for these areas:

- (1) Bostas del Territorio Antártico Chileno, Archipiélagos e Islas Adyacentes, Parte 1 and Parte 2.
- (2) Catálogo de Bortus Náuticas.

Copies of these publications can be obtained from the Departamento de Navegación e Hydrografía, Armada de Chile, Playa Ancha, Valparaiso, Chile.

Typical of the charts the Chileans used while navigating in the waters near their Antarctic bases are:

- (1) Puerto Soberanía, Scale 1:10,000, Carta No. 500 (Prat Base).
- (2) Caleta Gloria-Bahía Paraiso, Scale 1:50,000, Carta No. 511 (González Videla).
- (3) Isla Deception, Scale 1:50,000, Carta No. 501 (Aguirre Cerda Base).
- (4) Pelerto Covadonga, Scale 1:10,000, Carta No. 503 (O'Higgins Base).

These and other charts used during the expedition were corrected to 15 August 1958. In conjunction with their own charts, the Chileans possess Argentine and British charts of the lesser known waters in this region. None of these charts are classified and are obtainable on request.

V. USE OF EQUIPMENT

A. Ship Operations.

The Chilean Navy performed all the logistical work of the expedition. The three ships assigned to the expedition, MAIPO, LIENTUR, and LAUTARO, left Punta Arenas for the Antarctic on 25 December 1958, returning on 13 March 1959. The two ATA's, LIENTUR and LAUTARO, were the "taxis" of the expedition, making a total of twenty-five trips between the larger ship and the various bases. The tasks performed by these patrulleros included the delivery of cargo and personnel to the bases, scouting the pack ice, escorting the tourist ship (see Chapter VII), carrying water to the flagship, and doing the oceanographic and hydrographic work of the expedition.

The unfortunate engine room fire on LIENTUR on 4 February 1959 (see Chapter VII), put her out of commission. As a replacement, another ocean-going tug (ATA), LEUCOTON, was ordered into the area from Punta Arenas. During LEUCOTON's short stay in the Antarctic, she made one supply run to González Videla Base before towing LIENTUR back to the continent.

MAIPO, tanker and flagship of the expedition, made one voyage after arriving in the South Shetland Islands. She remained anchored in Discovery Bay from 1 January 1959 until 24 January 1959. Moving from Discovery Bay to Pendulum Cove, Deception Island, MAIPO remained there until the fleet's return to Chile in March. She served as headquarters and fuel and cargo depot for the expedition.

The frigate IQUIQUI's unsuccessful attempt to penetrate the ice pack north of the South Shetland Islands (19 to 23 January) in order to accomplish the task of returning the relieved wintering-over personnel to Punta Arenas forced LAUTARO to make an unscheduled trip to Punta Arenas to perform this task.

The loss of LIENTUR and the failure of IQUIQUI to accomplish her mission placed additional burdens on the ships of the expedition, preventing the ATA's from performing any exploratory voyages into Marguerite Bay and Prince Gustav Channel as planned.

The ship handling of the expedition was generally competent, and in some instances, excellent, considering that the ships were thin-skinned and not designed to work in these waters, that adverse weather conditions existed, and that there was a scarcity or lack of expendable equipment. The standard of ships' cleanliness and the practice of safety precautions were not, however, up to those set by the United States Navy.

B. Air Operations.

1. Helicopter.

The only aircraft assigned to the Chilean expedition was a two-seater Bell (47-D1) helicopter kept on board MAIPO and piloted by Lt. Nelson Sepulveda of the Chilean Air Force. Its small size and short range limited its usefulness. Its principal tasks consisted of ice reconnaissance, transportation of cargo and personnel, assistance in the maintenance of navigational aids, pleasure flights, and some aerial photography.

In spite of the helicopter's antiquity, it was kept in good condition and never failed to respond when called upon to perform. The flights were restricted to within visual range of the ship and at no time did any of the flights extend more than an hour's duration (although it had a fuel capacity for three hours' flight). No flying was done under adverse weather conditions.

2. Grumman Flight.

The inability of IQUIQUI to penetrate the pack ice north of the South Shetland Islands between 60° and 65° South Latitude prompted the Commodore to request the Chilean Air Force to make an aerial reconnaissance flight to check the extent of this ice field. On 28 January 1959, an Air Force Grumman (No. 566) left Punta Arenas to assist LAUTARO in clearing any ice obstructions that she might find on her trip north with the relieved personnel. The Grumman, flying at 5,000 feet, sighted LAUTARO at 59°S., and on recognizing that the ship was free of any ice obstructions, returned to Punta Arenas without incident, earning, however, a great deal of publicity.

During the five-hour flight, the radio beacon at Telefon Bay, Deception Island, was in operation. Aguirre Cerda Base was on standby in case of an emergency landing at Port Foster. During the flight the ships of the expedition maintained radio contact with the aircraft.

The preceding flights were the only air activities conducted during the expedition. There were no systematic aerial photographic or mapping missions, exploration flights, or trail support flights.

C. Trail Operations.

O'Higgins Base is the only Chilean Antarctic station equipped for and capable of conducting trail operations. The lack of good equipment and long range plans or objectives has limited the trail activities to exploratory trips of only short duration. Mobility is limited by the complete dependency on dog sleds without aerial or ground support.

1. 1957-1958.

The untimely death of two Chilean Army officers in August 1957 (see Chapter VII) during a field trip from O'Higgins Base was a severe blow to morale at the base, and caused Army Headquarters to place restrictions on future trail operations until the accident had been thoroughly investigated. As a result, trail operations in 1957-58 consisted of only short training trips by dog sled, the longest of these taking four men with two dog teams fifteen miles south of the base. This trip was completed in four days. None of these penetrations were conducted in areas that had not been previously explored.

2. 1958-59.

This season, the personnel wintering over at O'Higgins Base, under the guidance of Lt. Luis Pedrosa and Sgt. Lino Davila, hope to travel by dog sled to the Argentine and British bases at Hope Bay for the purpose of seeking out easier and safer routes to these sites. The success of these trips will determine the feasibility of conducting possible explorations along the west coast of Palmer Peninsula. Their duration and distance will be determined by the condition of the field equipment, the weather, the availability of time. These trips are planned for exploration, training, and the testing of equipment, and no scientific studies will be made other than the plotting and positioning of their routes. There will be no aerial logistical support for these operations.

The procurement of accurate small scale (1:35,000) British survey maps of this area of the Palmer Peninsula showing safe and tested routes of travel, and the location of British and Argentine cache sites, along with an abundant issue of new United States Army Antarctic clothing and equipment and United States Army Arctic field rations, and the excellent condition of the 18 Malamute and Siberian huskies at the base have given the Chileans confidence that they will accomplish these field trips without incident.

Comment: During this observer's stay at O'Higgins Base, the Chileans expressed a desire for the procurement of motor vehicles and scientists to aid them in their future trail operations. The British, who are doing extensive mapping and surveying in this area, are not using vehicles, but depend on aerial supported dog teams to accomplish their work.

VI. EXPEDITION SCIENTIFIC PROGRAM

A. Chile's Scientific Program in the Antarctic.

Chile's participation in the International Geophysical Year was terminated as of 31 December 1958. The withdrawal of the aurora observer team and their equipment from González Videla Base in February 1959 brought an end to Chile's contribution to the international scientific effort in the Antarctic.

The Chilean scientific program in the Antarctic has been plagued with a series of unfortunate incidents which have reduced its effectiveness to a minimum. Fire completely destroyed the Chilean IGY base, Luis Risopatron, in March 1958, along with a large number of scientific instruments. This disaster and the subsequent withdrawal of the assigned scientific personnel greatly handicapped Chile's productiveness for that year. The 160 million peso loss (\$160,000) represented a large portion of Chile's Antarctic budget for that year.

In November 1957, a fire had destroyed a major part of O'Higgins Base, resulting in the loss of most of the records and reports concerning scientific and meteorological observations made during the 1956-57 season. Chile has not been able to rebuild or to replace the buildings and equipment lost in these two fires.

The tragic death of two Chilean officers, who fell into a crevasse during a field trip from O'Higgins Base in August 1957, brought about restrictions on future Chilean explorations in this area. In 1958 the base personnel at O'Higgins were limited to only short training field trips of little significance. This year, the ban on field trips has been lifted and the acquisition of new field equipment may show progress in this field of endeavor.

The extent of the scientific program during the 13th Chilean Antarctic Expedition was limited by the small budget, and was restricted primarily to basic meteorological assignments required by the Air Force Meteorological Center in Santiago. Also included in this year's scientific program were various activities that would have some bearing on the Chilean sovereignty claims in the Antarctic.

No civilian or military scientist accompanied this year's Chilean Antarctic expedition, nor were any new scientific programs started. Since the inauguration of the new Chilean President, Señor Jorge ALESSANDRI Rodríguez, in November 1958, Chile has been subjected to more rigid economy measures, and the Antarctic program has been allowed to suffer during this transitional period.

B. Chilean IGY Disciplines in Antarctica.

1. Aurora and Airglow.

Chile's 1957-58 program of studies in aurora and airglow conducted at González Videla Base was the last program that could be directly attributed to Chile's IGY activities in the Antarctic.

For this study, four students from the Catholic University in Santiago volunteered to winter over at the base. All were selected for their scholastic accomplishments, physical health, and mental stability. As a salary each received 120,000 pesos per month (\$120.00). In preparation for this assignment, the four underwent three months of informal observer training under the guidance of Dr. Erich P. Heilmair, head of the Astronomy Institute at the University. The students, all in the field of construction engineering, were: Sergio Merino, Sergio Cisternía, César Durotto D., and Leopoldo Benitez H.

Information concerning various aspects of observations can be obtained by writing Dr. Erich P. Heilmair (Physics), Instituto de Física y Astronomía, Universidad Católica de Chile, Santiago, Chile.

Their instruments consisted of a K-100 all-sky camera (16mm, 100 foot magazine load) powered by a one-cylinder, four-stroke Briggs and Stratton diesel motor with a 750 watt, 220 volt AC generator. The film used was Tri-X reversible in 100 foot magazines.

a. Observational Data:

Theoretically the number of observational hours was 2941; however, there were actually only 739. There were 117 cloudy nights with no observations. Observations began on 3 February and ended on 6 November 1958. This period was determined by the ability to measure third and fourth magnitude stars.

Each man stood a two-hour watch and the camera was operated when there was less than 6/8 cloud cover. During alerts, the camera (weather and clouds permitting) operated at the rate of one picture every 45 seconds.

Of the aurora alerts received from McMurdo Sound, only three could be observed. The following is the data received from these observations:

- (1) Date: 6 and 7 June; Hours: 2352-0350Z
Type: Diffused surface with pulsating rays
Color: Red; Intensity: Bright
Position: Horizontal angle 255°-46°
Altitude: 40°

- (2) Date: 3 and 4 September
Hours: 1915Z-2338Z
Type: Glow with frontal rays
Color: Red and white
Intensity: Medium
Position: Horizontal angle 300°-40°
Altitude: 15°

b. Other phenomena observed and recorded:

(1) Measured vertical and horizontal angle, high and low limb of sun, sunset to sunrise using compass and a eclinometer to measure the angles.

(2) Data on third and fourth magnitude stars.

(3) Date and time of sun's angle, 27 February through 26 December.

(4) List of shooting stars, date, time, magnitude and duration.

(5) Observed for Mother of Pearl and illuminating clouds but none were seen.

All data was recorded on standard aurora data cards, numbers 2786 and 2787.

2. Seismology Recordings.

In 1948 the Chileans installed a seismograph in a special room in the main building at O'Higgins Base and have conducted studies from there ever since, except for periods of malfunction and adjustment. Recordings obtained from this instrument were part of Chile's contribution to the international scientific effort. To date, this is the only seismograph that the Chileans have in the Antarctic. The daily observations and recordings are currently conducted by the base leader, a career infantry officer, who attended a two-week seismology indoctrination course at the University of Chile prior to his present assignment. The following is a description of the seismological installation at O'Higgins:

a. Characteristics of the seismograph:

The seismograph consists of a steel "A" frame supporting a free-swinging concrete mass weight 2000 kilograms, with a north-south alignment. The daily movement of the mass, measured in minutes and hours, is recorded on a revolving cylinder covered with lamp-black paper that is synchronized with a master 24-day Ricardo Wust pendulum clock through a series of wet-cell batteries and circuits, and to the mass itself by a tank of oil containing six rudders or fins acting as buffers that dampen and reduce the arc of movement of the mass. The magnitude of the seismograph is 153, the velocity, 12.1 seconds.

Information concerning seismographic matters can be obtained from the Seismographic Institute at the University of Chile in Santiago.

b. Observation technique:

Observations are taken once a day 0800 local time, when a radio time tick is obtained from the Washington, D. C., observatory to check the accuracy of the master clock. Once the time correction is made, the lamp-blackened paper is removed and fixed in a tank of shellac and alcohol. A fresh sheet is inserted on the cylinder. If any shocks or tremors are noted on the fixed sheet, complete data is taken and radioed to Santiago, where the information is passed on to the University of Chile for further distribution and study. Otherwise, data is recorded in the seismograph log which will be sent to Santiago with the next relief ships. Included in the data is the daily maximum and minimum temperature within the seismograph room, time and characteristic of the disturbance, and the velocity and direction of the wind outside.

C. Chilean Non-IGY Programs.

1. Hydrographic and Oceanographic Work.¹

In addition to logistical activities, LIENTUR and LAUTARO did hydrographic and oceanographic work. Both ships used the standard radar, and navigational sounding gear installed in 1942 during their construction in the United States. LAUTARO, in addition to this equipment, had a bathometer.

a. Purpose of Missions:

(1) To rectify the charts of the east coast of the de Gerlache Strait from Trinity Island to Cape Anna.

(2) To take soundings in the de Gerlache Strait.

b. System Employed:

The two ships checked discrepancies in the charts of these channels that had been noted on previous voyages through these waters. Once at these points, the craft proceeded to take demarcations by gyrocompass and distance by radar from the ship to the principal promontories.

¹Appendix of this report contains charts and overlays involved in the work, which may be consulted at the Office of the United States Antarctic Projects Officer.

These observations were repeated from various stations, resulting in triangulations and fixes connecting the delineations of these promontories. Simultaneously, soundings were recorded during the navigation between these points with a NJ-9 Sonar.

In total, five waterways were investigated. The work in one had to be suspended before completion due to poor visibility.

c. Results Obtained from Observations:

Shortage of time prevented the Chileans from completing all the assigned work in this area. Those passageways that they were unable to reconnoiter were the bay that opens to the south of Trinity Island, the south coast of Hughes Bay, and the interior of Wilhelmina Bay. (The results obtained are illustrated on the "overlays" contained in the appendix of this report which are not reproduced, but may be consulted at the Office of the United States Antarctic Projects Officer.)

d. Bathymetric Information:

During the oceanographic cruise LAUTARO established six stations in the Drake Strait, two in the Bransfield Strait, and three in Pendulum Cove. At each station they obtained the following information:

- (1) Surface temperature
- (2) Temperature to 274 meters
- (3) Water samples at depths of 0, 10, 20, 30, 50, 75, 100, 150, 200, and 250 meters, to be analyzed at the Marine Biological Laboratories at Montemar, Chile.

The stations and the geographic positions:

Drake Passage

Sta. 1	Lat. 55°42'S.	Long. 65°49'W.
2	55°35'S.	65°04'W.
3	55°42'S.	65°09'W.
4	55°35'S.	62°48'W.
5	57°42'S.	60°00'W.
6	58°35'S.	57°42'W.

Bransfield Strait

Sta. 1	Lat. 63°21'S.	Long. 60°32'W.
2	61°23'S.	61°23'W.

Pendulum Cove

Sta. 1	Lat. 62°55'54"S.	Long. 60°35'54"W.
2	62°56'06"S.	60°35'55"W.
3	62°56'18"S.	60°35'05"W.

In addition, every hour during the cruise they took the surface temperature, complementing the standard meteorological observations.

2. Tide Observations.

In addition to the preceding studies, the Chileans corrected the hydrographic charts of Pendulum Cove, Deception Island, during the month of February 1959. They worked from small boats off MAIPO, using hand lead lines to obtain soundings and a sextant to obtain the necessary fixes from triangulation points located on the shore.

Maximum coverage was obtained by use of a grid system.

A tidal scale was installed in Pendulum Cove and recordings were taken of the tidal action for one month, from one full moon to the next. The tidal scale was read once every half-hour, and when it was near its maximum and minimum levels, once every five minutes. Similar work is scheduled at the other three bases during the later part of this year.

3. Meteorological Observations.

The primary scientific program of all four Chilean Antarctic bases has been the collection of meteorological data. Supplementary data has been furnished by the ships of the expeditions during their cruises in Antarctic waters. The gathering and recording of the meteorological data is done by the base personnel, none of whom are professional meteorologists. On MAIPO, as assistants to the Commadore, were two Chilean Air Force civilian meteorologists. They collected weather data (four times daily) from Punta Arenas, Santiago, the Falkland Islands, and the Chilean Antarctic bases. Their analyses and predictions of the weather governed the movements of the expedition. Each of the three ships attached to the expedition recorded hourly weather information in the quartermaster's log, standard procedure for ships at sea.

During 1957-58, the bases contributed to the IGY effort by relaying four daily weather reports to McMurdo Sound via Aguirre Cerda at 0200, 0800, 1400, and 2000 (IST). At 0700, 1200, and 1800, observations were relayed to the Air Force Meteorological Center at Santiago. Reports contained information on precipitation, visibility, wind direction and velocity, cloud formations and estimated heights, temperature and barometric readings, and relative humidity. Once a week, each base also reported the status of the sea ice, its concentration and direction of movement, and the condition of the sea, including new ice, leads, turbulence, etc. Instruments and equipment used in obtaining weather data are described in Chapter III of this report.

4. Geography and Topography.

The Chilean Army's Geographic Institute assigned Major Enrique Gillmore S., geographer, and Captain Ricardo Cepeda M., topographer, to accompany the 13th Expedition for purposes of checking the accuracy of the Chilean maps covering the O'Higgins and González Videla Base areas. Equipped with a Keuffel and Esser magnetic compass, with azimuth and tripod, and 1:35,000 scale topographic maps copied from British originals, this team spent an average of two weeks at each base, confining their working area to within a three-mile radius of the buildings.

Within this radius, the geographic position of the bases and the surrounding promontories were checked against the locations marked on the maps by cutting in a series of compass bearings from established triangulation markers. During their stay at O'Higgins they were able to obtain copies of 1:50,000 scale Falkland Islands Dependencies Survey maps of this area, published in 1958, from two British surveyors working from Hope Bay and who happened to visit O'Higgins Base at this time. These maps contained ground control points from 15 to 35 miles apart and were accompanied by an oblique aerial photographic layout of Trinity Peninsula, developed from the previous year's Hunting Aero-Surveys photo mission. Needless to say, these gifts enhanced a rather sketchy program.

5. Collection of Flora and Fauna.

All of the 1959 wintering-over personnel at the four bases attended a two-weeks introductory course in the flora and fauna of the Antarctic conducted at the Marine Biological Station at Montemar, an affiliate of the University of Chile. Biological specimens, collected at each base, will be sent to the station for further study. There was no definite program or system for collection. The types and quantities to be collected were left to the discretion of each base commander. No special tools or laboratory equipment were provided, but at least one man at each base was an amateur taxidermist.

VII. MISCELLANEOUS EXPEDITION SIDELIGHTS

A. 1957-58.

As there was no United States observer with the 1957-58 Chilean Antarctic Expedition, information of the following incidents has been obtained by consulting various sources, including reports on file in Santiago as well as from observations and interviews in the field. These incidents will aid in filling the gap between this report and that of James O'Neal, covering the 11th Chilean Antarctic Expedition of 1956-57.

1957-58 proved to be the most tragic year for the Chileans in the Antarctic since the construction of their first base in 1947.

1. Loss of Two Officers on Exploration Party.

On 12 August 1957 Lieutenants Oscar A. Inestroza and Sergio Ponce Torrealba, while enroute from O'Higgins Base to the Argentine settlement at Hope Bay, fell into the Los Genidor Crevasse and were killed. When the accident occurred, the two Chileans were well in advance of an accompanying dog team leading the way through a heavily crevassed area, about one day's distance from the Argentine base. Whiteout conditions prevented them from seeing the crevasse in time to prevent the sled and themselves from falling into it. The second team, under the leadership of the Commander of O'Higgins Base, Luis Orando, made an unsuccessful attempt to rescue them and then returned to O'Higgins Base for help.

On 13 August, Major Luis Correa, base leader of the scientific post, Risopatron (located near O'Higgins), arrived at the scene of the accident with an eight-man rescue party, including a doctor. During the evening of the same day, the rescue team managed to recover the body of Lt. Inestroza but were unable to locate the body of Lt. Ponce or to recover the sled or the dogs. During the return trip to O'Higgins the rescue team encountered bad weather conditions which delayed their arrival until the morning of the 19th.

This was the last attempt of the Chileans at field explorations for the rest of the 1957-1958 season.

2. The Fire at O'Higgins Base.

On 27 November 1957, a five-hour fire destroyed part of the installations at O'Higgins Base; fortunately there were no casualties. The fire, resulting from faulty wiring, began in the barracks and destroyed the base office, radio room, radio repair shop, personnel equipment storeroom, and part of the mess hall. Included in this loss was bedding, personal and Ant-

arctic clothing, surgical supplies, and most of the year's scientific records. LAUTARO's timely arrival on the scene with additional fire-fighting apparatus, and assistance by the personnel at Risopatron prevented the fire from spreading any further.

The installations destroyed by this fire have not yet been replaced. The interior of the remaining structure has simply been rearranged to accommodate the wintering-over personnel.

3. The Loss of Risopatron Base.

The Chilean IGY base, Luis Risopatron, adjacent to O'Higgins, was completely destroyed by fire on the night of 10-11 March 1958. There were no personnel casualties. The fire was caused by an over-heated stove and happened at the time when all base personnel, except one man, were attending a birthday party at O'Higgins. High winds and inadequate fire-fighting equipment resulted in the complete destruction of the building.

The fifteen members of the station, eight military personnel and seven scientists originally assigned to winter over at this base were forced to return to Chile on the LIENTUR with **such** instruments and equipment ~~as~~ could be salvaged. The \$160,000 loss of this base was a serious setback to the Chilean scientific effort in Antarctica.

B. 1958-59.

1. Visit of the Chilean Tourist Ship, Navarino.

Navarino, a combination cargo and passenger merchant ship belonging to La Empresa Marítima del Estado, and carrying approximately forty passengers, dropped anchor in Discovery Bay, Greenwich Island, on 15 February 1959. This was the first time a Chilean tourist ship had ever visited Antarctica. Mr. Robert N. Williams, United States geologist under contract to Chile's National Petroleum Enterprise, was one of the passengers. The trip was organized and advertised specifically as a tourist cruise to La Antártica Chilena. The ship departed from Valparaiso on 28 January 1959, traveling the inland waterway and stopping at Punta Arenas and Port Williams on the way.

Upon arriving at Discovery Bay, the passengers were allowed to visit Prat Base for two hours before the ship departed for Pendulum Cove, Deception Island, anchoring there on 16 February. Passengers were permitted to go ashore and visit Aguirre Cerda Base. The ship left Deception Island on 17 February and arrived in Valparaiso on 23 February.

Cost of a round-trip ticket was about \$500.00 (United States currency). It is rumored that this amount did not begin to pay for the cost of the trip and the main purpose for the journey was to establish additional evidences of Chilean sovereignty in this sector of the Antarctic.

OFFICIAL USE ONLY

On 2 February 1959, the Argentine tourist ship, El Yapeyu, visited Deception Island for one day before returning to Buenos Aires. On board the ship were approximately 250 passengers, 26 of whom were United States citizens. This is the second year that Argentina has sent a tourist ship to the Antarctic.

2. Fire on Board LIENTUR.

On the evening of 4 February 1959, while engaged in oceanographic work in Bransfield Strait, LIENTUR developed a fire in her engine room, resulting in the death of two crew members, damaging her electrical system, and putting her out of commission for the remaining part of the Antarctic operations.

a. Events Leading to Fire:

On 4 February 1959, LIENTUR was engaged in taking soundings in the Bransfield Strait (63°00'S., 57°51'W.) about ten miles northwest of O'Higgins Base. She was traveling at reduced speed (50 rpm), using her Number 2 engine, in a calm sea with unlimited visibility. At 2017 Commander H. Alsina, her captain, asked for full power (180 rpm) and an explosion occurred in the engine room. Fire stations were immediately sounded and a radio message was sent to MAIPO, informing the Commodore about the fire. This was MAIPO's last radio contact with LIENTUR. While crew members attempted to control the fire, a second explosion occurred in the engine room, 15 minutes after the first, disrupting the ship's electric power source. This second explosion caused Commander Alsina to issue orders to abandon ship.

b. Abandonment of LIENTUR:

Shortly after 2100, the captain ordered the three lifeboats of LIENTUR (a motor launch and two longboats) to be lowered into the water and ship's personnel (53 crew members, 5 passengers) boarded them safely, along with emergency supplies and a battery-operated radio that was damaged in transit.

While the boats were circling the LIENTUR, watching the progress of the fire, a tapping sound was heard, originating from the stern shaft well. Commander Alsina and selected members of his crew returned to the ship to investigate and learned that two of the four crew members on duty in the engine room at the time of the fire were alive and trapped in the after shaft tunnel. Further investigation showed that the fire was dying out and could be controlled. The boats were ordered back to ship and efforts were renewed to put out the fire and to free the trapped crew members. At this moment an iceberg was moving toward LIENTUR from the southwest, and crew members had to re-enter the lifeboats and tow LIENTUR from the path of the iceberg before the two trapped men could be rescued.

c. Rescué Operations:

In order to free the men from the shaft tunnel, the jammed escape hatch leading from the engine room to the stern weather deck had to be forced open. They then ran through the smoke-filled engine room and out the opened escape hatch to safety.

Shortly after the first explosion the four men on duty had attempted to escape from the engine room as it rapidly filled with fire and smoke. Two of the crew members attempted to leave by way of the escape hatch, only to find it battened down, and both suffocated in the futile attempt to open it. The other two chose the shaft tunnel as a means of escape, and upon entering the tunnel, closed the water-tight hatch between the engine room and the tunnel, preventing the entrance of any fire or smoke. No other exits lead from the tunnel and here they were forced to stay until rescued.

The Commodore, on receiving LIENTUR's radio message, sent the ship's helicopter to the Argentine base on Deception Island and requested that the ATA CHIRIGUANO be sent to aid LIENTUR. (LAUTARO was at Port Williams and MAIPO needed 12 hours to build up enough steam to get underway.) At 2130, the Argentines contacted CHIRIGUANO at Half Moon Bay and she immediately got underway, arriving beside LIENTUR at 0300 on 5 February. Once alongside, CHIRIGUANO used her fire hose to finish putting out the fire that was already under control. Once the fire was out and LIENTUR cooled down, CHIRIGUANO took her in tow and both arrived at Pendulum Cove at 2130 that evening.

During the action, MAIPO had finally been able to get underway from Deception Island at 0300 on 5 February, and at 0900 she met the two ships in the Bransfield Strait. The Commodore, on hearing that everything was under control, ordered MAIPO to return to Pendulum Cove. When the two ships arrived, Commodore Barros appointed a two-man administrative summary board, composed of Commander Varela, Operations Officer, and Lieutenant Guesalaga, Operations Secretary, to investigate all facts concerning the fire, and to determine the responsibility, but not to prosecute.

d. Cause of Fire:

The summary investigation found that a crack in the Number 5 cylinder head of the Number 1 engine had allowed gaseous vapors to escape. These vapors were ignited by friction in the over-heated engine when it was put on the line. The fire spread to the oil-drip pan below the engine, causing the first explosion. The heat and flame created by this explosion soon reached an overhead auxiliary diesel fuel tank, causing the second explosion. The fire damaged the overhead electric wiring, causing the loss of power. In spite of the loss of water pressure, the crew was eventually able to control the fire by closing off all the ventilating systems leading to the engine room. The fire snuffed itself out through the lack of oxygen. The fire had expanded so rapidly that the engine room crew members had no time to activate the carbon dioxide and foam extinguishers located there.

e. Result of Fire:

No permanent damage was sustained by the ship. The wiring system suffered the only severe damage and would have to be replaced. Superficial damage from the smoke and flames was removed by cleaning and painting the scarred areas. Emergency repairs performed at Deception Island restored the ship's power for lights, cooking, and water, enabling the crew to remain on board until she arrived at Punta Arenas.

With LIENTUR out of action, the Commodore was forced to request headquarters to replace her with another ship. The ATA LEUCOTON was ordered into the area to replace the damaged ship and to tow her back to the continent at the completion of the Antarctic operation. This proved not only an additional expense to the operation but the time lost also prevented exploratory cruises into the Marguerite Bay area or along the northeast coast of Palmer Peninsula.

f. Casualties:

The two engine room crew members who suffocated in the fire were Sergeant Armando MUNOZ Perez, Serial No. C-2054, and Corporal Jorge VENEGAS Bravo, Serial No. Q-1383. Catholic services were held at Aguirre Cerda Base, and the embalmed bodies were packed in ice and returned to Valparaiso to be buried in the Navy Cemetery.

g. Comments:

The relationship between the Argentines and the Chileans taking part in the accident was congenial. During CHIRIGUANO's two-day stay beside MAIPO in Pendulum Cove, numerous parties and visits were exchanged between the ships. The Commodore's request for assistance from the Argentines was met with prompt action.

Officers on board MAIPO were of the opinion that Lt. Cmdr. Alsina did everything possible to save his ship, and that he acted with calm dispatch. They felt that he would not be held responsible for the accident, nor would his career be jeopardized as a result. In fact, shortly after his return to Punta Arenas, he received his expected promotion to full Commander (Capitan de Fragata). It might be of interest to note that Chilean Navy ships of this size do not have commissioned officers assigned to duty in the engine rooms. All the ships' engineering plants are supervised by non-commissioned officers.

3. Chilean Antarctic Training Program.

a. Method of Selection of Candidates:

The Chilean Armed Forces have set up a definite system of selecting and training the personnel who will winter over at each of the four

FOR OFFICIAL USE ONLY

Chilean Antarctic bases. The selection of personnel is under the supervision of the Antarctic division of the Joint Chiefs of Staff. The high morale evident among both incoming and outgoing personnel speaks well for the system. The men chosen are volunteers and for every man selected, at least forty-five have been subjected to the steps outlined below:

(1) All applications are received and reviewed by selection boards within the individual's own branch of the Armed Service.

(2) Family histories and police and service records of the individuals selected in the first step are screened for any derogatory or disqualifying information.

(3) Applicants passing the first two steps are subjected to a series of examinations:

(a) A complete medical examination

(b) A complete laboratory analysis and examination

(c) Physical fitness tests

(d) Intelligence and psychoanalytic tests for personality, intelligence, stability, and neuroses.

Once the individuals have passed the four tests, their cases are reviewed by the service boards; and, on the basis of motivation, aptitude and attitude, family background, variety of interests, physical health and service records, wintering-over personnel are selected.

The training program is a coordinated effort by all branches of the Armed Forces and the men selected from the Army, Navy, and Air Force take the training together. During the six months' training period, the commanding officers have an opportunity to observe the men who will serve under them, and each officer is given the option of requesting changes within his group.

b. Training Program:

The men selected for Antarctic service attend the following courses, regardless of specialty or rank:

	<u>Course</u>	<u>Time</u>	<u>Place</u>
(1)	Communications	One month	Navy School of Engineering, Valparaiso, Chile
(2)	Motors & Machinery	Two months	Navy School of Engineering, Valparaiso

FOR OFFICIAL USE ONLY

	<u>Course</u>	<u>Time</u>	<u>Place</u>
(3)	Photography	One month	Navy School of Engineering, Valparaiso
(4)	Fire-Fighting	Two weeks	Same as above
(5)	Meteorology	One month	Air Force School of Meteorology, Santiago
(6)	Mountaineering	Two months	Army Mountain School, Ferrelones
(7)	Diet & Cooking	One month	Army School, Santiago
(8)	Fauna & Flora	Two weeks	University of Chile, Santiago, and annex of Marine Biology Station in Montemar.
(9)	Glaciology & Seismology	Two weeks	Same as above

c. Motivations and Incentives.

The principal reason for volunteering for duty in the Antarctic is monetary. Men receive 600 per cent extra pay for wintering-over duty in Antarctica. Other incentives may be curiosity, experience, prestige, and the possibility of advancement.

4. Recreational Facilities.

The Chilean Antarctic bases have rather limited indoor recreational facilities. The base libraries have few recent editions of magazines or books. Other than the darkroom equipment, the pursuit of a hobby is the responsibility of the individual. The two Air Force bases have the only movie equipment. Each has about forty films to be shown during the year. A few games and playing cards were in evidence at each base. Floor space limits indoor physical activities to boxing and calisthenics. There is, however, adequate equipment for outdoor activities, such as shooting, skiing, and boating.

Base personnel have the privilege of talking to their families by radio for one-half hour every Sunday. Special religious services are broadcast to them every Sunday and on religious holidays. All bases have an abundant variety of liquors and wine. The quantity consumed is left to the individual with liberal supervision by the base leader. Several members of each base are amateur musicians and these bring their guitars and accordions with them. O'Higgins, for example, has three guitar players and four accordionists. Radio hams are allowed to use the radio facilities after working hours. The exchange of visits with nearby Argentine and British bases help break the routine and monotony.

5. Amateur Radio Information.

Attached as an appendix to this report is a list of the amateur radio call signs and frequencies assigned to each of the four Chilean Antarctic bases. (This report is not reproduced and is available at the Office of the United States Antarctic Projects Officer upon request.)

6. Chilean Antarctic Clothing.

Each of the Armed Forces is responsible for furnishing its base personnel with Antarctic clothing. Much of the gear is of United States manufacture and duplicates the apparel worn by our forces in the Antarctic. It is adequate for the restricted living at the bases.

O'Higgins is the only base where men are required to work in the field and there they are outfitted with United States Army Arctic clothing. Attached as an appendix to this report are lists of the Antarctic clothing issued to the Chileans wintering over at the Navy and Air Force bases. (These are not reproduced, but are available at the Office of the United States Antarctic Projects Officer.)

7. Chilean Antarctic Budget.

This observer was unable to obtain the exact budget figures showing how much money was spent by Chile to support the 13th Chilean Antarctic Expedition. The following figures were given as estimates of the cost and do not include the expense of maintaining and operating the ships during their stay in the area.

Estimate of Cost of Maintaining Antarctic Bases, 1958-59, for 14 months.

Air Force (2 bases)

Salaries of base personnel	70,000,000 pesos
Maintenance & supply of base	50,000,000

Navy (1 base)

Salaries of base personnel	35,000,000
Maintenance & supplies of base	27,000,000
Installation of new heating unit	11,000,000

Army (1 base)

Salaries of base personnel	37,000,000
Maintenance & supply of base	20,000,000

\$250,000 (\$1.00 = 1000 pesos)	TOTAL	250,000,000 pesos
---------------------------------	-------	-------------------

VIII. ANTARCTIC MANAGEMENT

Chapter XII of James O'Neal's report contains details concerning the Chilean Ministries and Committees responsible for the organization and execution of the logistical and scientific programs in La Antártica Chilena. This is a brief description of the governmental organization controlling the administrative details in the sector of the Antarctic claimed by Chile (53°-90°W.). In reading this section, one must keep in mind that the November 1958 inauguration of the new President, Jorge ALESSANDRI Rodriguez, has created many changes in the political structure of the government. Some of these reforms are being felt by the Ministries which are concerned with Antarctic matters. Interviews and discussions between this observer and Chilean officials at the Ministries of the Interior and National Defense failed, however, to bring to light changes which might occur.

A. The Antarctic Statute.

The document of administration, known as The Antarctic Statute, determines the Chilean managerial responsibilities in the Antarctic. On 17 June 1955, by Law No. 11-846, the Chilean Congress authorized the Executive (the President of the Republic) to establish the Estatuto del Territorio Antártico, statutory laws governing Chile's Antarctic Territory. By this authorization, the President passed Decree No. 298 on 17 July 1956, vesting the administrative authority of Chile's Antarctic Territory to the Governor of the Magallanes Province, who would be directly responsible to the Minister of the Interior. (Decree No. 454 of September 1953 had placed the Department of Treaties and Boundaries and the Ministry of Foreign Relations in charge of specific problems related to Chilean sovereignty in the Antarctic.)

The Governor of Magallanes is advised, depending on the measure, by the respective representative of highest rank of the Army, Navy, or Air Force resident in Punta Arenas. Resolutions of the Governor are in writing and copies are immediately sent to the Ministries of the Interior and of Foreign Relations. The Governor is required to submit an annual report to the Minister of the Interior who will make copies available to the other interested Ministries. The Governor, after consulting the Ministry of Defense, will designate as his representative in the Antarctic the highest ranking officer stationed at the Chilean bases. In 1958-59, the representative was Group Captain Enrique MAURIN Costa of González Videla Base. That official has such civil functions as the power to draw up affidavits and to inscribe them in a special register. He is required to inform the office of Civil Registry at Punta Arenas annually of such inscriptions.

The statute provides that a postal and telegraph agency be established at each of the permanent Chilean bases in the Antarctic. It provides for vigilance and control over fishing and hunting and for the collection of

taxes and fines resulting from such activities. It provides for the granting of concessions of islands or parcels of territory to Chileans for five-year periods, subject to extension. It also provides for the handling and solution of all matters of a civil or criminal nature, voluntarily or from disputes arising within the Chilean Antarctic. Military cases are to be handled by the authorized military court. Article 15 of the statute states that all supervision and coordination of such matters that relate to the Chilean Antarctic are the function of the Ministry of Foreign Relations, and that action will be taken through the appropriate ministry.

Comment: The execution of The Antarctic Statute is another move to strengthen Chile's claims to a large sector of the Antarctic. (For organizational chart, see end of section VIII.)

B. Chilean Antarctic Institute.

In July 1957, plans were instituted by the Chilean Government for the establishment of a Chilean Antarctic Institute. These plans were drawn up by representatives of the Executive Committee of the International Geophysical Year and the Ministries of Defense and Foreign Affairs.

The University of Chile is charged with the over-all supervision of the activities of this Institute in order to insure proper coordination in all matters pertaining to the Antarctic. Five scientific positions were to be created in various regions of Chilean Antarctica. The purpose of the Institute would be to direct and undertake scientific research in the "Antarctic and southern regions of Chile." The Institute would centralize the findings of scientific research conducted in Chile and abroad, and maintain cultural and scientific exchanges with the fourteen countries having similar organizations. It would also collaborate with the Ministry of Education in releasing pertinent information, and advise the Ministries of Defense and Foreign Affairs, as well as other agencies, on matters relating to the Antarctic.

Comment: This observer's inquiries in Santiago about the actual existence of this Institute and its sister agency, the Chilean International Geophysical Year Committee confirmed the rumor that they had not gone beyond the planning stage and are little more than paper organizations.

C. Chilean Antarctic Commission.

Decree No. 185 of the Ministry of Foreign Affairs, issued on 27 March 1958, reorganized and determined the composition and aims of the Chilean Antarctic Commission. The Commission was organized to substantiate and perpetuate rights and claims to the Chilean sector of the Antarctic.

Members of the Commission include the Minister of Foreign Affairs, the Minister of Defense, Senators, Deputies, Professors, military representatives,

the President of the Chilean Border Commission, and others. The principal aims of the Chilean Antarctic Commission are as follows:

1. To recompile and list the legal, historic, geographic, diplomatic, and administrative precedents related to the Antarctic, and especially to Chilean Antarctic Territory;
2. To prepare reports that are requested or considered to be necessary regarding Chilean Antarctic Territory; and
3. To promote studies, investigations, reconnaissance, and exploration that is considered valuable for the better use of the Antarctic.

Since the inauguration of President Alessandri in November 1958, this Commission has been undergoing reorganization.

D. Rights of Chile in the Antarctic.¹

The following resumé is submitted to give the reader a better understanding of the Chilean position in the Antarctic. This report gives a brief description of the historical, geographical, legal, diplomatic, and administrative aspects in support of Chile's sovereignty rights over the Chilean Antarctic Territory.

On 6 November 1955, President Pedro Aguirre Cerda signed Supreme Decree No. 1747, fixing the boundaries of the Chilean Antarctic at 53°W., 90°W. This decree affirms the rights of the Chileans to a dominion which had legitimate birth at the time of the Spanish Conquest. The rights set forth in the decree are based on the historical, geographical, legal, diplomatic, and administrative proofs given below.

1. Historical Proofs.

In Chile's Foreign Office there exist some thirty-nine documents, including charts and maps defining the rights which Spain and its colony - the Kingdom of Chile - had over the southern polar territories.

From 1539, when the Emperor Charles V granted concessions to the conquistadores, among whom was Sancho de la Hoz, dates the first individual act of dominion over the southern confines of Chile. For reasons of conflict between Sancho de la Hoz and Pedro de Valdivia, this generous gift of the Spanish monarch came into the hands of the latter, and thus formed

¹Taken from the O/RMA, Chile, translation of an article appearing in the publication of the Chilean Armed Forces General Staff, Patria, No. 379.

part of the jurisdiction of the first conqueror of Chile, who was so interested in the "Terra Australis" (Antarctica), that in 1554 he obtained another royal decree from Charles V which clearly extended his mandate over the unknown polar regions.

During colonial times, Chilean territory kept its geographic continuity and all of the governors understood that their jurisdiction extended from the unpopulated area of Tacama to the South Pole itself. This is shown in the Royal Orders which appointed them. Hence, according to the Chileans, the later maritime discoveries of foreigners in that section of the Antarctic Continent have not annulled or weakened a dominion based on legal grants and through exercise of sovereignty which had come with the incorporation of Chile into the Spanish possessions.

When Chile obtained her independence and became a republic, she consisted of all the territory which Spain had assigned her. President O'Higgins in a document written in Lima in 1831 refers limitedly to Chile's Antarctic dominion. Thus, in this form, Chilean rights in the Antarctic derive from the time Chile was established as a Spanish colony.

2. Geographic Proofs.

Proofs of the geographic nature are based on two concepts: geographic "continuity" and geographic proximity or "contiguity." With respect to the former, the Chileans claim that their most southern continental section is united to the Antarctic polar territory by one mountain system, the Andean Cordillera. The Chileans claim that this mountain range submerges in the Drake Passage, reappearing in Palmer Land as the identical geo-morphological and geological system. In addition, the physical similarity between the two continents is another factor of geographic continuity. Studies of the orology, sand formation, volcanic content, and petrology reveal that the same animal and vegetable life have inhabited both regions.

With respect to contiguity, Chile is the country nearest the Antarctic. This proximity, claim the Chileans, shows objectively that no other country in the world can claim ownership at first sight.

3. Legal Proofs.

The Chilean Foreign Affairs Ministry set forth in an official publication inserted in the Revista Geografica de Chile, September 1948, the following:

"Our country has fulfilled and is fulfilling each one of the conditions required by International Law on this subject. It (Chile) is favored in the first place by its proximity which makes it the Antarctic nation 'par excellence' and secondly, it has strengthened and authenticated

by means of Supreme Decrees of concession, as will be set forth later on in describing administrative proofs, effective economic activities in the Chilean Antarctic.

"These legal titles have in themselves alone an appreciable importance, and if we add them to the historical proofs which demonstrate our polar sovereignty, among these the 'Uti Possidetis' of 1810, they acquire as a group undeniable worth since the various declarations of sovereignty represented in the acts of occupation carried out throughout our history were done precisely because we considered ourselves always the owners and masters, as O'Higgins pointed out, of the lands situated to the south of Cape Horn."

4. Diplomatic Proofs.

"The Government of Chile, through intermediary of [its] Foreign Office, has always preoccupied itself with the Antarctic polar affairs. It suffices to mention the steps taken by Chancellors Huneeus Gana and Puga Borne in 1906 and 1908. The general keynote has been to declare, when opportune, [their] Antarctic rights and sovereignty whenever the Government of Chile has been notified by pretensions of sovereignty of other countries over the Antarctic Continent.

"This doctrine has been categorically declared also in all international congresses and reunions which have taken place or are taking place on polar affairs, whaling, and other matters which touch on the Antarctic regions, as recently in the Council of the United Nations and in scientific circles interested in the lands, oceans, and snows of the South Pole."

5. Administrative Proofs.

These refer to the group of internal acts of the Government of Chile which are of transcendental international importance "as witnesses of our role of sovereign over the Chilean Antarctic."

The most important proofs are undoubtedly the Supreme Decrees by which the Government granted "fishing, whaling, and other kinds of hunting concessions in [their] polar regions because each Decree is a new confirmation of our sovereignty." The first of these was issued in 1902 and refers to the leasing of the Diego Ramirez and San Ildefonso Islands for whaling to Señor Pedro Pablo Benavides. This concession carries the distinction of having been the first granted in the world by a government in the Antarctic region. In 1904 and 1906 other authorizations were made, and in 1906 one granted a concession which included even the lands situated to the Pole. At that time no country protested, which proves that their rights were not questioned. Of importance also are the concessions granted to the Magallanes Whaling Society (Sociedad Ballenera de Magallenas) which operated especially with Deception Island as its base until the year 1914 when a fire ended its

activities. It is on this Island where on 18 February 1955 the Chilean base, "Pedro Aguirre Cerda", was founded on Pendulum Cove, in homage to the President who on 6 November 1940 issued the Supreme Decree fixing the boundaries of the Chilean Antarctic.

Convinced of its rights, Chile remains aloof and inflexible in her opposition to overtures by other countries towards the internationalization of Antarctica. Various Chileans interviewed by this observer readily admit that Chilean activities in the Antarctic are primarily manifestations of its claim to political sovereignty.

E. Fraternalization with the British and Argentines.

The close proximity of the four Chilean Antarctic bases to British and Argentine installations in the same area encourages a free interchange of visits. Any political tension between the three countries is notably lacking in this part of the field. During the summer season, when the ships are in the area, a half-hearted attempt is made to maintain the status of non-recognition between the representatives of the three countries, but "Acts of God" and the curiosity of man soon break down the barriers. For example, LIENTUR's fire and the assistance by CHIRIGUANO resulted in an exchange of visits with the Argentines. Commodore Barros' personal friendship with Captain Butler, skipper of HMS PROTECTOR, resulted in the exchange of social visits by the two captains.

Any past unpleasant incidents have apparently been put in the background and feeling is one of resigned tolerance and acceptability. Chileans, on the receipt of a declaration of sovereignty note from the British or the Argentines, promptly reciprocated by presenting the others with a formal declaration of sovereignty of their own. These occasions are, however, very rare. Base personnel of the various countries look forward to visits by the others and freely exchange equipment and supplies. An unwritten understanding assures that no politics are discussed during these visits. During the Snipe Island incident in 1958 the friendly feeling between the Chilean and the Argentine personnel did not diminish. The incident simply is not mentioned.

F. Chilean Trends in Antarctica.

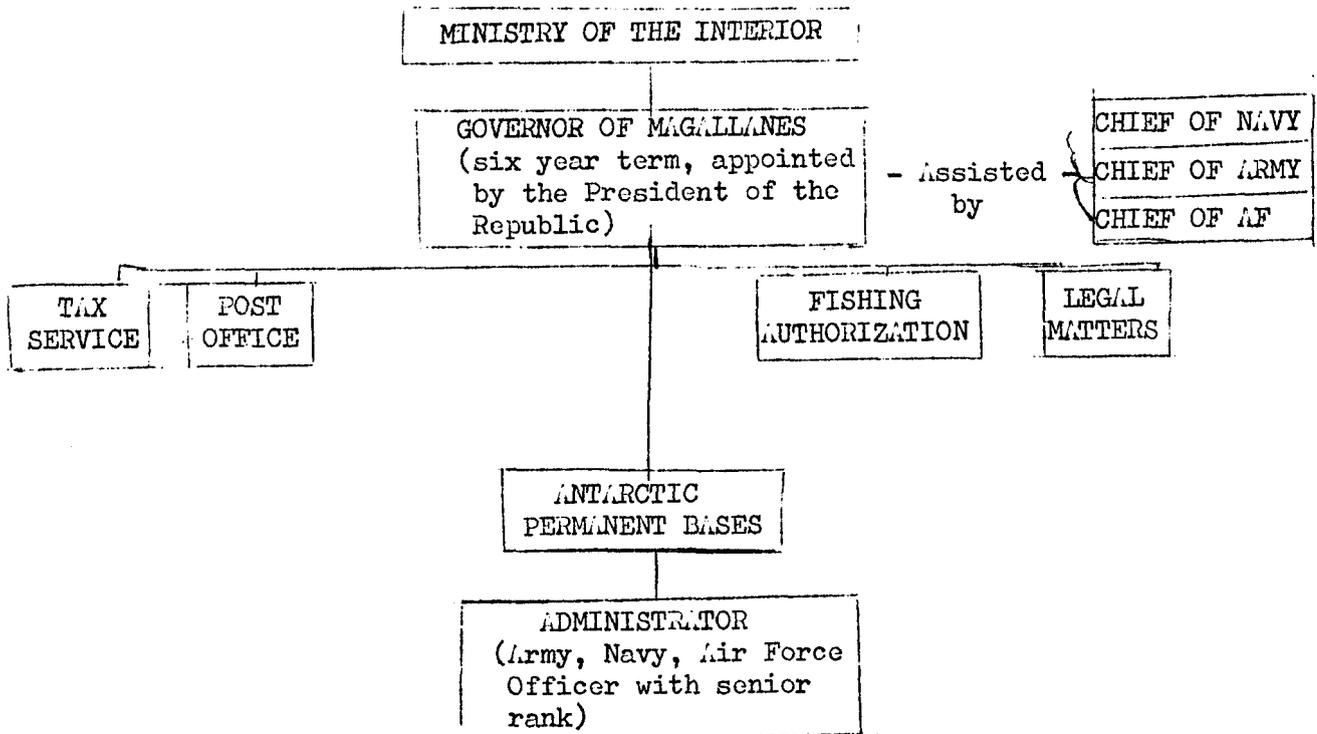
Increased activity in the Palmer Peninsula sector of the Antarctic by the British and the Argentines has made Chile increasingly aware of the necessity for establishing valid proofs to back up their manifestations of sovereignty. The Chileans are therefore working towards a greater scientific and military effort on the Antarctic Continent, combining military and civilian forces in order to determine more specifically the geological relation between the Andes Mountains and the Palmer Peninsula.

Desires and ambitions tend toward:

1. A cutback in the size of the three island stations;
2. A more active participation by civilian scientists and technicians;
3. Greater effort toward the establishment of bases on the Antarctic Continent itself;
4. Procurement of a specially-built ship to work in the Antarctic.

At present, the lack of funds has kept these goals from materializing. Chile's economy can spare little money for operations in the Antarctic.

ADMINISTRATION OF CHILEAN ANTARCTICA



Procedure followed in initiating protests or actions against foreign intrusions or retaliations

Governor of Magallanes



Ministry of the Interior



Ministry of Foreign Relations



Embassy of Country Concerned



Diplomatic Reclamation

The Governor of the Magallanes Province starts the action against interlopers. Action proceeds through channels as shown.

Exceptions occur with foreign ships sighted in Chilean Antarctic waters. The report here is passed by the Comodoro of the Chilean Antarctic Fleet directly to the Ministry of Foreign Relations and then to the embassy concerned.

Water areas within five miles of Territorio del O'Higgins constitutes Chilean territorial waters.

IX. OBSERVER REQUIREMENTS

The material contained in Chapter XIV (Observer Requirements) of James O'Neal's report proved to be of great value to this observer. It helped to make his tour with the Chileans extremely interesting and rewarding with the ~~minimum~~ amount of frustration usually encountered in traveling.

Although a year has elapsed between our respective trips, the travel conditions and accommodations encountered by this observer were identical to those experienced by Mr. O'Neal, and there is little to add without duplication. However, the Assistant United States Naval Attache in Santiago presented this observer with an introductory letter from the Protocol Officer of the United States Embassy that proved extremely helpful in obtaining interviews with the Chilean officials concerned in Antarctic matters. The letter, signed by the United States Ambassador to Chile, stated the purpose of the visit and enlisted the aid of the Chileans in achieving my objectives. Copies were forwarded to the various Chilean agencies which I was interested in visiting, paving the way for prompt and courteous responses to all my inquiries and enabling me to meet and interview various Chilean department heads who would have been unapproachable without such a letter.

The only other comment that might make a future trip more comfortable and enjoyable for observers assigned to Chilean Antarctic Expeditions concerns dietary habits.

The food served on board the Chilean ships and at the Antarctic bases is plentiful but lacks variety and tends to become somewhat monotonous. This condition is easily alleviated by procuring a few extras, such as cigarettes, liquor (Scotch and Bourbon), and grocery tidbits before going into the Antarctic zone.

The cigarettes and liquor can be obtained through the United States Embassy at a nominal cost. The various shops have a wide variety of delicacies that will satisfy most tastes, although they tend to be a bit expensive.

One will find the effort and expense of including these items in your personal gear will be well rewarded by the reception they will receive at festive occasions and at parties or snacks as an added boost to morale.

X. EXPEDITION BIOGRAPHIES

This chapter contains a series of short biographies of some of the military and civilian personalities participating in the 13th Chilean Antarctic Expedition. These biographies are arranged by service categories. Personnel attached to the United States Naval Mission in Santiago assisted in the compilation of material for these series. Photographs of these men and other expedition members are available in the Office of the United States Antarctic Projects Officer.

- A. BURKE, Malcolm Kevin
 Born: Stamford, Connecticut, 14 November 1916
 Education: Yale - B.A., 1938
 Fletcher School of Law and Diplomacy - M.A., 1939
 Occupation: Export business; free-lance writer, author of non-fiction
 articles published in Vision Magazine and La Prensa
 newspaper.
 Peru: Administrative Secretary, Instituto Cultural
 Peruano-Norteamericana, 1947; free-lance journalism
 and writing, 1948 et seq.
 Military Service: Wartime, USNR, IITJG
 Place of Residence: Peru: Edificio Jorge Chavez, 7-G
 Lima, Peru
 United States: % Gregory T. Burke
 Salem Straits
 Norton, Connecticut
- B. Captain Ramón BARRROS González, Chilean Navy, Commodore of 13th Chilean Antarctic Expedition
 Born: Valparaiso, 17 April 1911
 Education: Graduated from Chilean Naval Academy, 1929
 Military Service:
 Promoted to Lieutenant, 1934
 Promoted to Capitán de Corbeta (LCDR), 1943
 Promoted to Capitán de Fragata (CDR), 1949
 Promoted to Capitán de Navío (Captain), 1958
 Midshipman cruise up west coast as far as Vancouver, 1929
 Specialist in Torpedoes
 Special Course in Staff Work
 Sub-Director of the Chilean Naval War College, 1953
 Has served as Naval Attache in Lima, Peru, and Buenos
 Aires, Argentina
 Has served as CO of the seagoing tug GALVARINO, the PCE
 CHIPANA and of the oiler MALPO on an Antarctic expedition

FOR OFFICIAL USE ONLY

- C. Capitan de Fragata (CDR) Luis GAUCHEE Delano
Born: Valparaiso, 24 November 1951; married to Adriana TORO
Moreno; two sons, Gaston and Beltran
Education: Liceo de Valparaiso
Escuela Naval (Naval Academy) of Chile
Special Course in staff duties (Naval War College)
Specialist in Torpedoes
Graduated from Naval Academy in December 1934
Military Service:
Promoted to Lieutenant 2nd, 1939
Promoted to 1st Lieutenant, 1943
Promoted to Capitan de Corbata (LCDR), 1949
Promoted to Capitan de Fragata (CDR), 1954
Has served aboard battleship ALMIRANTE LATORRE
CO of patrol craft INDUS.
Instructor in torpedo school, aboard destroyers of the
Operations Squadron
CO of LEUCOTON with 6th Antarctic Expedition, 1952
Executive Officer of PF COVADONGA
Student in the Chilean Naval War College
- D. Colonel Hector MARTINEZ Amaro, Chilean Army, Chief, Antarctic Section,
Estado Mayor de Fuerzas Armadas
- Born: Santiago, 27 July 1908; married Brunilda BUSCH Portales;
children, Jorge Hernan and Maria Inez
Education: Liceo Amunategui, Santiago
Liceos of Temuco and Ancud
Escuela Militar (Military Academy of Chile)
Graduated from Military Academy in 1927 as Sub-Lieutenant
Military Service:
Has served as Professor at the Army War College; Pro-
fessor at the Infantry School; and Professor of the
Superior Institute of Carabineros (National Police)
Was one of the organizers of the Escuela de Guerra del
Ejército del Salvador in 1951 (Army War College of El
Salvador)
Was Secretary of Studies and Professor of the Escuela de
Guerra del Ejército del Salvador and a member of the
Military Mission of Chile in El Salvador.
Organizer of specialist courses for tracked vehicles in
the Army
Was one of the organizers of the Escuela Unidades
Mecanizadas (School of Mechanized Units)
Graduate of the Academy of War

FOR OFFICIAL USE ONLY

- E. Colonel Eduardo SAAVEDA Rojas, Chilean Army, Director del Instituto Geografica Militar
- Born: Antofagasta, 1 October 1909; married Lucia Hettich; children, Eduardo, Rolando, and Lucy
- Education: Liceo de Aplicación of Antofagasta
Escuela Militar (Military Academy of Chile)
Specialist in geodesy and photogrammetry
- Military Service:
Colonel, Military Geographical Engineer
Chief of the Restitution Section of the Photogrammetry Department of the Military Geographic Institute
Professor of Drawing and Reproduction of Plans in the Academy of Photogrammetry and Geodesy
Attended Congress of Photogrammetry in Argentina, 1939
Attended 1st Congress of Chilean Engineering, 1942
Attended Geodesy and Cartographic Congress, Washington, D.C., 1943
Attended Geodesy and Cartographic Congress, Mexico City, 1943
Commanding Officer, O'Higgins Base, Antarctica, 1947-48
Promoted to Lt. Colonel, 1950
Sub-Director of Academia Politécnica Militar, 1952
Commander of Armored Detachment at Iquique, 1953
Assigned to Directorate of Military Engineering, 1954
Sub-Director of Military Geographic Institute, 1954
Delegate of Chile at 10th Assembly of the International Association of Geodesy and Geophysics, Rome, 1954
Promoted to Colonel, November 1954
Delegate of Chile at the VI Pan-American Conference of Cartography, Geography, and History, Mexico, 1955
Delegate of Chilean Boundary Commission, 1955
Director of Military Geographic Institute, 1955

F. Base Leaders.

1. Group Captain Enrique MAURIN Costa
- Born: Santiago (39 years old); married Irene GALILEA Jimenez, two children, 14 and 12 years
- Graduate of the Naval Academy, 22 December 1940
- Courses Completed: Corpus Cristi (NAS) 1941
U. S. Army Air Base (Tampa) 1942
Pensacola (NAS) 1945
Academy of Air Warfare 1955-56
- Specialist in Mechanical Engineering and a Professor of Logistics and Operations
- Served in the following units: Troop No. 2 (Quintero) 1943-47
Test Pilot, Central Machine Shop
Aviation School, 1950
Director of Aeronautics, 1951-53
Specialization School, Sub-Director, 1954-55
On Chief of Staff of Air Force, 1957-58

2. Captain (Lt) Silvestre MAHUSIER Peña
Born: Yombel (Concepción Province), 31 years old; married
Gloria CONCHA Espina; three children, 5, 3, and 2 years
Graduated from the School of Aviation, 12 December 1947
Courses completed: Flight course at the School of Aviation, 1947
Information course for Captain, 1958
Units served in: Group No. 1 (IQUIQUI), 1948
Group No. 8 (QUINTERO), 1949-50
Group No. 11 (QUINTERO), 1951-52
Specialty School, 1953-55
Group No. 7 (CERRILLOS), 1956-58

3. Captain Hernán ROJAS Lemn
Born: Santiago, 32 years old; married Cristina LUCO Briones;
four children, 10, 9, 8, and 6 years
Graduate of Aviation School, 1 January 1947
Units served in: Group No. 1 (IQUIQUI), 1947
4 (QUINTERO), 1948-49
1 (IQUIQUI), 1950-51
11 (QUINTERO), 1952-54
8 (ANTOFAGASTA), 1954-55
Director of Air Transit, 1955-57
Air Headquarters, 1958

4. Captain Tarcisio ROSAS Thomas
Born: Valparaiso, 34 years old; married; four children, 10,
8, 7, and 6 years
Graduate of Military Academy, 1 January 1944
Courses completed: Infantry School (course for lieutenants), 1951
Antarctic Indoctrination, 1958
Units served in: Infantry Regiment 4 (RANCAGUA) (Arica), 1944-46
Infantry Regiment 2 (MAIPO) (Valparaiso) 1947-50
Infantry School (San Bernardi), 1951-58

5. Lieutenant José DIAZ Salinas
Born: San Francisco de Timache, 32 years old; married;
two children, 4 and 2 years
Graduate of Naval Academy, 1 January 1948
Courses completed: Application for Lieutenants, 1949
Torpedoes, Anti-Submarine Warfare, 1953
Antarctic Indoctrination, 1958
Units served in: Cruiser (CHACABUCO)
Attack Transport (PINTO)
Battleship (ALMIRANTE L. TORRE)
Frigate (BAQUENDANO)
Destroyer (HYATT)
Cruiser (PRAT)

XI. APPENDICES

The following materials were included as appendices to this report and have been submitted to the United States Antarctic Projects Office. They may be consulted at that office.

A. Publications collected by the observer.

1. Base O'Higgins, Ejército de Chile, Santiago, 1948.
2. Chilean Sovereignty in Antarctica, Oscar Pinochet, Santiago, 1954.
3. Limits between the Atlantic and the Pacific Ocean, International Union of Geodesy and Geophysics, Professor Humberto Fuenzalida, Santiago, 1957.
4. Revista Geográfica de Chile, No. 15-16, Santiago, 1958.
5. Memorial del Ejército de Chile, No. 264, January-February 1955.
6. República de Chile, Ministerio de Relaciones Exteriores, Luis Melo Lecaros, Santiago, 1957.
7. Territorio en Disputa, Thomas H. Holdich, Santiago, 1958.

B. Navigational Charts and Overlays.

1. "Isla Trinity a Estrecho Bismarck", 1:300,000, Departamento de Navegación Marina de Chile, Valparaiso, 1958.
2. "Trinity Peninsula", 1:300,000, FIDS, London, 1957.
3. "Antarctica", Año Geofísico, 1957-58.
4. "Recalads a la Antártica", XIII Chilean Expedition, 1958-59 (overlay).
5. "Rectificación/Sondaje Canal Gerlache", 1:300,000, XIII Expedition.
6. "Sondaje en Estrecho Ingles," Carta 504, XIII Chilean Expedition, 1958-59 (overlay).

C. Diagram.

1. Blue Print of Prat Base, 1:100 scale, Punta Arenas, 1959.

D. Meteorological Charts.

1. Plotting Chart, Oficina Meteorológica de Chile, Fuerza Aérea de Chile, 20 February 1959.
2. Plotting Chart, Oficina Meteorológica de Chile, Fuerza Aérea de Chile, 25 February 1959.

E. Newspapers..

Various Punta Arenas and Santiago newspaper clippings regarding Chilean Antarctic activities in 1958-59.

F. Photographs and Film.

During the XIII Chilean Expedition, this observer took 800 feet of 16mm black and white film, 1200 feet of 16mm color film, 11 rolls of 35mm black and white photographs, and 24 rolls of 35mm color photographs. These were taken of the ships, the bases, and the personnel of the expeditions. Copies of these photographs are available for reference at the United States Antarctic Projects Office.

G. Bibliographies.

1. Bibliografía Antártica (mimeo.) - works by Chilean authors in the library of the Department of Limits, Ministry of Exterior Affairs.
2. Bibliographie Chilena Antártica (mimeo.) - Chilean works in the library of the Institute of Military Geography.

H. Chilean Amateur Radio Call Signs in Antarctica.

1. O'Higgins Base:

Ham operators: Captain Tarcisio Rosas (Base Leader)
 Captain Carlos Arriagada (Executive)
Call Signs: CE9AA - CE9AB
Frequency (15 meter band) 7050 -7350 kcs
 14050-14350 kcs
 21000-23000 kcs
Hours (Chilean time) 2100 - 2400 daily

FOR OFFICIAL USE ONLY

2. Prat Base:

Ham operator:	Lt. José H. Diaz (Base Leader)	
Call Sign:	CE9AT	
Frequency:	(15 meter band)	7050-5350 kcs
Hours:	2030-2330, daily	14050-14350 kcs

- I. Decree No. 248 of the Ministry of Exterior Relations, dated 17 July 195 (mimeo.).
- J. Memoranda of the Commander of Chief of the Antarctic Division (typed).
- K. Clothing lists (in Spanish) (mimeo.).
 - 1. Chilean Air Force
 - 2. Chilean Navy

1960

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N.W.
Washington 25, D.C.

ACC. NO. _____
USAPO/bas
Serial 80
9 June 1960

MEMORANDUM FOR THE DISTRIBUTION LIST

SUBJECT: Forwarding of Report of U. S. Observer with Belgian Antarctic Expedition, 1958-59

The enclosed report, prepared by Mr. Oliver S. Crosby, U. S. official observer with the Belgian Antarctic Expedition, 1958-59, is forwarded for your information and retention. This report is a supplement to Mr. Crosby's previous report on the expedition.

D. M. TYREE

John Cadwalader

JOHN CADWALADER
By direction

DISTRIBUTION LIST:

OCB	1	USARP	1
OCB Working Group on Antarctica		U. S. Army Map Service	1
Captain Snow, CNO	1	U. S. Naval Academy	2
Dr. Wexler, Weather Bureau	1	Commandant, U. S. Coast Guard	1
Dr. Joyce, NSF	3	State Department	2
Mr. Owen, State	1	Dr. Taylor, House Committee	
Mr. Coote, Interior	1	on Interior & Insular	
OSD/Special Operations	1	Affairs	1
R&D, Army	1	Dr. Paul Siple, Army R&D	1
ACSI, Army	1	U. S. Geological Survey	1
SIPRE, Army	1	Director of Naval History	1
USA TREGG	1	OSD/ISA	1
CNO (Op-33)	3	Chief of Trans., Army	1
DNI	2	JAG, Navy	1
Hydro	1	JCS	1
Hydro (Attn: Code 5430)	1	Director, Weather Bureau	1
ONR/Bio. Science Division)	1	Hon. Edward A. Bacon, Army	1
QM Intelligence, Army	1	AEC	1
ComNavSupFor, Antarctica	2	Mr. Ross Peavy, NAS	1
Dir R&D/AF	6	Mr. John M. Jones, NAS	1
AF, AF CIN-1B	5	CDR John Mirabito	1
Board on Geographic Names	1	Mr. William Crawford, USGS	1
Arctic Institute of No. Am.	1	Dr. Louis Quam, ONR	1
USIA	1	U. S. Coast & Geodetic Survey	1
		ACIG (Det 1) Attn: ACRSC-3	1

BELGIAN ANTARCTIC EXPEDITION
(1958 - 1959)

A SUPPLEMENTAL REPORT
With notes on the 1959-1960
Expedition

By

OLIVER S. CROSBY

Department of State

13 April 1960

COAST & GEODETIC SURVEY
LIBRARY & ARCHIVES

JUN 15 1960

ACC. NO. _____

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. 1959 EXPEDITION	2
A. Exploration and Mapping	2
B. Other Scientific Programs	3
C. Contacts with the Soviets, Norwegians, Japanese, and Australians	7
D. Baudouin Base, 1959 Wintering-Over Party and Equipment	8
III. OCEAN TRANSPORTATION	10
IV. "OPERATION IRIS", SUMMER 1959-60	11
V. 1960 BELGIAN EXPEDITION AND FUTURE PLANS	13

I. INTRODUCTION

The material contained in this report was collected in Brussels from members of the 1959 Belgian Antarctic Expedition and other persons associated with Belgian scientific work in the Antarctic. The reporting officer, who had served as United States observer with the 1958 and 1959 Belgian expeditions in December 1958, January and February 1959, was invited by the Belgian National Center for Polar Research to attend the briefings and discussions occasioned by the return of the latter expedition from the King Baudouin Base on 12 March 1960. There are summarized below the main findings with regard to the activities of the 1959 expedition, the 1959-60 summer operation "Iris", and the plans and prospects for the 1960 wintering-over team and for future Belgian Antarctic operations. The general tenor of the evidence indicates that Belgian interest in the Antarctic continues undiminished, and that Belgium can be expected to continue to mount capable and responsible yearly Antarctic expeditions and to provide a widening range of scientific information about the Antarctic continent.

II. 1959 EXPEDITION

A. Exploration and Mapping.

The most ambitious of the expedition's plans involved a two-stage surface traverse to the South Pole and back to King Baudouin Base. Barely a week after the 21 February departure of the USS GLACIER, which had helped the icebound Belgians reach their base, about half of the expedition's personnel moved off to the South with five Tucker SnoCats, seeking a passage through the Sp̄r Rondane Mountains to the great polar plateau. One of the SnoCats broke down about 60 miles south of the base, but the party pushed on in the four remaining vehicles and was successful in finding a practicable passage to the plateau through the Gunnestadbreen Glacier. This was great good fortune, for later exhaustive examination of neighboring glaciers by dog sled was to establish that there was no pass through any of the three.

After depositing a large cache of gasoline at the edge of the plateau for the big push in September, the party turned back toward base. Their progress was halted some three weeks by heavy storms, and when at last they were able to break loose, their fuel supply had fallen to a dangerously low level. Rather than risk having his men stranded, Captain Bastin transferred them all and the remaining fuel to two SnoCats and abandoned the other two. The trip to the base was completed satisfactorily, but since three of the expedition's SnoCats had to be retrieved before the polar traverse could be begun, the schedule was seriously threatened.

The weather in September proved so stormy that no outside operation could be attempted, and it was only in October that the Cats were brought back and made ready for the push south. Stopping to make seismic shots every 20 kilometers to measure the thickness of the ice, the five SnoCats made their way up the Gunnestadbreen, reaching the edge of the polar plateau about 1 December. By that time, however, it had been decided that continuing mechanical difficulties with the SnoCats, together with the limited number of days before the relief expedition was expected, made it unwise to continue, and the party regretfully turned back to camp.

On this trip, Captain Bastin was on the lookout for a possible site for a small auxiliary base to be built on rock and somewhat above the normal level of the drifting snow. Such a spot was found 150 feet high on a flat-topped nunatak about 70 miles south of King Baudouin Base.

The principal mapping activity of the 1959 expedition was conducted by Ken Blaiklock, the British topographer, and Tony VanAutenboer, the geologist. These two, travelling over 500 miles by dog sled, explored

much of the mountain area between the Gunnestadbreen and the H. E. Hansenbreen, fixing the height and location of some fifteen peaks by triangulation and sketching in the topographical and geological features of the area. The two men are remaining another year in the Antarctic (Blaiklock's eighth) in order to make full use of the favorable summer weather for exploration and observation of the Byrdbreen.

B. Other Scientific Programs.

1. Aurora

Visual observations of the aurora were taken all during the winter. The photographic dome was snowed under, however, and the new round, sectional tower was not assembled and in use until 22 September 1959. There was then only one week left in which aurora photographs could be taken. The aurora camera had earlier been giving difficulty, but it was completely disassembled and a small bent piece in the film advance mechanism was straightened. No further trouble was encountered.

2. Biology

Some samples of lichens and moss were found and collected on the trail parties.

Many birds were found in the mountains 150 miles south of the base, and three colonies of snow petrels were located among granite boulders. Without a shotgun, the party could not obtain specimens for dissection and was unable to determine what these birds ate. They reported, however, the existence of many bodies of birds which had been completely eaten out inside. Only two or three pairs of skua were seen on these inland trips.

3. Earth Currents

Nothing was done in this field, as new equipment is being devised in Brussels to replace that which was found entirely unusable on the 1958 expedition.

4. Atmospheric Electricity

Some results were achieved in this field after the technicians worked two months to eliminate leakages and interference. In general, on a calm day, the atmospheric potential was found to be 148 volts per meter close to the snow surface. If the wind blew, however, these readings were thrown off by charges induced in the wires by the passing air. Snowfall was found to have the same effect of heightening the potential readings. While this appeared to limit the periods when meaningful readings could be taken, it was thought that the characteristic reaction to snow might prove useful in fixing the exact time of commencement of

to snow might prove useful in fixing the exact time of commencement of snow falls. From three to five times a month radiosonde balloons were sent aloft with equipment for registration of atmospheric electricity. These experiments provided a fairly consistent set of curves for electricity at different altitudes.

5. Geology

The area of the Sør Rondane Mountains surveyed by Blaiklock and Van Autenboer west of the Gunnestadbreen was found to be mainly granite. Virtually no minerals or ferrous materials were discovered. Radioactivity measurements were taken, and in localized areas, maximum readings of 1,400 beats per second were received, indicating nothing of commercial interest. Rock samples were taken from a number of nunataks for later radioactive measurement to determine the age of the rock.

6. Geomagnetism

After an initial period of adjustment to bring the equipment into an exactly vertical position, the geomagnetic measurements were accurate and satisfactory. Data from these measurements were exchanged with the Japanese and Russians. The measurements were interrupted on 8 January 1960, and the equipment was reset for the next wintering-over party.

7. Gravimetry

A series of gravimetric readings were taken at the base in order to check local variations, but the main gravimetric program was conducted by trail parties between the base and the Sør Rondane Mountains and on various traverses in the mountains for the purpose of estimating ice thickness and the characteristics of the rock below the ice.

It was calculated that the ice at the base was about 400 meters thick, that the base was located on shelf ice, and that the ice sheet rested on bed rock two miles south of the base.

Gravimetry is being continued this current year, and it is expected that the building, newly erected at the base for emergency living quarters and storage, may also be used for gravimetric work.

8. Seismology

The seismic program suffered from the fact that Georges Dieterle, the French seismic expert, developed appendicitis and was not allowed to go on trail parties. Roger Ketelers, an electronic technician, was taught the seismic operation by Dieterle, and in November 1959, he made a series of shots every 20 kilometers on the trip from the base to the polar

plateau. Later he made a regularly spaced series of shots about Breid Bay, King Leopold Bay, and thence to the base.

9. Glaciology

A snow mine was dug at the base, descending on a slant to a vertical depth of 27 meters. The shaft was 1.5 meters wide and 2 meters high. Two tons of ice core samples were brought back to Brussels for analysis. From the layering in the snow mine, it was seen that the yearly accumulation of ice varied between 10 and 30 centimeters. The trail party took snow samples every 20 kilometers between the base and the plateau, making tests of crystallization, density, etc. It is planned to measure the oxygen 16 and oxygen 18 contained in these samples on the theory that thus the age of the snow can be calculated and perhaps also the source of the snow, whether drift or precipitation, and even the average temperature range of the clouds from which the precipitation had come.

10. Ionospheric Soundings

The Barker & Williamson ionospheric sounder operated without any difficulty all year, and the results, although as yet unevaluated, seemed entirely satisfactory.

11. Medicine and Physiology

Blood and urine samples were taken under varying circumstances to measure the body reaction to exposure, heavy work, etc. One experiment was conducted with two men who spent 72 hours in an unheated tent with no food. Another test was made of a man who lived outside in a packing crate for a month, eating nothing but the 6,000 calorie trail ration, and performing heavy outside work all day long. This man remained in excellent condition and did not tire easily. The normal camp breakfast, on the other hand, did not provide enough energy to avoid a letdown in the middle of the morning.

The thermocouple equipment for measurement of internal body temperatures did not operate satisfactorily.

As indicated above, a member of the expedition developed appendicitis. It was not acute, however, and was kept under control through injections. The expedition doctor says he preferred not to operate because he had no qualified anesthetist with him.

12. Meteorology

602 successful radio soundings were made during the year, the greatest altitude recorded being about 95,000 feet. Almost all of these

launchings were made outside on the snow surface rather than from the building the de Gerlache expedition had used. The surface method made possible the launching of such balloons in winds of up to 55 knots. Although the balloons were made of natural rubber, it was found that their altitude performance was markedly improved by submersion in kerosene 1 minute for every 10 degrees of temperature below zero centigrade.

For this type of launching, it was found that damage to the radiosonde could be minimized by tying an old uninflated balloon into the line between the inflated balloon and the radio box, thus cushioning the shock at the moment of launching. It was also found helpful to leave the temperature element in the retracted position, which produced readings less than 1 degree centigrade off from control readings from radiosondes using the element in the normal position. Captain Bastin was proud to report that his four meteorologists had maintained the full observation program and a two-balloon-a-day radiosonde program, a feat which the Soviet chief at Mirnyy, Dralkin, had said he could not achieve with 9 meteorologists.

In general, the expedition found the weather unreliable. Periods in the fall and spring which were good the previous year produced so many heavy storms that outside work, particularly trail party work, was severely hampered. Temperatures were nearly the same as in 1958, about 60 degrees below zero centigrade, but the wind was stronger, being clocked at 95 knots on one occasion.

13. Solar Radiation

This program was conducted without incident, measurements being taken of both incident and reflected radiation to determine the heat budget.

14. Nuclear Radiation

The program was conducted satisfactorily except for the radon measurements, which could not be made because of faulty equipment.

15. Chemical Reaction Time

An esoteric test of chemical reaction times to determine whether this varies at different latitudes was unsuccessful because the metal-free crate used for the tests could not be held at the required temperature. The theory behind this experiment is that chemical reactions are affected by cosmic rays.

C. Contacts with the Soviets, Norwegians, Japanese, and Australians.

1. Radio contacts with the Norwegian, Japanese, and Australian bases was maintained on a daily schedule. The contact with the Soviet Lazarev Base was less frequent and rather wooden in character. The latter may have resulted from the fact that Lazarev seemed to serve merely as a relay station for such messages, forwarding them to Mirnyy for response and then relaying the answer received from Mirnyy. Messages from Lazarev and other Soviet stations were all signed with the name of the chief of the Mirnyy Base. This was Dralkin, until Gerotkevitch took charge at the end of the year.

2. Soviet air operations were conducted with dash and expertness. Not only had most of the pilots extensive flying experience in the Arctic, but some of them had as much as 1,000 or 2,000 hours of flight time in the Antarctic itself. Perov, who had rescued Commander de Gerlache in December 1958, had at that time about 12,000 hours of Arctic and Antarctic flying, and this was not considered unusual. The pilots were adept at landing on unprepared terrain, and one even executed a perfect landing next to a Belgian Snowcat which, though visible from above, was rendered invisible on the actual landing pass because of a deep layer of air laden with blowing snow. An IL-2 was once seen to land when visibility was down to 35 meters. One possible reason for the Soviets' adeptness at landing is that they offload their cargo on the ground rather than by parachute drop. The 10-drum cache of gas put down at the Belgian base by the Soviets for their emergency use was landed in this way, as was the gas for the Soviet polar traverse party. Despite their offhand approach to landing, the Soviets were cautious in other respects. Their planes fly along the coastal barrier whenever possible, so as to be more easily located in case of crash or emergency landing. Furthermore, they insist that all radio stations in the area maintain a watch on the emergency frequency and supply weather data every 15 minutes while a Soviet plane is in the air.

Most of the Soviet planes were IL-2s, but the IL-12 is beginning to come into use in the Antarctic. The equipment they use is rough and ready, as for example the IL-2 engine heater which was a compact, hot stove with a canvas funnel to lead the heating to the engine. The Soviets flew past the King Baudouin Base a number of times enroute from Mirnyy to Lazarev, and three or four times they landed, mainly to place the fuel cache or to conduct fueling operations. They also asked the Belgians about a route through the mountains which could be used by a trail party. They were given the route Bastin had found, and although the Soviet contact had started out rather reserved, a jerry can of pure alcohol, sparingly flavored with eau de cologne tended to liven things up. Communication remained a problem, for there appeared to be virtually a

complete lack of knowledge of English, French, German, etc., on the part of the Russians.

On 8 February 1960, de Ligne and Lodts flew to the Lazarev Base and landed. They saw no sign of large airfield construction work. There were two or three buildings there, outfitted thoroughly and well as far as good and efficient scientific work is concerned, but being rather primitive in respect to living conditions. The berthing was crowded, with about 6 tier bunks in each room. From what he saw, de Ligne concluded that they were maintaining a good solid scientific program, probably about as large as the Belgian program. There had been 12 men in the wintering-over party of 1959, and with the summer of 1959-1960, this was increased to about 20. In addition, a summer party of about 21 moved in for the primary purposes of photogrammetry and surface exploration of the region to the south of Lazarev Base. Special interest seemed to be placed in the seismological shots on the trail to determine the thickness of the ice cap and establish the contours of the land below. One of the aircraft seen at Lazarev also had a large "bomb-like" attachment on one side of the fuselage. The Soviets stated that this was used for magnetic measurements. The trail parties and air photographers were busy surveying the mountains to the south of the base and searching out a passage to the polar plateau. Dralkin told de Ligne of another range of mountains situated between the Sør Rondane Mountains and Lazarev Base. The general impression was that an important function of Lazarev was to serve as a base for traverse operations, both as a starting point and as a terminus.

D. Baudouin Base, 1959 Wintering-Over Party and Equipment.

1. Buildings and Equipment

The base buildings stood up well during the year. There was some leakage of melt-water through the roof in summer in a couple of buildings, but this was corrected by renewing the tar paper roof covering. During the year, the snow level, which had been even with the roofs of the buildings, rose 1.2 to 1.5 meters. The rawin tower continued to be free of snow because of the scouring effect of wind eddies around the dome. Captain Bastin thinks that the snow level could be held down if a team of about 30 workmen from the ship came in with shovels to clear away the snow above the roofs every year. Unfortunately, the Peter Junior snow plow proved to be unsatisfactory, because it sank in the snow and could not be budged.

With the arrival of the 1960 wintering-over party, an additional building was constructed for use as emergency living quarters and storage in case of fire. The building, approximately 20 feet by 80 feet, in size,

was erected some 400 yards from the other buildings in order not to raise the snow level at the camp. The building was of Belgian construction, and there was considerable complaint that it was unnecessarily heavy and that the prefabricated panels were difficult to fasten together.

As indicated in an earlier section, the expedition had considerable difficulty with the SnoCats. The most frequent difficulty was the snapping of fan belts. This was caused by crookedness in the crank shaft pulleys, which had to be straightened. Captain Bastin has a rather extensive list of suggested modifications to the Tucker SnoCat which he would like to discuss with the company, and which he feels might be of benefit to United States operations.

An odd difficulty encountered during the year was the disappearance of dogs. At various times, five of them apparently ran away or became lost. A sixth straggled back after an absence of several days, bedraggled and hungry. There was no explanation for their disappearance, which was surely not inspired by mistreatment, for the Belgians treat their dogs like house pets.

III. OCEAN TRANSPORTATION

Both the new wintering-over party and a summer aerial photogrammetry team were brought to the Antarctic in December 1959, aboard ERIKA DAN, a Danish sister ship of the MAGGA DAN, KISTA DAN, etc. ERIKA DAN is a vessel of 3,200 tons, powered by a 3,200 horsepower diesel engine. She can make $14\frac{1}{2}$ knots with her variable-pitch propeller, and has 1,000 tons of cargo carrying capacity. Much more roomy than the 658-ton POLARHAV, chartered by the two previous Belgian expeditions, ERIKA DAN, though comfortable, was found to roll as badly as the smaller vessel. More seriously, because of her length, ERIKA DAN could not maneuver in the ice as adroitly as POLARHAV. She became trapped in the pack ice and was virtually stationary for 27 days. Having entered the pack to the east of the King Baudouin Base, ERIKA DAN was carried by the prevailing westerly currents to a point relatively near the base by the time she broke loose in mid-January. While she was beset, ERIKA DAN had come under considerable pressure from the ice. Being high and flat-sided, the ship was unable to slip up and out of the pressing blocks of ice and for about half her length on both sides suffered damage amidships. Although the plates did not seem badly bent on the outside, in the engine room and holds the damage to the frames was evident. Many of them were twisted and crushed in by the displaced plates, and in one place a generator had been torn from its base by this displacement. Altogether, the ship's beam was said to have been reduced by about 5 inches. It seemed like more. The ship's Captain Christainsen said it would cost about \$100,000 to replace all the damaged plates and repair the ribs, an amount which was covered by the insurance held by the shipping line.

ERIKA DAN is said to have cost the expedition about \$200,000 in chartering fees. Her equipment was modern and efficient. On the bridge she boasted electronic Decca navigation equipment, 2 echo sounders, 2 radar installations, one an RCA CR-106 set.

Captain Bastin said that the South African Government has offered to share the use and expense of the ERIKA DAN next year in the placing of their expedition at Norway Station, which they have taken over. The Belgians have reservations about the idea, but they have not yet turned it down. Whatever transportation they use, they feel it would be worth the expense to take along a helicopter for ice reconnaissance in order to avoid the long periods of entrapment in the ice that all three Belgian expeditions have experienced so far.

IV. "OPERATION IRIS", SUMMER 1959-60

A eleven-man summer photogrammetric team under the direction of Prince Antoine de Ligne conducted aerial mapping operations during the time ERIKA DAN was at King Baudouin Base. Two planes had been brought along, a deHavilland Otter and a Cessna 180. The Otter was used for the photographic work, most of which was done with a Wild RC5a 19x19 cm camera with an 11.5 cm focal length. This camera, equipped with a registering statorscope, took the vertical photographs which will later be used for the production of additional maps of the area. In addition two Williamson 13x13 cm cameras with a 12.5 cm focal length were used for oblique photographs. These pictures were used only for reconnaissance purposes and to plan the various photographic flights. The Cessna was used for support work of ground parties establishing five additional map control points by astral fixes; it is also available for air rescue work.

Of the 16 days available, only four were good for photographic work. Mapping flights were made for about 200 miles in each direction along the coast from King Baudouin Base, stretching from the Soviet Lazarev Base at 12°E Longitude to a point at 34°E near the Japanese Showa Base. Detailed photographic coverage was also given the Belgica Mountains to the southeast of the Belgian base, and some work was done in the Sør Rondane Mountains to the south of the base. All together, a total of 1,300 vertical mapping photographs, 500 oblique and 200 infra-red shots were taken on 47 hours of flight. The vertical photographs covered an area of 6,700 square kilometers, 5,600 square kilometers of this at a scale of 1:40,000 and 1,020 square kilometers at 1:20,000. 80 square kilometers were larger than 1:20,000. Two of the "Iris" team operated a photographic laboratory aboard ERIKA DAN, developing the negatives as fast as the film was brought in. This enabled them to judge the quality of the work as it progressed and make adjustments in flying routes to cover areas which might have been missed. The expedition members felt that this method of operation proved to be most satisfactory.

The Otter and the Cessna were left at King Baudouin Base to serve as support for ground reconnaissance work and, if possible, to conduct some aerial photography of the area east of the Belgica Mountains and south of the Sør Rondane. The planes are also to be used to establish gravity liaison with the Japanese Showa Base.

The "Iris" operation also included two oceanographers, who kept a continuous echo-sounding record on the voyage, took bottom samples from depths of up to 300 meters. They also collected plankton samples and measured the ocean temperature and salinity.

Iris Personnel

Air Section

Prince Antoine de Ligne
Major Joseph Chatelle
Adjutant Francois Lepere
Sgt Henri Vanderheyden

Pilot, Chief of Section
Navigator
Photographer
Aviation mechanic

Ground Section

Louis Vander Ryt
Jacques Loodts
Jacques Giot
Rene Deschilder
Emile Pauwels

Geographer, Chief of Section
Geodesian
Geodesian
Photo lab technician
Photo lab technician

Oceanography and Zoology

Francis Closset
Dr. Jean-Jacques Capart

Licencie in zoology
Chemist

Observers

Captain Baron Philippe de
Jamblinne de Meux
Lt. Richard Waegeneer

Engineer
Meteorologist

V. 1960 BELGIAN EXPEDITION AND FUTURE PLANS

The 20-man 1960 wintering-over party under the direction of Major Guy Derom is to continue the scientific program of observations in meteorology, solar radiation, radio sounding, geomagnetism, aurora, ionospheric sounding, nuclear radiation, glaciology, geology, gravimetry, biology, and zoology. Earth current measurements will not be attempted, for no adequate equipment has yet been developed for this in Brussels. Added to the program will be the recording of cosmic ray activity. Last year's psychological observations are to be expanded, and the Rorhschach and T.A.T. tests will be given each member of the expedition at the beginning, middle, and end of the year. In the study of group dynamics, tape recordings will be made of the general discussions.

A surface traverse to the South Pole is not to be attempted this year, and surface exploration is to be generally limited in scope. Captain Bastin would like to see the polar traverse put off for two or three years so that detailed preparations can be made. Two new SnoCats were brought in by the Derom expedition, but three or four of the old ones were taken back to Belgium, leaving only three or four at the base. Next year the Belgians plan to commence ground and upper air ozone observations and perhaps even an upper atmosphere rocket program. Captain Bastin intends to counsel caution and slow, careful planning in all such new undertakings.

Although he is going to support the plan for construction of a daughter base on rock about 70 miles south of King Baudouin Base, Bastin does not expect this to materialize for another two years or so. Such a new base would be used not only for meteorological observations but for the study of earth tides by the use of a stationary gravimetric installation. Mountain glaciology and geology could also be studied conveniently from such a base. The main Belgian base, however, will continue to be located on the coast of the continent because of the practical requirements of easy and quick offloading from the ships and transportation of equipment to the base.

Derom Expedition Personnel

Major Guy Derom	In charge
Lt. Jean Verheye	Science Chief: Ionosphere
Lt. Jacques Gregoir	Meteorology
Sgt. Paul Pirsoul	Meteorology
Sgt. Francis Gordts	Meteorology
Guy Van Pelt	Solar radiation
	Atmospheric electricity
	Cosmic rays
Stanislas Berckmans	Nuclear radiation

Maurice Focroulle
William De Breuck

Tony Van Autenboer

Kenneth Blaiklock
Reverend Dom Vincent
Collin, O.S.B.

Dr. Jean Dubois
Albert Eyskens
Roger Van Marcke

Adjutant Michel Pierre
Emile Vereecken
Willy Mouton
Sgt. Leon Goossens
Sgt. Jean Debauve

Geomagnetism
Glaciology
Geology
Gravimetry
Geology
Gravimetry
Topography

Doctor
Chaplain
Surgeon
Pilot
Electronics technician
Radio operator
Aviation mechanic
Electrician
Vehicle mechanic
Movie photographer
Cook

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

JAN 25 1960

USAPO/bas
Serial 135
7 October 1959

~~ACC NO~~

MEMORANDUM FOR THE DISTRIBUTION LIST

SUBJECT: Forwarding of Report of U. S. Observer with Japanese Antarctic Research Expedition, 1958-59

The enclosed report, prepared by Mr. Daniel J. Meloy, United States official observer with the Japanese Antarctic Research Expedition, 1958-1959, is forwarded for your information and retention.

D. M. TYREE

John Cadwalader

JOHN CADWALADER

By direction

DISTRIBUTION LIST:

OCB	1	USARP	1
OCB/Ant. Working Group		U. S. Army Map Service	1
Capt. Kefauver - CNO	1	U. S. Naval Academy	2
Dr. Wexler - Weather Bur.	1	Commandant, U. S. Coast Guard	1
Dr. Joyce - NSF	3	State Department	2
Mr. Goodwin - USIA	1	Dr. Taylor/House, I&I Affairs	1
Mr. Dykes - CIA	1	Dr. Siple/Army R&D	1
Mr. Owen - State Dept	1	U. S. Geological Survey	1
Mr. Coote - Interior	1	Chief, BUSHIPS	1
OSD/Special Operations	1	Director of Naval History	1
R&D/Army	1	OSD/ISA	1
ACSI/Army	1	Chief of Transportation/Army	1
SIPRE/Army	1	DCNO/Logistics	1
TransTraComd/Army	1	Surgeon General/AF	1
CNO (Op-33)	3	JAG/Navy	1
DNI	2	JCS	1
Hydro	1	Director, Weather Bureau	1
Hydro (Attn: Code 5430)	1	Chief, BUPERS	1
ONR/Bio. Science Division	1	Hon. Edward A. Bacon/Army	1
QM Intel/Army	1	AEC	1
ComNavSupFor, Antarctica	2	Mr. Ross Peavy/NAS	1
Dir R&D/AF	6	Mr. John M. Jones/ NAS	1
AF/AFCIN-1B	5	CDR John Mirabito/FWC	1
CIA	1	Mr. Mort D. Turner/USARP	1
Board on Geographic Names	1		

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

J A P A N E S E A N T A R C T I C
E X P E D I T I O N
(1958 - 1959)

Report of UNITED STATES
OFFICIAL OBSERVER

DANIEL J. MELOY

TABLE OF CONTENTS

	<u>Page</u>
I. ABSTRACT	1
II. DIARY AND LOG OF EVENTS	2
III. THE JAPANESE ANTARCTIC EXPEDITIONS	19
IV. THE SOYA, AND LIFE ABOARD	21
V. THE HELICOPTERS	24
VI. SYOWA BASE	26
VII. TARO AND JIRO	28
VIII. SUGGESTIONS	29
APPENDICES:	
A DESCRIPTION OF THE SOYA	31
B MEMBERS OF THE JAPANESE ANTARCTIC RESEARCH EXPEDITION (1958-1959)	33
C SCIENTIFIC PROGRAM FOR THE JAPANESE ANTARCTIC RESEARCH EXPEDITION, 1958-1960	36
D ORGANIZATION OF THE JAPANESE ANTARCTIC RESEARCH EXPEDITION	37
E NOON POSITION, ETC., OF THE SOYA, DECEMBER 24, 1958, TO FEBRUARY 20, 1959	39
F ROLES OF SHIP'S COMPANY AND SCIENTIFIC PARTY	44

I. ABSTRACT

This report covers the activities and observations of the United States observer with the 1958-1959 Japanese Antarctic Research Expedition.

After a detailed account of the daily activities of the observer and of the expedition itself, reports and analyses are given on the Japanese Antarctic expeditions for the two years previous, followed by a description of life aboard the expedition ship Soya. Information about helicopter operations, the Japanese base, Syowa, and the two dogs who survived the Antarctic winter is included. Several suggestions complete the report.

Attached are annexes concerning the ship, expedition personnel, scientific program, and organization of the Japanese Antarctic Research Expedition, as well as a daily record of weather and other important phenomena as reported at the noon position.

II.) DIARY AND LOG OF EVENTS

1958

- December 18 Left Washington by air for New York, Lisbon, Accra, Leopoldville, Johannesburg, and Cape Town.
- December 20 Arrived Johannesburg. Met by Vice Consul Heubock and by Vice Consul Hamanaka of the Japanese Consulate General.
- December 21 Arrived Cape Town. Met by Vice Consul Smolik. Called on Consul General and Mrs. Boykin in afternoon, and on Japanese Consul General and Mrs. Futamata in evening. In afternoon was interviewed by Cape Times. Later visited Soya but found that neither Dr. Nagata nor Captain Matsumoto was aboard.
- December 22 Visited Soya in morning and met Dr. Nagata, who suggested that I delay boarding the ship until the evening of the 23rd. Captain Matsumoto was busy in morning, but met him during second visit to ship in afternoon. Had lunch with Consul General and Mrs. Boykin. Carried some heavy luggage to ship and left it there. Met Mr. Murayama, leader of the wintering party, and with him drove to town where we had tea and visited a botanical garden.
- December 23 Boarded Soya in evening. Had upper bunk in room shared with Dr. Muto, medical doctor of wintering party.
- December 24 Calisthonics on flight deck from 0650 to 0700. Breakfast in observation group dining room, dished out by two members of group who were "duty officers" for the day. Long tables, benches with cushions. Menu: rice, "miyotsuko" (soybean soup) with sliced radishes, eggplant pickles, "nori" (dried seaweed), soy sauce, "ika no shio kara" (salted entrails of squid), and green tea.
1000: Sailed from Cape Town.
1130: Lunch: curry rice, frozen grapes, tea.
1230: "Operations meeting" for small group designated from observation group to discuss order of shipments from ship to Syowa Base.
1630: Christmas Eve cocktail party. Observation group dining room gaily decorated; Christmas tree set up on aft deck. After drinks on aft deck, dinner served in observation group dining room. Menu: turkey, dressing, mashed

potatoes, carrots and peas, roast beef, baked ham, cheese, sausages, barbecued chicken livers and chicken, cakes with elaborate icing, and little chocolate sheets in the shape of houses inscribed with "Merry Christmas." Drinking continued during and after dinner, with much singing. Everyone was very friendly and Captain Matsumoto, who joined us for a while and sat next to me, said to be sure to let him know if there was anything I needed or wanted. After dinner a movie was shown on the aft deck: "Tsuma" (Wife), a story of a disillusioned Tokyo couple, an artfully simple widowed mother who works with the husband, the husband's dallying, the wife's attack on her rival, and the continued disillusionment and frustration of the couple. Gear on decks was lashed down because of probable rough weather.

December 25

0715: Whale sighted.

1000: Meeting with Dr. Muto, Asahi newspaper correspondent Yamamoto, and Kyodo News Agency correspondent Fukase to hear report from Dr. Muto, who had attended yesterday's operations meeting. At that meeting, it was planned to put 30 tons of materials and 13 men ashore if at all possible, and then an additional 10 tons and one man who could be chosen from three who were being considered. At conclusion of meeting, Mr. Fukase asked me about myself for an article in the Nankyoku Shimbun (Antarctic News), published about every other day on board ship.

1330: Meeting of observation group on aft deck, at which Dr. Nagata stated that by January 2 we would probably reach pack ice, that time would be of crucial importance, and that unnecessary delays must be avoided. He stated that Japan, unlike other countries, has an expedition without an "oath" but, without being rigid, discipline must be recognized and orders obeyed.

After dinner a radiosonde balloon was launched. It was difficult to hold the balloon while being inflated, because of the strong wind on the flight deck, but it was launched safely.

December 26

Breakfast: rice, "miyotsuko" with cabbage, "nori", eggplant pickles, canned pears, green tea. Lunch: rice, batter-fried salmon, cold macaroni, turkey and egg salad, sliced cabbage, black tea. Dinner: rice, soup with fish balls, beef "toriyaki" (marinated in soy sauce), "fuki" (a kind of celery-like plant, stewed in soy sauce and other liquids), mixed seafood and vegetables with sesame oil, apples, green tea.

0930: Observation group "symposium" to hear talks by group members on the ionosphere, the chemistry of sea water, and cosmic ray measurements.
1230: Operations meeting to discuss order of shipments. During evening talked for several hours with group in neighboring room. They asked, among other things, about segregation in the United States, and my reasons for being on the Soya.

December 27

During morning showed books I brought from Washington to Dr. Nagata. He thought that some might be taken to Syowa Base for use of wintering party.
1300: Operations meeting to discuss order of shipments. During afternoon met with Dr. Muto, Yamamoto, and Fukaso. Learned that I was to be a member of a group which would stay at the ship to sort equipment and load the helicopters. Summer clothing of wintering party stowed away. It was reported that a Soviet plane on a rescue mission to the Belgian base landed at Syowa Base. There was of course great interest here in finding out what was seen of the buildings at Syowa Base, and of the condition of the sea ice, but so far no other message had been received.

December 28

Holiday; no work done on the ship. Very cold outside and ventilators in rooms were supplying warm air. The three puppies brought from Japan were shivering and wet when I went up on the bridge to watch the mountainous waves, but Taiichi Kitamura, whose specialty is cosmic rays, and who is also in charge of the puppies, moved them around to the lee side and they then huddled together happily in their little box. Albatrosses had followed us right along, and there were now some much smaller birds which darted ahead of the ship and skimmed low. During calisthenics this morning a gull-sized, fat, gray bird flew past.

December 29

0700: First iceberg seen; Soya at 50° 17'S, 33° 35'E. During the day there were light flurries of pellet snow. This was laundry day for the observation group: we washed our own T-shirts and shorts, but on Mondays, sheets, pillowcases, and pajamas were collected and machine-washed, with two members of the observation group in charge. During the afternoon there was "mochitsuki" (pounding boiled glutinous rice with a wooden hammer in a wooden bowl for one of the traditional Japanese New Year's treats) in No. 2 hold. The room was draped with a red and white striped cloth, and we all took turns at swinging the heavy hammer. During the evening a telegram was received from Mirny, via

Mawson, saying that the Soviet pilot who had landed at Syowa Base believed the base buildings to be in good shape and the antenna to be still standing.

1900: Operations meeting.

December 30

1330: Observation group listened to talks on care and operation of snowcruisers.

Ration of soap, toothpaste, T-shirts, and shorts issued. The articles had been supplied to the expedition by the companies manufacturing them. The makers are well-known, and the articles of excellent quality.

1500: Storm warning.

1334: Soya crossed 55° South latitude at 38°29' East longitude: with the crossing of 55° a special pay increase began.

December 31

On a side-table in the dining room this morning there was a traditional New Year's decoration of "mochi" (dried rice cakes), an orange, a pine branch, two enormous strips of "kobu" (seaweed), a dried squid, and a lobster with "noshi-gami" (cut strips of folded paper). During the morning Dr. Nagata asked me to see him in his room. He told me that he knew I would like to visit Syowa Base but wondered if I would mind if I were not scheduled until after the minimum 30 tons of supplies had been delivered. I assured him that I would be happy to go at any time, that I wanted only to be not in the way, and that I was looking forward to helping the group to which I had been assigned sort supplies and load the helicopters.

1000: Operations meeting.

1330: Explanation for members of the observation group of radio equipment in the snowcruisers.

It was announced that because fresh water was scarce there would be a bath for the observation group only on Sundays, and laundry would be done only once a month, on the third Monday.

1959

January 1

0830: New Year's ceremony: all of the ship's company lined up on the starboard side of the aft dock, with the observation group, facing them, on the port. All were in dress uniforms - the observation group in yellow half boots (leather bottoms, cloth tops, fur-lined), navy blue ski pants, navy blue jackets, and navy blue ski caps with white furry linings. I was in an assortment of khakis, and the pale green rubber half boots I'd been given. One

of the ship's officers gave a command and each group gave a hand salute to the other. Then everyone turned toward the east and after another command, most bowed quite deeply and then all sang the "Kimigayo" (the national anthem). The atmosphere was solemn, but at the same time quietly festive. During the morning several neighbors came to chat with Dr. Muto and me.

1500: The "ice watch" in which the members of the observation group would participate was explained.

1900: USIS movies on Japan's admission to the UN, the equestrian olympics of 1956, and, of some interest, Eskimos in northern Canada. These were followed by two popular Japanese films.

January 2

0600: Ice watch began.

During the morning and afternoon everyone turned to in order to help sort the "construction rations" to be used at Syowa Base while the wintering team was being established, to uncrate the Bell helicopters, unwrap and assemble the Beaver and make red marking flags.

0830: Drift ice encountered about 60 miles from the coast, 300 miles from Lutzow-Holm Bay (in 1957-58 drift ice was encountered at about 300 miles, the pack at about 100 miles; in 1956-57 little drift ice was encountered, and the edge of the pack was soon reached, but at about 40 miles from the continent). The ice this year is thicker than last year. The ship hit floating ice now and then and lurched.

1305. Soya entered ice 18 miles off Cape Close in Enderby Land ($65^{\circ}37'S$, $51^{\circ}25'E$).

1509: Measurements made on ice floe of horizontal, perpendicular, and angular components of terrestrial magnetism; Worden gravimeter used to measure gravity.

During the afternoon we scraped the covering layer of plastic from the wheel frames of the Sikorskys - a seemingly endless task; it was supposed to peel but because of the cold, or because the paint was too thin, it didn't and had to be chipped away with fingernails and screwdrivers. Penguins and seals were seen in the ice.

January 3

Was outfitted with work pants and shirt, ski jacket, and windproof pants of the kind used by the observation group. The wings of the Beaver were attached, and the Bell engines were tested. One Bell flew off for a short test reconnaissance. More plastic was removed from the Sikorskys. We were in open sea again, with drift ice, instead of in the pack as we were yesterday. There were no seals. One

lone penguin on a slab of ice barked at us and then dove in and out of the water. There were few icebergs until near evening, when several enormous ones - both tabular and mountain-shaped - appeared. There were towering cumulous clouds inland, on the horizon.

January 4

The second Bell was tested during the morning. Then there was a storm warning and the gear for immediate delivery to the base which was being brought up from the forward hold and unpacked to make it lighter for helicopter delivery was cleared away, some crates returned to the hold, and the rest stored on the aft dock. The job was neatly done, with careful checking of lists, and marking of the contents of each box.

After dinner the Beaver was lowered into the sea and took off on a test flight. It returned after about a half-hour and alighted safely on the water. While being replaced on its cradle, however, the heavy swell caused the plane to swing, and the left tail fin struck the bridge and was damaged.

January 5

The storm came upon us last night, and after heading northwards, somewhere north of Syowa Base, Soya hovered in the same spot, facing into the wind, pitching violently, and sometimes rolling in a combination of swell and wave, waiting for the storm to blow over.

During the afternoon Dr. Muto explained the use of the emergency medical kits, and what to do in case of frost-bite.

Sent greeting by radio to Crosby, official United States observer with the Belgians, on the Polarhav.

January 6

During the morning there was a conference on communications, and a sorting of the aurora equipment which had been taken from its cases. The tail fin of the Beaver was removed for repair.

The course of the Soya was changed to the westwards, and ice conditions along the Prince Olav Coast were studied. Although there had been little ice along the Enderby Coast, between the Prince Olav Coast and Syowa Base, ice conditions of ten-tenths coverage were encountered. On the evening of the 4th, ice had extended from between 180 and 200 miles north of Syowa Base. According to reconnaissance by the Bell, floating ice extended another 40 miles to the north. Although the Beaver had attempted to find how far west toward the Riisor-Larsen Peninsula the ice extended, the

plano had to turn back because of bad weather. By the morning of the 6th, Soya was at about 66°50'S, 43°10'E. As the weather improved, Soya's course would be changed so that ice conditions after the storm could be studied. When a point north of Syowa Base was reached, the route to the base would be determined.

January 7

The day was rough, and there was some snow again on the flight deck. No outside work was done, although lashings were strengthened. Work on the Beaver tail fin continued in the machine shop.

During the afternoon there was a very long movie about the early days of judo. It was exciting and interesting, and simple and good in the way that Westerns are simple and good.

Just after dinner word was passed that a storm was brewing north of us, somewhere near where the whaling fleet was, with the lowest pressure in many years: 920 mb. or so. Everyone turned in order to baton down the gear on the aft deck. There was some rolling during the evening, but no real storm.

January 8

Bad weather continued. Two movies during the afternoon. A special bath.

January 9

1210: Soya entered the ice at about 67°18'S, 40°15'E, about 100 miles slightly east of north of Ongul Island. There was slush ice which closed quickly behind the ship. Captain Matsumoto said that the ship would continue into the ice until about the 12th and then establish a flight position. On or about the 13th the Sikorskys would make their first flights. This would, of course, depend on ice conditions, but it was hoped that the first flight position might be established at about 80 miles or less from Syowa Base. The edge of the pack had been greatly changed by the storm which had blown for the past four days. The pack which had extended about 200 miles north from the base had dropped back about 100 miles.

January 10

There was a two-hour flight during the morning by one of the Bell helicopters. The tail fin was replaced on the Beaver. Equipment to be sent to the base on flights 1 through 6, and other research equipment, was raised from the upper level of the first hold, and removed from the packing cases.

1630: Going-away party for members of the wintering team. Japanese champagne and other drinks served on the aft deck. Dr. Nagata, Captain Matsumoto, and Mr. Murayama spoke briefly about how glad they were to be this far, though there was still much to do.

January 11

Supplies were lifted from the first hatch and sorted. Assembly of the Sikorskys was begun on the flight dock. To get the Bolls out of the way, their propellers were removed and they were lowered one by one onto the ice. Then, after the ship had backed, they were raised to the foredeck. Both Bolls and the Beaver were now on the foredeck. The ice was two to three meters thick, with slush between the floes.

This was a special laundry day for the members of the wintering party. It was bath day for all of the observation group. At dinner there was a celebration for those with birthdays in January.

January 12

During calisthenics, thick, perfectly formed, snow crystals about 1/8" in diameter swept us, alighting on jacket sleeves, and then blowing on. Soya started to move early and continued on till noon, covering about five miles through thick but separated ice floes. Work on one of the Sikorskys went well; the propeller blades were attached, and, after draining and re-oiling the engine, it was tested, the aircraft looking like a great orange grasshopper perched on the flight dock.

1230: After lunch Dr. Nagata spoke to the observation group about prospects for starting to use the Sikorskys within a day or so, and Mr. Harada, who was Dr. Nagata's administrative assistant and in general charge of logistics, described how everyone would work in groups at the various stages of moving supplies from the hold to a transfer point and on to the loading points. There seems to have been very detailed planning.

During the evening I introduced rummy to some of my neighbors, and they seemed delighted to have a new card game to play. One reason that it appeals, I think, is that its scoring system is a little like that for mahjong.

January 13

The ice today seemed very thin, and broke easily as we moved ahead. The wind was from the west - unusual - and the ice floes were separated by fairly wide stretches of water. After dinner we came into an area of highly piled ice.

I wrote a short article about my impressions of the Soya which was requested for the ship's newspaper.
2300: Measurements made of gravity and terrestrial magnetism.

January 14

There was great excitement this morning immediately after breakfast for it was announced that the first flight would be made to Syowa Base. The first helicopter, with six members of the wintering team, reached the base after one hour and 20 minutes and found two of last year's dogs wagging their tails in greeting. Everyone here was agog--surprised and delighted that they had survived. Apparently everything else was in good order, too. Dr. Nagata flew to the base with the third trip. We all worked at building a heliport on a ice floe ahead and to the right of the ship, and a pathway to it. Materials to be sent to the base had been divided, weighed, and carried. Altogether six flights were made to the base. The sun set about five minutes past midnight, and rose again at about a quarter to one.

January 15

After three flights flying was stopped by bad weather. Everyone continued to work, however, unloading crates from the forward hatch, opening them, carrying contents to the aft deck for ready loading when flights were resumed. Each item was carefully weighed and marked. Early in the evening there was a movie. It was reported that at Syowa Base the electric lights were operating, a snow-cruiser had been put to work, telegrams could be sent to Japan, and work had started on constructing a frozen food locker.

January 16

We were awakened at 0550 with a call for all hands to help shift the position of the two Bolls from the east side of Soya's bow to the west side. The small floe on which they had been resting had tilted and was sinking. This was accomplished with no difficulty, and we all kept busy during the morning sledging baggage from the hold to the depots at the heliport and on the aft deck. After two flights flying was again stopped by bad weather.

January 17

Again, because of bad weather, there were no flights. In the evening there were two movies. At Syowa Base the Japanese flag and the flag of Lt. Shirase's expedition (1910-1912) were raised.

January 18

Again there were no flights. In the evening there were two more movies. The article which I wrote about my impressions of the Soya appeared in today's shipboard newspaper. A congratulatory radiogram was received by the expedition from the Ministry of Education, urging continued care.

Conditions at Syowa Base were reported to be as follows:

Huts: Three pre-fabricated huts, generator hut, toilet, cabooso, etc., all in good shape. Snow removed from inside of passageways.

Generators: 5kw and one 20kw restored to operation, supplying power for lights in all buildings, stoves, and reactivated radio transmitters.

Transmitters: 400w transmitter in operation, used for messages between Soya and base. On 16th, 1kw transmitter began contact with Japan.

Snow-cruisers: No. 2 and No. 3 in operation. At least one more to be carried from ship to base.

Automatic Weather Recorder: Continued to operate for three or four months after February 1958 before stopping. Lowest temperature recorded was -32°C .

Fuel drums and sleds in good condition.

Antennae: Good condition, no slackening of stays.

Food: Almost all could still be used.

Medical supplies: Could be used.

January 19

No flights. Laundry day. Talked with Masami Oso who was in charge of stamping the 170,000 pieces of mail sent to the Soya from all over the world for the "Japanese Antarctic Research Expedition" cancellation. Although some came with international postal coupons enclosed, some came with no stamps at all, and some with German or Swiss stamps or others. After dinner there were two movies.

January 20

No flights. Spent day reading, playing rummy and carom, and listening to tape recordings of classical music. After dinner there were two more movies.

January 21

Although a helicopter was readied for flight during the morning, the weather closed in again and no flights were made all day. During the NHK (Japan Broadcasting Company) regular daily broadcast to the Soya from 1830 to 1900 (the first 15 minutes was news and the second "voices from home"), the voices of several friends in Tokyo were broadcast, for which I am most grateful. After dinner there was another movie. Later in the evening

the helicopters were securely fastened down because of the growing storm, the crews working in driving snow.

- January 22 No flights. The storm continued with winds up to 33m., and, unusual for the Antarctic, there was rain at Syowa Base. Roofs leaked there, and tents were blown down by the strong wind. The ice had been driven tight around the Soya - even the space immediately behind the propellers, open until now, was closed.
- January 23 No flights. Before noon an Adolio and an Emperor penguin were caught and tied by the foot with straw rope. Everyone hurried to take pictures, and the puppies barked and sniffed, but kept at a safe distance from the sharp hooks. The people on the bridge were concerned about the birds, and sent someone down to release them. After dinner there was a movie: "Meiji no Hitori Onna," with Michiyo Koguro. It was interesting, but, like many of them, hard for me to understand. Much of the day was spent talking with people who came by singly or in groups of two or three just to chat.
- January 24 During the morning we cut ice near the fantail, passed it up a ladder to the porthole of the bath, loaded the tub, melted it with steam, and had a good bath. Spent most of the day reading.
- January 25 No flights to the base, although one helicopter took off after dinner on a 45-minute reconnaissance flight. A 300-gm. blast of TNT was set off at the stern to free the rudder from the surrounding ice. Spent most of the day reading and looking at slides.
- January 26 1300 to 2005: Flights 12 to 15 flew to Syowa Base, and then flights were again stopped because of bad weather. Telegram received from Crosby on the base Polarhav, saying they were eagerly awaiting coming of GLACIER.
- January 27 1455 to 2025: Flights 16 to 18. Both helicopters returned to the ship by evening, and, because the ice floe on which the heliport was located was thought to be softening, both were landed on the flight deck for the night. The Boll, which had been on the ice to the right of the bow, was placed on the foremost hatch cover. During the day, we loaded and then shifted the landing pads at the heliport because the wind had shifted from east to

west. In the afternoon we brought up a lot of frozen food which was in the deepest hold, uncrated it, and stowed it in the helicopter which was at rest on the flight dock.

January 28

1300 to 1635: Flights 19 and 20.

We cut ice, loaded the tub, and with the help of steam had a special bath day, with ice floating in the hot water of the tub.

January 29

The speaker announced at about 0400 that there was a wide load ahead of the ship and asked the first section of the observation group (the group had been divided into sections to permit round-the-clock work) to move the supplies on the ice at the heliport back to the ship. At 0755 flights resumed and continued throughout the day. By midnight flights 21 to 30 had been flown. After dinner, I went up to the bridge, where Captain Matsumoto showed me a mirage on the horizon. Ice cliffs on the edge of the continent could be clearly seen, though actually they were well below the horizon.

January 30

Flights continued without stop until 2010. By this time flights 31 to 42 had been made and more than enough supplies for a 13-man wintering party had been carried. The planes were stopped for servicing.

Captain Matsumoto flew to the base during the morning, and shortly after this Mr. Harada told me that I might fly whenever I wished. I left at about noon, on flight 39. After an hour and 20 minutes, the dark rocks of Ongul Island were clear against the surrounding ice, and the three tiny orange squares of buildings, with supplies and equipment around them, were soon visible against the rocks. Mr. Murayama showed me around the camp, and later I helped carry water from one of the shallow pools near the center of the island, and then went on a long walk eastwards across the island to a height from which there was a magnificent view of the frozen channel between the island and the mainland, the long sweep of the continental ice, and a massive, brown, rock mountain on the edge of the continent. During the afternoon, a postal flag was raised, and "Postmaster" Ose stamped several pieces of mail. On his table was a sign in large letters saying (in translation) "Syowa Branch, Soya Shipboard Post Office" - apparently out of deference to Norway's territorial claims in this area.

Captain Matsumoto and Dr. Nagata returned to the ship in mid-afternoon.

After dinner we watched another Michiyo Koguro movie, left from two years ago. I was put up for the night in one of the bunks in the weather hut.

January 31

1100 to 2250: Flights 43 to 47 were flown. At Syowa Base I went for water before breakfast with Dr. Muto and Zenkichi Hirayama. No observations were being made yet; everyone was busy carrying supplies, sorting, and storing them. I was told that I would have to return to the ship during the afternoon, and left at about 1515. Back at the ship that evening, TNT charges were set off in an attempt to crack the massive floe ahead of the Soya.

February 1

0930 to 1940: Flights 48 to 52 were flown. More TNT charges were set off ahead of the ship. Late in the afternoon there was a fire alarm, but it turned out that what had been thought to be smoke from a fuel storage locker was only steam. At the sound of the alarm everyone moved quickly and in good order, apparently familiar with his individual duties.

1350: Dr. Nagata spoke to the observation group, saying that 50 tons of supplies had been carried to Syowa Base, that he would fly to the base on the 51st flight and return to the ship on the 52nd to give instructions to the wintering party (the Ministry of Education had permitted a party of 14 men), and named Mr. Murayama as head of the party.

Loads opened suddenly behind and in front of the ship as we were finishing dinner, and everyone raced out to retrieve material from the ice floe as the ship got under way to take advantage of the opening. The lead ahead of the ship ran into the wide lead to the west, which, if it could be reached, would permit us to get out to open water, and possibly head in again for further landing of supplies. We moved about 50 yards before being stopped by a floe ahead of us.

February 2

The day was overcast, and although one helicopter took off to reconnoiter the ice, no attempt was made to fly to Syowa Base.

During the morning a small TNT charge was exploded to the right of the bow.

1800: The engines were started and the ship began to move through the ice between the floes, which appeared to be separating.

Sometime during the day, in a talk with one of the pilots, he said that now for the first time since the flights to the base started the pilots have laughed and joked: because the helicopters were now to them, and the region was, too, they had been under such tension during the flights that they couldn't.

2030: The ship reached the lead to the west.

February 3

0430: Reached open sea at 67°32'S, 37°58'E.

During the morning a message was sent to the Polarhav, asking whether they could use the Soya's helicopters: I was asked to translate the message from Japanese into English. During the day one Bell was disassembled and stowed in the first hatch. The other helicopters were battened down on the flight deck. On the bridge everyone was very glad that the ship had been able to move into the open sea again without assistance.

After dinner there were two movies, one Japanese and one French.

February 4

There was snow on the flight deck this morning. Late in the afternoon the ship reentered the pack.

At 1925 flights were resumed, and during the evening flights 53 to 55 took off for Syowa Base, loaded with oil drums and miscellaneous boxes, cameras, a typewriter, and parts of the snow-cruiser. The distance was about 100 miles.

February 5

The flights continued through the night until 0845, by which time flights 56 to 58 had been flown. 58 was the last flight.

At 0615 the speaker announced that the Beaver would be readied for flight. It took off at 1000 for photographic reconnaissance of the Prince Olav Coast, the repaired tail fin operating perfectly.

The first radiosonde balloon was sent aloft from Syowa Base.

February 6

Message received from Crosby on Polarhav saying that Polarhav in company of GLACIER was moving toward the Belgian base, which they hoped to reach by February 10.

One of the Sikorskys was disassembled by the flight crew.

February 8

During the morning the Soya, on an eastward course, approached close to Cape Close in Enderby Land. During the afternoon the course was changed to west.

Movio during the evening. Just past midnight there was an auroral display directly overhead and toward the northeast.

- February 9 Soya on westward course toward Riisor-Larson Peninsula. During the morning, passed through a school of whales. Some snow fell, during the morning. Temperature samplings of deep water made after dinner.
1900: Radio communication commenced between Syowa Base and Japan.
- February 10 The day was cold and overcast, and the sea rough. There was little activity on the ship. After dinner there was a movio.
- February 11 The day was cold and grey, with much rolling. During the morning both Sikorskys were covered and battened down. Deep water temperature measurements were made again. Plankton was collected with a cloth cone dragged behind the ship, and geomagnetic readings continued to be made.
2000: Dr. Nagata reported to the observation group that teleggrams had been received from both GLACIER and Polarhav saying that the assistance of the Soya would not be needed. Therefore, Soya would sail on the 12th for Japan.
- February 12 1200: The ship officially started from the Antarctic for Cape Town at noon, from a position of 67°08'S, 32°38'E. Actually, however, the ship was motionless in the water during the early afternoon and further deep water temperature readings were made and samples taken of the sea bottom. The engines were started at 1615.
During the NHK broadcast voices of friends in Sapporo were heard, and again I am most grateful for the kindness of those responsible. Later there was a movio.
- February 13 The day was overcast with a heavy swell and high waves. A crew worked on the flight deck storing one of the Bolls in a metal crate. Albatross were now following the ship again. Now and then there were light flurries of snow.
2000: Party to celebrate the dissolution of the "Maru-nan Kabushiki Kaisha" - the mythical transportation "company" which was responsible for transporting all of the supplies and men to Syowa Base.
During the afternoon we saw a small catcher boat on the horizon. On the bridge they said that it was probably Norwegian. After a few minutes it turned and headed east, trailing a tiny smudge of smoke across the horizon.

February 14 A crew worked on the flight deck making braces for the tails of the Sikorskys because of the rough weather. A movie was shown in the evening.

February 15 Today was a holiday, with no work done on the ship. It was overcast, with great waves and a wind which blow up to 20 knots from the northwest. The rough weather continued all day. It was difficult to sloop, with the ship rolling as much as 30°.

February 16 0423: Soya crossed 55°S at 26°11'E; the special pay allowance therofore ceased.
0500: Rolling to starboard of 31° recorded on bridge, the highest on this trip.

February 17: After lunch I was interviewed about my impressions of the trip for the Asahi newspaper. Spent most of the rest of the day reading, talking.
After dinner there was another movie - an old film with many stops for repairs.

February 18 Crow busy scrubbing docks with sand, stones, and coconut husks.

February 19 The day was overcast and the sea very rough. During the evening listened to more tape recordings of classical music. The sky was dark at night now, and the stars brilliant.

February 20 Day clear, and air much warmer than it had been. The sea had only a gontle swell.

February 21 The day was clear and warm. Most of the observation group gathered on the forward hatch cover to bask in the sun during the afternoon. After dinner there was a French movie with Joan Gabin.
I had been asked to write a farowell statement for the ship's newspaper, but it was hard to say precisely what I would have liked to say.

February 23 1000: Soya entered port at Cape Town. Vice Consul Smolik came to meet the ship.

February 27 Was asked to interpret during morning, and again during afternoon, for both Soya and representatives of the Shell Oil Company at discussions concerning the sale of Soya's excess aviation fuel to Shell.

- March 2 Was asked to interpret during afternoon for Captain Matsumoto during visit by the Mayor of Cape Town.
- March 3 Soya sailed from Cape Town.
Had lunch with Mr. William Maddox, our Counsolor of Embassy.
1700: Left Cape Town for Johannesburg. Met at Johannesburg by Vico Consul Houbock.
- March 4 Called at American Embassy in Pretoria and at Japanese Consulate General. Had dinner with Consul General and Mrs. Futamata and other members of Consulate.
- March 5 Left Johannesburg for Washington via Nairobi, Rome, and Paris.
- March 13 During call at Japanese Embassy in Paris, learned that Dr. E. E. Nishibori, leader of the 1956-57 wintering party at Syowa Base, was to arrive in Paris that evening. Was invited to have dinner with him and Counsolor of Embassy Sato.
- March 14 At invitation of Dr. Nishibori, visited home of Mr. B. Imbert, member of the 1956-57 French Antarctic Expedition, who was entertaining for Dr. Nishibori.
- March 16 Returned to Washington.

III. THE JAPANESE ANTARCTIC EXPEDITIONS

The Japanese Antarctic Expedition to which I was assigned as an observer was the third successive Japanese expedition to the Antarctic in connection with the International Geophysical Year. Before this, in 1910-1912, a Japanese expedition had been led by Lieutenant Shirase of the Japanese Navy to the Ross Sea Coast, but there was no other expedition until the beginning of the IGY program.

In the spring of 1955 Japan, as a participant in the IGY, decided to take part in the IGY Antarctic research program. The Japanese scientific community actively supported participation because it saw an opportunity for Japan to participate as an equal in scientific terms in a non-political international endeavor, and felt that Japanese participation was both welcomed and encouraged by the scientific communities of the other countries participating in the IGY. Encouraged by the Asahi Newspaper Company, which has been a major private contributor to the expeditions, the Japanese public gave its enthusiastic support. The Japanese Government also accepted the proposal of the scientific community and agreed to back the program.

After considering two other possible sites for a base - at Capo Adaro, and on Peter I Island - it was decided, because of the advantages for scientific observation, to establish the base at the third possible site, in the Lutzow-Holm Bay area between the Prince Olav and Prince Harald Coasts.

The first Japanese expedition to the Antarctic in connection with the IGY left Tokyo on November 8, 1956, with two ships, the Soya, and the Umitaka Maru. With favorable ice and weather conditions, the expedition was able to approach close to the shore of Ongul Island on the eastern edge of Lutzow-Holm Bay. About 155 tons of supplies were carried to the base site, buildings were constructed, the name "Syowa Base" was given to the camp (69°00'22"S, 39°35'24"E), and a wintering party of 11 men was left to make preliminary observations.

After leaving the mooring place near Ongul Island, the Soya was beset for about 10 days. On February 27, Soya was able to move from pack ice into open water, but on February 28, the ship's course was again blocked by the pack. The Soviet ice ship Ob came to assist during the afternoon, and during the evening the Ob broke a way for the Soya into the open sea. Together with the Umitaka Maru, which had remained clear of the ice, the Soya returned to Tokyo on April 24, 1957.

The second Japanese expedition left Tokyo on October 21, 1957, with the intention of landing large quantities of supplies, relieving the wintering party, and establishing another party of 20 to carry out a full-scale research

program under the IGY. Only one ship, Soya, was assigned to the expedition. Unfavorable ice and weather conditions near Lutzow-Holm Bay prevented an approach to the base, and Soya was beset from late December until February 6, 1958, when it drifted into open sea to the west of Lutzow-Holm Bay. On February 7 the U. S. icebreaker BURTON ISLAND came to Soya's assistance, and on February 8 both vessels proceeded toward Syowa Base. On February 9 a mooring place was reached. Between February 9 and February 14 about three tons of supplies were carried by snow-cruiser and plane to the base, the wintering party was brought back to the ship, and three men were sent to the base as a nucleus of the new wintering party. On February 14, because of increasingly bad weather and ice conditions these three were brought back to the ship, leaving the base unattended except for 15 sled dogs. It was thought that a new wintering party would reach the base in a few days at most, but weather and ice conditions did not permit this. Instead it was decided to abandon attempts to supply the base and establish a new wintering party. The Soya left the area on February 24 and returned to Tokyo on April 28, 1958.

The third expedition, which I joined in Cape Town, left Japan with one ship, Soya, on November 12, 1958, and reached Cape Town on December 19. We sailed from Cape Town on December 24, and reached the edge of the Antarctic ice pack for the first time on January 2, 1959. After entering and withdrawing, the pack was again entered on January 9. It was decided that the position in the pack reached by Soya on January 14, about 70 miles from Syowa Base, would be as far as the Soya would attempt to proceed, and that men and supplies would be carried from the ship to the base by helicopter.

As a result of reappraisals made in Japan after the unsuccessful 1957-58 expedition, this year's expedition was equipped with two S-58 Sikorsky helicopters, in addition to two 47G-2 Bell helicopters, and one DeHavilland Beaver, carried on the previous expeditions. Although it was hoped that Soya might approach close to Syowa Base, and thus make possible transportation of a large amount of supplies by snow-cruiser and the establishment of a wintering party of up to 15 men, the additional helicopters were carried to enable the expedition to transport men and supplies even if conditions like those of last year were encountered. As a result of the 70-mile distance between the point in the pack reached by the Soya and the base, the helicopters alone were used this year to transport men and supplies. They were flown both from the flight deck of Soya and from a "holiport" equipped with wooden landing pads, established on an ice floe off the starboard bow. By the time the last flight was flown on February 5, a 14-man wintering party had been established at Syowa Base, and about 57 tons of supplies had been carried to the base from the ship. Soya started from the Antarctic on February 12 and reached Cape Town on February 23. I left the ship at Cape Town. The ship sailed again on March 3, and reached Japan on April 13, 1959.

IV. THE SOYA, AND LIFE ABOARD

Construction of the ship which is now called Soya was begun in 1938 on order from the Soviet Union. The ship was designed to be a cargo vessel with her hull strengthened to withstand sea and ice conditions which might be encountered on routes between Japan and eastern Siberian ports. The Soviet Union cancelled the order, however, before completion of the vessel.

When completed, the ship was named Chiryo Maru, and was used for a time by a Japanese business concern. After the beginning of the war in the Pacific she was taken over by the Japanese Navy, and later was present at the Battle of Midway. After the end of the war, the ship was assigned to the newly established Maritime Safety Board (then called the Maritime Safety Agency, equivalent in function to the United States Coast Guard) and renamed Soya.

Since assignment as the Japanese Antarctic Research vessel, the Soya has been reconstructed three times. Besides rearrangement of the interior spaces, the bow has been redesigned, a bulge has been added, and, during the reconstruction which occurred between the 1957-58 and the 1958-59 expeditions, a flight deck was added to permit flights of the Sikorsky S-58 helicopters from the vessel.

The quarters for the ship's officers and most of the helicopter pilots, their baths, and their dining room are on the weather deck and upper deck. The quarters for the ship's crew, their bath, and their dining room are on the first deck below the weather deck, in the forward part of the ship. The quarters for the scientific team, their bath, and their dining room, are on this same deck, in the center and aft parts of the ship.

The cabins occupied by the members of the scientific team have from two to four bunks, a desk and chair, and lockers and drawers for storage of clothing and other articles. Some cabins have a sofa.

The cabin to which I was assigned was shared with Dr. Muto, the doctor of the wintering party. I was told that the bunks in this cabin had been lengthened by about six inches, after it was learned that an American would be accompanying the expedition, but apparently the foam rubber mattress and other bedding, though fully long enough, were of standard size. In the "head" there were both a Japanese style toilet and an American style one; the latter, I was told, had been installed in anticipation of the supposed needs of the foreign observer. In the bathroom was a tiled, Japanese style tub, big enough for about three. In addition, there was a shower which, again, it was said, had been installed for the convenience of the foreign

observer. In each of these alterations or additions it was clear that those in charge of the ship or expedition had gone to good deal of trouble and expense to provide for the comfort of the foreign observer.

One galley was used for the preparation of all food, and the menus were the same for the ship's officers, crew, and scientific team. Breakfast and dinner were Japanese meals, with a wide variety of dishes, made possible by an abundance of both canned and frozen foodstuffs. The noon meal was a "western" meal, with meat, potatoes or spaghetti, and often bread. It was said to contain more calories than the Japanese meals, but was not generally so well liked. Apparently emphasis on the previous expeditions had been on "western" meals because of their high calorie content, but this year's menus emphasized traditional Japanese dishes in deference to popular tastes.

In addition to the three main meals there was an evening snack for all hands. This was usually noodles in broth, or rice gruel, or a similar dish. During periods of hard manual labor a mid-afternoon snack was served. This was usually tea and crackers, a soft drink, milk, or "amazako" (a slightly sweet, slightly alcoholic drink made from rice).

The day's schedule began with an announcement over the speakers in each room at 0640 that it was "five minutes before getting-up time." 0645 was "all hands up." 0648 was preparations for calisthenics, and from 0650 to 0700 calisthenics were led on the flight deck when weather permitted. Breakfast was at about 0720, lunch at 1130, dinner at 1730, and the evening snack at 2000.

During the voyage from Cape Town to the Antarctic the members of the scientific team were busy making scientific observations, helping the crew unpack the helicopters, checking and rechecking the loading lists, and preparing plans and alternative plans for off-loading supplies from the ship and for transportation to the base. During the voyage it was not known, of course, whether a close approach to the base and a major off-loading would be possible, or whether the limited amount of supplies that could be carried by helicopter would be all that was possible.

Once in the ice, the scientific team was responsible for handling the supplies brought from the holds to the deck by the ship's crew. On deck the scientific team uncrated, marked, checked the supplies against lists, weighed them, and carried them either to the flight deck or to the heliport, where they then loaded them into the helicopters. During the busiest period the team was divided into two groups and worked around the clock.

During the return voyage to Cape Town, scientific observations were continued, the loading and transportation lists were checked, and preliminary reports were written. Leisure time was spent in talking while drinking coffee, tea, or liquor, reading, playing cards or carom (a game like pool, but played on a small board with checkers), listening to tape recordings of everything from Bach and Beethoven to popular Japanese radio singers, and watching movies. These were usually Japanese films, shown in the evening after dinner, although we saw several popular French films, too. There were no American commercial films.

V. THE HELICOPTERS

In considering the problem of reaching the Antarctic coast, which was illustrated by the failure of Japan's 1957-58 expedition to off-load sufficient supplies to permit the continuation of a wintering party, Dr. E. E. Nishibori, the leader of the 1956-57 wintering party at Syowa Base, raised the question of the value of submarines or planes, which might go through either water or air, over that of surface ships, which have to struggle against the ice. As a result of deliberations in Japan following the return of the 1957-58 expedition, it was decided to equip the 1958-59 expedition with two Sikorsky S-58 helicopters. These were purchased in the United States for the Maritime Safety Board and reached Japan in September, 1958. The Maritime Safety Board pilots assigned to the expedition had flown other types of helicopters, but had little more than a month's practice flying the S-58's before Soya sailed for the Antarctic. Although they had flown in northern Japan, none had ever flown in either the Antarctic or similar ice and weather conditions before arrival in the Antarctic on this expedition. Because of the tight budget of the expedition and limited fuel supplies, no real practice flying was possible even after Soya entered the ice.

On the voyage from Japan, the helicopters had been carried partially disassembled, stowed directly behind the stack on the foremost part of the flight deck. After leaving Cape Town the flight crews and the members of the scientific team worked together in removing the plastic and other protective coverings. The wheel assemblies and rotors were attached.

Once the first few flights to Syowa Base had been made there was great optimism, and it was thought that a large amount of supplies might be easily carried. But when bad weather prevented any flights for 10 days, beginning January 16, there was not only pessimism as to the possibility of transporting even the minimum amount of supplies needed by the smallest possible wintering party, but also increasing tension among the pilots and pressure upon them. Sometimes, when there was a whiteout at one end of the flight route, there was good weather at the other, and those who were enjoying the good weather, and were not flyers, wondered whether every effort was really being made to move the supplies. When flying weather returned, and round-the-clock flights were begun, the strain on the pilots was visible in their tired faces. The decision as to whether a flight should be ordered or not was made by the chief pilot, and the numerous factors involved made his decision at times a very difficult one.

The maintenance crews, instructed by a Sikorsky representative in the care of the S-58's before leaving Japan, worked industriously and apparently with great skill and efficiency in keeping the helicopters in safe flying condition, checking each plane after each flight, and giving more thorough examinations at regular intervals. These crews, too, worked tirelessly round-the-clock when weather permitted continuous flying.

One of the helicopters developed some sort of engine trouble after about 50 hours of flying. Although one of the ship's company wondered why a new plane should have engine trouble so soon, one of the helicopter pilots commented that it was a commendably well-built plane to have performed so well for so long without any major overhaul. The trouble with the engine was thought to have been caused by the fine sand, found in abundance among the exposed rocks of Ongul Island, having been blown into the air by the rotor blades of the helicopter and then drawn into the engine.

On the initial flights, while Soya was about 70 miles from Syowa Base, each helicopter carried one metric ton of supplies, or men, or both. While in the ice, however, the Soya drifted westward with the pack sometimes as much as 14 miles a day. As the distance from Syowa Base increased above 90 miles, auxiliary fuel tanks had to be installed in the helicopters, and the pay load was reduced to 800 kg. The farthest one-way distance flown by the helicopters was something more than 100 miles.

It is clear that because of ice conditions this year, Soya alone would not have been able to supply Syowa Base and establish the wintering party, and that the success of the expedition depended upon the ability of the helicopters and the skill of their pilots and maintenance crews.

VI. SYOWA BASE

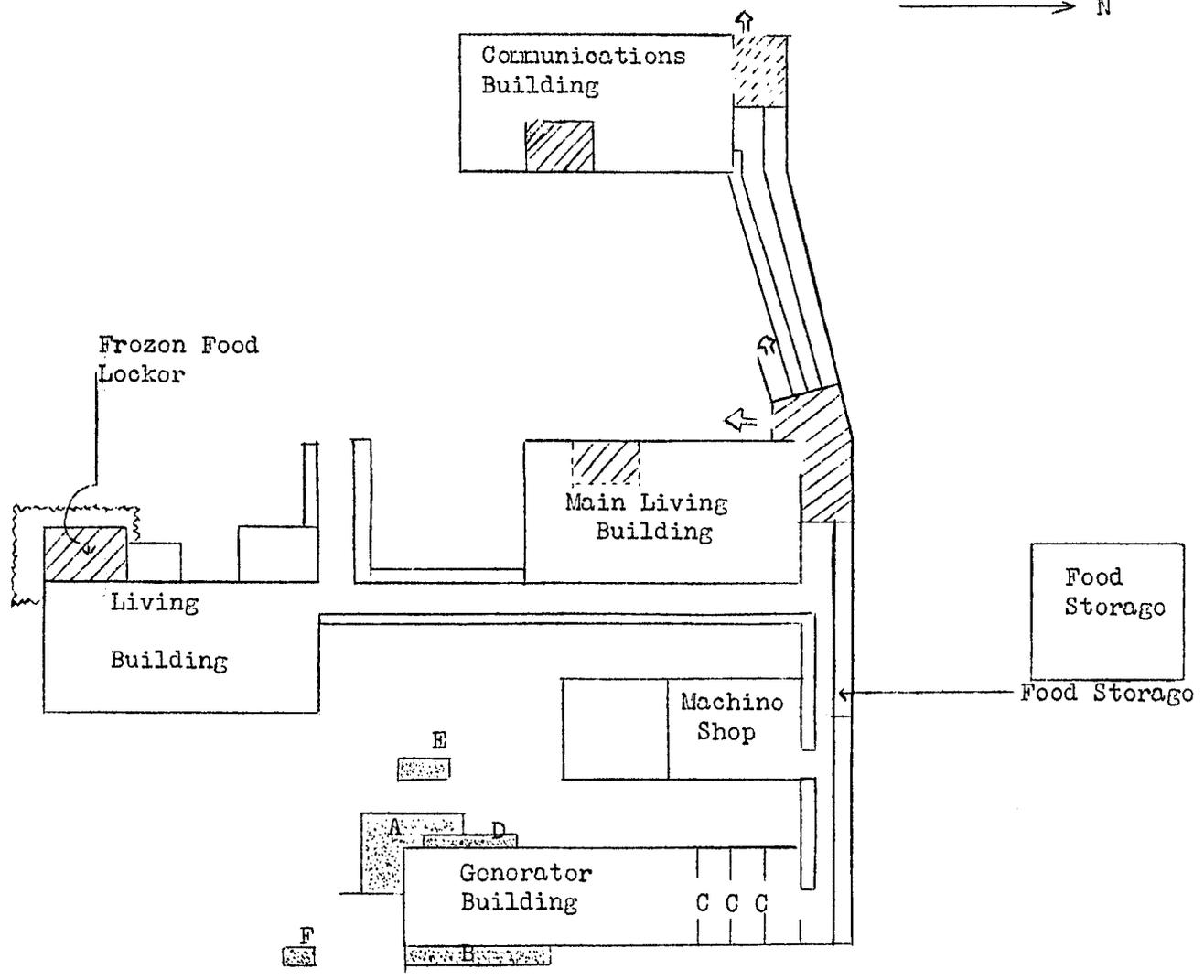
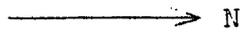
It had been announced to me soon after I boarded Soya that I might fly to Syowa Base after the minimum 30 tons of materials for the wintering party had been transported. This point was reached on January 30. I had been told the evening before that I should be ready to fly to the base sometime on the 30th, and then was told that there was room for me on a flight leaving the ship at noon. I spent the night of January 30 at the base, and returned to Soya during the afternoon of the following day. The flight took about one hour and twenty minutes.

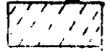
From the air the exposed rocks of Ongul Island stood out clearly against the surrounding ice, and the bright orange buildings of Syowa Base were easy to see at the northern edge of the island. On closer inspection after landing, the buildings, despite two Antarctic winters, appeared to be in excellent condition. They are prefabricated buildings, of insulated plywood panels, with flat roofs, trimly designed. In addition to the three main buildings there is a generator building. Supplies and empty crates have been used to build covered passageways between the buildings.

With the exception of one set of double-decker bunks shared by two men, each man has a room which, though small, is all to himself. Ventilation is provided by a blower system, and there is electric lighting and an electric cook stove in the kitchen. During colder periods, heating is provided by the blowers, but while I was at the base it was warm enough to work out of doors in shirtsleeves, so no heating was necessary. Water, during the summer, is brought from one of the small ponds near the center of the island. During the winter, ice and snow near the buildings are melted down. The chief work at the base during my brief visit was unloading the helicopters as they arrived, hauling the supplies to temporary or permanent resting places, sorting and unpacking, and preparing scientific equipment for use. No observations had been started.

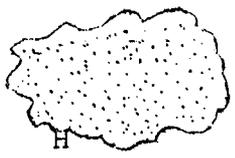
A chief ingredient of a successful wintering party - good morale - appeared to be present in abundance, based upon easy-going natures and experience in out-of-door living for most of the team, and fostered by the simple, direct, and unassuming personality of the wintering party leader.

SYOWA BASE (69°00'22"S, 39°35'24"E)



-  G
-  Now construction
-  Repaired
-  Fuel

- A - Light oil: 60 drums
- B - " " : 42 drums
- C - " " : 26 drums
- D - " " : 11 drums
- E - " " : 5 drums
- F - Korosono : 1 drum
- G - " : 2 drums
- F - Mobiloil : 7 drums
- H - Gasolino : 65 drums
- Mixed oil: 28 drums



Passageways are about 6' wide

VII. TARO AND JIRO

When Soya left the Antarctic on February 24, 1958, 15 sled dogs were left behind at Syowa Base. The dogs were tied to stakes near the base buildings, and a name tag was tied to each dog's collar to facilitate recognition by the new wintering team, which, however, because of the abrupt change in plans, never appeared. The dogs were of the breed known in Japan as "Karafuto dogs" because of their supposed origin on the island of Karafuto (Sakhalin), and had been contributed by their owners, most of whom live on the island of Hokkaido.

When it was learned in Japan that the dogs had been left, presumably to die, there was an immediate uproar of protest. Although the captain of Soya was not alone responsible for the decision to move the ship and leave the dogs, he was singled out for the bulk of the protests, and received not only reams of protest letters but telephone calls from irate dog-lovers who called him a "dog-killer." There were some dog experts, however, including Dr. Inukai of Hokkaido University who had helped collect the dogs, and Taiichi Kitamura - cosmic ray physicist who had been in charge of the dogs during the Antarctic winter of 1957, who said that it was not impossible that some of the dogs might survive until the 1958-59 expedition reached Syowa Base. Such views were not generally taken seriously, however.

While the Soya was on route from Cape Town to the Antarctic in December, 1958, it was learned that a Soviet plane on a rescue mission to the Belgian wintering party had landed at Syowa Base to transfer fuel from the fuel drums which it carried to its fuel tanks. Inquiries from Soya brought forth the information that the buildings and antennae of the base appeared to be in good condition, but no mention was made of any dogs, and apparently none were visible to the Soviet pilot.

When the first helicopter from Soya appeared over Syowa Base on January 14, 1959, two enormous black dogs came bounding up to meet it, wagging their tails. Their coats were more than six inches long, and they appeared to be in good condition and delighted to see the members of the new wintering party. They appeared to remember Kitamura, and obeyed his commands.

Since they were collarless, it was thought that they had been able to break away and forage for themselves during the long Antarctic winter which they spent by themselves, probably subsisting on penguins or seals. No other dogs were found, and it was thought that they were probably still deep under ice and snow at the spots where they had been left. There was some confusion at first as to exactly which dogs the survivors were; their collars and name tags were gone, and they appeared to have both grown and changed in shape with the lengthening of their coats. It was decided, however, that they were Taro and Jiro, brothers, and cousins of the three Karafuto puppies (two male and one female) brought quietly from Japan on this year's expedition. All five dogs are now with the wintering party at Syowa Base.

VIII. SUGGESTIONS

As a result of my travel with the Japanese expedition of 1958-59 there are several suggestions which I should like to make for the benefit of anyone who may travel with the Japanese in the future. The original United States proposal to the Japanese Government was for an exchange of observers, for a Japanese to travel on an American ship and an American to travel on the Japanese ship.

The Japanese thought in terms of an exchange of scientists, and although for budgetary reasons they were not able to send an observer on an American vessel, they expected an American scientist to join them. They were surprised, therefore, and somewhat suspicious when they found that the American observer this year was not a scientist but was a Foreign Service Officer. I believe that an American scientist would find a roadier welcome than a non-scientist, and that his position would be even more comfortable if there were really an exchange - if he could point to the presence of a Japanese on some American vessel as a counterpart to his own mission.

If the Japanese groups in the future are composed as they were this year, it would be almost essential for the American observer to have a fair knowledge of spoken Japanese. Although many of the scientists this year were able to read English, few were able to speak with any facility. In living intimately with the scientific group, and with the probability of long periods too rough to do anything but talk, an observer not able to communicate readily, or to speak to other than a limited few, might find the trip a long and tedious one. On the other hand, an ability to teach English, and a supply of suitable reading materials or other teaching aids, would be an asset which would be welcomed by both the scientific group and the ship's company.

The Antarctic on this particular voyage to Ongul Island in 1958-59 was not cold. There were chilly and windy days, but as for clothing, nothing warmer than ordinary ski clothing was needed. For manual labor on a ship, however, clothing should be sturdy, and not harmed by possible paint or grease. I found that waffle-weave underwear and heavy wool socks were the only useful items of clothing brought from Washington. A work suit, hooded ski jacket, and rubber boots were supplied by the expedition from its own stores; they fitted reasonably well, and I wore them constantly. I found that it was the custom on a Japanese ship, as in Japan, to wear shoes as little as possible; boots (either rubber or fur-lined boots of leather and cloth) were worn on the outer decks and on the ice, but these were removed and slippers worn in the cabins and passageways. If conditions similar to those of this last expedition prevail again, therefore, it would not be necessary to bring more than one pair of boots, which could be easily slipped on and off, and one pair of rubber or other waterproof slippers.

Because an American observer may be assumed to be an expert on all things American and even on all things foreign to Japan, it would be helpful and interesting to have along a copy of the U. S. Government Manual and one of the World Almanac. Any reading that can be done beforehand about the Antarctic will be valuable, and this is especially true for reading about both the American and Japanese expeditions. The journal entitled "Nankyoku Shiryo" (Antarctic Record), published by the Ministry of Education in both English and Japanese, and the National Reports published by the same Ministry are probably the best source of information about Japanese activities in the Antarctic. Most members of the 1957 wintering party have written accounts of their adventure, and Dr. Nagata has supervised a simply written comprehensive account of the first Japanese expedition. All of these are in Japanese.

APPENDIX A

DESCRIPTION OF THE SOYA (1958-59)

1. Name of ship: Soya (PL 107)
2. Call sign: JDOX
3. Owner: Ministry of Transportation (Maritime Safety Board)
4. Captain: Mitsuji Matsumoto
5. Port of registry: Tokyo
6. Usage of ship: Patrol ship
7. Navigation area: Ocean area
8. Gross tonnage: 2,722 tons
9. Net tonnage: 1,187 tons
10. Displacement: 4,818 tons
11. Color: Orange
12. Main engine: 2 cycle diesel engines (2400 HPx2)
13. Speed (maximum): 12.5 knots
14. Speed (cruising): 11.0 knots
15. Range (cruising): 16,400 miles
16. Icebreaking ability: approx. 1.2 meters
17. Length overall: 83.66 meters
18. Width: 15.80 meters
19. Depth: 9.30 meters
20. Draft (fully loaded): 5.55 meters (forward)
5.94 meters (middle)
6.33 meters (aft)
21. Number of persons on board: 96 (crew)
34 (observation team)
22. Number of holds: 3 (plus storage aft)
23. Hold capacities: 1503.54 square meters
24. Water supply: 480 tons, plus 4 to 5 tons per day
25. Booms: 5 tons (2 sets)
3 tons (1 set)
26. Radio sets on board:

<u>Call Sign</u>	<u>Type of Wave Form</u>	<u>Power (W)</u>	<u>Frequency (kc)</u>			
	A-1	1000	4180	4198	4222.5	6270
			6333.75	8360	8396	8445
			12594	12667.5	16720	16792
			16890	22235	22297.5	22360
			6297	12540		
JDOX	A-1	500	2012.5	2091	2250	2260
			2417.5	3720		
	A-1	350	410	425	454	468
			472	500		
	A-1	200				

Construction was started on the ship in 1938 on order from the Soviet Union. She was intended to be used in trade between Japan and Soviet Siberian ports and was constructed to withstand ice conditions in that area. The order was cancelled before the vessel was completed.

The ship, named the Chiryō Maru, was purchased by a private Japanese company, but, with the outbreak of the Pacific War, was taken over by the Japanese Navy. As a naval vessel, she took part in the Battle of Midway.

Since the end of the war she has been used in relief and repatriation, and as a patrol boat of the Maritime Safety Board (the Japanese Coast Guard). She has been refitted three times for service with the Japanese Antarctic expeditions. The last refitting, after the 1957-58 expedition, included the addition of a large flight deck for use by the two Sikorsky helicopters.

APPENDIX B

MEMBERS OF THE JAPANESE ANTARCTIC RESEARCH EXPEDITION, 1958-1959

[The employment given is the individual's usual employment; those not usually employed by the Japanese Government were temporarily hired as government officials for the period of the expedition. Ages given are as of 1958.]

NAGATA Takoshi: Leader of expedition; leader of 1st and 2nd expeditions; professor, Tokyo University, Geophysical Institute; age, 45.

MURAYAMA Masayoshi: Deputy leader of expedition and head of wintering party; member of 1st and deputy leader of 2nd expedition; private business; age, 40.

MURAUCHI Sadanori: Seismology, member of wintering party; member of 1st and 2nd expeditions; Ministry of Education, Science Museum (Uono); age, 40.

SEINO Zombou: Meteorology, member of wintering party; member of 1st and 2nd expeditions; Weather Bureau; age, 37.

KAWAGUCHI Sadao: Meteorology, member of wintering party; member of 2nd expedition; age, 29.

NAKAMURA Junji: Aurora, member of wintering party; member of 1st and 2nd expeditions; Tokyo University, Department of Education; age, 33.

WAKAI Noboru: Ionosphere, member of wintering party; member of 2nd expedition; Postal Ministry, Radio Research Laboratory; age, 31.

OGUCHI Takashi: Geomagnetism, member of wintering party; member of 1st and 2nd expeditions; Assistant, Tokyo University, Geophysical Institute; age, 28.

KITAMURA Taiichi: Cosmic rays, member of wintering party; member of 1st wintering party; Assistant, Tokyo University, Geophysical Institute; age, 27.

YOSHIDA Naganori: Cook, member of wintering party; member of 1st and 2nd expeditions; formerly cook on board Soya; age, 39.

HIRAYAMA Zenkichi: Construction, member of wintering party; member of 1st and 2nd expeditions; Nihon University, Engineering Department; age, 24.

MUTO Akira: Doctor, member of wintering party; Director of Koiso Railroad Hospital, Yokohama; age, 47.

ARAGANE Kanzo: Engineering, member of wintering party; member of 1st expedition; Komatsu Industries; ago, 36.

YOSHINO Takeo: Engineering, member of wintering party; lecturer, Communications College (Tsushin Daigaku), Tokyo; ago, 29.

TAKAMURO Takashi: Radio operator, member of wintering party; Postal Ministry; ago, 33.

OSE Masami: Ionosphere; member of 1st and 2nd expeditions; Postal Ministry, Radio Research Laboratory; ago, 33.

HARADA Yoshinichi: Geodesy; member of 2nd expedition; Construction Ministry, Geographical Survey Institute; ago, 39.

YOSHIDA Arao: Geodesy; Construction Ministry, Geographical Survey Institute; ago, 29.

KAKINUMA Seiichi: Geodesy; member of 2nd expedition; Construction Ministry, Geographical Survey Institute; ago, 28.

ONO Noboru: Oceanography; lecturer, Hokkaido University, Geophysical Institute; ago, 25.

FUKUSHIMA Hiroshi: Biology; lecturer, Yokohama City College; ago, 34.

FUKUSHIMA Shin: Cosmic rays; Assistant, Tokyo University, Geophysical Institute; ago, 28.

OTSUKA Masao: Engineering; member of 1st wintering party; Isuzu Industries; ago, 37.

MARUYAMA Hachiro: Engineering; member of 2nd expedition; Isuzu Industries; ago, 28.

HONDA Shunichi: Engineering; member of 2nd expedition; Victor Auto Company; ago, 30.

NISHIDA Yuichi: Construction; Nihon University, Engineering Department; ago, 24.

SAWA Hidetako: General affairs; Sankai Newspaper Company; ago, 29.

HASEGAWA Kikuji: Carpenter; member of 2nd expedition; private business; ago, 28.

OMIYA Hachiro: Carpenter; member of 2nd expedition; private business; ago, 26.

SATO Haruo: Carpenter; Construction Ministry; ago, 26.

MATSUMOTO Ikuo: Carpenter; member of 2nd expedition; Construction Ministry;
ago, 25.

YAMAMOTO Takoshi: Reporter; Asahi Newspaper Company; ago, 35.

FUKASE Kazumi: Reporter; Kyodo News Agency; ago, 29.

APPENDIX C

SCIENTIFIC PROGRAM FOR THE JAPANESE ANTARCTIC RESEARCH EXPEDITION, 1958-1960

<u>Subject</u>	<u>Ship</u>	<u>Landing</u>	<u>Station</u>
Aurora and airglow	x		x
Cosmic rays	x		x
Geomagnetism	x		x
Ionospheric physics	x		x
Meteorology	x		x
Glaciology			x
Seismology			x
Gravity		x	
Topography		x	
Oceanography	x	x	
Biology	x	x	

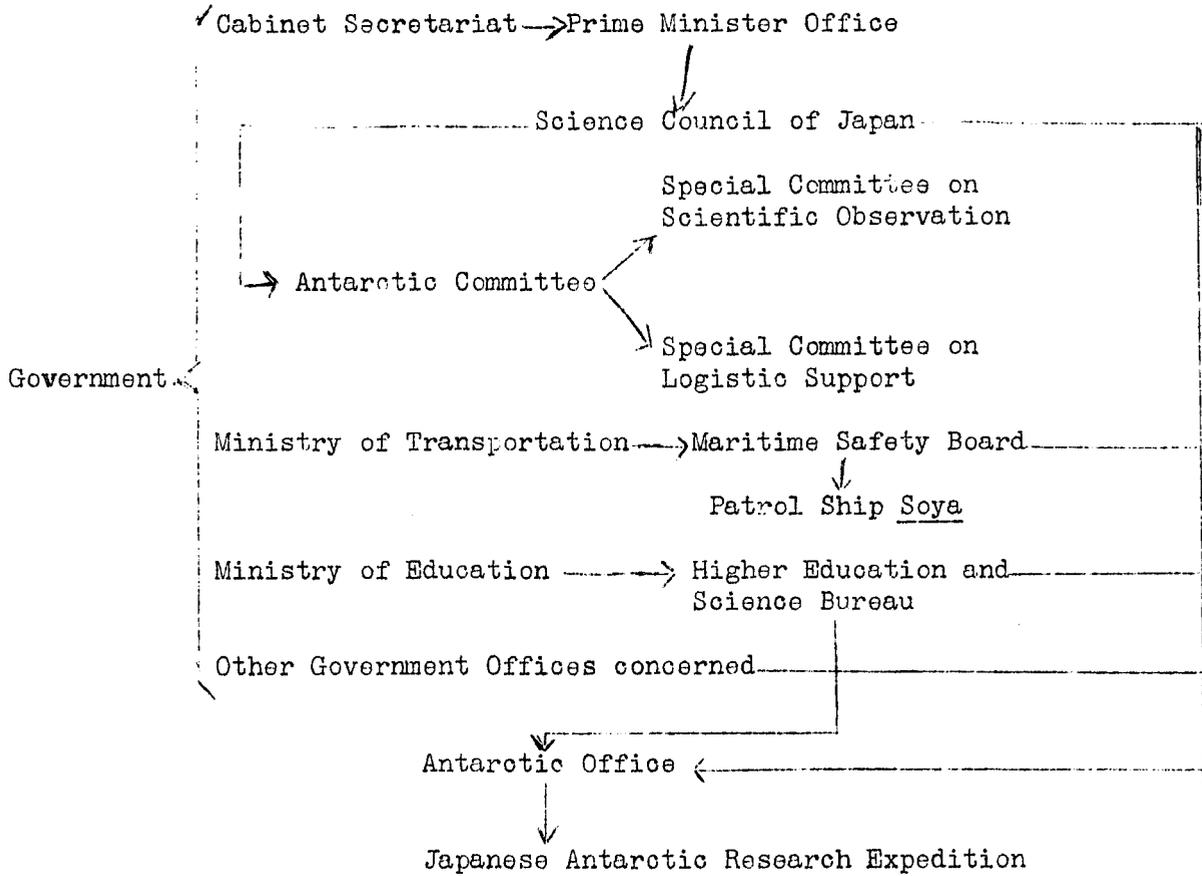
APPENDIX D

ORGANIZATION OF THE JAPANESE ANTARCTIC RESEARCH EXPEDITION (Information from Antarctic Record, No. 5, September 1958, pp. 1-2.)

In April 1956, an Antarctic Office was organized in the Higher Education and Science Bureau, Ministry of Education, to take charge of communications among the ministries responsible for the Antarctic expedition and the administrative business of the expedition, as there were many matters of concern to several ministries of the Japanese government. At the same time a Special Committee on Logistic Support was organized in the Antarctic Committee, Science Council of Japan. As a result of a conference of the Antarctic Office, it was decided that the preparation of the expedition ship Soya would be made by the Maritime Safety Board and the preparations for scientific observations and logistics would be made by the Antarctic Office. An office is located in the Antarctic Office to plan and prepare for each expedition and the training of its members.

Planning and preparation for scientific observations in and on the way to the Antarctic are the responsibility of the Special Committee on Scientific Observation of the Antarctic Committee. Subcommittees on architecture, food, supplies, aviation, medical treatment, expedition instruments, equipment and telecommunication were organized in the Special Committee on Logistic Support of the Antarctic Committee to take charge of examination and selection of materials, design of huts, instruments and equipment, and tests of all supplies to be used in constructing an Antarctic base.

All members of the Antarctic Research Expeditions who are not already employed as Japanese Government Officials are hired on a temporary basis and accorded the status of Government Officials.



APPENDIX E

NOON POSITION, ETC., OF THE SOYA, DECEMBER 24, 1958, to February 20, 1959

Visibility		7	8	8	7	6	7	7	8	7	8	8
Humidity		65	75	52	86	83	74	77	77	90	87	88
Water Temperature		11.2	22	17	12.1	7.0	3.7	2.5	1.9	1.9	0.2	-1.4
Temperature		19.5	22	13.4	11.4	4.8	3.5	0.5	0.8	0.7	-1.4	-0.8
Pressure		1016.2	1016.4	1020.7	1007.5	992.6	992.8	989.3	979.1	979.0	88.0	94.3
Weather		Clear	Clear	Clear	Cloudy	Hail	High Clouds	Clear	High Clouds	Cloudy	Clear	High Clouds
Swell		SSW2	SSE3 W 4	SSW5 W 5	SSW4 W 4	SW5 W 4	WSW7	SW4 W 4	WSW WNW	ESE	N1	NNEL
Waves		SSE4	NNWL	2	4	5	6	4	3	4	2	
Wind Speed		6.0	1.0	3.3	10.5	18.0	15.5	11.5	7.5	12.0	9.0	3.0
Wind Direction		SSE	WNW	WNW	W	WNW	WSW	WSW	NNE	E	E	WNW
Distance from Cape Cross		2215	1979	1725	1476	1215	976	730	476	217		
Distance from Cape Town		18	254	508	757	1018	1257	1503	1757	1816	2032	
Average Speed		10.0	10.0	10.0	10.0	10.87	9.95	10.25	10.58	10.79	10.41	7.26
Noon Position (South lat., East long.)		34°04' 18°14.5'	37°15' 20°56'	40°48' 23°55'	44°12' 27°07"	47°48' 30°38'	50°57' 34°23'	54°26' 37°56'	58°06' 41°46'	61°55' 45°48'	65°24' 50°56'	65°42' 47°20'
Date		24	25	26	27	28	29	30	31	1	2	3

Date	Moan Position (South lat., East long.)	Average Speed	Distance from Cape Town	Distance from Cape Cross	Wind Direction	Wind Speed	Waves	Swell	Weather	Pressure	Temperature	Water Temperature	Humidity	Visibility
4	66°14' 41°14'	8.04			ENE		ENE	N1 NE1	Cloudy	993.6	0.0	-0.5	77	6
5	66°07' 41°16'	4.42			E	8.0	E6	E6	Storm	969.8	-1.1	-1.2	95	4
6	66°55' 42°44'	4.34			NE	6.0	NE5	N3 NE5	Cloudy	974.5	-0.5	-1.6	84	7
7	66°33' 43°59'	4.5			E	6.0	E4	NE4	Cloudy	967.7	-0.5	-0.6	84	7
8	66°47' 41°51'	5.45			E	7.0	E5	NE4	Cloudy	963.3	-1.4	-0.9	84	7
9	67°18' 40°15'				E	4.0	E3	NE4 NW3	Cloudy	964.9	-0.5	-1.3	83	7
10	67°21' 40°03'				SE	2.0		N2	Cloudy	979.5	0.0	-0.9	90	8
11	67°21' 39°54'				W	3.0		N1	Cloudy	987.5	-1.6	-1.7	76	8
12	67°28' 40°08'	1.05			W	3.0			Snow	988.5	-1.0	-1.7	88	5
13	67°26' 40°26'				W	3.0			Cloudy	992.7	-1.6	-1.8	68	7
14	67°34' 40°26'				NE	3.0			Cloudy	989.0	-2.5	-1.8	77	8
15	67°34' 40°26'				ENE	5.0			Snow	984.6	-1.3	-1.8	91	4

Visibility	6	2	6	5	3	5	6	5	3	6	6
Humidity	92	90	94	90	95	78	92	88	93	87	90
Water Temperature	-1.7	-1.8	-1.7	-1.7	-1.7	-1.7			-1.6	-1.7	
Temperature	-1.4	-1.2	-0.6	-0.2	-1.0	-0.7	0.9	1.4	-0.5	1.3	0.6
Pressure	995.7	985.3	984.6	990.2	995.6	992.4	974.2	999.3	985.1	969.3	994.4
Weather	Snow	Snow	High Clouds	Snow	Snow	Snow	Cloudy	Snow	Snow	Snow	Cloudy
Swell											
Waves											
Wind Speed	3.0	4.0	1.0	2.0	8.5	5.0	8.0	4.0	13.0	10.0	4.5
Wind Direction	ENE	ENE	ENE	NE	E	E	ENE	ENE	ENE	ENE	ENE
Distance from Syowa Base						76.5					
Average Speed											
Noon Position (South lat., East long.)	67°44' 40°14'	67°44' 40°14'	67°43' 39°56'	67°43' 39°56'	67°43' 39°56'	67°43'15" 39°39'	67°49' 39°07'	67°49' 39°07'	67°49' 39°07'	68°00' 38°00'	67°56' 37°29'
Date	16	17	18	19	20	21	22	23	24	25	26

Visibility	6	6	6	8	8	8	8	7	4	8	8	8
Humidity	90	87	82	79	68	81	76	87	87	87	75	65
Water Temperature	-1.7	-1.7	-1.7	-1.8	-1.8	-1.7	-1.8	-0.7	-1.0	-1.0	-0.7	-1.2
Temperature	-1.3	-0.6	-1.1	-5.1	-3.2	-3.1	-3.3	-2.2	-2.3	-4.0	-3.6	-3.6
Pressure	997.2	993.3	990.9	988.2	985.4	985.7	986.6	985.0	983.0	974.6	992.8	989.4
Weather	Cloudy	Cloudy	Snow	Sunny	Clear	Cloudy	High Clouds	Cloudy	Snow	Cloudy	Cloudy	Rain
Swoll								N1	NNEL NNWL	NWL	NNWL	NNEL
Waves								S1	E1	SWL	E2	E2
Wind Speed	2.5	1.0	7.0	3.5	6.2	5.0	2.0	3.5	10.0	4.0	5.0	5.5
Wind Direction	WNW	NNW	E	SW	W	W	E	S	E	SW	E	E
Distance from Syowa Base									128			
Average Speed								5.25	4.62	4.40	6.28	7.96
Noon Position (South lat., East Long.)	67°54' 37°26'	67°54' 37°26'	67°55' 37°20'	67°54' 37°12'	67°51' 37°10'	67°49' 37°18'	67°50' 37°22'	67°19' 40°33'	66°53' 40°06'	67°09' 40°11'	67°04' 40°51'	67°55' 44°40'
Date	27	28	29	30	31	1	2	3	4	5	6	7

Date	Noon Position (South lat., East long.)	Average Speed	Distance from Cape Town	Distance from Antarctic Ocean	Wind Direction	Wind Speed	Waves	Swell	Weather	Pressure	Temperature	Water Temperature	Humidity	Visibility
8	66°01' 50°02'	8.0			ENE	7.0	ENE3	NNW1	Clear	992.5	-3.0	-1.7	73	8
9	66°39' 44°03'	8.52			S	3.3	S2	NNE2	Light Clouds	993.6	-3.5	-0.9	75	8
10	67°18' 35°32'	10.45			E	8.0	E3	NNE2	Cloudy	980.5	-2.3	-1.4	91	8
11	67°36' 31°05'	9.41			ESE	5.0	ESE1	N2 NNW1	Cloudy	972.3	-4.8	-1.1	92	7
12	67°08' 32°38'	5.96			ESE	6.5		NE2 NW2	Cloudy	980.4	-3.1	-1.7	87	7
13	64°09' 30°10'	9.35	1960	190	SW	8.5	SW3	WNW3	Cloudy	994.7	2.0	1.8	82	7
14	60°15' 28°43'	9.8	1720	430	WNW	5.0	WNW3	WNW3 SW3	Snow	1011.8	1.0	1.7	88	6
15	57°01' 27°49'	8.0	1523	627	NW	7.0	NW6	NW6	Cloudy	1006.0	2.1	1.9	88	6
16	54°03' 26°33'	8.0	1339	811	W	5.0	W4	WNW7	Clear	1025.8	2.0	1.5	86	6
17	50°25' 24°34'	9.45	1110	1040	E	5.6	E3	SW4 W3 NE3	Sunny	1024.8	4.3	3.0	65	8
18	46°29' 22°19'	10.5	858	1292	S	4.0	S3	ENE4	Fog	1000.9	7.5	6.6	92	4
19	42°55' 20°52'	10.0	563	1515	SSW	4.0	SSW3	SW4	Rain, Fog	1000.8	8.9	19.8	95	6
20	40°57' 18°03'	8.75	440	1725	W	8.5	W4	SW4	Sunny	1022.2	13.7	15.2	79	8

APPENDIX F

ROLES OF SHIP'S COMPANY AND SCIENTIFIC PARTY

The Soya is a ship which belongs to the Japanese Maritime Safety Board, and is, therefore, not a military vessel. The Board was established for the first time at the end of World War II, and the functions which it now performs had previously been performed by the Japanese Navy. The officers of Soya, with one exception, as far as I am aware, are former merchant marine officers. The sole exception to this non-military background was one of the helicopter pilots, who was a wartime graduate of Japan's Naval Academy at Eta Jima.

The captain of Soya was, of course, responsible for his ship, although his decisions concerning her movements were often made in close consultation with his headquarters in Tokyo. In addition, since the ship had been assigned by the Maritime Safety Board to the Antarctic Research Expedition, the decisions of the captain concerning the movements of his vessel had to be coordinated with the wishes of the leader of the expedition, a civilian scientist and a professor at a government university, who was responsible for the success of the expedition in carrying on scientific observations en route to and from the Antarctic and in establishing a wintering party, equipped to perform scientific observations, at Syowa Base. The leader of the expedition, to insure that advantage was taken of any opportunity which sea and ice conditions might offer to advance the expedition, spent long hours on the bridge, advising the captain concerning the course he should follow through the ice. The leader of the expedition, moreover, like the captain, had to work in consultation with the scientific and governmental authorities in Tokyo who were ultimately responsible for the expedition.

Two divisions of responsibility between the ship's company and the members of the scientific group were interesting, and occasionally the subject of comment. The first was the "ice watch" which was established when the ship entered the area of floating ice, and which was manned by members of the scientific group. They kept a careful log of the type and quantity of ice observed, as well as the condition of the sea. Some of the ship's officers, after reading the log of the circumnavigation of the Antarctic by GLACIER, noted with surprise that in the case of the United States such observations were made by the ship's officers and men, and wondered whether the performance of such duties by the ship rather than by the scientific group might not be advantageous.

The second division of responsibility was with regard to the cargo - the materials destined for Syowa Base. Raising these materials from the holds was the job of the ship's crew, as was the lowering of them over the side of the ship to the ice. Handling of the supplies once they were on deck, howe-

ever, together with uncrating, checking, weighing, and then, once on the ice, loading them and sledding them was the responsibility of the scientific group. Although they were often helped by the crew, there were comments now and then that the crew should be encouraged to help more, because in general they were brawnier than the members of the scientific group.

The division of responsibility, and the sharing of it, on Soya, as far as I could observe, worked smoothly. The ship's company and the members of the scientific group lived in close quarters, though separately, and apparently got along well together. The relationship between the captain and the leader of the expedition could have been a delicate one, but on this expedition was apparently both friendly and effective.

2

U.S. ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

U.S. ANTARCTIC PROJECTS
LIBRARY & ARCHIVES

JAN 25 1960

USAPO/bas
Serial 83
17 July 1959

MEMORANDUM FOR THE DISTRIBUTION LIST

SUBJECT: Forwarding of Report of U. S. Observer with Belgian
Antarctic Expedition, 1958-59

The enclosed report, prepared by Mr. Oliver S. Crosby, United States
observer with the Belgian Antarctic Expedition, 1958-59, is forwarded for
your information and retention.

D. M. TYREE

John Cadwalader

JOHN CADWALADER
By direction

Enclosure: Report

Distribution List: (see attached sheet)

DISTRIBUTION LIST:

OCB	1
OCB/Antarctic Working Group	
Capt. Kefauver - CNO	1
Dr. Wexler - Weather Bureau	1
Dr. Joyce - NSF	1
Mr. Benedict - USIA	1
Mr. Dykes - CIA	1
Mr. Owen - State	1
Mr. Coote - Interior	1
OSD (Special Operations)	1
R&D/Army	1
ACSI/Army	1
SIPRE/Army	1
TransTraComd/Army	1
CNO (Op-33)	3
DNI	2
Hydro	1
Hydro (Attn: Code 5430)	1
ONR/Bio. Sciences Division	1
QM Intel/Army	1
ComNavSupFor, Antarctica	2
Dir R&D/AF	6
AF/AFCIN-1B	5
CIA	1
Board on Geographic Names	1
USARP	1
U. S. Army Map Service	1
U. S. Naval Academy	2
Commandant, U. S. Coast Guard	1
State Department	2
Dr. Taylor, House Committee on Interior and Insular Affairs	1
Dr. Siple - Army R&D	1
U. S. Geological Survey	1
Chief, Bureau of Ships	1
Director of Naval History	1
OSD, Internat'l Sec. Affairs	1
Chief of Transportation/Army	1
DCNO/Logistics	1
Surgeon General/AF	1
JAG/Navy	1
JCS	1
Director, Weather Bureau	1
Chief, of Naval Personnel	1
Hon. Edward A. Bacon/Army	1
AEC	1
Mr. Ross Peavy/NAS	1
Mr. John M. Jones/NAS	1

UNITED STATES ANTARCTIC PROJECTS OFFICER
718 Jackson Place, N. W.
Washington 25, D. C.

BELGIAN ANTARCTIC
EXPEDITION
(1958 - 1959)

Report of UNITED STATES
OFFICIAL OBSERVER

OLIVER S. CROSBY

TABLE OF CONTENTS

	<u>Page</u>
I. ABSTRACT	1
II. NARRATIVE	2
A. Background	2
B. Belgian Expedition Beset in Ice	2
C. Assistance by USS GLACIER	3
D. Off-loading at King Baudouin Base	6
E. Description of King Baudouin Base	6
F. Exploration Activities and Rescue of Stranded Personnel by Soviets	7
G. Return of de Gerlache Expedition to Cape Town	8
III. ORGANIZATION AND PLANS OF BELGIAN EXPEDITIONS	10
A. The de Gerlache Expedition	10
B. The Bastin Expedition	10
1. Projected Polar Trip	11
C. Future Belgian Antarctic Plans	11
IV. CONCLUDING OBSERVATIONS ON TRIP	13
APPENDICES:	
I. AIR AND SURFACE EXPLORATION AND MAPPING ACTIVITIES	15
A. Aerial Photograph	15
B. Surface Exploration	15
1. Fall Trail Party	15
2. Spring Trail Party	16
II. AIR CRASH AND RESCUE BY SOVIETS	18
III. PLANS FOR POLAR TRAVERSE	21
A. Use of Dog Sleds	21
B. Scientific Program	22

	<u>Page</u>
IV.. SCIENTIFIC PROGRAMS	23
A. International Geophysical Year Programs	23
1. Meteorology	23
2. Aerology	24
3. Glaciology	24
4. Solar Radiation	25
5. Geomagnetism	25
6. Aurora	25
7. Ionosphere	25
B. Non-IGY Programs	26
1. Earth Currents	26
2. Atmospheric Electricity	26
3. Nuclear Radiation	26
4. Geology	27
5. Topography, Geodesy, Photogrammetry	27
6. Medicine and Physiology	27
7. Biology	28
8. Botany	28
9. Zoology	28
V.. BASE AND BUILDINGS	29
VI. TRANSPORTATION	30
A. Sea	30
B. Air	30
C. Land	30
VII. SUPPLIES	32
A. Fuel	32
B. Cold Weather Clothing	32
C. Food	32
D. Power Megaphone	32
E. Explosives	33
F. Cargo Handling	33
VIII. COMMUNICATIONS	34
A. Official Radio	34
B. Amateurs	34
C. Postal	35
IX. PERSONNEL	36
X. ORGANIZATIONS, PERSONS AND FUNDS BEHIND BELGIAN ANTARCTIC EXPLORATION	38
XI. CHRONOLOGY AND ICE LOG	41

I. ABSTRACT

As United States observer with the Belgian Antarctic expedition, Mr. Oliver S. Crosby, a Foreign Service Officer, accompanied the expedition from Cape Town to King Baudouin Base on the Princess Ragnhild Coast of the Antarctic continent and returned with those who had passed the previous year in the area. Departing from Cape Town on December 14, 1958, and returning on March 3, 1959, he spent several weeks icebound in the Antarctic pack aboard the expedition ship Polarhav as it drifted westward away from the base the ship was trying to reach. Finally aided by the United States icebreaker, GLACIER, Mr. Crosby and the Belgians were brought to King Baudouin Base, and a successful unloading of cargo and transfer of personnel was accomplished.

This unusual and exciting trip was rich in varied experiences: seal hunting and other excursions on the ice pack, close and extended association with Belgian expedition personnel, ice reconnaissance flight in GLACIER's helicopter, icebreaking operations both on Polarhav and GLACIER, the difficulties of communication and navigation in the Antarctic, offloading operations at Breid Bay, inspection of King Baudouin Base and its scientific equipment, and discussions concerning completed and planned programs for scientific observations and exploration.

In 1958 the expedition had established the base and conducted a full and successful IGY scientific program. The field exploration portion of the program, however, was terminated a little early due to an air crash stranding four expedition members, who were then rescued by a Soviet plane from Mirny Base. The 1959 wintering-over party plans an expanded scientific program and hopes to make a surface traverse to the Pole and back to King Baudouin Base, one of the longest traverses yet undertaken in the Antarctic.

The reporting officer found many aspects of the expedition instructive and was particularly impressed by the extent to which man is at the mercy of the elements in the Antarctic, the importance of good communications and mutual support, and the difficulty of access to the continent by surface ship.

II. NARRATIVE

A. Background.

In the early annals of Antarctic exploration, Belgium played a small but significant role. Prior to the present effort, one Belgian expedition under Lieutenant Adrien de Gerlache visited the area and had the distinction of being the first scientific group to winter over when its ship, Belgica, came beset in the Bellingshausen Sea early in 1898.

During the ensuing half-century, Belgian interest in the Antarctic never entirely disappeared. Several projects for further exploration were launched, but none reached reality largely for financial reasons. On the few occasions when Antarctica became the subject of consideration among the world's foreign offices, the Belgian Government indicated that it expected to be consulted in any territorial settlement.

It was not, therefore, surprising that Belgium took advantage of the opportunity offered by the International Geophysical Year (1957-58) to re-enter the field. Continuity with the past was preserved by the selection of Commandant Gaston de Gerlache, son of Adrien de Gerlache, as head of the first wintering-over expedition. Beginning in early 1958, the Belgians established a base in the vicinity of 23°E. and carried on an active program of scientific research in accordance with the program of the International Geophysical Year.

Belgium has been one of the nations participating in the Special Committee on Antarctic Research (SCAR) established by the International Council of Scientific Unions to develop research programs after the official end of the International Geophysical Year, December 31, 1958. The Belgians agreed to keep their station open and named Captain Francois Bastin, Chief of the Belgian Air Force Meteorological Service, as officer in charge of the second wintering-over party. As official United States observer under the provisions for observer exchange, the reporting officer accompanied the Bastin expedition to King Baudouin Base in December 1958, January and February 1959, visited the base while the expedition's equipment was being offloaded and returned to Cape Town, South Africa, with the de Gerlache expedition in March, 1959.

B. Belgian Expedition Beset in Ice.

Whereas the de Gerlache expedition had reached its base site south of the Cape of Good Hope after a mere two weeks of steaming in December 1957, ice conditions were unfavorable in 1958. The Bastin expedition was caught in the polar ice floes some 50 miles north of the base and was carried 210 miles westward over a period of seven weeks until its final release by USS GLACIER.

The unexpected protraction of the voyage was an unwelcome surprise to everyone, including the reporting officer, but at least it afforded an opportunity to become acquainted with the personnel and organization of the expedition in considerable detail. This was at once pleasant and rewarding, for the members of the expedition were as delightful companions as they appeared to be competent technicians. They extended every hospitality to the reporting officer and made him feel in all respects at home among them - almost a member of the expedition.

During the difficult seven-week period while the ship was trapped in the ice, the Belgians displayed a fine sense of humor and a remarkable ability to create diversions for the maintenance of morale. This included the appointment of officers and a town council for the "town" of "Penguin Hollow" (Trouville les Pingouins), an organization which both provided an opportunity for bombastic argument and served to maintain order and discipline aboard ship. There was a good deal of reading done aboard, numerous seal hunts were organized, excursions were made on the ice pack, and both serious and lampoon lectures were delivered in the evenings.

In addition to these and other activities, we all spent a good deal of time rummaging in the expedition ship's hold to find vital equipment which would be needed quickly in case we were obliged to fly in to the base by helicopter and could carry only the minimum of essential items. Captain Bastin worked out a series of possible unloading plans, stipulating how much of each type of cargo could be taken in each contingency. The cargo had been loaded aboard in a rush at Ostend, so virtually everything except the fuel drums had to be moved in an effort to make available the most essential equipment.

During these weeks of uncertainty, as we drifted farther and farther westward, morale remained good, giving support to the impression that the quality and character of the personnel were up to the requirements for a year in the Antarctic. Aside from the selection of a nucleus of personnel well and favorably known to Captain Bastin, expedition members had been obtained through public advertisement, interviewed for personality characteristics, and tested at the University of Brussels and various other scientific institutions in the fields of their specialty. No psychological tests were given, although character assessments were secured on the basis of handwriting analysis.¹

C. Assistance by USS GLACIER.

The fairly even tenor of our ways was at last disrupted by the approach of USS GLACIER. United States assistance had been requested on January 12.

¹Commandant de Gerlache, who used this method, was impressed with the accuracy of the analysis, which in certain cases proved to be more penetrating than had his own assessment.

After a prompt though inconclusive response that USS EDISTO, if available, might be able to reach us by February 1, nothing further was heard for several days. This put the Belgians in a difficult position, for the summer season was drawing to a close, and some action had to be taken quickly. The Belgian Foreign Ministry urged that an application be made to the Soviets, and although Captain Bastin asked that they wait a little longer for the American reply, the Ministry approached the Soviet Ambassador in Brussels on January 16, and the Belgian Embassy in Moscow inquired of the Soviet Antarctic Committee regarding the possibility of Soviet assistance.

Moscow gave immediate instructions for its Mirny Base to communicate with the Polarhav, and on January 19 Mirny informed us that the Soviet ice ship, Ob, should be finished with its current work by February 1, at which time it could leave Mirny to assist the Polarhav. A couple of hours after this word was received, Radio Brussels carried a Reuters report that USS GLACIER was on its way to help Polarhav. When we had received official confirmation of this, the expedition thanked the Soviets for their offer and informed them that assistance would not be necessary.

The next 12 days all hands followed the daily GLACIER position reports with great interest. As we radioed Admiral Dufek and his deputy, Captain McDonald, everyone aboard was greatly impressed with the fact that the United States had sacrificed her long-cherished plans to use GLACIER for exploratory operations and was sending it halfway around the continent to help us.

When GLACIER came within voice radio range of Polarhav, the reporting officer assumed responsibility for communications with the icebreaker, welcomed its approach with understandable warmth, and gave pertinent information regarding ice conditions and Polarhav's position, cargo, and requirements. As GLACIER drew closer, we endeavored at two-hourly intervals to talk her in to our position. GLACIER was at that time experiencing difficulty with her radio direction finder equipment (RDF), and her helicopter was grounded by poor visibility, so that for a few hours we were put in the bizarre position of not being able to locate a ship which had sailed thousands of miles to reach us and lay only some 15-20 miles away.

The small hours of February 3 saw a hilarious time as a recitation of verse from Lewis Carroll provided a "long count" for GLACIER's RDF and both Polarhav and GLACIER hastily launched weather balloons with kite tails of cigarette foil designed to evoke a radar response. Red and white flares were sent up on both sides, and finally we saw one of those from GLACIER and could give a bearing, down which GLACIER's helicopter flew when conditions had improved, wending its way among the icebergs and just below the dark gray overcast. It was a great thrill to see that luminescent orange aircraft churning out of the distance and landing on the ice a hundred yards from the ship. After a very warm welcome aboard Polarhav, GLACIER's Captain, Commander Joseph R. Houston, took off once again and returned to his ship with the reporting officer aboard as a passenger. The 15-mile-flight over

pack and iceberg supported Captain Houston's assertion that Polarhav was stuck in the biggest floe in the entire area.

The next day and a half was required for GLACIER to work its way through the ice and pound into the final three and a half miles of very compact floe to reach the Polarhav. GLACIER then turned and retraced her course, trying to coax Polarhav along in her wake. This proved to be a very difficult job, requiring much backing and filling in the effort to clear the channel of large pieces of ice which GLACIER broke loose and churned in her wake, blocking Polarhav's path. After two days of this, the pressure of the surrounding ice increased and our progress slowed to a crawl. We hove to and both ships were immobile for six days.

During this time there was a memorable joint beer party and football game on the ice beside the ships. Casualties from both activities were fortunately held to a minimum. As the days passed and conditions did not improve, it was decided to offload the expedition cargo and personnel from Polarhav to GLACIER. Then, when we were able to bring Polarhav safely into open water and could proceed without her to the base, much time would be saved in the landing of the Belgian supplies and personnel. This period was marked by the crash of GLACIER's helicopter, fortunately without loss of life.

The cargo transfer from Polarhav proceeded quickly and was finished just as conditions were improving. GLACIER got under way on February 12, and escorted Polarhav to a rendezvous with another icebreaker, USS EDISTO, which had meanwhile come up and supplied a replacement for GLACIER's lost helicopter.

GLACIER's trip from this rendezvous to Dred Bay was quick and relatively uneventful, ice conditions being much easier than we had found farther west. Once in the bay area, however, we again experienced difficulty in making visual contact with the people we were to meet. Weather conditions had deteriorated badly, and a strong northeasterly storm was driving a swell even into the depths of the coastal pack ice. Because of the storm and poor visibility, our helicopter could not fly. The RDF equipment would not work properly, so that we cruised east and west in the shifting fog, passing King Leopold Bay three times, as we later discovered, without knowing it. We sent up rockets and looked for Sno-cats which the base radio reported were prowling on the ice escarpment, but it was not until the next afternoon at 1800 that our flares were finally sighted, and we could be guided in by visual contact.

As on so many other occasions, it was the weather which controlled the situation. We were soon to learn how providential it had been that we had not found King Leopold Bay the day before. If we had, we would most certainly have lost one or more Sno-cats, several tons of equipment and possibly some people, for barely two hours before our arrival, some six miles of fast sea ice had broken up and floated away in a scattered jumble. One of the Sno-cats from the base was lucky to have missed the break-up, for it had driven about four miles out into the bay on the ice that same morning, looking for GLACIER.

D. Offloading at King Baudouin Base.

We found that departure of the fast ice from the barrier had not left a suitable place to moor for unloading, so that after a moving reunion of the two expeditions on the escarpment, we regained GLACIER and she steamed around the headland toward another embayment running off Breid Bay. Morning found us still breaking our way through very hard bay ice toward a snow ramp which would provide satisfactory access to the barrier top. Captain Houston finally called a halt some 2500 yards from the point where the ramp was said to be. We could not see it because of falling snow which cut visibility to about 50 yards. A Sno-cat picked its way uncertainly in the snow and fog from the base toward the edge of the barrier, and after about eight and a half hours it finally reached the ship.

Cargo unloading commenced February 18 at 0200 in somewhat improved weather conditions, although there was still a partial whiteout. The three new Sno-cats which we had brought with us were supplemented by a fourth and also by a Muskeg from the base. Each vehicle would pull two heavy sleds alongside GLACIER to be loaded by the large aircraft crane on the flight deck. About three-quarters of the expedition's cargo was taken some five miles to a safe depot on the ice barrier; the very heavy items were brought directly to the base to avoid extra handling.

As loading promised to move with some dispatch, the reporting officer rode to the base with Captain Bastin as soon as his Sno-cat was ready. The 4.1-mile drive took about three hours, a time which was later cut to one and a half hours after the vehicles were broken in and the route had been marked with gas drums and bamboo sticks. Our drive was made in a condition of whiteout, so that there was little to see other than the markers which had been placed on the way to the ship. When King Baudouin Base was finally within direct line of sight ahead of us, however, the darkness of its masts and vehicles was plainly visible. From that distance of about four miles the camp looked terribly small and puny in the vastness of the great continental ice cap.

E. Description of King Baudouin Base.

One reason for the modest initial impression given by the base was the fact that its buildings had been covered with snow to the height of their roofs. The Rawin-dome for radar tracking of weather balloons was the only exception to this, and I later found that this structure, raised six feet above the snow on pipes, had originally stood about 19 feet above snow level. Access to the underground quarters was gained through a square, rusty hatch leading down steep steps into the generator and workshop area. This opened on the main base passage, an odorous corridor lined with food cases and roofed over with chicken wire and canvas. The nubby ice floor offered a precarious way off to the left to the living quarters and to the right to the main science building.

The larger buildings, manufactured by the Clements Company in Connecticut, were roomy and comfortable. The living quarters appeared larger than I had expected, 20'x104', and the 17 individual sleeping cubicles, radio shack, kitchen, washroom and storage section did not seem to squeeze the living-dining room unduly. One wall of that room was decorated with a hand-made paper U. S. flag and the heartfelt inscription, "Welcome to our liberators." Two permanent dining tables stood on one side of the room, the library was opposite, with a bar at one end, and the central Thermobloc heating unit at the other. The trellised roof beams carried the barest remains of what must have been an impressive liquor "cellar."

The temperature control in the building seemed excellent, ventilation the same, and I was to learn that there had been no difficulty with condensation on the walls or ceiling. Most sleeping cubicles were equipped with a bed, chair, and small table, although some had been more elaborately set up by their occupants. Sleep in one of these rooms proved to be blissfully quiet and relaxing after the roar of the 22,000-horsepower engines aboard CIACIER.

The radio and science programs will be treated more fully in the technical annexes to this report, but the general comment can be made about the buildings that, although somewhat crowded, they were well-equipped and seemed quite adequate for their purposes. The impression received from a careful examination of the entire establishment was that King Baudouin Base had been well-constructed and the scientific programs pursued with vigor and imagination. Discussions with the scientists indicated that they had made special efforts to check out and calibrate their instruments on a continuing basis and that, when difficulties were encountered, determined efforts were made to resolve them. As a result of these efforts, the Belgian expedition appears to have met the objectives of the IGY program and fulfilled its scientific plans with regard to meteorology, ionospheric physics, etc., except in a few instances, as indicated in the technical annex.

F. Exploration Activities and Rescue of Stranded Personnel by Soviets.

In the field of mapping and exploration, the de Gerlache expedition produced valuable results in the form of aerial photographs of the Antarctic coastline from 23° to 29°E. and similar photographic runs as well as ground exploration in the area of the Sør Rondane Mountains, 100 miles to the south. A new mountain range christened the Crystal Mountains was discovered 80 miles southeast of the Sør Rondane Mountains and this too was photographed.

Unfortunately, the Auster aircraft crashed while on a flight in the Crystal Mountains. The two members of the party on board escaped unhurt. One of them walked about 30 kilometers to an identified point known as the "Sphinx" and joined two others who had been waiting there. It was felt necessary to keep some of the group at the "Sphinx" because a traverse party, equipped with Sno-cat and Muskeg, was about 80 miles distant in the Sør Rondane Mountains and would undoubtedly try to reach the aircraft party when it failed to return. The last identified point toward which those on the surface

could head was the "Sphinx". Commandant de Gerlache therefore undertook to go alone to the site of the crash with supplies for the member of the party who had remained with the plane. The helicopter, which might have effected a rescue, could not be used because both expedition pilots were with the Auster group stranded in the mountains.

The Muskeg, which could maneuver more easily between the close-packed crevasses than could the Sno-cat, did set out but fell into a crevasse with its loaded sled. The Muskeg and most of its contents were saved, but the sled could not be recovered. The following day the Muskeg tried again with another sled of supplies and fuel. The chaos of broken ice and lurking crevasses was too much for it, however, and the second sled with its load was lost.

In the meantime, the four stranded men had reassembled at the "Sphinx". On December 12 they set out on foot carrying two tents, sleeping bags, fuel, and food for 10 days. Some of this equipment was drawn on a sled made from skis, but the rough ice along the route broke this rig repeatedly so that at length they abandoned it, giving up a tent and some equipment. From then on, all four of them squeezed nightly into the remaining 4'x6' tent.

Upon the Muskeg's failure to penetrate the crevassed area a second time, Captain de Maere, who was in charge at the base during de Gerlache's absence, requested air assistance from the Antarctic Rescue Committee, which had been established in 1956 pursuant to meetings in Paris attended by Admiral Dufek. The Soviets at once reported that they could send a ski-plane, similar to our DC-3, from Mirny and on December 13 the plane arrived, having stopped at Australia Mawson Base to refuel. Search operations were commenced, five flights being made altogether, and on December 15 the group was found holed up in the tent about two-thirds of the way back to the Spør Rondane Mountains. The men were in reasonably good condition, had food and fuel for six more days, and confidentially stated that they could have made the remaining 30 miles on foot despite the crevasses. They were, however, overjoyed when the Soviets landed about a mile away and taxied over to pick them up.

Back at the base, the Soviets visited with the Belgians for two days of inclement weather, looking over the base installations with great interest. On December 18 they gassed up, taking all the remaining Belgian aviation fuel, and left for Mawson and Mirny.

G. Return of de Gerlache expedition to Cape Town.

Around December 20, 1958, when Polarhav was expected to arrive at any time, the de Gerlache expedition made urgent preparations for departure, only to wait another eight weeks before relief finally arrived. The group moved aboard ship with some alacrity after a turnover of command ceremony at the base on February 21. It was clear that the members of the de Gerlache expedition were glad to be returning home, but they did not appear to view the prospect with as much excitement as one might expect. Their 15 months in the Antarctic seemed to have left many of them with a perceptible lassitude.

Once more, personnel and cargo were transferred, this time from GLACIER to Polarhav at the outer edge of the ice pack. The return to Cape Town was uneventful.

III. ORGANIZATION AND PLANS OF BELGIAN EXPEDITION

A. The de Gerlache Expedition.

Several persons in Belgium had the idea of an Antarctic expedition in support of the International Geophysical Year. It was left, however, to the enthusiasm of Commandant Gaston de Gerlache, the son of Adrien de Gerlache, to create the public interest and win the governmental sanction necessary to obtain funds and mount the expedition. The original undertaking had a personal character, some of the money being raised by public subscription and the rest contributed by the State directly to de Gerlache himself.

The site chosen at 23°E. on the Princess Ragnhild Coast had been recommended by the Antarctic Committee of the International Geophysical Year as particularly suited to scientific activity. The mission of the expedition -- to establish a base, carry out a scientific program, and explore the adjacent area -- was accomplished during the first year.

B. The Bastin Expedition.

The second expedition, led by Captain Francois Bastin, was organized under a private association, the National Center for the Antarctic Campaign (CNCA), 1958-59-60, in whose name the funds and loans of equipment from the State were received.

Establishment of the organization was unfortunately delayed, and although Captain Bastin secured approval of the project by the Belgian Committee for Antarctic Research on April 5, 1958, it was not until July 27 that the CNCA finally received money and authorization to proceed with the selection of personnel and acquisition of equipment.

The second expedition was thus thrown together on a crash basis, and it is much to Captain Bastin's credit that he was able in the short space of three and a half months to bring together his men and material and leave from Ostend on November 19, with a full complement of both. The men were selected primarily on a basis of technical competence. Unfortunately, there was no opportunity for special training with snow and ice equipment on the glaciers of Switzerland, as the first expedition had had.

The plans of Bastin's expedition are essentially (1) to carry out an expanded scientific program at the base and on trail, (2) to explore a route inland toward the geographic Pole and if possible to push to the Pole itself with a Sno-cat train, returning to the base by the same route, (3) to explore possible sites for construction of a base inland where the continental rock projects above the ice cap. The advantage of such a base would be that seismic work could be effectively carried out on solid ground, and if the base were 100 feet or so above the ice it should be freer from blowing snow, which has often hampered weather and aurora observations at the King Baudouin Base.

1. Projected Polar Trip.

The polar trip is divided into two parts. An initial reconnaissance is being run in to the Sør Rondane Mountains to seek out a likely route to the interior and to place fuel depots as far inland as possible. This reconnaissance commenced on March 5, 1959, and was to take about two months. The return trip is expected to be rigorous, for temperatures of minus 50° Centigrade are likely at that late season.

The second phase will constitute the main attempt to reach the Pole, beginning, if weather permits, in September. The plans are to take five Sno-cats on these trips, each pulling two sleds loaded with a total of five tons of fuel, food, and equipment. The Sno-cats will be preceded by a dog sled, driven by Kenneth Blaiklock, who in the same capacity helped Sir Vivian Fuchs navigate the crevasses on his crossing of Antarctica during 1957-58. Scientific observations are to be taken along the route. These include seismic shots about every 30 kilometers, gravity readings at more frequent intervals, and meteorological observations and nuclear radiation readings taken on a regular time schedule.

On the basis of fuel requirements, Captain Bastin expects that he will have enough fuel to get to the Pole and return with three Sno-cats, abandoning two en route and doubling up his nine people in the remaining vehicles. If he were to receive 1,800 gallons of fuel at the South Pole Station, as he has requested from Commander, U. S. Naval Support Force, Antarctica, Captain Bastin thinks he would be able to bring all five Sno-cats back to base.

It is difficult to form an estimate of the expedition's chances of reaching the Pole and returning to King Baudouin Base. There are some adverse factors, such as (1) the late start on the reconnaissance trip, which may keep the party from finding a suitable route and laying depots, (2) the fact that two of the five Sno-cats have already done a full year's service in the Antarctic, and (3) the lack of air support. The Auster is wrecked, and the Bell helicopter has been returned to Belgium because it was too small for cargo handling. On the positive side, Captain Bastin and his people are approaching the task with drive and determination. He is a fine leader and a good organizer and can be expected to take his party as far as is possible with safety. A late report forwarded by his wife indicates that he has found a pass through the mountains and his first reconnaissance is moving well.

C. Future Belgian Antarctic Plans.

With regard to future Belgian plans for Antarctic expeditions, the Brussels Government has decided upon a 10-year program to maintain scientific observations and exploration at approximately the existing level. These operations are to be under the direction of a semi-governmental agency, the Belgian Committee for Antarctic Research. Financing will come entirely from the State, as is the case with the Bastin expedition. Next year's leader will

be Major Verbruggen of the Belgian Army.

The Belgians are now considering the purchase of a vessel for these operations, somewhat larger than Polarhay and outfitted to continue oceanographic research during the months that it is not needed in the Antarctic. They are also considering the purchase of two light planes for their Antarctic operations, perhaps of the Otter or Beaver type, such as the British Commonwealth used to support its Trans-Antarctic Expedition.

IV. CONCLUDING OBSERVATIONS ON THE TRIP

Among the general impressions received on the Belgian expedition to Antarctica, the strongest was the extent to which man is at the mercy of the elements. Land, sea, and air operations can be rendered impossible or extremely hazardous by unfavorable ice or weather conditions. The construction of base installations can be held up for weeks or even months at a time, as was the case with the British at Shackleton Base in 1956. This injects an element of hazard into Antarctic operations as well as uncertainty in the planning and execution of programs. It also tends to underline the importance of mutual aid and support as well as the need for dependable communications. The role of the amateur radio operators in this regard has been vital, for the quality and dependability of their communications have been markedly superior to those of the regular operators.

Another general impression is that of the extreme difficulty of access to the continent by sea. The Belgian expedition ship was beset in the ice last year as well as this year. The Japanese, operating on the same coast, were also beset last year and had to be assisted by an American icebreaker. They avoided that difficulty this year by the use of helicopters, flying in supplies and personnel without having to penetrate the ice pack. This was done at the expense of cargo volume, for the Japanese moved only about 60 tons of cargo ashore this year as against the 340 tons landed by the Belgians. Of the four principal modes of approach to Antarctica - sea, air from ocean vessels, air from remote bases, and submarine - the last appears potentially the most satisfactory. The problems of cost and availability of suitable cargo undersea craft, however, will probably rule out the undersea approach to all but the great powers for a number of years to come.

A final thought concerns the value of sending Foreign Service Officers as observers with such expeditions. Although the average Foreign Service Officer is not a specialist in any of the pertinent scientific fields, a number of officers could presumably be found who, like the reporting officer, have a basic knowledge of electronics from work with radar, communications or anti-submarine warfare in the United States Armed Forces. Such a knowledge provides a useful background for understanding the problems and operations of Antarctic scientific equipment, for most of it is essentially electronic amplification of signals received from various sources.

Even though the Foreign Service Officer may lack any special knowledge in scientific the/field, his experience in the use of foreign languages and in representation of United States viewpoints and interests is a strong compensating factor. Among the Belgians on this trip there was a keen interest in the United States, its history and attitudes, and the reporting officer came to feel that the close personal contact and extensive opportunity for exchange of views and friendly argument represented an unusually valuable opportunity for the promotion of mutual understanding and respect.

On this particular expedition the reporting officer was able to be of considerable service to the Belgians in drafting and handling communications with United States ships and naval authorities and in providing a channel for easy contact and discussion with the officers and personnel aboard GLACIER, relaying queries and requests from both sides and interpreting the requirements of each to the other.

Last but not least, the Foreign Service Officer gains a valuable experience in the firsthand knowledge of the Antarctic and the character and limitations of Antarctic operations.

APPENDIX I

AIR AND SURFACE EXPLORATION AND MAPPING ACTIVITIES

The Belgian mapping and exploration activities were somewhat abridged by the need to construct the base and commence the scientific program in the beginning of 1958 and by the air crash and rescue operations at the end of that year. Despite this, however, the expedition conducted useful photographic and ground reconnaissance programs. The map used was of Sør Rondane, prepared by the Norsk Polarinstitut from Operation HIGHJUMP photographs and published in 1957. The map is scale 1:250,000 and covers from 71°27' to 72°30'S., and from 21°15' to 27°40'E. Another map in use at the base was the Norwegian map "Antarctica", covering the area from 69°10'S to 72°30'S., and from 21°0'E to 27°0'E. This map is at the scale of 1:500,000 and was worked out by H. E. Hansen on the basis of oblique photographs taken from the air by Lars Christensen's expedition in 1936-37.

A. Aerial Photography.

Coastal area and continental ice barrier from 23° to 29°E. was covered by oblique photography in January-February, 1958. The same coastal area was covered with both vertical and oblique photographs in October, 1958.

King Baudouin Base (70°25'53"S., 24°18'38"E., altitude, 37 meters) south to Romnaes Fjell (71°27'20"S., 23°57'00"E., altitude, 1270 meters) was covered by oblique aerial photography.

Romnaes Fjell east to Nordtoppen (Nordtoppen West: 71°26'55"S., 25°18'20"E.; 980 meters; Nordtoppen East: 71°26'45"S., 25°20'00"E., 910 meters) and thence south to Fidjelandfjellet (71°40'21"S., 25°39'25"E., 1030 meters) was covered by vertical photographs.

North-south runs were made down the east and west sides of the Byrd-Breen Glacier as far as Devoldnuten and Vörterkaka to take oblique photographs of the mountains extending to the east and west on each side.

Oblique air photographs were taken all around the Crystal Mountains (located from approximately 72°45'S., 30°45'E. to 72°37'S., 31°40'E.).

B. Surface Exploration.

1. Fall trail party (March 12 to 31, 1958):

a. Purpose:

Reconnaissance, depot laying, geodesy, geology and photography.

Two Sno-cats and two dog sleds were used on this reconnaissance.

The trail party proceeded from King Baudouin Base to Romnaes Fjell, Nordtoppen, Smahausane, and Fidjelandfjellet. A food and fuel depot (D-2) was established at Smahausane between Nordtoppen and Fidjelandfjellet.

At Fidjelandfjellet, a number of stakes were placed at 60-meter intervals across the Byrd-Breen Glacier as a control for the study of glacier movements.

2. Spring Trail Party (October 16 to December 26, 1958):

a. Purpose:

Exploration, geodesy, geomagnetism, geology, and photography.

(1) Two dog sleds went from King Baudouin Base to Romnaes Fjell, then to Vesthaugen (southwest of Romnaes Fjell) and back to Romnaes Fjell over a crevassed area, thence to Nordtoppen, north of which there was found a very badly crevassed area, and on to Smahausane and Fidjelandfjellet. Then a geological and glaciological reconnaissance was made up the west side of the Byrd-Breen Glacier to Strandrudfjellet, Bautaen, and Gunnar Isachsenfjellet and return via Glitrefonna, Mefjell, and Kampbreen Glacier to Smahausane.

(2) One Sno-cat and the Muskeg left King Baudouin Base on November 11, proceeding to Romnaes Fjell, Nordtoppen, Smahausane, and Fidjelandfjellet, thence eastward across the Byrd-Breen Glacier to Austhjelmen (71°40'45"S., 26°35'00"E., 1322 meters) and Trillingane (71°50'00"S., 27°49'00"E., 1393 meters) where another depot (D-3) was established. On this trip geomagnetic readings were taken every 30 kilometers, and the precise location of the points located were calculated with a Wild T-3 theodolite, the measurements being taken very carefully and checked on successive days. The following table lists all the positions which were thus accurately established by the Belgian expedition during the year:

NAME	LATITUDE	LONGITUDE	ALTITUDE
Romnaes Fjell	71°27'20"S.	23°57'00"E.	1270 meters
Nordtoppen West	71°26'55"S.	25°18'20"E.	980
Nordtoppen East	71°26'45"S.	25°20'00"E.	910
Fidjelandfjellet	71°40'21"S.	25°39'25"E.	1030
Austhjelmen	71°40'45"S.	26°35'00"E.	1322
Trillingane	71°50'00"S.	27°49'00"E.	1393
King Baudouin Base	70°25'53"S.	24°18'38"E.	37
King Leopold Bay	70°20'19"S.	24°12'41"E.	0
Breid Bay	70°19'55"S.	24°01'06"E.	0
East Bay	70°18'40"S.	24°39'00"E.	0
D-4	72°24'54"S.	30°31'00"E.	?
"Sphinx"	72°21'19"S.	31°17'20"E.	2306

From the above observations, the Belgians concluded that the following points are inaccurately located on the Norwegian map derived from the HIGHJUMP photographs:

Romnaes Fjell is too far to the southeast.
Nordtoppen is too far to the southwest.
Fidjelandfjellet is too far to the southwest.
Austhjelmen is too far to the southwest.
Trillingane is very far west.

The Belgian Institut Geographique Militaire will publish a revised map of the area on the basis of this and other information acquired during the year.

APPENDIX II

AIR CRASH AND RESCUE BY SOVIETS

While the reconnaissance and mapping described in the preceding section were going on, the Auster aircraft was being used for aerial photography, and, together with the Bell helicopter, for the transport of men and equipment.

On November 27, 1958, the Auster flew from Trillingane (D-3), some hundred miles southeast to a range of newly-discovered mountains which were christened the "Crystal Mountains". A supply depot (D-4) was established at 72°24'54"S., 30°31'00"E., and four supply flights were made in to this point from D-3. Some of these supplies were then moved on from D-4 to the "Sphinx" (D-5) at 72°21'19"S., 31°17'20"E. (elevation, 2306 meters) in four flights of the Auster.

Two flights were made around the Crystal Mountains for photography, and on December 5 the Auster flew from D-5 about 30 kilometers south to a point near the center of the north side of the Crystal Mountains to reconnoiter a spot to establish another depot.

On take-off from there, the plane hit the sastrugi, broke a ski, and cracked up, breaking the propeller and damaging a wing tip, but not hurting the pilot, Prince de Ligne, or his passenger, Hulshagen.

The Prince left Hulshagen at the plane and walked the 30 kilometers to contact de Gerlache and Loodts at the "Sphinx", arriving about midnight. The next day, December 6, de Gerlache carried a tent and supplies to Hulshagen at the plane. The two waited there for the next three days, taking the opportunity to make sketches of the mountains, take rock samples, etc.

Although he was unable to communicate with the Sno-cat party at D-3, de Gerlache knew that they would realize something was wrong when the plane did not return and would try to come in to the Crystal Mountains with the vehicles. De Gerlache figured that if the vehicles could not reach them within five days after the crash, this would mean the crevasses near D-3 were too difficult to cross, and his group had better begin to walk out.

De Gerlache's expectation was correct, for at D-3 Vanderheyden was attempting to get through the closely crevassed area with the Muskeg, which could maneuver in narrow spaces more handily than the Sno-cat. Twice the sled he was towing and its load fell into a crevasse. Once the Muskeg itself lurched into a crevasse, but fortunately the vehicle and most of its load could be saved. Vanderheyden reported to Captain de Maere, who was in charge at King Baudouin Base, and the latter told him to pick up two other men at D-2 to help him. On December 10, the three rode from D-2 to D-3 and reported that the ice surface had altered for the worse and that it would probably take many

days to traverse it. Captain de Maere at once requested help from the Antarctic Rescue Committee and on December 11 heard from Mirny that the Soviets were sending a DC-3 type aircraft. The Soviet plane refueled at Mawson on the 12th and arrived at King Baudouin Base at noon on the 13th, commencing search flights immediately.

In the meantime, on December 10, de Gerlache and Hulshagen had left the plane and joined the other members of the party at the "Sphinx". They rigged a sail to help move the cargo sled they had made from skis. This tested well, and on December 12 all four left "Sphinx", taking two tents, four sleeping bags, two stoves, ropes, 10 liters of kerosene, and all the food (10 days' normal rations). They departed at 0900 and by 1500 they had had so much trouble with the sled, which broke repeatedly on the hard ice, that they decided to leave it and one of the tents, carrying most of their equipment on their backs from that point and pulling some of it behind them on the snow. At 2000 they stopped for the night and all four squeezed into the small 4'x6' tent.

After an uncomfortable night they found everything inside the tent wet from condensation. They ate a hasty breakfast and set out, roped together this time, not so much because of the danger as to prevent lagging. Hulshagen and Loodts had been making rather heavy going of it, and de Gerlache felt it better to keep the party together.

The four men continued in this manner on the 14th and the 15th, averaging about 20 kilometers a day, and following a somewhat northerly course to avoid the crevasses they knew lay between them and D-3. Each day they stopped for one hour at noon to dry out their sleeping bags. At 1300 on December 14 they saw a plane far away to the northwest, but it vanished without sighting them.

The Soviets flew a total of five search flights, about 4,000 kilometers in all. On December 14 they sighted the wreck of the Auster aircraft and found a message which told them the four men were walking to D-3. On the morning of the 15th they found the abandoned ski sled and that same evening, at 2230, Captain de Maere, who was aboard the plane with them, spotted the tent in which the four tired men were holed up. One and a half hours later the four were back at King Baudouin Base. They had walked over two-thirds of the way from D-5 to D-3 and they felt that they could certainly have made the rest of the distance on the six days of food which remained.

De Gerlache was worried about the helicopter and men at D-3, and on December 16 he persuaded the Soviets to fly him there so he could arrange for an orderly withdrawal of men and equipment to the base. The helicopter had been immobilized during this time because both of the expedition's pilots were with the Auster in the Crystal Mountains. It was flown out to the base without difficulty.

The Soviets remained at King Baudouin Base until December 18, waiting for the snow surface to harden. The pilot, co-pilot, navigator, two mechanics,

and radioman, together with their interpreter, had a convivial visit at the base, inspecting all the installations with great interest. When conditions were favorable they gassed up once more and took off at 0400 on the 18th for Mawson and Mirny, having used up about 10,000 liters of the Belgian gas for the operation.

APPENDIX III

PLANS FOR POLAR TRAVERSE

The push to the Pole and back is to be made in two parts. A two-month reconnaissance trip is now under way, having started about March 5. The purpose of this is to reconnoiter a passage through the Sør Rondane Mountains and to place a food and fuel dump some 670 kilometers inland (Point E¹).

The second trip is to start in September, 1959, and take about four months. Five Sno-cats and nine men will follow up the course laid in March and April. One Sno-cat is to be left at Point F (about 970 kilometers from King Baudouin Base), one at Point G (1370 kilometers), and one at H (1850 kilometers). The nine men will then proceed the rest of the way to the Pole (Point X, 2450 kilometers from the base) in the remaining two Sno-cats.

If 1,800 gallons of gasoline are available at the Pole, all the vehicles will, in theory, be brought back. Otherwise, the two left at Points G and H will have to be abandoned. Captain Bastin's fuel requirements are based on the following data:

One Sno-cat can pull five tons or 6,000 liters of gasoline on two sleds.

A Sno-cat travels from .8 to 2 miles per imperial gallon, or an average of 1.2 miles per imperial gallon (2.35 liters per kilometer). This has been rounded off to 2.5 liters per kilometer for a 6 per cent safety factor.

A Sno-cat is expected to travel from 30 to 50 kilometers a day, or an average of 40 kilometers.

One Sno-cat load will be devoted exclusively to spare parts, food, equipment and scientific gear, the rest of the expedition's cargo capacity being devoted to fuel.

On the basis of these assumptions, it is calculated that the depot-laying reconnaissance will require 25,200 liters of gas, including that left in depots, and the major trip, 24,000 liters. This total of 49,200 liters covers only the return of three of the five Sno-cats, 8,000 liters in addition being required for the return of all five.

A. Use of Dog Sleds.

On both trips Mr. Kenneth Blaiklock, with the dog sleds, will be used for reconnoitering and marking routes through crevassed areas, and assisting with the navigating, as he did on the British Commonwealth Trans-Antarctic Expedition. The Belgians consider dog sleds and teams to be particularly useful

¹This and following lettered "Points" are arbitrary designations by the Belgians.

for this purpose and also to offer the advantage of low-cost and unencumbered operations in mountain exploration. Once the Sno-cats emerge from the Sør Rondane Mountains on to the great Antarctic plateau, Blaiklock may remain behind to carry out geologic and mapping reconnaissance among the mountains. As this observer was leaving King Baudouin Base, there was discussion of a plan for Blaiklock and van Huttenboer to set up a small shack, currently used as the King Baudouin toilet, in the mountains and spend the winter there doing geological and exploration work.

D. Scientific Program.

The scientific observations to be made on the polar traverse include seismic shots every 20 miles, glaciological observations of snow and ice density, crystalline structure, orientation, and layers. The Ramsonde will be used. Seismic ice depth measurements will be checked against those previously made at the South Pole Station. In addition, meteorological observations will be taken, gravimetric readings made every 10 miles, and radioactivity of the air will be measured at regular intervals.

APPENDIX IV

SCIENTIFIC PROGRAMS

In addition to the information which follows, the reporting officer has considerable detailed technical information on various of these subjects in his files. Technical publications outlining the Belgian plan for scientific observations on both expeditions have been turned over to the United States Antarctic Projects Officer.

A. International Geophysical Year Programs.

1. Meteorology.

The meteorology program at King Baudouin Base got under way fairly quickly, surface observations commencing January 20, 1958, a full temperature program March 1, 1958, and radio soundings February 10, 1958.

During the summer and winter seasons good weather was encountered. Fall and spring brought blizzards, whiteouts, and drifting snow practically every day. Minimum temperature recorded at the base was minus 50° Centigrade and the maximum wind speed, 72 knots.

a. Surface Observations.

The R. W. Munro Dynes anemometer was very good, but its Pitot tube had to be blown out frequently to keep it snow-free. Modification to provide automatic clearance of this tube every 15 minutes would be a useful improvement.

b. Temperatures.

The red-colored toluene in low-registering thermometers faded out and the columns of liquid became separated too easily, rendering the thermometers unusable. Honeywell-Brown type T copper Constantan thermometers were fine after being shielded to protect them from solar radiation. Thermocouples placed one centimeter below the surface were found to be artificially heated by the sun until painted white.

Honeywell recorders were thrown off by radio and ionosonde transmissions until a 33,000 ohm, 1000 pF filter was installed on the amplifier input. The grounding of this and other scientific equipment presented a problem until a copper grid one meter long and two to three centimeters thick was buried one meter deep in the snow and used as a ground.

c. Humidity.

Measurements were unsatisfactory, most readings being an improbable 90 per cent. The Bastin expedition took in a lithium chloride hydro-

meter which may be more effective than the Lambrecht equipment, which uses Frankenburger hair.

d. Precipitation.

Precipitation proved very difficult to measure. The Nivometer, with a special Nipher cone, was supposed to be good, but above 15 kilometers per hour air speed, the air turbulence disturbed the readings. Also, because a surface layer of drifting snow up to 20 meters in thickness often blew over the base, it was frequently difficult to know whether new snow was falling or not. Placing the instruments on the top of a tall mast might help in this regard.

2. Aerology.

650 radio soundings were made, using American equipment and 500-gram Beritex balloons. The highest balloon reached the 21-millibar level (about 25 kilometers), and the average height of soundings was 50 millibars (about 19 kilometers). This average fell in the cold months until the expeditions immersed the balloons in kerosene prior to launching, as suggested by the Soviets. Balloons were launched from a pit in winds up to 35 to 40 kilometers per hour.

The base ran out of balloons on January 8, 1959, and the Bastin expedition aboard Polarhav took over this responsibility, putting up 26 balloons and tracking them to an average height of 15 kilometers during the succeeding weeks. The radiosonde used for this program was purchased by the Belgian Air Force from an American surplus property dealer for the phenomenal price of three dollars a piece (normal price is 31 dollars each).

3. Glaciology.

Very little was attempted in this field, no trained glaciologist being on the expedition. As indicated elsewhere, stakes were placed across the Byrd-Breen Glacier as a control for glacier movement study. The general impression was received that the ice recession in the Sør Rondane Mountains area was not very recent, for erosion was fairly marked in regions close to the ice. Some examination was made of snow crystal structure in relationship to air temperature and altitude of formation of these crystals in the effort to study origins of blizzards.

The Bastin expedition includes a glaciologist, who plans to make studies of ice density, temperature, crystalline structure, etc., at the base and on trail.

The Bastin expedition also includes a seismologist, who is to make seismic shots at the base and on the trail, principally for the purpose of measuring the thickness of the ice cap at various locations and determining whether the base is located over water or land.

4. Solar Radiation.

These measurements began in February 1958 and were generally satisfactory, only minor difficulties being encountered.

5. Geomagnetism.

Absolute geomagnetic measurements were commenced at the base in March 1958. The recording apparatus was put in operation in April, and by June the entire program was functioning satisfactorily. At the base, the deviation between the magnetic and geographical South Pole was found to be $34^{\circ}43'18''$ in a northwest-southeasterly direction. Geomagnetic readings were also taken at various points along the coast and along the route traversed by the ground exploration parties as far as Trillingane.

As expected, there was found a direct relationship between geomagnetism, the aurora, and changes in solar radiation. A three-day magnetic storm about June 9, 1958, accompanied the best auroral display seen all year.

6. Aurora.

King Baudouin Base is located in the middle of the Antarctic aurora belt, and through the winter from mid-March on, auroras are visible practically daily, being mostly a mobile green-yellow glow. Only occasionally was the display very colorful or spectacular. The tropopause altitude was found to increase as the winter progressed.

The Stoffregen all-sky camera did not function well, and many of the pictures were spoiled because of failure of the film advance mechanism. Difficulties were encountered in keeping the aurora observation dome from icing up, and one-meter-wide tower tube sections were brought in to build up the aurora and meteorological domes to a height of some six meters above the snow level to avoid external snow and ice troubles.

7. Ionosphere.

The electric portions of the Barker and Williamson ionospheric sounder were very good and operated with only 12 hours' interruption from the commencement of observations in April 1958. The camera, however, was unsatisfactory, difficulty being encountered in the shutter and film advance mechanism.

Low level ionization was found to be very great, especially in winter, and layer altitude changes were very much faster than in Belgium. The whole ionospheric picture was often found to change in 30 seconds, whereas it might remain unaltered for as much as six hours in Belgium.

General Ionospheric Findings:

<u>Ionospheric Layer</u>	<u>Altitude</u>	<u>Comments</u>
E	100 kilometers	Normally present in winter but disappears at night.
E _s (sporadic)	100 kilometers	This was present 80 per cent of the time in winter, presumably because of aurora and perhaps concentration of X-rays at the Pole.
F ₁	250 kilometers	Rises at night.
F ₂	350-400 kilometers	Observed only in summer; disappears at night.

Electronic absorption by the aurora was often found to block the higher ionospheric measurements and it is suggested that the present sounder frequency range of one to 25 megacycles be extended as low as 200 kilocycles in the effort to penetrate the aurora at such times. A 10-12db greater antenna gain would also be useful.

8. Timing Mechanism.

The mechanical IBM clock used to regulate and time accurate observations was not stable enough. Crystal control is required.

B. Non-IGY Programs.

1. Earth Currents.

The measurements of electric currents in the snow was found extremely delicate and difficult because the resistance encountered in the snow and between the snow and plate contacts was unexpectedly high, five to 10 megohms. The equipment was not sensitive enough for the work and extensive difficulties were encountered from the accumulation of electricity charges on lead wires.

2. Atmospheric Electricity.

The very delicate measurements of atmospheric electricity was also thrown off by leakage and blizzard-induced voltages. Seven balloon soundings were made carrying equipment for measurement of upper-atmospheric electricity, but the results were inconclusive.

3. Nuclear Radiation.

Measurements of radioactivity in the air were commenced at the base in mid-February 1958, in the attempt to determine:

- a. radon concentration
- b. Thoron concentration
- c. long-life Alpha emission (Boron, radium, plutonium)
- d. long-life Beta decay (strontium, cesium)
- e. absorption co-efficient of filter papers

One goal of these measurements was the assessment of the possibility of using natural and man-made radioactivity as a means for tracing atmospheric circulation.

Natural radioactivity at the base was found to be about one per cent of that in Belgium and fall-out radioactivity about two to three per cent of the Belgian level. There seemed to be little fluctuation in the level of radioactivity, but this might have been due to the fact that the level was at the extreme lower sensitivity limit of the measuring equipment. More sensitive gear has been brought in by the Bastin expedition for the 1959 measurements.

Alpha and Beta measurements were made aboard the Polarhav during the voyage to and from the base, December 1958 to March 1959.

4. Geology.

Geological observations were made in the Sør Rondane Mountains and the Crystal Mountains, which were found to be of basement complex, primarily old crystalline rock such as granite or gneiss, as are most mountains in this general area of the Antarctic continent. Dr. Piccioto collected some 500 kilograms of rock samples to take back to Belgium for radium-lead dating measurements.

5. Topography, Geodesy, Photogrammetry.

As indicated in another appendix, the coastal area about King Baudouin Base and the area from there to the Sør Rondane Mountains, among the mountains, and thence southeast to the Crystal Mountains have been photographed from the air. Most of this area has also been surveyed and mapped from the ground, and several control points have been fixed by astral measurements.

The de Gerlache expedition had no gravimeter, but gravity measurements are to be taken at the base and on trail by the Bastin party.

6. Medicine and Physiology.

There was no medical research program at the base last year, and no medical treatment other than dental work proved necessary. The doctor on the Bastin expedition has brought equipment for measurement of sodium and potassium in the blood and urine and of sugar in the blood. He will also preserve plasma and blood in order to measure steroids and evaluate thyroid activity. He will measure vitamin C, urinary creatinine and cholesterol, the

sedimentation rate, hemotocrit, and urinary acidity and density as well as as thiocyanate, and antipyrine. He will count blood corpuscles, measure hemoglobin and take internal body temperatures by use of thermocouple thermometers.

7. Biology.

Some plankton samples were collected by the de Gerlache expedition. The Bastin expedition should do much more of this as one of its members is a marine biologist.

8. Botany.

Some lichen samples were taken by the de Gerlache geologist, who had no special knowledge of the subject.

9. Zoology.

A few fish were caught and preserved, and a seal's liver, pancreas, and stomach, full of crayfish, were preserved for examination in Belgium. Two skuas were banded and specimens of skua, adelic penguins, snow petrels, and Wilkes petrels were preserved.

On the Polarhav's voyage south, two killer whales were seen and a number of crabeater seals, about 30 of the latter being shot for food. We also saw three or four albatross, a dozen skuas, many pintado petrels and some Antarctic petrels, Wilson petrels, and silver-grey petrels. A total of 40 adelic and emperor penguins, respectively, were also seen, although no rookeries were discovered in the region of King Baudouin Base.

APPENDIX V

BASE AND BUILDINGS

American-made Clements buildings were used for the living quarters (20' x 104'), science building (20' x 40'), and the power building (20' x 32'). The layout of these buildings has been described previously, and it will only be noted¹ that the buildings had been set up well and had proved very satisfactory.

No difficulty had been encountered with condensation or leakage, presumably in part because the roof panel joints had been painted with a French ceiling compound, Rutex, before the canvas cover was applied. Aluminastic was also said to be good for this purpose. Skylights were not used in these buildings to avoid leakage, although plastic observation domes were installed in the science building.

The Thermobloc Residence P-25 heater had operated perfectly, as had the ventilating system. The generators likewise gave no difficulty, with the exception of one brief fire which was quickly extinguished. It is estimated that generator fuel requirements for 370 days of normal operation are 58,000 liters.

Some difficulty resulted from the storage of fuel drums in three tiers within 100 yards of the base, for this hastened the snowing-in of the base buildings. De Gerlache estimates that 300 to 500 yards is a safe distance and states that the drums should be placed in only one tier.

¹Once again, detailed information is available on the buildings and layout from the reporting officer.

APPENDIX VI
TRANSPORTATION

A. Sea.

Polarhav, a Norwegian ship built in 1957 and owned by Peter S. Brandal & Company A/S, Aalesund, Norway, is 53 meters long, nine meters wide, of 658 tons dead weight, and is powered by a Swedish Nohab 1400-horsepower diesel engine. Her fuel capacity is 175 tons and normal daily consumption is four and a half tons. The ship is ice-strengthened, strong braces having been placed behind 24-millimeter thick bow plates, plate thickness tapering off to 22 millimeter and 18 millimeter farther aft.

Captain Boe of the Polarhav is an excellent ice seaman, knows the capabilities of his ship, and maintains good order and discipline aboard. He and his crew were friendly and cooperative.

Polarhav was very crowded with the expedition cargo and personnel, and the Belgians are considering the purchase of a vessel of about 1,000 tons dead weight, with capacity for 25 passengers and 400 tons of cargo. The chartering costs of the Polarhav are said to be \$100,000 a year, and the Belgians hope they would save money in the long run by buying. The ship could be used for hydrographic/when it is not required in the Antarctic.
work

B. Air.

The Bell helicopter and Auster aircraft taken by the de Gerlache expedition proved to be too small for practical use. The plan is now to get two Beavers or Otters, similar to those used by the British Commonwealth Trans-Antarctic Expedition.

An alternative being considered by de Gerlache is the rental of two such planes for the summer season alone. He argues that most of the good flying is concentrated in this period and that there would be a saving in return of the planes, avoidance of trouble maintaining them in winter and elimination of the need to have pilots and plane maintenance personnel in the wintering-over party.

C. Land.

King Baudouin Base now has one Muskeg and five Sno-cats, three of them new and two one year old. The Sno-cats seem to have performed fairly well, although there was rather frequent need for the replacement of parts. The Belgians carried out a rather extensive list of modifications to the Sno-cats to fit them better for Antarctic work. This list is available among the files of the reporting officer and from the United States Antarctic Projects Officer.

For cargo, there are about 12 Norwegian-made sleds, each of three to four tons' capacity. The runners of certain of these sleds are covered with Tufnol plastic and others with Teflon plastic, which has been irradiated with Cobalt-60 in order to change the cellular structure of the plastic and reduce its co-efficient of friction.

Two dog sleds and teams are operated, about 22 dogs currently being at the base. The Greenland Fan Hitch is used on the dogs and is said to be satisfactory.

Navigating techniques used by both Sno-cats and dog sleds were standard.

APPENDIX VII

SUPPLIES

A. Fuel.

The Bastin expedition brought in a total of 340 tons of cargo, 1750 tons of this being POL products received at cost from the British Petroleum Corporation. The ship's bunker fuel was supplied free of charge.

The Bastin expedition took with it aviation gasoline, and even if no planes are to be brought in by the next expedition, aviation gas will again be on the cargo list in case planes of other nations need to be refueled, as did the Soviet plane on its rescue mission at King Baudouin Base in December 1958.

B. Cold Weather Clothing.

Although some use was made of United States surplus military clothing, especially Air Force, most of the expedition cold weather gear was made in Belgium on the basis of Sir Vivian Fuchs' recommendations. Some clothing was also purchased in Norway. The cold weather gear proved more than adequate, temperatures generally being not very low at the base, and most of the time the men were comfortable in net undershirts, wool underwear, wool shirts, one or two sweaters, and double cotton wind-proof trousers and hooded jackets.

Soft reindeer leather boots with two pairs of felt liners and two pairs of wool liners, then socks and thick spun nylon inner-soles were excellent for very cold weather. Ski boots were not worn much, but Norwegian felt-insulated rubber boots were found good in temperatures down to minus 50° Centigrade, when worn with two pairs of socks.

C. Food.

A variety of trail food was taken, pemmican being supplemented by macaroni, dried fruit, beans, tinned meat, soups, etc. Rum was found warming on trail parties, consumption averaging one bottle per person every 10 days.

D. Power Megaphone.

A Pye power megaphone was used and found very satisfactory for amplification of orders shouted outside during unloading operations. It was also useful for waking expedition members aboard Polarhav.

E. Explosives.

2,200 slabs of American TNT and 1,500 electric detonators were taken for the seismic shots. The Bastin expedition took with it for hunting use two Mauser rifles, one Browning automatic rifle, and two Browning over-and-under shotguns.

F. Cargo Handling.

The Belgians carried out a large part of the cargo handling and unloading themselves. They are convinced that there is much less danger to the delicate equipment if the scientists who are to use it are also the ones to move and handle it.

APPENDIX VIII

COMMUNICATIONS

A. Official Radio.

In general terms, the expedition's radio equipment operated very satisfactorily. The base had daily voice communications with Brussels, sometimes maintaining contact for four hours at a time. Excellent communications were maintained with the "mother station" at Mawson and with Mirny and the Norwegian base. 20 to 25 megacycles or even as high as 28 or 30 megacycles were found to be the best frequency ranges for long distance communications in the daytime and 10 to 15 megacycles were best at night. Reception was generally best from about 1300 to 1700 in the fall and spring and 1500 to 1900 in the winter. Careful records were kept of variations in propagation conditions from one season to another, and detailed information on this is available at the expedition headquarters in Brussels.

The Bastin expedition brought in with it Creed automatic Morse Code equipment and will also try testing a new teletype, TP-845, produced in Charleroi, Belgium, which is supposed to be particularly sensitive and garble-free under difficult atmospheric conditions. The reporting officer has considerable technical data on this equipment.

The receivers at the base all operated satisfactorily, the Collins 51J4 being rated excellent. The one-kilowatt Marconi HSL01 transmitter was also excellent, but the Belgian 1509 transmitter was unstable, and the AN-GRC 9 was found to be only fair, its whip antenna being practically useless.

Different types of dipole and rhombic antenna were used at the base, all working well, especially the rhombic, which was said to produce about four db more gain than the others. Further technical information is available in the reporting officer's files on both the antennae and transmitters.

B. Amateurs.

As often happens in the Antarctic, the ham radio operators turned in the best communications performance. The Belgian base amateurs were Sergeant Henri Vanderheyden and Roger Schoonlau, and the base call sign is OR4RW. Schoonlau brought with him an amateur all band midget transmitter-receiver of 85-watt power input with CW and voice generation. The reporting officer has detailed information and photographs of this remarkable equipment which was made in Belgium by a radio amateur with the call sign of ON4JN to fit into the British Army C-19 radio case, which measured only 7-5/8" x 7-5/8" x 16-3/4".

C. Postal.

Aboard Polarhav and at King Baudouin Base alike, a mailman was designated. The one on Polarhav was actually an employee of the Belgian Postal Service and sworn in as a postal official. Each of these had a cancellation stamp with an adjustable date in the center and an inscription around the edge, reading:

Base Antarctique Belge
Belgische Zuidpoolbasis

When we thought Polarhav was about to reach the base on December 23, 1958, there was a flurry of letter-writing, and all the envelopes and stamps were cancelled, post-dated 1 January 1959 to make sure we were actually at the base at the time indicated. It is rather ironic that we did not reach the base until February 17, 1959.

APPENDIX IX

PERSONNEL

Six hundred applications were received in response to Captain Bastin's advertisement for expedition members. Applicants were then screened for suitability and tested for technical competence in the areas of their specialties. One of the applicants who did not pass muster was a 14-year-old girl who "wanted to do something in life."

Of the applicants, 22 were chosen, 16 being scientific personnel and six technical and support personnel. Fifteen spoke French, six Flemish, and one English. The average age was 30 years as against 33 for the Fuchs expedition and 36 for the de Gerlache expedition.

The personnel of the expedition are listed on page 37.

In addition to those listed on page 37, the expedition was accompanied by Professor Paul Kipfer, of the University of Brussels, and Dr. René Boulanger of the Belgian Nuclear Research Laboratory, CEN, at Mol. These two nuclear physicists took nuclear radiation measurements on the Polarhav voyage to and from the base, and Dr. Boulanger installed new nuclear radiation measuring equipment at the base.

NAME	DATE OF BIRTH	JOB IN EXPEDITION	JOB AT HOME
BASTIN, Francois E.	Nov. 11, 1920	Chief	Chief of Air Force Meteorology
BLAIKLOCK, Kenneth (UK)	Dec. 6, 1927	Topographer	Government surveyor
CAUSSIN, Serge	June 12, 1927	Vehicle Mechanic	Army sergeant
COOLS, Hubert	May 30, 1930	Supply	British Petroleum electro-mechanic
DIETERLE, Georges, (French)	June 5, 1921	Seismologist	Seismologist
DILLEN, Ludo	July 2, 1933	Photographer	Assistant at Gaevert Photography School
DIRCKEN, Franz	Jan. 29, 1920	Cook and supplies	Professor of religion, priest
KELECOM, Arthur	Jan. 19, 1931	Ionosphere	Electronic engineer
KETELERS, Roger	Sep. 6, 1928	Nuclear radiation, trail party radio	Electronic technician, Nuclear Center at Mol
MAQUET, Jacques	June 13, 1927	Topographer	Captain, Army Engineers
REMSON, Gaston	Mar. 23, 1928	Radio operator	PTT radio operator
SCHOONLAU, Roger	Feb. 16, 1921	Chief of base radio	Air Force technician
STAQUET, Maurice	Aug 14, 1930	Medical doctor	Medical doctor
SUETENS, Pierre	Apr. 19, 1930	Nuclear radiation	Electronic technician, Nuclear Center at Mol
SWAAB, Henri	July 25, 1938	Vehicle mechanic	Mechanic
VAN AUTENDOER, Tony	Mar. 22, 1932	Geologist	Geologist (Army ser- vice)
VAN BAELEN, Joseph	Mar. 5, 1935	Meteorologist	Air Force sergeant
VANDEGAN, Ivan	July 21, 1925	Biologist, Glaciologist	Microbiologist
VANDENBOSCH, Andre	Feb. 11, 1929	Meteorologist	Air Force sergeant
VAN der SCHUEREN	Feb. 9, 1935	Solar radiation, Atmos- pheric electricity	Electrical engineer
VERFAILLIE, Georges	Nov. 26, 1925	Geomagnetism	Chemistry assistant in nuclear physics

*indicates persons designated to go on trail party.

APPENDIX X

ORGANIZATIONS, PERSONS, AND FUNDS BEHIND BELGIAN ANTARCTIC EXPLORATION

The idea of Belgian participation in Antarctic exploration under the International Geophysical Year was first suggested in May, 1955, by Mr. E. Hoge of the Royal Meteorological Institute. Two or three months later he turned the project over to Captain Bastin, who tried until November, 1955, to get support for it. At that time, Commandant de Gerlache indicated his interest in the plan and assumed responsibility for securing financial support. Eleven months later, largely through the intervention of Kings Leopold and Baudouin, he was finally successful in securing a favorable decision from the Brussels Government. De Gerlache then consulted General G. Laclavere, Associate Secretary of CSAGI for the Antarctic, and the present location of the base on the Princess Ragnhild Coast of Queen Maud Land was agreed upon.

The de Gerlache expedition was given a grant of 40 million Belgian francs from the State, plus eight million francs' worth of equipment loaned from the Ministry of National Defense and other ministries, plus another eight million francs from private and public sources. In support of this expedition, an executive committee was formed, composed of Commandant de Gerlache, Captain Bastin, Captain de Maere, and Captain G. Valcke, all officers or reserve officers in the Belgian Air Force. The expedition's offices were located at 9 Rue de Namur, Brussels. An honorary committee of 34 government ministers, generals, professors, etc., was also named. The scientific aspects of the expedition were handled by the 22-man Belgian IGY Committee of which de Gerlache and Bastin were made associate members, by a 10-man Expedition Programs Working Group, a 13-man Geodesic Committee, and an eight-man Medical Committee.

Pursuant to a Special Committee on Antarctic Research recommendation that Antarctic research be maintained after the termination of the International Geophysical Year, the Belgian IGY Committee on May 6, 1958, recommended continuation of Belgian efforts in the area, and on June 16, 1958, the Belgian Council of Ministers decided that a second expedition should be mounted and charged the National Center for the Antarctic Campaign, 1958-59-60 (CNCA) with mounting it. The CNCA had been established as a stopgap organization until a more permanent arrangement could be made. The National Center has 25 members and a 19-member honorary committee, and scientific committees have been appointed, as for the de Gerlache expedition. The CNCA offices are at 3 Avenue Circulaire, Brussels.

The CNCA was given a grant of 25 million Belgian francs, plus the loan of about two million francs' worth of equipment. Its budget was drawn up as follows:

CNCA BUDGET

Materials and Scientific costs

Meteorology and glaciology	1,000,000	
Geomagnetism	100,000	
Nuclear radiation	300,000	
Radiation	20,000	
Aurora and night sky	43,000	
Ionosphere	100,000	
Geodesy, topography, seismology	1,250,000	
Atmospheric electricity	25,000	
Earth currents	10,000	
Air photogrammetry	100,000	
Photography	250,000	
		3,198,000

Materials and Technical costs

Buildings, furniture	200,000	
Electro-generators, heaters	150,000	
Safety	50,000	
Workshop	50,000	
Sno-cats	3,000,000	
Tractor	500,000	
Heavy sleds	300,000	
Traverse equipment	100,000	
Fuel, lubricants	2,500,000	
Radio	300,000	
Clothing	1,000,000	
Food	1,150,000	
Cooking equipment	50,000	
Explosives, chemicals	30,000	
Medical	100,000	
Leisure	50,000	
Packing	150,000	
Material insurance	250,000	
		9,930,000

Costs of Wintering Personnel

Preparation	300,000	
Winter payments	1,000,000	
Salaries	2,500,000	
Insurance	450,000	
		4,250,000

CNCA BUDGET (continued)

General Administrative Expenses

a. Office

Office expenses	160,000
Office furniture	75,000
Office equipment	100,000
Telegraph and telephone	100,000
Stamps	<u>15,000</u>
	350,000

b. Personnel

Salaries	300,000
Miscellaneous expenses	50,000
Transportation	<u>100,000</u>
	450,000

Books, Press, Publications

822,000

1,622,000

Ship Expenses

5,000,000

TOTAL

24,000,000*

*As in original

In the course of its work, the CNCA has established contact with the leading polar institutions in other countries. It has also published a report entitled CNCA Nouvelles, 1958-59-60.

At the end of November 1958, the new, permanent, National Center for Polar Research was established in Brussels under the chairmanship of M. J. van Mieghem, Professor at the Free University of Brussels and Chief of the Royal Meteorological Institute. This organization is to carry on the 10-year Antarctic research program which has now been approved by the government. The funds for these operations have not been specifically set, but adequate financing has been promised. The offices of this Center are to be established in the National Museum of Natural Sciences in Brussels.

APPENDIX XI

CHRONOLOGY AND ICE LOG

1958

14 December	1415	Under way aboard MS <u>Polarhav</u> from Cape Town, South Africa, 34°09'S., 18°15'E.
18 December	1630	Sighted first iceberg at 50°37'S., 19°35'E.
21 December		Snowing; quite a number of icebergs visible.
22 December	0530	Entering pack ice, 3/10 coverage.
	1100	Ice thicker; progressing slower; 4/10 coverage.
	1200	Ice one foot thick; soft floe; speed about four knots; 5/10 coverage; 66°31'S., 22°0'E.
	2100	Ice up to five feet thick; going was rough but there were still open leads.
23 December		Ice one and a half feet thick, 7/10 coverage; tortuous course through fairly close pack.
	1600	About 80 miles from base, 68°44'S., 23°24'E.; ice about four feet thick and hummocked, 9/10 coverage; progress slow; saw midnight sun for the first time.
	2400	Ice about six to seven feet thick, 9/10 coverage.
24 December	0400	Beset in ice rafted to 10 feet under pressure; about 60 miles from base, 69°08'S., 22°59'E.
25 December	2330	Under way; ice pressure eased off.
26 December	1130	Ice gave way to open leads several miles across; 69°33'S., 23°22'E.
	1300	Entered tight pack, 9/10 coverage.
	1800	Ice opened to 7/10 coverage and we proceeded at three knots through small leads; ice about six feet thick on average but rafted up to 35 feet.
	2200	Increasingly tough ice roughly eight feet thick and under tight pressure, 9/10 coverage.
	2400	Beset.
27 December	1300	Under way; ice seven to eight feet thick, 9/10 coverage; 69°49'S., 23°25'E.
	1800	Stopped about 25 miles from base; coast barrier visible.
30 December	0200- 1200	Under way; coast just in sight, 69°50'S., 23°36'E.

1959

1 January	1230	Under way; less pressure, but ice rafted far down below the surface; 69°54'S., 22°41'E.
	2300	Stern hung up on broken ice.
2 January	0200	Free of ice; broke through with use of ship's engines and dynamite; secured engines.
3 January	0700-0930	Under way.

3 January	1200	Under way, battering through close-packed ice.
	1600	Firmly beset between two floes about 41 miles from base; 69°51'S., 22°57'E.
4 January	0010-	Pressure eased; under way again.
	0300	
5 January	0200-	Under way, but position still 41 miles from base.
	0730	
	1345	
6 January	1700	Under way in 9/10 coverage; ice thicker, about one and a half feet thick.
		Stopped, 69°54'S., 22°41'E.
		Sailed two to three hours in the morning, but drifted 11 miles north; we were usually drifting further to the west and northwest than we could run to the south and southeast.
	1700	Under way; made very good progress in 6/10 coverage of ice and fine leads formed in the lee of a string of icebergs; wind up to 50 miles per hour.
	2300	Came to the end of the leads, having made about 15 miles.
8 January		About 16 miles from ice shelf, 69°55'S., 22°0'E.; discussed chances of walking to the ice barrier; the conclusion was that it would be too dangerous because of barrier crevasses, shifting pack ice, open water, lack of reliable air support, the problem of locating another surface party on the ice, and the chance that the ship might not be able to reach the base, and part of the second expedition would be stranded there with the first; situation appears to be growing serious; if we were not actually unloading by February 1, we would have to start back because of fuel supply; although Captain Boe did not yet want to ask for aid, I urged Captain Bastin to send Brussels a telegram to relay to Washington describing the situation in order to keep them informed so that if requests for had to be made, it would not come from the blue.
	1500	King Baudouin Base had fuel for nine months and could continue a limited program of ionospheric physics, meteorology, and radiation without relief; first meteorological radiosonde was released from <u>Polarhav</u> because the base had run out of radiosonde balloons. Two tents had been erected on the ice beside the ship. Breid Bay reported to be filled with ice and last five miles of open water said to have vanished. Captain Bastin drew up plans for limited program with only a 12-man party, together with landing plans for various landing conditions, especially landing by helicopter.

9 January Had long radio discussion with the base; de Gerlache and de Maere both thought it would be too dangerous to walk in or to transfer personnel by helicopter because there are no rescue facilities; if we could not go in with an icebreaker, they felt it might be best for the de Gerlache group to remain at the base in order to avoid accidents and to keep the scientific measurements going.

10 January 1500 Discussion with base and Captain Boe, and all agreed the sooner we could request and receive icebreaker aid the better; message sent to Brussels to that effect; Captain Boe felt he could not take chances of remaining at base to unload after icebreaker left; I suggested to Bastin he might rearrange cargo so that more vital items were on top in case the icebreaker could not wait with us more than a few hours.

2200 Report from base that Soviet ice ship Ob was speeding up unloading at Lazarev.

11 January Report from Brussels that Washington Embassy had received request for icebreaker.

12 January All hands worked in hold from 1900 to 0600 (13 Jan.) rearranging cargo for quick off-loading; request for icebreaker submitted to Department of State today.

14 January Received message from Ambassador Silvercruys that USS EDISTO, if available, might be able to come to our assistance by February 1.

16 January Message from Brussels that, if United States could not supply an icebreaker, Brussels would ask Moscow; another message said that the Foreign Office would make "personal" inquiry of the Soviets without waiting for United States' reply; Bastin at once sent a message that situation was not serious and urged Foreign Office to "hold Troika horses."

17 January Learned that Foreign Office asked Soviet Ambassador last night if Soviet Union would be in position to extend aid; same inquiry said to have been made in Moscow of the Soviet Antarctic Committee; Bastin and de Gerlache were instructed to make same approach to Mirny but Bastin thought more coordination of such requests should be exercised by Foreign Office.

18 January Message from Brussels that Moscow had instructed Mirny to get in direct contact with Polarhav.

19 January This evening got in touch with Mirny and was told that Ob should be able to leave for our area about February 1; later received word from Brussels that USS GLACIER would be coming to help Polarhav after rescuing five Argentines on Robertson Island off the Palmer Peninsula.

20 January 2200 Message from Ambassador Silvercruys that Australian ship Magga Dan beset near Davis Station, Norwegian ship Tottan beset near Norwegian station, and EDISTO likewise beset nearby at 71°09'S., 14°40'W.

22 January Sent message to Soviets, thanking them for readiness to help and telling them it would not be necessary because United States icebreaker was coming.

23 January Message sent Admiral Dufek thanking him for assistance.

25 January 0100 Sun set below horizon for first time.

26 January 1700 First CW radio contact with GLACIER; Captain Bastin asked if GLACIER could remain with Polarhav for three days of offloading operations and Captain Houston of GLACIER replied, "Certainly," and offered assistance of helicopter; we had drifted by this time to about 130 miles west of base, 69°32'S., 18°22'E.

30 January Base helicopter ice reconnaissance reported three to four miles of free water outside Broid Bay, extending north-northeast-east into loose pack.

1 February About 150 miles west of base, 69°23'S., 17°22'E.

2 February 1400 First radio telephone contact with GLACIER about 100 miles northwest of us; GLACIER not in ice yet; set up two-hour radio schedule.

2000 GLACIER just entering brash ice, proceeding at eight knots, position 68°35'S., 16°04'E., about 50 miles away; we learned EDISTO and Tottan both free of ice.

3 February 0200 GLACIER about 22 miles northwest of us; weather overcast.

0300 Sighted GLACIER flare at 331° true.

0500 GLACIER helicopter landed alongside Polarhav, 69°20'S., 17°02'E.

0600 Helicopter returned to GLACIER with observer aboard; GLACIER battering through seven feet thick, tough ice which was coated with one to two feet of soft snow.

1500 Polarhav in sight.

2330 Blade on one of GLACIER's propellers snapped off in ice.

4 February 0400 Polarhav 4500 yards away.

1400 Ice reconnaissance flight with Captain Houston.

1900 Reached Polarhav and observer returned from GLACIER.

5 February 0730 Stopped in ice; Polarhav took aboard 42 tons of fresh water from GLACIER.

2030 Got under way again, observer aboard GLACIER once more.

6 February 1130 GLACIER making heavy going through pack ice which had been loose and full of leads two days earlier; made only 1200 yards from 0800 to 1200; going increasingly tough until 2200, when we discontinued operations to lie to "for a day or two" until conditions improved, 69°0'S., 16°18'E.; observer returned to Polarhav.

8 February		Worsening ice and weather conditions.
10 February	1100	Commenced transfer of cargo from <u>Polarhav</u> to GLACIER.
11 February	2030	GLACIER helicopter crashed about one miles from ship.
12 February	1830	Finished cargo and personnel transfer, Under way, heading north, all expedition personnel and cargo aboard GLACIER, 68°57'S., 14°30'E.
13 February	0900	Hard going in close pack up to 10 feet thick, 10/10 coverage.
	1300	Proceeding well in 9/10 coverage.
	1500	Pack easing to 8/10 coverage, open water reported ahead.
	1600	Ice 5/10 coverage, open water visible.
	1900	Rendezvoused with EDISTO; GLACIER taking aviation fuel aboard, 68°57'S., 14°20'E.
	2345	GLACIER under way for King Baudouin Base.
14 February		Turned south, being 70 miles from base in loose pack.
15 February	0800	30 miles from base, proceeding in poor visibility through ice five feet thick in loose floes with good leads.
	1130	Coasting east along ice barrier in open water with some clear ice, looking for Breid Bay; could hear base radio but RDF equipment did not operate properly.
	1230	Lying to, waiting for better visibility.
	1400	Sighted flares.
	1620	Under way west on basis uncertain RDF bearing.
	2100	Lying to, uncertain as to ship's position.
16 February	0800	No change; ice had closed in on ship and was grinding against her sides.
	1300	Visibility improved; under way eastward again.
	1410	Helicopter flew off under low overcast but had to return at 1440, having seen nothing.
	1700	Sno-cat sent up flares; GLACIER sent flares which were finally seen ashore; we were 15 miles too far to the east.
	1835	Steaming west, finally saw Sno-cat and expedition personnel at ice barrier.
	1900	Arrived at ice barrier; reunion of expeditions.
17 February	0045	Under way for Breid Bay, having been unable to moor to soft snow bank in King Leopold Bay.
	0700	GLACIER cracking through heavy bay ice 10 feet thick, 10/10 coverage; slow, hard progress, snowing heavily.
	0710	Sno-cat left base for ship, proceeding slowly in very poor visibility; GLACIER stopped, having cut ice dock about 2500 yards from barrier ramp, 70°20'S., 23°50'E.
	1530	Captain Bastin arrived from base with Sno-cat, having been eight and a half hours on way.
18 February	0100	Off-loading of Sno-cats and cargo commenced.
19 February	2000	GLACIER reported to base that sea swell had broken up bay ice within 200 yards of GLACIER.

20 February	1030	Ice reported broken to within 100 yards of GLACIER.
	1230	GLACIER reported sky clearing in bay, 27-knot wind, and suggested helicopter fly out from base to ship.
	1300	Belgian expedition helicopter took off.
21 February	1215	Change of command ceremony at base.
	1830	Under way, leaving Bastin expedition waving good-bye on bay ice.
22 February	0645	Rendezvoused with <u>Polarhay</u> and commenced transfer of cargo and passengers; $69^{\circ}03'S.$, $23^{\circ}23'E.$
	1130	<u>Polarhay</u> and GLACIER under way, proceeding independently; <u>Polarhay</u> to Cape Town, GLACIER to South America; loose pack ice five feet thick.
23 February		Steaming in open water; many icebergs.
25 February		Saw last iceberg $57^{\circ}36'S.$, $20^{\circ}37'E.$
3 March	0300	Arrived Cape Town, South Africa.