COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

**BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS**



RECORD No. 1966/71

# WILKES ICE THICKNESS AND RELATED STUDIES, ANTARCTICA 1965

*by*

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**RESTRICTED**

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## ILLUSTRATIONS

## SUMMARY

This report outlines the field geophysical work carried out in the vicinity of Wilkes Base, (Lat. 66° 15' S, Long. 110° 31' E), Australian Antarctic Territory, during the Australian National Antarctic Research Expedition of 1965-66. The year's work can be broadly divided into four parts.

1. An autumn traverse where seismic reflection stations were established every 10 miles around a triangle with corners at Cape Folger, the Dome Centre and Cape Poinsett.
2. A mid winter traverse to the inland glaciology station S-2 for a programme of seismic ice velocity studies.
3. A spring traverse where a rectangular grid network of seismic, gravity, and elevation stations were installed in a region between S-2 and 80 miles south of S-2.
4. Two attempts at recording reflections off the Mohorovičić discontinuity shot in the vicinity of Wilkes.

## 1. INTRODUCTION

The 1965/66 Australian National Antarctic Research Expedition for Wilkes sailed from Melbourne on January 8, 1965 on board M.V. Thala Dan and returned on February 21, 1966. During this period the author, a member of the Geophysical Branch of the Bureau of Mineral Resources, carried out a programme of ice thickness determinations and related studies using geophysical techniques. This report is a preliminary report on the geophysical work carried out during this expedition.

The year's work can be conveniently divided into four parts:-

(1) An Autumn traverse around the triangle shown in Plate 1 covering a distance of 184 miles. Seismic shooting and vertical magnetic intensity readings were carried out on this traverse.

(2) A mid winter traverse to S-2, an inland graciological station 53 miles SE of Wilkes, for the purposes of depoting and a programme of seismic ice-velocity shooting.

(3) A spring traverse of 340 miles installing a grid pattern of seismic, gravity and elevation stations. This was an extension of the grid commenced in 1964.

(4) In December 1965 two attempts were made to record a relfection from the Mohorovicic discontinuity. These shots were situated at the bottom of the Moraine Slope, about one mile from Wilkes.

As yet no detailed work has been done on the geophysical data and records obtained on these traverses. Consequently, no scientific results are given in this report.

## 2. PREVIOUS GEOPHYSICAL WORK IN WILKES LAND

Geophysical field surveys were commenced at Wilkes in 1961 by F. Jewell, and then successively carried out by D. Walker 1962, M. Kirton 1963 and R. Whitworth 1964.

Jewell installed seismic reflection stations every 20 miles on a line from S-2 to a point 300 miles due south, (Jewell, 1962). His results showed the bedrock to fall below sea level approximately 40 miles south of S-2, and to remain thus for a distance of 240 miles southwards. He located within this broad trough a deep valley between 40 and 80 miles south of S-2. The bedrock surface lies 7,500 feet below sea level at a point 60 miles south of S-2. Jewell suggested that the Vanderford Glacier, to the west of Wilkes, and the Tottan Glacier, to the east of Wilkes, owe their existence to this deep valley.

In 1962/63 Walker made two geophysical traverses in Wilkes Land. (Walker, in prep.). His Autumn traverse (1962) was solely a gravity traverse which ran from Wilkes, via S-2, to the Tottan Glacier. This traverse crossed the ice dome on whose western flank Wilkes is situated. Walker established the summit of the dome to lie approximately 20 miles SE of S-2. Walkers Spring traverse was from Wilkes to the U.S.S.R. station Vostok (900 miles south of Wilkes). Both gravity and seismic stations were installed along the line. An isolated reflection station was installed at a point 57 miles due south of S-2 to confirm Jewell's results of the previous year. Instead of a single bedrock reflection being recorded, several groups of reflections with differing dips were recorded. It was suggested that these events are reflections from different points on the valley sides.

In 1963 M. Kirton made two major traverses (Kirton, 1965). The first was from S-2 to a point 100 miles east, and the second to a point 300 mines south-south-east of Wilkes. He carried out much valuable experimental work in obtaining reflections in poor reflection areas. He further showed that 4 feet holes were adequate for seismic reflection shooting in the low plateau regions within 150 miles of Wilkes.

In 1964 R. Whitworth, (Whitworth, in prep.) devised a more concentrated traversing technique in the shape of a grid network. His aim was to establish a system of detailed mapping of the area to the south of S-2. This region includes the dome, whose crest lies approximately 20 miles south east of S-2, and the valley commencing approximately 40 miles south of S-2. The original plan was to install a rectangular grid, with an east-west line passing through S-2 as the northern baseline. The north-south limbs were to be 90 miles long and spaced at 10 mile intervals. The most westerly limb was to start 30 miles west of S-2, with limbs to be installed to the east as far as it was possible to travel by vehicle. Around the grid seismic reflection stations were to be installed every 10 miles, gravity stations every mile, elevation stations every fifth of a mile and vertical magnetic intensity stations every 10 miles.

Whitworth notated these north-south limbs with letters of the alphabet. The most westerly limb was to be called "A", the next one east "B" and so on down the alphabet whilst passing progressively eastwards. A point on one of these limbs was to be identified by two figures representing its mileage south of the northern east-west baseline.

Whitworth commenced his spring traverse at S-2, (D00), and then travelled to A00 where the seismic work was commenced. At A22 the party was stopped by the Vanderford Glacier. On B leg they were stopped at B31, again by the Glacier. C leg was then completed from C00 to C30. The Proline drill rig was not taken on this traverse and all holes were drilled by hand.

## 3. OBJECTIVES AND PROPOSED PROGRAMME

Previous investigations of the elevation and ice thickness of the ice cap in the vicinity of Wilkes have indicated that a domal area exists to the south east of Wilkes. From a high point of 4,800 ft, situated 20 miles south east of S-2, surface elevations decrease to sea level in the east, west and north directions. They decrease to the south reaching a low point of about 2,700 ft. approximately 50 miles south of S-2, before beginning to rise again. This surface dome is roughly circular in shape.

The glaciological programme at Wilkes has been concerned for the last two years with the ice dome referred to above. This is because the ice dome can be taken as a scale model of the larger ice plateau which comprises the Antarctic continent. In 1964 a triangle was established by P. Morgan, glaciologist, with marker stakes every mile and corners at Cape Folger, (10 miles north east of Wilkes), the dome centre, and Cape Poinsett. The glaciology programme was to study ice strain and snow accumulation around the triangle. It was originally planned for seismic reflection stations to be installed every 15 miles around the triangle in 1964 if time availed.

The general objective of the geophysical surveys to be carried out in 1965 was to contribute to a determination of the ice loading of the ice dome and associated gravity effects that may be related to each of isostatic compensation and crustal strength. Also obtain a detailed knowledge of the ice dome surface, the land mass beneath it and the trough to the south of it. Ice thickness information was required in the domal area to help the glaciologists with their studies there. It was also planned to obtain more information about the valley to the south of the dome and to determine whether or not the valley extends from Walker's shot point, 57 miles due south of S-2, in both easterly and westerly directions, to the coast and so join the Vanderford and Tottan Glaciers.

The detailed objectives of the 1965 ice thickness programme, are stated below.

(1) Complete a measurement of ice thickness over the greater part of the northern domal area using seismic and gravity techniques. This entailed the installation of gravity and seismic stations over the central area of the triangle in the Autumn, provided the seismic work around the triangle had been completed in 1964.

(2) Obtain more information on ice thickness over the southern flanks of the ice dome and the valley situated between 40 and 80 miles south of S-2. It was hoped to fulfill this objective by continuing the rectangular grid started by Whitworth in 1964.

(3) Carry out a detailed seismic study of the valley between the limits of 50 and 70 miles south of S-2. The programme was to extablish a line of continuous reflection profiling within the limits stated.

(4) Obtain more information on vertical ice velocities. This work was to be done at S-2, whenever time availed, and included an uphole shoot and a velocity profile.

## 4. PROGRAMME OF WORK COMPLETED

### Autumn traverse

Time did not permit the seismic work to be carried out around the triangle in 1964, apart from experimental work at the dome centre. As the seismic work around the sides of the triangle was more important than the previously planned programme inside the triangle, the Autumn traverse was devoted solely to the former. Further, owing to the vehicle situation at Wilkes it would not have been possible to do the geophysical work inside the triangle, at the same time as the glaciologist was travelling around it. The RN110 Nodwell tracked carrier was returned to Australia in February 1965 for maintenance, leaving a Weasel as the only suitable vehicle for carrying the seismic recording instruments. The Weasels although being good traverse vehicles are now old and susceptible to broken tracks, of which there are no new spares.

The traverse party of six men left Wilkes on March 16, and commenced operations at Cape Folger. The seismic recording instruments were mounted inside a Weasel, which itself was loaded on a Norwegian sledge. This was towed by one of the two D.4's on traverse. The two Snowtracs and four occupants were devoted solely to glaciological work whilst the two D.4 drivers, which included the author, installed the seismic stations.

Gravity readings had been previously read every mile in 1964 by the glaciologist, and were taken again in 1965 for glaciological purposes only.

Seismic stations were installed at 10 mile intervals around the triangle. No station was installed at TR00, (see plate 1), in the Autumn as the area is heavily crevassed and unsuitable for travel in D.4 tractors. This station was installed after the spring traverse using Weasels for transport.

Station TR10 was installed first, and the other stations successively travelling around the triangle in an anti-clockwise direction. At stations TR10 and TR20 several different spread arrangements were tried. The best arrangement was as follows: 8 H.S.J. 14 c.p.s. geophones per trace spaced at 7 ft. intervals with 50 ft. geophone cable takeout intervals. Just prior to the traverse a 1500 ft. Vector cable was bound up with tape such that the takeout intervals were spaced at 50 ft. instead of the usual 115 ft. This proved to be a great time saver on traverse. The above spread arrangement was consequently used at all stations from TR10 to TR123 inclusive. Four to six feet holes were used, generally offset up to 40 feet from the centre of the spread. In addition to centre shots, colinear offset shots, with the shot 100 feet from one end of the geophone line, were carried out at each station with the intention of gaining more first break velocity information. A new hole was used for each shot, being well tamped after loading. At least three different filter settings were used at each station the common ones being 70 - 160 cps, 90 - 215 cps and 120 - 215 cps. From stations TR 123 to TR 172 single 20 cps geophones were used in place of the multiple geophones in an attempt to speed up progress. Also 3 hole pattern shots were used in addition to single holes, but failed to show any appreciable improvement of reflection quality. One pound of RDX/TNT was the average charge size. Good readable bedrock surface reflections were obtained at every station.

## Velocity Programme

On April 26th, a 5 man traverse party left Wilkes for S-2 with the quadruple purpose of:

(1) Remarking the trail from Wilkes to S-2.

(2) Depoting fuel at S-2 for the coming Spring traverses.

(3) Glaciological work at S-2.

(4) Seismic Shooting at S-2.

A total of three days seismic work was carried out at S-2 during which time a velocity profile and an uphole shoot were attempted.

The results of the velocity profile are disappointing. In order to shoot as long a line as possible in the time available, single geophones were used with 115 ft. spacing. This arrangement quite obviously was not the best for obtaining reflections at S-2. The profile layout was based on that outlined by Musgrave (1962). The centre shot was attempted first with only a weak bedrock reflection being obtained. The reflection quality was certainly not good enough for the purpose required.

The two adjacent spreads were then shot, but equipment troubles bedevilled the results. Much trouble was experienced with the pre-suppression and with noisey amplifiers.

The results of the uphole shoot were more encouraging. A 170 foot deep hole, which had been drilled in 1964 by the glaciologist, was used. Shots were fired at 20 feet intervals from 170 feet to 10 feet. These shots were recorded using 12 single 20 cps geophones at 115 feet intervals. The strong bedrock reflection recorded from the shot at 170 feet, became poorer and weaker as the shot depth decreased. For the shot at 10ft. depth the reflection is hardly pickable.

From a preliminary examination of the records, it does not appear as though there is much difference between the vertical and horizontal velocities in the near surface layers of the ice. The maximum velocity recorded by the uphole shoot was 10,100 ft/sec.

Spring Traverse

The total time available for the spring traverse was only 7 weeks. This was due to the fact that no traverses were allowed to leave Wilkes before October 1st and that all traverses had to be back at Wilkes by the third week in January. It was impossible for the glaciological and geophysical traverses to operate in the field at the same time on both vehicle and manpower considerations. Consequently, it was decided to split the time available equally between glaciology and geophysics. As one week was a reasonable estimate of the time necessary to travel from Wilkes to S-2, and S-2 to Wilkes at the end of the survey only 6 weeks would be available for actual geophysical work.

The geophysical traverse was planned, therefore, with the above time limit in view. It was decided to start at D00 (S.2), and travel down D leg to D80. As Jewell had previously installed seismic reflection stations at D20, D40, D60 and D80, only seismic refraction shots were carried out at these points. From D80 it was planned to travel to C80 and thence C50, E50, F80, F40, E40, E00, D00 (S-2). This is a traverse distance of 280 miles from S-2 and back, and was considered possible in the time available. This route was proposed in order to cover as much ground as possible in the area of the deep valley between 40 and 80 miles south of S-2.

Owing to good weather and the full co-operation of all members of the traverse party, this programme was fulfilled, and more so. The party arrived at E00 with a week still in hand. Consequently, it was decided to extend the grid to the north and so fill in some of the area inside the triangle. As a result both D and E legs were extended 30 miles to the north.

The traversing technique used followed very closely to that instituted by R. Whitworth in 1964. The vehicles used were one Snowtrac with two occupants, one weasel containing the seismic recording instruments driven by the author and 2 D4's pulling the fuel, caravans and seismic equipment. The nature of the work on the traverse can be divided into four parts.

Navigation. Navigation was carried out by backsighting on stakes placed every fifth of a mile. An east-west azimuth had been set up at S-2 in 1964 by the surveyor, and was used to obtain a true north-south course. Each stake could be planted in line with an accuracy of ½ inch using binoculars and taking account of parallax errors. These errors would be cumulative and would cause the path taken to be curved rather than a straight line. Sometimes the staking distance had to be cut down to 1/10th of a mile and even 1/15th of a mile to allow the traverse to travel in bad weather. Generally, however, if visibility dropped below 1/5th of a mile, work was stopped because of the errors that would be involved.

Distances were measured by means of a converted Weasel speedometer fitted in the Snowtrac. The speedometer was geared at a ratio of 2:1 for greater accuracy in picking the 1/5th mile points. The speedometer was calibrated at Wilkes, before the traverse, using tellurometers. The Weasel also carried a speedometer which acted as a check on the Snowtrac. The success of the navigation was proved by the finishing point at D00 being only one mile due east of the starting point stake.

Elevation. Elevation differences were determined using Mechanism microbarometers. The Snowtrac always travelled one mile ahead of the Weasel, the former vehicle planting the stakes every 1/5th of a mile and the latter retrieving them. Both vehicles recorded atmospheric pressure at each stake. In addition, radio contact was established every mile between the two vehicles and the barometers read simultaneously. These simultaneous readings eliminated the effect of varying atmospheric pressure. This process of barometric levelling is referred to as the "modified leapfrog technique".

At every 10 mile point, (i.e. every seismic station), the Snowtrac extended the levelling and staking on its own for 5 miles to the side of the north-south leg. Whilst travelling down D leg these sidelegs were extended to the east and on E leg were extended to the west. A stake was left at the end of each 5 mile sideleg from D limb and was retrieved when carrying out the respective sideleg from E leg. This gave a check on navigation, and also a tie point for the barometric levelling and gravity readings, (gravity readings were taken every mile on the sidelegs). On C and F legs, (see Plate 1), the sidelegs were extended towards the centre of the grid. It was necessary to run two sidelegs from E40 to complete the grid.

Gravity. Gravity readings were installed every mile both on the main legs and on the sidelegs. To begin with the gravimeter was read from the Weasel. However, it soon became evident that it was quicker for the Snowtrac to carry the gravimeter. M. Forecast had been trained to read the instrument one month prior to leaving on the spring traverse, and capably did most of the gravity observations on traverse. The gravimeter performed well, the only trouble experienced was with the lighting system and an occasional icing up of the dial.

Seismic. Seismic reflection stations were installed every ten miles around the grid except at those points on D leg where Jewell had previously carried out reflection probes. At those points, viz. D20, D40, D60 and D80, only refraction profiles were shot.

The same shooting arrangement was used as was found successful in the autumn. This was a spread of 8 HSJ 14 cps geophones per trace at 7 ft. intervals and 50 ft geophone takeout intervals. Single 8 ft. holes were used, generally offset 40 feet from the centre of the spread. With three people carrying out the seismic work it was possible to lay the spread, fire three shots and pick up again in two hours.

It was found that by using the same hole for successive shots at a station, the reflection's quality and amplitude increased with the number of shots fired in the hole. Apart from improving record quality this technique also saved a great deal of time. Good clear reflections were obtained from the ice-bottom, bedrock zone at all stations except those in the vicinity of S-2, viz. D00, D10 and D30, where reflection quality was very poor.

An intriguing feature portrayed on a majority of the records is that instead of a single bedrock reflection being recorded, a series of events with varying dips are recorded. The two records in plate 2 exhibiting multi-dipping events are given as good examples of this phenomenon. This same feature was also obtained by D. Walker, (1962), on his record shot 57 miles due south of S-2. Walker attributed these separate events as originating at separate points in the trough. This could probably be true in this place. However, the same type of events were recorded at so many stations installed on both the autumn and spring traverses, and further, in areas where the bedrock surface is believed to be flat, that some other factor must be involved. The answer could lie in the ice-bedrock junction not being a simple plane, but rather a complex and gradual change from ice through ice and moraine to solid bedrock.

No continuous reflection profiling was done at all during the year. The reason for this was that due to the time limit imposed on the spring traverse, it was decided to obtain as great a coverage of the ice dome and the trough to the south of it as possible; at the expense of the more detailed work.

Moho reflection shooting attempts.

Two attempts were made to record reflections from the Mohorovicic Discontinuity in December 1965. Both shots were fired at the bottom of the moraine slope about 2 miles from Wilkes.

For the first shot 400 lbs. of T.N.T. and demolition packs were detonated 2,500 feet from the closest geophone. Two 6 cps geophones per trace were used with the geophone takeout intervals being 115 feet apart. The record was run for 30 seconds with the usual paper speed of 16 inches per second. For this the Weasel was balcked out, also a special light proof sleeve was made up to fit over the camera and catch the paper. Several lineups appear on the record, but it is not certain what these represent. There is still some doubt as to whether these lineups are instrumental pulses or actual events picked up by the geophones.

To try and confirm the events obtained on the first record, a second shot was fired one week later consisting of 500 lbs of demolition packs. 8 HSJ 14 cps geophones were used with the hope of obtaining better ground-geophone coupling. However, no events at all were recorded from this shot.

## 5. REFERENCES


| | | |
|---|---|---|
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| MUSGRAVE, A.M. | 1962 | Application of the expanding reflection spread. Geophysics Vol XXVIII. No. 6 Part III Dec. 1962. |
| WALKER, D.J. | - | Wilkes Geophysical Surveys, Antarctica 1962 (In preparation). |

# APPENDIX 1

## OPERATIONAL DETAILS

### (a) AUTUMN TRAVERSE

| | |
|---|---|
| Dates: | 16th March - 27th April, 1965. |
| Personnel: | J. Lanyon (OIC).<br>K. Shennan (Senior Diesel Mechanic)<br>W. Demech (Radio Operator)<br>M. Forecast (Meteorologist)<br>A. McLaren (Glaciologist)<br>G. Allen (Geophysicist). |
| Vehicles: | 2 Porsche Snowtracs<br>2 Caterpillar D.4 Tractors.<br>1 Weasel (mounted on Norwegian Sledge).<br>2 Large Caravans<br>2 Otaco Fuel Sledges<br>2 Norwegian Cargo Sledges. |

| | |
|---|---|
| No.of days on traverse | 42 |
| No. of days lost due to blizzard | 15 |
| No. of days interrupted by bad visibility | 8 |
| Total Distance travelled | 220 miles |
| Minimum Temperature | -49.2°F |
| Average Temperature | -13.2°F |

| | |
|---|---|
| No. of Seismic Stations | 17 |
| No. of Seismic Shots | 113 |
| No. of Vertical Magnetic Intensity Stations | 9 |
| Quantity of RDX/TNT used | 153 lbs. |
| No. of Detonators used. | 128 |

(b) S-2 TRIP

| | |
|---|---|
| Dates: | 26th May - 19th June, 1965. |
| Personnel: | K. Bennet (Radio Operator & Leader) |
| | M. Glenny (Diesel Mechanic) |
| | J. Tarbuck (Cook) |
| | A. McLaren (Glaciologist) |
| | G. Allen (Geophysicist) |
| Vehicles: | 1 Porsche Snowtrac |
| | 2 Caterpillar D.4 Tractors. |
| | 1 Weasel (Sledged to S.2) |
| | 2 Otaco Fuel Sledges |
| | 2 Large Caravans |
| | 2 Norwegian Sledges |
| | 1 Snowtrack Sledge |

| | |
|---|---|
| No. of days on traverse | 22 |
| No. of days lost due to blizzard | 9 |
| No. of days spent on geophysical work | 2½ |
| No. of days spent travelling | 4 |

(c) SPRING TRAVERSE

| | |
|---|---|
| Dates: | 1st October - 15th November, 1965. |
| Personnel: | J. Lanyon (OIC, Navigator, Radio Operator). |
| | M. Forecast (Meteorologist, Navigator) |
| | R. Wiggins (Diesel Mechanic) |
| | R. Holmes (Electrician, Shooter) |
| | G. Allen (Geophysicist). |
| Vehicles: | 1 Porsche Snowtrac |
| | 2 Caterpillar D4 Tractors |
| | 1 Weasel |
| | 1 Large Caravan |
| | 1 Small Caravan |
| | 1 Otaco Sledge |
| | 1 Engineering Sledge |
| | 2 Norwegian Cargo Sledges. |

| | |
|---|---|
| No. of days on traverse | 41 |
| No. of days lost due blizzard, mist etc. | 11½ |
| No. of days travelling S.2. and back | 4 |
| No. of Seismic Stations | 32 |
| No. of gravity stations | 470 |
| No. of elevation stations | 2,360 |

## APPENDIX 2

## EQUIPMENT

**Seismic:**

HTL 7000B 12 channel seismic amplifier system.

Model 521, T.I.C. 25 trace oscillograph camera.

Shot Boxes:
1) SIE 2000 vold blaster, condenser-generator system.
2) T.I.C. 90 volt blaster, condenser-battery system.
3) SIE $67\frac{1}{2}$ volt blaster, condenser-battery system.

Geophones: 320 off HSJ 14 cps vertical geophones, in strings of 8.

14 off SIE 5 cps horizontal geophones.

30 off TIC 6 cps vertical geophones.

14 off TIC 20 cps vertical geophones.

Cables: 6 off Vector 1500 ft. cables, with 13 moulded takeouts at 115 ft.

Explosives: RDX/TNT (60/40), in 1 lb. charges with CE primer.

Detonators: ICI 'seismic' with 6 ft, 30 ft, 125 ft and 200 ft. leads.

Photographic: Kodak Linagraph paper type 480, 6 inches wide in 200 ft. rolls.

Kodak acid fixer and Dectol developer both in 1 gallon tins.

Drill: Proline HDBA7 Borer (never used in 1965).

**Gravity:** Worden No. 260 geodetic meter.

**Magentic:** La Cour B.M.Z. No. 121

**Elevations:** 3 off. Précision Mechanism Microbarometers.

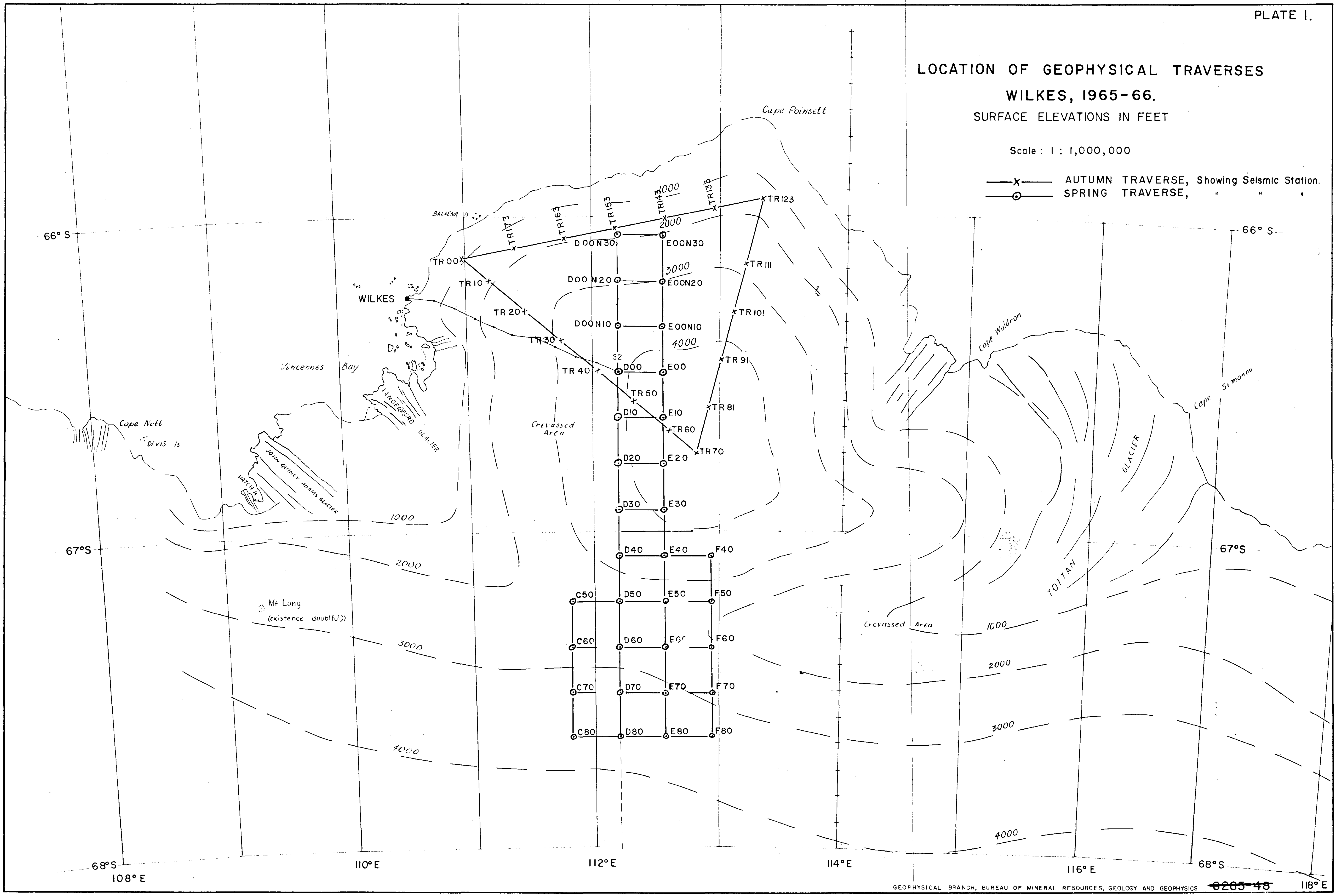
PLATE I.
LOCATION OF GEOPHYSICAL TRAVERSES
WILKES, 1965-66.
SURFACE ELEVATIONS IN FEET
Scale : 1 : 1,000,000
AUTUMN TRAVERSE, Showing Seismic Station.
SPRING TRAVERSE, " " "
Cape Poinsett
Cape Waldron
Cape Simonov
Cape Nutt
DAVIS Is
BALAENA Is
WILKES
Vincennes Bay
VANDERFORD GLACIER
JOHN QUINCY ADAMS GLACIER
HATCH Is
Mt Long
(existence doubtful)
Crevassed Area
Crevassed Area
TOTTAN GLACIER
TR00
TR10
TR20
TR30
TR40
TR50
TR60
TR70
TR81
TR91
TR101
TR111
TR123
TR133
TR143
TR153
TR163
TR173
D00N30
E00N30
D00N20
E00N20
D00N10
E00N10
S2
D00
E00
D10
E10
D20
E20
D30
E30
D40
E40
F40
C50
D50
E50
F50
C60
D60
F60
C70
D70
E70
F70
C80
D80
E80
F80
1000
2000
3000
4000
66° S
67°S
68°S
108° E
110°E
112°E
114°E
116° E
118° E
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

SPECIMEN SEISMIC REFLECTION RECORDS, EXHIBITING COMPLEX ICE-BEDROCK JUNCTION REFLECTIONS.

PLATE 2.

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SEISMIC SURVEY

Area WILKES ANTARCTICA
S.P. E60 Trav. Spring Date 28/10/65
Shot 23 Charge 2 lbs Depth 8 ft
Spread Normal Split 275'-0-275'
Geos. HSJ 14c Amp. 7000 B Cam. TIC 6"

| | Orig'l. Recording | Play Back |
|---|---|---|
| Filters | KK90 - MK215 | |
| Gains | -30 | |
| Mixing | Bilevel | |
| A.G.C. | HR | |
| Presupp. | -60 | |

Pattern Geophones
No. 8 Spacing 7 ft
Layout in line along traverse, with 50ft takeout intervals.

Pattern Holes
No. Spacing
Layout Single hole offset 40 ft from centre of spread.
Remarks.

ELEVATION AND WEATHERING CORRECTIONS

D= Vo= Ve= ds= (E - ds)/Ve =

| S.P. | | Dist. | Elev. | tw | f.tw | E/Ve | Σt |
|---|---|---|---|---|---|---|---|
| 1 | | 275' | | | | | |
| | 2 | | | | | | |
| 2 | 3 | 225' | | | | | |
| | 4 | | | | | | |
| 3 | 5 | 175' | | | | | |
| | 6 | | | | | | |
| 4 | 7 | 125' | | | | | |
| | 8 | | | | | | |
| 5 | 9 | 75' | | | | | |
| | 10 | | | | | | |
| 6 | 11 | 25' | | | | | |
| S.P. | 12 | | | | | | |
| E60 | 00 | 00 | | | | | |
| | 13 | | | | | | |
| 7 | 14 | 25' | | | | | |
| | 15 | | | | | | |
| 8 | 16 | 75' | | | | | |
| | 17 | | | | | | |
| 9 | 18 | 125' | | | | | |
| | 19 | | | | | | |
| 10 | 20 | 175' | | | | | |
| | 21 | | | | | | |
| 11 | 22 | 225' | | | | | |
| S.P. | 23 | | | | | | |
| 12 | 24 | 275' | | | | | |

| | Ls. Elev. | Ls. tw | Ls f.tw | Ls E/Ve | Ls. Σt |
|---|---|---|---|---|---|
| Traces 1-12 | | | | | |
| 13-24 | | | | | |
| 1-24 | | | | | |

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SEISMIC SURVEY

Area WILKES ANTERCTICA
S.P. DOON10 Trav. Spring Date 13/11/65
Shot 30 Charge 2 lbs Depth 8 ft
Spread Normal Split 275' -0- 275'
Geos HSJ 14c Amp. 7000 B Cam TIC 6"

| | Orig'l. Recording | Play Back |
|---|---|---|
| Filters | L120 - MK215 | |
| Gains | -30 | |
| Mixing | Bilevel | |
| A.G.C. | HR | |
| Presupp. | -55 | |

Pattern Geophones
No. 8 Spacing 7 ft
Layout in line along line of spread with 50ft geophone takeout intervals

Pattern Holes
No. Spacing
Layout Single hole offset 40ft from centre of spread.
Remarks

ELEVATION AND WEATHERING CORRECTIONS

D= $V_o$= $V_e$= $d_s$= $(E - d_s)/V_e$ =

| SP | E | Dist. | Elev. | $t_w$ | $f.t_w$ | $E/V_e$ | Σt |
|---|---|---|---|---|---|---|---|
| | 1 | | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 4 | | | | | | |
| | 5 | | | | | | |
| | 6 | | | | | | |
| | 7 | | | | | | |
| | 8 | | | | | | |
| | 9 | | | | | | |
| | 10 | | | | | | |
| | 11 | | | | | | |
| SP | 12 | | | | | | |
| | 00 | | | | | | |
| | 13 | | | | | | |
| | 14 | | | | | | |
| | 15 | | | | | | |
| | 16 | | | | | | |
| | 17 | | | | | | |
| | 18 | | | | | | |
| | 19 | | | | | | |
| | 20 | | | | | | |
| | 21 | | | | | | |
| | 22 | | | | | | |
| SP | 23 | | | | | | |
| | 24 | | | | | | |
| W | | | | | | | |

| | Ls. Elev. | Ls. $t_w$ | Ls. $f.t_w$ | Ls. $E/V_e$ | Ls. Σt |
|---|---|---|---|---|---|
| Traces 1-12 | | | | | |
| 13-24 | | | | | |
| 1-24 | | | | | |