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RECORD No. 1964/66

GOSSES BLUFF SEISMIC SURVEY, AMADEUS BASIN, NORTHERN TERRITORY 1962

by

F.J. MOSS

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SUMMARY

A seismic survey, consisting of a main north-south reflection traverse and several short supplementary reflection and refraction traverses, was made in the Gosses Bluff area of the Amadeus Basin, Northern Territory by a seismic party of the Bureau of Mineral Resources, Geology and Geophysics between March and July 1962.

The purpose of the survey was to obtain information on the Missionary Plain Syncline, the Gosses Bluff uplift, the fault at the northern flank of the Gardiner Range, and the tectonic features relative to the Archaean/sedimentary contact at the northern edge of the Missionary Plain.

The seismic reflection method proved to be an excellent exploratory tool in the undisturbed parts of the sedimentary basin. The Missionary Plain Syncline was shown to have a maximum thickness of sediments of 33,000 ft, nine miles north of Gosses Bluff. The results indicate that Gosses Bluff is a diapiric structure of the salt dome type, where the Proterozoic Bitter Springs Limestone has provided the necessary mobile material. The Gardiner Range Fault was shown to be overthrust from the south with a hade of 15 to 20 degrees. The problem regarding the Archaean/sedimentary contact was not solved.

1. INTRODUCTION

A seismic survey was made in the Gosses Bluff area of the Amadeus Basin by the No.2 seismic party of the Bureau of Mineral Resources, Geology and Geophysics from 26th March to 3rd July 1962.

The survey was part of the Bureau's programme of seismic operations in the Amadeus Basin, which began in 1961 with a series of north-south traverses across the eastern part of the Basin between Alice Springs and Finke and was followed in the same year by a short survey over the Palm Valley Anticline, 80 miles west of Alice Springs. These surveys showed that relatively simple seismic reflection techniques could be used to give reliable information in the undisturbed parts of the sedimentary basin, but that only limited results could be obtained by the seismic refraction method owing to the presence of shallow high-velocity refractors in the areas tested. Many tectonic problems of the Basin were left unsolved, and it was the purpose of the 1962 surveys to try to solve some of these problems.

In the Gosses Bluff area the seismic programme was planned to give information on:

(a) the Missionary Plain Syncline,

(b) the nature of the Gosses Bluff uplift,

(c) the fault at the northern flank of the Gardiner Range, and

(d) the region at the northern side of the Missionary Plain where the steeply-dipping sediments meet the Archaean Complex.

Magellan Petroleum (NT) Pty Ltd was the tenement holder of Oil Permit 43, the area in which the survey was conducted.

2. GEOLOGY

The general aspects of the geology of the Amadeus Basin have been discussed by Moss (1962). A report on the geology of the Missionary Plain area has been given by Prichard and Quinlan (1962), and the geology of Gosses Bluff, which lies in the centre of the Missionary Plain about 110 miles due west of Alice Springs, has been discussed by Brunnschweiler, Leslie, and Richards (1959). A regional geology map (after Quinlan) is shown in Plate 3. The geology of the area covered by the seismic survey (Plate 2) is taken from the photogeological maps of the Institut Francais du Petrole.

The Missionary Plain Syncline is bounded in the north by the MacDonnell Ranges and in the south by the Gardiner, Krichauff, and James Ranges. West of Hermannsburg Mission, the syncline is estimated to contain approximately 30,000 ft of Palaeozoic and Proterozoic sediments. This estimate has been made by measuring thicknesses of cross-sections in the steeply-dipping outcrops of the MacDonnell Ranges.

Gosses Bluff

Gosses Bluff is a circlar ridge of steeply-dipping strata projecting 600 to 700 ft above a comparatively-flat surrounding plain. Sandstone and conglomerate of the Pertnjara Formation form this plain, whereas the rocks of the steep rim of the Bluff are of Lower Pertnjara Formation and Mereenie Sandstone. Prichard and Quinlan (1962) identified the material inside the circular ridge as Stokes Formation (Silurian) and Goyder Formation (Cambrian), but Quinlan (personal communication) now believes that the Stairway Greywacke (Ordovician) also crops out.

Prichard and Quinlan (op.cit.) consider the structure to be a true diapir with Bitter Springs Limestone (Proterozoic) acting as the mobile formation. They quote M.A. Condon (op.cit. p.29) as believing that 'the relation of the Bitter Springs Limestone to the diapirs ... indicates that the formation became fluid, probably because of the great thickness of the sediments above, and flowed particularly into places where the vertical stress was reduced'. This postulate implies that the Heavitree Quartzite probably lies undisturbed beneath the diapir or at most has only been disturbed to the extent of supplying the initial 'blister' required to start the upward movement of the diapiric material. Brunnschweiler et al. (1959) agree that the Bluff must be of diapiric origin, but they do not come to any definite conclusion as to the nature of the diapiric material.

Aerial photographs reveal the possible existence of a peripheral sink. The almost-circular shape of this and its size, taken in conjunction with the almost-circular form and size of the surface expression of Gosses Bluff, strongly suggest that it is a diapiric structure where pure salt is the fluid material. Brunnschweiler, however, considers that there must be a more-solid core in the structure, but co-authors Richards and Leslie favour salt.

The geological problems to be solved by the seismic method are the nature and origin of the intrusive material, the attitude of the underlying basement, and the attitude of the sedimentary layers in the vicinity of Gosses Bluff.

Gardiner Range Fault

South of Gosses Bluff the Missionary Plain terminates against the northern flank of the Gardiner and Krichauff Ranges. A major fault is evident here, where the Bitter Springs Limestone (Proterozoic) in the south abuts Mereenie Sandstone (Ordovician) beds north of the fault.

There is little geological evidence on the hade of this fault or of the attitude of the beds below it.

Archaean/sedimentary contact at northern edge of the Missionary Plain

The outcrops of the MacDonnell and Heavitree Ranges indicate the presence of a very thick sedimentary cross-section, which is postulated as culminating in a deep syncline below the Missionary Plain. The steeply-dipping beds of the Heavitree Range are thrown sharply up against the Archaean Complex, but about five miles beyond this contact the quartzite of the Chewings Range appears as an isolated mass of north-dipping sediments.

In the absence of data from considerable depths, such as could be obtained from deep geological test bores, surface geological evidence suggests that a representative cross-section at the northern margin of the Basin is as shown in Figure 1 of Plate 5.

3. PREVIOUS GEOPHYSICAL SURVEYS

Missionary Plain Syncline

Magnetic. An aeromagnetic traverse was flown from Alice Springs to Giles by the Bureau of Mineral Resources in 1960. Where the traverse crossed the Missionary Plain Syncline, the magnetic profile indicated a substantial depth of sediments. The results from this one traverse

were not sufficient to show the structure of the syncline or give information on its margins.

Gravity. The Bureau of Mineral Resources made gravity surveys, using helicopters, in the Amadeus Basin in 1961 (Langron, 1962) and in 1962 (Lonsdale and Flavelle, 1963). The results of these surveys, when tied-in to previous regional gravity traverses by the Bureau in 1959-60, gave the Bouguer anomaly map of the area shown in Plate 4. The large Bouguer anomaly 'low' in the Missionary Plain suggests the existence of a great depth of sediments. It is estimated from gravity results that sediments are more than 30,000 ft thick in the deepest part of the Basin.

Seismic. A short seismic traverse surveyed south of Hermannsburg Mission in 1961 (Turpie and Moss, 1963) showed the existence there of more than 20,000 ft of sediments dipping north at about 18 degrees. Reflections at the northernmost shot-point still indicated northerly dip, hence no synclinal axis was found in this work to indicate the maximum depth of the sedimentary cross-section.

Gosses Bluff

Richards (1958) and Brunnschweiler et al. (1959) describe magnetic and gravity surveys of Gosses Bluff made on behalf of Frome-Broken Hill Co. Pty Ltd.

Magnetic. The magnetic survey showed a small anomaly imposed on a strong westerly gradient. A portion of the gradient could be caused by an increased thickness of sediments, but the absence of any marked anomaly leads to the definite conclusion that the intrusive mass is not igneous.

Gravity. The gravity survey, though of limited coverage, revealed a circular gravity 'low' typical of known salt intrusions. A small positive anomaly in the centre of the Bluff could possibly indicate a cap rock formation. An attempt was made by Richards (1958) to estimate the depth to the possible salt formation and the thickness of the cap rock. The depth to the possible salt was estimated at between 2500 ft and 4000 ft below the surface. The cap rock could be 350 ft thick. These values should be treated with reserve, as the gravity control was not detailed.

A further semi-detailed gravity survey was made along seismic traverses, and also on a grid, inside Gosses Bluff by the Bureau of Mineral Resources in 1962 (Gibb, in preparation). The Bouguer anomaly profile along the main Traverse L is shown in Plate 6.

Archaean/sedimentary contact

Magnetic. An aeromagnetic traverse by the Bureau of Mineral Resources in the Amadeus Basin in 1960 indicated a substantial depth of sediments in the Missionary Plain Syncline, but gave no information for the region where sediments crop out against the Archaean Complex in the north.

Gravity. The helicopter gravity work (Langron, 1962) indicated a steep gravity gradient north of the contact between the sediments and the Archaean Complex. This gradient is not in the position one would expect it to be in, according to the simple geological picture deduced from surface outcrops (Plate 5, Fig. 1).

Two alternative geological cross-sections, inferred from the gravity data, are shown in Plate 5 (Fig. 3).

4. OBJECTIVES AND PROGRAMME

Objectives of the survey

The objectives of the seismic survey in the Gosses Bluff area were outlined as follows:

(a) to obtain a north-south cross-section of the Missionary Plain Syncline through Gosses Bluff, to look for unconformities in the Basin, and to examine the general nature of structures below the Pertnjara Formation;

(b) to attempt to identify reflectors and refractors with outcrops and to determine the age, nature, and tectonic history of the probable diapiric core of Gosses Bluff,

(c) to determine the hade of the major fault at the northern flank of the Gardiner Range, and

(d) to determine whether the Proterozoic and Palaeozoic formations fold under the Archaean mass at the northern end of the Missionary Plain Syncline or whether they merely dip steeply to the south into the syncline.

Programme

To achieve the objectives, a programme of seismic reflection and refraction work was carried out. The traverses surveyed are shown in Plate 2.

Missionary Plain Syncline. A reflection traverse was surveyed across the Missionary Plain through Gosses Bluff using the continuous profiling technique.

Gosses Bluff. Seismic reflection traverses were surveyed in the vicinity of Gosses Bluff.

It was intended that refraction arc-shooting through the Bluff would be done to find the diameter of the core and the velocity in the core material. However, the results of a refraction depth-probe six miles west of the Bluff indicated high-velocity refractors at shallow depth. The arc-shooting programme was abandoned and a programme of in-line refraction shooting through, and just north of, the Bluff was substituted.

Gardiner Range Fault. The main north-south reflection traverse was surveyed across the Gardiner Range Fault in an attempt to follow reflections to their abutment with the fault and so establish the hade of fault.

Archaean/sedimentary contact. The main north-south reflection traverse was extended north to cross the MacDonnell Range outcrops and to continue on to the Heavitree Quartzite. The nature of the contact was not clear from the work south of the outcrops.

5. RESULTS

Field work

Appendices A, B, and C, and the seismic operations chart (Plate 35) summarise the statistical information on the work done in the survey. The locations of traverses and shot-points are shown in Plate 2.

Continuous reflection profiling was done on Traverse L (with breaks in the profile because of the Bluff rim), on Cross-traverses LV, LW, LX, LY, and LZ, on Traverse M from Shot-points 60 to 64 and 72 to 78, and on Cross-traverse MX. Generally, single holes were shot and reflections were recorded using six geophone per station at 22-ft intervals; stations were 110 ft apart. In the disturbed part of the cross-section near Gosses Bluff, experimental work was done in an attempt to attain the optimum shooting and recording conditions. From the results of this experimental work at Shot-point 89 on Traverse L, improved reflection records were obtained, but the general quality of records near the Bluff remained poor. This poor quality is probably due mainly to faulting and to the steeply-dipping beds near the Bluff. The experimental work in the Gosses Bluff area will be the subject of a separate report.

Refraction probes were shot on Traverse M and on Traverse L inside, and north of, the Bluff.

A velocity profile was shot between Shot-points 15 and 22 on Traverse L under ideal conditions; viz. no wind, little vegetation, uniform weathering, a straight traverse, and reflectors having little or no dip. Recordings were made using geophones at normal spacings. The maximum charge used was 80 lb with a shot-to-geophone offset of $1\frac{1}{4}$ to $1\frac{1}{2}$ miles.

Missionary Plain Syncline

A small-scale generalised cross-section of seismic results on the main north-south traverse across the Missionary Plain is shown in Plate 6. Reflection cross-sections for all traverses are shown in Plates 8, 9, and 10. On these cross-sections, only the first legs of the main reflections are plotted from the corrected variable-area reflection cross-sections, which are presented in Plates 12 to 33. The reflections were plotted using the time/depth relation found at Hermannsburg (Turpie and Moss, 1963). The time/depth relation established late in the survey in the cross-section at the southern end of Gosses Bluff Traverse L, is also indicated in Plates 8, 9, and 10. The time/depth relation for Gosses Bluff only is shown on the variable-area reflection cross-sections. Locations where non-standard geophone groups were used are shown on the cross-sections.

The velocity profile on Traverse L indicated a very high vertical velocity in the cross-section. The records are shown in Plate 34 and the results in Plate 7. The average velocity down to a depth of 23,000 ft is calculated as 16,000 ft/sec. Poor reflections were recorded from below this depth, but they yielded insufficient information for velocity determination. However, by extrapolating the curves an average velocity of 17,500 ft/sec in the cross-section to 30,000 ft was obtained.

The reflections recorded to about one-second reflection time in the Missionary Plain Syncline (i.e. to a depth fo 7000 to 8000 ft) were generally of poor quality. These poor alignments are probably representative of the Pertnjara and Mereenie Formations. Good-quality reflections were generally recorded at reflection times of between one second and 3.5 sec in the relatively undisturbed parts of the Missionary Plain Syncline. At the axis of the syncline (Shot-point 116) a good reflection at 3.5 sec was interpreted to be from the Bitter Springs Limestone.

Generally, the north-south reflection cross-sections on Traverses L and M indicate that the Basin deepens from the Gardiner Range outcrops in the south to the MacDonnell Range outcrops in the north. The dip in the cross-section is not consistent but ranges from zero to about 20 degrees north. The deepest part of the Basin appears to be at about Shot-point 116. The reflecting horizons in the Basin appear to be conformable down to a strong reflector, which is tentatively identified as the Bitter Springs Limestone. An unconformity existing below this horizon is most evident on the cross-section between Shot-points 20 and 30 on Traverse L at 2.9 sec (about 24,000 ft). There is also some suggestion of it below Shot-point 110 at a time of 3.5 sec.

A refraction depth-probe shot in the centre of the Basin on Traverse M (Plate 11) gave results as follows:

Velocity (ft/sec)	Depth (below datum) (ft)	Dip
12,000	Sub-weathering	
17,650	2800	1° north
19,400	6000-7000 (approx.)	4° north

The 17,650-ft/sec velocity refractor is tentatively identified as a highly-silicified boundary zone between pebble and conglomerate units in the Pertnjara Formation (Quinlan, personal communication, 1962). The higher velocity of 19,400 ft/sec probably represents the formation below the Pertnjara Formation and Mereenie Sandstone, i.e. the Stokes Formation. The formation identifications are tentative and depth estimates are only approximate.

Gosses Bluff

In the disturbed parts of the Basin in and around Gosses Bluff, simple seismic reflection techniques gave poor results. The deterioration in quality is probably due mainly to the faulting in and around the Bluff and to the steeply-dipping beds of the Bluff rim. Diffraction patterns originating from these sources interfere with reflections recorded, rendering the reflections unpickable. Improved recording techniques were introduced on the basis of experiemtnal work done north of Shot-point 89 on Traverse L. These techniques, however, gave only slightly-improved results nearer the Bluff.

The peripheral syncline, indicated on the surface from aerial photographs, is shown to extend through the sedimentary cross-section to about 25,000 ft, i.e. to the top of the probable Bitter Springs Limestone reflecting horizon. The northern rim of this syncline is indicated on Traverse L at about Shot-point 98, and the southern rim at about Shot-point 36. The distances from the Bluff centre are about 6½ miles. The reflection quality near the Bluff deteriorates from roughly 4½ miles from the centre of the Bluff.

Poor-quality deep reflectors recorded near, and within, Gosses Bluff at times between 2.5 and 3.5 sec (20,000 and 30,000 ft) appear to have little or no dip (Plate 8). This supports Prichard and Quinlan (1962) and Condon's hypothesis that Gosses Bluff resulted from the movement of a plastic material within the sedimentary cross-section, and not from a deep-seated crustal movement. The Bitter Springs Limestone has not been identified definitely as the mobile bed, although this interpretation appears to be the most probable. A poor-quality low-dip reflection is recorded inside the Bluff at about 0.775 sec (roughly 6000 ft). This questionable reflection is only recorded over a ⅛-mile spread in the centre of the Bluff, hence is not reliable enough for a positive interpretation to be based on it.

Because of the presence of high-velocity refractors at shallow depths, the arc-shooting planned at Gosses Bluff was abandoned. Refraction traversing centred on Shot-point 89 of Traverse L indicated a 15,600-ft/sec refractor at a depth of 1400 ft below Shot-point 89, with one-degree-south dip. A fault was indicated on this refractor below Shot-point 87 with a downthrow of roughly 600 ft to the north.

Gardiner Range Fault

The main reflection traverse (Traverse L) crossed the surface expression of this fault at the northern end of the Gardiner Range between Shot-points 9 and 10. Good reflections, with little or no dip, down to approximately 3-sec reflection time (26,000 ft) were recorded.

The suite of good reflections below one second were recorded quite well as far south as Shot-point 10; at this point they were dipping only slightly north. In particular, the supposed Bitter Springs Limestone reflection was at 2.8 sec (about 23,000 ft) at Shot-point 10, although it is known to outcrop only $\frac{1}{4}$ mile farther south on the south side of the fault. This strongly suggested that the fault must be overthrust from the south. No reflections were recorded at Shot-points 8 and 9, probably owing to the fault being near the surface. However, deep reflections (to 3 sec) were again recorded at Shot-points 6 and 7.

Using offset-shooting, reflections at 0.6 sec with roughly 12-degrees-south dip, and at about 2.7 sec with roughly four-degrees-north dip were recorded from Shot-point 4 through the Arumbera Greywacke outcrops south of Shot-point 5, and from Shot-point 6 through the fault. These reflections were tentatively identified as coming from the Bitter Springs Limestone.

From this reflection work, the fault was interpreted as being an overthrust from the south with a hade of about 15 to 20 degrees.

Archaean/sedimentary contact

North of the deepest part of the Missionary Plain Syncline (Shot-point 116) the reflection quality deteriorated, where the traverse followed a river channel through irregular rounded hills of the Pertnjara Formation outcrops. Between Shot-points 122 and 127 the traverse followed the roughly north-west line of strike of the Mereenie Sandstone outcrops, which are just north of the traverse here, and the reflection quality improved. From Shot-point 128 northwards as far as the Heavitree Quartzite outcrops at Shot-point 150 no reflections were recorded. This part of the traverse is perpendicular to the strike of the steeply-dipping outcrops.

A good-quality reflection with little dip, which appears at about 3.4 sec between Shot-points 122 and 127, probably correlates with the Bitter Springs Limestone reflection at Shot-point 116, where it is at 3.5 sec. Although this indicates southerly dip, the dip is much smaller than that expected on the northern limb of the syncline. At this point, the beds of the Pertnjara Formation show dips of 80 degrees in outcrop. Unfortunately, no data were obtained on the shallower part of the cross-section north of the synclinal axis, and it is possible that at the Bitter Springs Limestone level the steep dips could be farther north. The seismic work has therefore not solved the problems regarding the Archaean/sedimentary contact.

6. CONCLUSIONS

The excellent quality of reflections obtained by simple techniques in the relatively undisturbed parts of the Missionary Plain shows that the seismic reflection method is an excellent tool for exploration of the sedimentary cross-section in the area. In the disturbed part of the Basin, complex recording techniques involving a considerable amount of time for experimentation will probably improve results.

The refraction method appears to be limited in use to the investigation of shallow refractors.

The Missionary Plain Syncline at the Gardiner Fault appears to contain about 26,000 ft of sediments. It deepens towards the north as far as Shot-point 116, where there is a thickness of about 33,000 ft of sediments. The sediments north of Shot-point 116 are generally south-dipping.

The results of the seismic survey in and around Gosses Bluff suggest that the uplift is a sedimentary feature. They are consistent with the suggestion that the Bitter Springs Limestone may have provided the necessary mobile material to create the Bluff and in fact add further weight to that suggestion. The presence of a poor-quality low-dip reflection recorded inside the Bluff from a depth of about 6000 ft suggests that the core material is deeper than 6000 ft. The presence is confirmed of a peripheral syncline in the cross-section at depth, with its rim $6\frac{1}{2}$ miles from the centre of the Bluff.

All the seismic evidence available is in agreement with the theory that Gosses Bluff is a diapiric structure of the salt dome type.

The fault at the northern flank of the Gardiner Range is an overthrust and probably dips at 15 to 20 degrees to the south. The basin sediments from the north continue under the fault with only a small change of dip. The Mereenie Sandstone appearing north of the surface depression of the fault is probably the result of drag from the overthrusting.

Seismic reflection work in the region of the Archaean/ sedimentary contact gave no results, hence the problems regarding the contact were not solved.

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APPENDIX A

STAFF AND EQUIPMENT

STAFF

Party leader	:	F.J. Moss
Geophysicist	:	G. Bow
Surveyors	:	J. Dwyer (26.3.62 - 11.5.62))Dept of T. Howard (1.5.62 - 4.7.62))the R. Leetham)Interior
Clerk	:	E.J. Quinn
Observer	:	G.L. Abbs
Asst observer	:	J.K. Grace 1.5.62 - 4.7.62
Shooter	:	C. Wood
Toolpusher	:	J.G. Halls
Drillers	:	J. Chandler K. Suehle F. Reith J. Keunen
Mechanics	:	I.D. Pirie E. McIntosh
Field hands	:	11

EQUIPMENT

Seismic amplifies	:	HTL 7000B
Seismic oscillograph	:	Electro-Tech ER66
Magnetic recorder	:	Electro-Tech DS7
Geophones	:	Electro-Tech 20-c/s (reflection) TIC 6-c/s (refraction)
Drills	:	2 Careys, Type H1 (Bedford) 1 Failing, 750 (Bedford) Drills supplied by the Petroleum Technology Branch of the Bureau
Water tankers	:	3 Bedford, 700-gal 1 Bedford, 1000-gal (flat top)
Shooting truck	:	Bedford, 700-gal

A workshop truck, 5 landrovers, a 30-cwt utility truck, a large number of trailers, and camping equipment completed the party equipment

APPENDIX B

TABLE OF OPERATIONS

Sedimentary basin	:	Amadeus Basin, NT
Area	:	Missionary Plain, Gosses Bluff
Camp sites	:	Gosses Bluff
Survey commenced	:	26th March 1962
Survey completed	:	3rd July 1962
Miles surveyed	:	53¼
Topographic survey control	:	Dept of the Interior, gravity survey levels
Total footage drilled	:	38,899 ft
Explosives used	:	15,090 lb
Number of detonators used	:	1270
Datum level for corrections (above sea level)	:	2300 ft
Source of velocity information	:	velocity profile

REFLECTION SHOOTING DATA

Shot-point intervals	:	1320 ft
Geophone group		standard - 6 geophones per trace at 22-ft intervals non-standard - 12 geophones per trace at 10-ft intervals, 12 geophones per trace at 5-ft intervals.
Number of holes shot	:	215 (including 8 patterns, 10 holes for offset-shooting and 6 holes for velocity-shooting)
Miles traversed	:	41
Usual recording filter	:	K18 K75
Usual playback filter	:	K24 K57
Common charge sizes	:	30 to 40 lb
Noise test north of Bluff	:	Subject to separate report

REFRACTION SHOOTING DATA

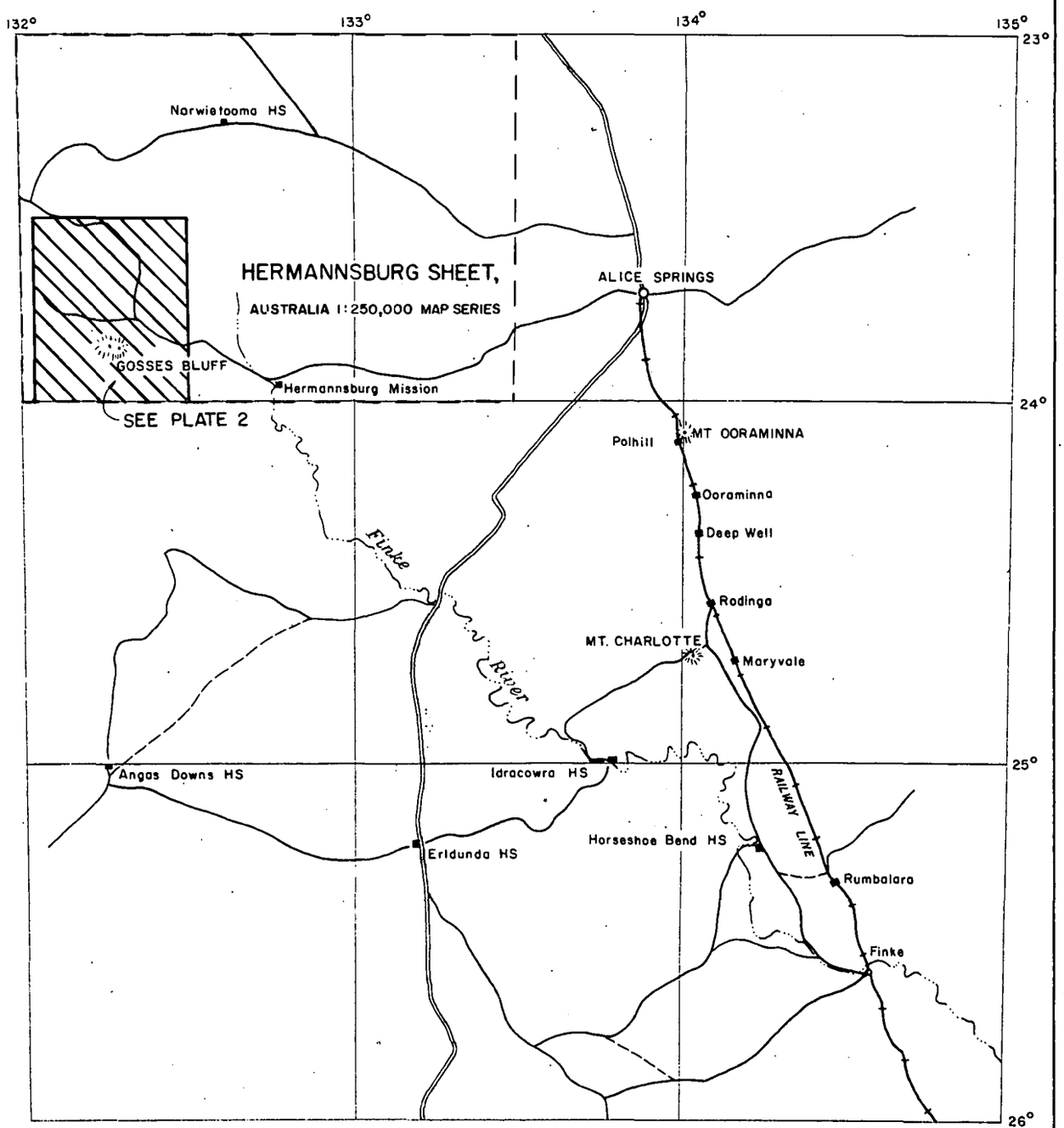
Geophone group	:	Two per trace
Geophone group interval	:	220 ft
Number of holes shot	:	28
Usual recording filters	:	KO K57
Weathering control	:	reflection work
Maximum shot-to-geophone offset	:	6¾ miles
Maximum charge	:	250 lb

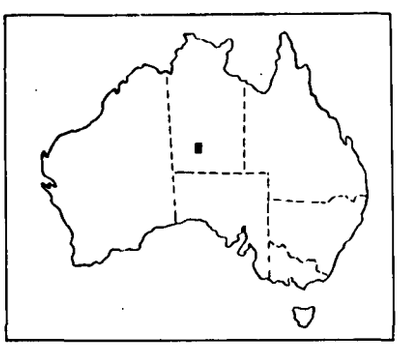
APPENDIX C

SEISMIC SHOT-HOLE DRILLING STATISTICS

Total footage drilled	:	38,899 ft
Total number of holes drilled	:	743
Average depth of holes	:	52 ft
Deepest hole drilled	:	150 ft
Travelling time and rigging up	:	227¾ hr
Time lost, waiting on water	:	4¼ hr
Time lost, repairs to drill	:	93¼ hr
Time lost, repairs to rig engine	:	17¼ hr
Time lost, waiting on surveyors	:	1 hr
Time lost, stand by recorder	:	17¼ hr
Drilling time	:	840½ hr
Number of shifts worked	:	147
Maintenance to drill	:	107½ hr
Bentonite used	:	28¼ bags
Fishing job	:	¾ hr
Drilling rate	:	46 ft/hr

DRILLER	FOOTAGE	NO. OF SHIFTS	FOOTAGE/SHIFT
J. Chandler	12,887	36	358
K. Suehle	16,436	71	231
F. Reith	7198	27	267
J. Keunen	208	1	208
J.G. Halls	2170	12	181





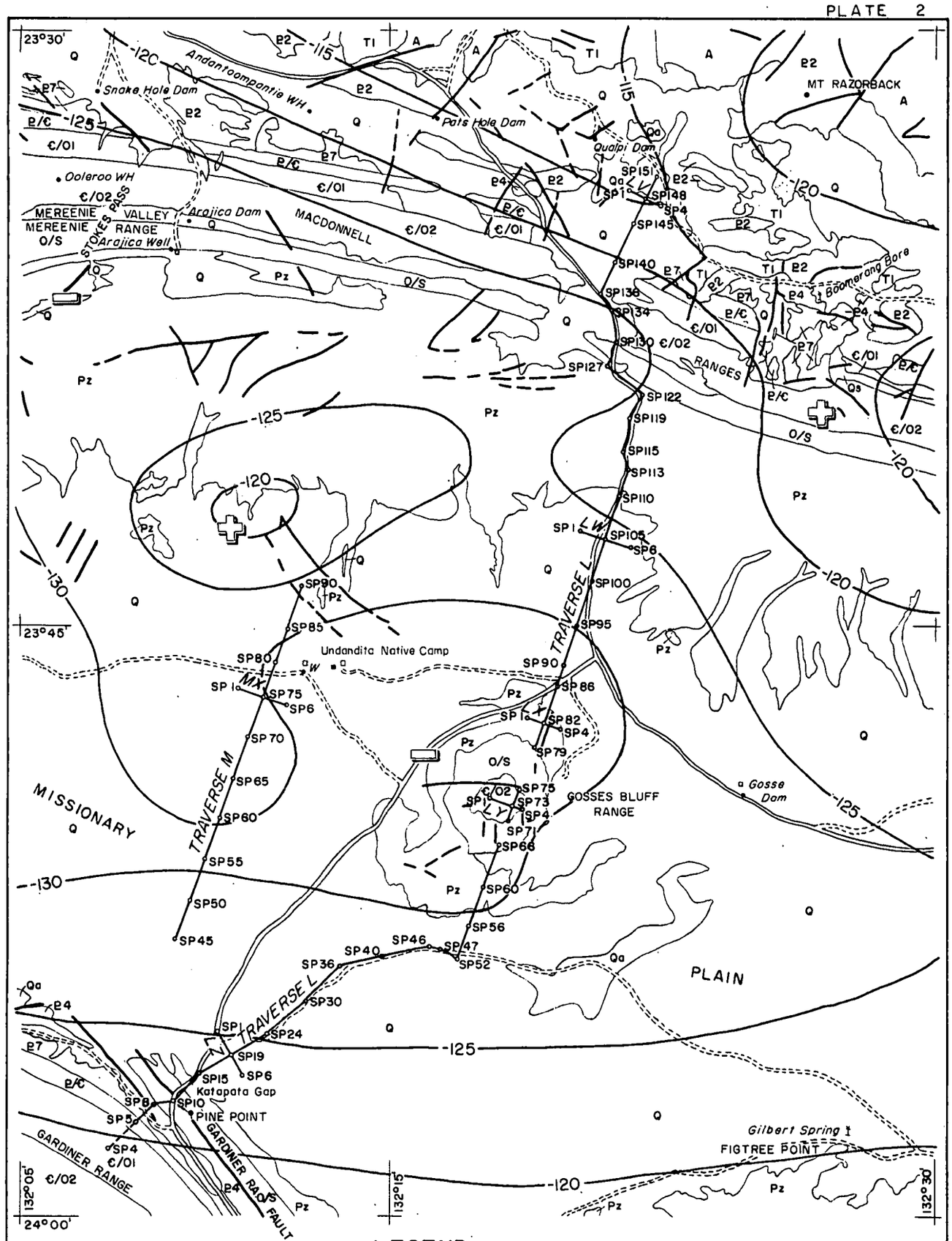
GOSSES BLUFF SEISMIC SURVEY
AMADEUS BASIN N T 1962
LOCALITY MAP

SCALE IN MILES

20 0 20 40 60 80

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. F 53/83-24
TO ACCOMPANY RECORD No 1964/66

GOSSES BLUFF N.T. SEISMIC SURVEY, 1962



LEGEND

	FORMATION	AGE
Qa, Q	Sand and sand dunes, cover Alluvium	QUATERNARY
T1		TERTIARY
K		CRETACEOUS
Pz	Pertnjara Formation	PALAEOZOIC
O/S	Mereenie Sandstone	ORDOVICIAN-SILURIAN
€/02	Larapinta Group	CAMBRIAN-ORDOVICIAN
€/01	Pertaoorrta Formation	
P/€	Arumbera Greywacke	UPPER PROTEROZOIC-CAMBRIAN
P7	Pertatataka Formation	UPPER PROTEROZOIC
P4	Bitter Springs Limestone	
P2	Heavitree Quarzite	
A	Basement	ARCHAEAN

Fault

Probable Fault

-120 Gravity Contour, based on BMR Map G69-440-2

High Anomaly

Low Anomaly

Road

Vehicular Track

SP86 Traverse

4°30'

M.N.

T.N.

MILES 4 2 0 4 8

GEOLOGY, BOUGUER ANOMALIES AND SEISMIC TRAVERSES

(Geology after Institute Francais du Petrole)

TO ACCOMPANY RECORD No 1964/66

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

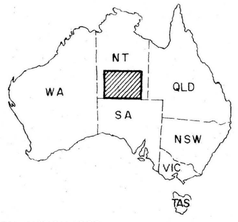
F53/B3-67

GOSSES BLUFF, NT, SEISMIC SURVEY, 1962

AMADEUS BASIN, NT
REGIONAL GEOLOGY

SCALE IN MILES
10 0 10 20 30 40 50 60

LOCATION



MAP DATA

PROJECTION: LAMBERT CONFORMAL CONIC STANDARD PARALLELS 24°40' AND 27°20'.

CONTROL: ASTRONOMICAL FIXATIONS BY THE DIVISION OF NATIONAL MAPPING.

DETAIL: BASE MAP FROM 1:1,000,000 I.C.A.O. AERONAUTICAL CHARTS, (3231) LAKE MACKAY, (3232) ALICE SPRINGS, (3343) ODNADATTA (2nd EDITION) AND (3344) PETERMANN RANGES. GEOLOGY FROM DRAFT COPY BY BMR GEOLOGICAL BRANCH AT 12 MILES TO 1 INCH APPROXIMATE SCALE. PLANIMETRY FROM 1:1,000,000 I.C.A.O. CHARTS.

RELIABILITY: PLANIMETRIC – SKETCH
GEOLOGICAL – REGIONAL GEOLOGY

LEGEND

	Deep weathering profile (laterite) Superimposed on formations concerned.	UPPER PALAEOZOIC AND DEVONIAN	Sandstones, conglomerates, shales, "Pertnjara Series", Mereenie and Dulcie Sandstones
RECENT AND PLEISTOCENE	Aeolian sands.	ORDOVICIAN AND CAMBRIAN	Sandstone, limestone, dolomite, shale, quartz greywacke, (includes members of "Perfoocorta" and Larapinta "Groups" and the "Sandover Beds")
	Alluvium, wash, red earth soil, calcrete evaporites, clays, terrace gravels.	PROTEROZOIC	Sandstone, quartzite, shale, limestone, conglomerate, boulder beds.
TERTIARY	Chalcedony, calcareous silt, gypseous clays.	UNDIFFERENTIATED PRECAMBRIAN	Gneiss, schist, amphibolite, granite, granodiorite, basic intrusive pegmatites, dolerite, "Arunta Complex"
MESOZOIC AND PERMIAN	Undifferentiated sandstones, siltstones, claystones, also silty sandstones, boulder bed, arkose and conglomerate of "Finke Series."		Granite.

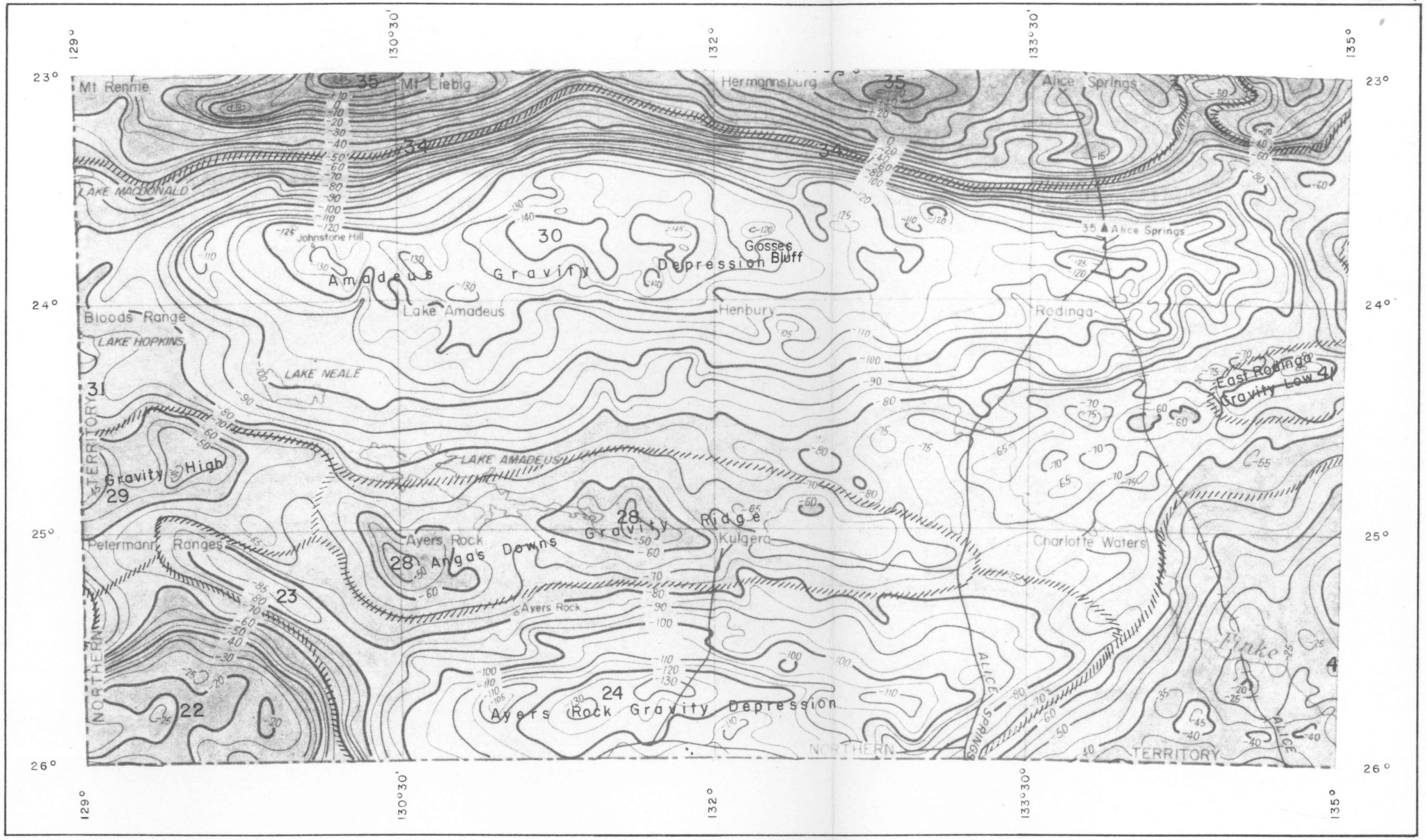
STRUCTURES (after Brunnschweiler 1957)
- Fault
- AN Areyonga Nappe Thrust
- BN Blatherskite " "
- CN Chandler " "
- TN Trickett Creek Disturbance
- Anticline
- Ane Angas North closure in L. Ordovician?
- Ans Angas South " " L. Ordovician
- Ga Gardiner " " M. Cambrian
- He Henbury " " M. Cambrian
- Hu Hughes " " M. Cambrian
- Ja James " " M. Cambrian
- Ke Kernot " " L. Ordovician?
- Ma Maryvale " " U. Cambrian?
- Oo Ooraminna " " L. Cambrian
- Po Palm Valley " " U. Ordovician
- Te Tempe " " U. Cambrian
- Sk Stokes Creek " " M. Cambrian?
- Sm Storm Creek " " M. Cambrian
- Wa Waterhouse " " M. Cambrian

Aeromagnetic flight-line
Cross-section referred to in Plate 5
Cross-section referred to in Plate 5

FIRST EDITION, MARCH 1960

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS F53/B3-26
To Accompany Record No 1964/66

PLATE 4



BASED ON G69-475-2

LEGEND

- Isogals, values in milligals
- ▲ 35 — BMR gravity pendulum station
- □ — BMR gravity reading at aerodrome
- Ryan — BMR 1:250,000 gravity map area
- Gravity 'High'
- Gravity 'Low'
- 12 — Anomaly number
- Feature boundary

Source of gravity information
Reconnaissance Gravity Survey (1961-62)
Record No 1963/52

AMADEUS BASIN N.T.

BOUGUER ANOMALIES

SCALE IN MILES

40 0 40 80 120

Reference – Division of National Mapping 40 miles to 1 inch topographic map

CONTOUR INTERVAL 5 MILLIGALS

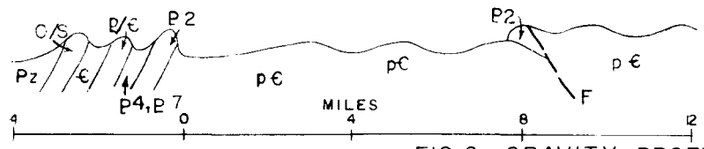
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS F53/B3-27

TO ACCOMPANY RECORD No 1964/66

SEISMIC SURVEY

FIG. 1. GEOLOGICAL CROSS-SECTION

Pz	Pertnjara Formation
O/S	Pacoota and Mereenie Sandstones
€	Jay Creek Limestone
P/€	Arumbera Greywacke
P4,P7	Bitter Springs Limestone and Pertatataka Formation
P2	Heavitree Quartzite
p€	Gneiss, schist, and amphibolite



Cross-section X Y shown in Plate 3
(After N.O.Jones, personal communication)

FIG 2. GRAVITY PROFILE

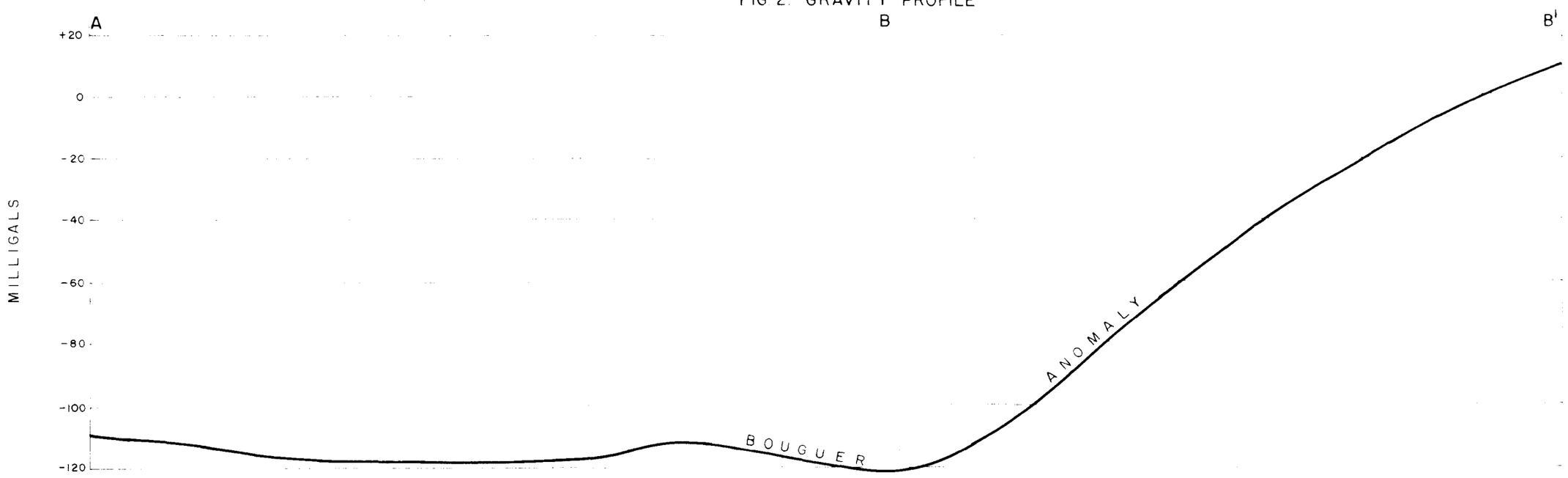
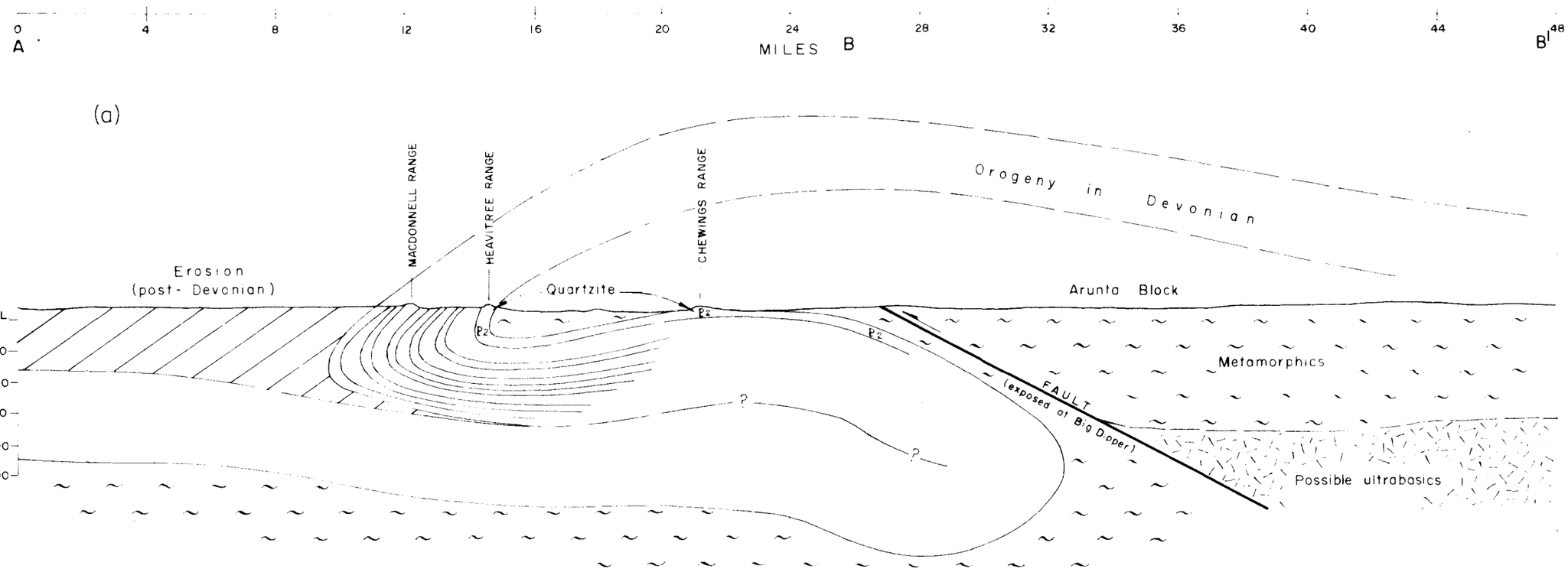


FIG. 3 GEOLOGICAL CROSS-SECTIONS INFERRED FROM GRAVITY DATA



NOTE CROSS-SECTIONS DRAWN ALONG
LINE AB' IN PLATE 3
FOR INFORMATION REFER RECORD No. 1962/24

AMADEUS BASIN, N.T.

GEOLOGICAL AND GRAVITY CROSS-SECTIONS

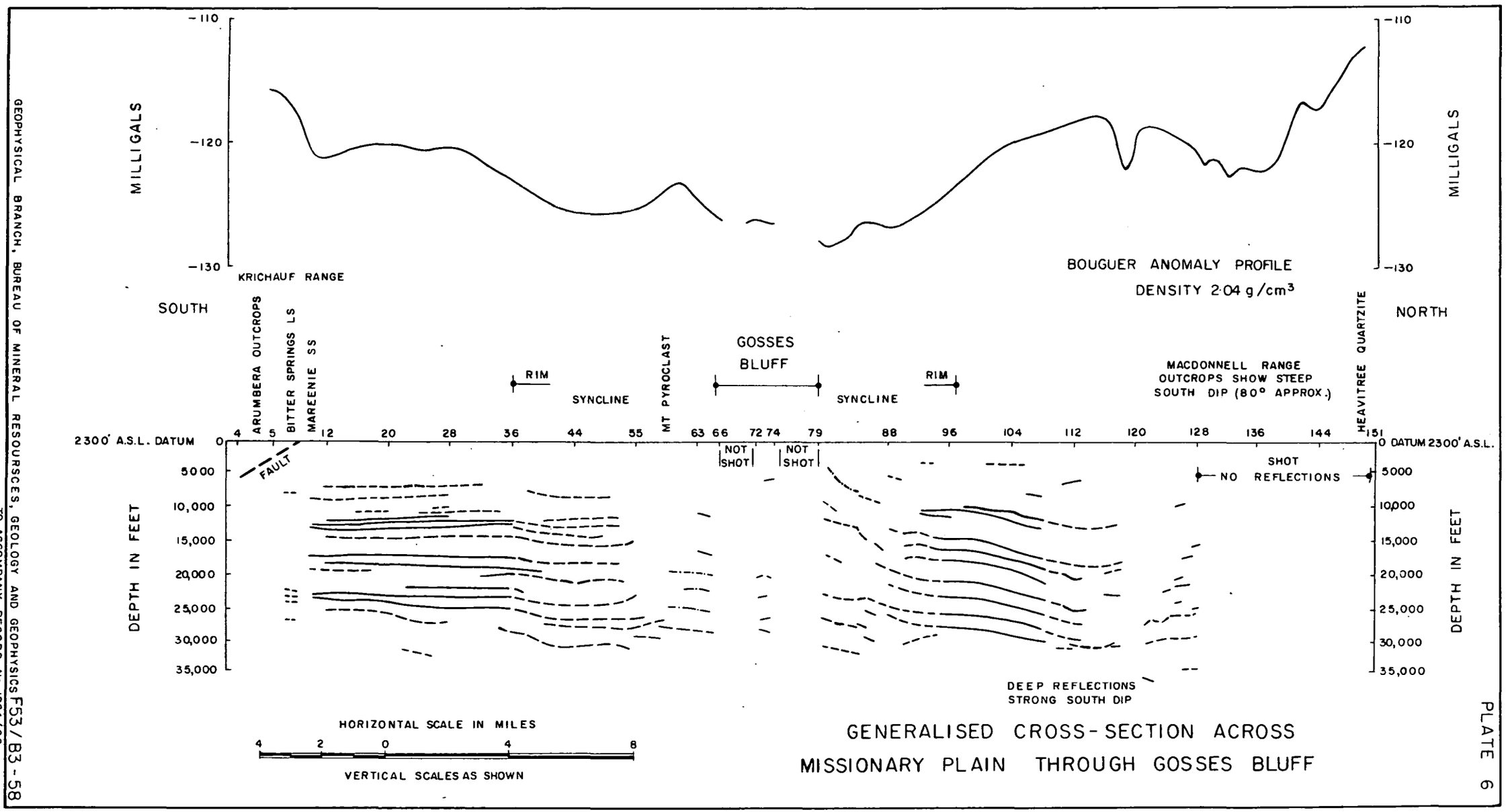
SCALES AS SHOWN

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS F53/B3-28

TO ACCOMPANY RECORD No 1964/66

GOSSES BLUFF SEISMIC SURVEY

GOSSES BLUFF NT, SEISMIC SURVEY, 1962



GENERALISED CROSS-SECTION ACROSS MISSIONARY PLAIN THROUGH GOSSES BLUFF

PLATE 6

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
TO ACCOMPANY RECORD No 1964/66
F53/B3-58

PLATE 7

TWO - WAY REFLECTION TIME (tc msec)

ONE - WAY VERTICAL TIME (t msec)

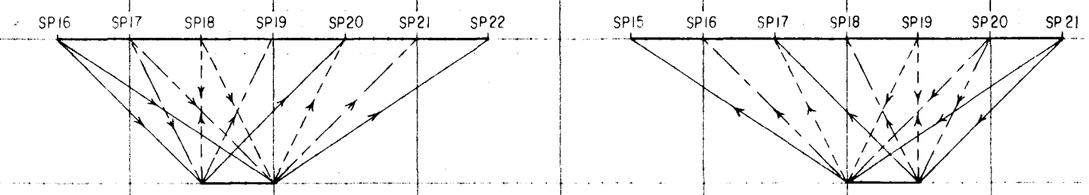
INTERVAL VELOCITY and AVERAGE VELOCITY (Vi ft/sec) (Va ft/sec)

INTERVAL VELOCITY

AVERAGE VELOCITY

TIME / DEPTH

SPREAD LAYOUT OF VELOCITY PROFILE



DEPTH BELOW DATUM — 2300FT A.M.S.L. — 2000 4000 6000 8000 10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000

LITHOLOGY

FORMATION

AGE

(Based on G 85/3-18)

Time / depth curve (t-d)

Interval velocity (Vi)

Average velocity (Va)

LITHOLOGY

Sandstone Siltstone Shale Limestone

VELOCITY AND TIME VERSUS DEPTH

AREA GOSSES BLUFF NT

Basis t^2 Versus x^2

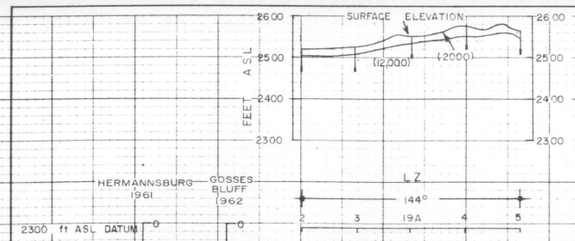
Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

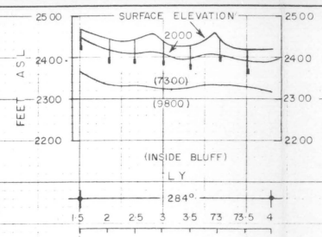
F53/B3-29

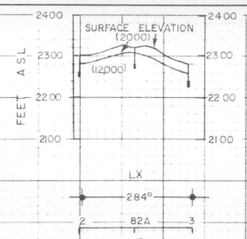
TO ACCOMPANY RECORD No 1964/66

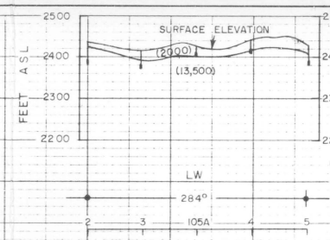

PLATE 8
VERTICAL OUTCROPS
SURFACE ELEVATION
FEET ASL
NOTE Cross-section plotted on time/depth relation found at Hermannsburg in 1961.
Gosses Bluff relation shown for comparison
HERMANNSBURG 1961
GOSSES BLUFF 1962
DATUM 2300 FT ASL
SHOT
BITTER SPRINGS LIMESTONE ?
FIRST-BREAK VELOCITIES (FT/SEC)
NOTES 1 THE FIRST LEGS OF MAIN REFLECTIONS ARE PLOTTED FROM VARIABLE-AREA CROSS-SECTIONS
2 REFLECTION TIMES ARE SHOWN
3 BETWEEN SP 88 AND SP 108 4 MILLISEC SHOULD BE ADDED TO REFLECTION TIMES
4 REFLECTIONS MARKED WITH AN 'M' ARE MIGRATED REFLECTIONS FROM OFFSET-SHOOTING
REFLECTION CROSS — SECTION
TRAVERSE L
FEET
VELOCITIES SHOWN IN FT/SEC
To Accompany Record No 1964/66
Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics
F53/B3-30

PLATE 9

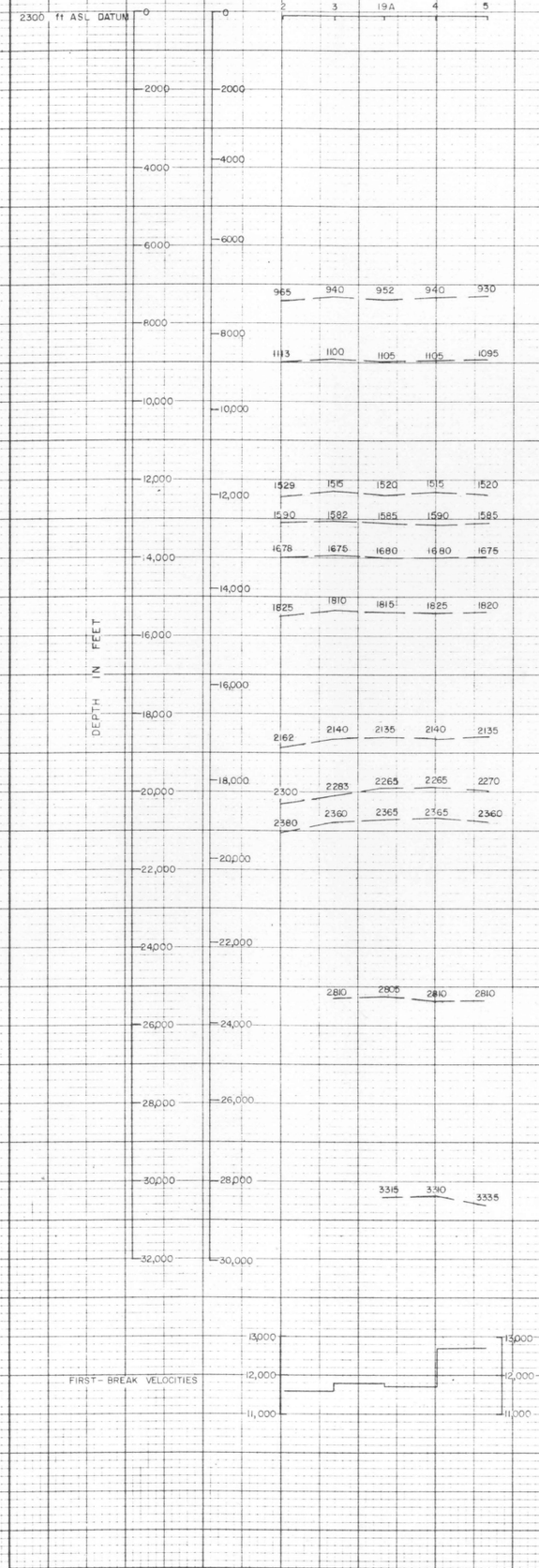


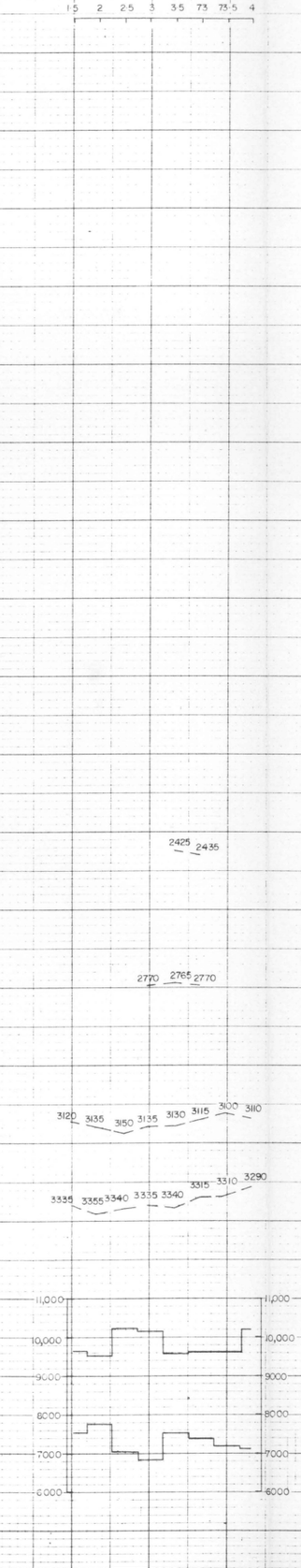


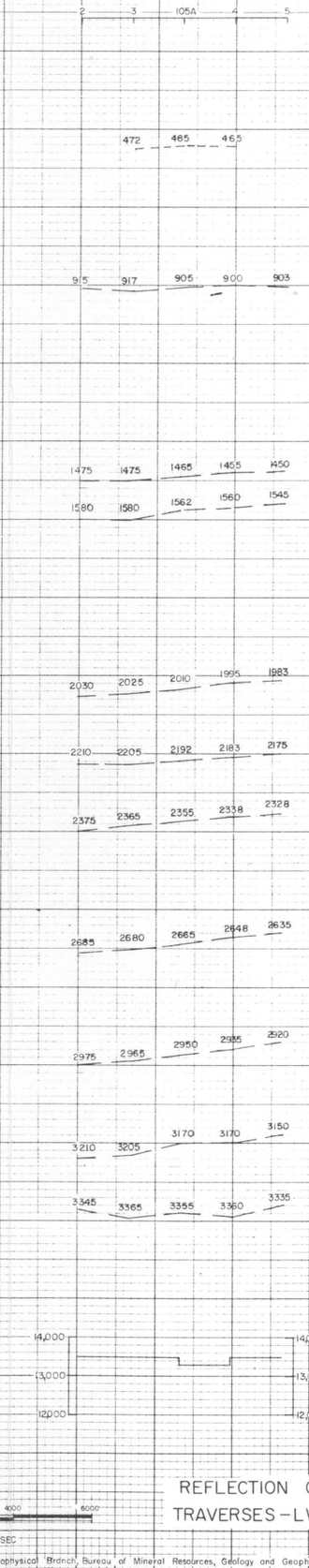




NOTE - Cross-section plotted on time/depth relation found at Hermannsburg in 1961. Gosses Bluff relation shown for comparison.





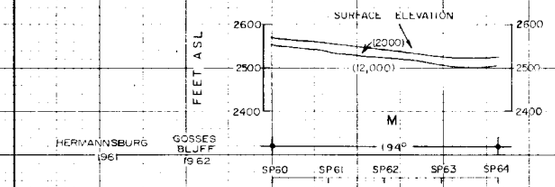


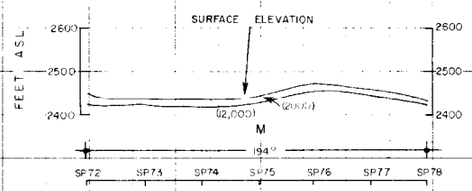
NOTES - 1. The first legs of reflections are plotted
2. Reflection times are shown

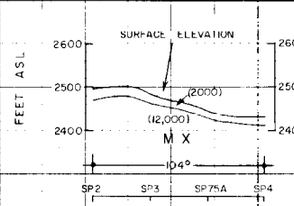
REFLECTION CROSS-SECTIONS TRAVERSES - LW, LX, LY, AND LZ

To Accompany Record No. 1964/66 — Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics — F 53 / B 3 - 31

PLATE 10







NOTE - Cross-section plotted on time/depth relation found at Hermannsburg in 1961. Gosses Bluff relation shown for comparison.

HERMANNSBURG 1961 | GOSSES BLUFF 1962 | GOSSES BLUFF 1962 | HERMANNSBURG 1961

2300ft ASL DATUM | DATUM 2300ft ASL

DEPTH IN FEET

0 2000 4000 6000 8000 10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000 32,000

1124 1130 1124 1129 1142
1265 1269 1274 1273 1281
1187 1211 1215
1344 1357 1374 1382 1395 1409 1424
1417 1405 1382 1374
1706 1711 1709 1718 1722
1803 1811 1827 1834 1854 1870 1877
1887 1903 1901 1906 1918
1867 1854 1844 1826
2005 2016 2034 2042 2061 2079 2094
2171 2183 2197 2212 2229 2247 2264
2385 2392 2393 2390 2411
2528 2546 2562 2575 2592 2610 2620
2607 2592 2587 2568
2696 2706 2698 2706 2719
2806 2822 2839 2855 2888 2897
2885 2872 2854 2836
3056 3072 3068 3075 3087
3169 3185 3192 3214 3228 3245 3261
3246 3229 3222 3206
3865 3855 3872 3879 3882 3881
3882 3876 3874 3867

FIRST-BREAK VELOCITIES

13,000 12,000 11,000 10,000

FIRST-BREAK VELOCITIES

NOTES 1 The first legs of reflections are plotted
2 Reflection times are shown

FEET
2000 0 2000 4000 6000
VELOCITIES SHOWN IN FT/SEC

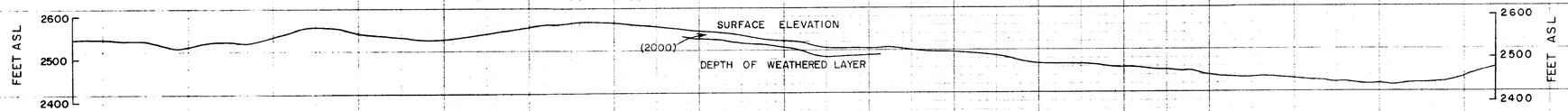
REFLECTION CROSS-SECTIONS TRAVERSES M AND MX

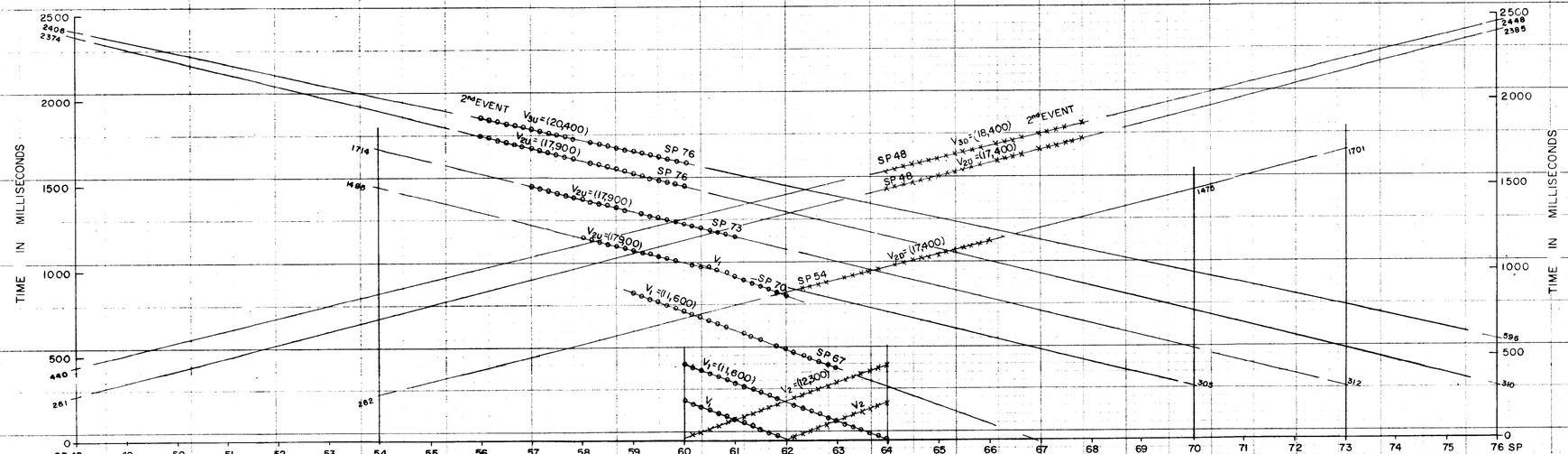
GOSSES BLUFF N.T., 1962

To Accompany Record No 1964/66

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics F53/B3-32

PLATE II





SP 67 80 lb at 80 – 100 ft

t_o	876	863	850	830	807	786	776	761	736	716	696	680	—	638	620	602	—	563	539	526	506	486	470	452	432
V_1	8							6	6	9	7	8	—	10	7	8	7	8	8	10	10	11	9	9	9
t_c	868	855	842	822	799	778	768	755	730	707	689	672	—	628	613	594	—	555	531	516	596	475	461	443	423

$W_c + E_c$

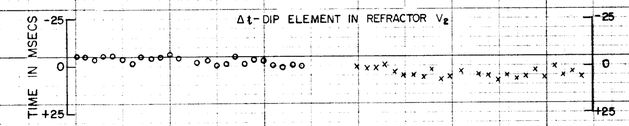
SP 54 140 lb at 87 – 122 ft

t_o	896	—	923	935	949	963	—	991	999	1014	1025	1034	—	1063	1077	1091	1101	1116	1127	1136	1153	1158	1176	1186	1203
$W_c + E_c$	30	32	31	32	30	30	30	32	31	28	27	28	—	30											30
t_c	866	—	892	903	919	933	—	959	968	986	998	1006	—	1033	1047	1061	1071	1086	1097	1106	1123	1128	1146	1156	1173

V_2

SP62 SP64 SP 66

Δt – DIP ELEMENT IN REFRACTOR V_2



SP 70 140 lb at 82½ – 100 ft

t_o	1214	1207	1194	1181	1169	1157	1145	1130	1121	1108	1097	1079	—	1059	1047	1036	1017	991	979	957	931	913	895	875	852
$W_c + E_c$	28										28	27	—	25	25	9	7	8	12	10	7	8	7	8	8
t_c	1186	1179	1166	1153	1141	1129	1117	1102	1093	1080	1069	1052	—	1034	1022	1027	1010	983	967	947	924	905	888	867	844

V_2

SP 58 SP 60 SP 62

SP 73 200 lb at 75 – 100 ft

t_o	1519	1506	1495	1481	1468	1458	1447	1431	1421	1407	1392	1382	—	1359	1346	1337	1323	1305	1296	1280	1269	1261	1249	1235	1227
$W_c + E_c$	26																26	25	25	23	23	26	24	25	29
t_c	1493	1480	1469	1455	1442	1432	1421	1405	1395	1381	1365	1356	—	1333	1320	1311	1297	1280	1271	1257	1246	1235	1225	1210	1198

V_2

SP57 SP59 SP61

SP 48 200 lb at 75 – 100 ft

t_o	1508	1518	1531	1545	1555	1568	1578	1597	1611	1620	1632	1645	—	1668	1685	1695	1705	—	1730	1742	1755	1766	1781	1795	—
$W_c + E_c$	31												31	30				30	29	29					29	29
t_c	1477	1487	1500	1514	1524	1537	1547	1566	1580	1589	1601	1614	—	1638	1655	1665	1675	—	1701	1713	1726	1737	1752	1766	—

V_2

SP64 SP66 SP68

SP 76 200 lb at 75 – 100 ft

t_o	1811	1797	1786	1773	1759	1747	1740	1726	1713	1699	1689	1677	—	1655	1643	1630	1618	1604	1591	1577	1565	1556	1548	1527	1519
$W_c + E_c$	27					27	28																28	27	27
t_c	1784	1770	1759	1746	1732	1720	1712	1698	1685	1671	1661	1649	—	1627	1615	1602	1590	1576	1563	1549	1537	1528	1518	1500	1492

V_2

SP56 SP58 SP 60

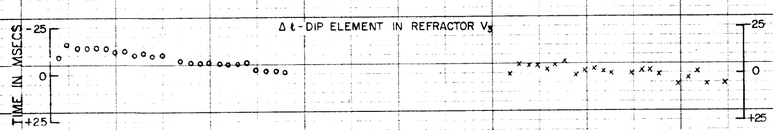
SP 48 200 lb at 75 – 100 ft

t_o	1594	1599	1612	1624	1637	1647	1656	1675	1683	1693	1705	1719	—	1742	1751	1762	1775	—	1803	1812	1820	1838	—	1861	—
$W_c + E_c$	34				34	33								33	32	32	32	31							31
t_c	1560	1565	1578	1590	1603	1614	1623	1642	1650	1660	1692	1686	—	1709	1719	1730	1743	—	1777	1781	1789	1812	—	1835	—

V_3

SP64 SP66 SP 68

Δt – DIP ELEMENT IN REFRACTOR V_3

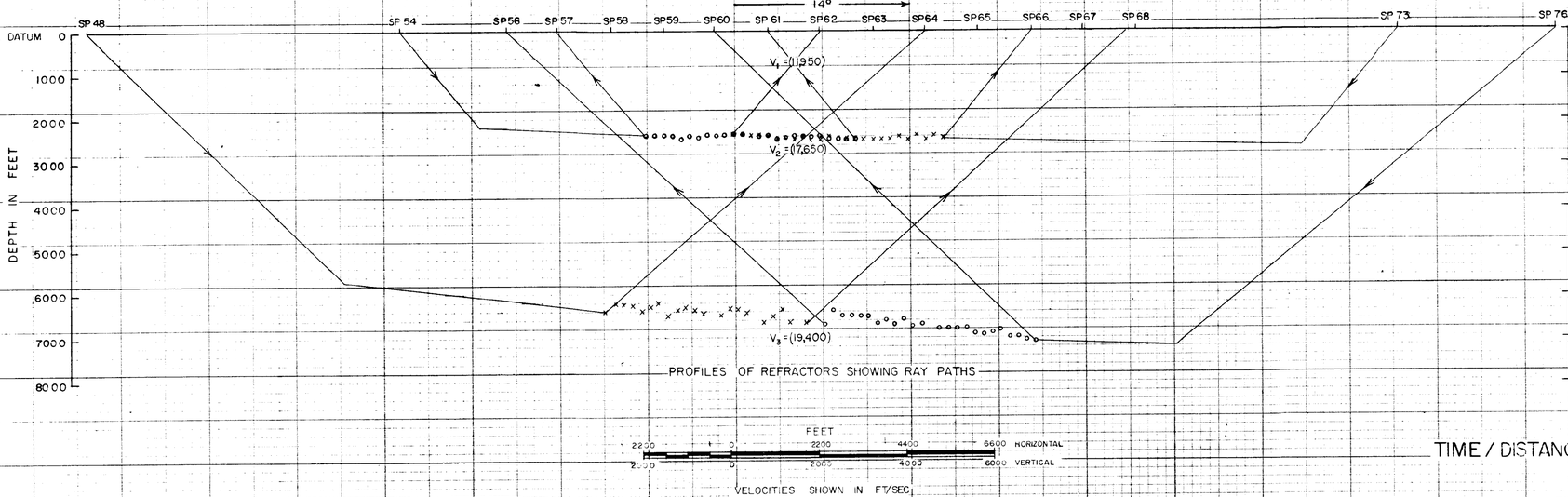


SP 76 200 lb at 75 – 100 ft

t_o	1924	1906	1898	1886	1875	1864	1855	1843	1833	1820	1813	1799	—	1780	1768	1758	1746	1736	1726	1713	1700	1693	1682	1671	1661
$W_c + E_c$	30									30	31								31	30					30
t_c	1894	1876	1868	1856	1845	1834	1825	1813	1803	1790	1782	1768	—	1749	1737	1727	1715	1705	1695	1683	1670	1663	1652	1641	1631

V_3

SP56 SP58 SP 60



PROFILES OF REFRACTORS SHOWING RAY PATHS

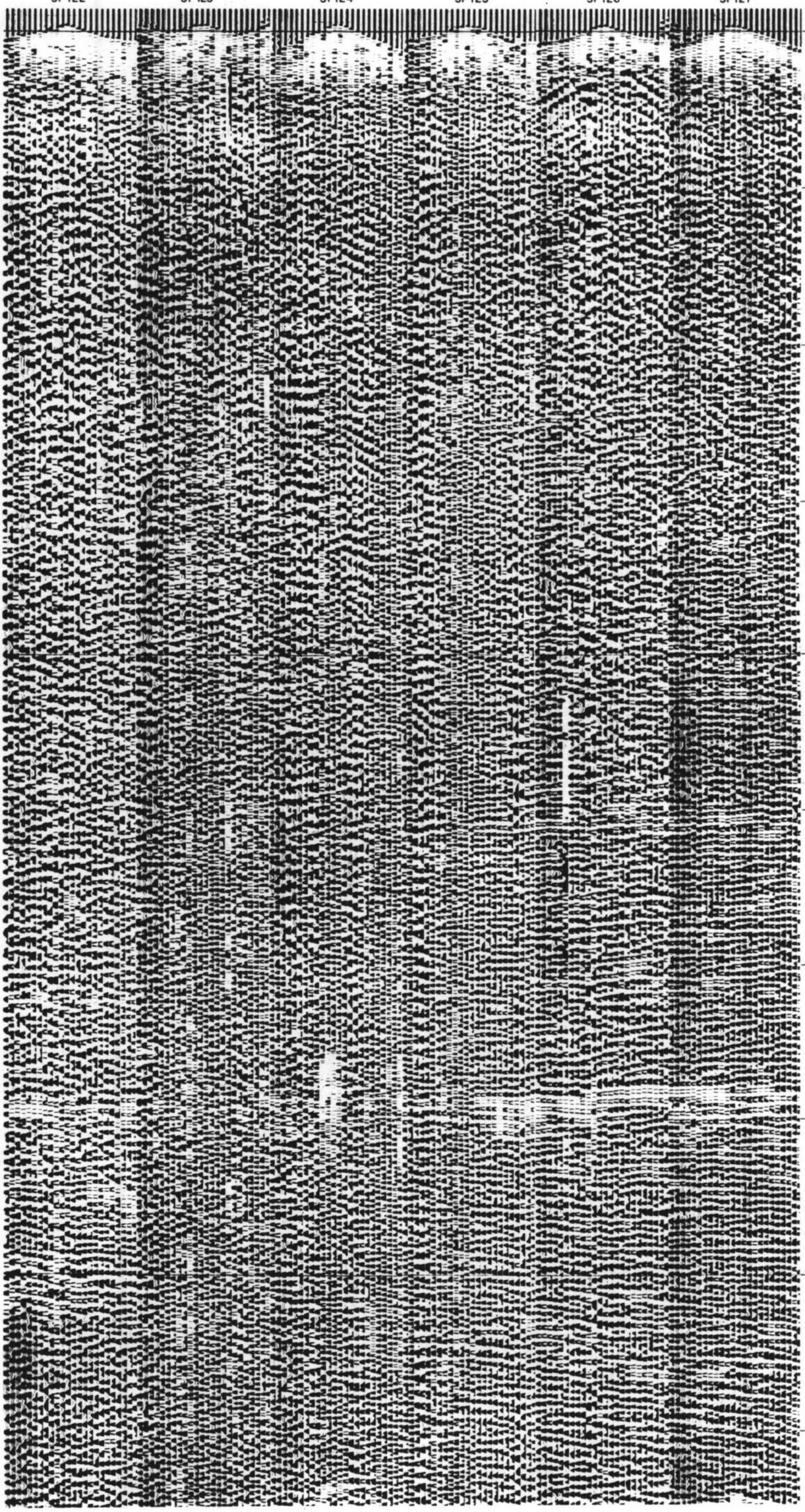
VELOCITIES SHOWN IN FT/SEC

TIME / DISTANCE CURVES AND INTERPRETATION
TRAVERSE M

To Accompany Record No 1964/66 Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics F 53 / B 3 – 33

BRAVEX PLOT N.Y. 1964

PLATE 12



TO ACCOMPANY RECORD No 1964/66

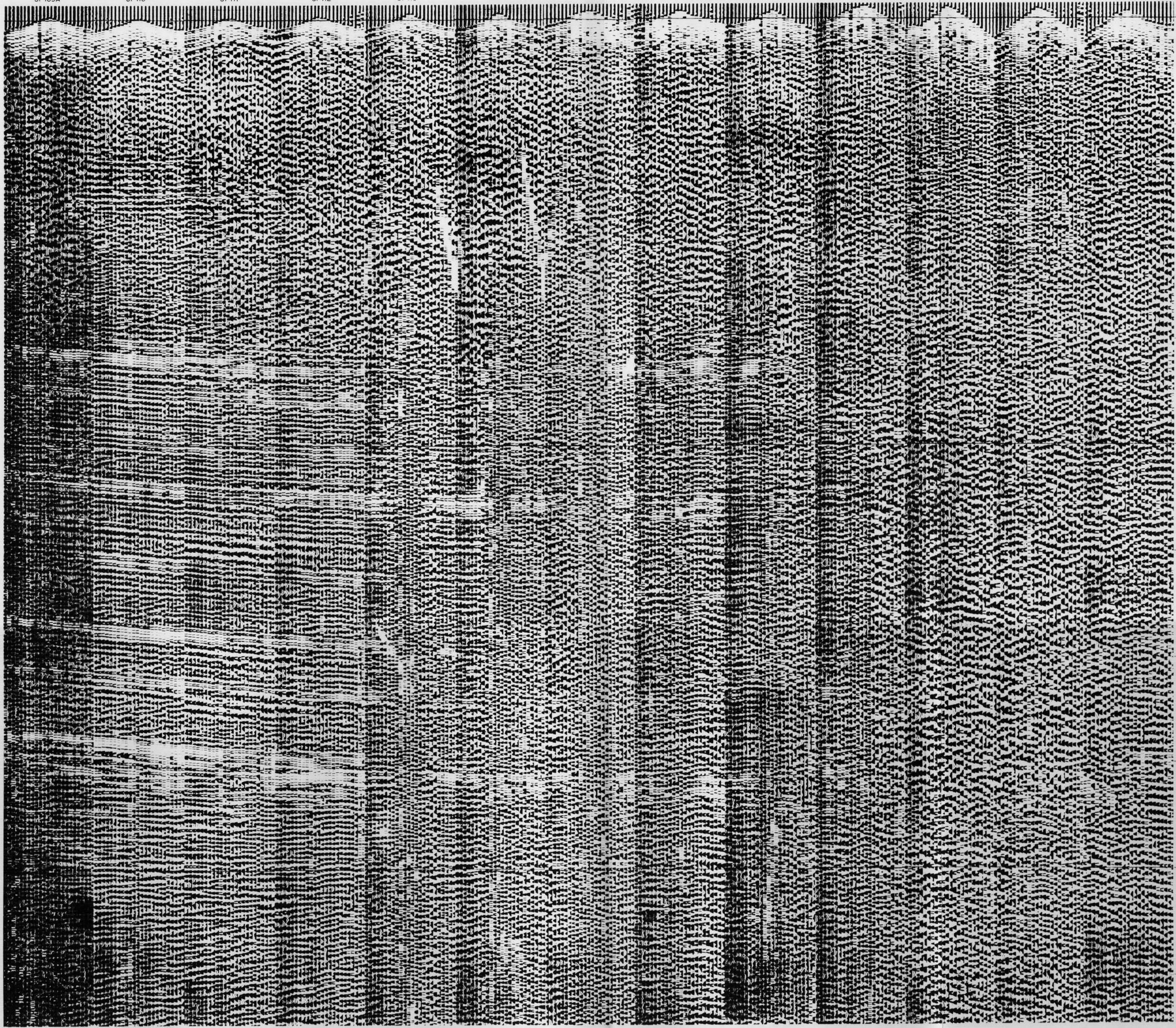
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 122 TO 127

F53/B3-34

GOSSES BLUFF, NT, 1962

PLATE 13



TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 109A TO 121

F53/B3-35

PLATE 14

SP 94 SP 95 SP 96 SP 97 SP 98 SP 99 SP 100 SP 101 SP 102 SP 103 SP 104 SP 105 SP 106 SP 107 SP 108

0 DATUM 2300' ASL

REFLECTION TIME (SECONDS) / DEPTH (FEET)

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

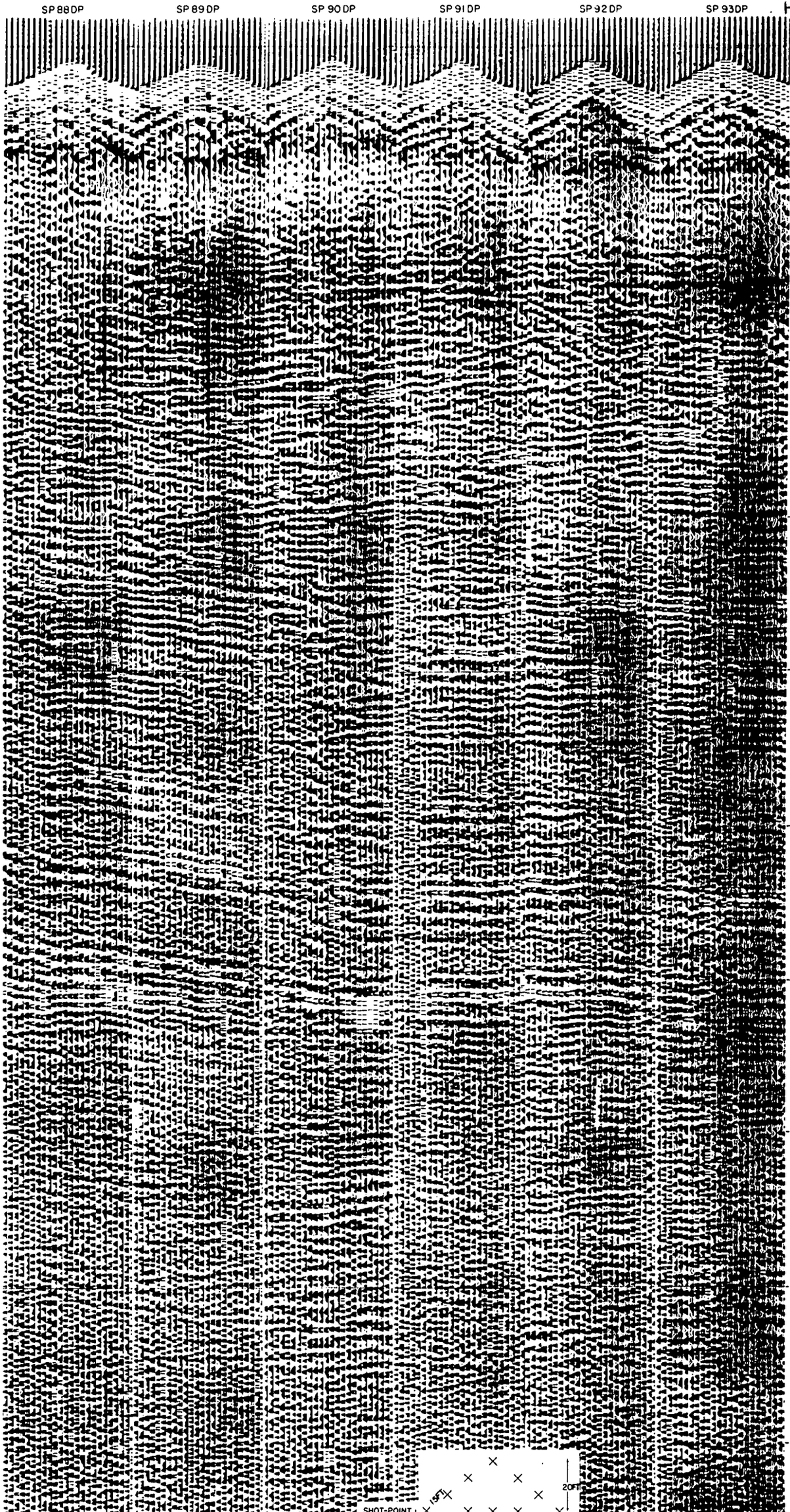
2000 4000 6000 8000 10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000 32,000 34,000 36,000 38,000 40,000

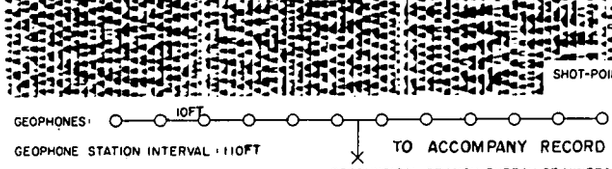
TRAVERSE L SHOT-POINTS 94 TO 108

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS F 53/83-36

TO ACCOMPANY RECORD No 1964/66

PLATE 15





TO ACCOMPANY RECORD No 1964/66

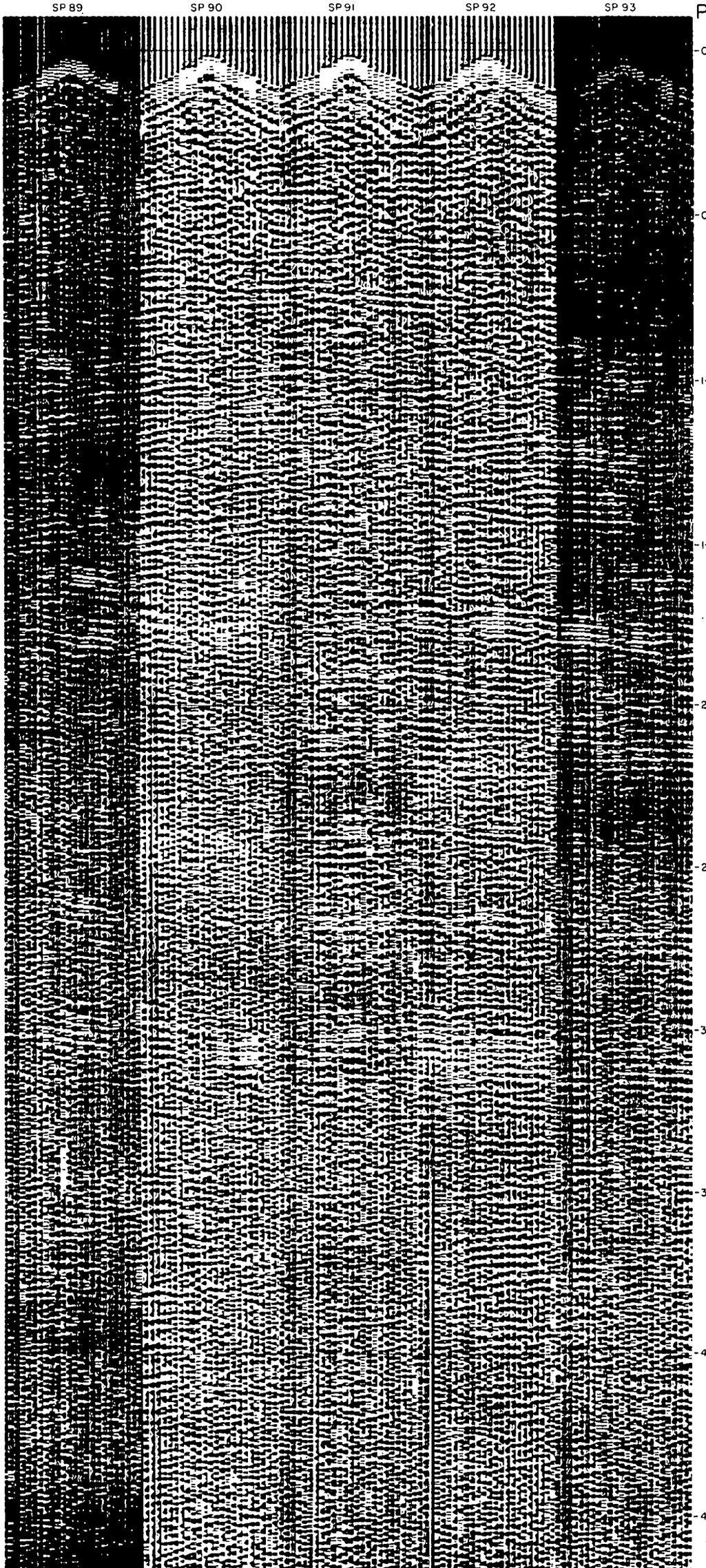
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L

SHOT-POINTS 88DP TO 93DP F53/B3-37

GOSSES BLUFF, NT, 1962

PLATE 16



GOSSES BLUFF, NT, 1962

GEOPHONES 6 AT 22 FT SPACING PER TRACE
TRACES 110 FT

TRAVERSE L SHOT-POINTS 89 TO 93

TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS F53/8 3-38

A

SPREAD: 1320 ft
GEOPHONES: 6 in line at 22-ft intervals
HOLES: One Depth 43-48 ft
Charge 20 lb
FILTERS: Record K24K66
Playback KK24KK57

B

SPREAD: 1320 ft
GEOPHONES: 12 in line at 10-ft intervals
HOLES: One Depth 35-45 ft
Charge 30 lb
FILTERS: Record KK18KK92
Playback KK24KK57

C

SPREAD: 1320 ft
GEOPHONES: 3 lines of 6 geophones at 22-ft intervals
Lines 20 ft apart parallel to traverse
HOLES: One Depth 37½-45 ft
Charge 30 lb
FILTERS: Record KK18KK92
Playback KK24KK57

D

SPREAD: 1320 ft
GEOPHONES: 3 lines of 6 geophones at 22-ft intervals
Lines 20 ft apart parallel to traverse
HOLES: 9 in diamond pattern 30 ft apart
Depth 44-48 ft
Charge 9 × 3⅓ lb
FILTERS: Record KK18KK92
Playback KK24KK57

E

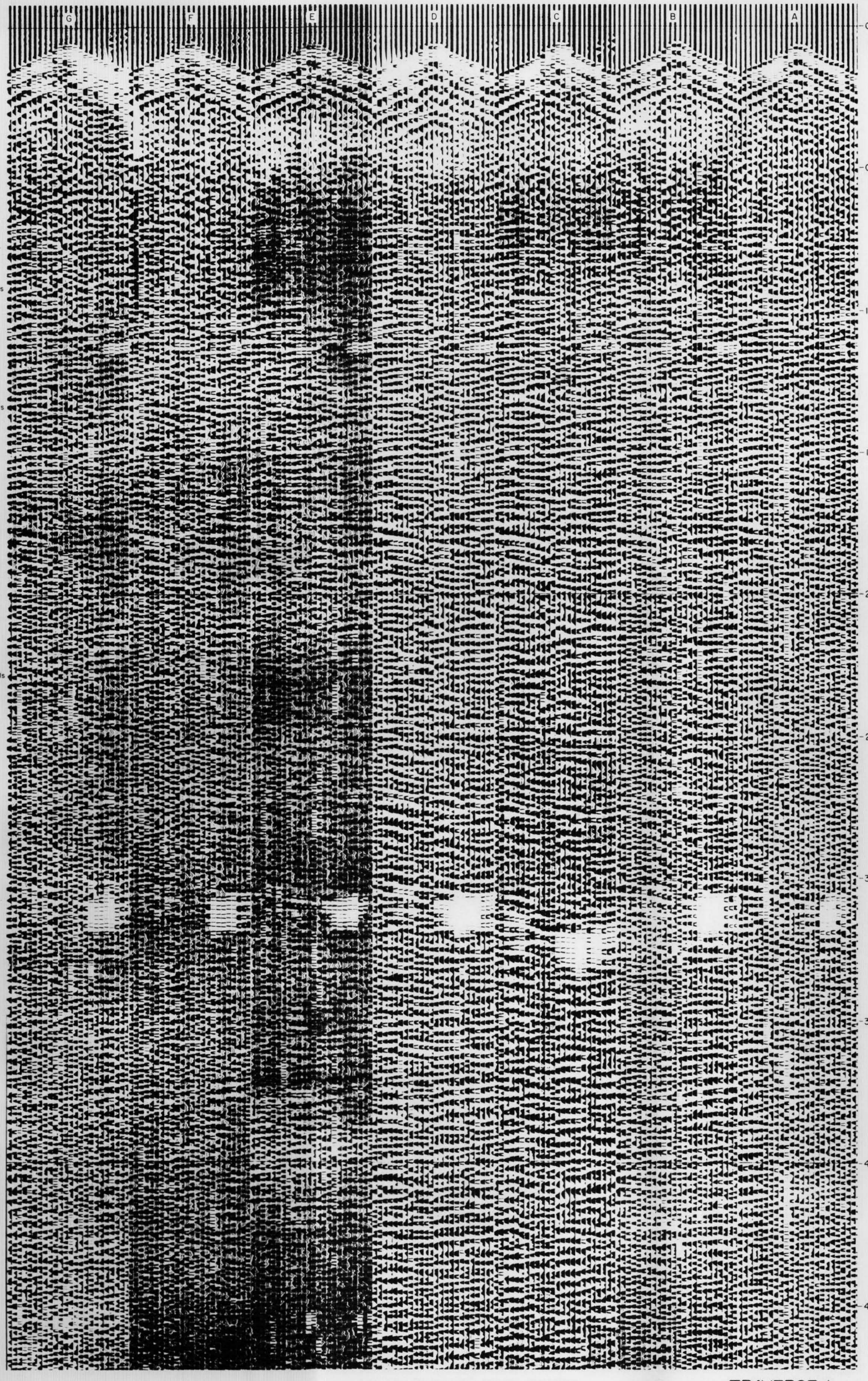
SPREAD: 1320 ft
GEOPHONES: 12 in line at 10-ft intervals
HOLES: 15 in diamond pattern
Depth 45 ft
Charge 15 × 2 lb
FILTERS: Record KK18KK92
Playback KK24KK57

F

SPREAD: 1320 ft
GEOPHONES: 12 in line at 10-ft intervals
HOLES: 12 perpendicular to traverse at 30-ft intervals
Depth 45 ft
Charge 12 × 2½ lb
FILTERS: Record KK18KK92
Playback KK24KK57

G

SPREAD: 1320 ft
GEOPHONES: 12 in line at 10-ft intervals
HOLES: 10 parallel to traverse at 10-ft intervals
Depth 45 ft
Charge 10 × 3½ lb
FILTERS: Record KK18KK92
Playback KK24KK57



TO ACCOMPANY RECORD No 1964/66

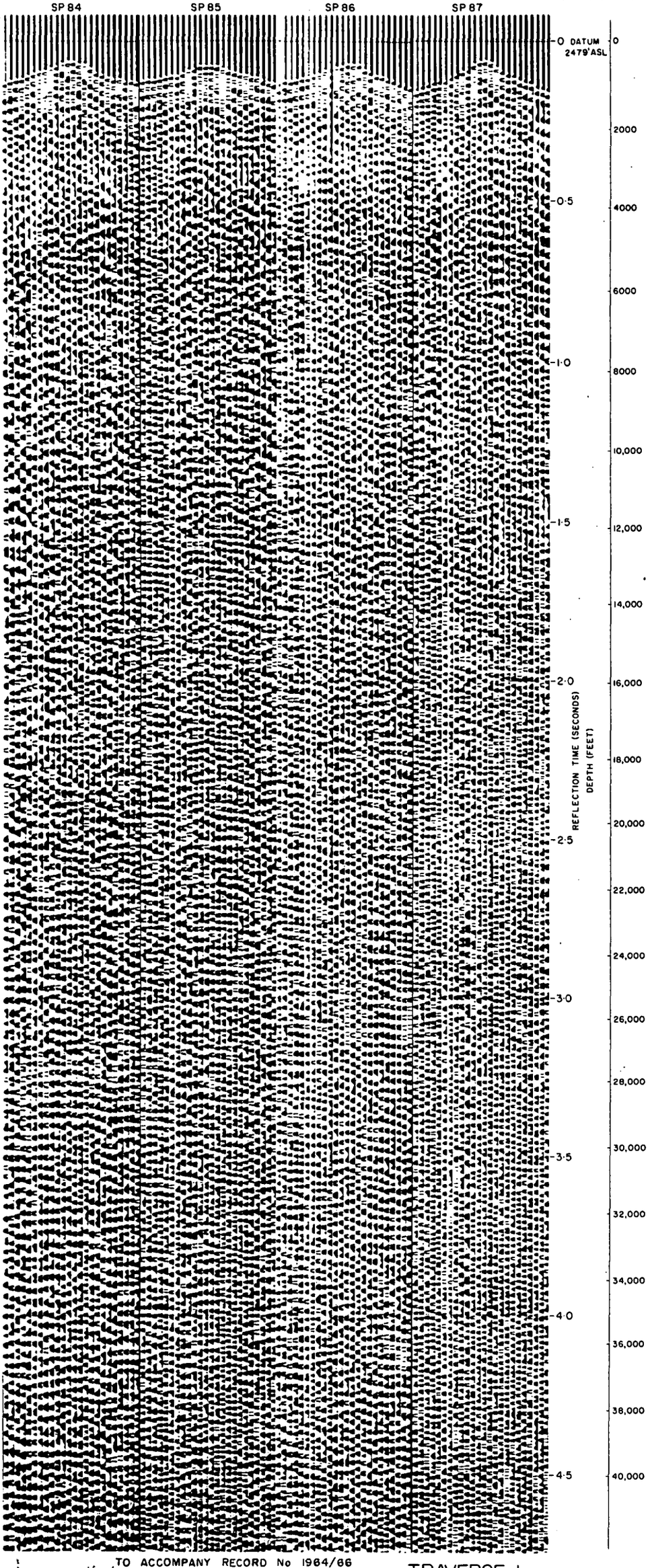
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L

SHOT-POINT 90 COMPARISON RECORDS

F53/B3-39

PLATE 18



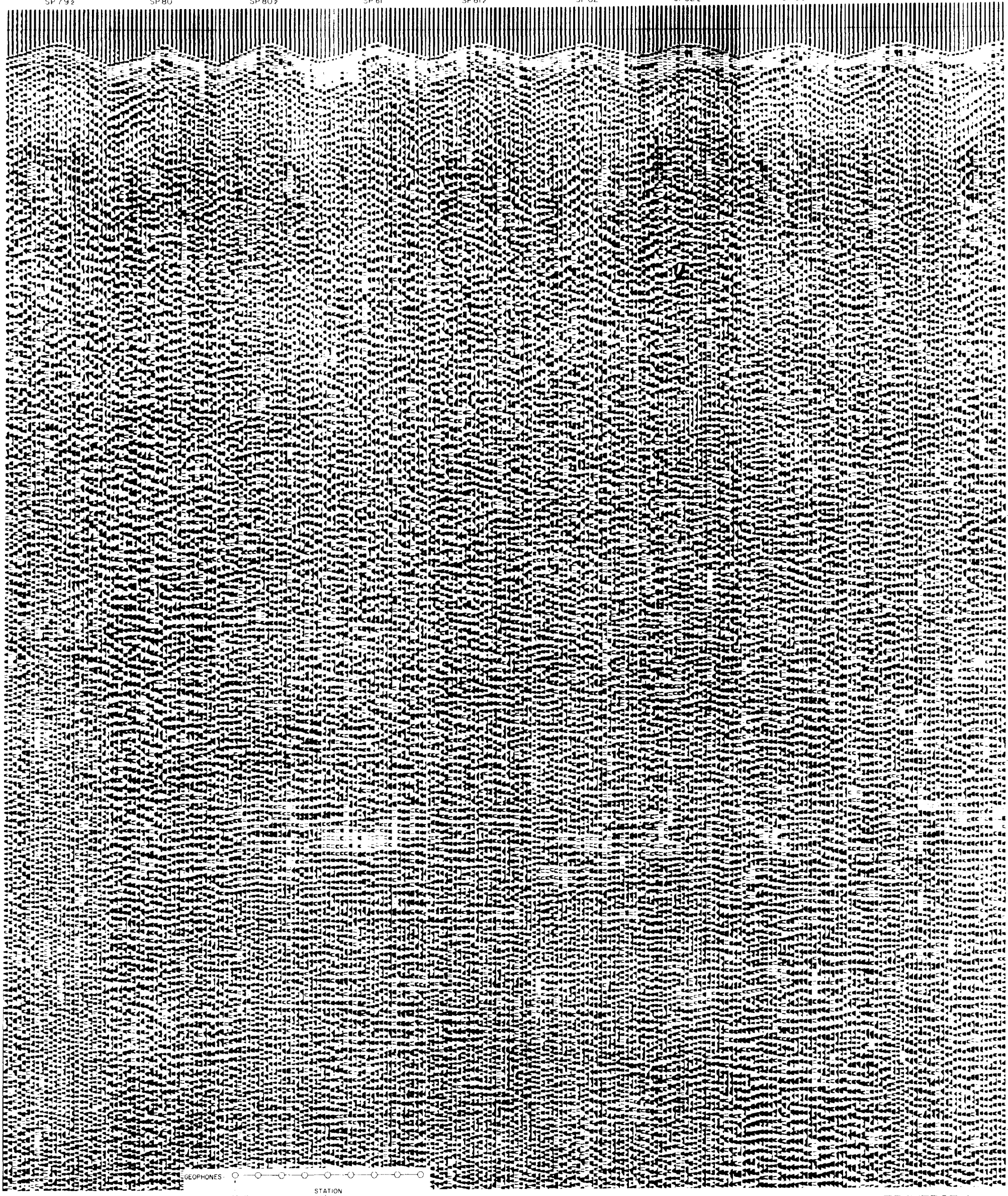
GOSSES BLUFF, NT, 1962

TO ACCOMPANY RECORD No 1964/66

TRAVERSE L

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS SHOT-POINTS 84 TO 87 F53/83-40

PLATE 19



NOTE NO DYNAMIC CORRECTIONS APPLIED

TO ACCOMPANY RECORD No 1964/66

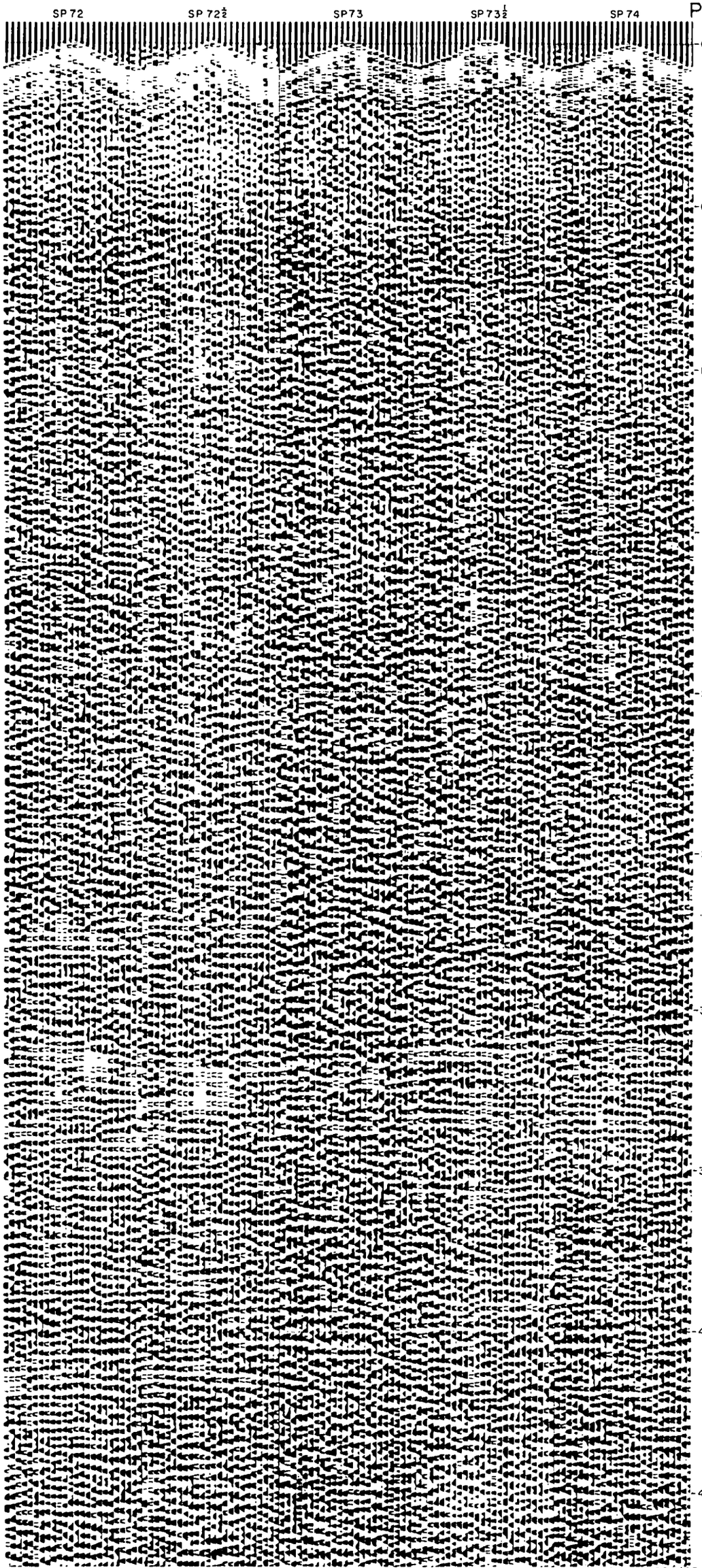
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 79½ TO 84

F53/B3-41

JOSSES BLUFF, N.T., 1962

PLATE 20



GEOPHONES: 5FT

GEOPHONE STATION INTERVAL: 55FT

NOTE: NO DYNAMIC CORRECTIONS APPLIED

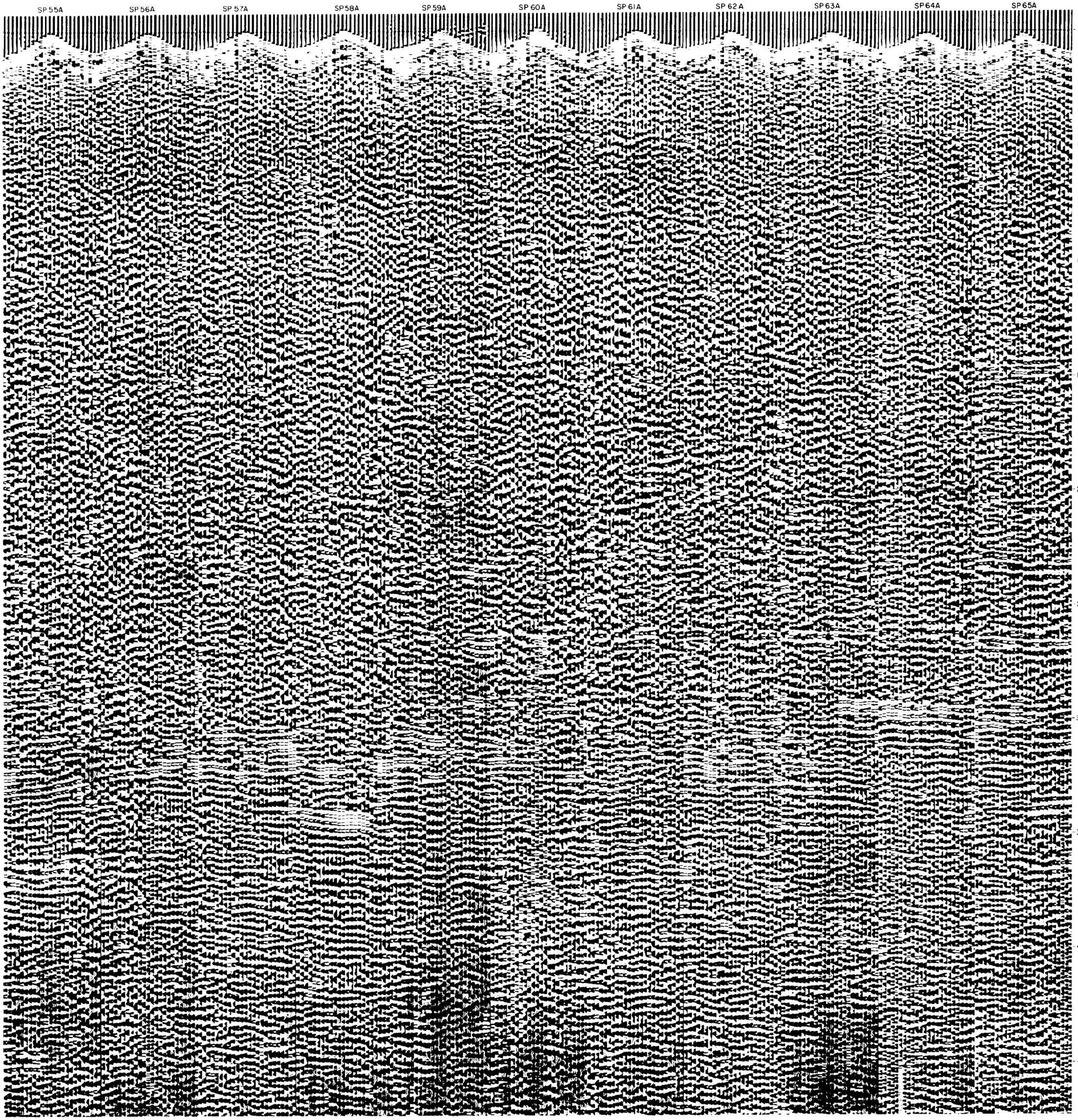
TO ACCOMPANY RECORD No 1964/66

TRAVERSE L
SHOT-POINTS 72 TO 74
(INSIDE BLUFF)

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

F53/83-42

PLATE 21



GOSSES BLUFF, NT. 1962

GEOPHONES 10FT

GEOPHONE STATION INTERVAL 110FT

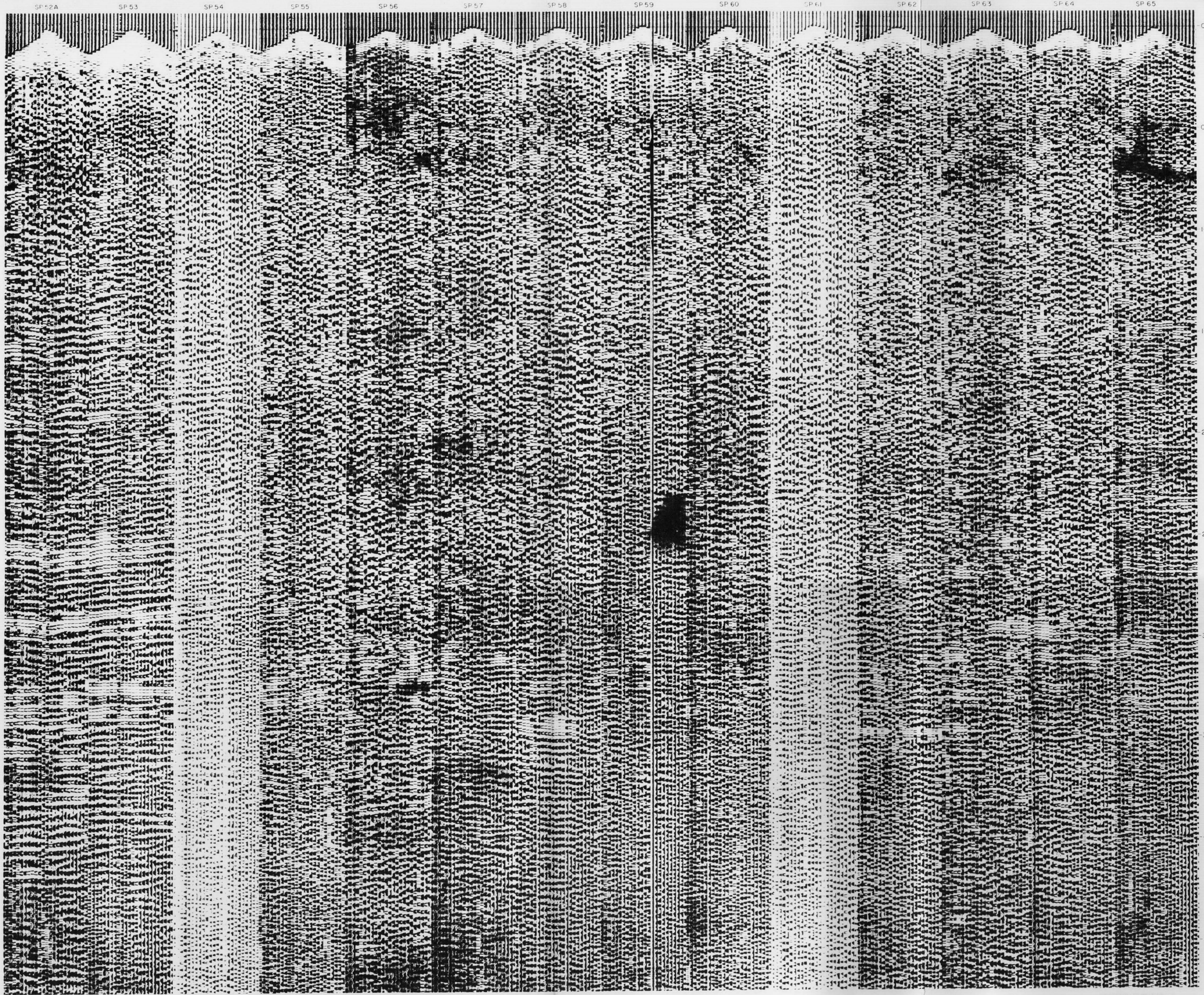
TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 55A TO 65A

F53/B3-43

PLATE 22



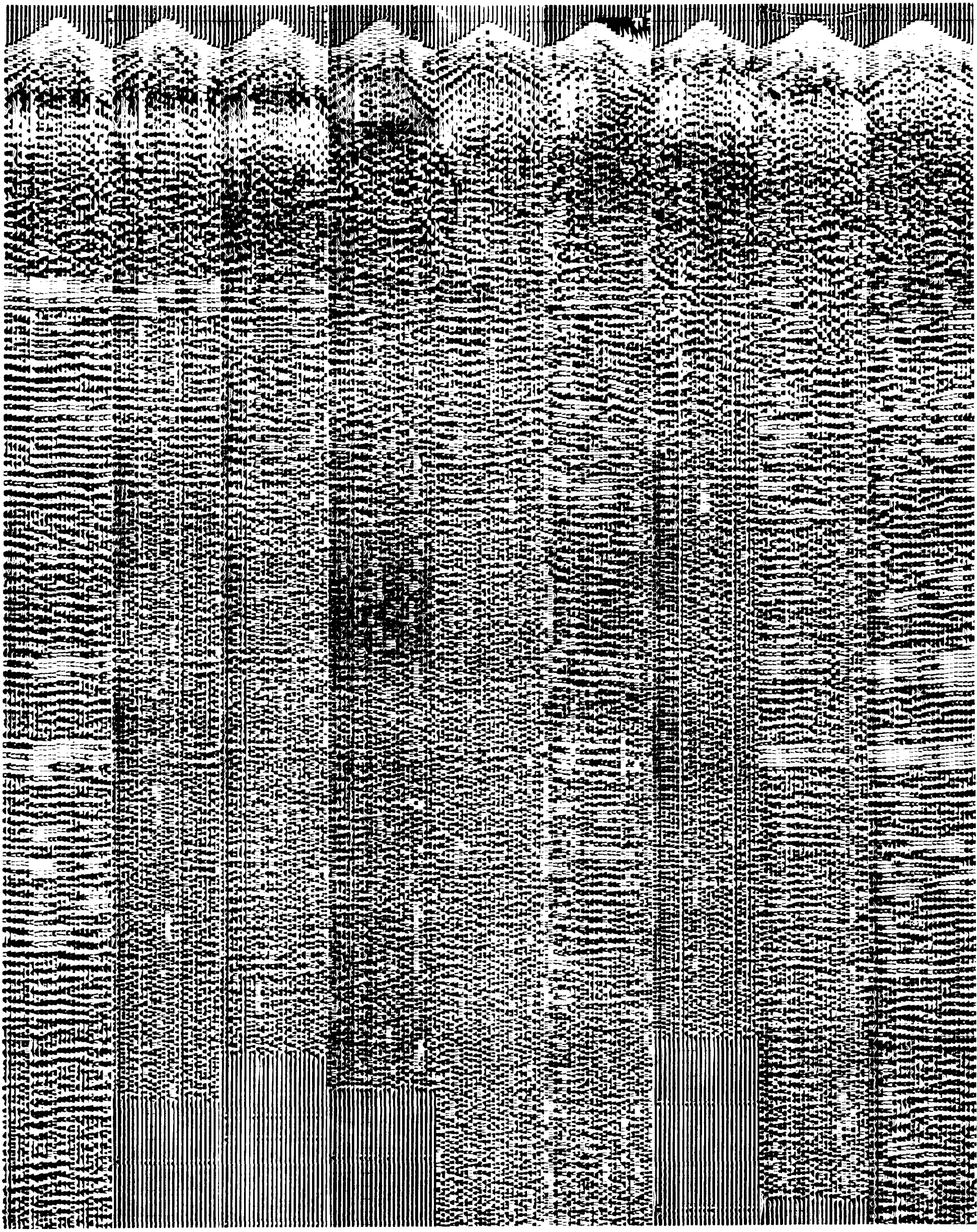
TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 52 TO 65

F53/B3-44

PLATE 23



GOSSES BLUFF, N.T., 1968

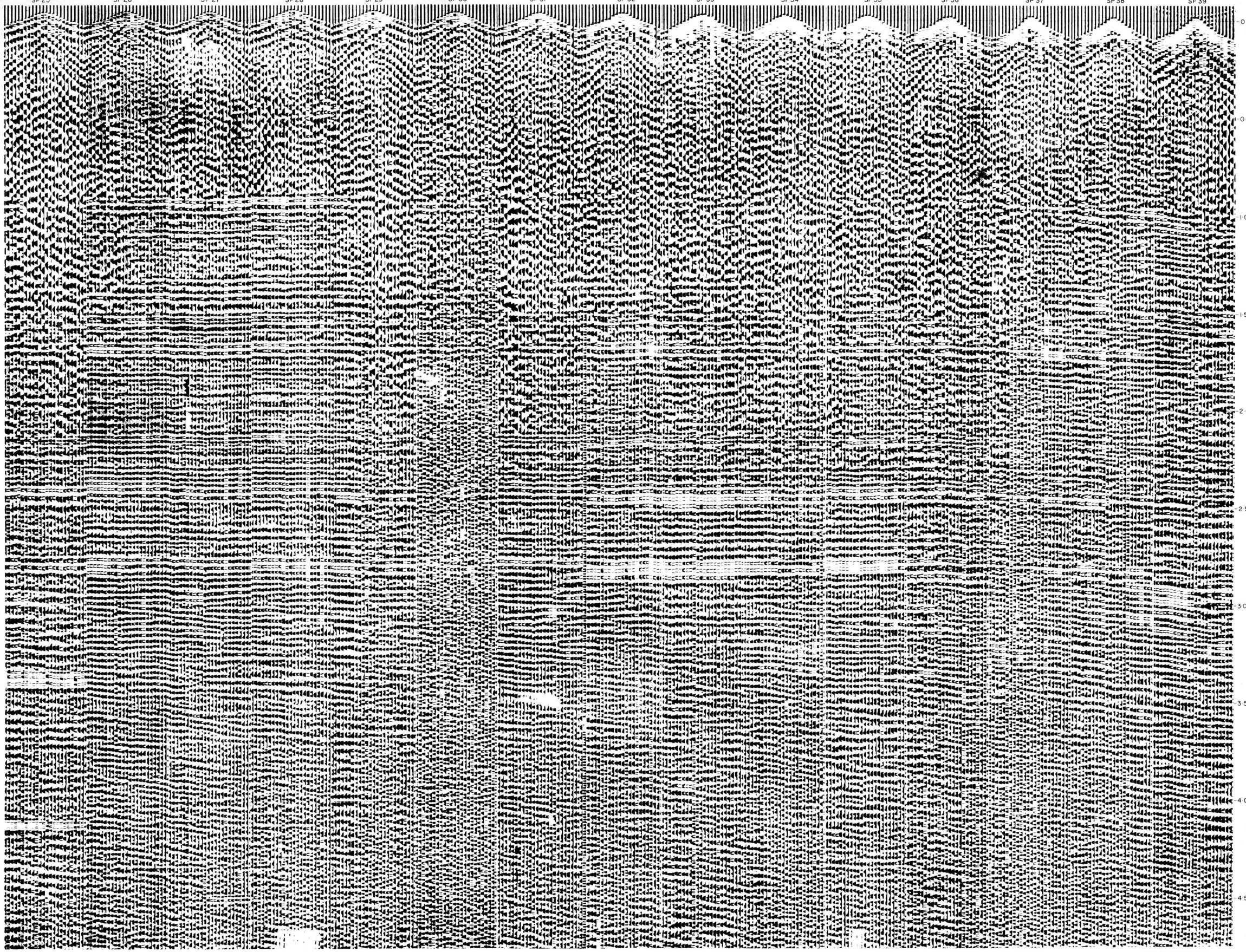
TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 40 TO 48

F53/B3-45

PLATE 24



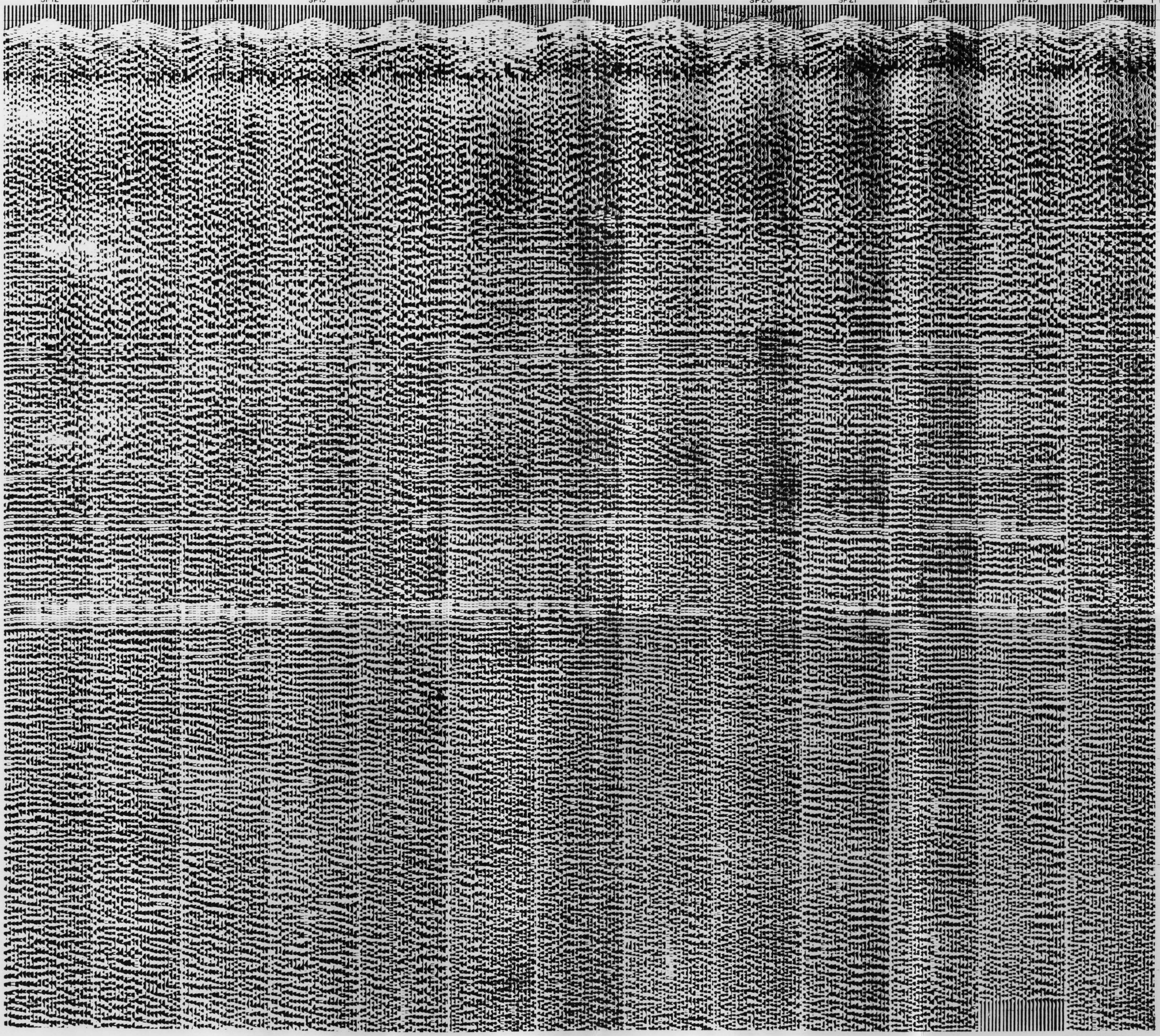
GOSSES BLUFF, N.T., 1962

TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 25 TO 39 F53/B3-46

PLATE 25



GOSSES BLUFF, N.T., 1962

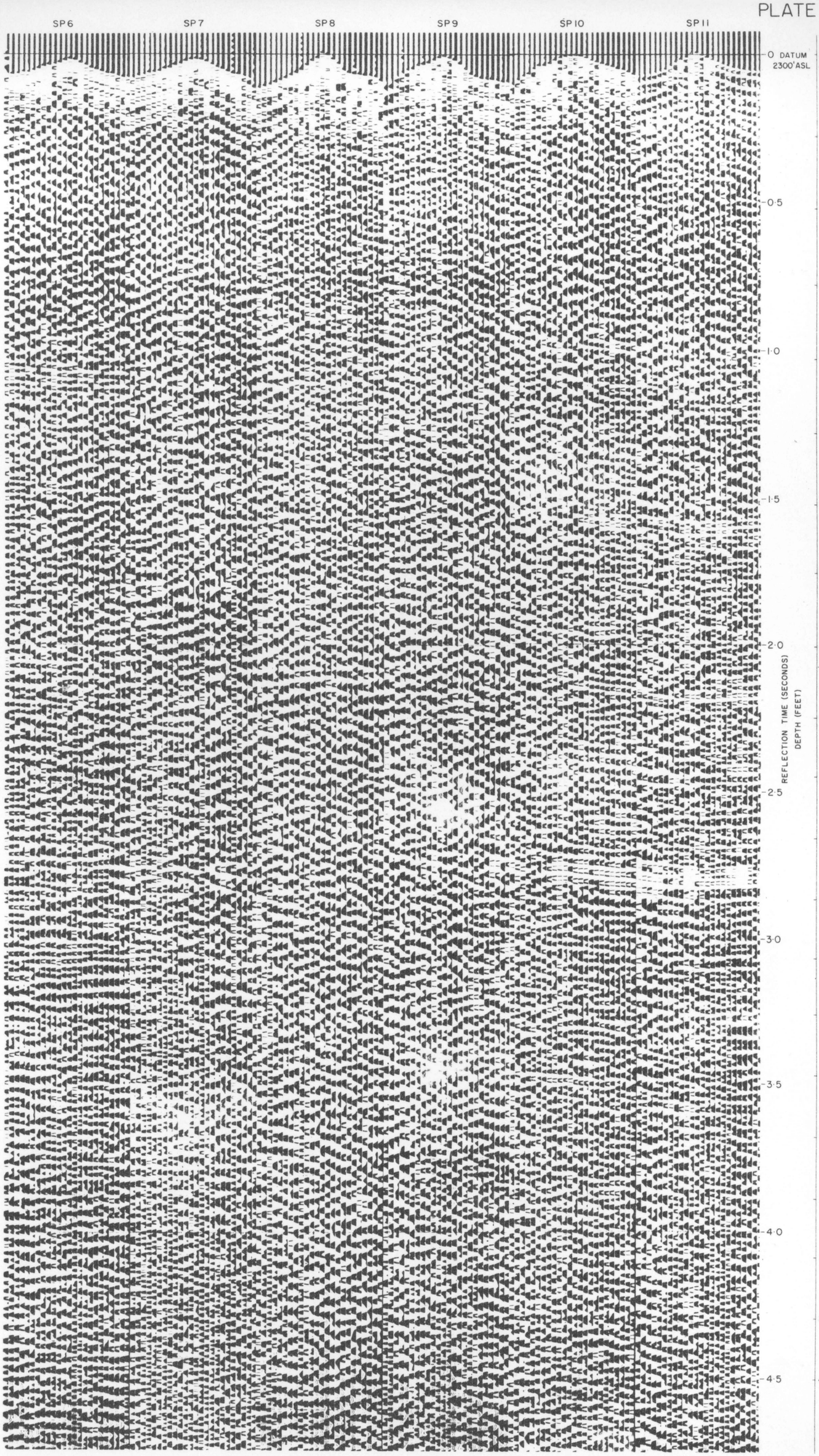
TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
SHOT-POINTS 12 TO 24

F53/B3-47

PLATE 26



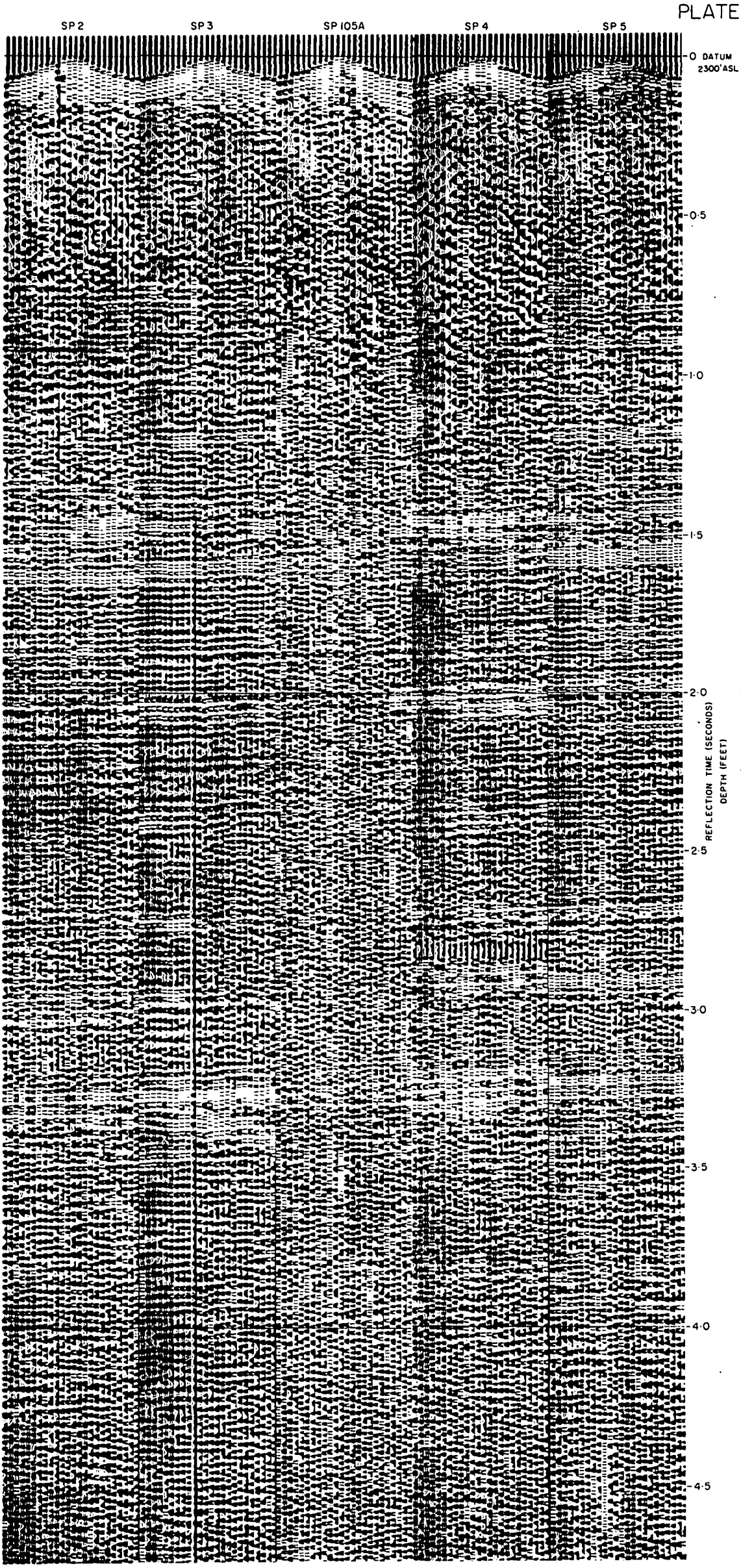
TO ACCOMPANY RECORD No 1964/66

TRAVERSE L
SHOT-POINTS 6 TO 11

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

F53/B3-4P

PLATE 27

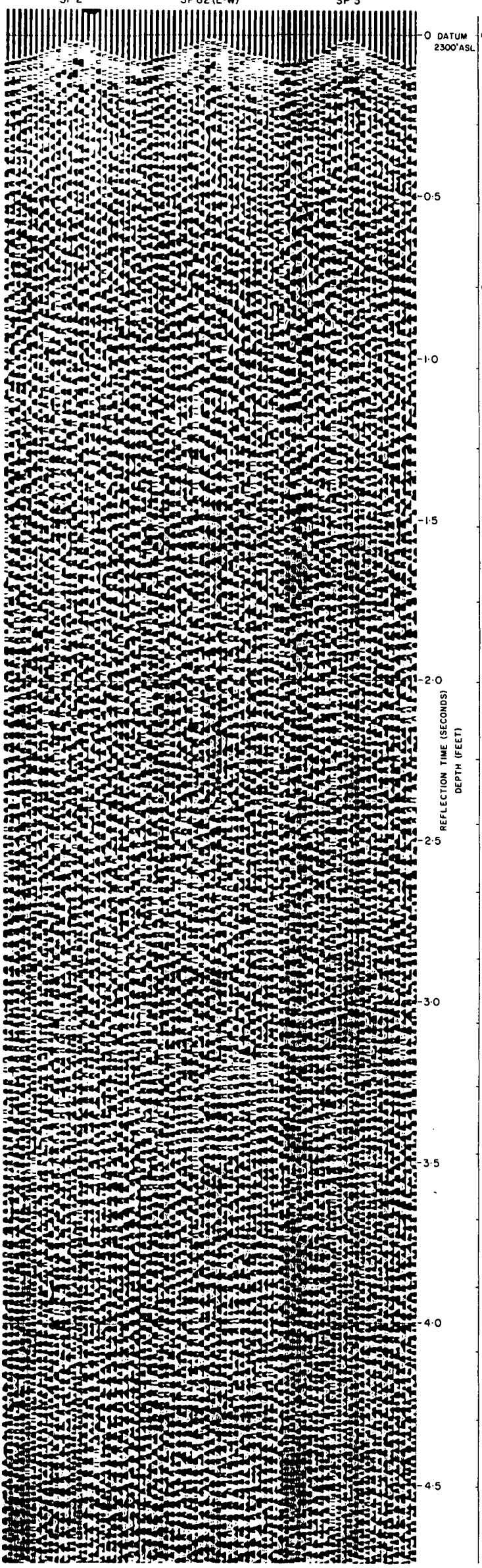


GOSSES BLUFF, NT, 1962

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS TRAVERSE LW F53/B3-49

TO ACCOMPANY RECORD No 1964/66 SHOT-POINTS 2 TO 5

PLATE 28



GOSSES BLUFF, NT, 1962

GEOPHYSICAL BRANCH,
BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

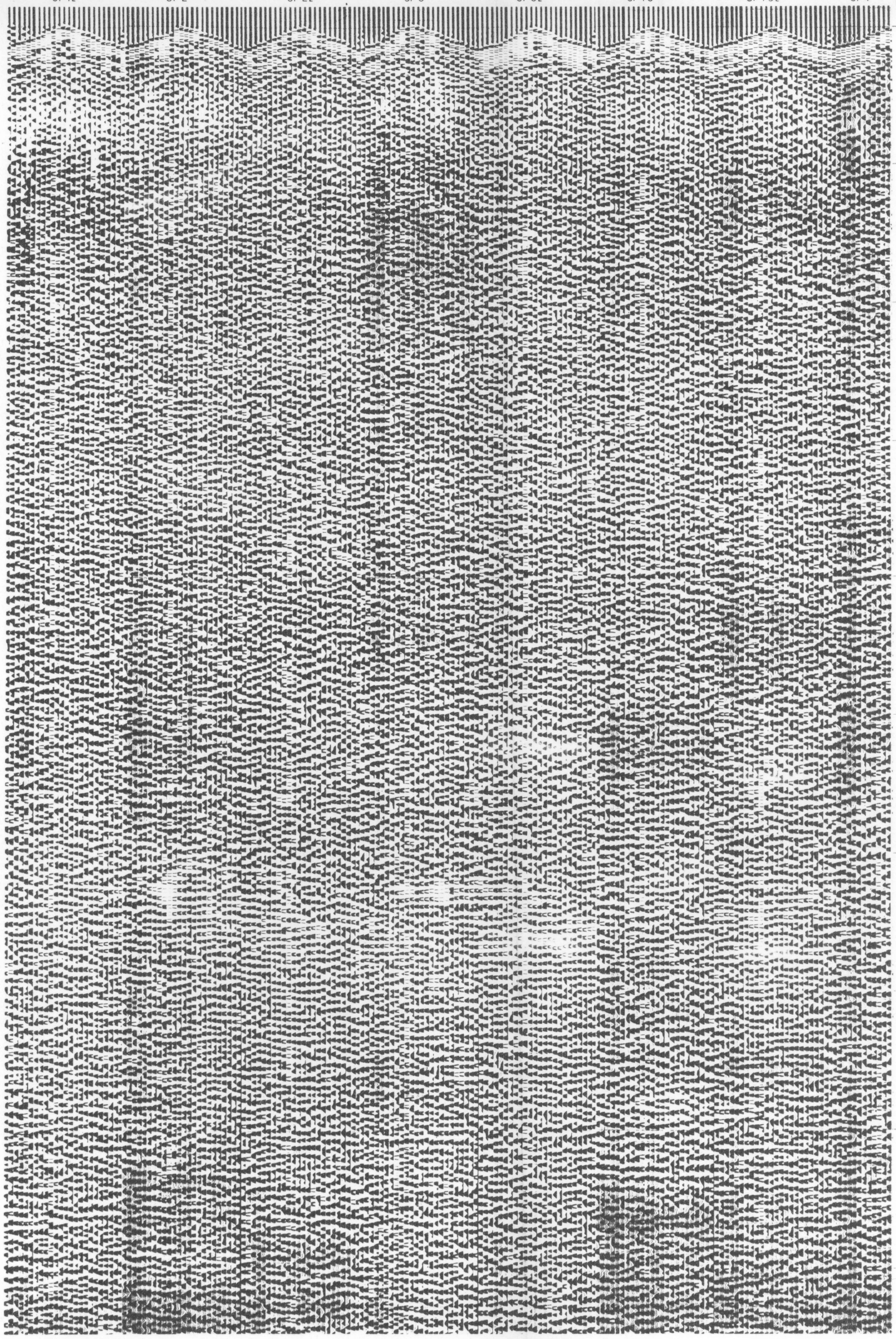
TRAVERSE LX

SHOT-POINTS 2 TO 3

F53/83-50

TO ACCOMPANY RECORD No. 1964/66

PLATE 29



GEOPHONES: 5FT

GEOPHONE STATION INTERVAL: 55FT

TO ACCOMPANY RECORD No 1964/66

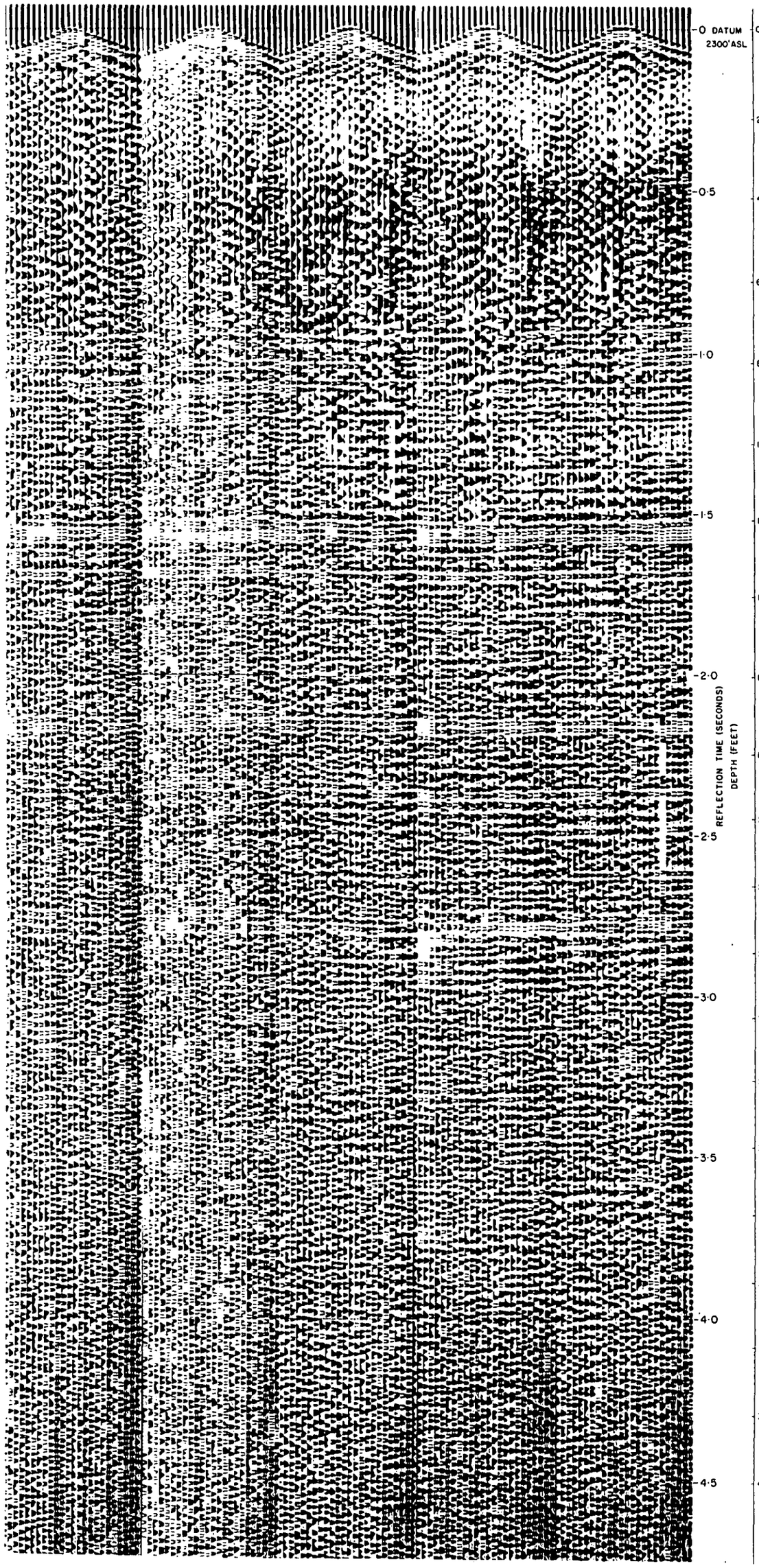
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE LY
SHOT-POINTS 1½ TO 4
(INSIDE BLUFF)

F53/B3-51

DUBBO BLUFF, N.S.W. 1962

PLATE 30



TO ACCOMPANY RECORD No 1964/66

TRAVERSE LZ

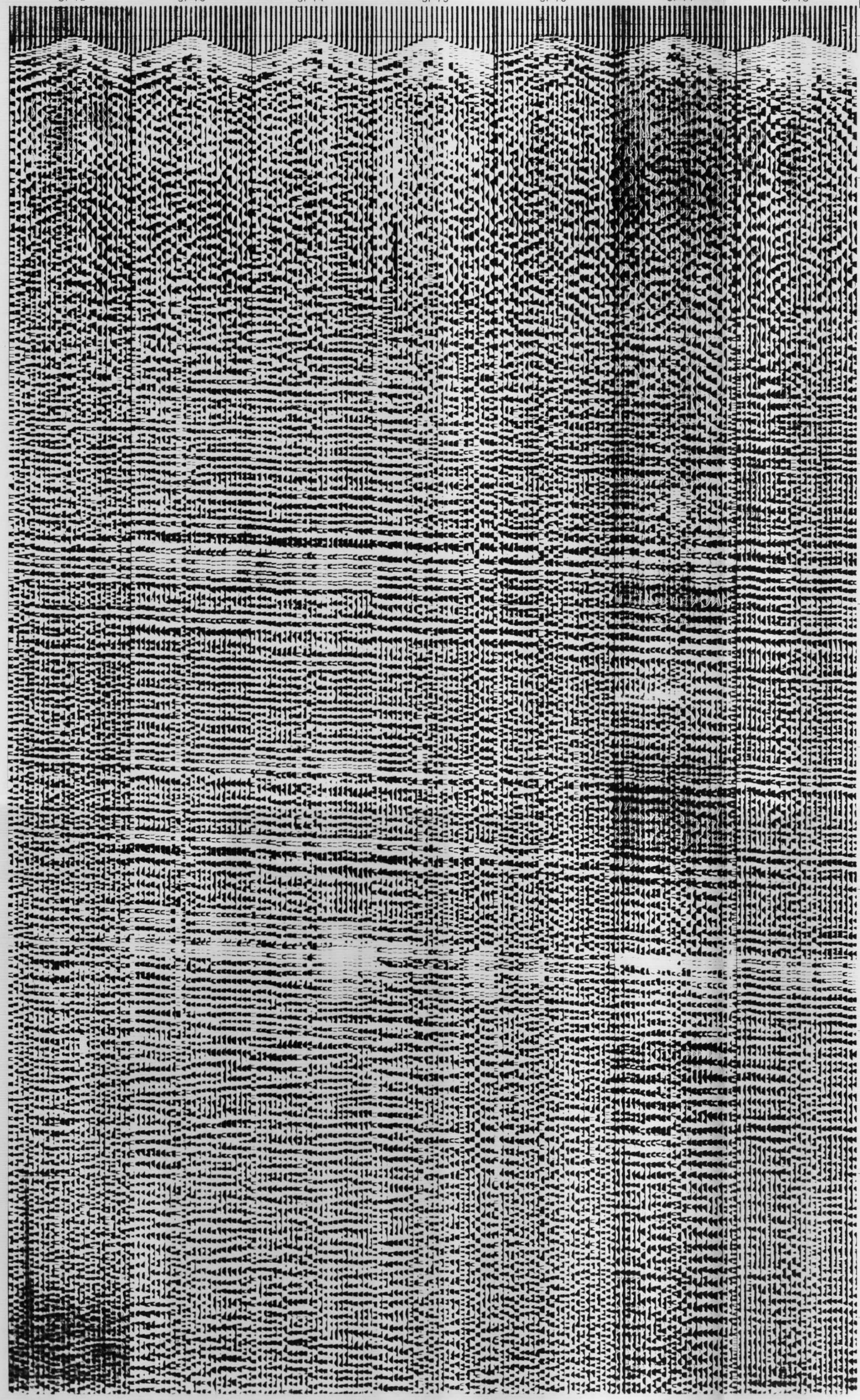
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

SHOT-POINTS 2 TO 5

F53/B3-52

GOSSES BLUFF, NT, 1962

PLATE 31



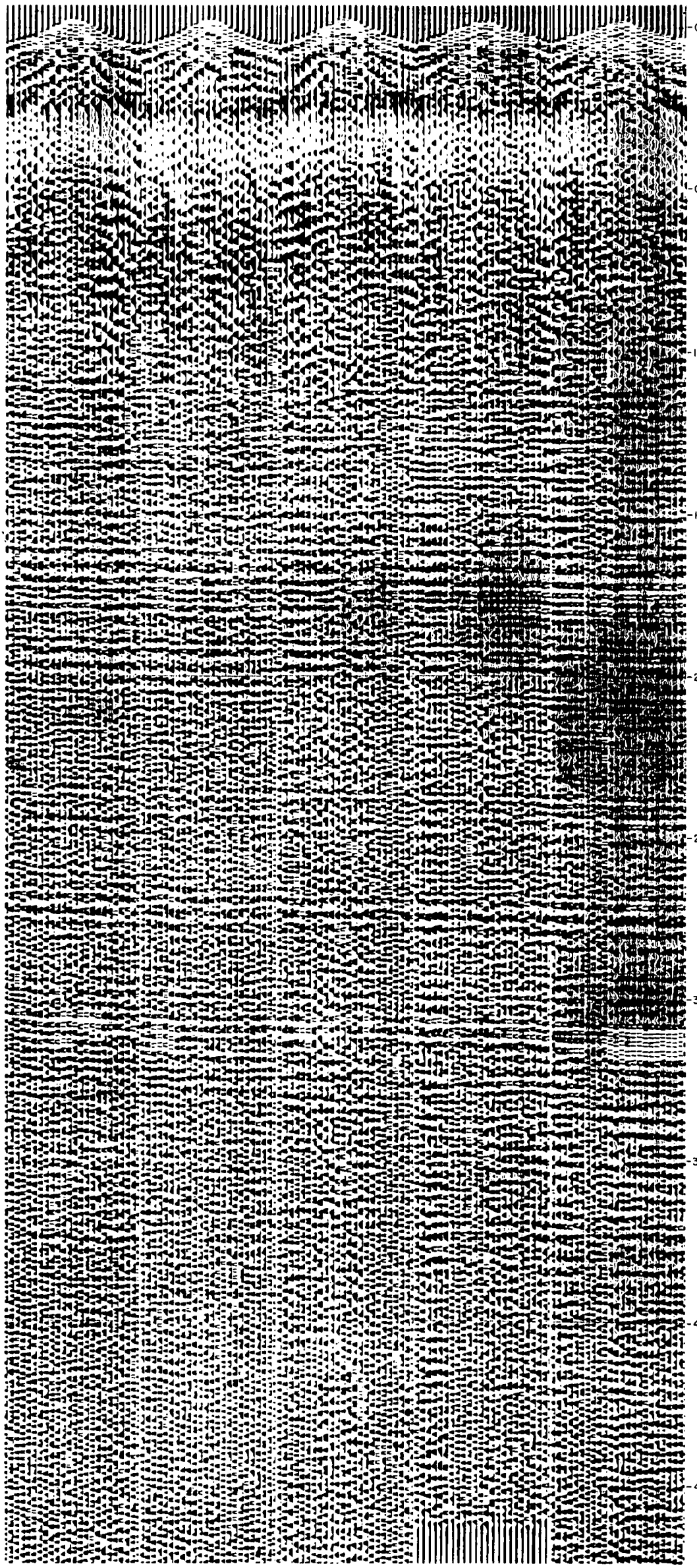
GOSSES BLUFF, N.T. 1962

TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE M
SHOT-POINTS 72 TO 78 F53/B3-53

PLATE 32



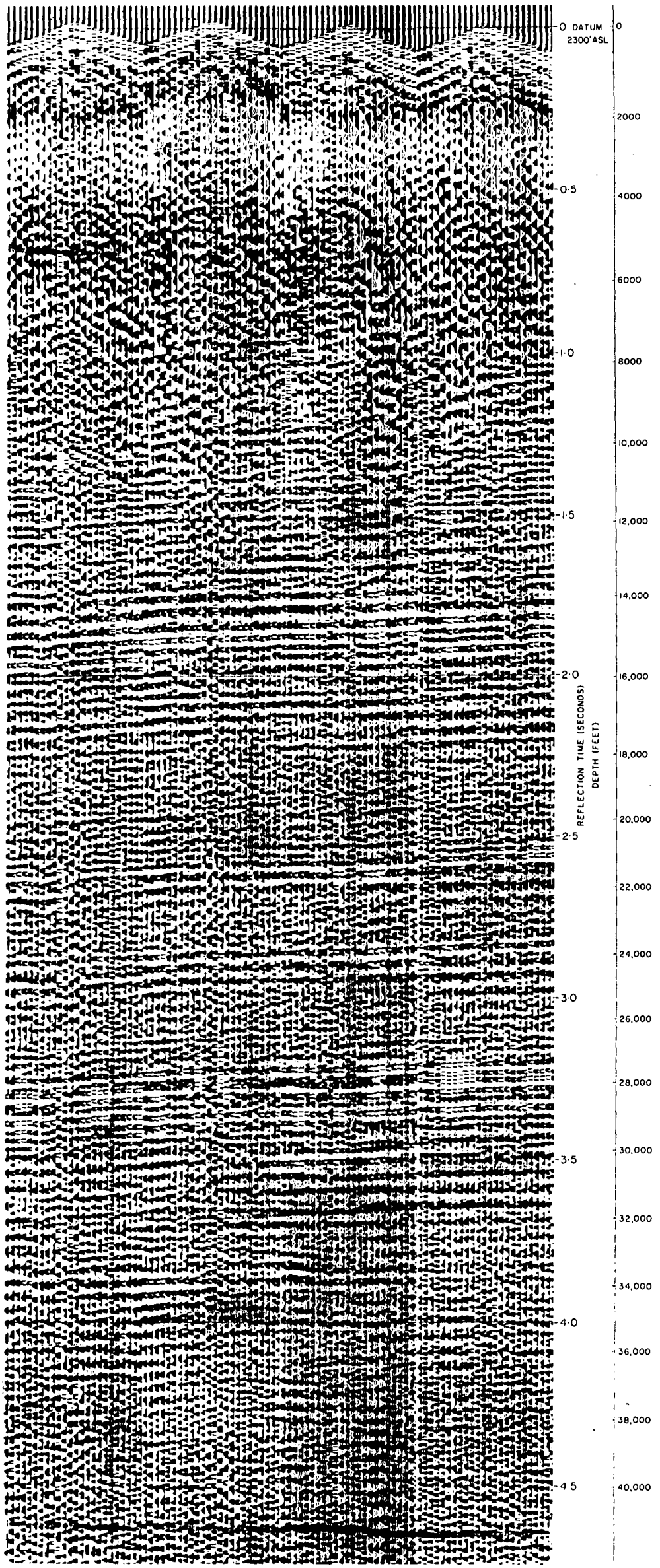
GOSSES BLUFF, NT, 1962

TO ACCOMPANY RECORD No 1964/66

TRAVERSE M

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS SHOT-POINTS 60 TO 64 F53/83-54

PLATE 33



GOSSES BLUFF, NT, 1962

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

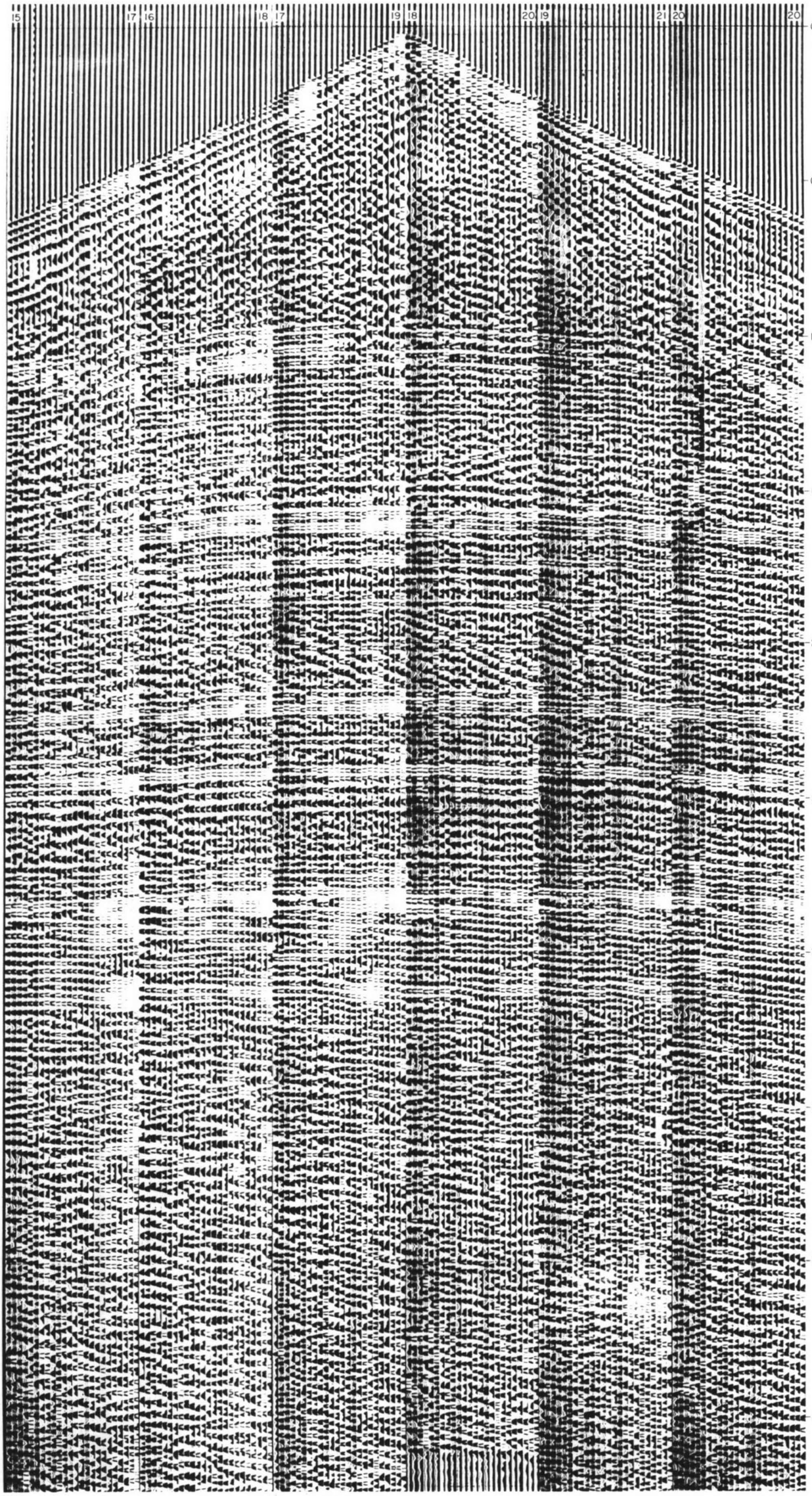
TO ACCOMPANY RECORD No 1964/66

TRAVERSE MX

SHOT-POINTS 2 TO 4

F53/B3-55

PLATE 34



TO ACCOMPANY RECORD No 1964/66

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

TRAVERSE L
VELOCITY PROFILE

F53/B3-56

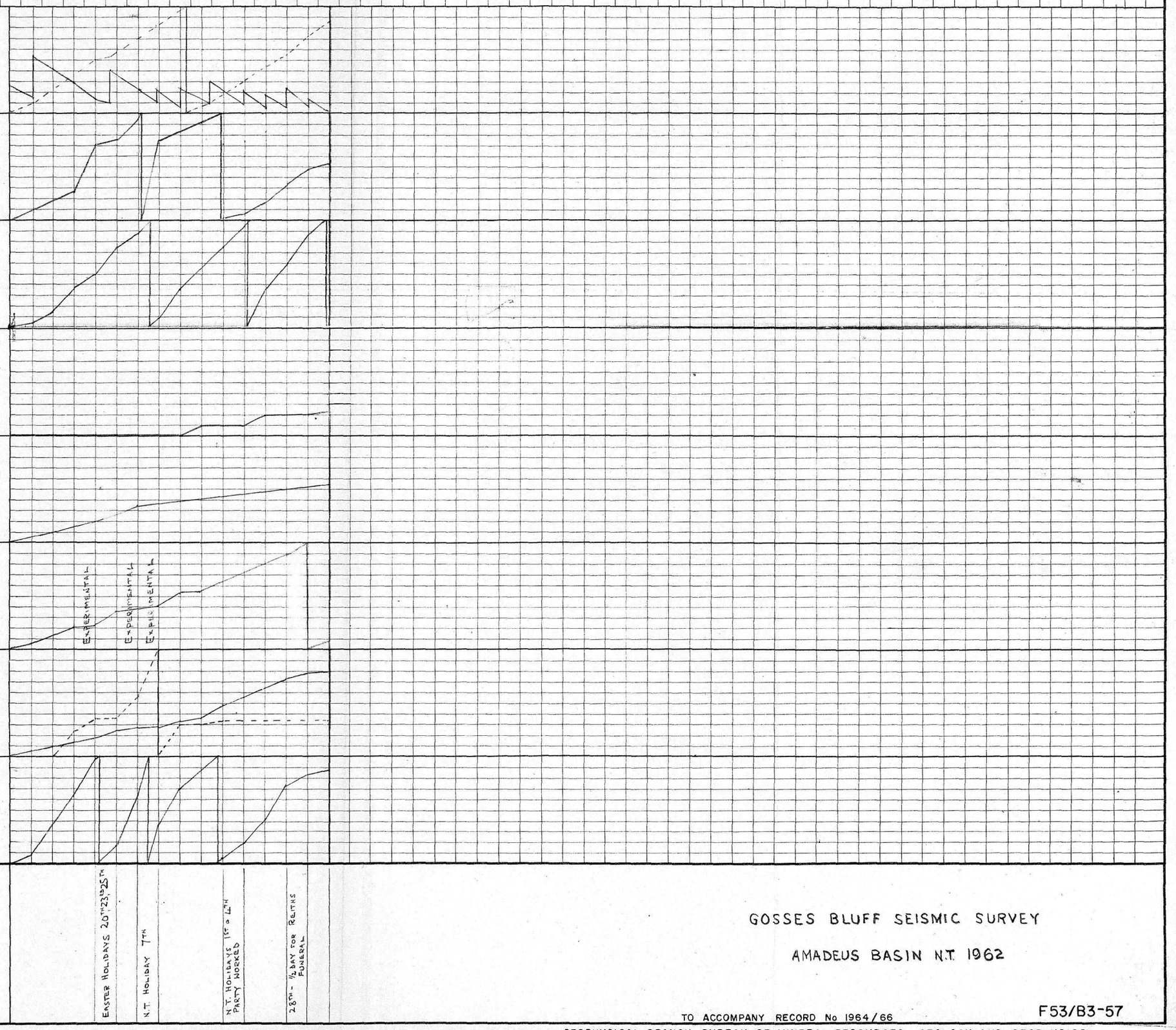
YEAR 1962

SEISMIC PARTY Nº 2

SEISMIC SURVEY OPERATIONS CHART

PLATE 35

	MARCH				APRIL				MAY				JUNE				JULY
WEEK ENDING	27	30	6	13	20	27	4	11	18	25	1	8	15	22	29	4	
SHOOTING LOCATION	GOSSES BLUFF															GOSSES BLUFF	



PETROL
1 DIV = 10 DRUMS
—— STOCK
---- CONSUMPTION

DETONATORS
1 DIV = 50 DETS

EXPLOSIVES
1 DIV = 500 lb

REFRACTION HOLES SHOT
1 DIV = 10 HOLES

LINE PEGGED AND LEVELLED
1 DIV = 10 MILES

REFLECTION HOLES SHOT
1 DIV = 20 HOLES

HOLES DRILLED
1 DIV = 40 HOLES
—— SINGLE HOLES
--- HOLES ON PATTERNS

FOOTAGE
1 DIV = 1000 ft

REMARKS

GOSSES BLUFF SEISMIC SURVEY

AMADEUS BASIN N.T. 1962

TO ACCOMPANY RECORD No 1964/66

F53/B3-57

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

(BASED ON G85-152)

GOSSES BLUFF NT, SEISMIC SURVEY, 1962