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GEOPHOTO MINERALS REPORT 1972/15

GEOLOGICAL AND GEOPHYSICAL SURVEY
E.L. 7/68 AMBER CREEK
(WEST TASMANIA)

MICROFILMED

PREPARED BY

GEOPHOTO RESOURCES CONSULTANTS

FOR

TEXINS DEVELOPMENT PTY LTD.

LANFRANCO DISCALA
Senior Geologist.

OCTOBER, 1972

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729002

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SUMMARY:

Due to extreme scarcity of rocks cropping out as well as a swampy environment, the 27 km^2 (11 sq.m) E.L. 7/68 Amber Creek area has not been comprehensively studied until now.

This study has gathered new geological data; in addition it has compiled all other existing but scattered observations which resulted from earlier attempts to study this area.

Testing the possible occurrence of lead-zinc replacement lodes in the Gordon Limestone is the main purpose of this study. In view of the difficultites mentioned in the first paragraph another purpose just as essential was to find better than just haphazard methods to probe this area. Both of these main purposes were partially accomplished. Thus, the geological survey confirmed the sub-surface existence of the Gordon Limestone, while the VLF-EM survey complemented by indicating the existence of several sub-surface conductive masses.

Recommendations were made for further work and include additional grid lines over the existing VLF-EM anomalies, to be followed by a more detailed VLF-EM survey.

It is also suggested that an additional geophysical method should be used to compensate for the relatively restricted penetration of the VLF-EM method. An I.P. survey is proposed.

Ideally, this would be followed by target selection and then target testing by diamond drilling.

INTRODUCTION:

The purpose of this report is to summarise the results of the geological and geophysical surveys recently carried out in the Amber Creek area as well as to gather the scattered observations recorded in earlier studies performed by Geophoto Resources Consultants. Although more detailed work remains to be done, there is now sufficient information to outline the overall stratigraphy and structure of the area and to recommend the steps to be followed in the next phase of the exploration.

LOCATION AND ACCESS:

The Amber Creek area covers approximately 11 sq miles and is a part of the Exploration Licence 7/68. The northern boundary of the area lies about 6 miles south of Zeehan (See Fig. 1). Access is provided by the Zeehan-Queenstown road and by a track, passable in summer with 4-wheel drive vehicles, which departs the main road 8 miles southeast of the Zeehan-Burnie junction. The track, which was made by Geophoto Resources in 1971, extends for about 2 miles into the Amber Creek flats. Access on foot is easy in the button grass-covered flats while it becomes rather difficult in the thick vegetation-covered surrounding hills.

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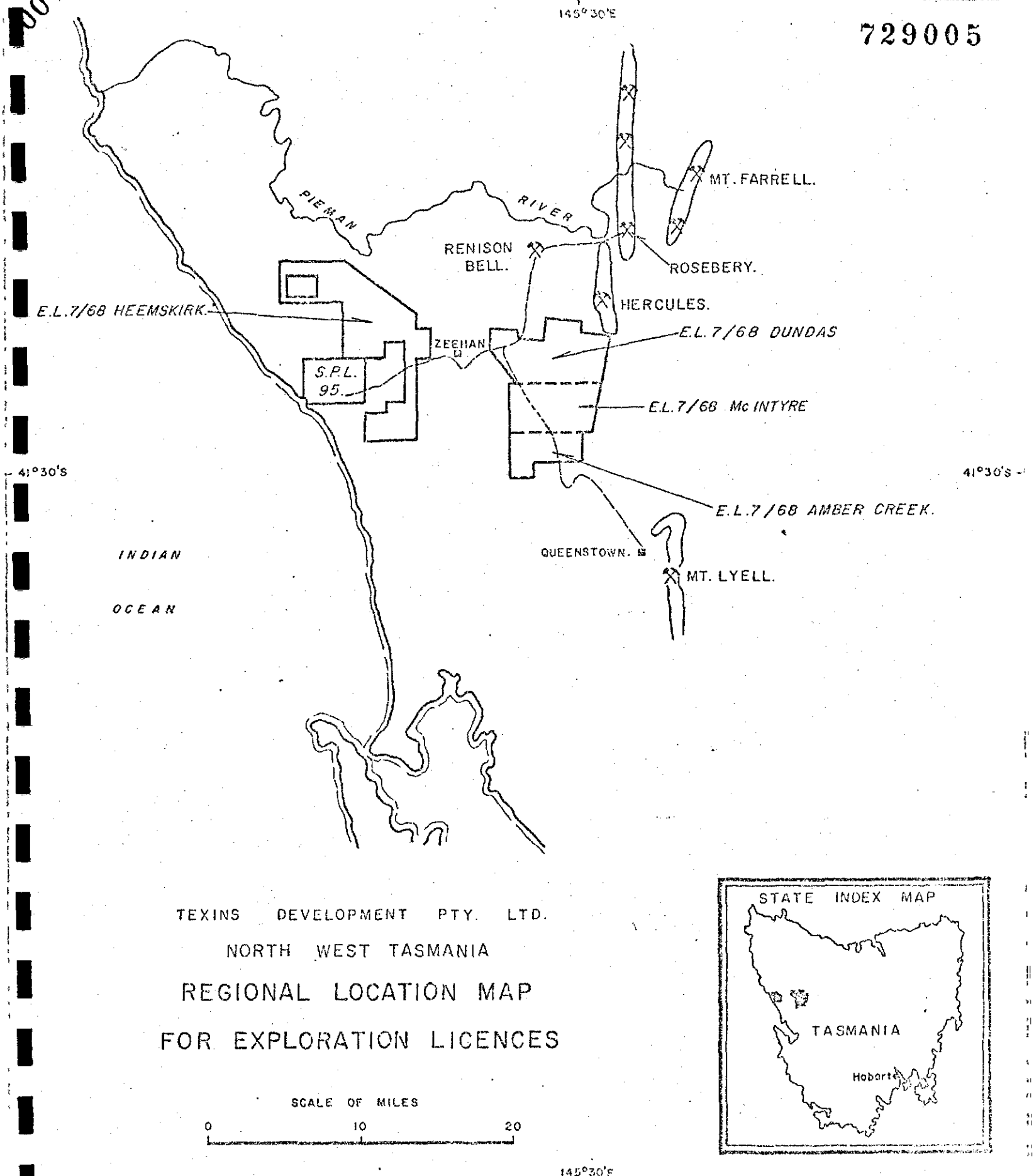

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NORTH WEST TASMANIA

REGIONAL LOCATION MAP

FOR EXPLORATION LICENCES

SCALE OF MILES

0 10 20

145°30'E

5 cm

PURPOSE OF THE INVESTIGATION

The objective of the investigation is the possible occurrence of lead-zinc replacement lodes associated with the Gordon Limestone which usually in this area forms large, swampy, button grass-covered flats. No surface evidence of mineralization has ever been recorded in this portion of the lease but orebodies of fissure-replacement type, related to the Gordon Limestone and consisting of galena, with minor sphalerite, chalcopyrite and pyrite have been mined in the near vicinity (Oceana, Mariposa, Eden mines). The old Eden mine, about which no information is available, is located two miles southwest of the southwest corner of the area, on the west limb of the Professor anticlinorium.

METHODS OF INVESTIGATION

The field geological investigation was carried out from November 1971 to March 1972 and at the beginning was limited to the swampy flats which were assumed to be underlain by the Gordon Limestone. Because of the few and poor exposures, and in order to gather more information on the structural setting of the area, reconnaissance traverses were also carried out across the Ewart Syncline, the Moina Hills, and along the northwestern part of the Amber Creek. An enlargement (at scale 1" = 500') of the state aerial topographic map at scale of 40 chains to 1 inch

was used as a base map. Final plotting has been done at scale 1:25,000. In March 1972, a grid was laid out to cover part of the flat area and magnetic and very low frequency electromagnetic surveys were carried out along the grid lines in April-May 1972.

PREVIOUS WORKS IN THE AREA

A general description of the geology of the area can be found in Blisset's report on the geological map of the Zeehan quadrangle (one mile geological map series). The photo-geological map prepared by Geophoto Resources in 1970 is the most detailed source of information available. The geological reconnaissance map enclosed in this report is essentially a modification of that map on the basis of field evidence. In April 1971 several auger holes were drilled by Geophoto Resources in the flats with the two-fold purpose of examining the soil profile and of trying to reach the Gordon Limestone at depth. The holes, which were drilled to a maximum depth of 70ft, failed to reach the bedrock. The soil samples collected showed occasional anomalously high values of Zn and Pb: Hole 2 Zn 1090 ppm at 2'6", Zn 470 ppm at 4'6" - Hole 3 Zn 1670 ppm at 2'6", Zn 2160 ppm at 7'6".

GEOLOGY:

A) Stratigraphy

1) Cambrian undivided: Rocks of probable Cambrian age are inferred in the southeastern part of the area. The region is densley covered by vegetation and no outcrops have actually been observed during the field work. Floats of green siltstone and grey sandstone (Dundas Group ?) have been recorded on the east slope of the hill which is about 1km northwest of the junction between Spencer and Ewart creeks.

2) Ordovician (Junee Group)

a) Mount Zeehan Conglomerate:

Exposures of massive, quartzose, Mt. Zeehan Conglomerate occur in the southwestern portion of the area. The conglomerate, which is considered to be the basal member of the Junee group, is in fault contact to the east with the Moina Sandstone and the Cambrian undivided; and to the north is in fault contact with the Gordon Limestone which underlies the Quaternary deposits of the flats.

b) Moina Sandstone:

A sequence of reddish quartzite, grey quartzose sandstone and pebbly grit, belonging to the Moina formation, is exposed inthe centre of the southern part of the area. The

sequence, which has been intensely folded, is in fault contact to the west against the Mt. Zeehan Conglomerate and to the east against the undivided Cambrian rocks. To the north, although the contact with the overlying Gordon Limestone is not observable, it is assumed to be conformable.

c) Gordon Limestone:

In the southeastern portion of the area, the deep downcutting of Spencer creek has exposed northeast dipping beds of a massive, dark grey limestone with occasional interbedded thin layers of grey calcilutite. The exposure makes up part of the western limb of the Ewart Syncline which is faulted to south-west against the Cambrian rocks along a longitudinal fault the northern extension of which is unknown. On the button grass-covered flats no outcrops have been observed but large boulders occur about 500m west of the northernmost outcrop along Spencer Creek. Besides, both stratigraphic and structural evidence account for the assumption that the Gordon Limestone occurs under the Quaternary cover.

3) Silurian

a) Crotty Quartzite

The sequence which conformably overlies the Gordon Limestone, consists of light grey quartzose sandstone (which often weathers into white quartzose sand) and red-brown mudstone.

The Crotty formation is considered to be the base of the Silurian-Devonian Eldon Group.

b) Amber Slate:

Strongly weathered exposures of a grey shale thought to be part of the Amber Slate formation have been observed, conformably overlying the Crotty Quartzite, during the traverse across the Ewart Syncline. In the northwestern portion of the area, which because of the thick vegetation cover does not lend itself to a detailed field mapping, the boundary of the formation has been traced by aerial photographs.

c) Keel Quartzite:

It forms narrow, rather steep, ridges in the northwest portion of the area. Also in this case, the boundary of the formation, which consists mainly of fine grained quartzite, has been outlined on the aerial photographs.

d) Austral Creek Sandstone:

It consists of a sequence of grey shale and siltstone conformably overlying the Keel Quartzite.

4) Devonian

a) Florence Quartzite:

It overlies conformably the Austral Creek sandstone and consists of grey siltstone, coarse sandstone and quartzite (Blissett).

b) Bell Shale:

Formed by siltstone with interbedded layers of quartzite (Gill and Banks). Also in this case, the contacts with overlying and underlying formations have been traced by aerial photographs.

5) Quaternary

In the flats, the Gordon Limestone is blanketed by a thick cover of Quaternary alluvial deposits formed mainly of dark grey clay and pebbles of light grey quartzite, reddish sandstone and conglomerate. Hummocks of white quartz gravels and clay are scattered in several parts of the area. Their origin is not clearly understood, but they might represent the remnants of an outwash apron of debris from the Pleistocene glacial deposits which occur further north outside the area. From auger drilling and topographic computations it can be inferred that the total thickness of the Quaternary cover could be more than 100ft in the southern part of the flats.

Pleistocene moraine deposits occur in the eastern portion of the Amber Creek area where they cover Cambrian rocks in fault contact with the Ordovician Junee group.

B) Structure

The structural features of the area are related to the Tabberabberan orogeny which took place during the Devonian, after deposition of the Eldon group. The major structural elements are:

1) The Ewart Syncline:

This northwest trending, southeast and northwest plunging syncline is located in the eastern part of the area. To the east and to the south the syncline is in fault contact with Cambrian rocks which are assumed to belong to the Dundas group. Grey shale of the Amber Slate formation crop out in the core while on the east and west limbs, the oldest outcropping rocks are, the grey argillaceous limestone and the grey calcilutite of the Gordon Limestone formation. The syncline has been affected by numerous, mainly northeast trending, normal cross-faults.

2) The Ewart Fault:

It trends roughly N 10°W, almost parallel to Ewart creek and marks the contact between the Eldon group and the moraine-covered Cambrian units. On aerial photographs its occurrence and approximate position are indicated by a strong lineament.

3) Professor Syncline zone:

In the northwestern portion of the area the Eldon group has been folded along a major northwest axis into a large synclinorium. Devonian Bell shale crops out in the core of the syncline zone, the northern end of which is terminated by the Little Henty Fault. To the south the structure is in contact with the undivided Cambrian along a northeast trending fault which has been offset by later northwest trending faults. Between the Professor Syncline zone and the Ewart Syncline, stratigraphic and structural evidence indicate that a northwest trending anticline is present underneath the Quaternary cover. The axis of this anticline has been tentatively traced on the evidence of limestone outcrops and from photogeology. Several distinctive lineaments were mapped from aerial photographs. The lineaments are believed to be due to recent faulting which affects the Quaternary deposits and probably the underlying bedrock.

With these geologic data a map at scale 1:12,500 was compiled (see Drawing 1/301 in back-cover pocket).

GEOPHYSICAL INVESTIGATIONS

A grid totalling 140,000 line feet and grid lines generally at 400ft intervals cover most of the flat swampy area where the Gordon Limestone was assumed to exist under the Quaternary alluvial deposits. The grid has several 200ft interval lines in the central part of the area and does not cover the southwest portion of the flats (see Drawing 1/346 in back-cover pocket). Very low frequency electromagnetic and magnetic surveys were carried out from April to May, 1972.

a) Magnetic Survey

A reconnaissance magnetic survey was carried out over the base line and alternate grid lines at 600ft - 800ft spacing. The maximum magnetic relief recorded in this part of the area was rather low (about 60 gamma) and no significant anomalies were revealed.

b) VLF Survey

A VLF-EM survey was carried out over the 400 and 200ft spaced, east-west lines of the grid. Readings were taken

at 50ft intervals using the signal from the North-west Cape transmitting station. The data have been filtered and contoured following the procedure described by Fraser (1969).

The VLF method was considered suited to be used in this area since the main structural feature trends towards north-west perpendicular to the electromagnetic field provided by the transmitter.

However, we must also consider that the depth of penetration capable of yielding reliable anomalies as computed by Langron (1970) is about 100ft in the Dundas area. As already mentioned, in several places on the Amber Creek flats, auger drilling and topographic observations suggest that the thickness of the overburden might be close to that figure. This indicates that there may be some problems in the correct interpretation of the VLF anomalies since a strong overburden effect can be expected.

The following is a description of the major anomalies:

Anomaly 1: Line 62N - from 20W to 17W.

The in-phase component shows a rather steep, positive cross-over, while the quadrature component seems to indicate a moderately conductive body lying at a depth of about 100ft. The anomaly was also recorded along line 58N.

Anomaly 2: Line 50N - from 18.8W to 15W.

The anomaly seems to be due to two conductive bodies. The one giving the strongest response should lie at a depth of about 100ft under 17.7W. The positive slope of the quadrature component indicates a weak conductor. The anomaly has also been recorded on line 46N and (probably) on line 54N.

Anomaly 3: Line 42N - from 10.2W to 8.7W.

The in-phase component shows a conductive body lying at depth of about 80ft, probably under 9.4W. The strong positive quadrature slope suggests very weak conductivity. The anomaly has also been intersected along line 38N.

Anomaly 4: Line 38N - from 16.3W to 14.2W.

The gradient of the in-phase component with its steep positive cross-over indicates a conductive body close to the surface. The quadrature response is high and with a positive slope, thus indicating a weak conductor.

Anomaly 5: Line 9N (North-west portion of the grid) from 45.3W to 47.3W.

The steep positive cross-over of the in-phase component suggests also in this case a conductive body very close

to the surface. The quadrature shows a positive inflection. The anomaly has been intersected also by line 8N.

Anomaly 6: 5.36N (North-west portion of the grid) from 54.5W to 58W.

The anomaly seems to be formed by two conductive bodies. The most pronounced part of the anomaly indicated a conductor lying under 56.5W.

The strong negative slope of the quadrature component suggests the influence of a conductive overburden.

CONCLUSIONS AND RECOMMENDATIONS

The exploration techniques which have been used so far in the Amber Creek area have not provided any reliable indirect clues to the occurrence of economic sulphides in the Gordon Limestone.

The geological reconnaissance of the area has confirmed, as it was expected, the occurrence of limestone under the Quaternary cover and has permitted a better understanding of the structural setting of the area, but no evidence of mineralization has been found.

The VLF survey has indeed recorded several anomalies but the general response of the quadrature component seems to indicate rather weak conductive bodies. Besides, a high degree of confidence cannot be placed on these results only, because of the limitations of this method, mainly poor depth of penetration (critical in an area of thick alluvial cover) and no discrimination capability between economic and non-economic sulphides. In the flats of the Amber Creek area the occurrence of graphitic slate or shale, which often have influenced the response of the VLF in other parts of E.L. 7/68, has been excluded, but the possibility of a rather strong influence from a conductive overburden cannot be excluded.

It therefore becomes important to use an auxiliary method for screening the VLF anomalies. Soil geochemistry does not seem to be applicable in this area of transported overburden partially of glacial origin.

Should a replacement type mineralization occur in the limestone, the epigenetic anomalies which might have developed in the overlying Quaternary cover are likely to be confused with local anomalous patterns not related to mineralization but related only to mechanical sorting during the transport of the debris.

Sampling of the overburden at depth by auger drilling would probably be meaningful, but because of the large area to be tested in order to obtain reliable background values, it would be rather expensive.

The I.P. method seems to be the most suitable for checking at greater depth the VLF anomalies, although polarization effects are also to be expected from thick lenses of clay which might be in the overburden.

Summarizing, the recommendations for the next phase of the exploration programme in the Amber Creek area are:

1) New grid lines should be laid out, at 200ft intervals from those already existing in the west portion of the northern part

of the grid, (from line 62N to line 38N), and in the western part of the grid, (from line 13N to the base line), for a total of 26,400 line feet. An additional VLF survey should be carried out along these lines to check the extension of the already known anomalies.

2) An I.P. survey should be conducted across the most important VLF anomalies with electrode spacing of 100ft. This survey should intersect each anomaly with at least two lines and should be carried out in January or February to take advantage of the drier season.

3) Should the I.P. survey provide encouraging results, the grid should be extended to the southwestern portion of the area, and additional VLF (and I.P.) surveys carried out over the new grid lines.

4) Targets should be selected for diamond drilling.

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Jean Juilland

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Projects Manager

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835,000yds N. | 345,000yds E. | 145°25'E | 347,500yds E. | 350,000yds E. | 352,500yds E. | 835,000yds N.

832,500yds N. | 832,500yds N

41°59'S | 41°59'S

830,000yds N. | 830,000yds N.

345,000yds E. | 145°25'E | 347,500yds E. | 350,000yds E. | 352,500yds E.

SH/61

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Floats of quartz and quartzose sandstone.

Floats of quartzose sandstone.

Quartzose-sandstone. 45°

Pink-grey calcilutite.

Grey shale

Shale. 50°

60°

Floats of quartzose-sandstone & quartz.

Quartzose-sandstone. 30°

EWART SYNCLINE

EWART FAULT

Ewart Creek

Quartzose-sandstone.

Quartzose-sandstone floats.

Amber Creek

Floats of quartzite & pebbly grit.

Floats of quartzite, pebbly grit & quartzose-sandstone.

Floats of red quartzite.

Floats of quartz of probable fluvio-glacial origin.

Floats of quartz.

Boulders of limestone scattered in the area.

Brown-reddish mudstone & quartzose-sandstone. 20° 30°

Floats of quartzose-sandstone poor exposure.

Moraine deposits underlain by Cambrian units (Dundas group ?)

Quartzose-sandstone. 20°

Floats of coarse quartzose-sandstone & conglomerate.

PROFESSOR

47° Quartzose-sandstone.

Floats of coarse quartzose-sandstone.

40° Quartzose-sandstone.

Quartzose-sandstone.

Floats of quartzose-sandstone.

Pink quartzose-sandstone, coarse quartzite & purplish pebbly grit. 45° 42° 62° 70° 55°

Pink quartzite.

Quartzose pebbly grit.

Spencer

Dark grey-black argillaceous limestone. 35° 30°

Creek

SYNCLINE

Pink quartzose-sandstone.

Quartzose-sandstone.

Floats of quartzose-sandstone.

53° Pink quartzose-sandstone.

Red quartzose conglomerate.

LEGEND

QUATERNARY
- Qa Alluvium.
- Qg Quartz gravels.
- Qpm Pleistocene moraine.

DEVONIAN
- Db Bell Shale.
- Df Florence Quartzite.

SILURIAN
- Sac Austral creek Siltstone.
- Sk Keel Quartzite.
- Sa Amber Slate.
- Sc Crotty Quartzite.

ORDOVICIAN
- Og Gordon Limestone.
- Om Moina Sandstone.
- Oz Mount Zeehan Conglomerate.

CAMBRIAN
- € Cambrian undivided.

- 20° Dip & strike (field observed).
- Dip & strike, amount cannot be determined on photographs.
- Dip group 3, 10° to 25°.
- Dip group 4, 25° to 45°.
- Dip group 5, 45° to nearly vertical.
- Outcrop, poor exposure.
- Contact, dashed where indefinite.
- Fault, normal. (U)
- Fault, position indefinite.
- Fault, inferred.
- Dotted where concealed, with arrow showing dip.
- Anticline, arrow denotes plunge dashed where indefinite.
- Syncline, arrow denotes plunge, dashed where indefinite.
- Stream
- Intermittent stream.

5 cm

Scale: 1 : 12,500

1000 0 1000 2000 3000 4000 Feet

500 0 500 1000 Metres

Note: Geology is from photogeological map as modified by field evidence.

T.N.

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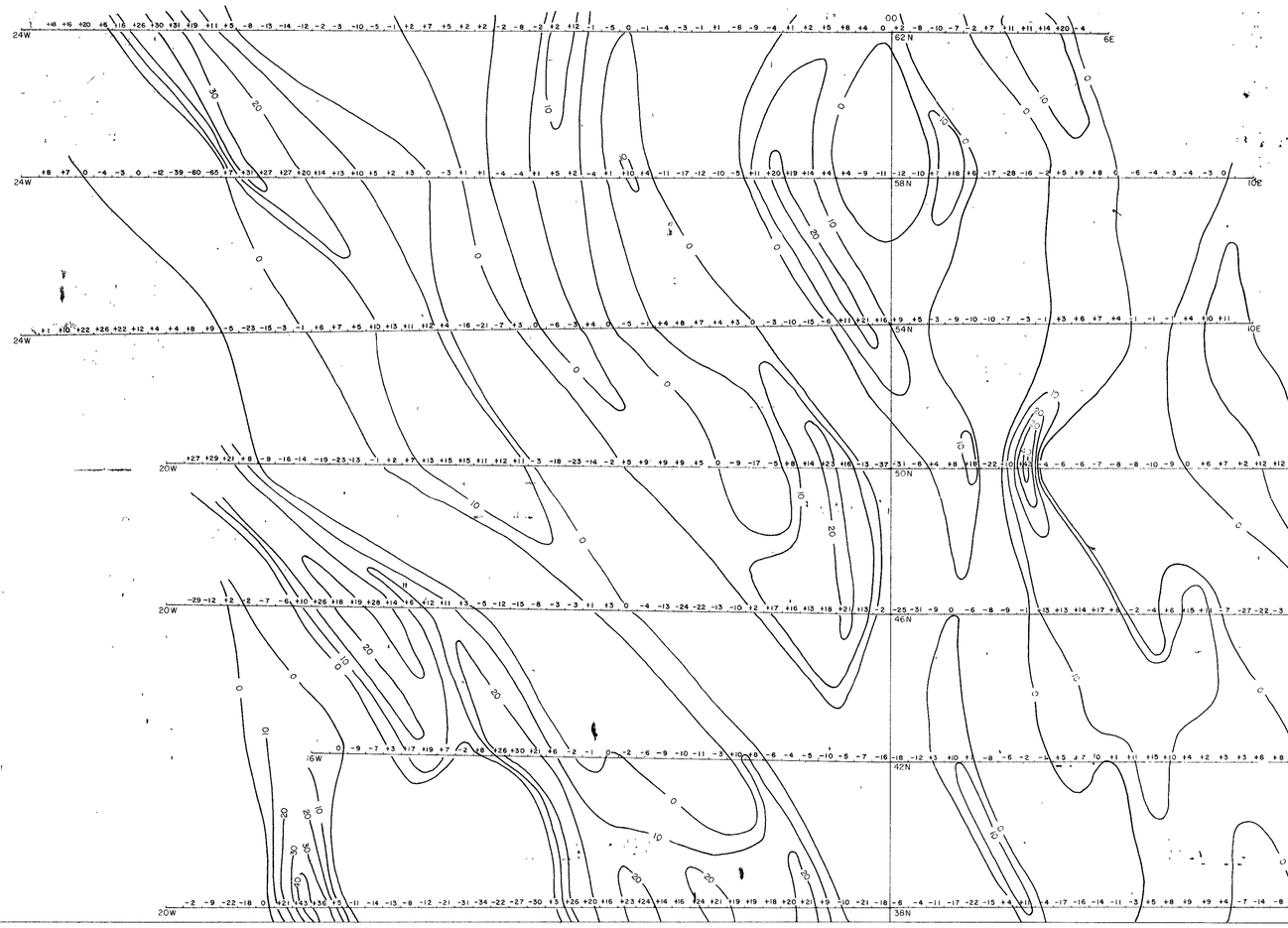
E.L.7/68 AMBER CREEK DISTRICT, TASMANIA
GEOLOGICAL RECONNAISSANCE MAP 2272

PROJECT	E.L.7/68	AUTHOR	L. Discala.	DATE	Feb 1972	DWG Nº	1/301



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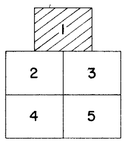
SHEET INDEX



LEGEND

$\frac{dH}{dx}$ First derivative value

Scale 200 Feet to 1 Inch

200 0 200 400 600 800 Feet

100 0 100 200 Metres

5 cm

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2273

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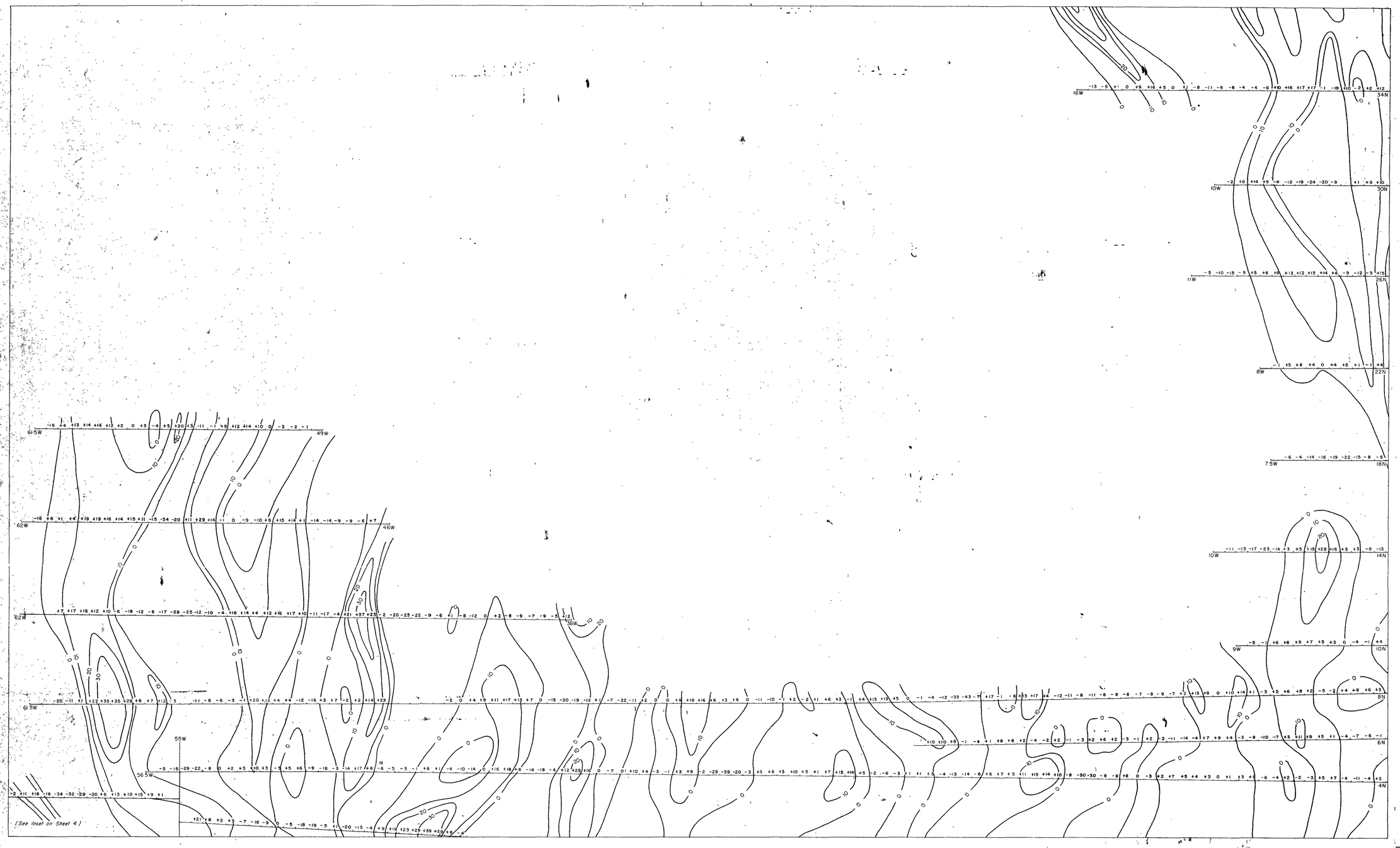

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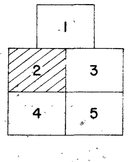

LEGEND

48 First derivative value

Scale 200 Feet to 1 Inch

200 0 400 800 Feet

100 0 200 Metres

5 cm

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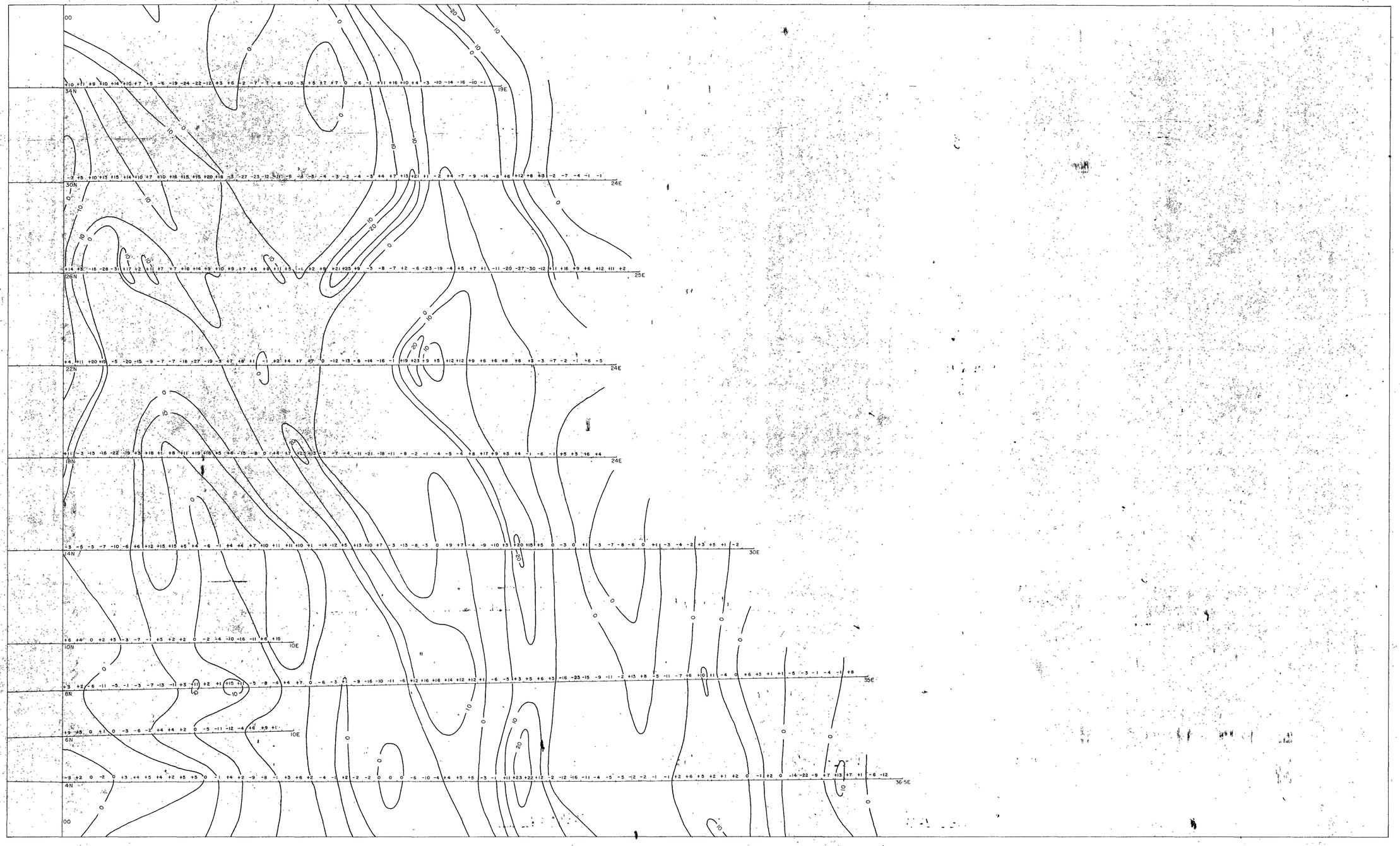
FIRST DERIVATIVE CONTOURS
2274

PROJECT	E.L. 7/68	AUTHOR		DATE	MARCH 1973	DWG. Nº	1/346



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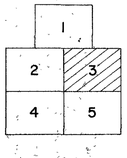

LEGEND

+11 First derivative value

Scale 200 Feet to 1 Inch

200 0 200 400 600 800 Feet

100 0 100 200 Metres

5 cm

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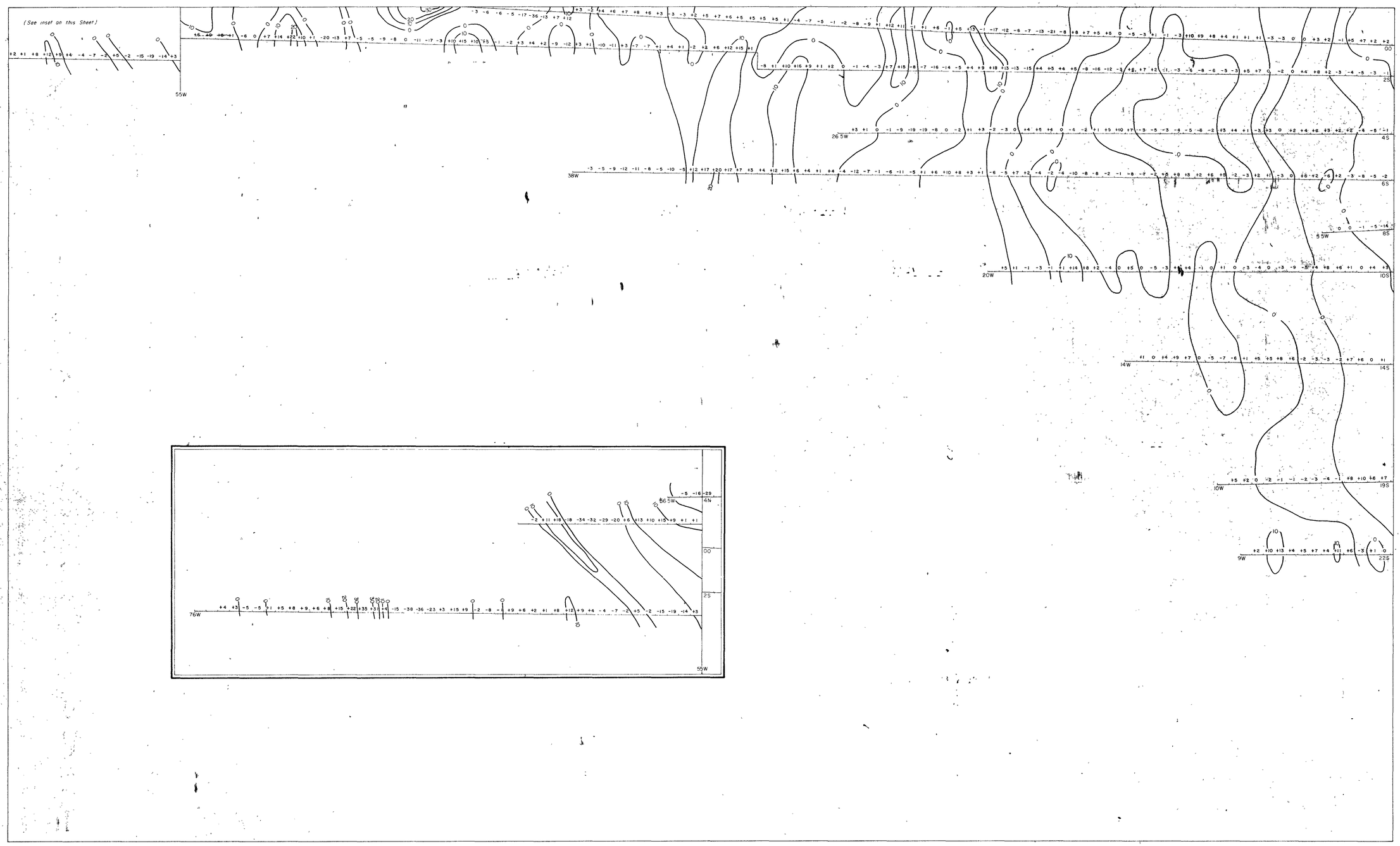
PROJECT	E L 7/68	AUTHOR		DATE	MARCH 1973	DWG Nº	1/346



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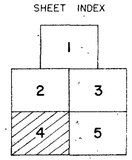

LEGEND

+11 — First derivative value

Scale 200 Feet to 1 inch

200 0 200 400 600 800 Feet

100 0 100 200 Metres

5 cm

729026 72-900

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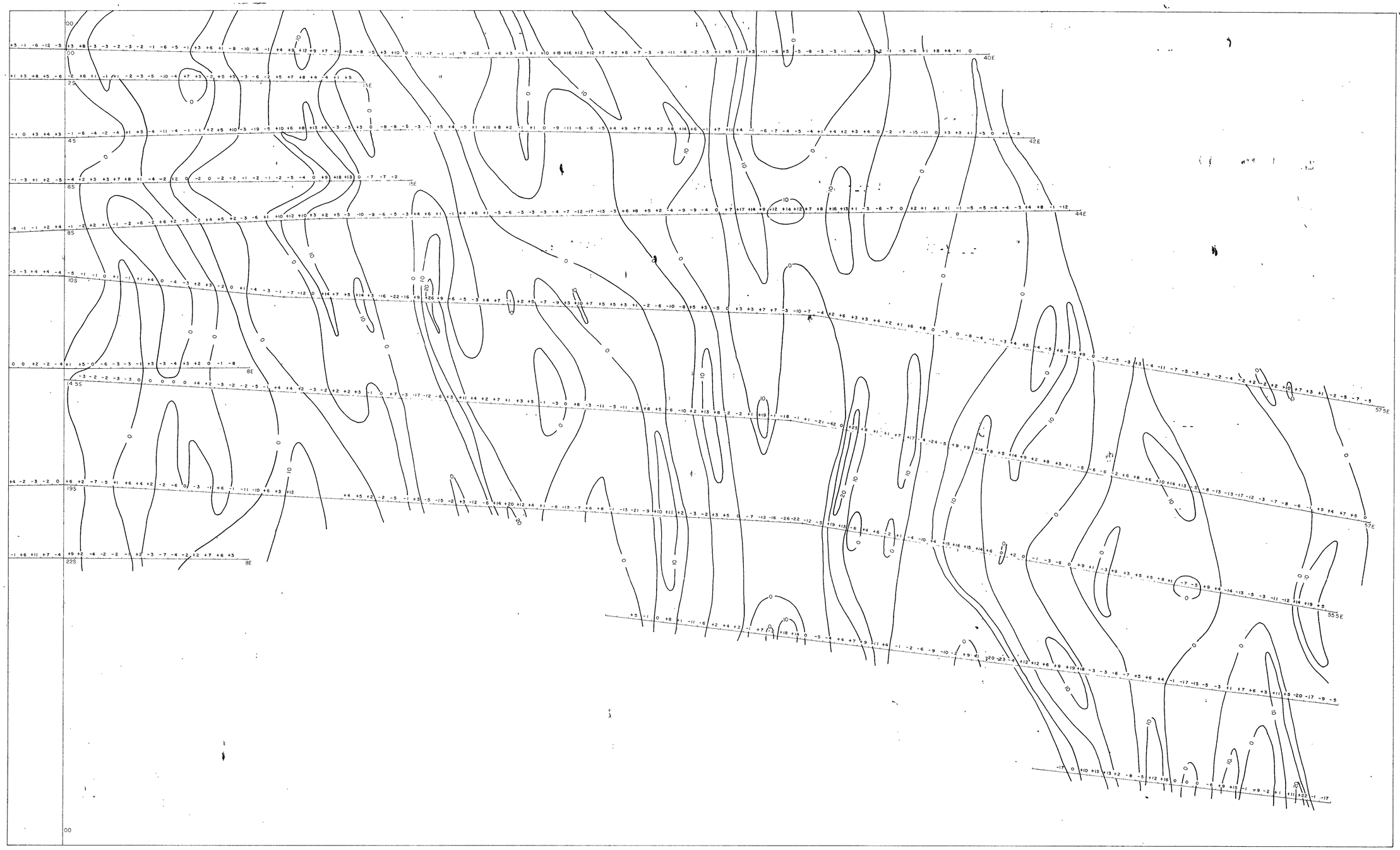
FIRST DERIVATIVE CONTOURS

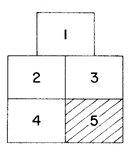
2273

PROJECT	E.L 7/68	AUTHOR		DATE	MARCH 1973	DWG Nº	1/346



729027 72-900

SHEET INDEX



LEGEND

+11 First derivative value

Scale 200 Feet to 1 Inch

200 0 200 400 600 800 Feet

100 0 100 200 Metres

5 cm

TEXAS INSTRUMENTS INCORPORATED
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PROJECT	E.L. 7/68	AUTHOR		DATE	MARCH 1973	DWG Nº	1/346