A.E.M. Anomaly 24/1.
L.E.G. 11/3/59.

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Aerogeophysical Results of an Area in South-West
Adastra Hunting Geophysics Proprietary Limited; Elect
Hancock, H.S. EL3/1959; SPL307; SP

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GEOPHYSICAL REPORT

TO

LYELL - E.Z. EXPLORATIONS

ON

AEROGEOPHYSICAL RESULTS

OF

AN AREA IN SOUTH-WEST TASMANIA.

JOB NO. AH117.

MICROFILMED

ADASTRA HUNTING GEOPHYSICS PTY. LTD.

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Originals not to be used unless permission given by geophysicist filed in ~~Hobart~~ library map drawers

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SHEET NUMBERS:
2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S

AEROMAGNETIC SURVEY – SOUTH WEST TASMANIA 1957

SHEET NUMBERS:
2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S

1. INTRODUCTION.

During the period of 15th. September, 1958 to 3rd. October, 1958, discussions were held in Queenstown, Tasmania, between Dr. B. Scott, Geologist-in-Charge, and M. Audley-Charles, Geologist, of L.E.E. and the writer, on the aeromagnetic and airborne electromagnetic survey, flown and reduced by A.H.G.L., covering an area of South West Tasmania.

This report is essentially the outcome of those discussions.

It is hoped that it is appreciated that, in coping with such a volume of data a certain amount of compromise is unavoidable in order to attain within a reasonable period of time an initial broad evaluation of the results. Therefore, it is undoubtedly true that further investigation of the results, especially more detailed scrutiny e.g. in the form of transparent overlays of magnetic and E.M. contours on individual photos, would prove profitable; interpretation should be regarded as a continuing process.

11. DISCUSSION OF RESULTS.

A. General Comments.

(i) Airborne Magnetometer Surveying is now a well established method in mineral exploration, whereas the airborne electro-magnetic survey technique is still relatively new. It is recognised that aeromagnetic contours often reflect geological structure as well as pinpointing the more highly magnetic ores and rock types. Ample evidence is available in these results to demonstrate this and is discussed in detail below.

(ii) Regarding electro-magnetic surveying it is widely acknowledged that whilst such a method is capable of locating conductors, the geophysical picture can be complicated by drainage patterns and other near surface unwanted conductors.

In addition, with respect to the Ronka P.S.C. Airborne E.M. system in particular, which was employed on this survey, the physical quantity measured viz. phase shift, is essentially a measure of the quadrature component of the secondary magnetic field produced by a ground conductor. The magnitude of the quadrature response rises to a maximum and then decreases as the value of a parameter of the conductive body continually increases. This parameter is a function of the frequency employed and conductivity and size of the conductive body e.g. in the case of a thin conductive sheet the parameter is:-

c w a d where

c = conductivity of the body

w = angular frequency

a = linear dimension of the body

d = thickness.

As a result of this type of quadrature response curve it is thought that:-

(a) Magnitude of E.M. anomaly is no necessary criterion of importance.

(b) The ratio of the response at a lower to response at a higher frequency (400c/s to 2300c/s in the case of the Ronka system) can provide an indication of the conductivity - size factor. While it is important not to attach too great a significance to the entity of ratio, because of the dependence of impedance (and hence response) on the geometry and size of the conductor, it can be a useful characteristic with higher ratios being regarded as more favourable.

(iii) In view of (i) and (ii), the basis which has been adopted in examining the AH117 results is that of coupling E.M. anomalies with magnetic contours initially to determine any geophysically significant feature and then to correlate with any known geology (mainly photogeology).

It is understood that the main purpose of the survey has been to select areas for ground follow-up investigation (both geological and geophysical), which have shown some sign of being conductive and are promising in other respects.

Magnetic data can be very valuable in providing confirmation of the existence of structural features.

The writer does not believe that there is available any diagnostic property or group of them which can provide a final definite decisive means of acceptance or rejection of anomalies as potential zones of mineralisation. The selection process is rather akin to the cumulative weighing of probabilities.

In the same category fall queries concerning the origin of anomalies from changes in ground-aircraft clearance. Whilst the fact of increase in response with decrease of altitude is clearly established, it is maintained that anomalies should not be automatically rejected just because there is a height change. Frequently instances arise where on either side of an anomaly associated with some height change there are comparable or greater height changes without a corresponding response on E.M.

Almost all E.M. anomalies would have possible drainage and/or ground-aircraft clearance change correlations.

(iv) In the discussion of the individual sheets, the procedure, which has been followed, is to deal with more regional trends on magnetics and/or E.M. first and more detailed features subsequently. Numerous E.M. anomalies, many of which are correlated with geological structures only and not entertained as "potential ore-bodies", have been numbered on the L.E.E. Standard System.

It is important to realise that mineralisation (i.e. potential ore bodies) cannot be predicted from the E.M. anomalies only conductive zones which may be favourable geological settings for mineralization.

Anomalies being given consideration for possible follow-up have been checked on charts but others have not because of the time factor.

B. Consideration of Individual Sheets.

SHEET 5.

REGIONAL:

The whole area consists of pre-Cambrian rocks and is mainly flat on both Magnetics and E.M. There is only very slight regional correlation, between faults and lithological junctions and E.M., possible.

DETAILED:

There are two minor magnetic "highs" of interest, both occurring along a major intra-pre-Cambrian fault, trending north east-south west. Any E.M. reflection of either faulting or magnetic anomalous areas is absent.

5/M1: Occurs north of principal point (= photo centre and hereafter denoted PP) 39 at the intersection of the major NE fault with NW-SE linear, in the eastern quadrant. Magnitude of anomaly is of the order of 150 gammas.

On the basis of magnitude, steepness of gradient and environment, this warrants a higher order of priority for follow-up investigation than 5/M2.

5/M2: Occurs on NE fault, east of PP 40. Magnitude is about 30 gammas.

SHEET 6.

REGIONAL:

There is a magnetic high trend (compare PP 37) which continues through from Sheets 9 and 10, with magnitude of the order of 200 gammas (300 gammas on Sheet 10). It is intra-Cambrian Dundas, just to the east of the pre-Cambrian-Cambrian faulted junction. To the north it is displaced slightly east, a more or less north-south linear lying along the break, probably indicating the fault origin of the displacement. Throughout its length this magnetic high appears to be delinited by fault and linears.

Digression relating to Sheet 20. Photogeology and field mapping have established the existence of the greywacke - basic lava association in the vicinity of this magnetic high trend on Sheets 6, 9 and 10. This provides some supporting evidence for the idea that 20/6 may be in this favourable host rock environment.

6/1: This E.M. high trend (compare PP 37) could be loosely correlated with the linear and/or the western margin of the main magnetic high trend. In parts, drainage could be the cause of the anomaly. In the vicinity of Line 665A, frame No. 4348 there is an interesting flexure which is rather suspect.

DETAILED:

6/2: This E.M. high trend occurs south of PP 38, within the pre-Cambrian, near the faulted junction with the Cambrian and near an intra-pre-Cambrian fault and linear. Ratios are good, with one, 1.25. There is contortion of magnetics which appear to arise from a magnetic high near junction of major fault with fault and linear.

This anomaly could be a portion of an E.M. trend which continues from Sheet 10. It is somewhat suspect due to drainage influence.

SHEET 9.

REGIONAL:

The main regional feature is the low E.M. response obtained on the pre-Cambrian at the northern end of the sheet.

There is reflection of faulting and lithological boundaries throughout the magnetic contours but particularly so to the north.

DETAILED:

9/1: Is an E.M. high trend which parallels the margins of a magnetic high and the pre-Cambrian-Cambrian junction fault, SW of PP 48. Ratios range from 0.3 to 0.7 with the highest values in the vicinity of a magnetic low closure.

9/2: This E.M. high trend correlates approximately with the position of the maximum magnetic gradient on the western side of the Cambrian Dundas magnetic high extending from Sheet 10 (south of PP 48). Ratios are of the order of 0.4

9/3: Is an E.M. trend which has a broad conformity with the magnetic trend 9 towards the south, near PP 128, the eastern branch coincides with the lithological junction between the Cambrian and pre-Cambrian, although there is a possible drainage influence.

9/4: Ratios of this E.M. high trend, situated south of and between PPs 128 and 129, are greater than 1.0 in the centre and of the order of 0.6 on the margins. The trend is more or less conformable with the magnetic contours, occurring in the Carbine Group of the pre-Cambrian between a NE-SW trending linear to the north and a NE-SW trending fault to the south. A possibly unfavourable physical feature of the anomaly is its breadth, (compare Overlay to air photographs.) Drainage appears to be transgressive although some correlation could be possible.

SHEET 10.

REGIONAL:

The most pronounced feature on the magnetic pattern is the major high trend with maximum intensity of the order of 3000 gammas (just east of the more or less N-S line joining PPs 53 and 74) which is associated with the faulted junction between the Cambrian and pre-Cambrian. Both the junction and the magnetic trend continue south into Sheet 14. The origin of these magnetic anomalies is considered to be ultra-basic intrusives along the major faults. These intrusives are known to be serpentinised at least in part and are believed to occur more in the form of discrete "pods" rather than continuous bodies.

SHEET 10 REGIONAL CONTD.

Further east of this major magnetic high trend, between PPs 77 and 78 i.e. near Birch Inlet, a small segment of another major magnetic high trend is showing on this sheet and like the former trend extends south on Sheet 14. This trend has a Tertiary (Macquarie) cover, but presumably the same cause.

To the West there are some minor magnetic highs intra-Cambrian (Dundas), conforming well with faults, linears and lithological boundaries.

The E.M. contours are complex over both Cambrian and pre-Cambrian, west of the major magnetic trend (PPs 54 to 75) and flattish to the east over the Cambrian Dundas, becoming more complex again over Tertiary Macquarie sediments.

Within the complexity over the Cambrian and pre-Cambrian areas it is possible to discern some regional trends although somewhat discontinuous. Two of these E.M. high trends 10/3 and 10/4 faithfully follow parallel portions of the major magnetic trend discussed above.

The other most significant one closely follows the NE-SW trending Cambrian-pre-Cambrian junction fault (compare PP 71 - PP 52 for approximate location) and has been designated 10/7 and 10/5 in certain portions.

There are several other correlations of E.M. trends possible, some of which are discussed in detail below.

DETAILED:

10/1: North west of PP 49 (NW corner of the sheet) there is an E.M. high anomalous area consisting of a NE-SW trend, one ratio 1.38, more or less parallel to, but displaced to the east from, a major fault and parallel with the regional magnetic trend, together with an E.M. high to the west, ratio 1.1, large, broad with steep gradient on low frequency, occurring at the intersection of the major Cambrian-pre-Cambrian junction fault with another fault.

On magnetics there is a suggestion of a disturbing effect which might be continuing from or isolated from a minor magnetic high to the east. There is a further possibility of some spurious effect here arising from magnetic control or sheet joins.

The favourability is somewhat lowered by possible correlations with altimeter record.

10/2: In Cambrian Dundas, north of PP 49, a magnetic anomaly, with magnitude of the order of 400 gammas, occurs between two linears. Near the eastern linear some correlation of an E.M. high trend with ratios of the order of 0.5 is possible. Near the peak of the magnetic high an E.M. anomaly, with ratio

SHEET 10 DETAILED CONTD.

0.78 falls. It is small and broad, with obvious correlation with altimeter trace, which makes its ultimate significance rather suspect.

10/3 and 10/4: Ratios of the E.M. highs have a wide range of values with three greater than or equal to 1.0 (3a,3b,4a) 10/4, which parallels the eastern branch of the magnetic high presumably ends in the vicinity of a transgressive linear where the magnetic high terminates. Further north along the same trend line there is a correlation between two E.M. highs and a linear, as well as several other possible associations of E.M. highs with faults and linears.

Both trends (3 west of 4) are discontinuous, which conforms with the concept of the more discrete nature of the intrusive bodies.

There is no doubt about the intimate association between these major trends already mentioned above and the basic intrusives as outlined by magnetic anomaly peaks. A similar association is observed and commented upon further to the south, notably on Sheet 14 (compare 14/5).

There could be considerable conjecture, however, over the origin of the E.M. responses. The following possibilities arise :-

(i) Due to the higher conductivity value of the serpentinite and/or basic intrusives.

(ii) Due to increased amounts and/or degree of salinity of ground water in fractures and/or faults associated.

(iii) Due to disseminated and/or massive conductive mineral concentrations within the serpentinite.

(iv) Due to variations in topography or ground-aircraft clearance in the vicinity of the body; topographic variations would probably have a geological origin.

Ground checking is necessary to enable a closer discrimination between these possible causes to be made. It is highly desirable that the E.M. anomalies associated with serpentinites should be accorded some detailed consideration, with a view to attempting to discern any change in characteristics of the E.M. anomalies which may be correlated with some variation in the nature of structure of the bodies. Unfortunately, chart appearance of these particular anomalies tends to favour (iv) as the cause, although there should be some conductivity contrast also contributing.

SHEET 10 CONTD:

Magnetics.

In the vicinity, east of PP 74, there is a suggestion of a possible NW-SE trending fault and branching of serpentinites into two separate pods.

It is the second, eastern pod mentioned, which ends just north of PP 123 near the E-W transgressive linear, so that faulting is also suggested by magnetics. Just to the north west, pinching of the main magnetic trend also coincides with the linear.

There is a major NW-SE trending fault intersecting Cambrian-pre-Cambrian junction fault south of PP 74, which coincides with magnetic high trend with highest intensity magnetic anomaly (north tip of Sheet 14) of the order of 3500 gammas which tends to occur in the acute angle of this intersection. This type of tendency is observed elsewhere, although no universal applicability can be extended to it.

Asbestos Point, Line No. 657, Frame No. 5111, was mapped by Basil Taylor, who shewed that the serpentinites here differ from those at Beaconsfield and Zeehan-Rosebery by the absence of veins of magnetite. He states that disseminated chromite and magnetite are common. Taylor noted that these serpentinites failed to outcrop a few chains south of the point, where Main Creek crosses the belt of serpentinites.

Photo faults show clearly that the serpentinite belt is faulted out here and magnetics support this.

As far as can be seen this magnetic trend is of much lower magnitude, although it is possible that it may be of higher magnitude over Macquarie Harbour to the north. Between PPs 123 and 122 there is a possible further pod with much lower magnitude of the order of 800 gammas. It should be observed therefore that there may be an association between these magnetic highs to the north and south, as there is a remote possibility that portions of the serpentinites rich in asbestos are correlated with lower magnitude anomalies.

A N-S fault, east of PP 122, appears to be reflected in magnetics, whilst further faulting and linears to the south, also appear to provide cause-effect relationships with the magnetics.

SHEET 10 CONTD.

10/5: On Line No. 656, Frame No. 4604, a small E.M. high, of L.F. 0°.3 and ratio 0.3, occurs at the junction of a linear with the Cambrian-pre-Cambrian faulted boundary, together with a small magnetic high. There is possible drainage influence on E.M.

10/6: West and North of PP 127, there is minor flexing of magnetic contours, which was emphasised on a trial residual map as two highs. (Note on trial residual map: This was compiled from a ½" grid by averaging 4 points on a (square root of 2) x ½ inch radius circle and subtracting from centre point. It was undertaken for two portions of Sheet 10, as an experiment to decide if more detailed sharper delineation was obtained to warrant extension to other areas. It appeared that the expenditure of the additional time and labour was not sufficiently remunerative in terms of new features at least in this early stage.)

The E.M. is complex in this area with some rather large broad conductors and higher background response with possible drainage and/or altimeter trace correlations.

10/7: Like 10/5 occurs more or less on the NE-SW trending Cambrian-pre-Cambrian fault junction. The E.M. high, of ratio 0.59, is close to the peak of magnetic high to the west of the fault at PP 126, bounded in the west by another fault. On the charts, this E.M. anomaly has possible height change correlation and not a "favourable" appearance.

A similar magnetic high occurs further displaced from fault junction to the north. It is bounded in the east by a linear and lies on a lithological junction, intra-Dundas. There is a small E.M. high, ratio 0.45 near it.

10/8: This NNW-SSE trend occurs in the south west corner of the sheet, west of PP 71 consisting of three E.M. highs with one ratio of 1.0. There is possible correlation between this good ratio and a creek which coincides with the Cambrian-pre-Cambrian fault junction. It is also near the intersection of a NW-SE trending fault (intra Dundas). The good ratio E.M. high is very close to the highest closing magnetic contour; the maximum intensity is 300 gammas.

The magnetic high is composed of two small trends each parallel to fault trends. The residual map reveals a slight change of pattern with the magnetic high still over the main E.M. anomaly with possible slight displacement to the east i.e. to the pre-Cambrian with the two associated low trends again paralleling two previously mentioned directions.

SHEET 10 CONTD.

In the writer's opinion, the magnetic anomaly is rather intriguing and well situated but from charts the E.M. anomaly seems strongly influenced by topography.

10/9: Just west of PP 73, there is a small broad NNE-SSW trending E.M. high, intra pre-Cambrian. It parallels the trend and point of change in the magnetic pattern. There is no apparent geological reason, although this is recognised to be a highly complex geological area.

E.M. ratios are good and although height change correlation is possible it becomes more favourable by virtue of neighbouring portions remaining lower for greater height variations.

SHEET 13.

REGIONAL.

This sheet is best considered in conjunction with the west side of Sheet 14 onto which it joins because of its small areal extent and similar complex E.M. pattern and similar fairly uniform magnetics, with increasing gradient towards the west coast.

Herringbone in the magnetics adds to the difficulties in evaluating this type of pre-Cambrian terrain (compare other pre-Cambrian areas e.g. Sheets 18, 21 and 24).

Although there are several good ratioed E.M. anomalies and a few trends there is none worthy of being singled out for special mention in the light of the existing geological knowledge.

SHEET 14.

REGIONAL:

Both magnetic and E.M. contours reflect the sub-division of this Sheet geologically into three portions, which from west to east are pre-Cambrian, Cambrian (Dundas), and Tertiary (Macquarie).

Firstly the pre-Cambrian has a complex E.M. pattern with a uniform gradient magnetic field (with some herringbone).

Secondly, the faulted pre-Cambrian-Cambrian junction has associated with it a major magnetic high trend due to the ultra-basic intrusives along the major fault planes. The Cambrian Dundas area is more disturbed magnetically due presumably to other ultra-basic intrusives along major faults (compare South-west PP 81, north-west PP 08) whilst being generally of lower E.M. response.

SHEET 14 REGIONAL CONTD.

Thirdly further to the east there is another major magnetic trend underneath Tertiary cover, indicating another major zonal trend of faulting, on the downthrow side of which, Tertiary sediments (Macquarie) have been deposited and have overlapped onto the Cambrian Dundas in part. The Tertiary area east of this major magnetic trend is rather flatter magnetically, whilst the E.M. pattern is complex and of higher background response generally, the cause being presumed to be the presence of horizontal conductive horizons within the sediments.

This feature of the nature of E.M. response is characteristic of Tertiary cover throughout the area so that frequently (Sheets 17, 20 and 21 provide notable examples) the margin of the Tertiary areas is faithfully followed by trends of increase in background E.M. response.

Another feature, which is common to other Tertiary covered portions of the area is the presence of large magnetic anomalies, which imply the existence of major faults within the sub-Tertiary formations. As can be gauged from the exposed regions, the major faults more or less follow the magnetic peaks but faulting is usually complex so that this principle can provide merely a guide and should not be applied too rigorously.

DETAILED:

In the light of the above factors, combined with the favourable geological nature of the Cambrian Dundas, it was deemed advisable, at least in the early stages, to devote more attention to this rock group, especially on Sheets 14, 17, 20 and 23.

Western Margin of Cambrian.

The most persistent and causal structural feature is the NNE-SSW trending major fault. At the north end, there are two E.M. high trends with an intermediate low trend more or less paralleling the fault.

14/1: Is well to the west of the fault, with ratios of the order of 0.3, and is possibly correlated with the timbered pre-Cambrian junction.

14/2: Has ratios of the order of 0.5 and closely follows the magnetic anomaly peaks, which have a range of values from 3500 gammas maximum to less than 500 gammas to the south where there is a pinching out of the magnetic contours.

This is undoubtedly an important trend in that it is another E.M. trend associated with serpentinites, although the exact origin cannot be tied down as yet.

SHEET 14 DETAILED CONTD.

Both of these E.M. high trends are discontinuous for 10,000 feet and this discontinuity falls on the pinching of the magnetic highs.

At the south end this discontinuity being to the north, there is a similar situation with regard to two E.M. high trends as at the north end with a further one further east.

14/3: See after 14/6.

14/4: Falls west of the fault, on a magnetic low trend in pre-Cambrian and has ratios of the order of 0.4.

14/5: Which is slightly east of the major fault, coincides exactly with the magnetic high peaks (note flexures) and is very close to a linear.

The magnetic highs increase from less than 500 gammas at the pinching to 2000 gammas maximum, falling south to 1600 gammas passing south to Sheet 17. Although it is possible to observe some correlation between altimeter trace and E.M. response, this anomaly would appear to be arising from some geological cause. Its very broad nature suggests of course a broad conducting band. Possible geological causes of the E.M. anomaly, as of 10/3 and 10/4, particularly (i), (ii) and (iii) apply equally here.

14/6: Which is slightly east of 14/5 and has good ratios in part, could be correlated in part with fault and/or drainage. To the south it branches into two, both branches being associated with magnetic highs.

14/3: This is the most interesting feature in that it is an E.M. high trend, in the vicinity of a rather curious rounded magnetic high (compare PP 08), and the intersection of a fault with linear. The trend curves similarly with the fault-linear trend.

Remaining Cambrian: There are several E.M. trends obviously associated with drainage pattern. There is a possible correlation between the major anticlinal axis and a E.M. (low) trend.

SHEET 15.

REGIONAL:

The whole area is flat magnetically and rather unfavourable geologically, hence attention on it has not been accentuated. On the western margin of the sheet, the Tertiary Macquarie - Ordovician Lithological junction trends N-S and is reflected in the change in E.M. pattern from more complex over Tertiary to rather lower background on the western side of the Ordovician.

Several E.M. highs could possibly be correlated with geological structure and others with drainage.

DETAILED:

In the southern central portion Ordovician Gordon is delineated by E.M. high pattern.

N-S faulting in the centre of sheet near the N-S line through PP17 could well be associated with the E.M. high trend.

15/1: This falls south of PP 83 in an area difficult for height keeping and has been recorded at high altitude which may be responsible for the high ratios (two greater than 1.0).

Although magnetics are flat, the occurrence at the intersection of two major faults provides some support; it is very suspect due to drainage and relatively unfavourable geologically.

15/2: Occurring south west of PP 88, in Ordovician Owen, it has very good ratios. Although parallel and near to a linear it is broad and unfavourable geologically.

SHEET 17.

REGIONAL:

Tertiary Macquarie cover extends over the eastern portion of the sheet resulting in a typical complex E.M. pattern with higher values generally than the Cambrian and other rock types to the west. In addition this Tertiary area features a large broad magnetic N-S trend extending south from Sheet 14 and presumably again arising from ultrabasic intrusives in major faults.

The broadening of the magnetic anomalies could be attributed to one or more of the following factors:-

(i) Increased depth due to Tertiary Cover.

(ii) Increased depth due to position within Cambrian (?) of emplacement.

SHEET 17.REGIONAL CONTD.

(iii) Increase in effective areal extent of intrusive bodies in this area.

Within the Cambrian Dundas the magnetic picture is quite complex with a distinctive serpentinite.- ultrabasic band (compare PPs 05 and 91) extending south from sheet 14 near the western margin of the Cambrian. This has an accompanying E.M. high trend,17/4.

Between this trend and the previous one mentioned there is some suggestion on both magnetics and E.M., (17/6), of a major trend line (fault?) in a flexuous NW-SE direction.

The small area of Mesozoic rocks exposed on the west coast,with a few exceptions,exhibit low E.M. response and minor reflection of structures in magnetics.

DETAILED:

North West Corner of the sheet contains some E.M. highs coincident with magnetic highs and continuing from Sheet 14.

17/1: Seems to be an extension of 14/5 and has a ratio of 1.76 but is subject to strong drainage influence in this region.

17/2: Is also an extension from Sheet 14 with one anomaly 17/2a of ratio 0.82 coincident with a small magnetic high of about 250 gammas, but again probably being influenced by drainage. As a whole this trend is very broad and correlates with the altimeter trace, whilst 17/2a is a small broad anomaly not so suspect on these grounds. The vicinity of 17/1 and 2 appears to mark the position of displacement of the major magnetic trend to the east.

17/3 and 17/4: The eastern branch of 14/6 continuing south (near PP 05) seems to follow fault and magnetic high trend for about 10,000 feet with several ratios of the order of 0.8. Then it swings east of the fault still following magnetic high and being strongly influenced possibly by a river. It follows the magnetic high, which has successive peaks of the order of 800, 400, 400, and 1700 gammas, almost to the Spero River.

The reason for the differentiation into 17/3 and 17/4 is that there is a discontinuity in the trend just south of PP 05 which may be arising from a height effect on Line 609.

Near the Spero River mouth, the E.M. pattern is complicated by strong drainage influence. There is an E.M. high at Line 596 (Frame687) coincident with the magnetic high peak over the known serpentinite body which is well delineated on magnetics.

SHEET 17 DETAILED CONTD.

A chart examination of the many lines involved indicates that the anomalies are generally broad but they vary in that sometimes correlation with drainage is possible, at other times with altimeter, in some cases no obvious correlation - and in others where topographic correlation could be inferred there exist greater decreases in the ground-aircraft clearance without corresponding increases in E.M. response. This exemplifies a common situation that while extraneous influences such as drainage and topography can obviously affect or accentuate a response, the zone may still have some positive conductivity contrast as it is believed this one possesses.

So, as on Sheets 10 and 14, a marked association between ultra-basic intrusives along major faults and E.M. high trends is again evident.

Although there is insufficient evidence as yet to establish it as a principle, it is interesting to observe that there is a tendency for E.M. ratios to be higher over higher magnetic intensity portions of trends.

North West Costal Area.

17/5: This more or less N-S E.M. trend with ratios from 0.2 to 0.7 paralleling the coastline, could possibly connect to the north with 17/2 and 14/5 but drainage obscures the picture in that area. It is closely associated with the major Cambrian-Mesozoic junction fault until a position about mid-way between PPs 89 and 90. The most pronounced E.M. anomaly on Line 604 Frame 734 coincides with a minor magnetic high but is unfortunately being strongly affected probably by a river. Major and minor faults correlate with various changes in magnetic contours, whilst just to the west (south-west of PP 89) the faulted Jurassic Dolerite is well defined on magnetics.

Vicinity of PPs 07 and 93.

About mid-way between PPs 06 and 07 there is an E.M. high trend of low ratio of the order of 0.2 which correlates with a major more or less N-S trending intra Cambrian Dundas fault. This fault does not appear to have an appreciable influence on magnetics, except possibly along its northern extremity.

Near PP 92, this fault is joined by another major intra Cambrian Dundas fault striking ENE-WSW which is reflected in magnetics to the east. There is no obvious E.M. response from this fault which could be due to the flight lines almost paralleling the strike along most of its length.

SHEET 17 DETAILED CONTD.

17/6: This E.M. high trend with ratios mainly of the order of 0.2 correlates well with a NW-SE trending intra-Canbrian linear. Continued further southeast it links up with the Tertiary junction and possibly constitutes "fundamental" faulting. (See discussion of Moore's Valley area).

17/6a: Is one E.M. anomaly with ratio 0.75 interestingly situated near fault and linear junctions. The close proximity to creeks renders it suspect. Just to the south there are several E.M. anomalies with a trend conforming with magnetic contours but again broad. The 0.61 ratioed E.M. anomaly on Line 599, Frame 2033, is very close to an intersection of major fault and two linears.

17/7: Near PP 100, with ratios of the order of 0.3, this E.M. trend coincides with a magnetic high trend and are both displaced slightly to the west from but parallel to a curving N-S linear. A creek should not be the influence here.

N.B. Both the magnetic and E.M. patterns of the Canbrian Dundas on this sheet are involved so that this area is certainly one which warrants a later review.

SHEET 18.

REGIONAL:

Height keeping over a considerable portion of this sheet was poor so that the best control was obtained in a central E-W belt. Consequently, the most significant E.M. picture is confined to this zone. There are a number of more or less N-S E.M. high trends of good ratio which conform well with the lithological strike. Several are obviously coincident with drainage.

There are no really major magnetic features although there is generally good agreement between magnetics and structure in detail.

The most pronounced magnetic feature is the intra-Canbrian Dundas high trend which, whilst extending under Ordivician Owen (compare PP 102 and 16), can be regarded as arising from Dundas formation.

The Lyell Shear on the west margin of the sheet is defined here by the Tertiary Macquarie - Ordovician Owen junction. There is no marked reflection of it in magnetics.

SHEET 18 CONTD.

DETAILED:

18/1: Occurring near the Lyell Shear this E.M. trend has ratios greater than or equal to 1.0. Whilst magnetics are flattish, it is in the vicinity of an E-W breaking trend and in the vicinity of the displacement of the fold axis in the Ordovician Owen. Correlation with a creek or change in ground-aircraft clearance is probable.

To the south, a number of E.M. peaks occur which can probably be correlated with drainage and/or Tertiary boundary.

18/2: To the east of 18/1, there is an E.M., N-S trend correlated with drainage in the vicinity of PP 16. Further east, (in the vicinity east of PP 92) another E.M. high trend with some good ratios can probably be correlated with drainage and/or the Ordovician Owen-Cambrian Dundas junction. Thus 18/2 is on a magnetic high trend but terminates short of the maximum intensity region.

18/3: This small broad E.M. anomaly occurs north-west of PP 17 in Cambrian Dundas and in a flattish magnetic area although on the breaking trend. To the north east and south there are some fair ratioed E.M. highs. Correlation with altitude change is possible.

18/4: With a ratio of 1.0 and occurring (compare west of PP 18) between a linear and the Cambrian Dundas-Ordovician Owen junction in Ordovician Owen, this E.M. anomaly is in the vicinity of a distortion of the magnetic pattern and hence appears very favourable geophysically, except that when altimeter trace is shifted laterally about 850 feet there is a faithful fit with the high frequency response. Thus this anomaly is now suspect and the magnitude of this displacement is surprising.

18/5: In Ordovician Owen (compare east of PP 18) it is characterised by ratios of the order of 0.3 to the north and 0.5 to the south. There is possible association with a linear and drainage. It is a magnetically low area.

Some Comments on the pre-Cambrian, Davey Group.

The pre-Cambrian, Davey Group is considered an unfavourable host rock environment and so in general the time dispensation has been allocated accordingly. Regarding this sheet, however, which was investigated chronologically earlier, it was considered that it would be instructive at least, to deal with it somewhat more deliberately although by no means meticulously. A factor influencing this decision was that it was apparent that this area provided some

SHEET 18 DETAILED CONTD.

interesting correlations between E.M. anomalies and near surface structural trends, providing information on and substantiation of the logical character of the E.M. technique.

In the pre-Cambrian terrain on this sheet it appears that the N-S trending magnetic highs coincide with valleys and lithological units composed predominantly of Quartz-Mica-schist whilst the ridges consist essentially of metaquartzites.

18/6: About mid-way between PPs 18 and 19, in the pre-Cambrian, the E.M. high trend with ratios from 0.5 - 1.0 conforms with strike and magnetics. The best ratio of 1.0 occurs at a flexure in the magnetic trend.

Whilst there is the possibility of topographic or drainage effects, this small broad series of anomalies undoubtedly correspond to a conductor in the vicinity as there exist lower response for lower altitudes on neighbouring portions of the chart.

18/7: Occurs in a valley (compare just east of PP 19) coincident with a magnetic high of 80 gammas and a creek. Ratios are of the order of 0.9. At the south end of the magnetic anomaly there is a transgressive trend to the east, which appears to be coincident with probable faulting on air photos. At the north end, E.M. and magnetic trends terminate together more or less in the vicinity of complex magnetics.

18/8: Just east of PP 19, there are three E.M. anomalies which coincide exactly with a lithological junction. The northern-most one has a ratio of 0.83. There is no suggestion of an anomaly on the next two flight lines whilst on the following two to the south small unratioed highs appear. From air photos the anomalies lie on the western side of a cliff and, even if not actually caused by the junction itself, would appear to arise from some structural feature trending in the same direction.

18/9: Just east of 18/8, are two good ratioed E.M. anomalies which, whilst occurring on top of a ridge, coincide also with a fault indicated by detailed photo-interpretation.

18/10: To the south and slightly east of 18/9, an E.M. anomaly falls on the magnetic low transgressive trend near the 18/9 fault, having a ratio of 3.0 and 1.2 degrees magnitude on L.F. at 670 feet. It is a large broad anomaly in the neighbourhood of noisy L.F. trace and very small H.F. correlation with drainage or topography is possible.

SHEET 18 DETAILED CONTD.

To the east of 18/9 and 10, some other E.M. highs occur of fair to good ratio. Some of these could possibly be correlated with small creeks.

To the south of 18/9 and 10, there are two linears each with magnetic highs to the east. There are some low ratio E.M. highs in this vicinity.

18/11: Between and south of PPs 21 and 22, an E.M. high trend falls on a magnetic high region, presumably reflecting again Quartz-mica schist unit, with differential vegetation. Within this group of E.M. anomalies, two particularly are of good ratio, greater than or equal to 1.0 18/11a has possible topographic correlation and rather unfavourable appearance.

The magnetic intensity is greater than 300 gammas. The possibility of variations within the Quartz-Mica schist units should be borne in mind.

Some of the transgressive magnetic trends, e.g. vicinity north of PP 89 appear to be associated with faults whilst others have no apparent geological correlation.

SHEET 20.

REGIONAL:

This is an important sheet by virtue firstly of inherent interesting geophysical features and secondly of the fact that together with Sheets 17, 18 and 21, it covers the area called Moore's Valley. Moore's Valley is geologically a very interesting area and is dealt with separately because of its occurrence at the join of 4 sheets.

The E.M. response for most of the area is low. The marked exception is the very high values obtained over the Tertiary cover which it has been observed is typical. Thus this Tertiary portion is fairly faithfully delineated by the E.M. contours which link up with the NW-SE trend on Sheet 17. It would be extremely doubtful that the E.M. response is due to other than conductive horizons within the Tertiary sediments, variation in response being attributable to changes in lithology and/or ground water conditions.

Magnetic contours suggest three major sub-divisions of the area into:-

(1) A western, higher, more complex magnetic region which arises from essentially Cambrian Dundas formations and in the main terminates to the east faithfully with the Lyell Shear.

(2) A south eastern uniform gradient magnetic region consisting mainly of Ordovician Owen.

SHEET 20 REGIONAL CONTD.

(3) A north eastern magnetically flattish area of Ordovician Owen and Tertiary Macquarie cover, a zone of faulting evident between 2 and 3.

This change in magnetic pattern within the Ordovician Owen syncline could be explained in terms of thickening sedimentation to the north due to pitch and/or changes in lithology due to pitch and faulting.

The Tertiary cover near Line 565 (E-W margin) has little effect beyond being the probable cause of a slight broadening of magnetic contours of the high peak. The somewhat triangular area is an overlap of sediments.

Region (1) contains a main N-S magnetic high trend, which appears to continue south from the main N-S trend under Tertiary cover on Sheets 17 and 14 (from Birch Inlet) and considered to be ultra-basic intrusives. Hence the first suggestion is that this trend originates from a similar cause. While this explanation cannot be ruled out, it is believed that the following evidence supports a more probable alternative.

(i) The nature of the magnetic contours is different from that known or considered to be associated with ultra-basic rock types in other portions of the AH.117 coverage.

This difference expresses itself in a broader, more complex "broken" pattern than the distinctly thin elongated or smooth, rounded modes of the ultra-basic intrusives. With a few minor exceptions, there is a tendency for the ultra-basics to possess higher magnitudes (greater than 1000 gammas) whilst these Cambrian Dundas exhibit lower magnitudes (less than 1000 gammas).

(ii) Description of an E-W traverse across this region contained in Marshall Penney's Report G.41, points to the existence of a greywacke conglomerate-basic lava type association in this area with which the magnetic pattern could well conform.

(iii) Pinching of magnetics near PP 48 together with other suggestions on Sheet 17 of major NW-SE trend (See Moore's Valley Area for more detail on these arguments) support the concept of a major transgressive fault which could account for the proposed change in rock type and structure.

With two sets of rock types of relatively high magnetic susceptibility, both with N-S trends, an extending magnetic high trend would be anticipated.

DETAILED:

Magnetics agree well in detail with known (photogeological) faults and linears.

SHEET 20 DETAILED CONTD.

20/1: In Cambrian Dundas, south west of PP 46 a small E.M. High (L.F. 0.6 degrees) occurs near a small magnetic high, although possible trends of each could be transgressive.

The E.M. anomaly is broad with possible drainage association.

20/2: In Cambrian Dundas, an E.M. high, L.F. 0.3 degrees, on two flight lines isolated in an area of generally low E.M. response. While some correlation with altimeter trace could be possible, it appears fair although small and broad. This coincides with a small magnetic low. It is adjacent to a more or less N-S linear which joins another NW-SE one a little to the south. Photogeology has revealed what is very probably a truncated fold very closely associated with the trace of the E.M. high trend. It is worth observing that this area and the direction of E.M. trend are allied to the Lyell Shear.

20/3: This is a NW-SE, E.M. trend in Cambrian Dundas with ratios of the order of 0.3 (compare Line 555, Frame 2157 neighbourhood.) Magnetics have a tendency to a NW-SE trend including the suggestion of a breaking trend at the northern extremity of 20/6.

20/4: Occurs in Cambrian Dundas in the vicinity of Line 555 Frame 2194. It shows two small E.M. trends with L.F. of the order of 0.5 degrees, interestingly situated with respect to a more isolated magnetic high. South of the frame 2194 on Line 554 there is another small broad high. These anomalies lie between two more or less N-S linears, north of 20/6. There is no marked correlation of E.M. response with altimeter trace.

20/5: This N-S trend occurs just east of the faulted junction (viz. Lyell Shear) between Cambrian Dundas and Ordovician Owen in the latter rock type and parallel to the fault. It is in the region of other NW-SE trending faults and in the vicinity of change of magnetic patterns. Obviously, it is a favourable fault locality, although the Ordovician Owen conglomerate is not considered a favourable host rock, unless hydrothermally altered.

The E.M. anomalies themselves are small and broad and very suspect of being influenced by drainage and/or of being correlatable with altimeter trace.

20/6: This is a marked, more or less N-S, E.M. high trend which very faithfully follows with its flexures a magnetic low. The magnitude of the magnetic peaks, in the immediate vicinity, is about 300 gammas while to the north and south 500 to 600 gammas. The main direction conforms with general strike direction as indicated by magnetic contours and with the main series of linears.

SHEET 20 DETAILED CONTD.

Strike lines from air photos are closely conformable with flexing anomaly trend.

The maximum E.M. anomaly peak is 1.4 degrees and ratios are good, ranging from 0.67 - 1.56. The trend is about 8000 feet long and somewhat broad. Some topographic effect could be influencing the response but the anomalies appear quite valid irrespective of this.

At the northern end another small anomaly on Line 549 Frame 4225 suggests a NE-SW branch which agrees with a branching magnetic low in this area.

On Line 548, Frame 3107, another small anomaly is also interestingly situated, with some small disturbance on magnetics.

There are some associated features warranting mention. A NW-SE fault just north of PP 24, is apparently reflected in magnetics and could well be continuing south east, as could the fault just north of PP 115. This southern fault would strike the N-S line of 20/6 a little to the south of its termination in a region where there seems to be a breaking trend on magnetics; unfortunately the picture here is obscured by mosaic distortion. At the northern end of the anomaly trend, another more or less NW-SE breaking trend is suggested.

It is interesting to note that the best ratios and some of the largest magnitude L.F. values occur in the neighbourhood of intersections of suggested fault lines with the main anomaly trend.

In conclusion, in view of the generally low background response in this region and the faithful agreement between E.M. and magnetics and photogeological structures, there seems little doubt that this E.M. anomaly is of structural significance. In addition it is believed that the area consists of the highly favourable greywacke-basic lava association.

The magnitude of the magnetic anomalies can be easily accounted for by basic lavas. The only way of eventually deciding on the nature of conductive zone is by ground checking.

It is on these grounds that this anomaly has been accorded the highest priority for ground follow-up.

20/7: West of PP 115 in Cambrian Dundas, there is a NW-SE trend with ratios of the order of 0.3 and parallel to a magnetic trend between a high and low. It is closely associated with a fault-cum-linear.

SHEET 21.

At the outset a note on the treatment accorded to this sheet and to Sheet 24 which adjoins it to the south is perhaps warranted. Because of the considered geological unfavourability for mineralisation of the majority of this sheet, notably the pre-Cambrian Davey group, most of the E.M. anomalies and complex magnetic patterns have not been considered in as much detail. This is especially true of magnetics which are probably broadly related to rock type on the basis of predominantly quartz-mica-schist with magnetic highs and a predominance of meta-quartzites with magnetic lows. Furthermore, more detailed inspection could possibly yield additional correlations of E.M. anomalies with lithological boundaries, faults and magnetics of at least academic interest. 20/8

REGIONAL:

A full description of the western side of this sheet is included in the description of the Moore's Valley area. The pre-Cambrian eastern side is referred to in the above introductory note.

Apart from the western E.M. high trend at the Tertiary margin there is nothing particularly distinctive about this sheet.which is generally low.

DETAILED:

21/1 and 2: These two good E.M. highs with ratios greater than or equal to 1.0, occur south of PPs 53 and 54. 21/1 occurs on a magnetic low between two magnetic highs and on a linear. 20/2 occurs near a magnetic high with magnitude of the order of 100 gammas and a linear. Another magnetic high of the order of 150 gammas occurs to the west and has a southern flexure due to faulting.

Air photos reveal that 21/1 is possibly correlatable with drainage and 21/2 is very unlikely to have drainage correlation.

The area is known to contain garnet-mica-schists in places but geological evidence from photos is not conclusive as yet as to lithological distinction related to magnetic highs.

21/3,4 and 5: South of PPs 55, 56, these three, good ratioed, E.M. anomalies fall on or near a lithological boundary in typical pre-Cambrian.

21/6 and 9: In each case, 21/6 south of PP 58 and 21/9 south of PP 24, the E.M. anomalies with ratios greater than or equal to 1.0 develop on one flight line only. Both are in Gordon Limestone and probably at the same stratigraphic horizon. They are possibly associated with shaly bands common in the lower Gordon. 21/9 could be related to drainage but it is also favourably placed with respect to faults, one of which is reflected in magnetics. Magnetics are generally inconclusive in these areas in respect of anomalies.

SHEET 21 DETAILED CONTD.

21/7: South of PPs 30 and 29 an E.M. anomaly has a ratio of the order of 0.4 and is possibly correlatable with Tertiary pre-Cambrian faulted junction.

21/8: South of PP 27 this E.M. trend has one good and one poor ratio. It is near a fault in pre-Cambrian with typical minor complex magnetics in the general vicinity.

21/10: In the neighbourhood of PP 34 this E.M. trend has some fair to good ratios although rather broad. Photos suggest the probability of drainage influence although it is in a very favourable faulted environment with minor complex magnetics.

21/11: North-east of PP 38 there is an E.M. high with one good ratio of 1.34 on a river and close to minor magnetic flexing and in pre-Cambrian.

Further to the north-east there are some other E.M. anomalies with good ratios in a northerly trend probably related to the Caroline Creek Gordon limestone junction. To the south, the E.M. anomalies are related to the junction of intra-Ordovician Gordon lithological boundaries.

21/12: South of PP 105 an E.M. anomaly with one ratio 1.0, coincides exactly with a magnetic high of the order of 100 gammas between two faults and one linear. On geophysical grounds alone this one looks very interesting, although it is again in pre-Cambrian.

21/13: East of 21/12 several other good ratioed E.M. highs appear in the vicinity of numerous intersecting linears. There is probably some correlation with drainage.

21/14: Just west of PP 103 there are some haphazard E.M. highs of fair ratio. There is no clear cut general magnetic or geological structural association.

21/15: North-west of PP 102 one E.M. high of ratio 1.0 falls on a magnetic high near a lithological junction and fault.

SHEET 23.

REGIONAL:

This sheet consists predominantly of Cambrian Dundas and has associated with it some complex high magnetic regions, one of which continues south from Sheet 20 in the north-western corner of this sheet. In the south-western area there are some distinctive magnetics associated with a granitic intrusion. It can be observed that two types of Cambrian are apparent from the change in magnetic pattern. The E.M. is generally low for most of the sheet. In view of the large area of Cambrian Dundas involved, this is another sheet which warrants a further perusal.

DETAILED:

23/1: South of PP 47 this north-south E.M. trend with ratio of the order of 0.4 parallels one of several faults and is associated with magnetic lows. Drainage is a probable influence.

23/2: South of PP 48 this E.M. anomaly ratio 0.7 falls in Ordovician-Owen close to a major junction fault. In the north-west corner of the sheet there are several E.M. anomalies which could warrant a closer inspection at a later stage; apparently due to some reason of control there is a general increase in the background response in this area.

SHEET 24. (See Introductory Note of Sheet 21).

REGIONAL.

Again on this sheet many close correlations between magnetics and structure are obvious, similar to those discussed in Sheet 21, particularly notable on the eastern side of the sheet. There are several minor correlations between E.M. and geology possible of which a few are discussed. There are no outstanding regional features on this E.M. sheet.

From PP 55 to PP 30 and south a magnetic high north-south trend lies between major fault and linear.

DETAILED:

24/1: South-east of PP 51 this E.M. high has two ratios equal to 1.0. It is a very sharp high anomaly with favourable appearance on chart but with obvious correlation with altimeter. It is very close to the granite-pre-Cambrian faulted contact. Magnetics are inconclusive. The trend is coincident with the vicinity of three intersecting linears in the granite and one in the pre-Cambrian. The anomaly actually falls in the pre-Cambrian.

SHEET 24 DETAILED CONTD.

24/2: Slightly further to the east of 24/1 two E.M. highs parallel with magnetic high and several other good ratioed anomalies occur. Drainage influence is suspected.

24/3: South of PP 54 several E.M. highs are correlatable with linears, e.g. west of Frame 3786 Line 534. Again drainage presents a query and magnetics are inconclusive.

24/4: Just east of PP 32 two small E.M. highs close to a major intra pre-Cambrian fault, with drainage a query.

24/5: There is an E.M. high north and south of PP 28 sub-dividable into two portions, both coincident with minor magnetic high trends. The north one is broad on the east side of a major fault. The southern portion lies in an area between three major faults and two east-west linears and has better correlation with magnetics. There are two good ratios greater than 1.0 on each side of one east-west linear. The significance is probably structural (Schists?).

24/6: Just west of PP 121 an E.M. high trend parallels a major intra pre-Cambrian fault and linear. One ratio is greater than 1.0 near the linear and fault intersection with a lithological junction nearby. It parallels a magnetic trend near a high between a high and low. There is probable drainage influence.

24/7: To the east of PP 121 there are several good ratioed E.M. anomalies, with drainage the probable cause.

DAVEY RIVER AREA.

REGIONAL:

There are major magnetic high trends of the order of 100 gammas due, apparently, to garnet-mica-schists with associated faulting. This area as a whole is considered unfavourable for mineralisation and has been treated accordingly.

DETAILED:

The tendency of higher E.M. background could be due to graphitic schists.

SHEET 4S.

4S/1: Near the coast an E.M. high trend roughly parallels the magnetic high and is of probable structural significance only.

4S/2: Near PP 141 there is a possible E.M. trend which would be favourable structurally.

4S/3: South east of PP 141 there is an E.M. high within metaquartzites transgressive to magnetic trend and very unfavourable.

SHEET 5S.

The magnetic high of 550 gammas due to pyritic-graphitic schists and associated with major faulting occurs on the west coast of the Davey River inlet. Magnetics, as in other sheets, reflect structure. E.M., in view of the unfavourable geological environment, is uninteresting.

SHEETS 6S and 7S.

Similar types of correlations of magnetics and comments on E.M. as above apply here too.

C. Some Special Aspects.

1. MOORE'S VALLEY AREA.

On geological evidence it has been suggested that a rift valley intersects the Lyell Shear in this region, the rift valley having been filled with Tertiary Macquarie sediments. The Lyell Shear suffers a flexure in this area resulting in a displacement in the south to the west.

This area is being treated separately because of its falling at the intersection of photo mosaics 17, 18, 20 and 21. In view of its geological importance, an attempt is made here to provide some additional information, or at least definition as to the possible structural conditions. Because it is believed that the E.M. response from the Tertiary Macquarie sediments mask any response which might have been obtained from the underlying rock types attention is confined mainly to the aeromagnetic maps.

The following points are relevant in discussing the possible lines of faulting:-

(i) In the south-eastern corner of Sheet 21 there are some magnetic highs around the margin of the granite which are considered to be due to magnatic segregations, which apparently contain higher concentrations of magnetic minerals and delineate the periphery of the granite.

(ii) The high to the south-east of the granite is probably an intra pre-Cambrian feature. The idea of the granite extending east of the junction under the pre-Cambrian to the south is not favoured.

(iii) In the central portion of the Tertiary cover on Sheet 21 there is a broad magnetic low swinging in the direction of the proposed rift valley. Hence it can be assumed that both the Tertiary sediments, which here and

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elsewhere can be regarded as essentially non-magnetic, and the underlying rock types here are non-magnetic.

(iv) South of PP 127 (Sheet 21) there is an east-west linear which is presumably reflected in magnetics by a low to the south and a high to the north, both in Cambrian Dundas. There is a low over the adjoining Ordovician Owen but it is questionable whether it is really significant. e.g. Note there is a high to the west of Sheet 21 in the Ordovician Owen. (compare Item xi).

(v) Extending on to Sheet 20 there is a uniform gradient NW-SE trend (compare PP 111) over thinner Ordovician Owen with faulting to the north and flatter magnetics.

(vi) The delineation on magnetics of the Lyell Shear on Sheet 20 by virtue of the higher values over the Cambrian Dundas can be employed to extrapolate to the north through the vicinity of PP 33 to join up with the known position on Sheet 18. A postulated, elongated with strike, magnetic body faulted to the north and east, could satisfactorily account for the magnetic pattern observable to the west of PP 33, together with the high magnetic influence further west. Magnetics in the north-east corner of Sheet 20 and neighbourhood, strongly suggest a change in the nature of the Cambrian Dundas immediately to the north. Thus arises the possibility of a fault line which would be in a sense the northern extension of the north-east fault of the Moore's Valley rift.

(vii) Pinching of magnetics near PP 48 at the intersection of a NW-SE trend continuing to the north-west on Sheet 17, could be the effect of a major fault.

N.B. Geological evidence supports the concept of the termination here of ultra-basic intrusives along major faults such as occurs to the north and the commencement to the south of a greywacke conglonerate-basic lava type association, so that it can be regarded as a "coincidence" that they are on the same N-S trend.

(viii) The north boundary fault of the "rift valley" can be selected on the basis of the cessation of steep gradients and general high locations in the northern part of Sheet 21.

(ix) The south boundary fault of the rift valley is the most difficult one to attempt to define. It is believed that a reasonable assumption is that

any magnetic high (only minor ones) must be to the south.

Note that in the vicinity of PPs 32 and 31 there is a uniform gradient decreasing from west to east which can be regarded as regional. It should be recognised also that in such a generally flat area, unavoidable small control errors due to non-linearity of diurnal drift, can lead to considerable distortion.

(x) If the magnetic N-S contours south of PP 31, which are considered to arise from magnetic control, can be shifted west, a better picture is obtained and the south boundary fault could be shifted south.

(xi) Two possible explanations of the pattern near PPs 126 and 127 are (a) there is lateral thinning of Ordovician Owen over Cambrian Dundas which is the explanation preferred, or (b) magnetic variations exist within the Ordovician Owen.

(xii) Similarity exists between the Cambrian Dundas magnetic highs, of magnitude of the order of 150 gammas on each side of the Lyell Shear. This can be accounted for by greywacke conglomerate.

(xiii) There is one point from the E.M. picture worthy of consideration. It has been observed that the south western edge of the Tertiary sediments are faithfully followed by a high E.M. trend. It is significant that this is irrespective of flight line direction and that areas to the north-east are generally flatter. The cause could well be that the E.M. high complex area lies on the Tertiary overlap which results in different drainage and/or lithology.

Supporting this idea is the fact that these sediments could be considered more likely to be of the upper stratigraphical series and thus more argillaceous in character. To the north a corresponding E.M. high trend is absent. This sharp contrast could be due to the fact that there is no major overlap here because of subsequent erosion due to increasing elevation of the land to the east and hence drainage to the west.

(xiv) It is important to realise that numerous assumptions have been made in postulating these fault positions which may or may not be valid. The conclusions reached based on these assumptions are considered to be the most probable ones and have been drawn because it is hoped that they could provide a basis for further investigation. It should be appreciated also that when faulting is referred to, as can be seen from known geology in other areas,

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it is quite likely to be of a corplex nature rather than just a simple fault line.

In summarizing,the position of the Lyell Shear, a north and south boundary fault on the eastern side and a line of faulting on the north-western side are postulated.

2. FAULTING UNDER TERTIARY COVER.

It can be seen in exposed regions that as a general principle, major faulting, with associated ultra-basic intrusives, closely follows but does not necessarily exactly fall on magnetic high trends. Also sharp breaking trends are associated with minor faulting. Provided it is not accepted as rigorous, this principle can be adopted in postulating fault trends under Tertiary sediments.

3. SOME RELEVANT DATA FROM AH.113.

An area to the north of AH.117 known as AH.113 has been surveyed aeromagnetically. A brief examination of these results provided the following information which is valuable for comparison.

Jukes greywacke conglomerate exhibited magnetic anomaly peaks of from 150 to 400 gammas, greywacke conglomerate (Cambrian-Dundas) from 200 to 250 gammas peaks. These conglomerates contain magnetite.

111. CONCLUSIONS AND RECOMMENDATIONS.

To some extent, conclusions have been implied and drawn at various stages through the report. There are in these records a vast number of conductive zones; an attempt has been made to investigate what have appeared the more interesting ones in at least a little detail.

Selection of Order of Priorities.

A distinction has been made between anomalies which are considered worthy of ground follow-up work in the near future (i.e. higher economic potential) and those which are considered to be mainly of structural significance. It should be appreciated that often such a line of demarcation is not only difficult to draw and artificial, it should be subject to continual review as further evidence, especially from ground surveys, comes to hand.

Hence this list should be considered as providing, in the opinion of the present writer, the most logical basis on which to regard and commence to investigate anomalies.

Selection of Order of Priorities.Contd.

One important factor influencing the selection has been to ensure the inclusion in the higher priority lists of a range of the more favourable E.M. anomalies, related to a particular set of magnetic and geological conditions. Thus in the event of one anomaly of a particular set proving interesting, the raising of priorities of other members of the set or at least similar anomalies, may be warranted.

Assessment of Anomalies.

N.B. Order within priority group is numerical.

FIRST ORDER PRIORITY:	20/6.
SECOND ORDER PRIORITY:	14/5, 20/2, 20/4.
THIRD ORDER PRIORITY:	5/M1, 6/2, 9/4, 10/1, 10/3b, 10/8, 17/2a, 18/6, 20/5, 24/1.
FOURTH ORDER PRIORITY:	5/M2, 10/2, 10/3a, 10/4a, 10/5, 10/7, 10/6, 17/6a, 18/1, 18/3, 18/11a, 20/1, 21/12, 23/2.
STRUCTURAL:	6/1, 9/1 - 3, 10/3, 10/9, 13/1, 14/1-6, 15/1-2, 17/2-4, 18/1-9, 18/11, 20/3, 20/7, 21/1-15, 23/1-2, 24/1-7. Davey River. 4S/1-3.

It is suggested that ground E.M. surveys should be utilised to define, and to assess the quality of, the conductive zone more accurately, and ground magnetometer surveys to delineate the structural setting in more detail.

If an anomaly still appears promising, gravity and possibly other geophysical methods (e.g. Afmag) might be employed if available in order to provide greater discrimination. It is believed very advisable that a thorough check be made by ground methods before drilling is recommended or the anomaly rejected. Even if this latter course is finally adopted the results obtained would still be valuable in assessing other anomalies.

It is important to retain flexibility in the ground checking programme.

Re Moore's Valley Area.

The problem here is (i) to determine the thickness of Tertiary sedimentation, (ii) to obtain some information if possible on the pre-Tertiary basement structure and topography, and (iii) by some means, if still favourable in the light of (i) and (ii) results, to try to assess the probability of mineralization.

It is suggested that a seismic refraction survey be employed to try to solve (i) and (ii). A very detailed, accurate gravity survey could be used on (iii); this would possibly provide further information on (ii).

It is believed that this qualitative review demonstrates the usefulness of the aerogeophysical methods for reconnaissance purposes.

H. S. Hancock.

H. S. HANCOCK, B.Sc.

Senior Geophysicist.

ADASTRA HUNTING GEOPHYSICS PTY. LTD.

034

APPENDIX 1

LYELL - E.Z. - EXPLORATIONS

380036

079

To: Mr. G.F. Hudspeth. 11th March, 1959

A.E.M. Anomaly 24/1

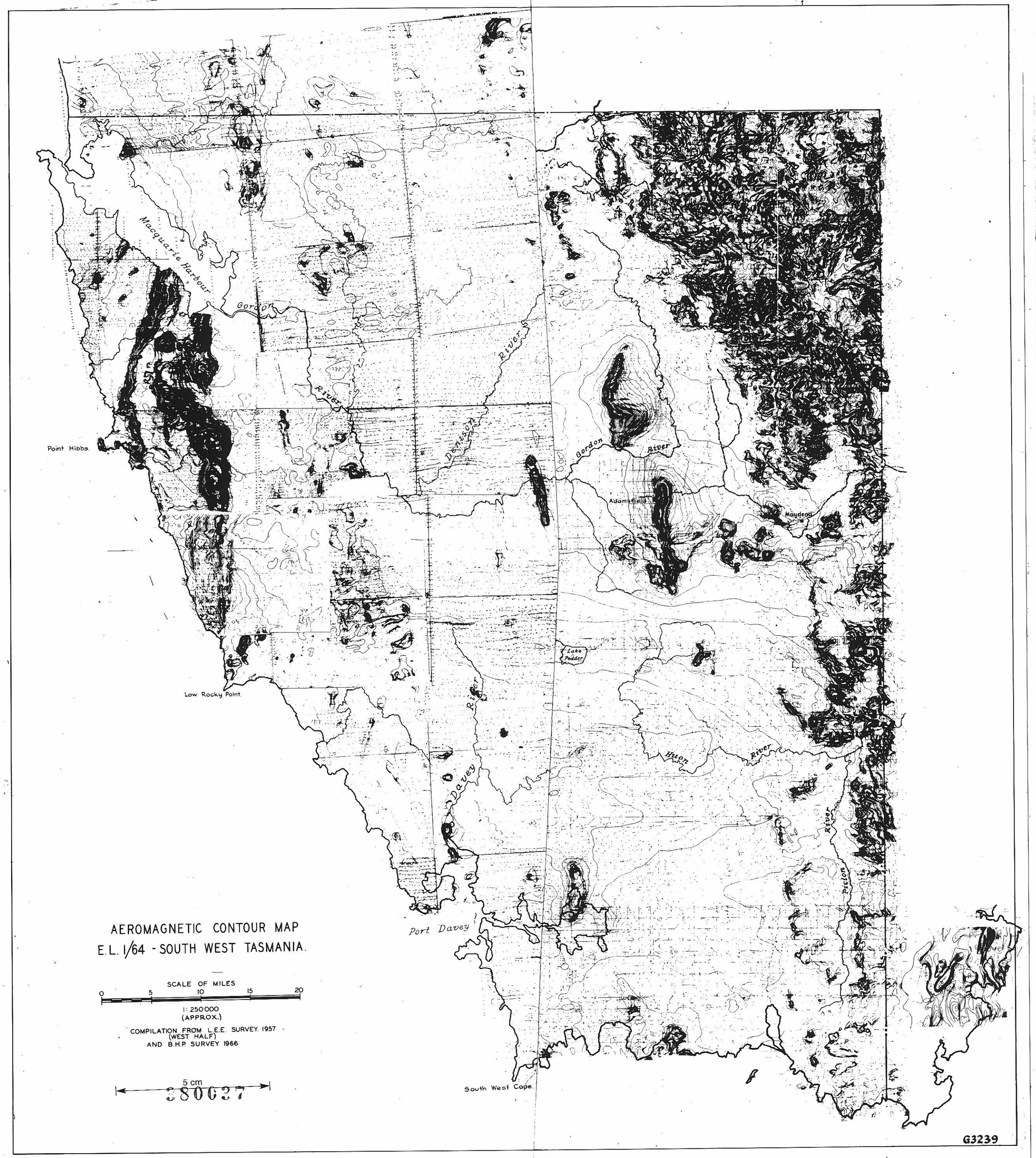
The airborne anomaly 24/1 occurs in rocks of Precambrian age very near the contact of a Devonian granite. The anomalous expression is characterised by an apparent strike length in excess of 5000', and a peak low frequency response of 0.9 degrees of phase shift above background in a ratio of 0.82 with the high.

Ground investigations confirmed the presence of a steeply dipping (about 60 degrees west) conducting sheet under a thin cover, less than 20' to the south, but increasing to the north. A discontinuity in strike was implied between lines 14N and 18N.

Gravimetric coverage allowed the interpretation of a cross-structure compatible with a displacement of 400' E to the electrical horizon. A further N-S fault axis can be inferred, and is apparently similarly displaced. However, the only evidence of mineralisation in this setting is the 70 gamma magnetic high on line 22N. The character and order of this latter anomaly suggests the minor incidence of pyrrhotite throughout the dip extent of the conductor horizon.

Graphite has been recognised at the conductor intersection of line 10N. If it be assumed that the N-S structure is a strike fault, then the geophysical investigation presumes a graphitic horizon with insignificant mineralisation along planes of schistosity. Thus, no economic potential is implicit to this zone.

J.B. BONIWELL



AEROMAGNETIC CONTOUR MAP
E.L. 1/64 - SOUTH WEST TASMANIA.

SCALE OF MILES
0 5 10 15 20
1: 250000
(APPROX.)

COMPILATION FROM L.E.E. SURVEY. 1957
(WEST HALF)
AND B.H.P. SURVEY 1966

5 cm

380627

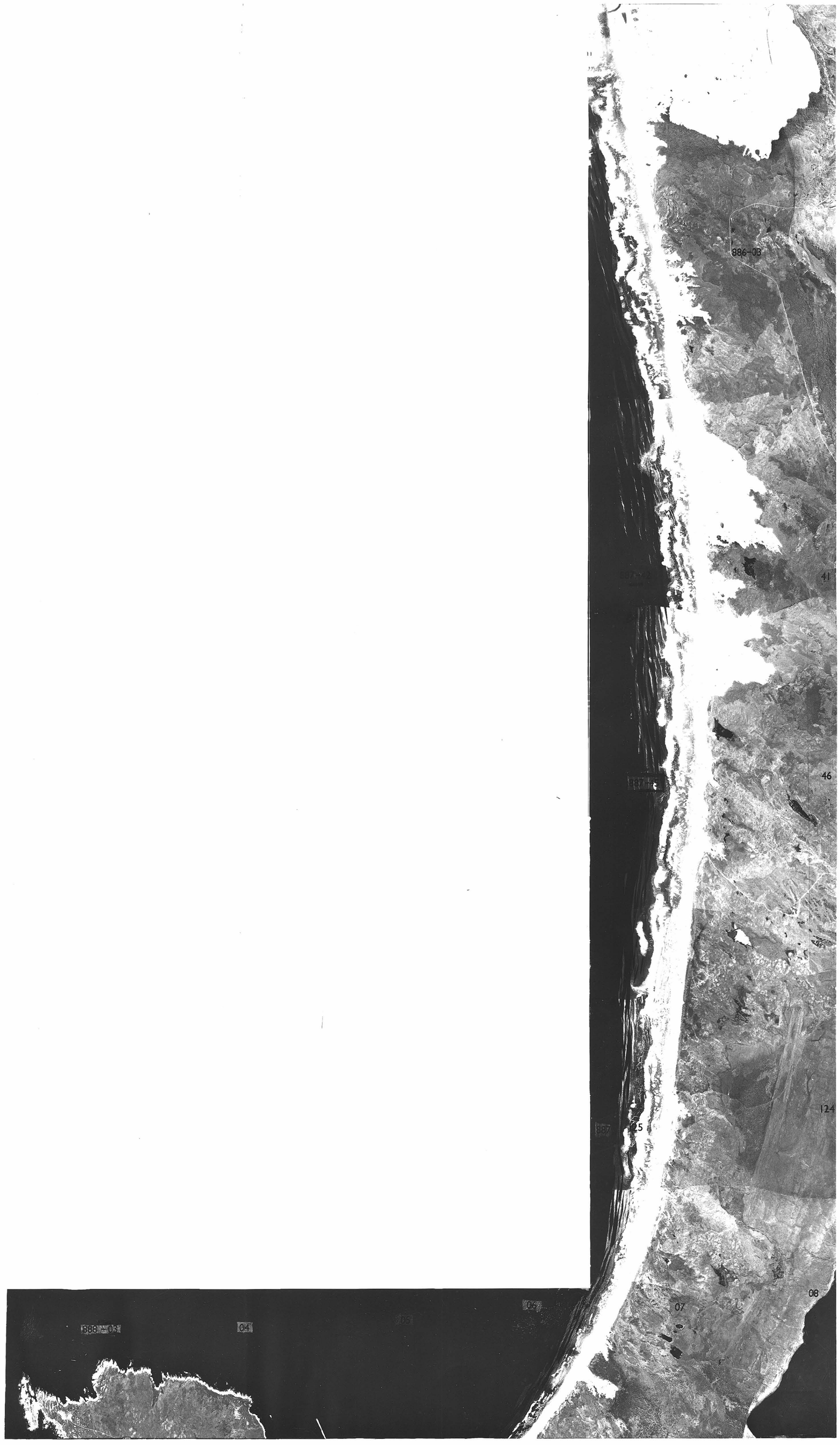
G3239

G3249

MT. LYELL ELECTROLYTIC ZINC EXPLORATIONS S. W. TASMANIA

380038

SHEET NO. 1



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MAY 1957

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5 cm

SHEET INDEX

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	~~4~~ 5	~~5~~ 6

380038

MT. LYELL ELECTROLYTIC ZINC EXPLORATIONS S. W. TASMANIA

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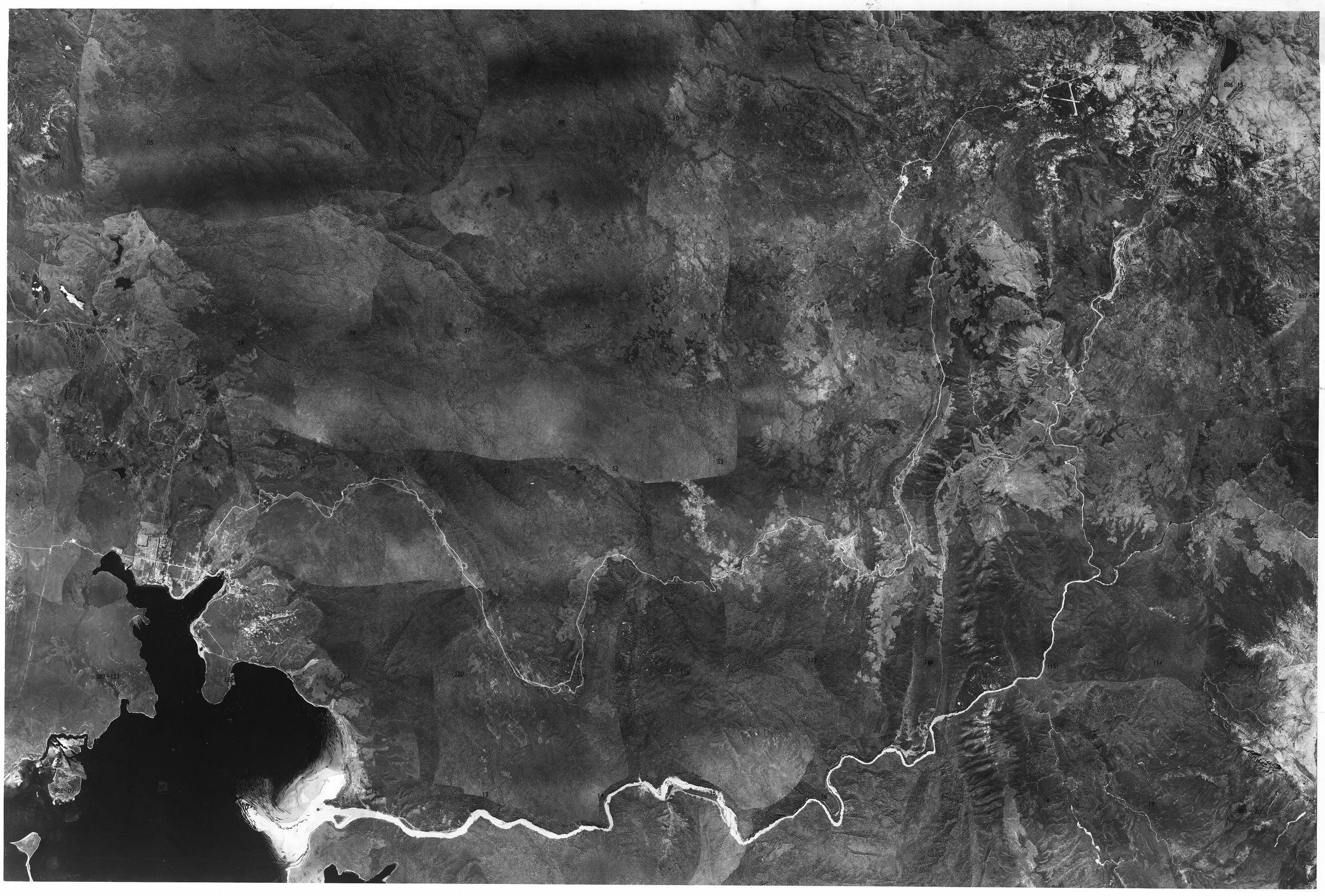

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SHEET INDEX

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380039

MT. LYELL ELECTROLYTIC ZINC EXPLORATIONS S. W. TASMANIA

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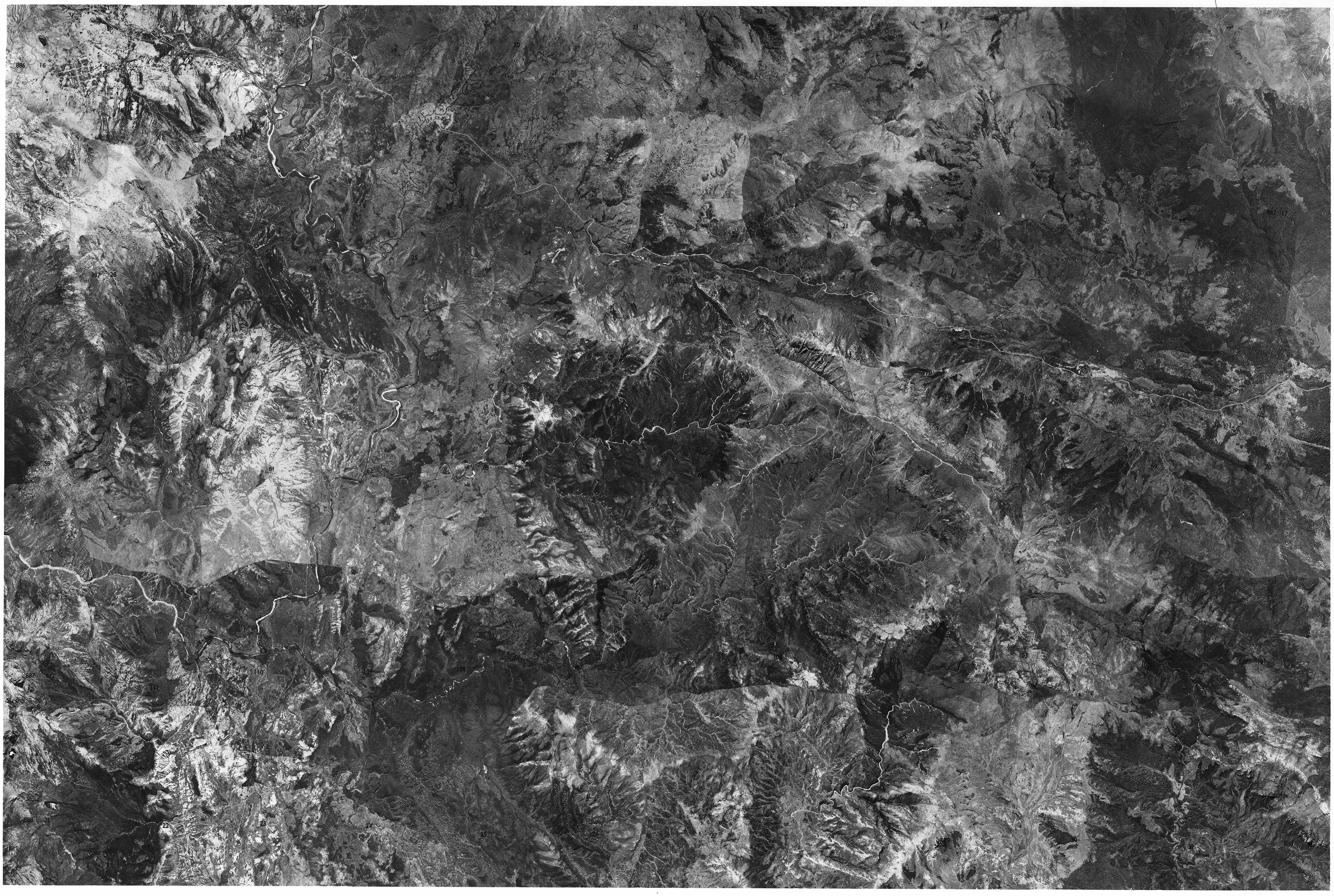

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MT. LYELL ELECTROLYTIC ZINC EXPLORATIONS S. W. TASMANIA

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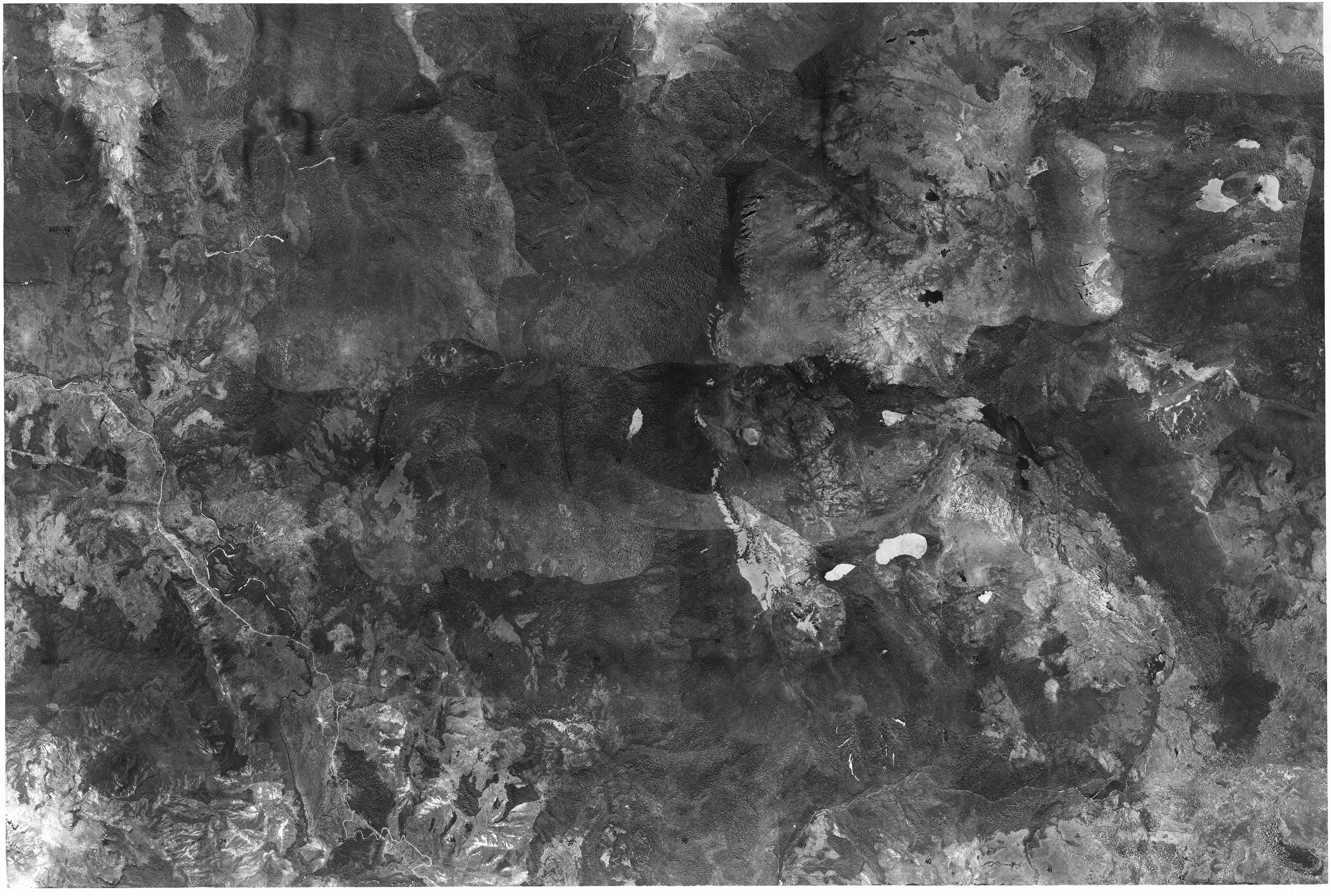

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MT. LYELL ELECTROLYTIC ZINC EXPLORATIONS S. W. TASMANIA

SHEET NO. 5



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SHEET INDEX

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MT. LYELL ELECTROLYTIC ZINC EXPLORATIONS S. W. TASMANIA

SHEET NO. 6



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SHEET INDEX

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SHEET INDEX

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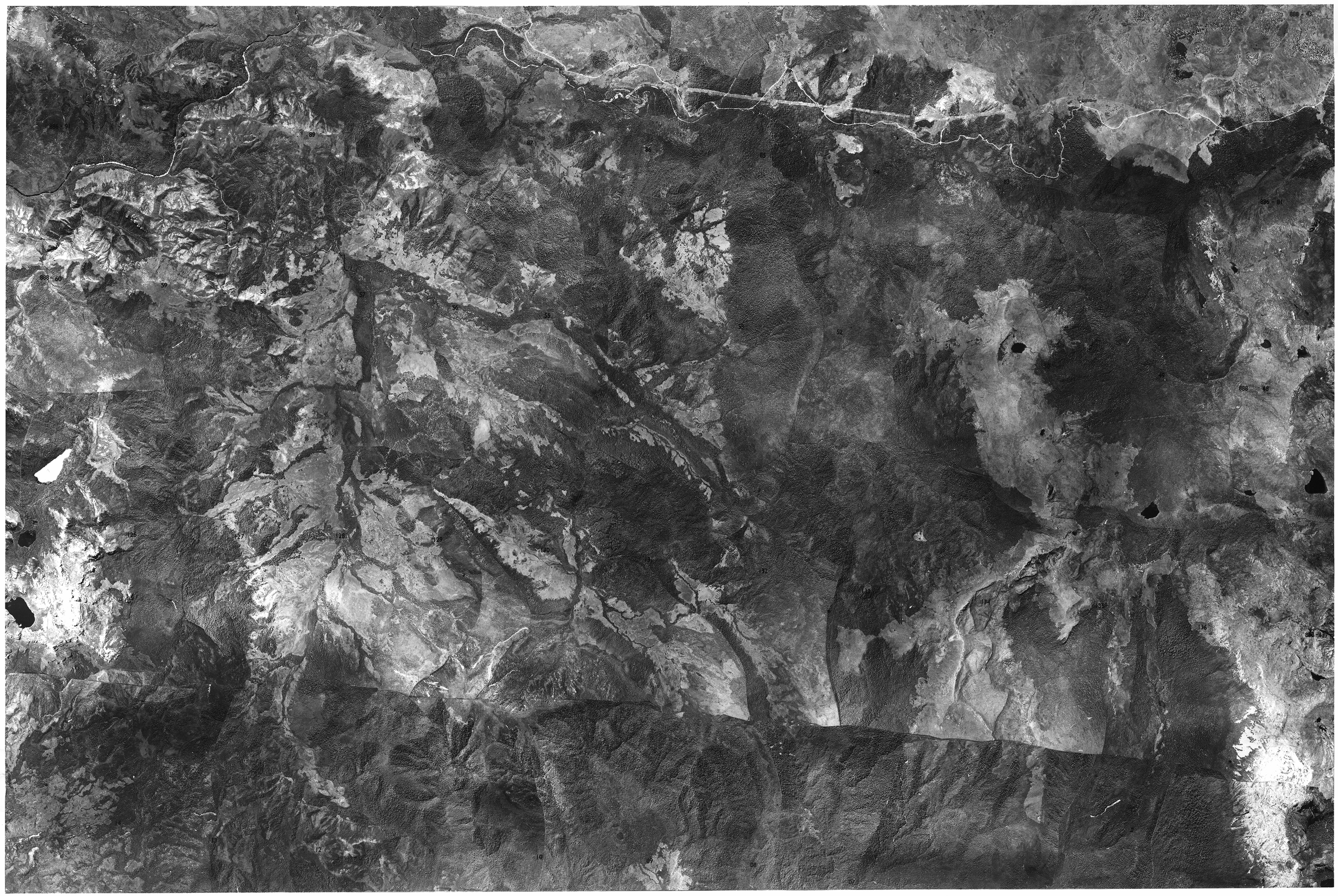

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SHEET INDEX

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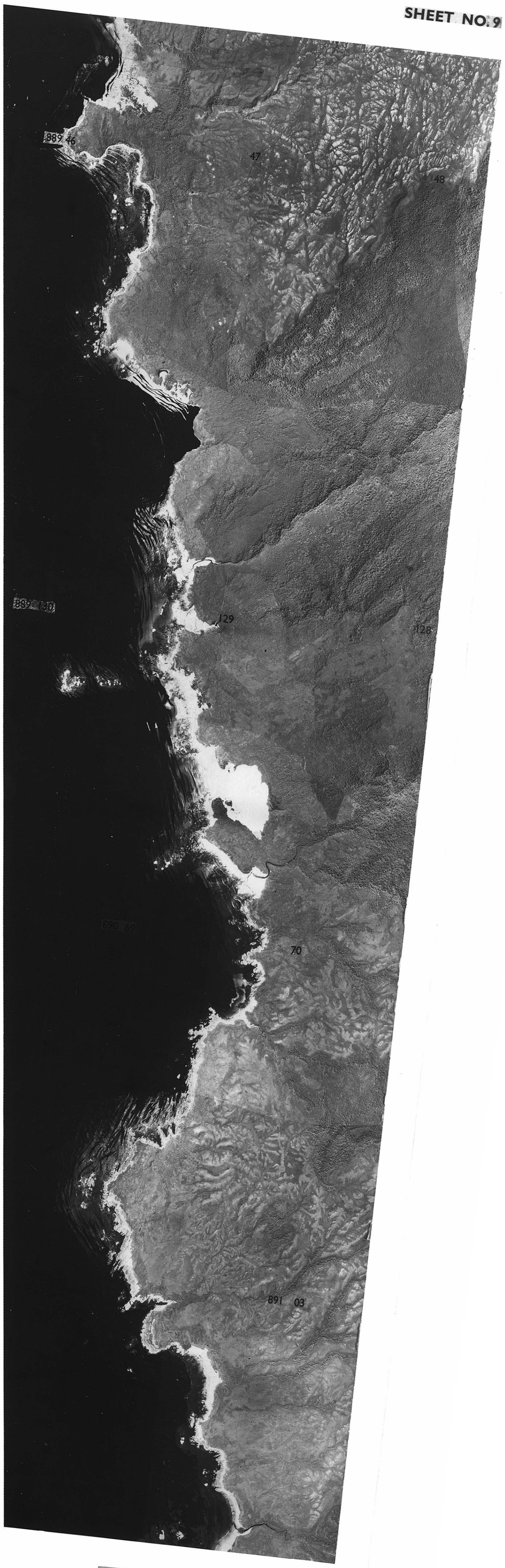

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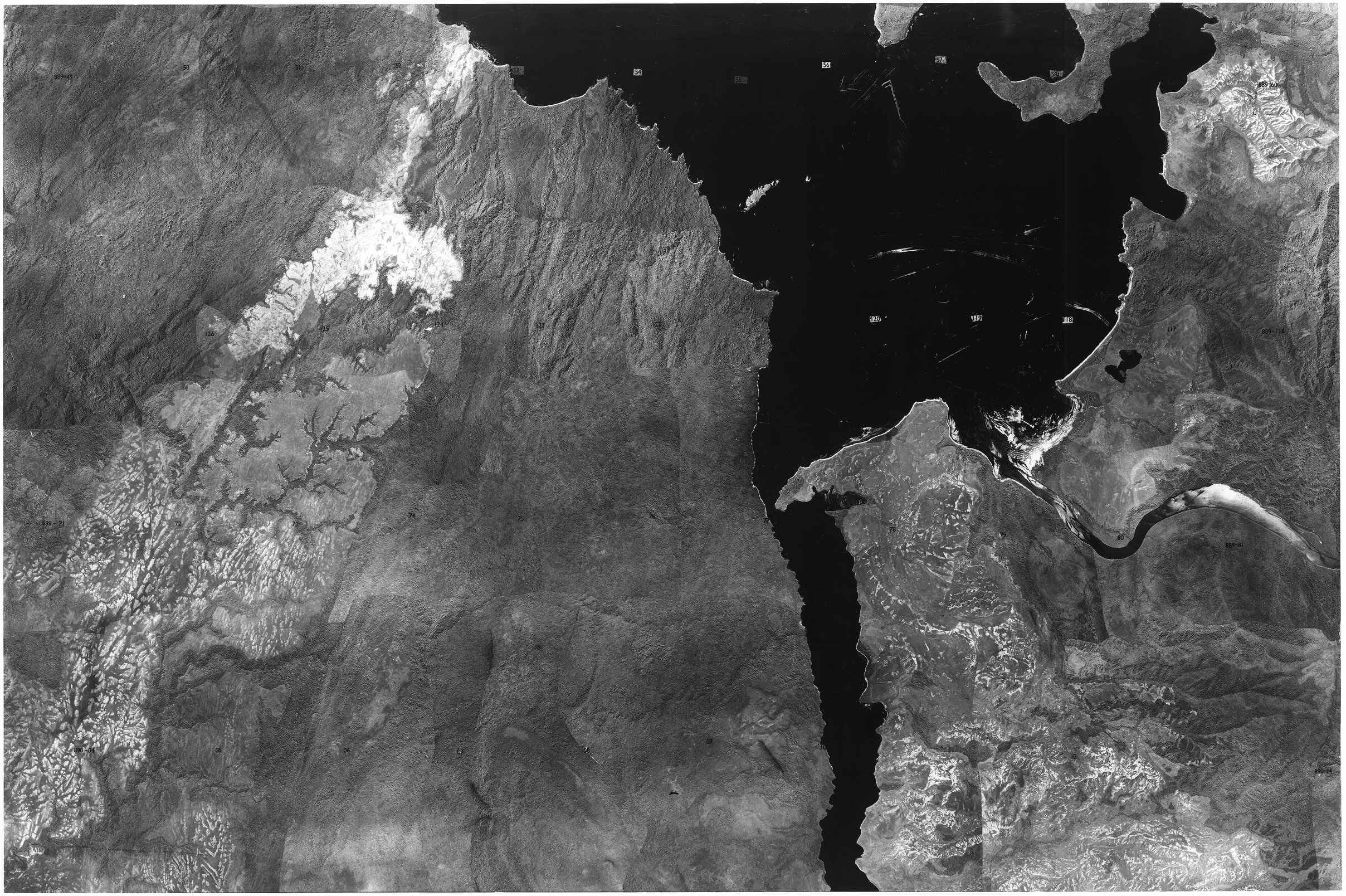

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SHEET INDEX

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SHEET INDEX

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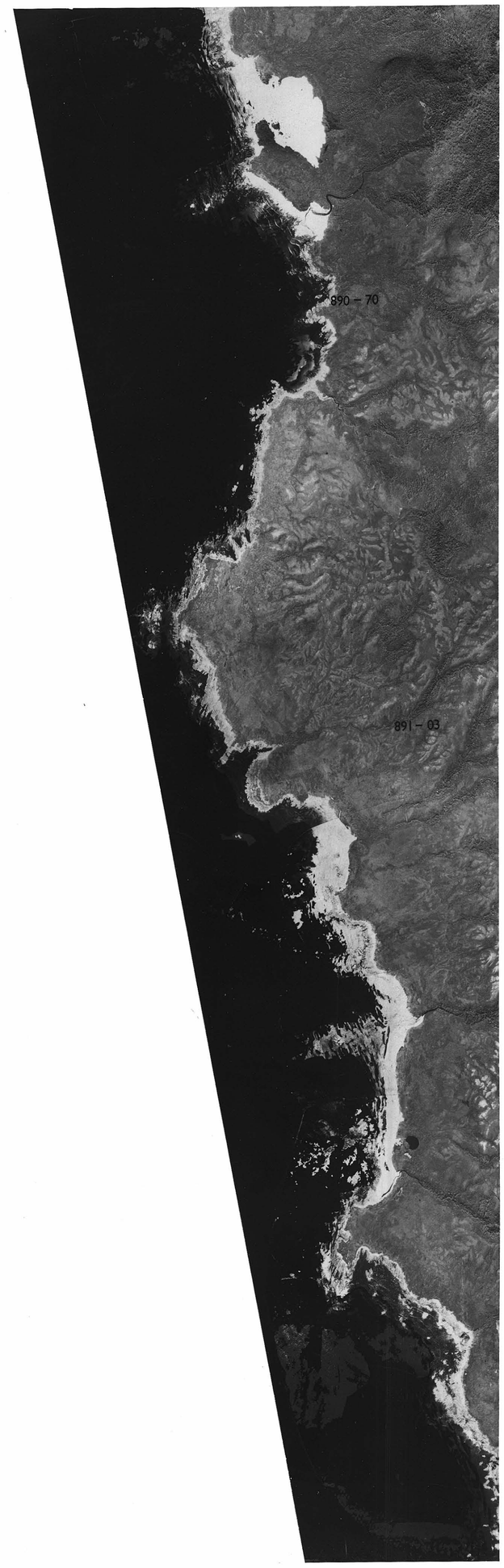

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SHEET INDEX

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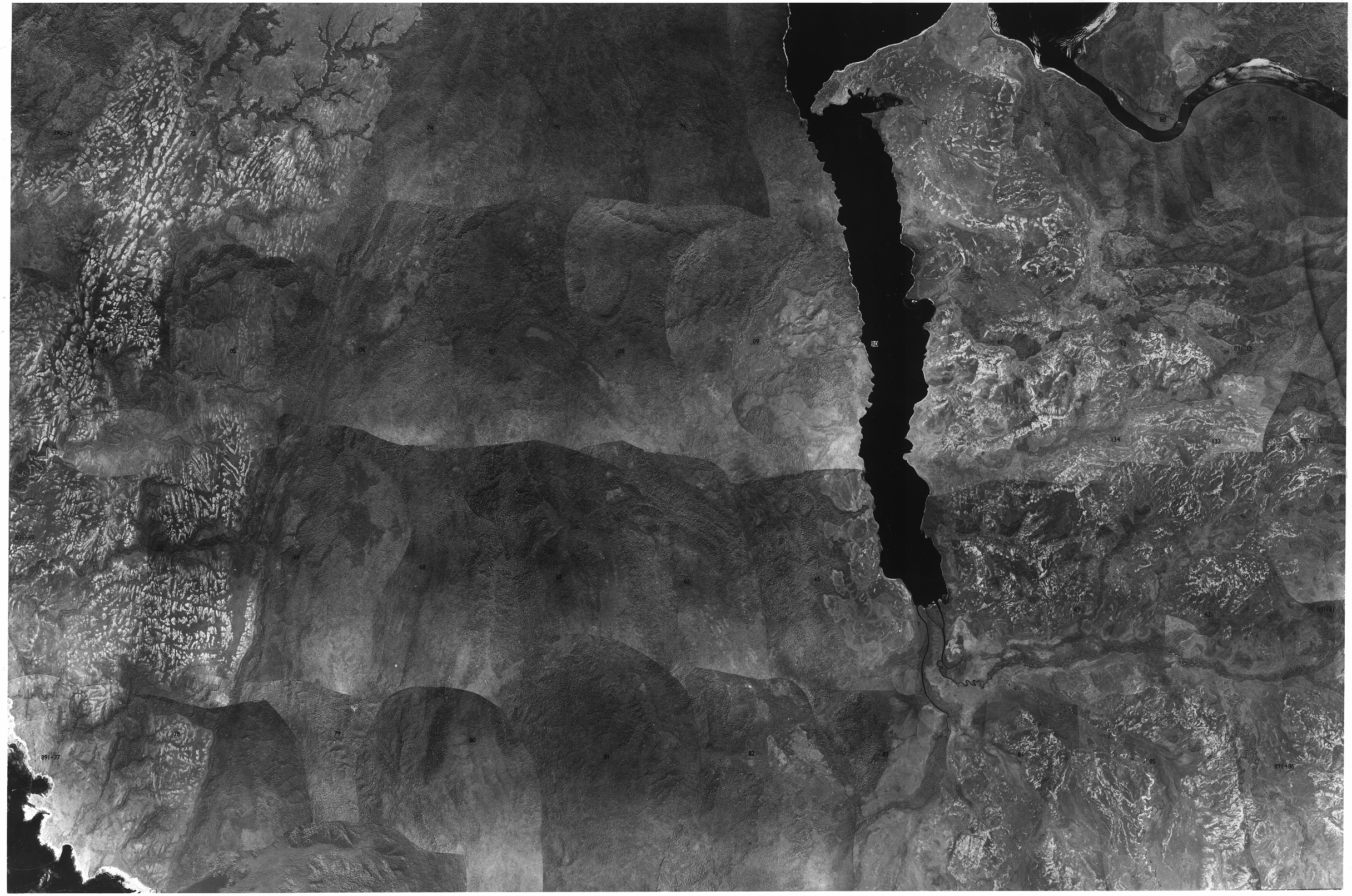

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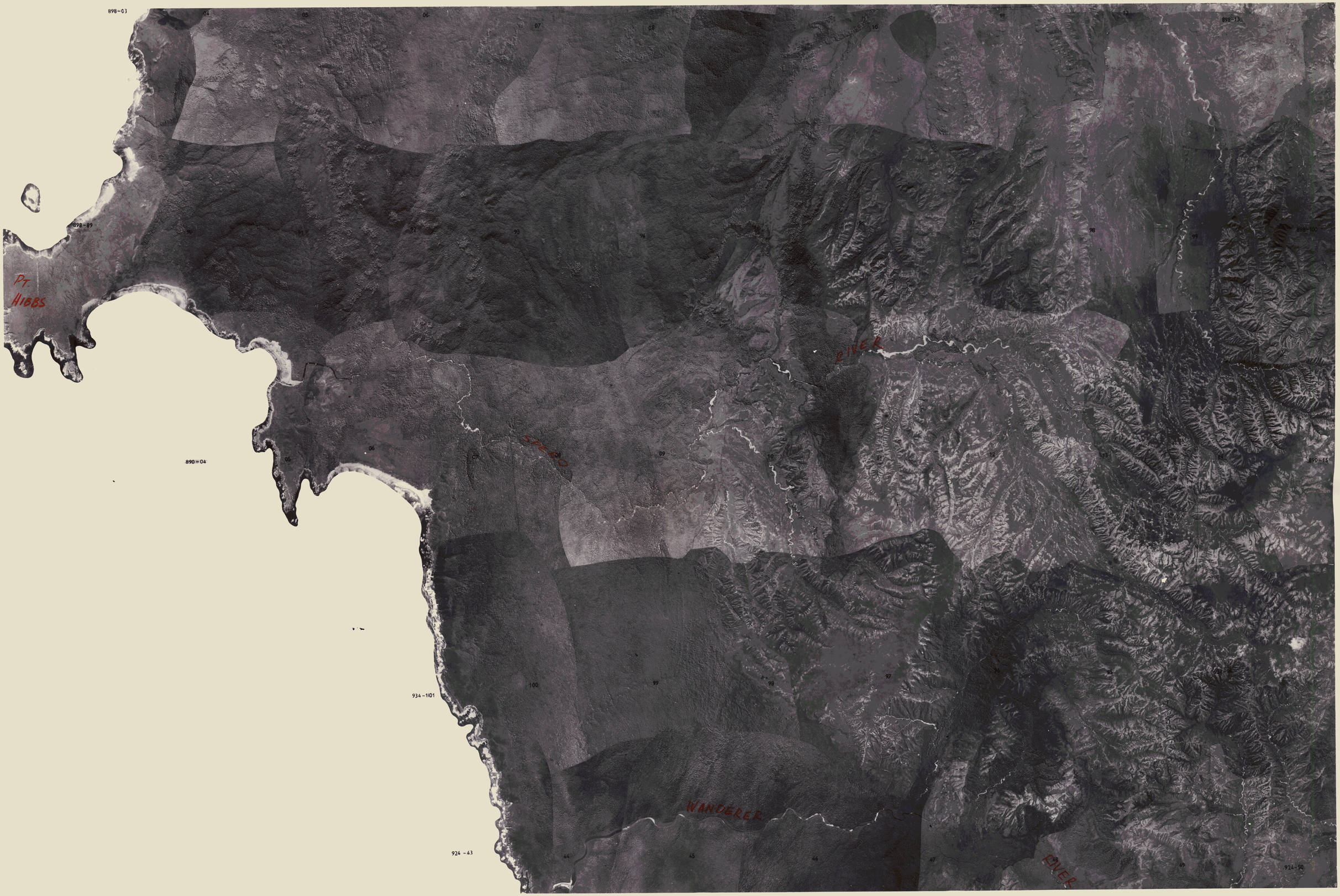

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SHEET INDEX

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SHEET INDEX

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SHEET INDEX

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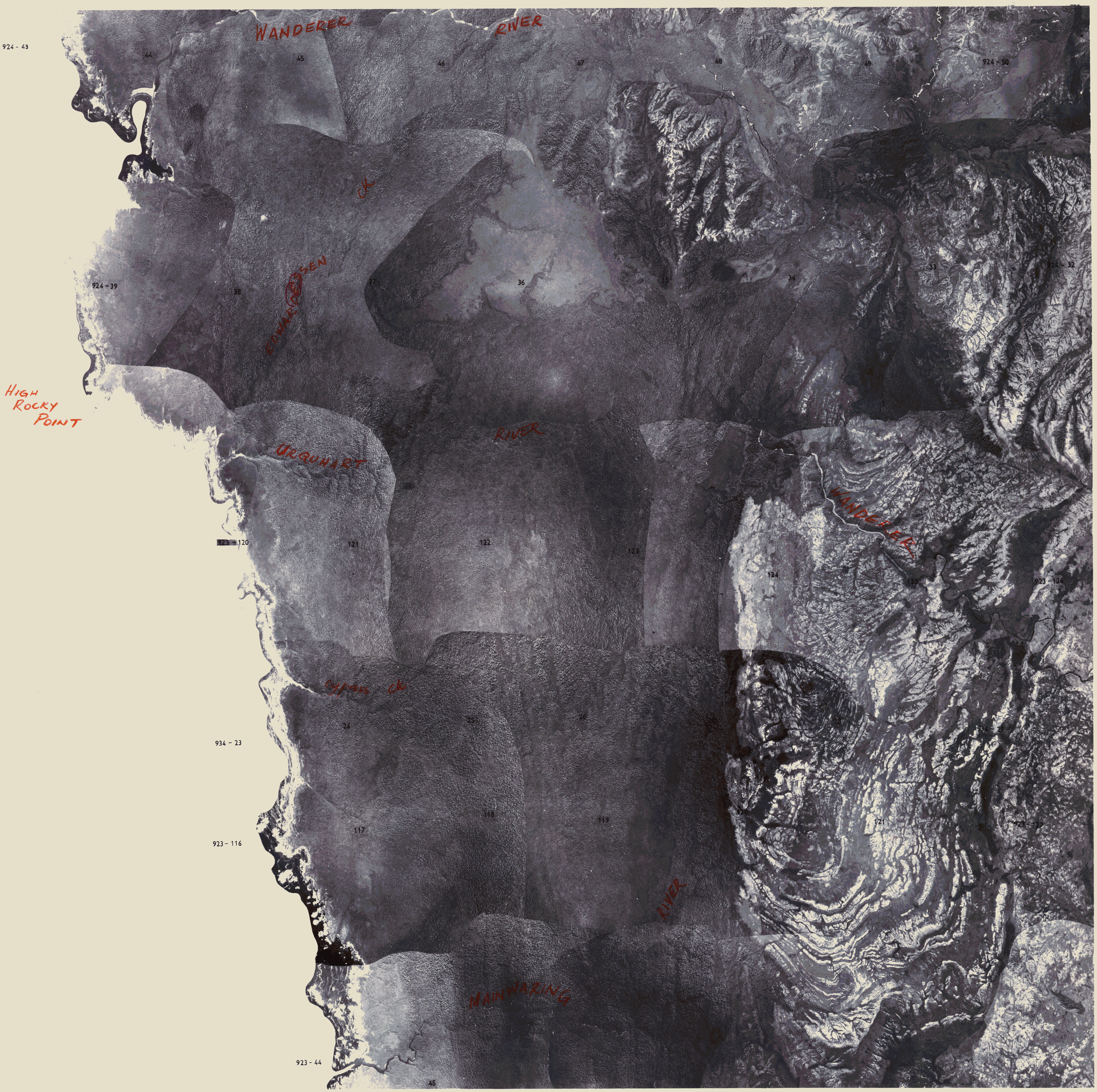

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SHEET INDEX

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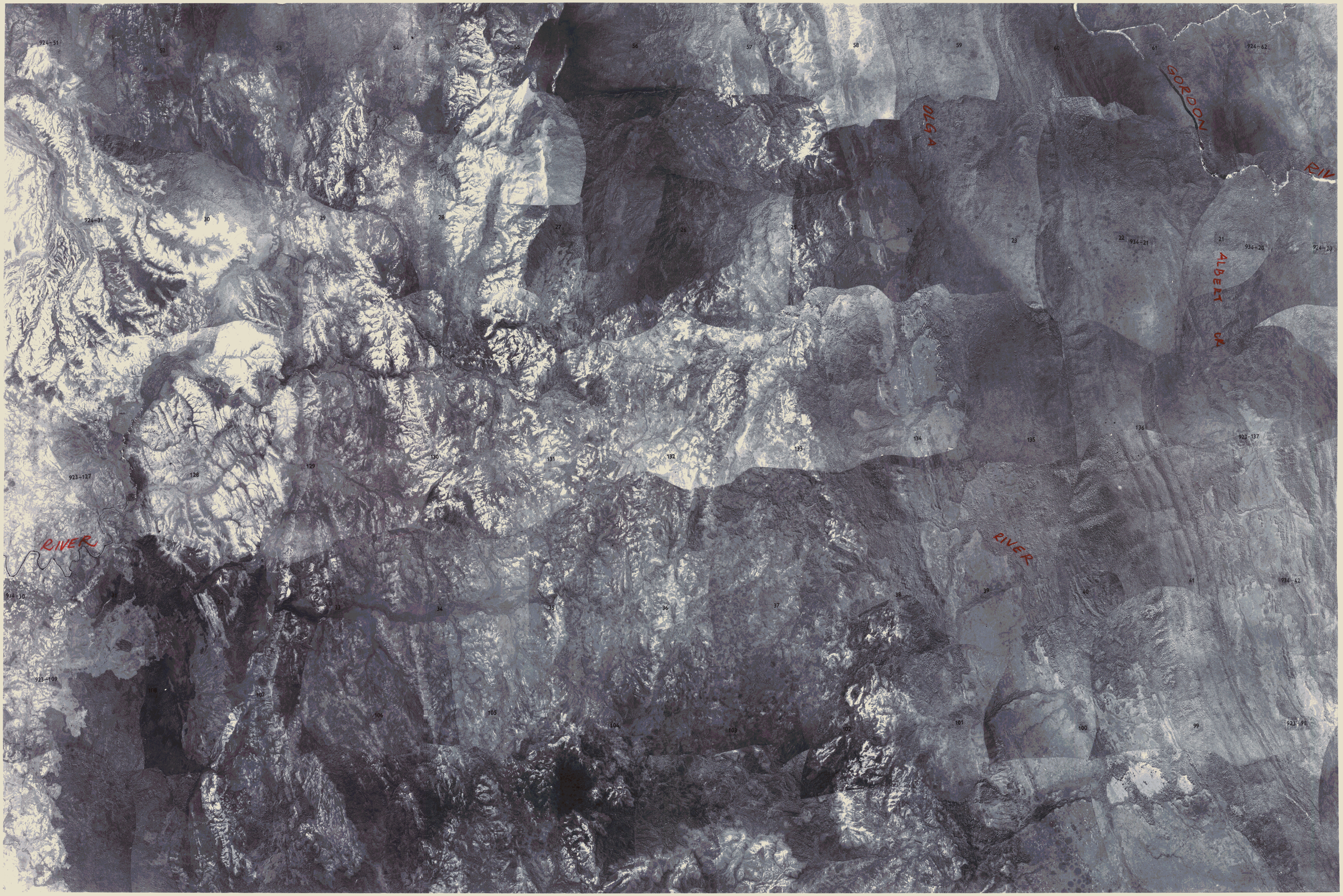

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SHEET INDEX

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23	24	25

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SHEET NO. 22



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SHEET INDEX

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23	24	25

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MT. LYELL ELECTROLYTIC ZINC EXPLORATIONS S.W. TASMANIA

SHEET NO. 23



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SHEET INDEX

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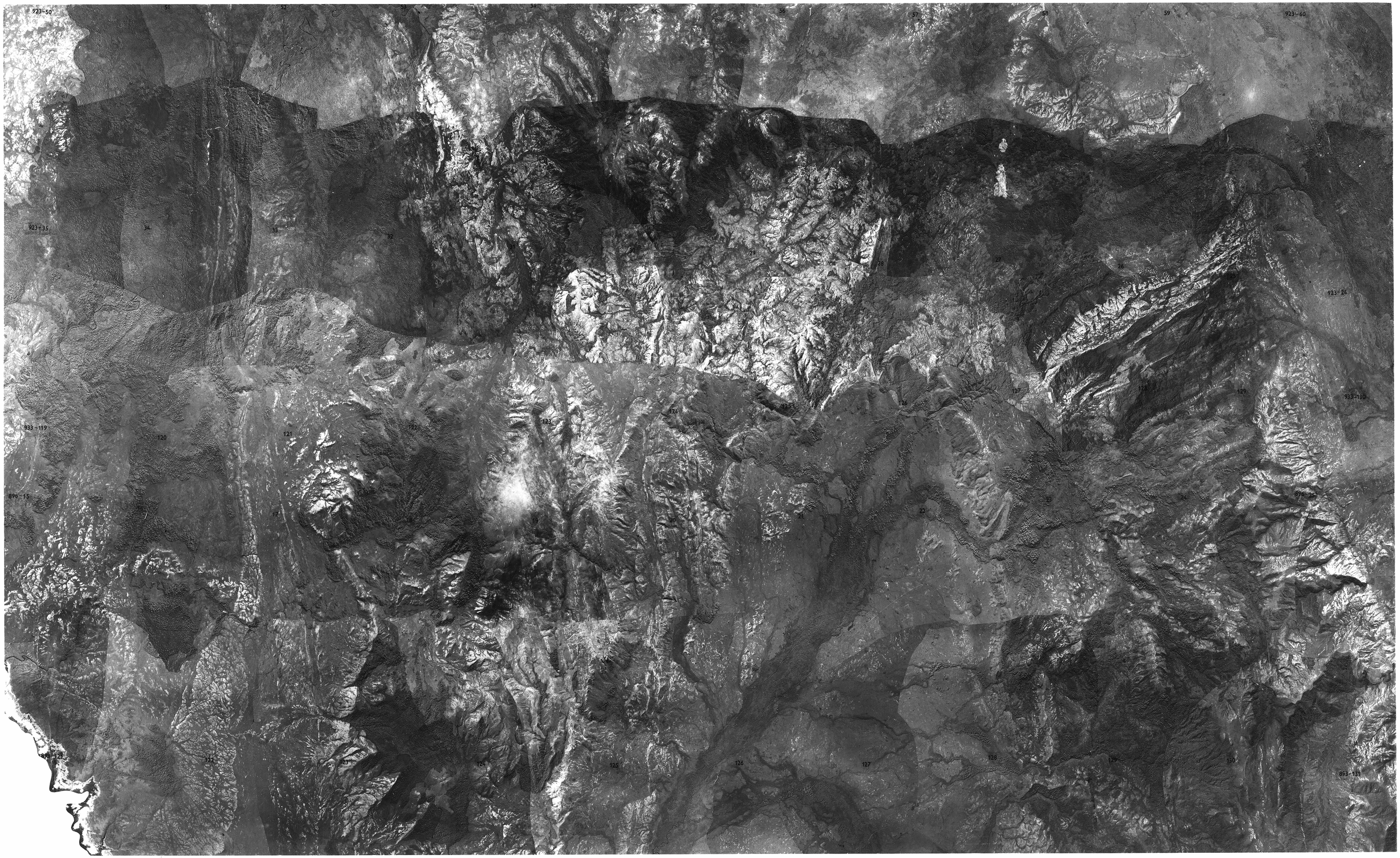

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