GRUM JOINT VENTURE

MINERAL INVENTORY

GRUM DEPOSIT - VANGORDA CREEK AREA Y.T.

N.T.S. 105-6

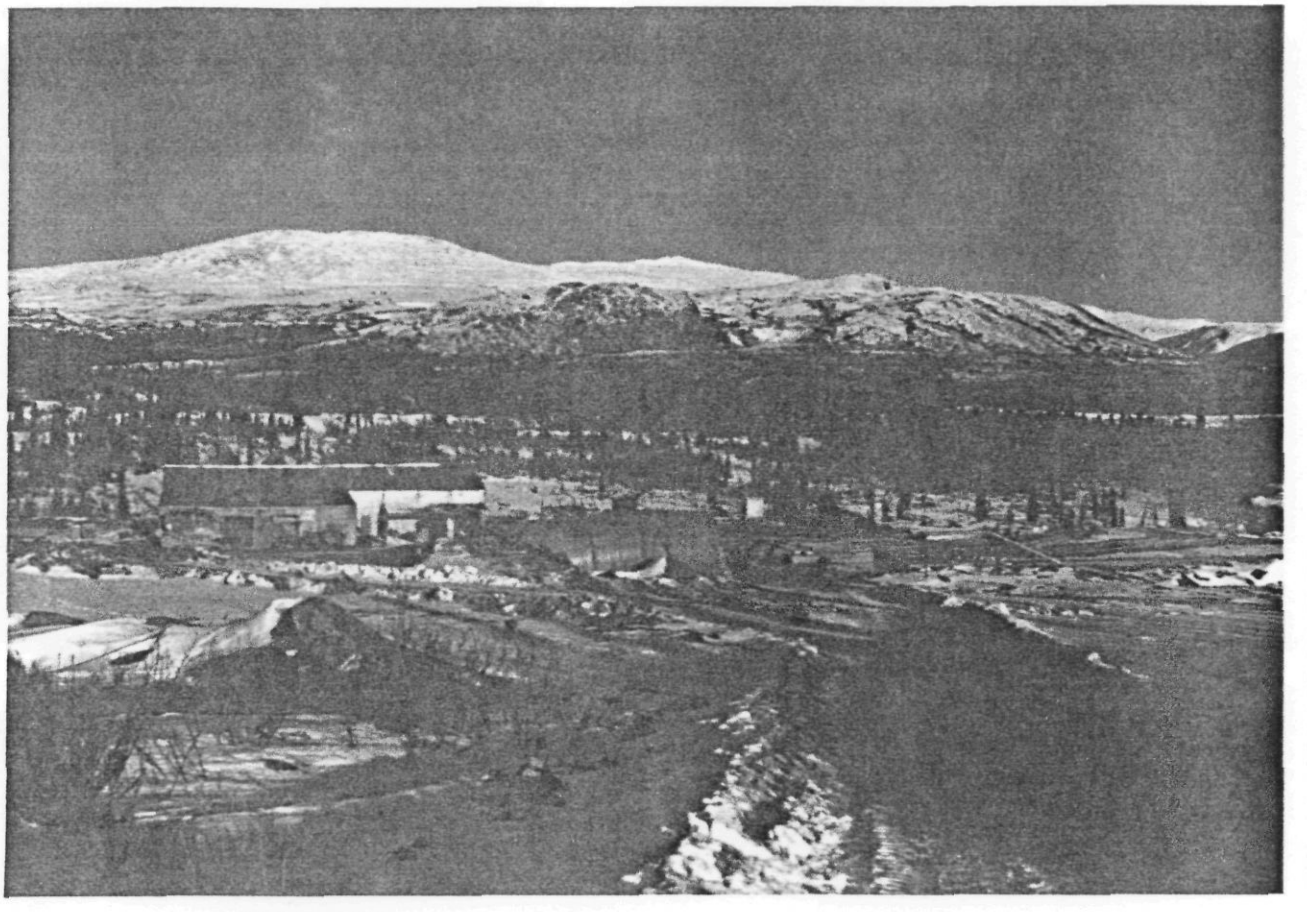
PREPARED JOINTLY BY

GEOLOGICAL STAFF - GRUM JOINT VENTURE

AND

GEOLOGICAL STAFF - KERR ADDISON - VANCOUVER B.C.

MARCH 1977



GRUM JOINT VENTURE

VIEW OF UNDERGROUND DECLINE
PORTAL AND SHOP, LOOKING
NORTH TOWARD MOUNT MYE

DECEMBER 1976

GRUM MINERAL INVENTORY (1977)

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I. Summary

1. The Grum Joint Venture Mineral Inventory is based on all of the work completed on the project since the signing of the option agreement with the AEX Syndicate in 1973. The work includes 41,000 meters of surface diamond drilling, 15,000 meters of underground diamond drilling and 2,900 meters of underground development.

2. In our view, the underground program was justified because:

   (a) The shape and continuity of the deposit as now visualised, would have been extremely difficult to determine by surface drilling alone.

   (b) We now have an insight into ground support problems to the extent that the ground has been excavated in development work.

   (c) We know that ground water encountered in the workings does not constitute a major mining problem.

   (d) We have a means of determining, with some accuracy, what the cost of underground mining would be.

   (e) We have ready access to bulk samples over a 700 meter portion of the deposit.

(f) We know that the mineralization is both stratiform and stratabound and that the prominent foliation of the Anvil District is axial planar to the mineralized folds in the Grum deposit.

(g) We have a much better understanding of the role of post mineral faulting and the effect of these faults on the deformation of the Grum deposit.

3. The 1977 undiluted geological mineral reserve from 62W to 86W is estimated as follows:-

(a) Grum Joint Venture drill proven:
23,102,162 metric tonnes averaging 3.88% Pb, 6.49% Zn, 61.62 Ag (gm/m.t.)

*(b) Grum Joint Venture drill indicated (Sec. 86W):
1,678,746 metric tonnes averaging 3.59% Pb, 5.80% Zn, 55.0 Ag (gm/m.t.)

Total Grum Joint Venture Reserves:

24,780,908 metric tonnes averaging 3.86% Pb, 6.42% Zn, 61.17 Ag (gm/m.t.)

(c) Vangorda Mines Property drill proven:
980,084 metric tonnes averaging 5.06% Pb, 6.03% Zn, 68.65 Ag (gm/m.t.)

* A small drill indicated reserve in the Champ Zone is not included in this report.

4. Exploration of the Grum deposit northwest of section 88W has not thus far added materially to mineral reserves. However, there are sufficient indications in drill holes to justify an attempt at a better understanding of structure in that area.

II. Introduction

The 1977 mineral inventory is based on 41,000 meters of surface diamond drilling, 15,000 meters of underground diamond drilling and 2,900 meters of underground development.

Some drilling was done by Canadian Natural Resources on the contiguous property of Vangorda Mines Limited and separate calculations were made in order to segregate these tonnages.

The first mineral inventory was done in January 1975 following some 17,000 meters of surface diamond drilling based on drill holes 60 meters apart drilled on lines 120 meters apart. At that time we stressed the opinion that drill hole spacing was far too broad for reliable estimates of tonnage and grade and that opinion has been vindicated by the extreme complexity of structure indicated in the accompanying illustrations in this report.

Despite the density of drilling to date and the many days of

sometimes frustrating effort that preceded the writing of this report, we recognise that the interpretation arrived at may still be subject to some modification. We doubt, however, that any such modification would materially affect the tonnage and grade calculations shown in this report.

III. Review of Exploration and Development Programs - 1973 to 1976

The discovery hole A-4 was drilled in the Fall of 1973 on the Grum No. 3 mineral claim. The hole intersected 5.94 meters of 6.7% Pb, 10.8% Zn and 3.85 ozs. Ag at a depth of 199 meters. Quite apart from the very significant values in this drill hole, was the possibility that the intersection indicated continuity north westward of the near-surface mineralization located in the Champ zone in 1954 by Prospectors Airways and later implied in our 1965 residual gravity map.

The combination of these data made it reasonable to pursue a drilling program based on the existing Prospectors Airways grid which extended over the full length of the Grum Joint Venture property.

The AEX Syndicate drilled a total of 16 holes aggregating 4,000 meters to July 1974 at which time Kerr Addison assumed control and drilled a further 13,000 meters of surface diamond drill holes.

At this point in time, the results of this work and proposed future programs were described in our report entitled "Program for Continued Exploration and Confirmation of Ore Reserve Outlines", dated January 1975.

The report indicated that a deposit of a known length of 1,680 meters (52W to 108W) and a width of 366 meters, had been indicated by drill holes spaced 60 meters apart on lines 120 meters apart. Part of the deposit (62W to 88W) had been drilled sufficiently to permit a preliminary estimate of tonnage: 25,400,000 short tons averaging 4.01% Pb, 6.67% Zn and 1.86 ozs. Ag and including 10,234,000 tons averaging 5.46% Pb, 9.72% Zn and 2.5 ozs. Ag. It was cautioned, however, that the deposit was erratic in cross section and therefore continuity and shape remained uncertain from surface drilling. It was further indicated that the enclosing rocks were incompetent and ground support problems would be a significant factor in the underground mining of the deposit.

The report recommended that the deposit be examined underground by means of a decline on a 16% grade approximately 800 meters long from which two ramps, 120 meters apart, would be driven down the plunge of the mineralization for a distance of 615 meters for the first ramp and 430 meters for the second. Cross cuts would connect these ramps at 120 meter intervals. Ring drilling would be conducted from the two ramps at intervals of 60 meters. Four

raises were to be driven on existing surface drill holes and one ventilation raise was planned.

The total underground development program was to consist of 2,600 meters of openings and 8,000 meters of underground diamond drilling. A further 12,800 meters of surface drilling were included in the program.

As the work progressed, modifications were made in the sense that only the ventilation raise was driven but the underground drilling was greatly expanded. Upon completion of this program, some 2,900 meters of underground development had been carried out together with 15,000 meters of diamond drilling.

IV. Evolution of the Current Geological and Structural Concept

The first major drilling program, begun in 1973 and completed in the Fall of 1974, was based on the concept that most of the Grum mineralization would, in a general sense, be controlled by the gently dipping pervasive foliation evident in all of the metamorphic rocks of the Anvil range. To some extent this concept was valid since the other known deposits such as Faro, Vangorda and Swim appeared to conform to that pattern. Geologically speaking, we knew from past experience that lead-zinc mineralization could be expected to occur at or near the facies change between graphitic

section was dominated by calcareous and chloritic sericitic phyllites with graphite phyllite on or near the mineralization.

Footwall rocks were in general more highly metamorphosed and were dominated by sericitic biotite phyllites and biotite garnet staurolite schist. The latter unit at the Champ zone appeared to be separated from the phyllitic rocks by a low angle thrust. In other words, green schist facies were seemingly in fault contact with amphibolite facies.

We recognise that there is always some danger in referring to "hanging wall" and "footwall" in a series of highly contorted metamorphic rocks, but we consider the concept valid in the light of our present knowledge.

The 1977 concept derived from the massive underground drilling program augmented by the exposures in the underground workings, is not materially different in gross structural form from Takeda's concept, but is much more complicated in detail. Brittle deformation (faulting) suspected from Takeda's work was confirmed and it became possible to postulate approximate offsets. Generally speaking, however, the deposit maintains its continuity from section to section despite the numerous local irregularities. It remains a series of complex more or less recumbent folds sigmoidal in cross section and segmented by a series of high angle faults.

V. Characteristics of the Sulphide Zones

For mineral inventory display and specific gravity determination purposes, the inter-layered sulphide zones have been divided into two categories:-

(a) Massive sulphides, and

(b) Quartz sulphides.

Massive sulphides contain 50 - 75% or more of total sulphides and may be sub-divided into the following categories:-

Structureless - hard; compositionally banded - hard; compositionally banded - porous, friable; and

Massive with variable barite content.

In the folding process the massive sulphides have developed flow lines (?), shattering and brecciation and have been sufficiently mobile in some instances to be injected into fractures normal to the sulphide layers. Galena and sphalerite are more mobile than pyrite over a broader range of temperature and pressure, consequently, both minerals will flow into local zones of brecciated pyrite causing enrichment at that point.

Quartz sulphides consist of banded and disseminated sulphides in a siliceous or phyllitic ground mass and usually have a characteristic beaded texture. These have been sub-divided into:

(a) Inter-banded quartz and sulphides

(b) Foliated quartz and sulphides

(c) Granulose quartz and sulphides

In the writer's opinion the normal top to bottom sequence as exhibited in 72W cross cut appears to be massive sulphides with sharp hanging wall contacts underlain by banded sulphides which in turn are underlain by disseminated quartz sulphides. There are, however, variations of this sequence, some caused by possible over-turned folds and some by the lack of massive sulphides. It is, however, a concept worth pursuing in the interests of correlating the various mineralized zones.

From a grade standpoint massive sulphides usually contain the highest lead-zinc values although there are some variations on this theme and some massive pyrite sections can be almost entirely devoid of base metal sulphides. An excellent example of this correlation between higher grades and massive sulphides may be seen by comparing the geologic outline on cross section 70W with the corresponding mineral reserve section.

From limited polished section work, we have found that the sulphides

in the Grum deposit fall into the fine to medium grained category in which pyrite averages 0.3 - 0.6mm, galena 0.08 - 0.2mm, sphalerite 0.05 - 0.4mm and pyrrhotite 0.01 - 0.02mm. We stress however, that this work is very preliminary and very limited and is therefore an approximation at best.

VI. Procedures used in the Preparation of Geological Sections and Plans

(1) The surface drill holes were first plotted in their actual (deviated) positions on standardised plans. These were then projected orthographically on cross sections and longitudinal sections. The detailed cross sections are 60 meters apart (sections 62W, 84W) and the longitudinal sections are 60 meters apart (0 to 10N). The standard map sheet has the dimensions 79.2cm x 97.10cm and the scale used is 1:500.

(2) Primary and secondary foliation angles were plotted numerically on drill holes in cross section and longitudinal section.

(3) Rock types were shown by letter symbol on all drill holes but, for the purposes of this report, only the graphitic units which have a close affinity to the mineralization, were shown.

(4) Massive sulphide outlines and quartz sulphide outlines were first drawn on cross sections because there is comparatively little deviation of underground drill holes from the cross section and because the density of information is much greater on cross section than on longitudinal section.

(5) Since the Grum deposit is both stratiform and stratabound, it was possible to treat the mineralized zones as rock types in constructing cross sections. To save time, only the graphitic and sulphide members were shown as distinct units. All other phyllites were lumped together as one unit.

In attempting to correlate structure from section to section, Jim Paxton and Alexander Po found that only by numbering axial planes, major fold hinges and faults, could they begin to assemble a meaningful geological picture. Five north westerly faults, one north easterly fault and one east west fault were identified in the underground workings and drill core and some of these caused considerable confusion by shifting segments of the mineralization.

For mineral reserve purposes, the outlines of the mineralized zones from the geological cross sections were traced on a print on which

all drill hole assay data had been compiled. The final product was a mineral reserve cross section showing in colour the combined lead-zinc values in the sequence 12%+, 10 - 12%, 8 - 10%, 6 - 8%, 4 - 6%, 2 - 4% and 0 - 2%. Along the peripheries of the mineralized zones are shown the length and the average thickness of each zone containing greater than 4% lead-zinc, together with the average lead, zinc and silver assays.

VII. Classification of Mineral Reserves

Despite the density of surface and underground drilling, we are reluctant to use expressions such as the somewhat archaic "proven" classification.

We think the term "drill proven" best describes that portion of the Grum deposit which occurs between sections 62W and 84W. Within this interval no mineralization was projected more than 30 meters from drill hole to drill hole and most of the mineralization is much more closely controlled by the ring drilling patterns.

The core of the deposit (62W - 84W) has been drilled in great detail from underground, even numbered, 60 meter sections with some intermediate drilling on odd numbered sections 69W, 71W, 73W, 75W and 83W. In addition, at the south east end of the deposit, the portion

from 62W to 70W has been drilled on 30 meter centres from the surface and the remainder of the surface drilling has been on 60 meter centres.

Where lead-zinc intersections occur in a drill hole and there are no intersections in adjacent holes or where adjacent holes have not been drilled to that depth, the mineralization has been projected 15 meters on either side of the drill hole.

The term "drill indicated" means that mineralization has been drilled on a 60 meter grid from surface but was not confirmed by underground drilling. This applies only to section 86W.

VIII. Tonnage and Grade Calculations

(a) Specific Gravity Determinations

Having decided that the Grum mineralization could be classified into two principle types for mineral reserve purposes, it became necessary to determine average specific gravities for these two types.

Since the classification "massive sulphides" was based on an actual content of greater than 50% sulphides, there was no problem in selecting representative drill core for specific gravity

determination. However, the term "quartz sulphides" was essentially a textural term wherein the sulphide content could vary from 5 - 50% and consequently specific gravities could be highly variable.

Sixty representative samples were selected from drill core by Jim Paxton and Alexander Po and later an additional 14 were selected from specimens collected by Dave Carson. These samples were analysed for their lead, zinc and iron content and from these results, total sulphide content was calculated on the assumption that all of the content lead, zinc and iron were in sulphide form. From these determinations it was found that the massive sulphides had an average density of 4.10 but when samples containing barite were excluded, the figure dropped to 4.07.

Quartz sulphides were found to have an average specific gravity of 3.18 but this reduced to 3.06 when anomalous pyrite rich samples were excluded.

For ease of calculation and to provide a small factor of safety, a specific gravity of 4.0 was used for calculating massive sulphide tonnages and a specific gravity of 3.0 was used for quartz sulphides.

(b) Methods Used in the Determination of Mineral Reserves

That portion of the Grum deposit which falls between 62W and 84W has been extensively tested by ring drilling on 60 meter centres from

underground, as well as by vertical drill holes on 30 - 60 meter centres from surface. Such being the case, the vertical cross sections provide the best basis for computing mineral reserves. In addition to the detailed ring drilling of even numbered sections 62 - 84W, intermediate ring drilling of lesser density has been done on odd numbered sections 69W, 71W, 73W, 75W and 83W to establish continuity along the long axes of the mineralized structures.

The detailed calculation procedure was as follows:-

(1) Starting with an assay cross section on which all drill holes are shown in their surveyed positions and on which the values are shown as percent combined lead-zinc, the outline of the massive and quartz sulphide types of mineralization shown on the geologic cross sections were traced on to the assay cross section.

(2) Since it had been agreed that the assay sheets would show the outlines of categories 12% +, 10 - 12%, 8 - 10%, 6 - 8%, 4 - 6%, 2 - 4%, 0 - 2%, the procedure then was:

(3) Starting with the highest grade possible over a minimum (mining) width of 10 feet (or three meters), adjoining

samples in the drill hole intersections were composited to give a weighted average which falls within the above mentioned categories over a maximum combined thickness. This procedure was repeated for all categories. Whenever a minimum true width of 3 meters could not be achieved by combining given sample intersections, then the necessary width was gained by adding the required amount from the highest grade adjoining sample (see 44.6 - 47.6m on sketch). The prime purpose was to obtain the highest grade over a maximum length.

The weighted average grades plotted on the assay and mineral reserve sections also show internal intervals of higher and lower categories. Assay wall values were shown to the nearest 1% Pb + Zn.

Drill hole sections show Pb, Zn and Ag assays separately. Mineral reserve sections show the combined Pb + Zn values on the drill hole, but separate Pb, Zn and Ag grades on "ore" blocks.

The mineralized zones were outlined by joining the sulphide zone based on structural control, geological rock boundaries, and mineral composition. The mineral reserves were then calculated, segment by segment from adjoining D.D. hole weighted averages within the zone. Mean thickness of each segment was

arrived at by averaging the measured widths along the segment. The dip length was measured parallel to the boundaries of the segment.

No adjustment has been made for the fact that the cross sections used in computing mineral reserves are not necessarily true cross sections. This discrepancy should be adequately compensated by the use of horizontal distances between sections instead of plunge distances between sections. In ignoring the fact that some additional tonnage results from undulations, both in plan and in longitudinal section, a small factor of safety is built in.

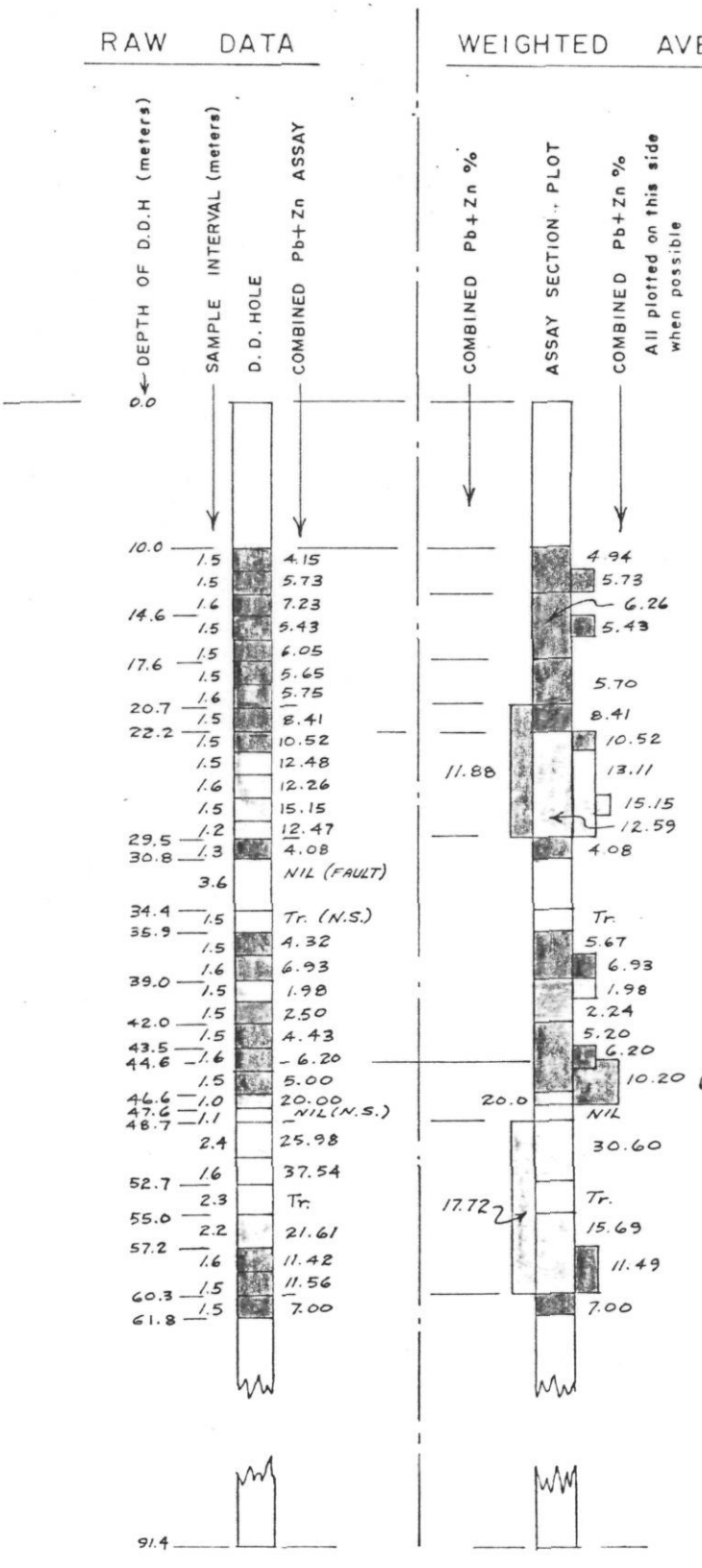
The detailed mineral reserve for each cross section is calculated as follows:-

The drill hole mineralized segments, together with their dip length, thickness and grade are shown on a calculation sheet and from these figures a tonnes x grade calculation is made for each metal. The next step is to total the various grade categories separately and cumulatively, starting from + 12% and reducing in two percent stages down to + 4% combined lead-zinc.

The final step is to combine each grade category from each cross section and to calculate the weighted average for each category. The net result is a calculation sheet showing the tonnage and grade for each category, i.e. + 12%, 10 - 12%, + 10%, 8 - 10%, + 8%, 6 - 8%, + 6%, 4 - 6%, + 4%.

GRUM JOINT VENTURE, Y. T.

Sketch Showing Method Of Portraying Metal Grades On D.D. Hole Sections



* 1. D. D. H. (Assay) Sections show Pb, Zn, Ag assays

* 2. Mineral Reserve Sections show combined Pb+Zn grade on D. D. Holes but separate Pb, Zn, Ag values on mineral reserve blocks

ASSAY COLOR CODE

No Assay	white
0.00 - 1.99	lt. yellow
2.00 - 3.99	dk. yellow
4.00 - 5.99	
6.00 - 7.99	
8.00 - 9.99	
10.00 - 11.99	purple
12.00 +	blue

(c) Metal Ratios and Variation in Grade

With the exception of the hanging wall zone labelled "H" on the assay cross sections, the Pb:Zn ratio in the Grum deposit is 0.625:1 or for every lb. of lead, there are 1.6 lbs. of zinc. In the "H" zone, the Pb:Zn ratio is 1:1 or better.

Higher grades (10% combined Pb-Zn) persist from 62W to 82W, at which point the fold structure begins to open north westward with an attendant diminution of grade.

Generally speaking there has been a thickening of mineralization in the hinges of folds but this thickening is not necessarily accompanied by an increase in grade or a change in metal ratios. As a rule of thumb, silver content varies with lead content but not as a straight line function. Again, as a generalization, a grade of 5% Pb accompanied by 8% Zn, would have a silver content of 2.5 ozs. (86 gms per metric tonne).

IX. Mineral Reserves

(a) Summary of Reserves - Grum Joint Venture (Kerr Option)

Drill proven - 62W - 84W

Category	Metric Tonnes	% Lead	% Zinc	Ag (gms/m.t.)
+ 12%	8,652,000	5.95	9.94	89
10 - 12%	3,252,000	4.25	6.59	68
+ 10%	11,904,000	5.48	9.03	83
8 - 10%	2,284,000	3.63	5.25	54
+ 8%	14,188,000	5.18	8.42	78
6 - 8%	4,379,000	2.7	4.23	42
+ 6%	18,567,000	4.60	7.43	70
4 - 6%	4,858,000	2.03	2.92	31
+ 4%	23,425,000	4.06	6.5	62

Drill indicated - 86W only

+ 12%	424,200	5.46	9.25	85
10 - 12%	212,800	4.42	6.63	66
+ 10%	637,000	5.11	8.37	79
8 - 10%	362,200	3.32	5.31	51
+ 8%	999,200	4.46	7.26	69
6 - 8%	354,300	2.48	4.09	42
+ 6%	1,353,500	3.95	6.43	61
4 - 6%	325,200	2.14	3.17	33
+ 4%	1,678,700	3.59	5.80	55

Total Drill Proven and Drill Indicated

+ 12%	9,076,000	5.92	9.91	89
10 - 12%	3,465,000	4.26	6.59	68
+ 10%	12,541,000	5.46	8.99	83
8 - 10%	2,646,000	3.59	5.26	53
+ 8%	15,187,000	5.14	8.34	78
6 - 8%	4,733,000	2.68	4.22	42
+ 6%	19,920,000	4.55	7.36	69
4 - 6%	5,183,000	2.04	2.94	31
+ 4%	25,103,000	4.03	6.45	61

(b) Summary of Reserves - Grum Joint Venture (Vangorda Option)

Drill Proven - 62W - 68W

Category	Metric Tonnes	% Lead	% Zinc	Ag (gms/m.t.)
+ 12%	481,000	7.26	8.22	98
10 - 12%	61,400	5.11	6.26	69
+ 10%	542,300	7.02	8.0	95
8 - 10%	54,800	3.97	4.73	53
+ 8%	597,100	6.74	7.7	91
6 - 8%	172,200	3.01	3.87	40
+ 6%	769,300	5.90	6.84	79
4 - 6%	210,800	1.99	3.05	29
+ 4%	980,000	5.06	6.03	69

Total Reserves - Grum Joint Venture (Kerr and Vangorda Options)

Category	Metric Tonnes	% Lead	% Zinc	Ag (gms/m.t.)
+ 12%	9,557,000	5.99	9.83	89
10 - 12%	3,526,000	4.28	6.58	68
+ 10%	13,083,000	5.53	8.95	83
8 - 10%	2,701,000	3.59	5.25	53
+ 8%	15,784,000	5.20	8.32	78
6 - 8%	4,906,000	2.69	4.21	41
+ 6%	20,689,000	4.60	7.34	69
4 - 6%	5,394,000	2.03	2.94	31
+ 4%	26,083,000	4.07	6.43	62

GRUM JOINT VENTURE

REVISED MINERAL INVENTORY - "CHAMP ZONE"

March 21, 1978 (A.Y. Po)

Calculations based on reinterpreted sulphide boundaries. CHAMP zone is bounded by 51W to 63W on cross section and by 13S to 1S on longitudinal section.

Drill Indicated

Category	Metric Tonnes	% Lead	% Zinc	gms/m.t. Silver
+ 12%	140,461	7.16	8.36	79
10 - 12%	342,218	4.71	6.31	63
+ 10%	482,679	5.42	6.91	68
8 - 10%	206,468	3.90	5.14	48
+ 8%	689,147	4.96	6.38	62
6 - 8%	225,979	3.07	3.86	40
+ 6%	915,126	4.49	5.76	57
4 - 6%	777,505	2.34	2.55	33
+ 4%	1,692,631	3.51	4.28	46

Drill Possible

+12%	-	-	-	-
10 - 12%	-	-	-	-
+ 10%	-	-	-	-
8 - 10%	-	-	-	-
+ 8%	-	-	-	-
6 - 8%	37,870	3.28	4.63	34
+ 6%	37,870	3.28	4.63	34
4 - 6%	77,440	1.88	2.60	22
+ 4%	115,310	2.34	3.26	26

(b) Mineral Reserves calculated by Cross Sections - Grum Joint Venture

Sec. No.	Category	Metric Tonnes	% Lead	% Zinc	Ag (gms/m.t.)
62W	+ 12%	138,130	7.28	14.31	107
	10 - 12%	32,773	3.67	6.66	60
	+ 10%	170,903	6.59	12.84	98
	8 - 10%	76,227	3.26	5.55	50
	+ 8%	247,130	5.56	10.59	83
	6 - 8%	62,328	3.36	3.15	47
	+ 6%	309,458	5.12	9.09	76
	4 - 6%	178,186	2.48	2.11	34
	+ 4%	487,644	4.16	6.54	60
64W	+ 12%	347,086	6.00	11.47	100
	10 - 12%	53,286	4.02	7.26	75
	+ 10%	400,372	5.74	10.90	96
	8 - 10%	Nil			
	+ 8%	400,372	5.74	10.90	96
	6 - 8%	140,315	3.01	4.03	41
	+ 6%	540,687	5.03	9.12	82
	4 - 6%	277,960	2.28	2.77	36
	+ 4%	818,647	4.10	6.97	66
66W	+ 12%	387,506	6.06	9.90	87
	10 - 12%	192,327	4.64	6.09	60
	+ 10%	579,833	5.59	8.63	78
	8 - 10%	24,033	3.39	5.17	51
	+ 8%	603,866	5.50	8.50	77
	6 - 8%	118,072	3.02	3.89	40
	+ 6%	721,938	5.09	7.74	71
	4 - 6%	249,381	2.05	3.03	34
	+ 4%	971,319	4.31	6.53	62
68W	+ 12%	579,298	6.95	10.19	100
	10 - 12%	283,768	4.21	6.74	102
	+ 10%	863,066	6.05	9.06	100
	8 - 10%	162,868	4.23	4.80	61
	+ 8%	1,025,934	5.76	8.38	94
	6 - 8%	253,381	3.08	3.78	40
	+ 6%	1,279,315	5.23	7.47	83
	4 - 6%	372,181	2.24	2.80	35
	+ 4%	1,651,496	4.56	6.42	73
70W	+ 12%	1,035,396	6.40	11.01	91
	10 - 12%	254,570	5.06	5.77	64
	+ 10%	1,289,966	6.14	9.98	86
	8 - 10%	283,774	3.96	4.76	53
	+ 8%	1,573,740	5.74	9.04	80
	6 - 8%	352,148	2.67	4.08	40
	+ 6%	1,925,888	5.18	8.13	73
	4 - 6%	300,604	2.11	3.08	30
	+ 4%	2,226,492	4.77	7.45	67

Sec. No.	Category	Metric Tonnes	% Lead	% Zinc	Ag (gms/m.t.)
72W	+ 12%	912,602	5.74	9.05	85
	10 - 12%	372,163	4.18	6.61	67
	+ 10%	1,284,765	5.29	8.34	80
	8 - 10%	66,613	3.81	4.74	51
	+ 8%	1,351,378	5.21	8.17	79
	6 - 8%	527,390	2.62	4.38	42
	+ 6%	1,878,768	4.49	7.10	68
	4 - 6%	344,950	1.98	2.93	32
	+ 4%	2,223,718	4.10	6.46	63
74W	+ 12%	1,233,403	5.71	9.18	91
	10 - 12%	396,761	4.17	6.66	67
	+ 10%	1,630,164	5.33	8.57	85
	8 - 10%	233,905	3.30	5.45	48
	+ 8%	1,864,069	5.08	8.18	80
	6 - 8%	490,648	2.64	3.89	42
	+ 6%	2,354,717	4.57	7.29	72
	4 - 6%	423,732	1.83	3.00	30
	+ 4%	2,778,449	4.15	6.63	66
76W	+ 12%	879,817	6.40	10.11	98.24
	10 - 12%	457,748	4.38	6.78	66.94
	+ 10%	1,337,565	5.71	8.97	87.52
	8 - 10%	198,729	3.56	5.19	46.5
	+ 8%	1,536,294	5.44	8.48	82
	6 - 8%	449,931	2.83	4.08	43.43
	+ 6%	1,986,225	4.85	7.49	73
	4 - 6%	746,585	2.05	2.93	30
	+ 4%	2,732,810	4.08	6.24	61
78W	+ 12%	972,994	5.65	10.17	63
	10 - 12%	471,780	4.13	6.58	60
	+ 10%	1,444,774	5.16	8.99	62
	8 - 10%	291,475	3.56	5.28	56
	+ 8%	1,736,250	4.89	8.37	61
	6 - 8%	633,094	2.48	4.26	39
	+ 6%	2,369,338	4.24	7.27	55
	4 - 6%	540,153	1.81	2.92	28
	+ 4%	2,918,497	3.79	6.45	50

Sec. No.	Category	Metric Tonnes	% Lead	% Zinc	Ag (gms/m.t.)
80W	+ 12%	953,294	5.55	8.74	84
	10 - 12%	302,406	4.13	6.32	65
	+ 10%	1,255,700	5.21	8.16	79
	8 - 10%	509,177	3.37	5.26	54
	+ 8%	1,749,565	4.69	7.34	72
	6 - 8%	421,255	2.83	4.30	42
	+ 6%	2,170,821	4.33	6.75	66
	4 - 6%	868,553	2.01	3.09	30
	+ 4%	3,039,373	3.67	5.71	56
82W	+ 12%	1,014,615	5.41	10.05	94.38
	10 - 12%	276,686	3.82	6.88	62.61
	+ 10%	1,291,301	5.07	9.37	87.57
	8 - 10%	143,046	4.06	5.56	56.98
	+ 8%	1,434,347	4.97	8.99	84.52
	6 - 8%	455,478	2.58	4.89	42.79
	+ 6%	1,889,826	4.39	8.00	74.46
	4 - 6%	295,621	1.90	2.82	31.12
	+ 4%	2,185,447	4.06	7.30	68.6
84W	+ 12%	197,503	5.89	10.31	95
	10 - 12%	157,733	4.02	7.18	66
	+ 10%	355,236	5.06	8.92	82
	8 - 10%	293,897	3.65	5.71	56
	+ 8%	649,134	4.42	7.47	70
	6 - 8%	474,948	2.54	4.19	39.95
	+ 6%	1,124,082	3.63	6.20	58.03
	4 - 6%	151,038	2.01	2.91	30.50
	+ 4%	1,375,120	3.33	5.60	53
86W	+ 12%	424,162	5.46	9.25	85
	10 - 12%	212,840	4.42	6.63	66
	+ 10%	637,002	5.11	8.37	79
	8 - 10%	362,198	3.32	5.31	51
	+ 8%	999,201	4.46	7.26	69
	6 - 8%	354,308	2.48	4.09	42
	+ 6%	1,353,508	3.95	6.43	61
	4 - 6%	325,237	2.14	3.17	33
	+ 4%	1,678,746	3.59	5.80	55

(c) Vangorda Mines Ltd. - Mineral Reserves Calculated by Sections

Drill proven - Sections 62W - 68W

Sec. No.	Category	Metric Tonnes	% Lead	% Zinc	Ag (gms/m.t.)
62W	+ 12%	Nil			
	10 - 12%	21,302	3.74	6.46	52
	+ 10%	21,302	3.74	6.46	52
	8 - 10%	33,501	4.39	4.64	55
	+ 8%	54,803	4.14	5.35	54
	6 - 8%	49,766	2.81	3.89	28
	+ 6%	104,569	3.51	4.65	42
	4 - 6%	38,053	2.36	2.93	32
	+ 4%	142,622	3.20	4.19	39
64W	+ 12%	173,339	6.57	8.22	92
	10 - 12%	40,055	5.84	6.15	78
	+ 10%	213,494	6.43	7.83	90
	8 - 10%	21,302	3.32	4.87	51
	+ 8%	234,749	6.15	7.57	86
	6 - 8%	47,217	2.96	3.50	42
	+ 6%	281,965	5.61	6.90	79
	4 - 6%	64,149	1.83	3.14	26
	+ 4%	346,115	4.91	6.20	69
66W	+ 12%	274,804	7.80	8.23	101
	10 - 12%	Nil			
	+ 10%	274,804	7.80	8.23	101
	8 - 10%	Nil			
	+ 8%	274,804	7.80	8.23	101
	6 - 8%	25,830	3.32	3.84	42
	+ 6%	300,658	7.42	7.86	96
	4 - 6%	105,843	1.93	3.05	30
	+ 4%	406,502	5.99	6.61	79
68W	+ 12%	32,773	6.41	8.10	95
	10 - 12%	Nil			
	+ 10%	32,773	6.41	8.10	95
	8 - 10%	Nil			
	+ 8%	32.773	6.41	8.10	95
	6 - 8%	49,341	3.08	4.14	49
	+ 6%	60,691	4.41	5.72	67
	4 - 6%	27,310	2.49	2.34	36
	+ 4%	84,845	4.35	5.61	66

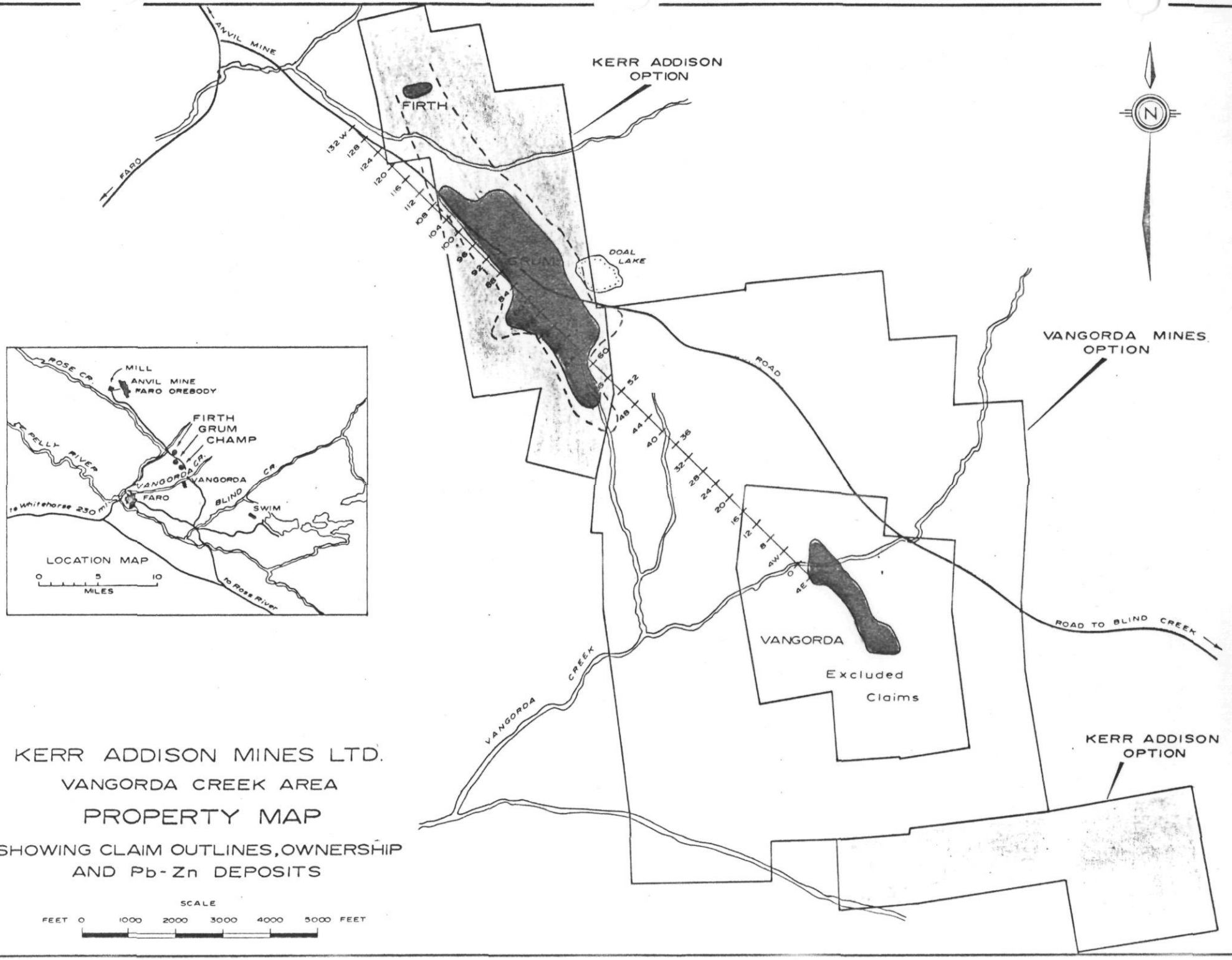
Dr. Mel de Quadros was the first to indicate the presence of highly calcareous (limy) phyllites and this observation was important in establishing the metamorphic stratigraphy of the Grum deposit and its relationship to other deposits in the area.

Dr. Stanley Reamsbottom of Canadian Natural Resources contributed useful geological concepts while on the property and his assistance in core logging is gratefully acknowledged.

Philippe Haillot has consistently done excellent work as Draftsman for the Grum Joint Venture.

W.M. Sirola

Vancouver, B.C.
March 28, 1977



KERR ADDISON MINES LTD.

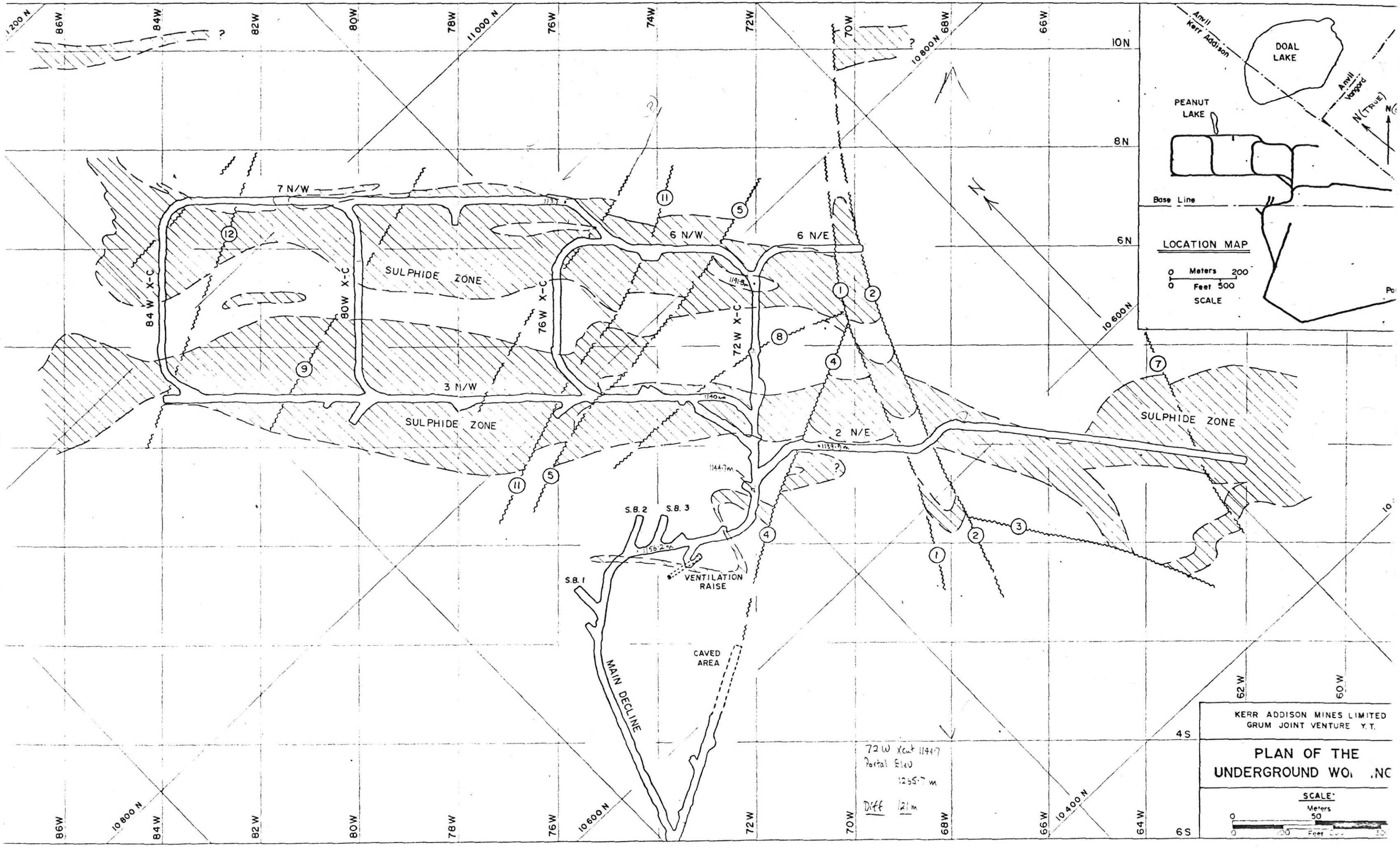
VANGORDA CREEK AREA

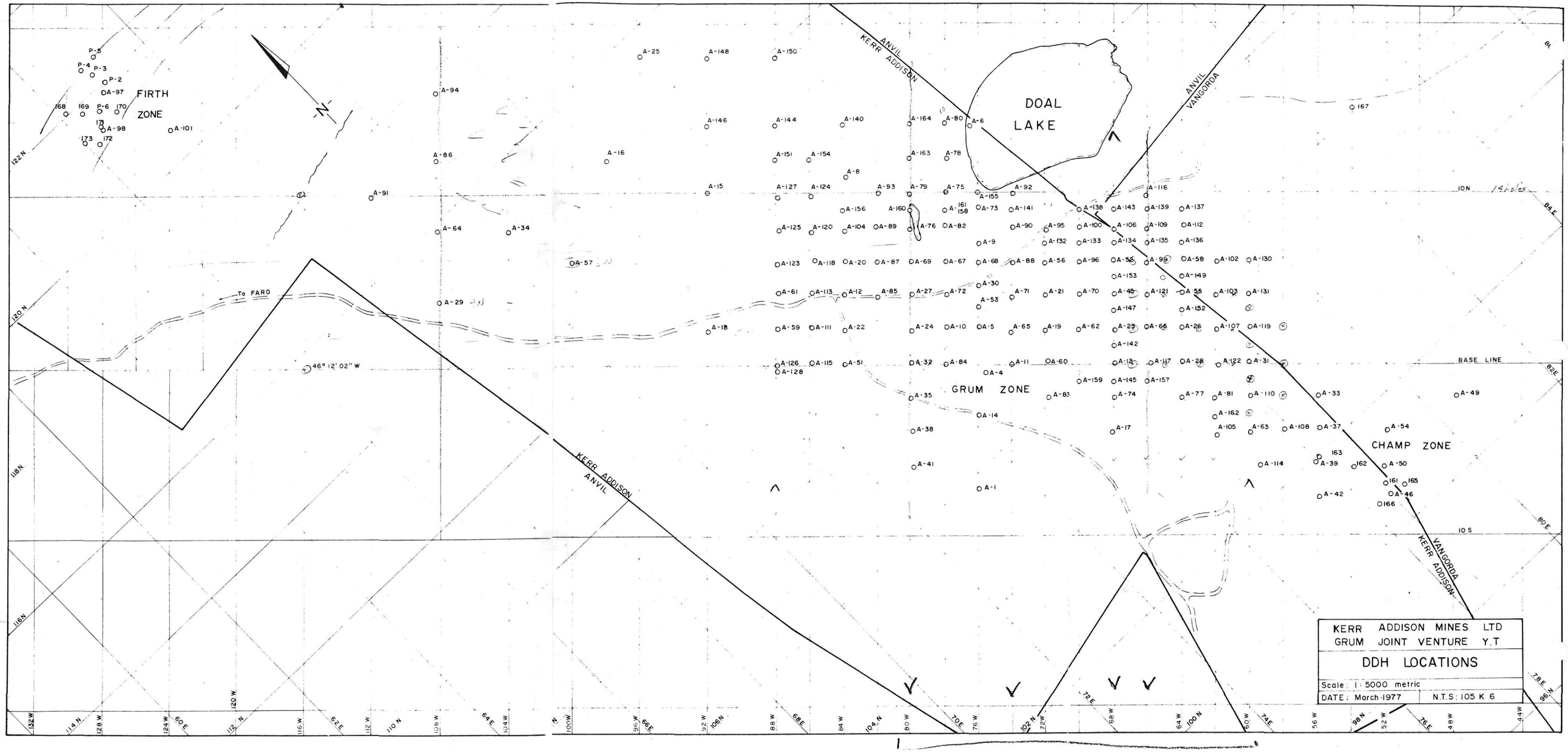
PROPERTY MAP

SHOWING CLAIM OUTLINES, OWNERSHIP AND Pb-Zn DEPOSITS

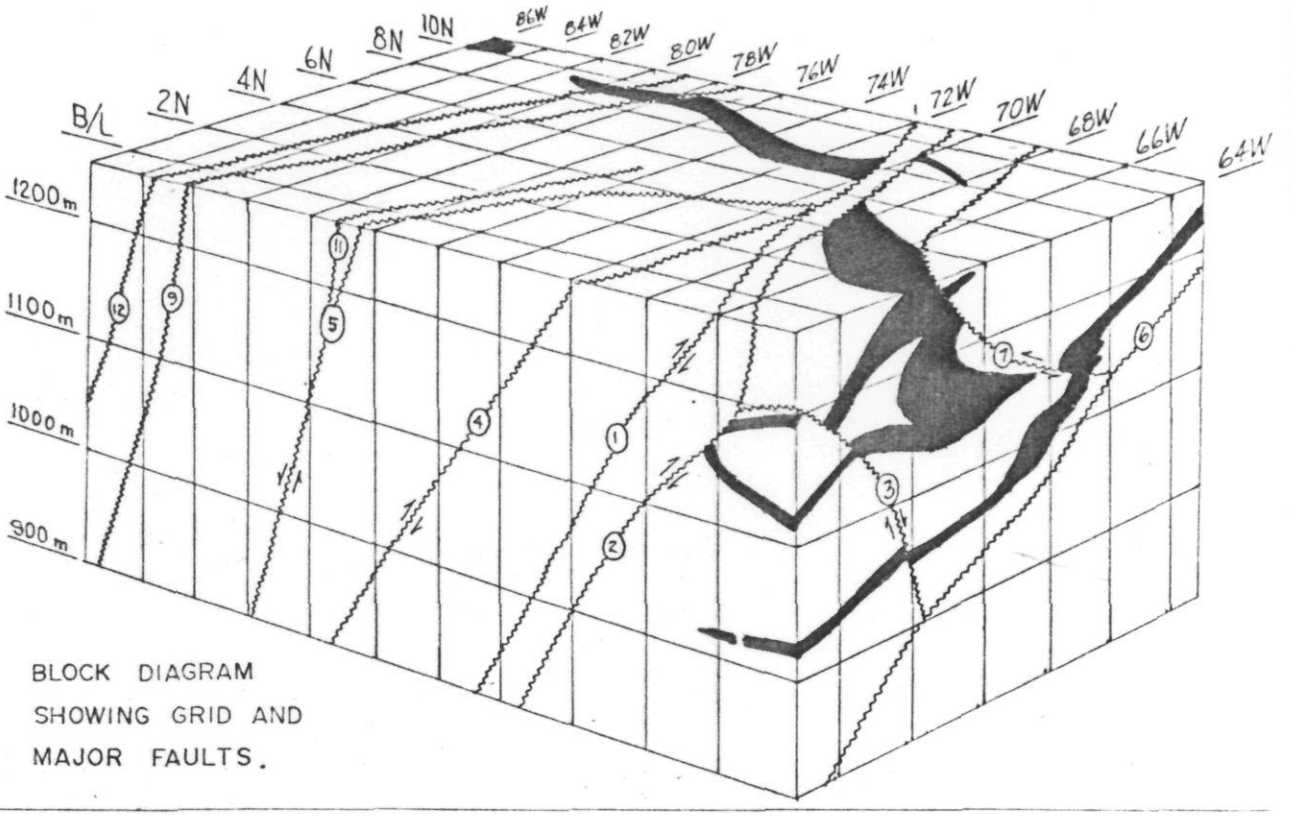
SCALE

FEET 0 1000 2000 3000 4000 5000 FEET

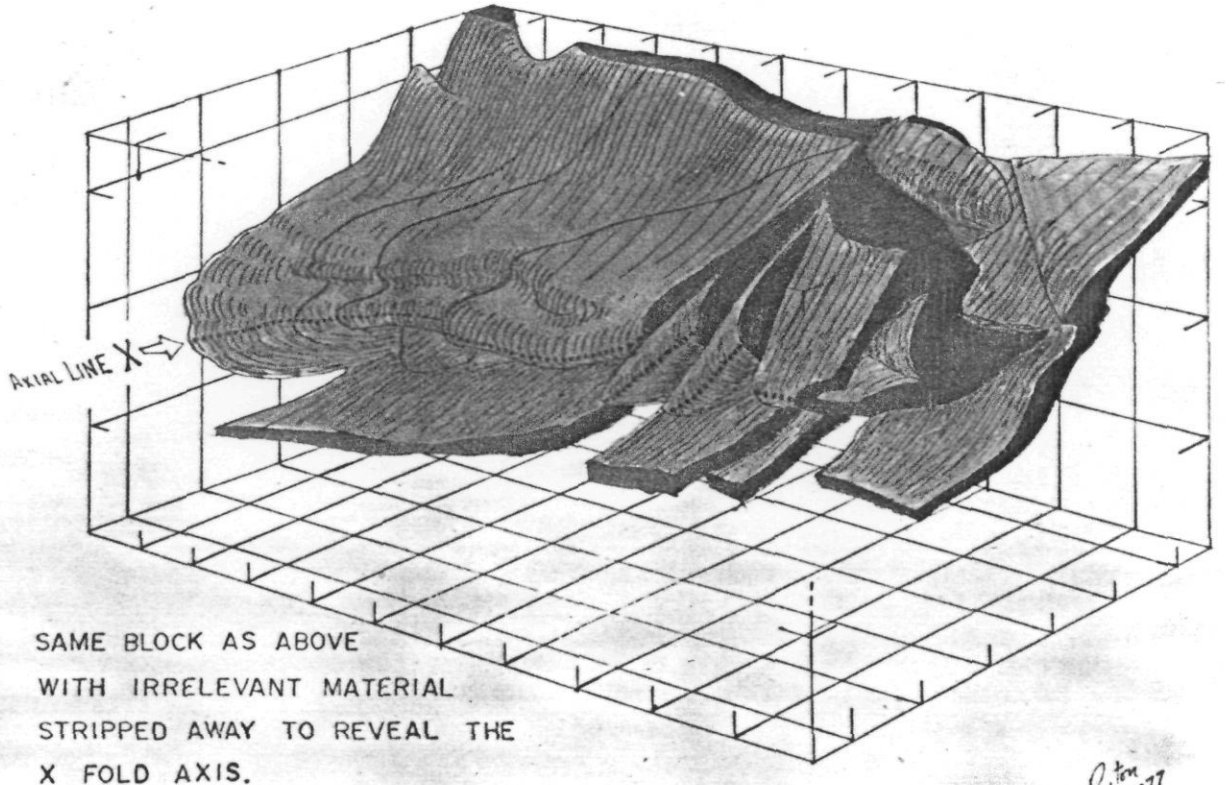

11200 N
86W
84W
82W
80W
78W
11000 N
76W
74W
72W
70W
10800 N
68W
66W
10N
8N
6N
7 N/W
6 N/W
6 N/E
3 N/W
2 N/E
SULPHIDE ZONE
SULPHIDE ZONE
SULPHIDE ZONE
84 W X-C
80W X-C
76W X-C
72 W X-C
S.B.1
S.B.2
S.B.3
VENTILATION RAISE
MAIN DECLINE
CAVED AREA
10600N
10400N
72 W Xcut 1144.7
Portal Elev
1265.7 m
Diff 121 m
DOAL LAKE
PEANUT LAKE
Anvil
Kerr Addison
Anvil
Vangard
N(TRUE)
Base Line
LOCATION MAP
0 Meters 200
0 Feet 500
SCALE
62 W
60 W
4S
6S
64 W
KERR ADDISON MINES LIMITED
GRUM JOINT VENTURE Y.T.
PLAN OF THE
UNDERGROUND WO
SCALE
Meters
50
0
0
Feet


FIRTH ZONE
DOAL LAKE
GRUM ZONE
CHAMP ZONE
ANVIL KERR ADDISON
ANVIL VANGORDA
KERR ADDISON ANVIL
VANGORDA KERR ADDISON
To FARO
46° 12' 02" W
BASE LINE
122 N
120 N
118N
116N
10 S
KERR ADDISON MINES LTD
GRUM JOINT VENTURE Y.T
DDH LOCATIONS
Scale : 1 : 5000 metric
DATE : March 1977
N.T.S : 105 K 6

STRUCTURAL DIAGRAMS – GRUM ORE ZONE

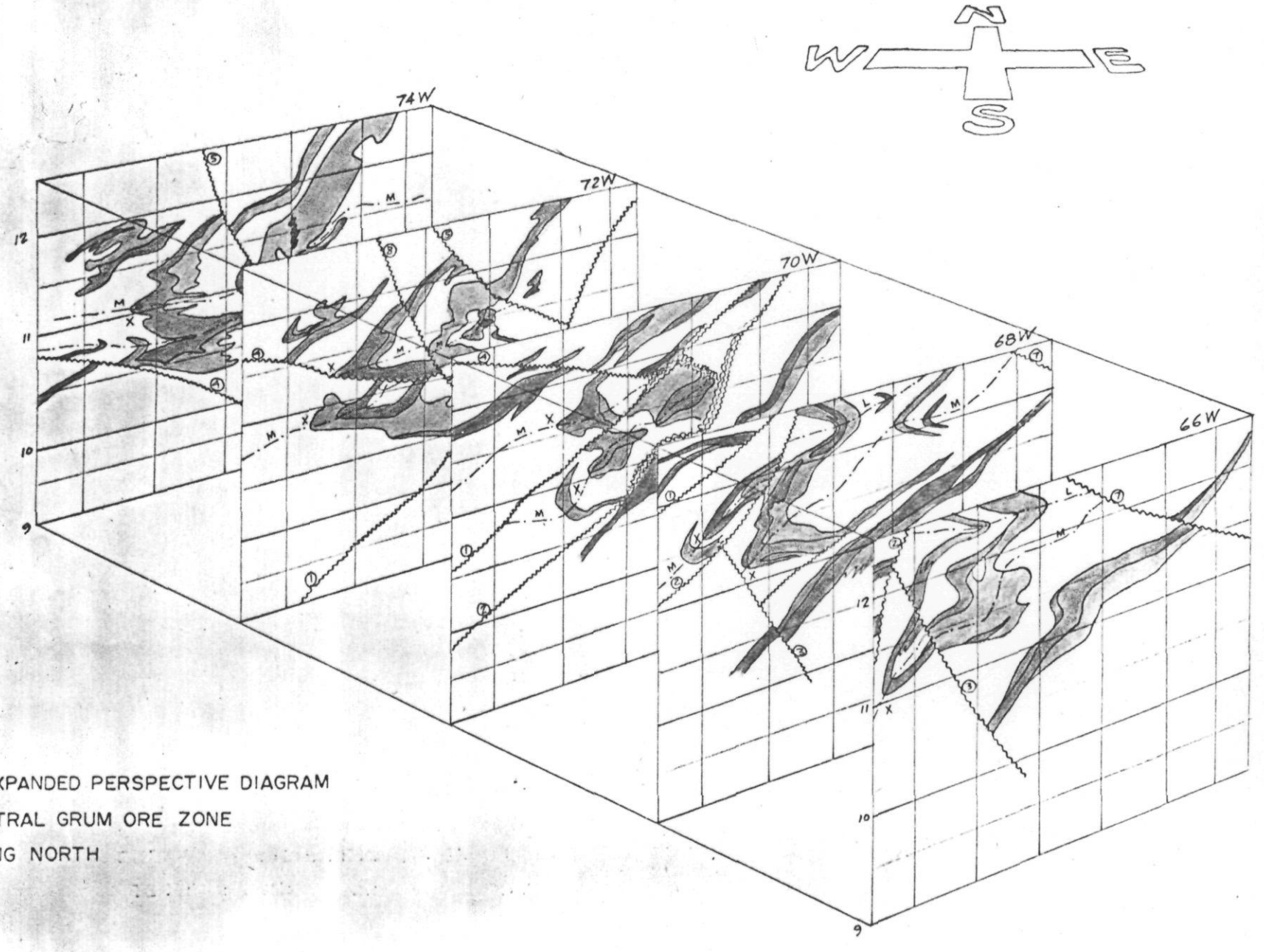


BLOCK DIAGRAM
SHOWING GRID AND
MAJOR FAULTS.



SAME BLOCK AS ABOVE
WITH IRRELEVANT MATERIAL
STRIPPED AWAY TO REVEAL THE
X FOLD AXIS.

Jim Paxton
March 1977



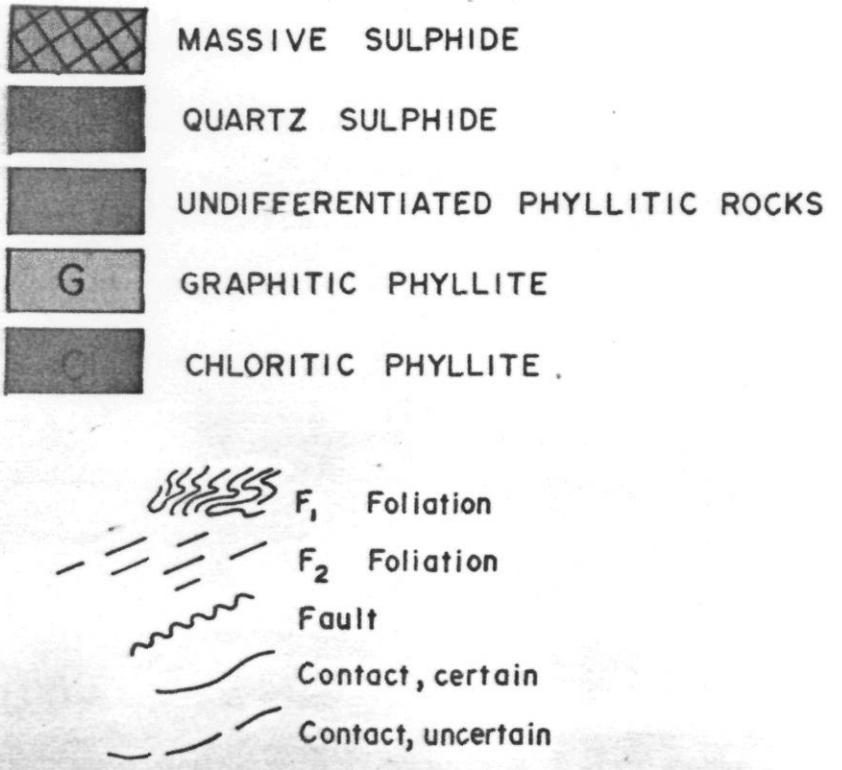
EXPANDED PERSPECTIVE DIAGRAM

CENTRAL GRUM ORE ZONE

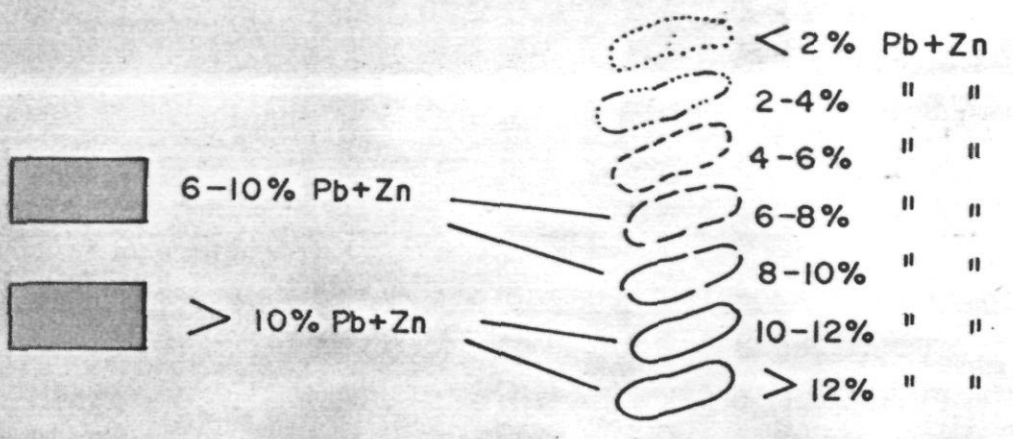
LOOKING NORTH

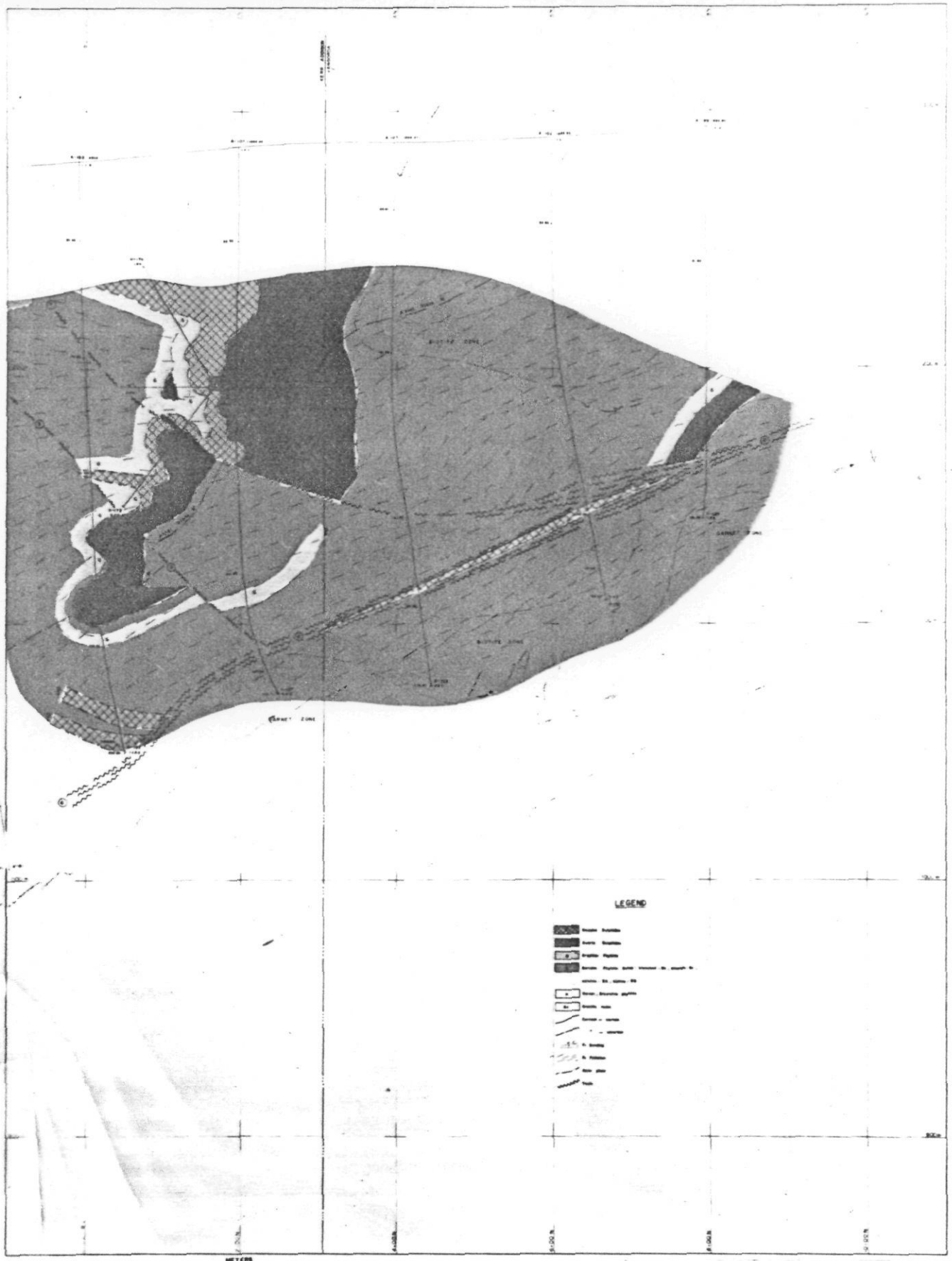
LEGENDS

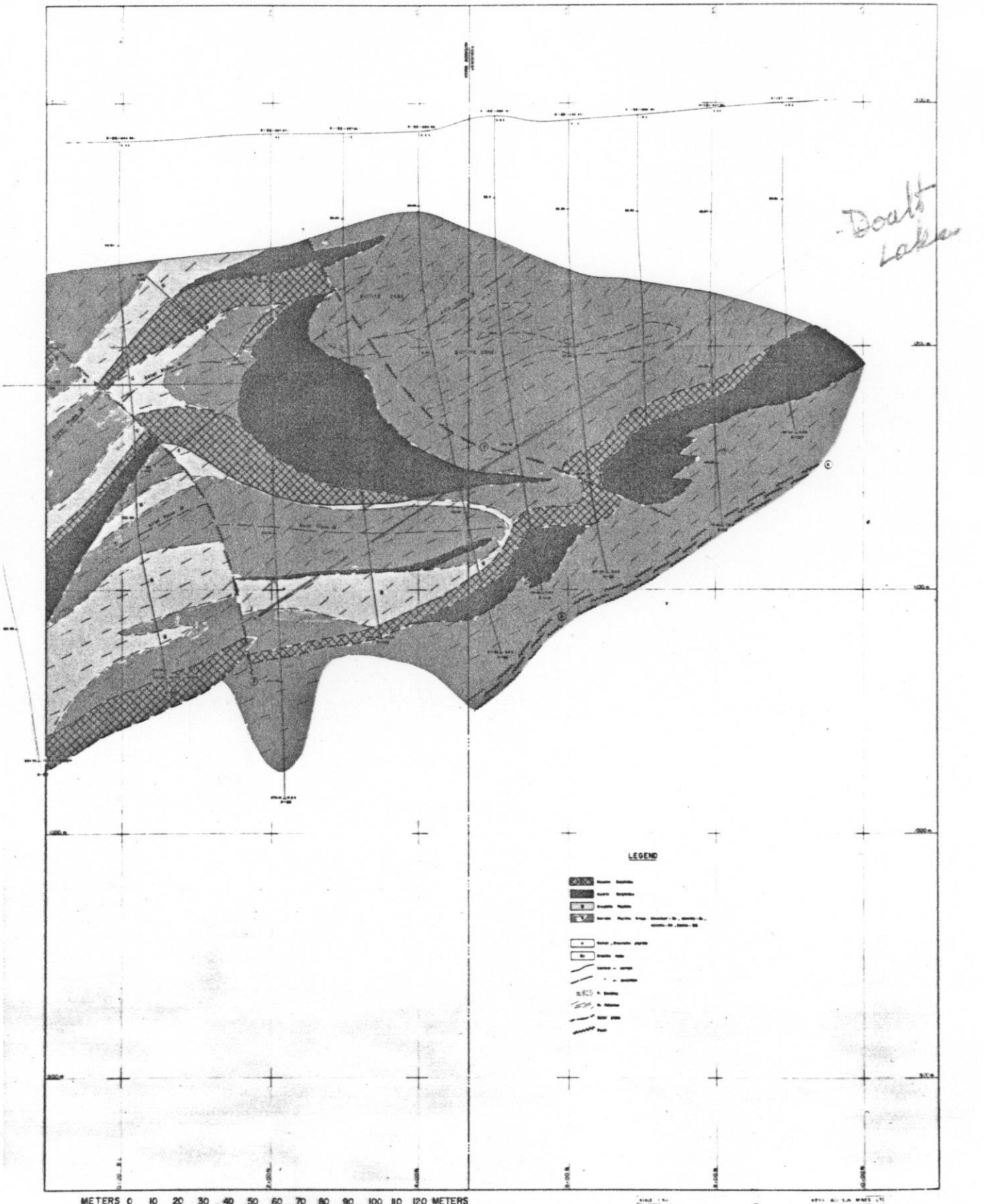
GEOLOGIC LEGEND

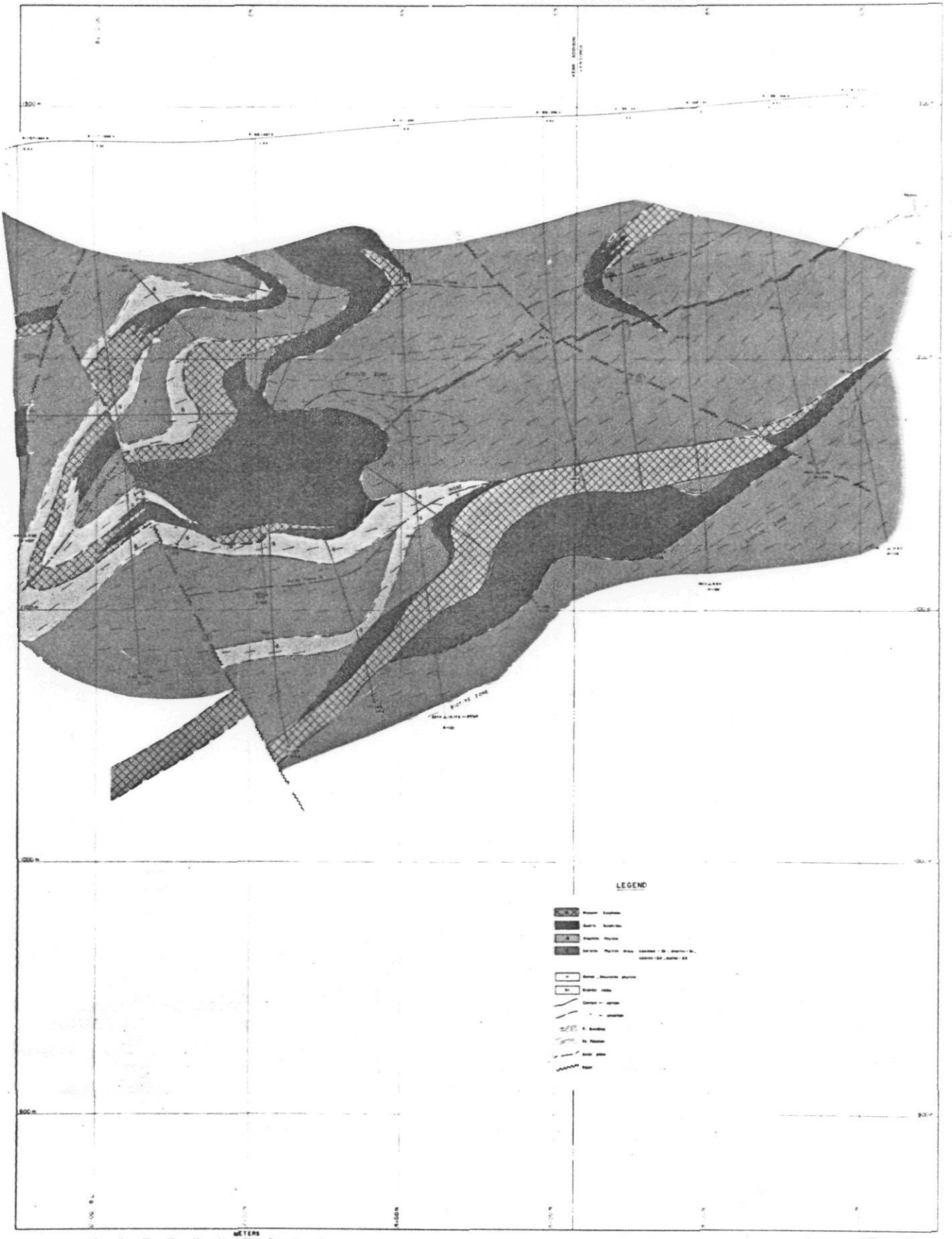


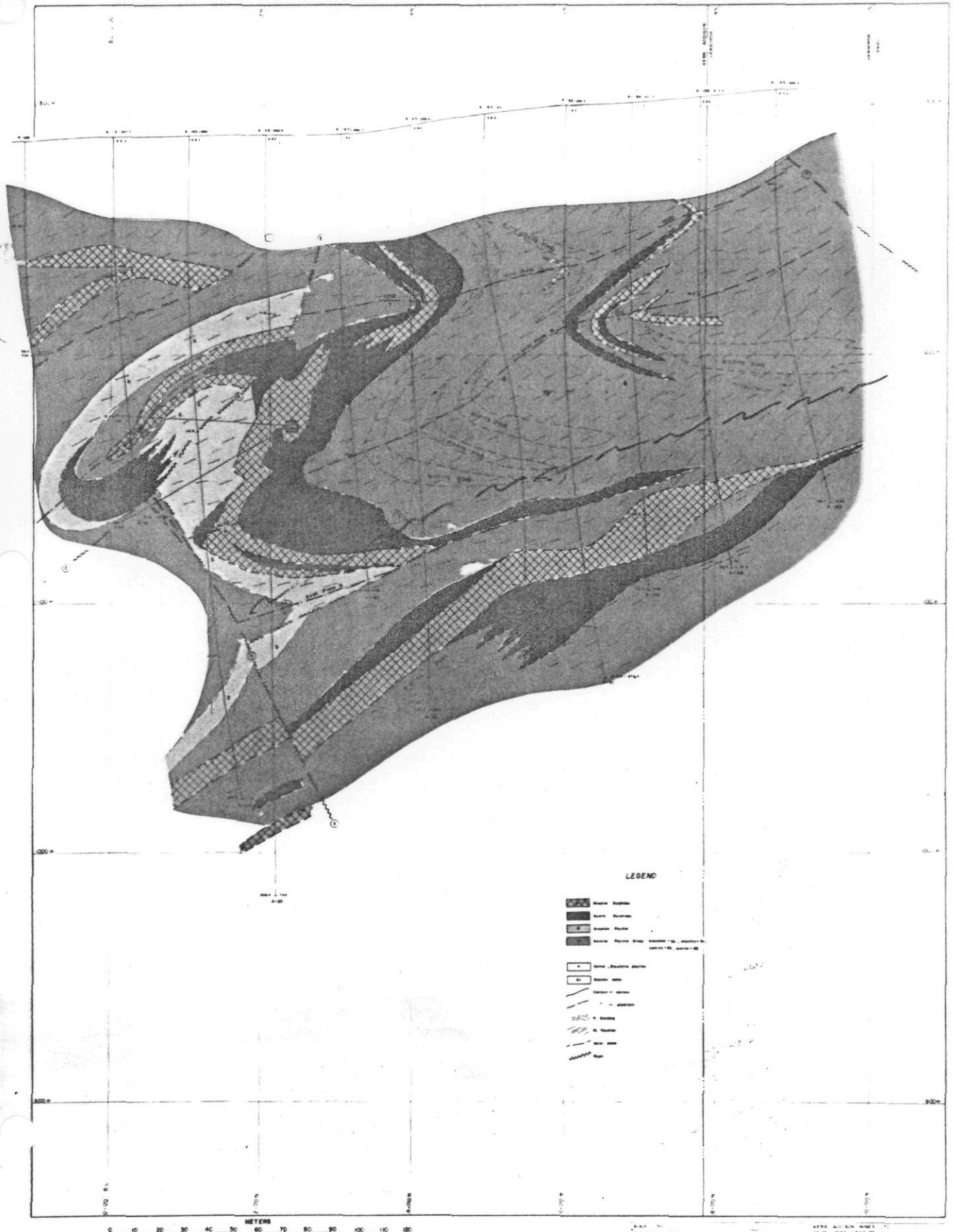
ASSAY LEGEND



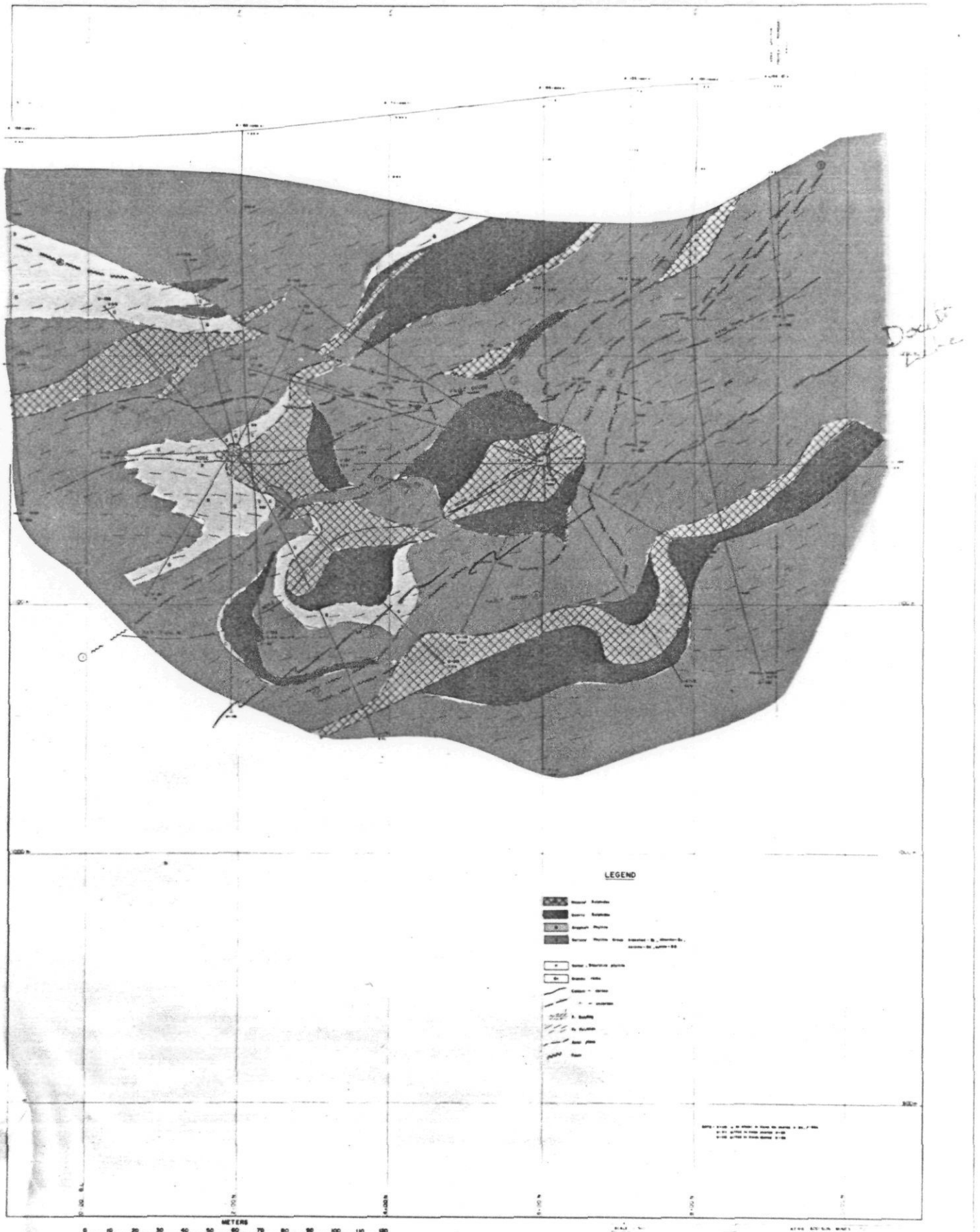

LEGEND
METERS
FEET
GEOLOGY

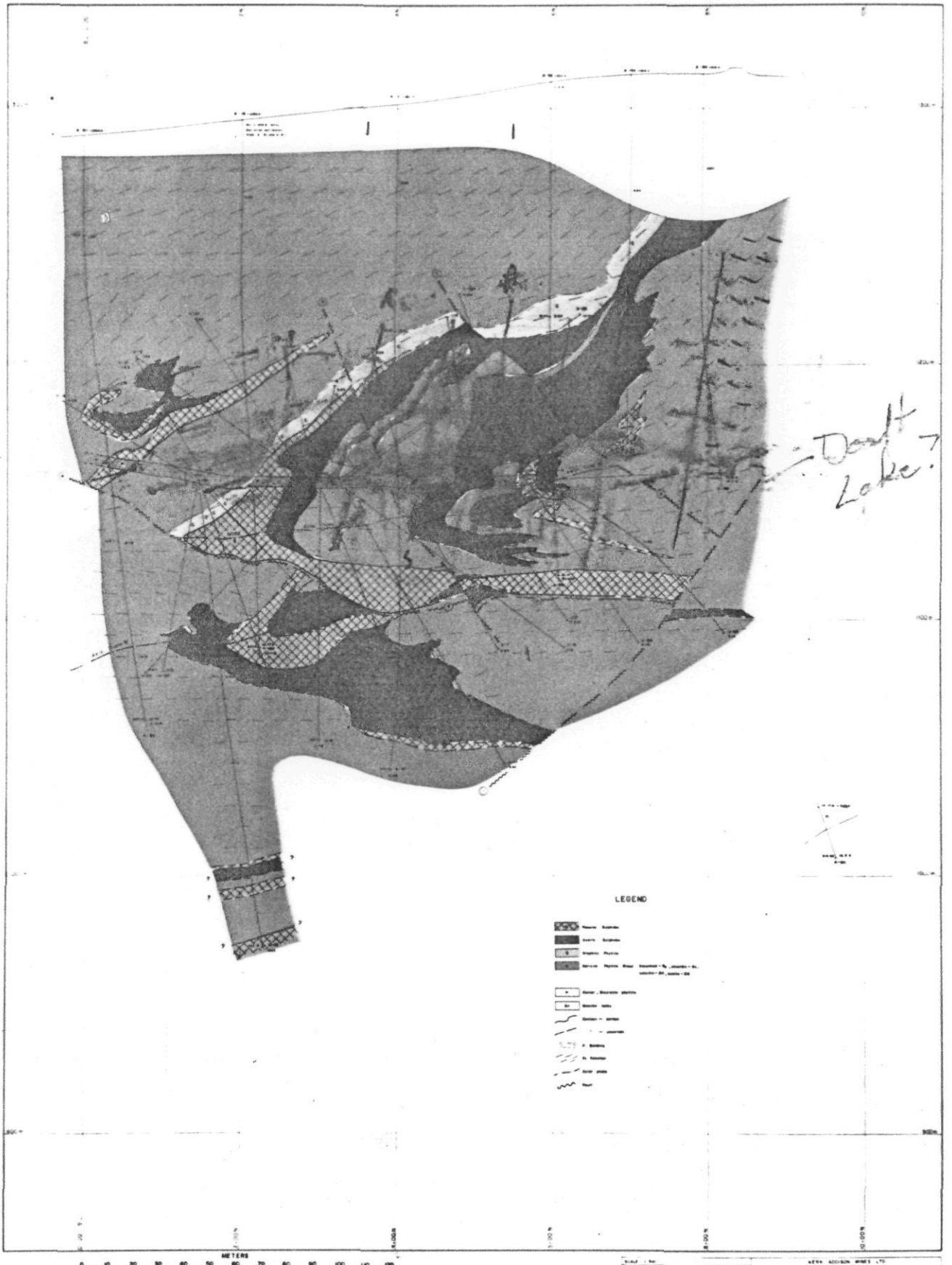

Doalt Lake
LEGEND
METERS 0 10 20 30 40 50 60 70 80 90 100 110 120 METERS
FEET 0 50 100 150 200 250 300 350 400 FEET
GEOLOGY
SECTION 64W

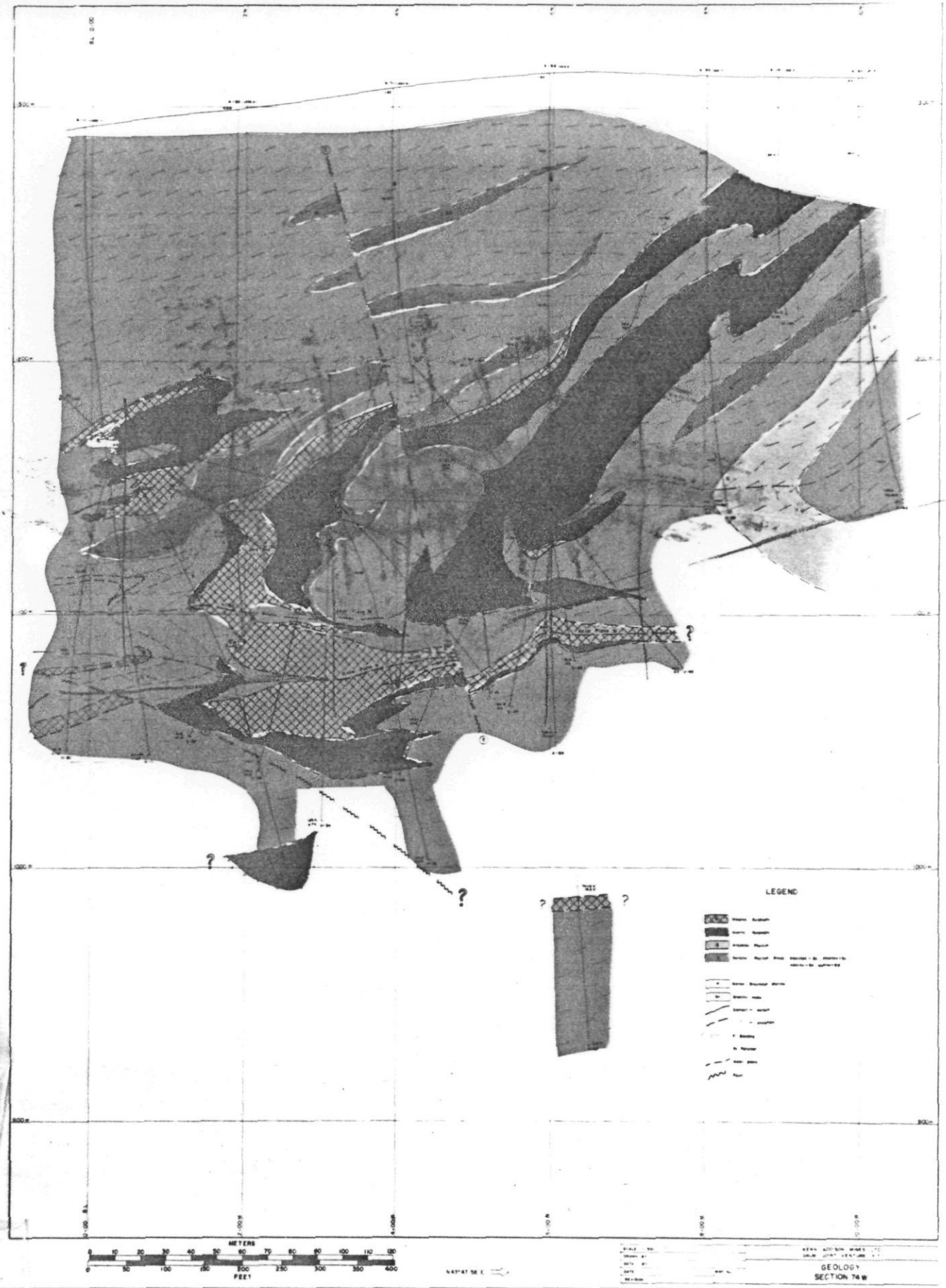

LEGEND
METERS
FEET
GEOLOGY
SECTION 66 W

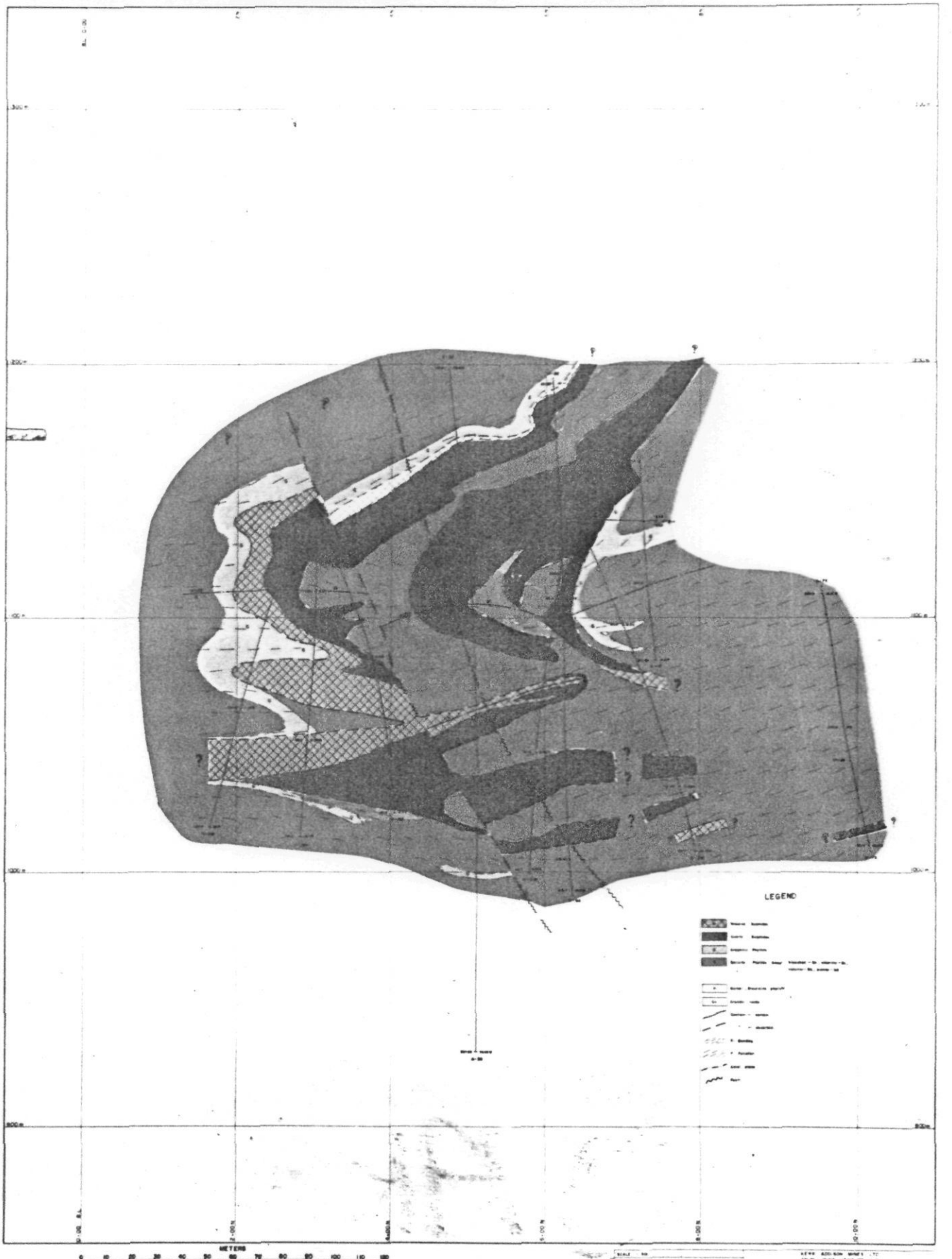


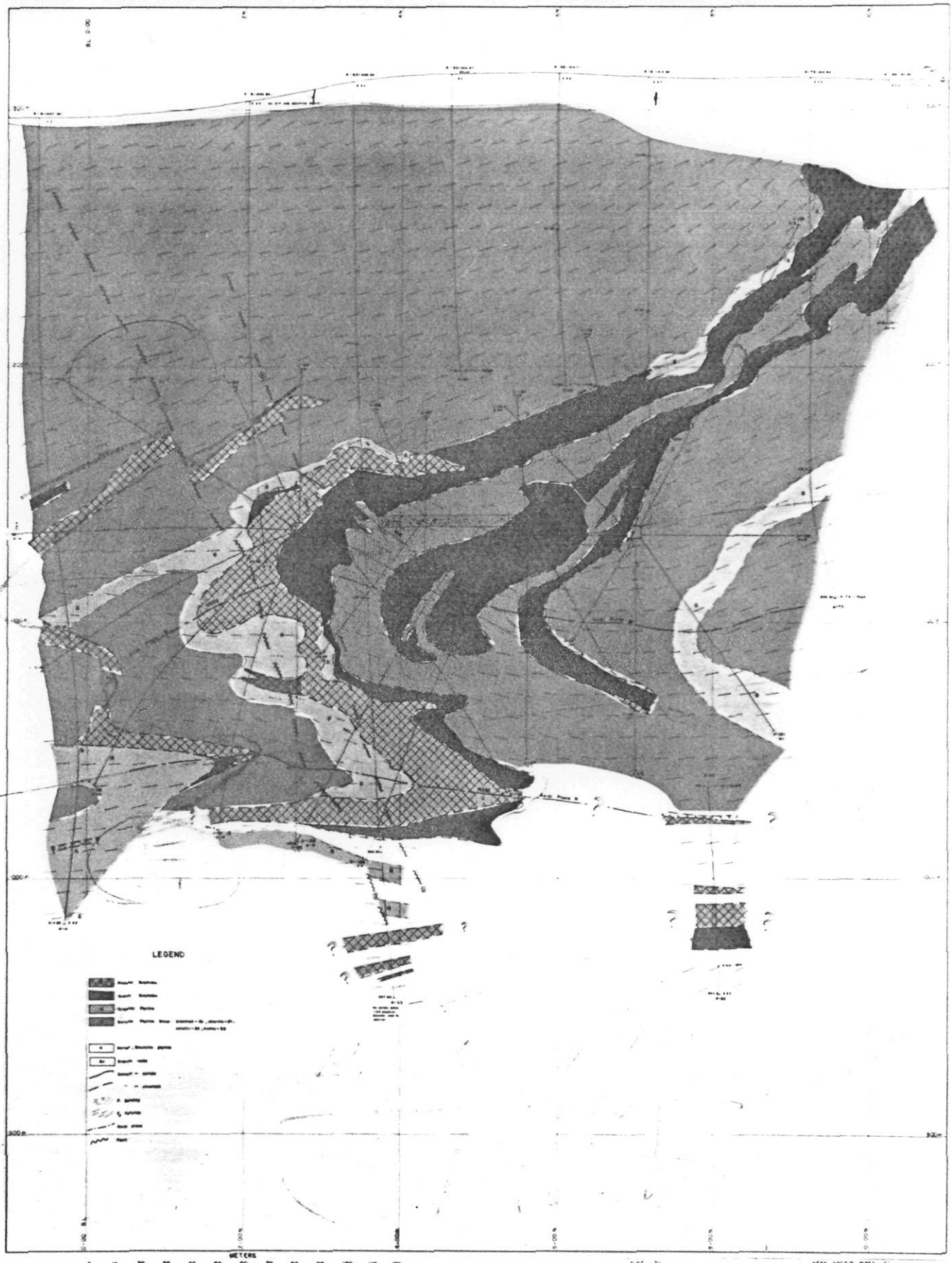
GEOLOGY
SECTION 68 A


LEGEND
METERS
FEET
GEOLOGY
SECTION 70W

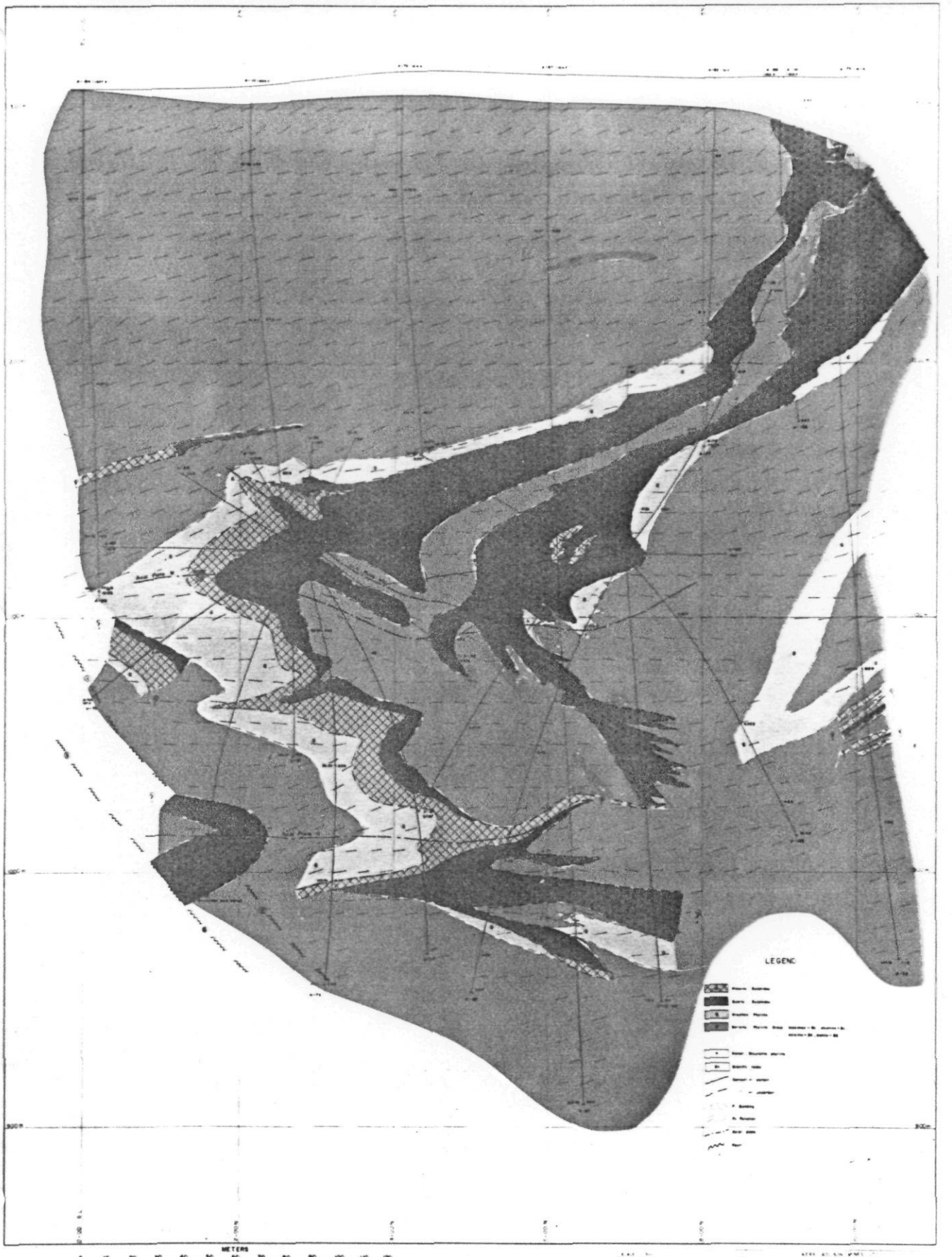

Dent Lake
LEGEND
METERS
FEET
GEOLOGY
SECTION 72W


LEGEND
METERS
FEET
GEOLOGY
SECTION 74 W

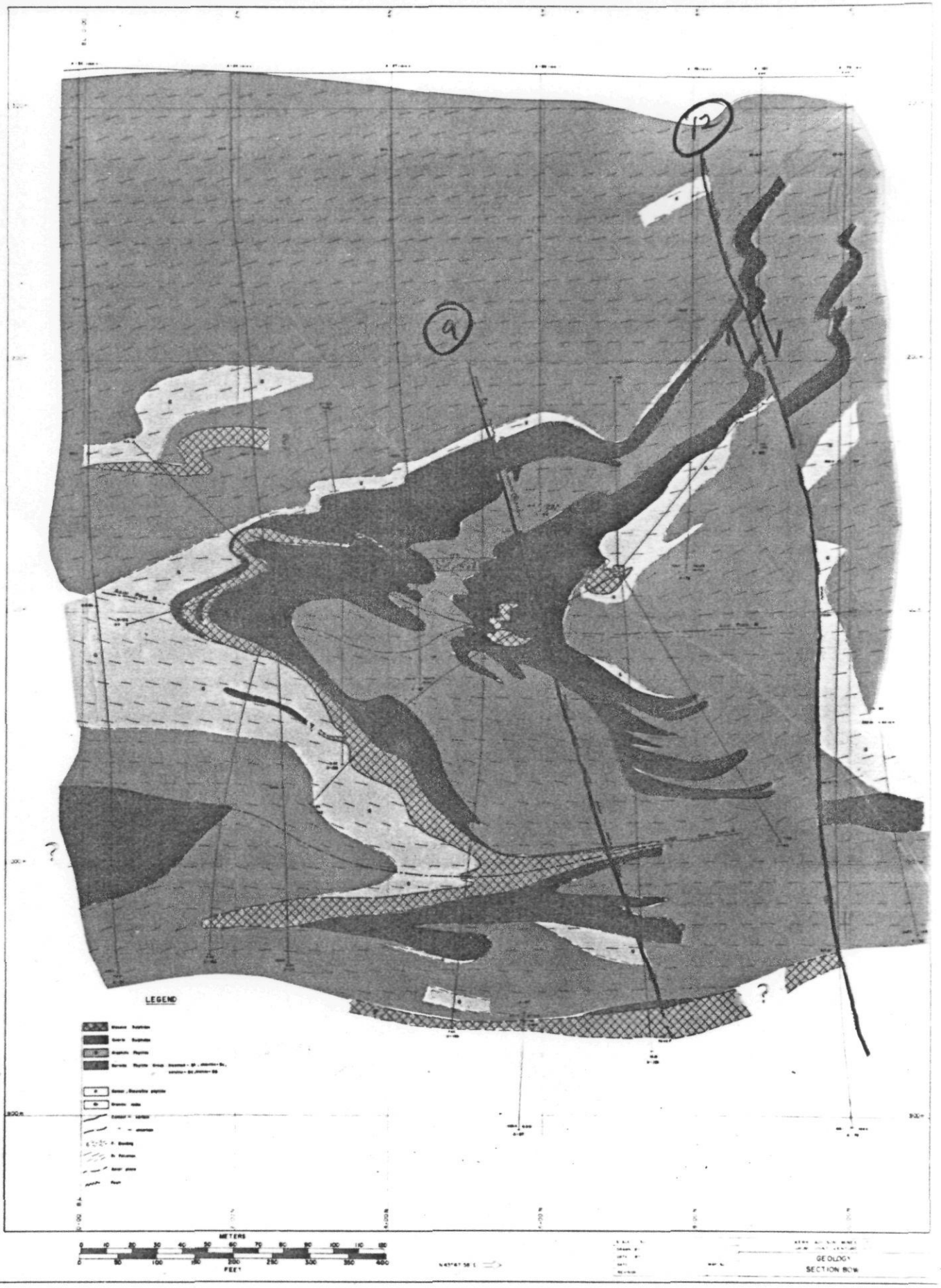

LEGEND
METERS
FEET
GEOLOGY
SECTION 75 W

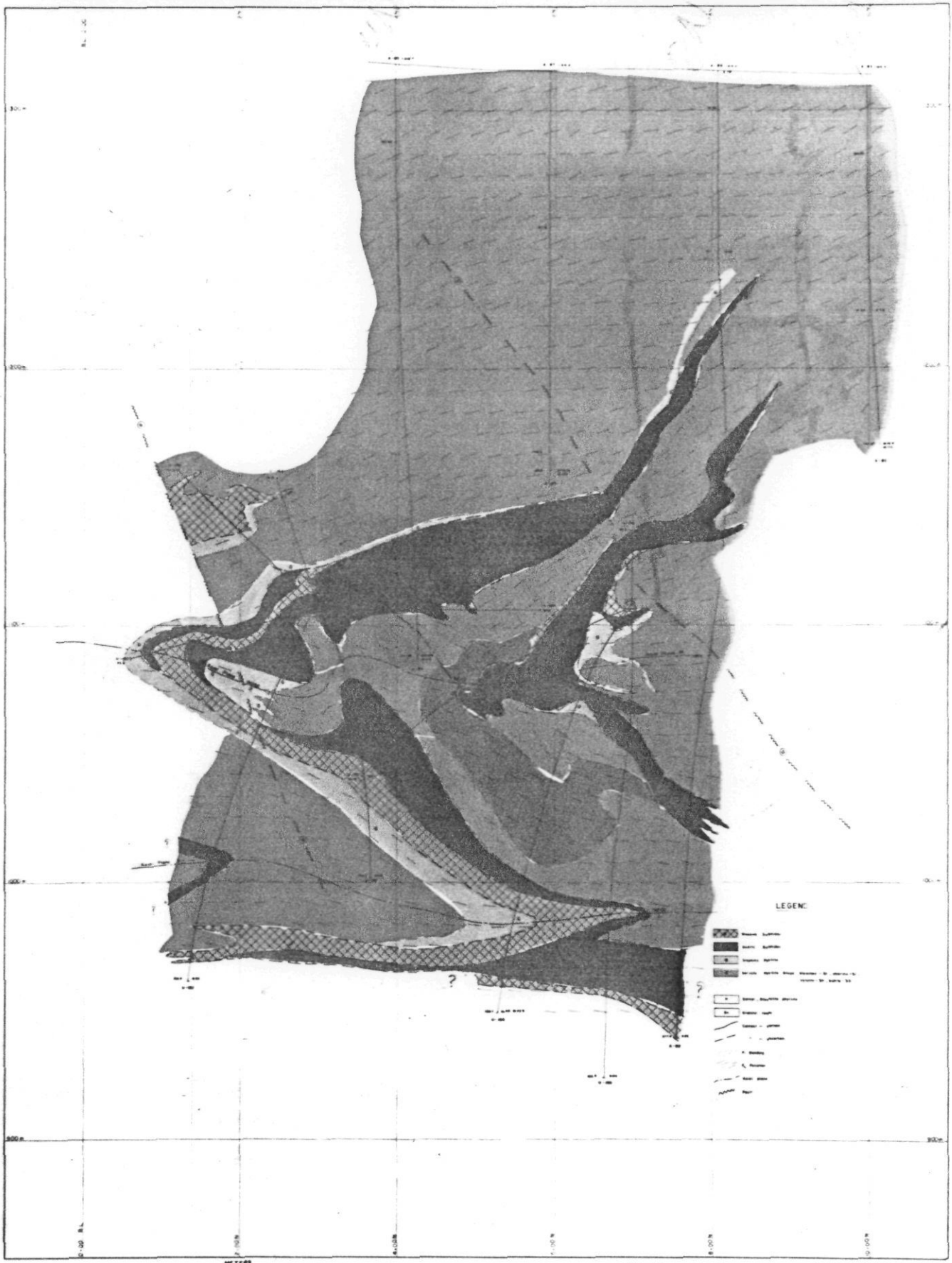


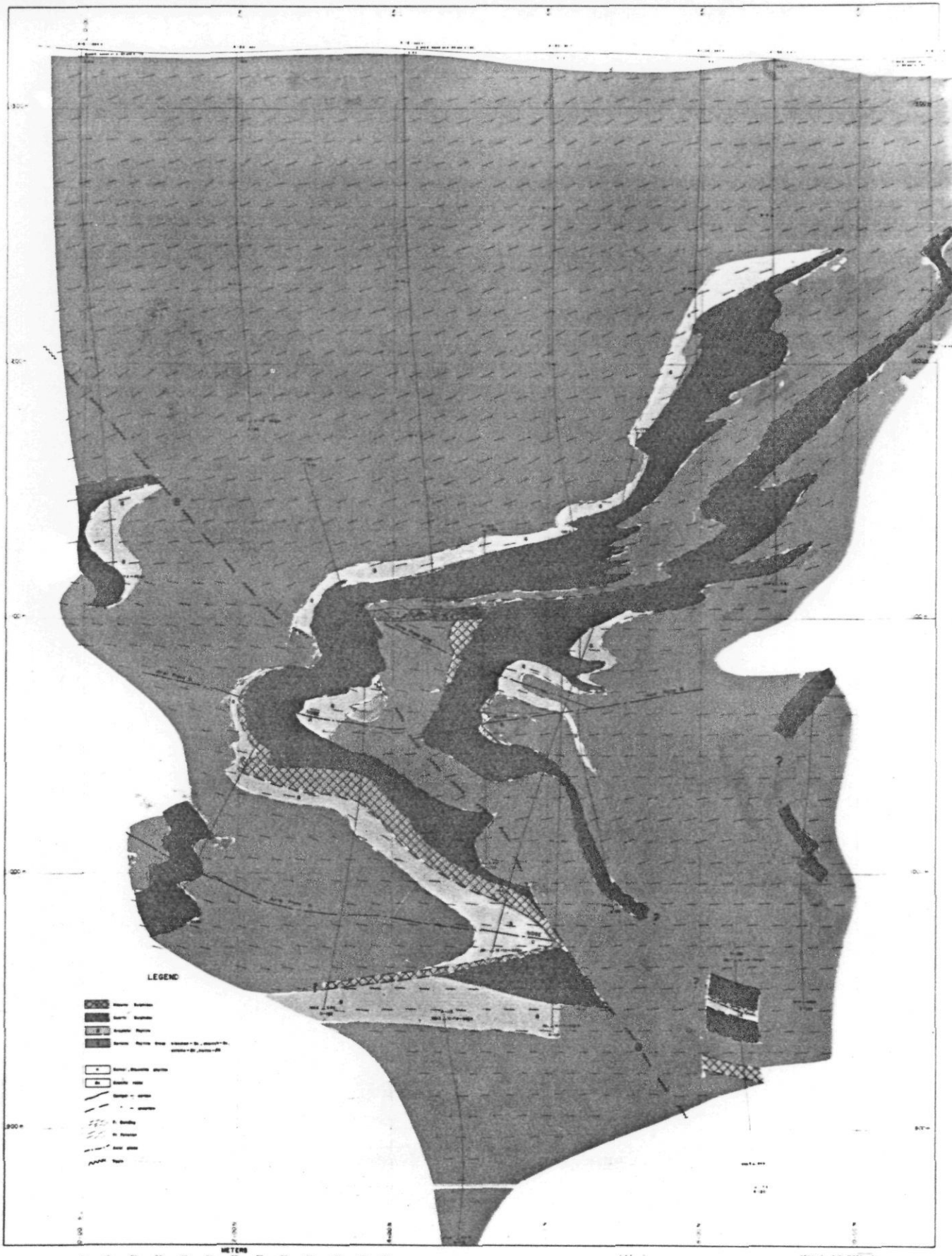
GEOLOGY
SECTION 76-W



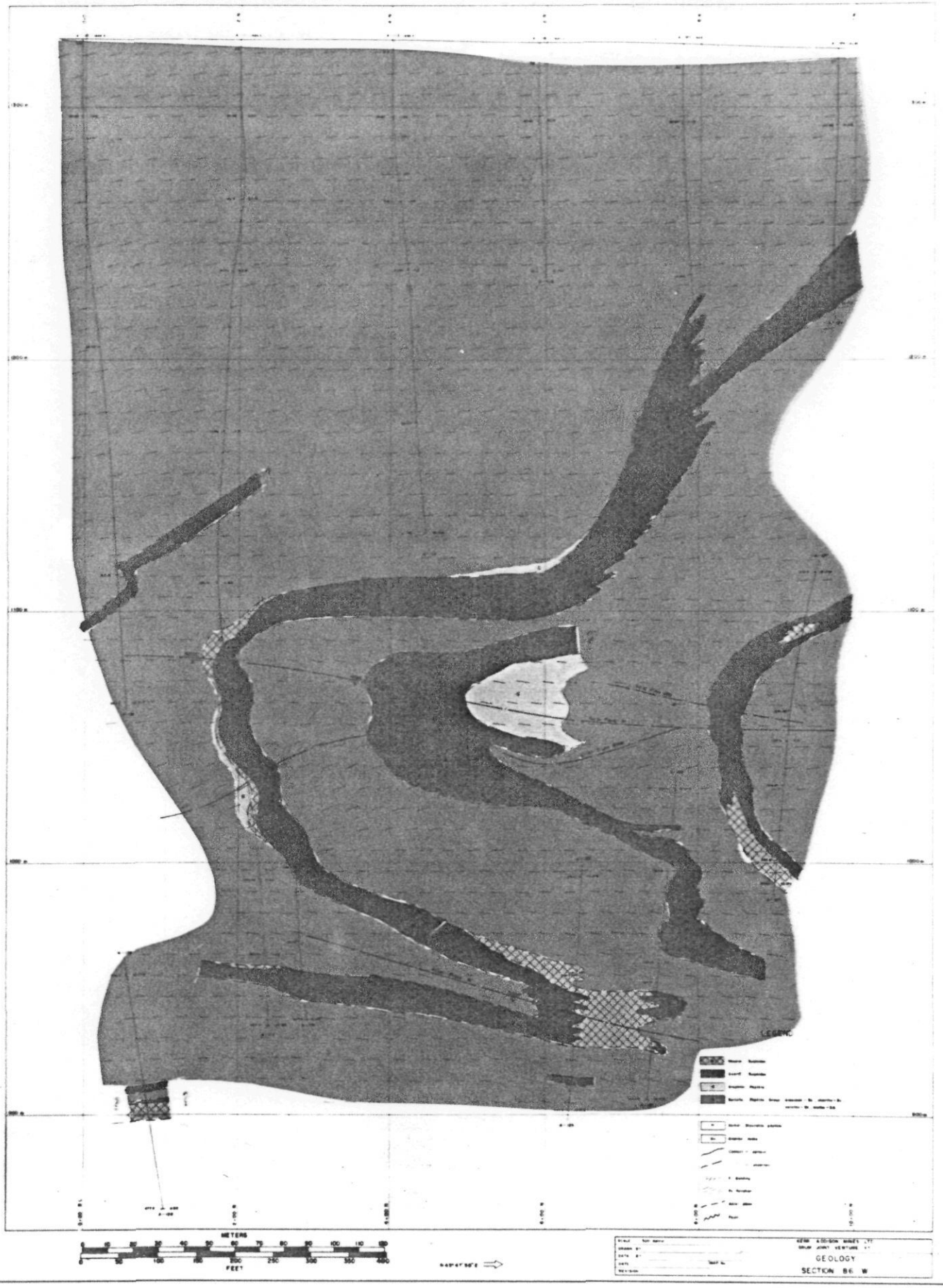
GEOLOGY
SECTION 7BW

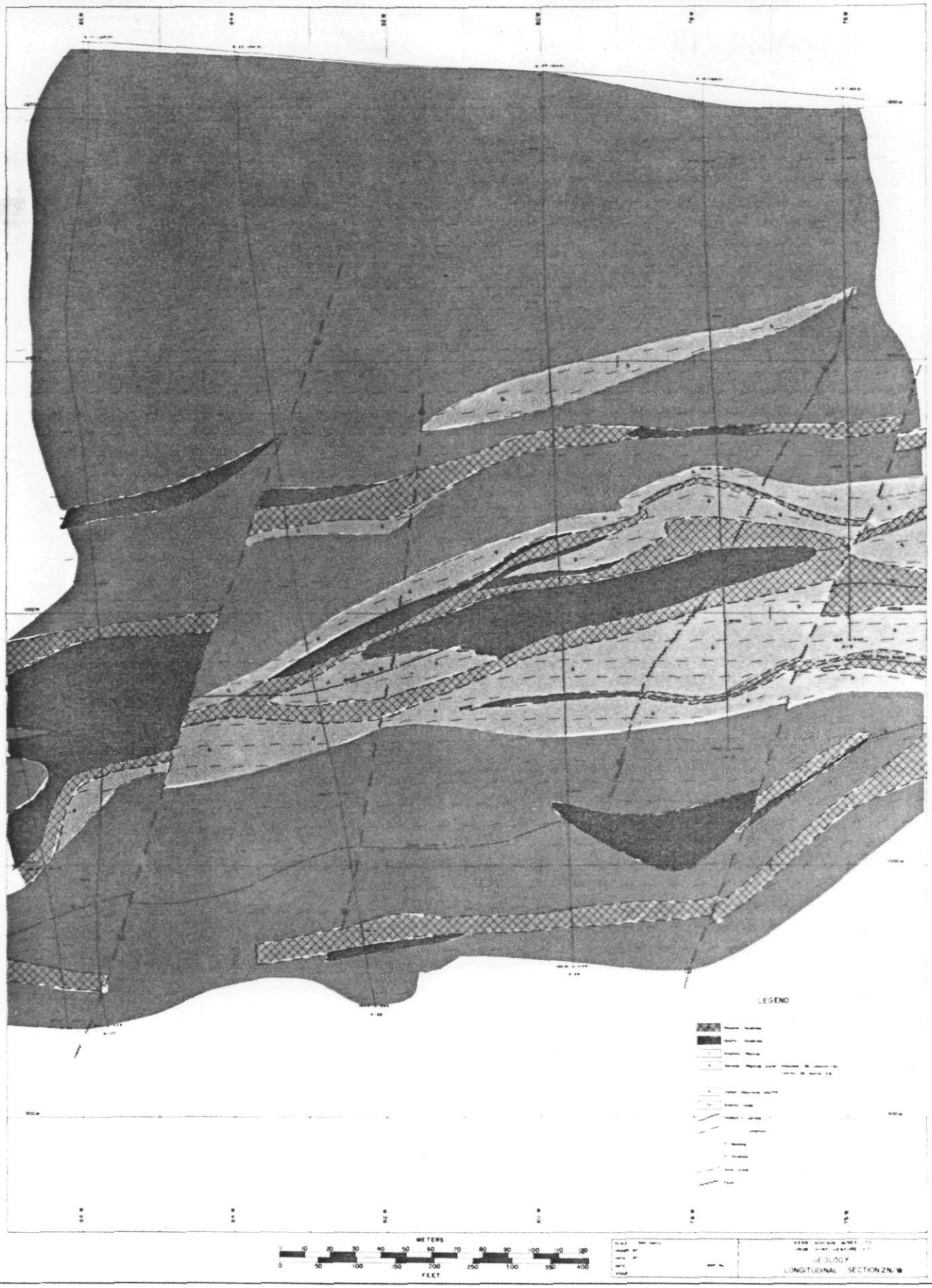

12
9
LEGEND
METERS
FEET
GEOLOGY
SECTION BOW


LEGEND
METERS
FEET
GEOLOGY
SECTION 82 W



GEOLOGY
SECTION B-4 W


LEGEND
METERS
FEET
GEOLOGY
SECTION B6 W


LEGEND
METERS
FEET
GEOLOGY
LONGITUDINAL SECTION ZN/W

GEOLOGICAL

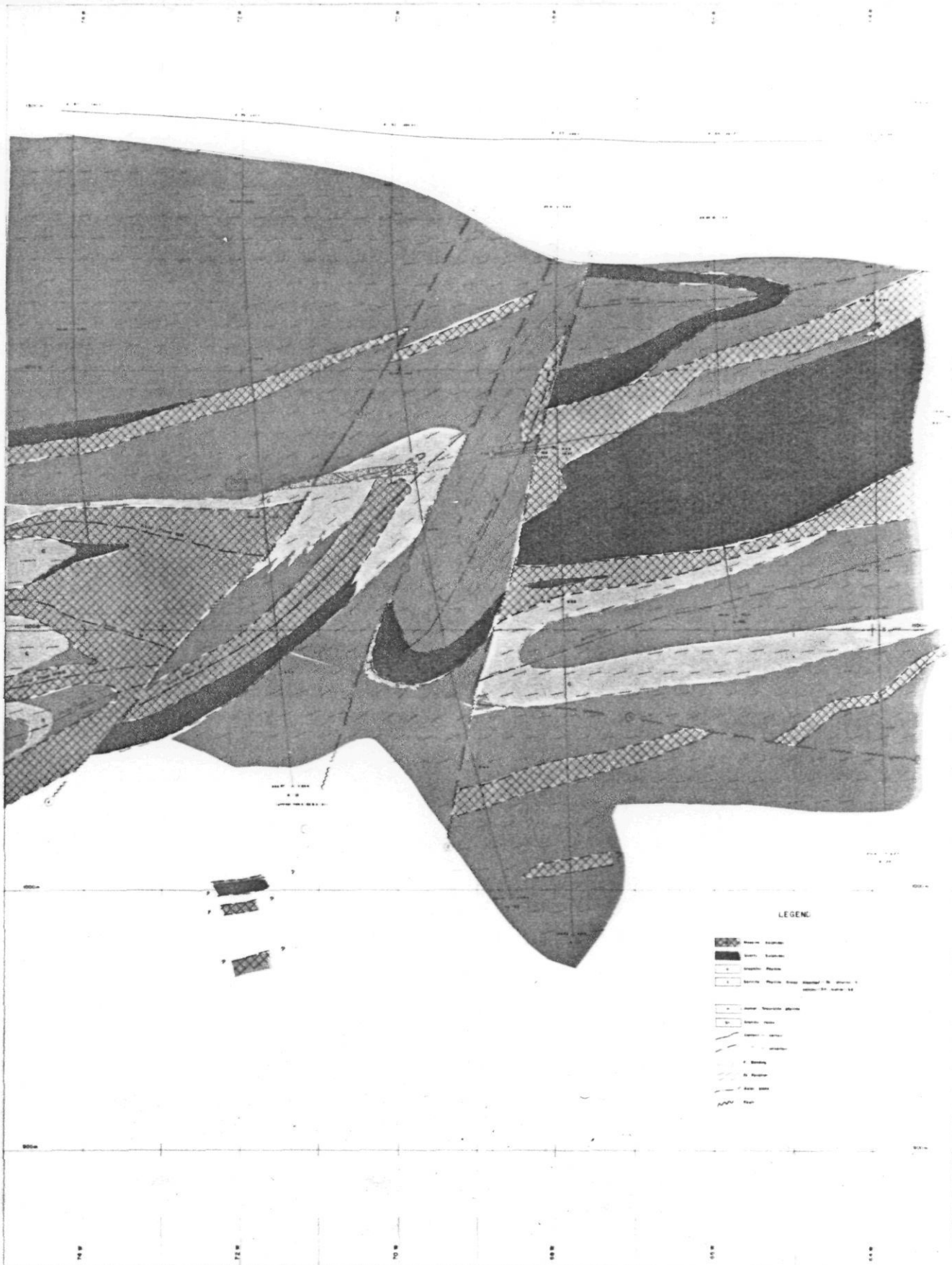
LONGITUDINAL SECTIONS

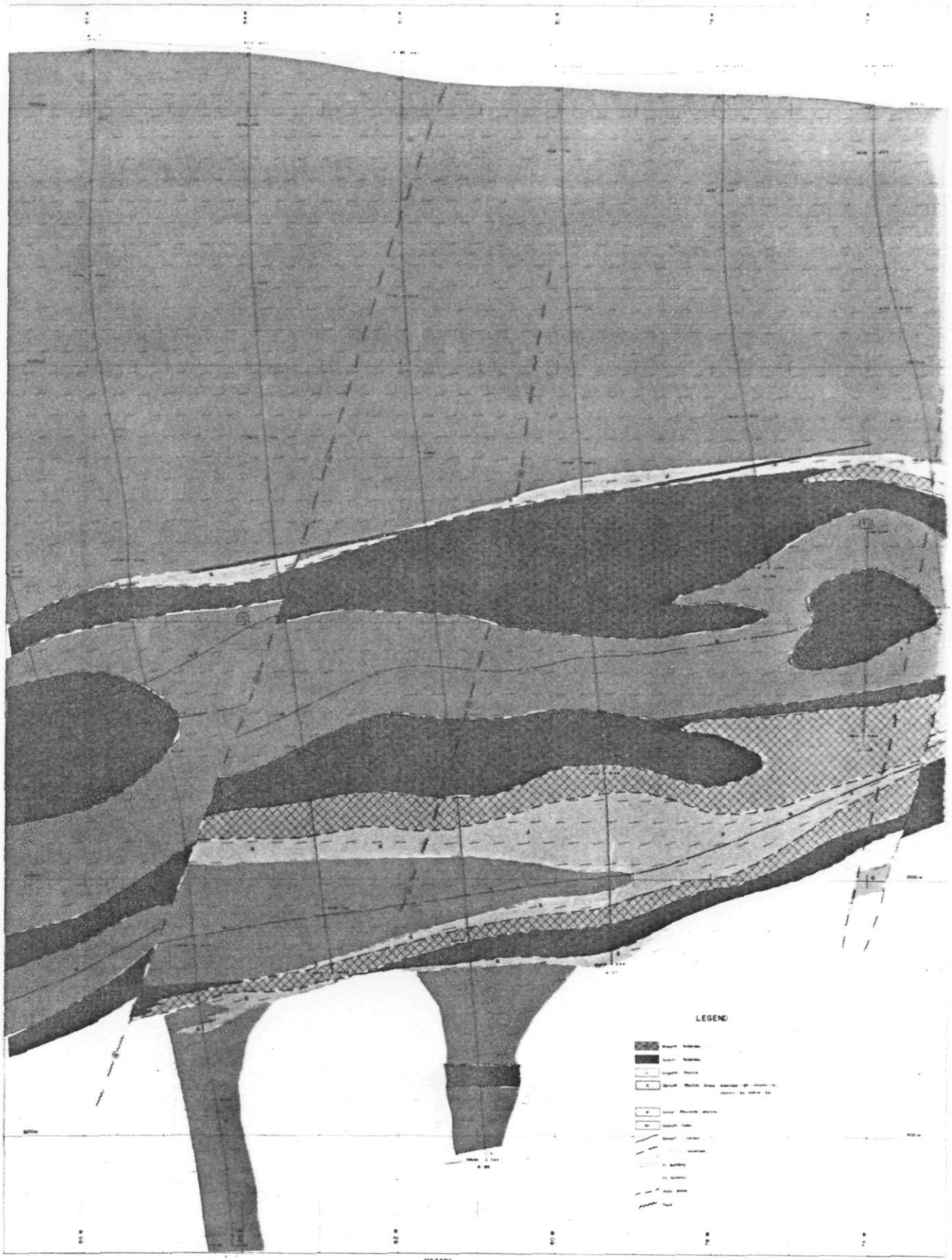
2 N/W, 2 N/E, 4 N/W, 4 N/E, 6 N/W, 6 N/E

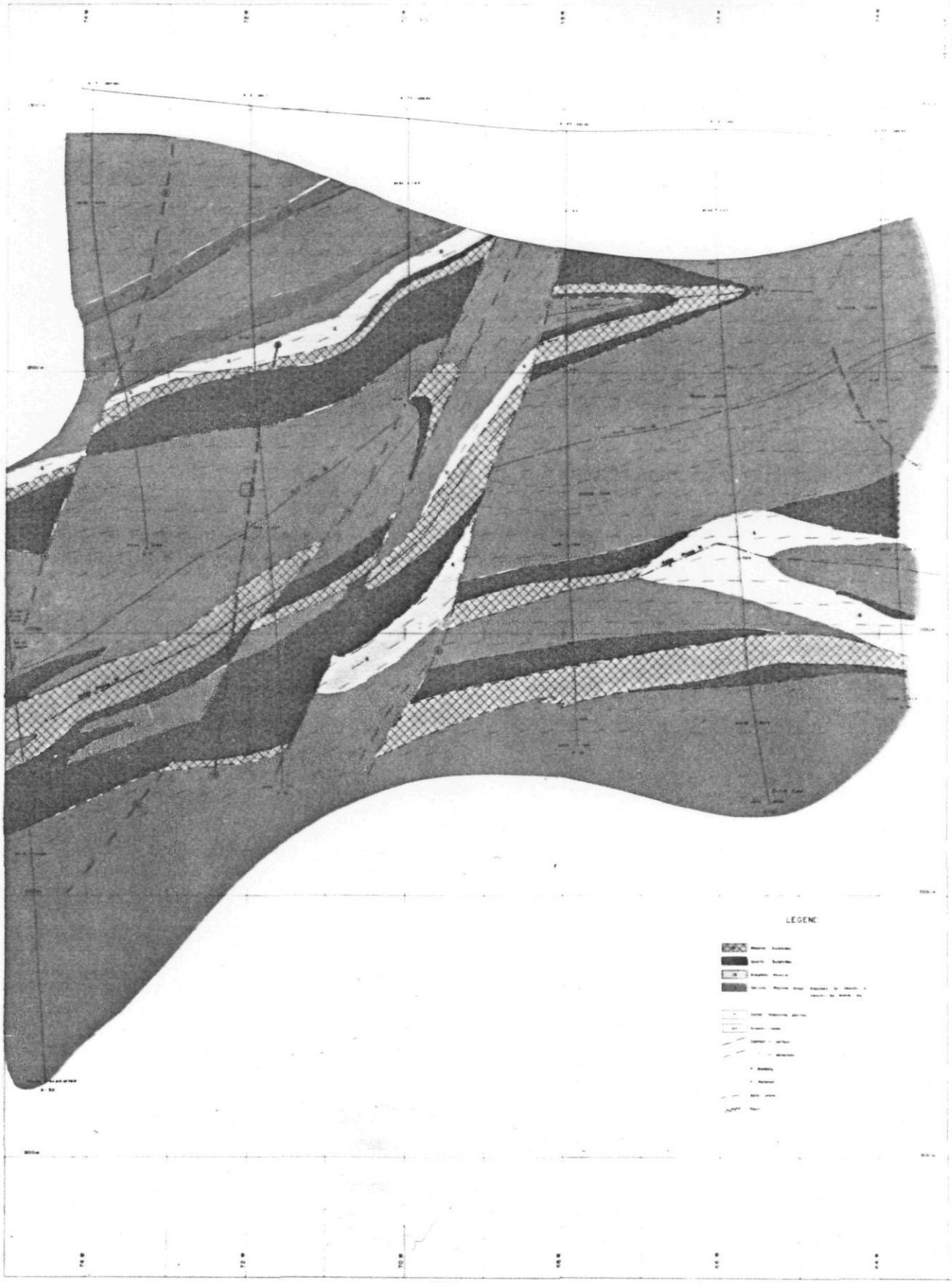
AND

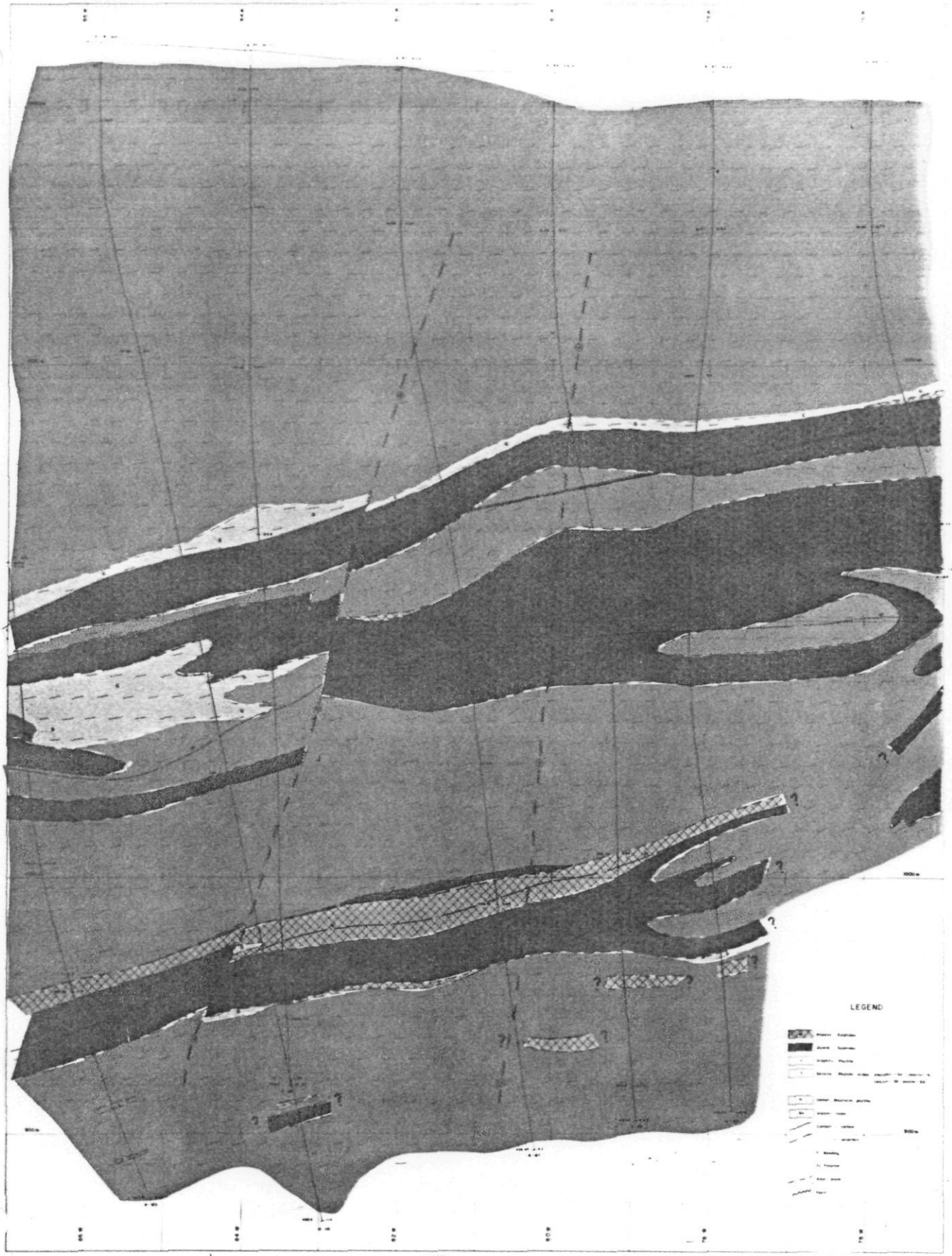
GEOLOGICAL PLANS

1100 W, 1100 E, 1200 W, 1200 E


LEGEND
METERS
0 10 20 30 40 50 60 70 80 90 100 110 120
0 50 100 150 200 250 300 350 400
FEET
GEOLOGY
LONGITUDINAL SECTION ON E

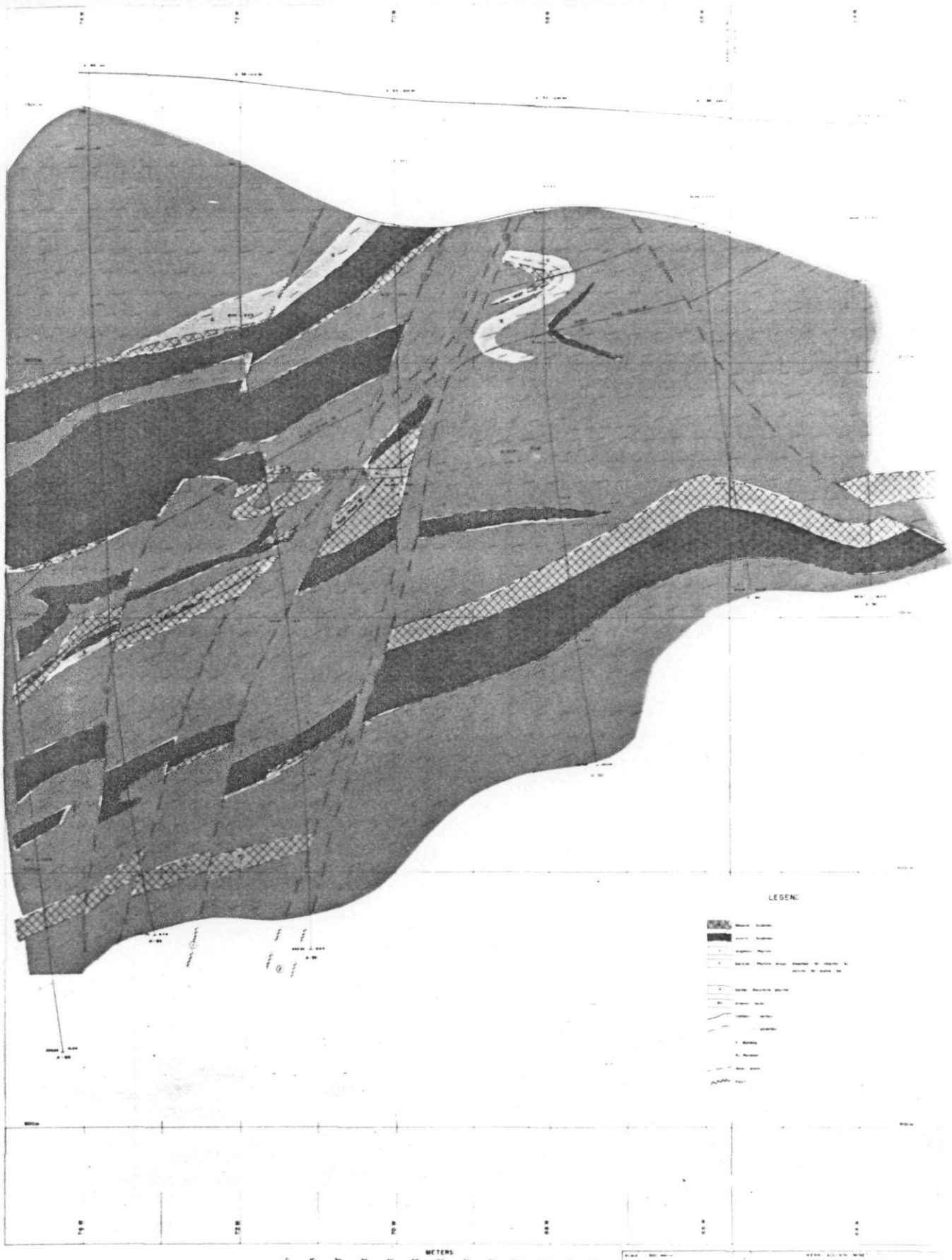

LEGEND
METERS
FEET


LEGEND
METERS
FEET
GEOLOGY
LONGITUDINAL SECTION A-A'



METERS
0 10 20 30 40 50 60 70 80 90 100 110 120
0 50 100 150 200 250 300 350 400
FEET

GEOLOGY
LONGITUDINAL SECTION 6N/W


LEGEND
METERS
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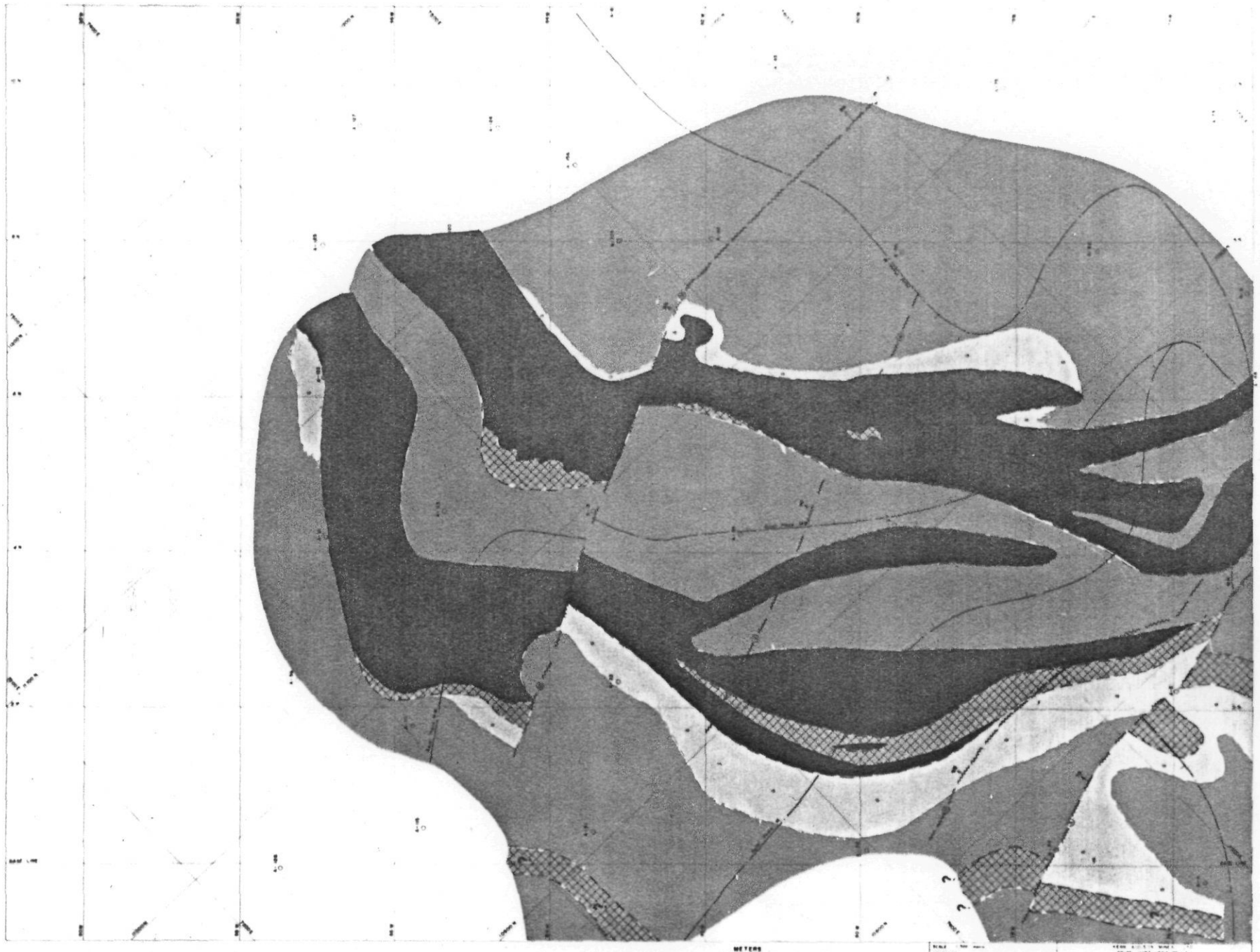
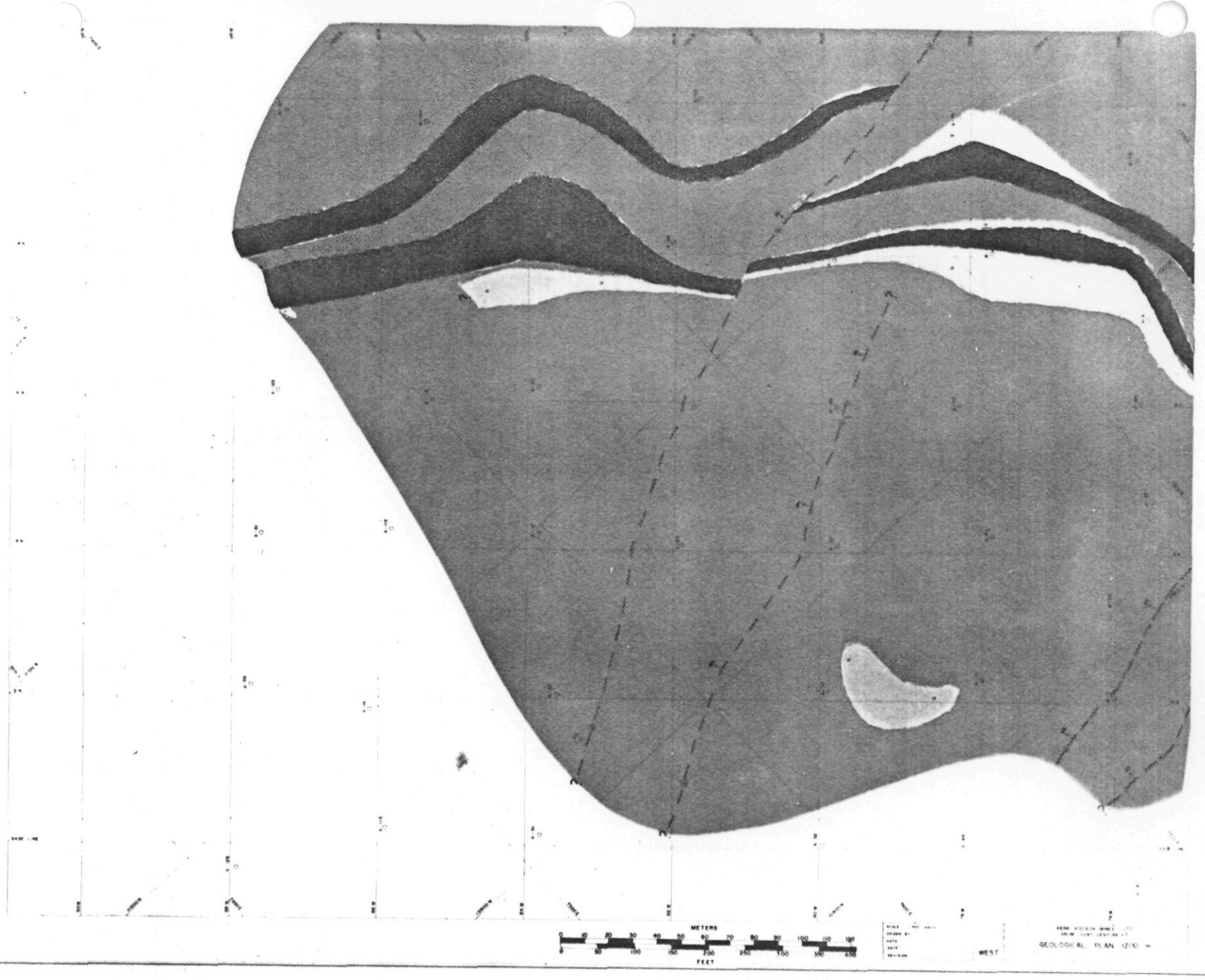
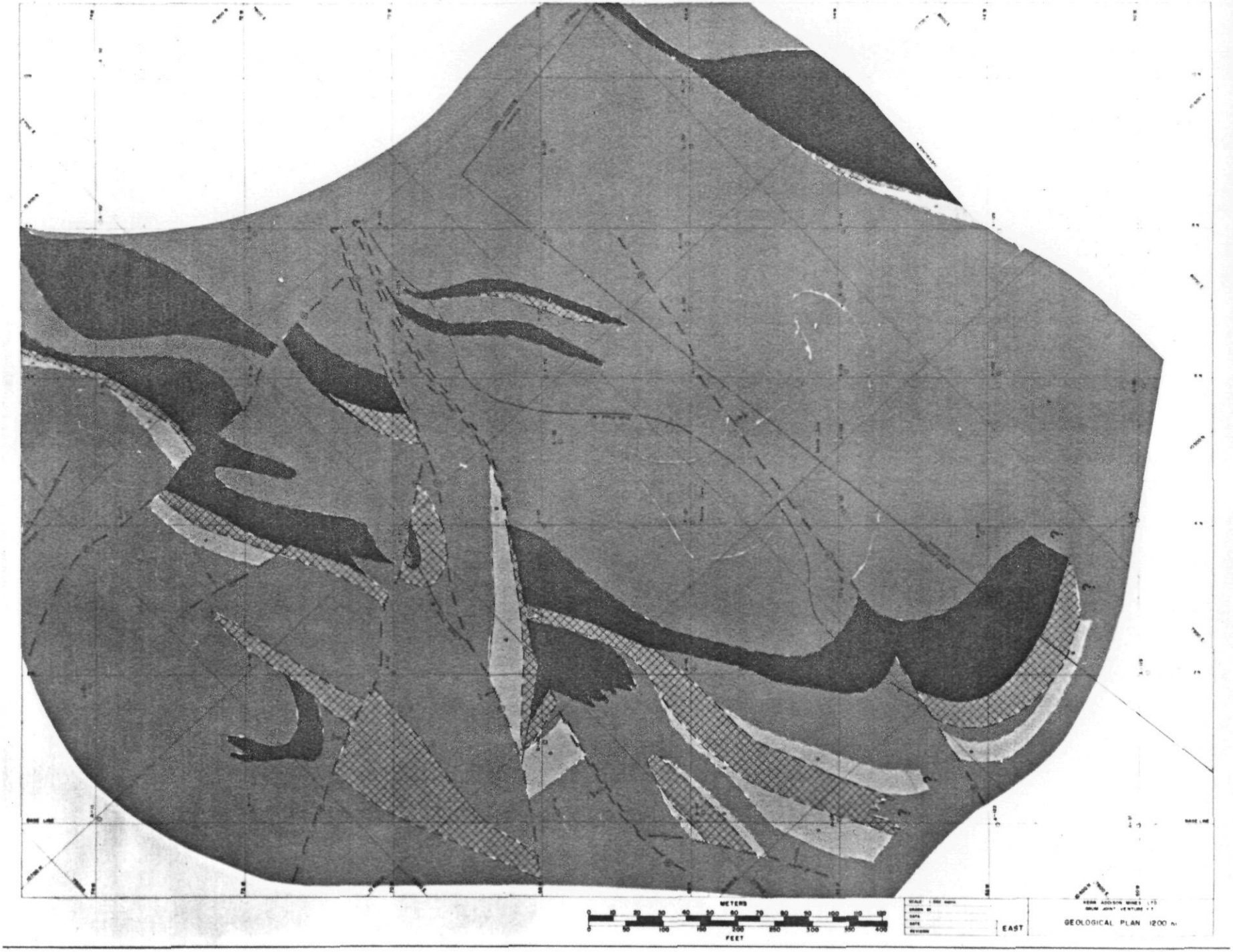
0 50 100 150 200 250 300 350 400
FEET


METERS
FEET
WEST
GEOLOGICAL PLAN 1100 m

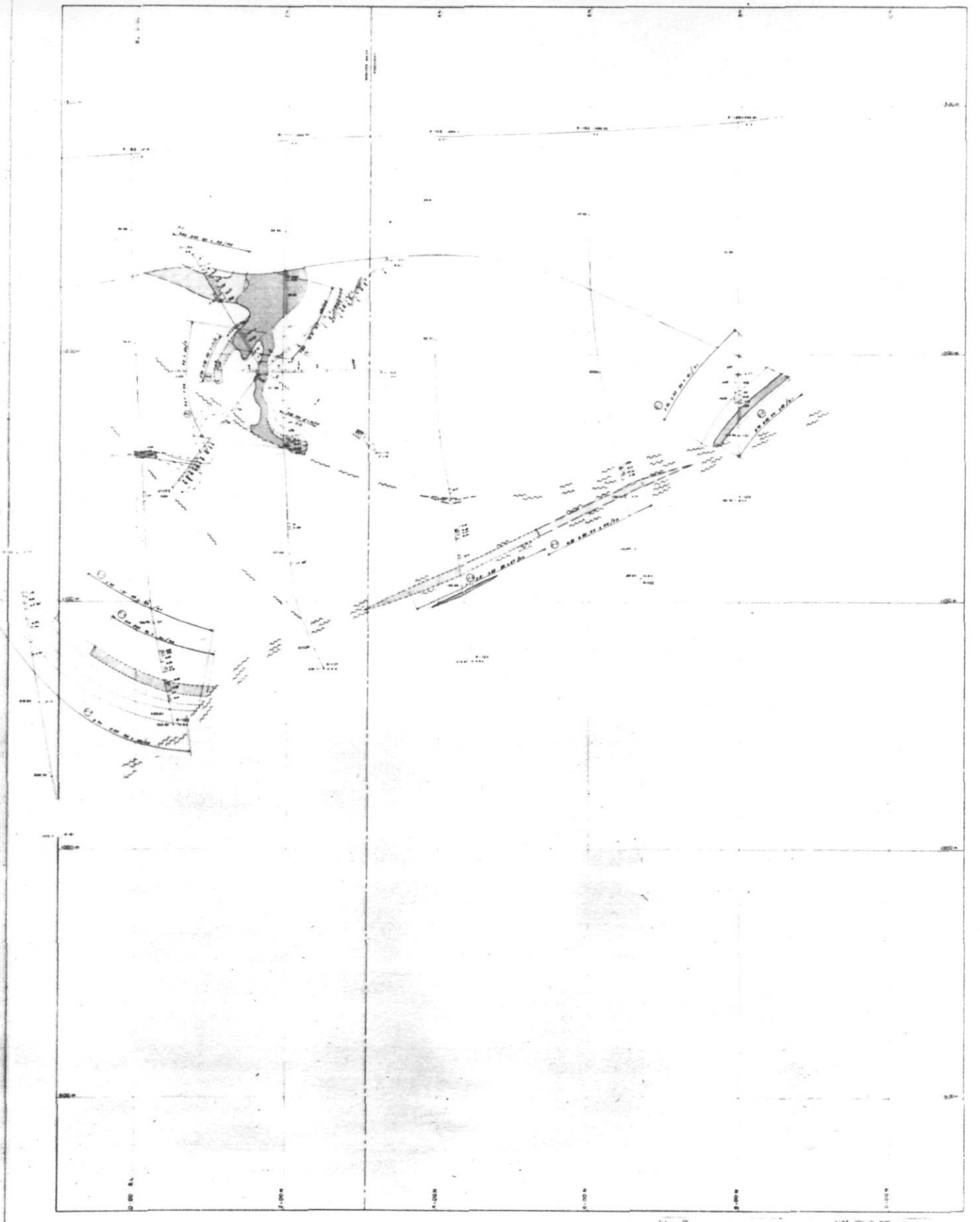

METERS
FEET
EAST
GEOLOGICAL PLAN 1100 m


METERS
FEET
WEST

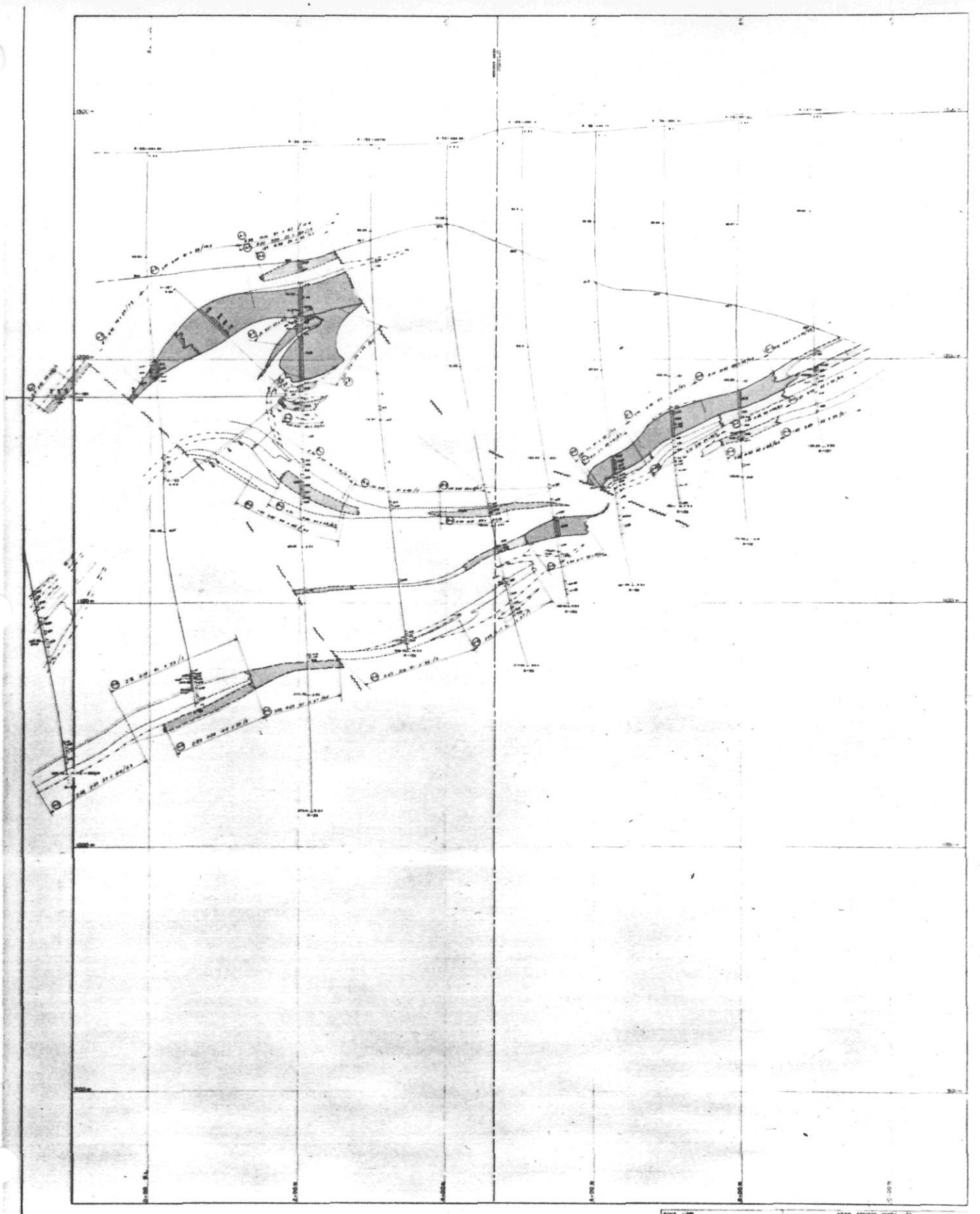

METERS
FEET
EAST
GEOLOGICAL PLAN 1200 n

ASSAYS AND MINERAL RESERVE OUTLINE

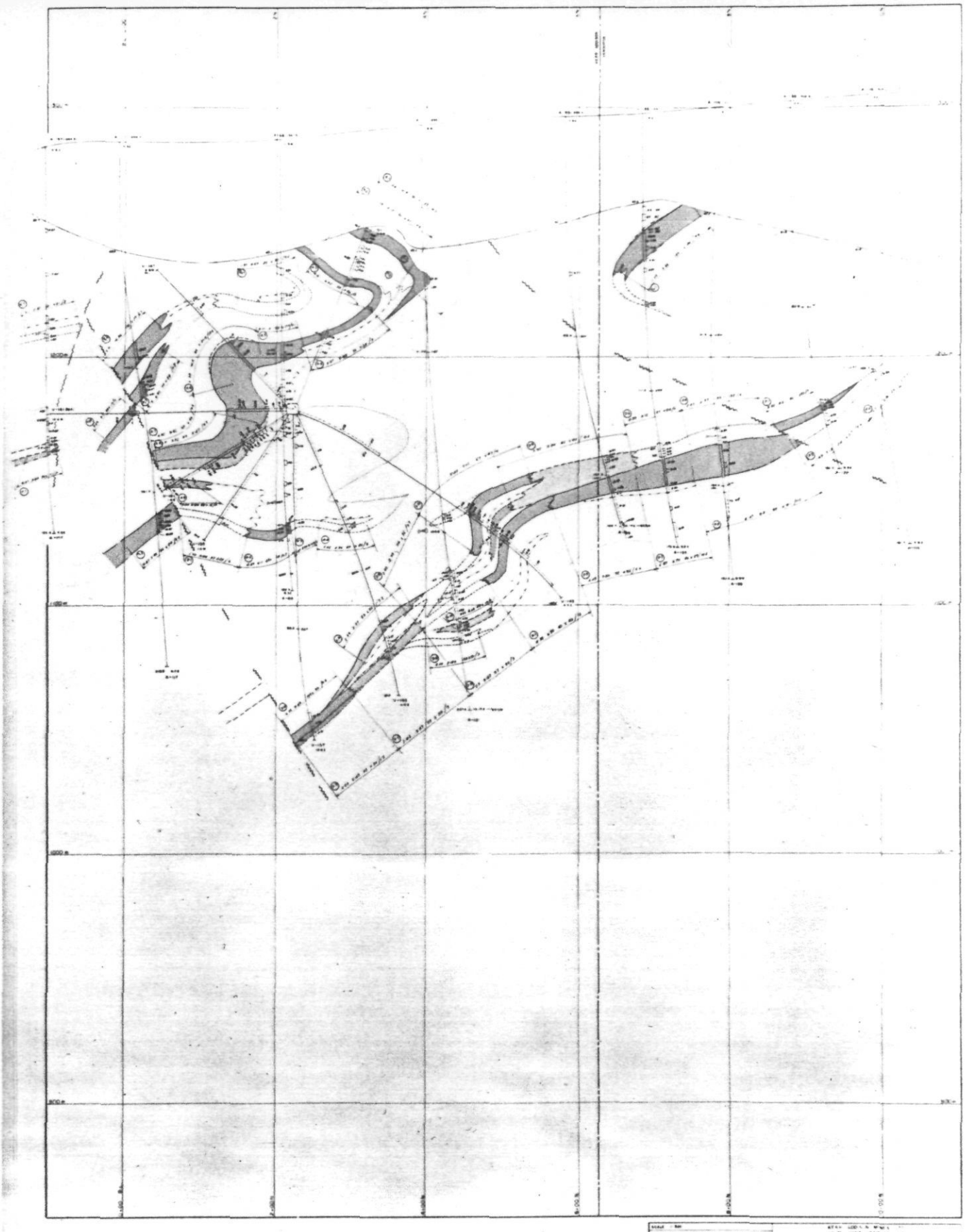
CROSS SECTIONS 62W TO 86W



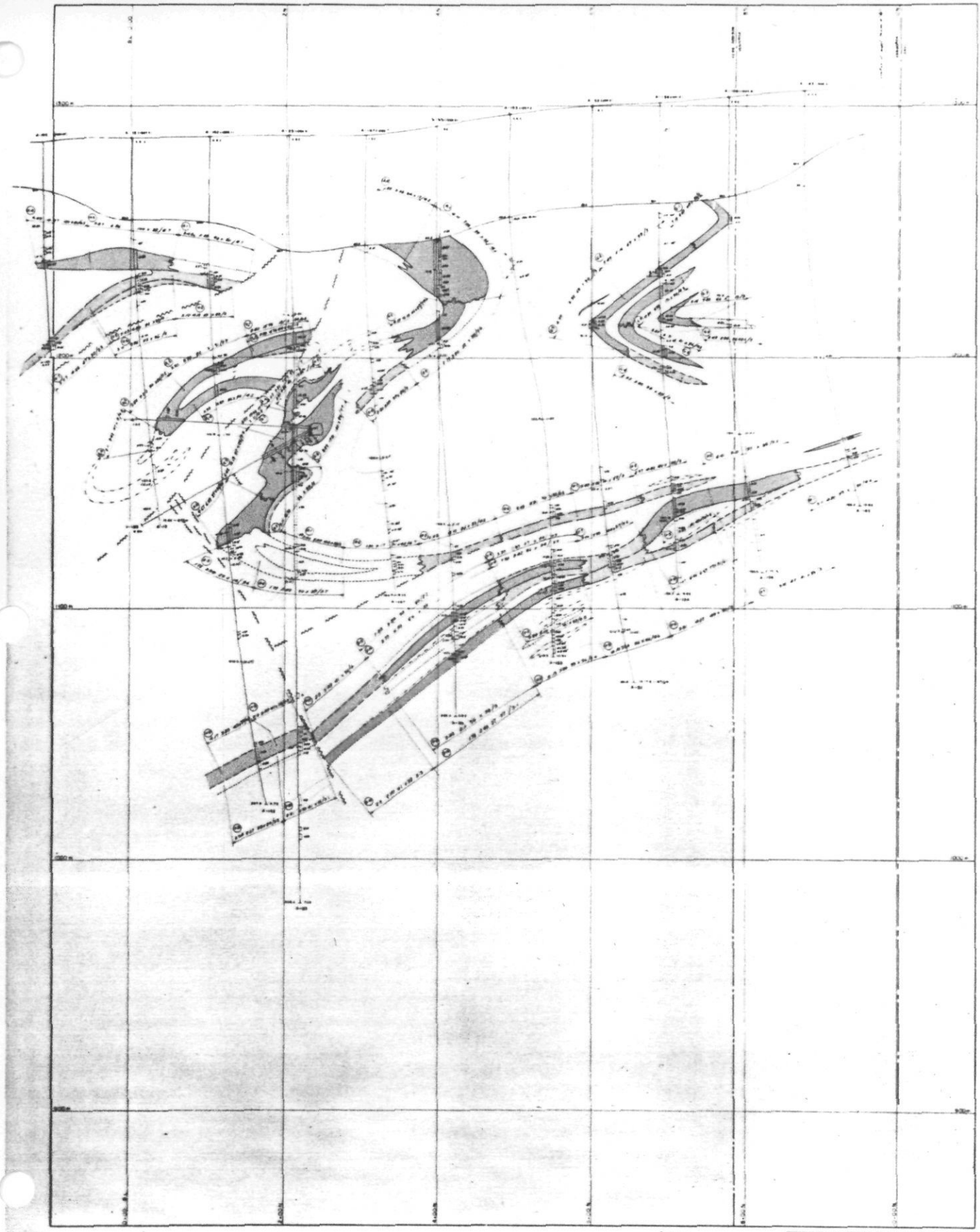
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 62 W



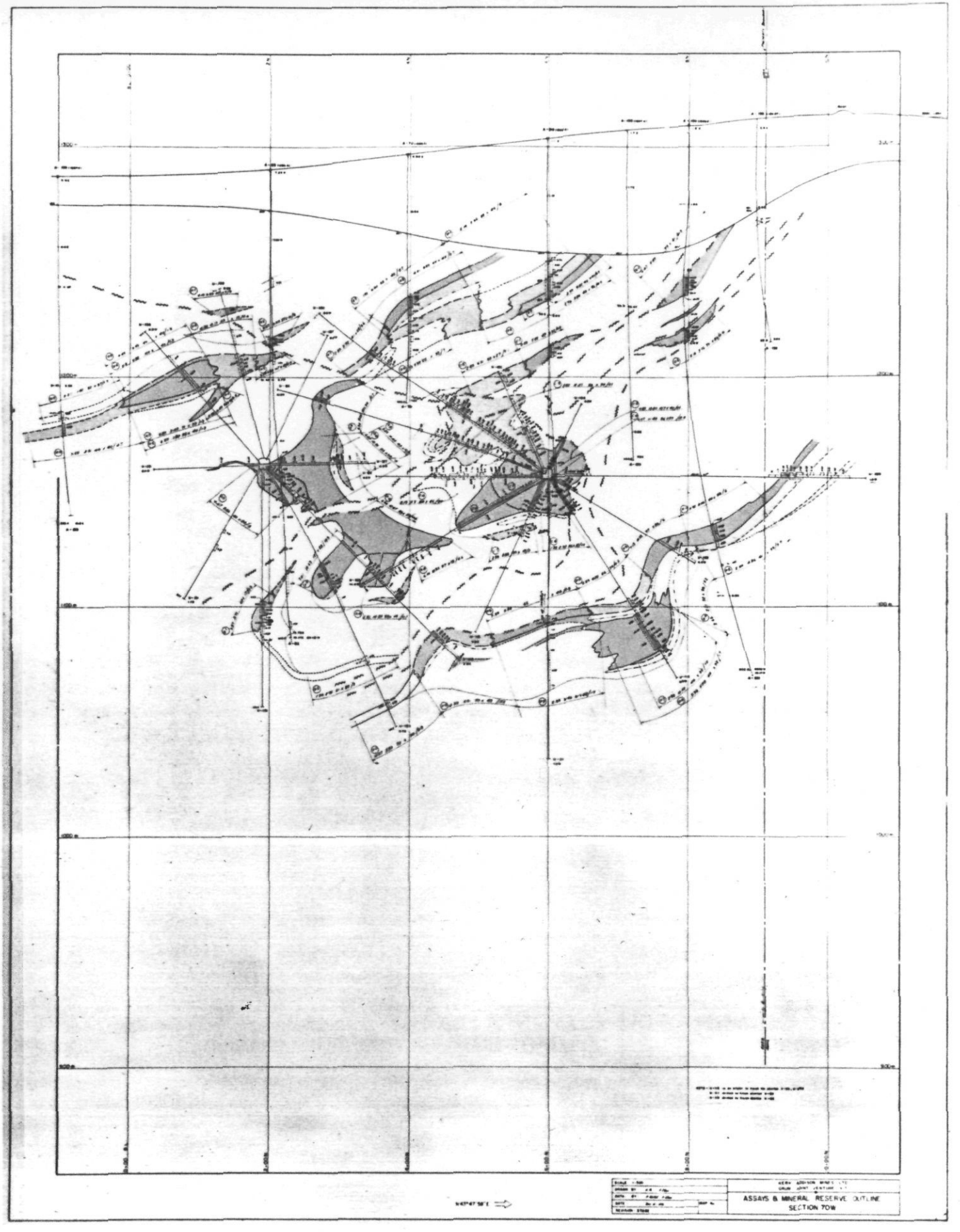
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 64 W



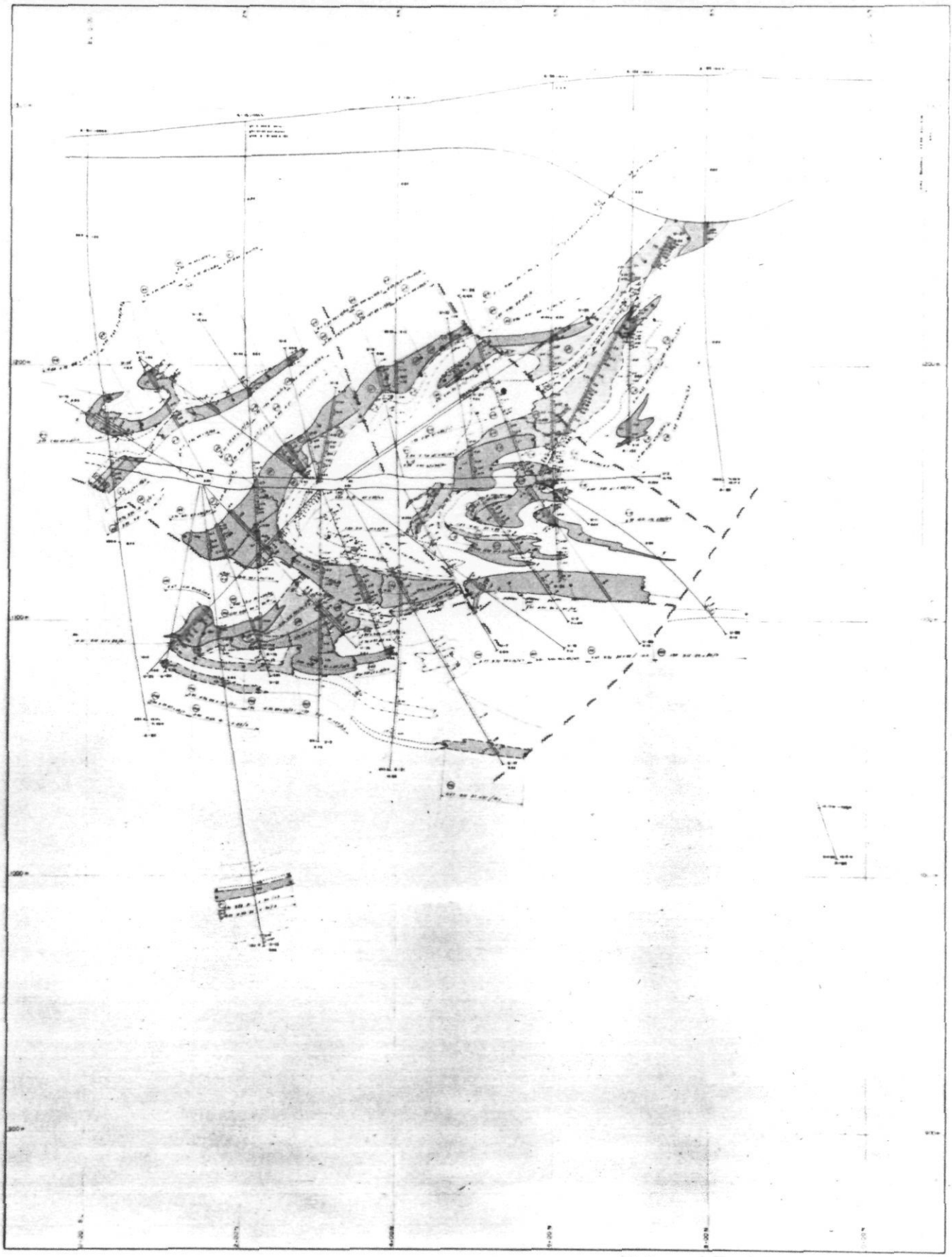
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 66 W



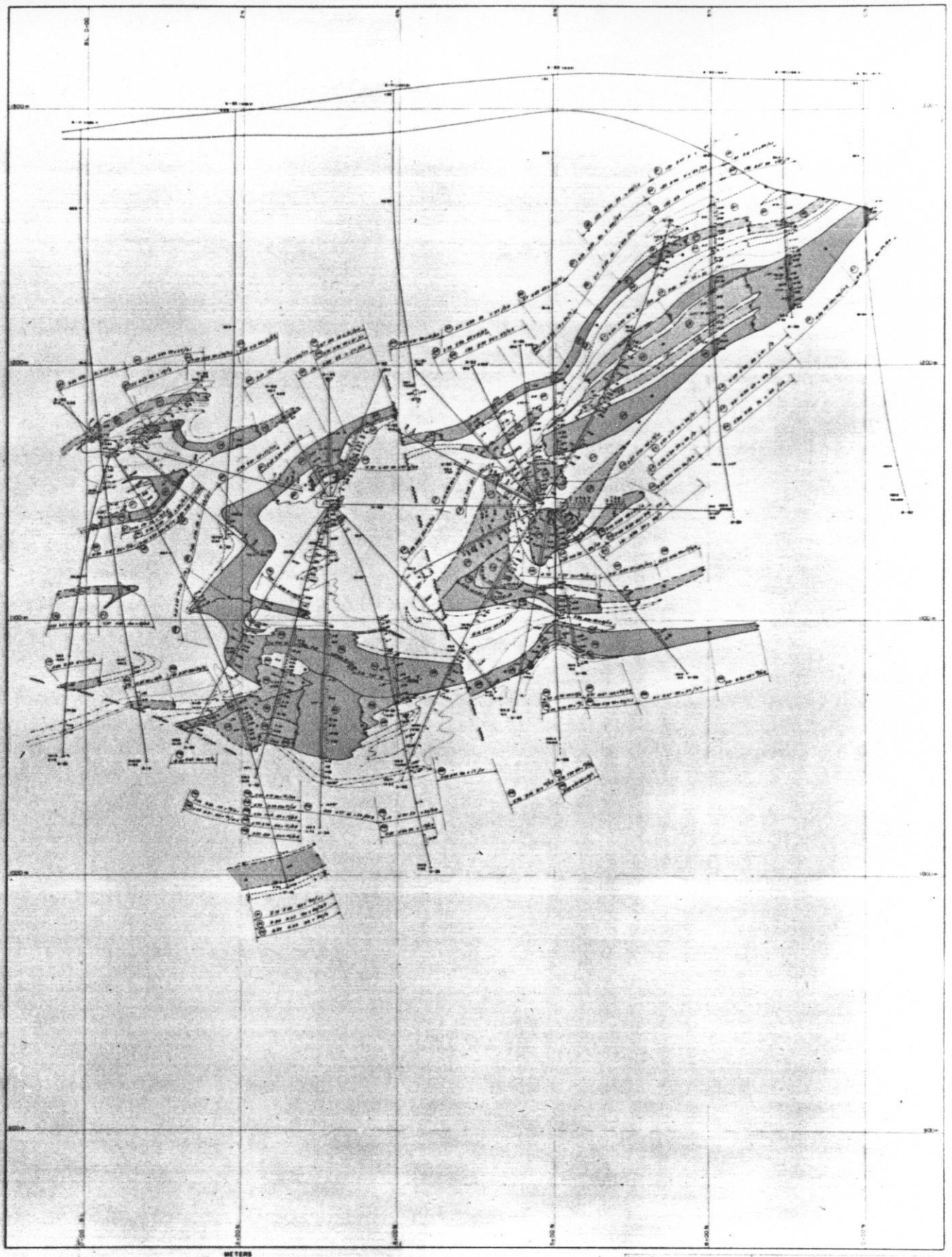
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 68 W



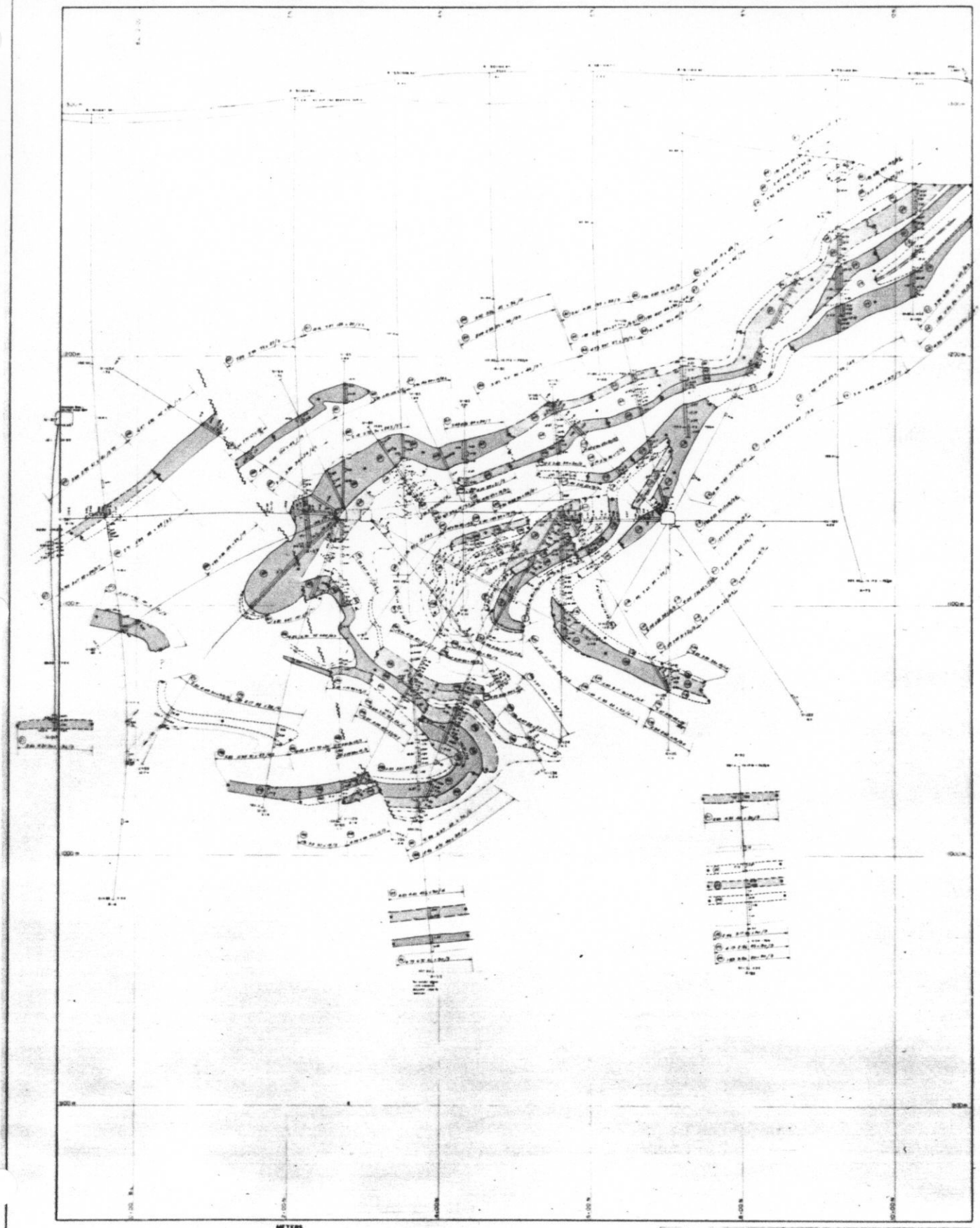
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 70W



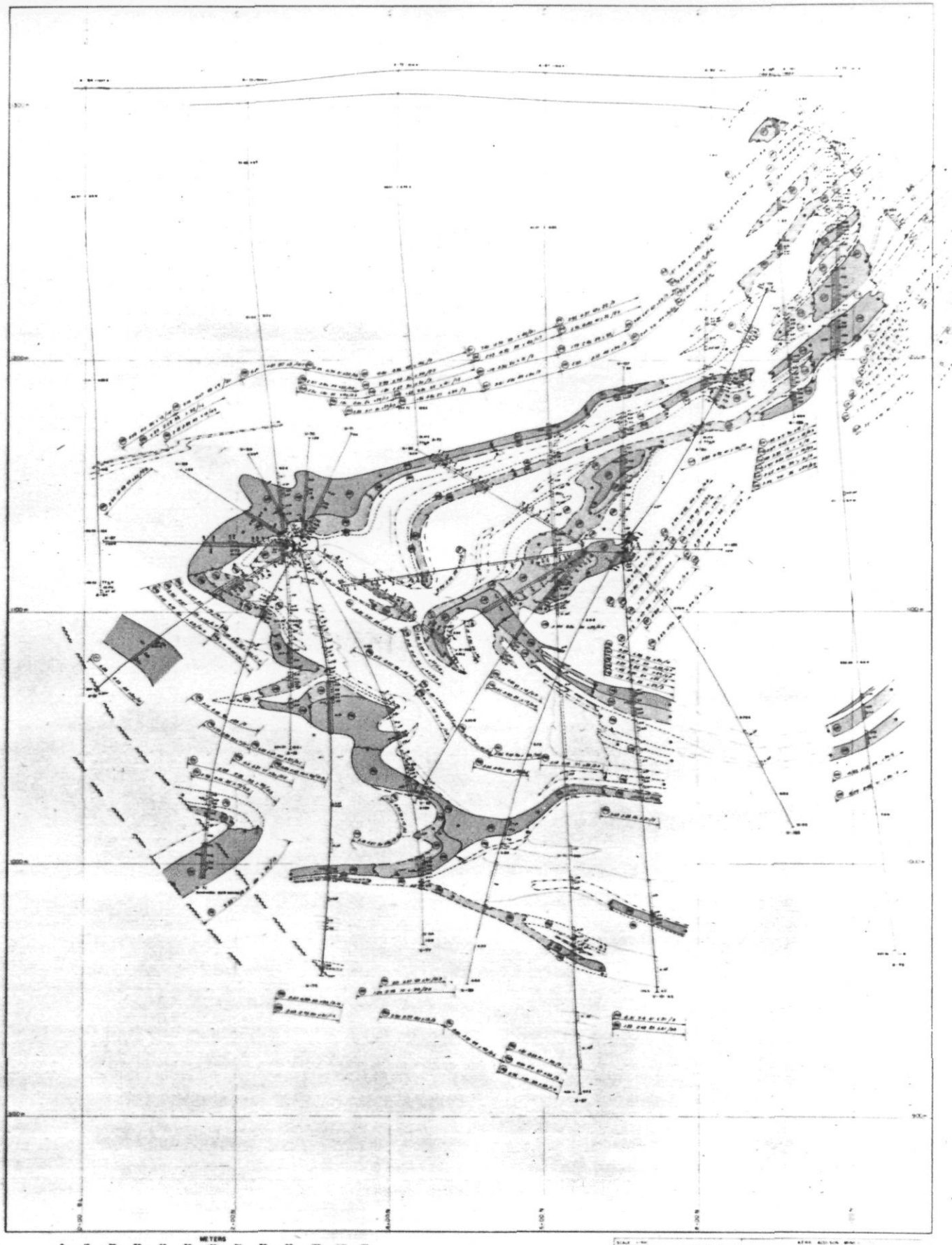
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 72W



ASSAYS & MINERAL RESERVE OUTLINE
SECTION 74 W



ASSAYS & MINERAL RESERVE OUTLINE
SECTION 76 W

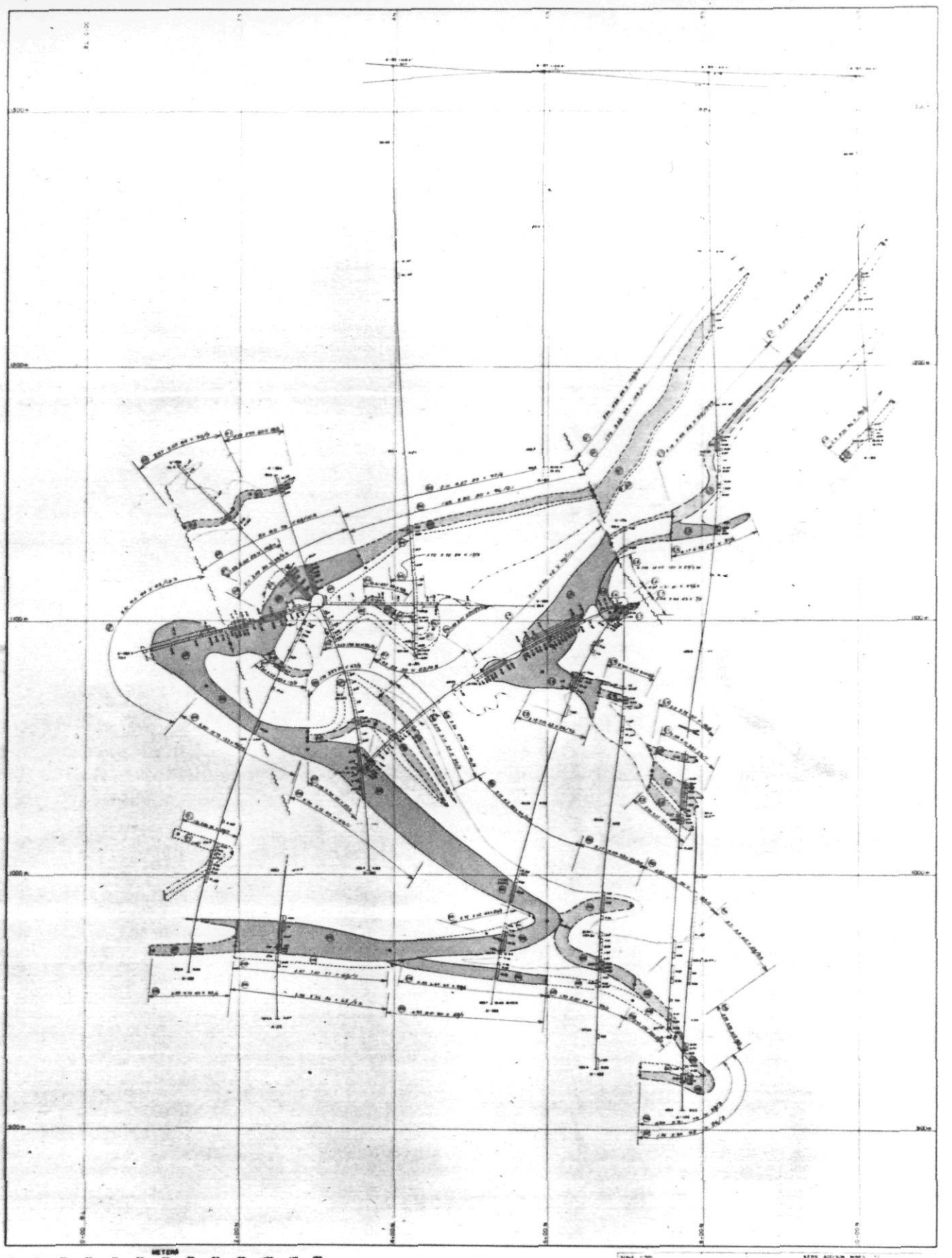


METERS 0 10 20 30 40 50 60 70 80 90 100 110 120

FEET 0 50 100 150 200 250 300 350 400

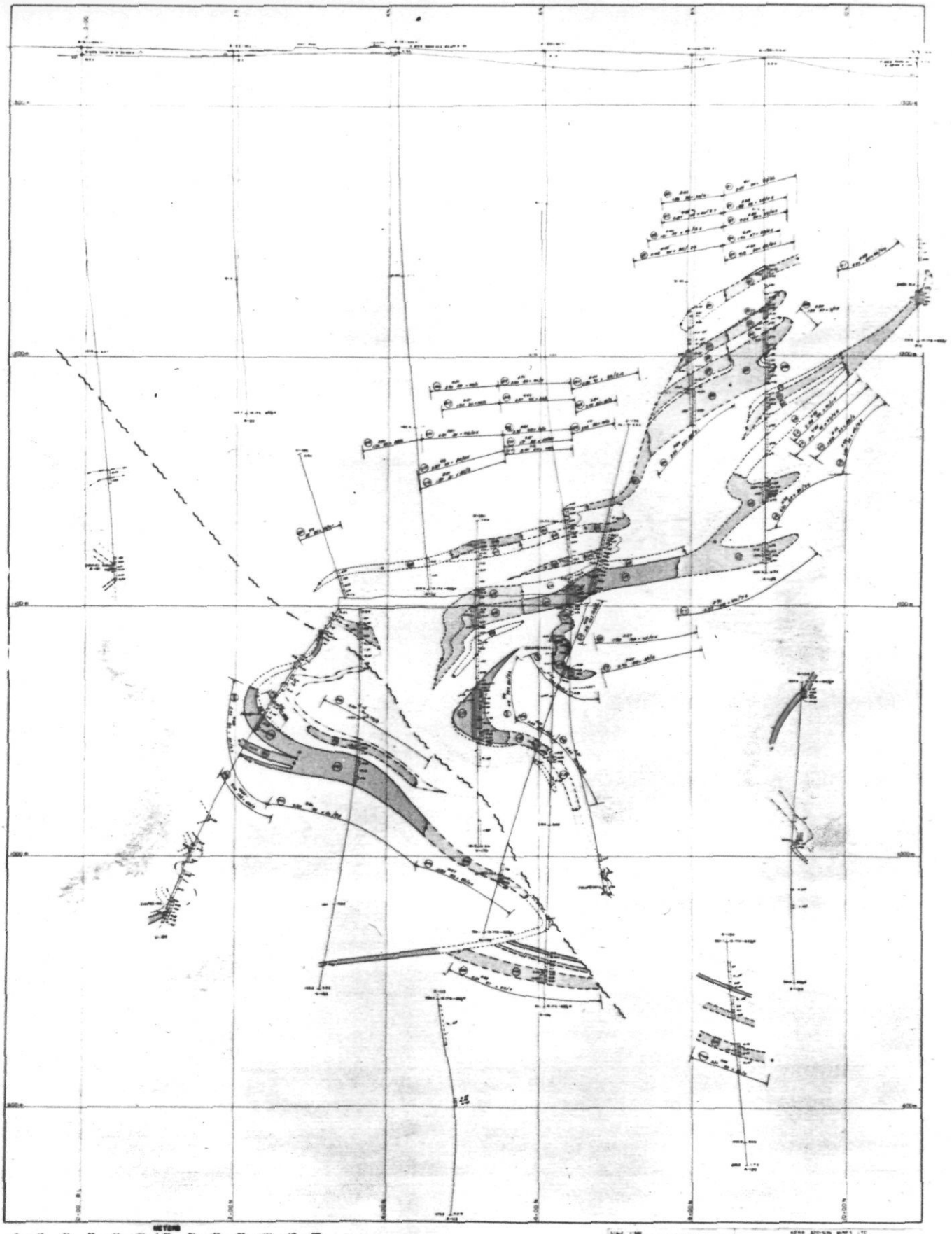
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 78 W

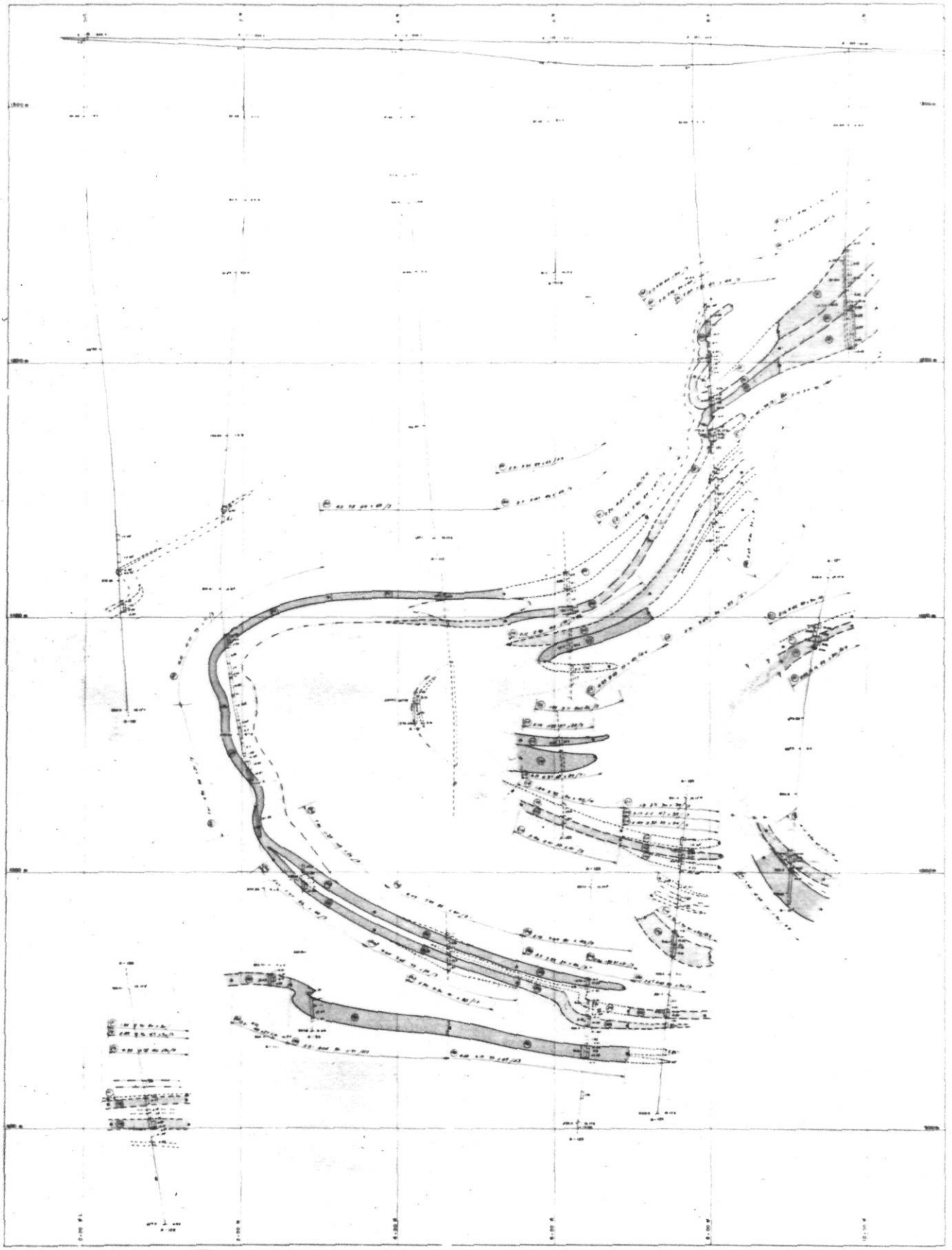

METERS
FEET
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 80W



METERS
0 10 20 30 40 50 60 70 80 90 100 110 120
FEET
0 50 100 150 200 250 300 350 400

ASSAYS & MINERAL RESERVE OUTLINE
SECTION 62 W


METERS
FEET
ASSAYS & MINERAL RESERVE OUTLINE
SECTION 84 W

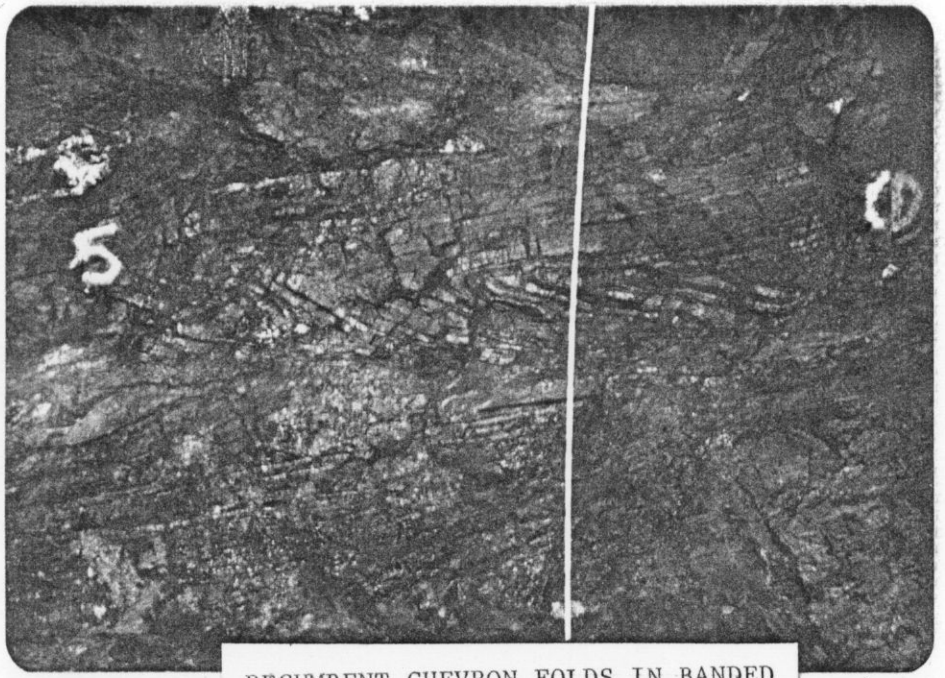


METERS

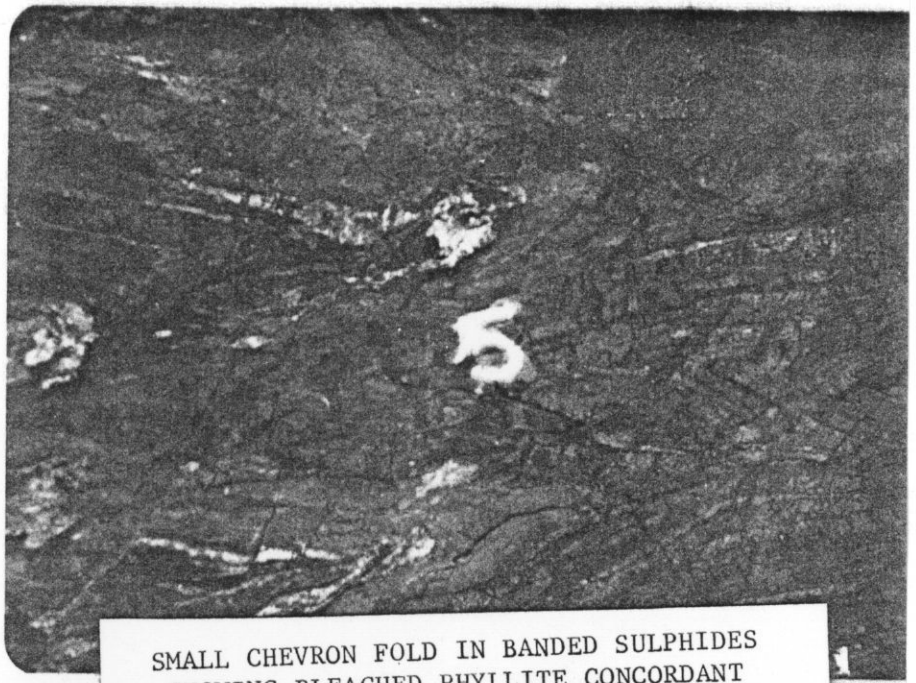
FEET

ASSAYS & MINERAL RESERVE OUTLINE

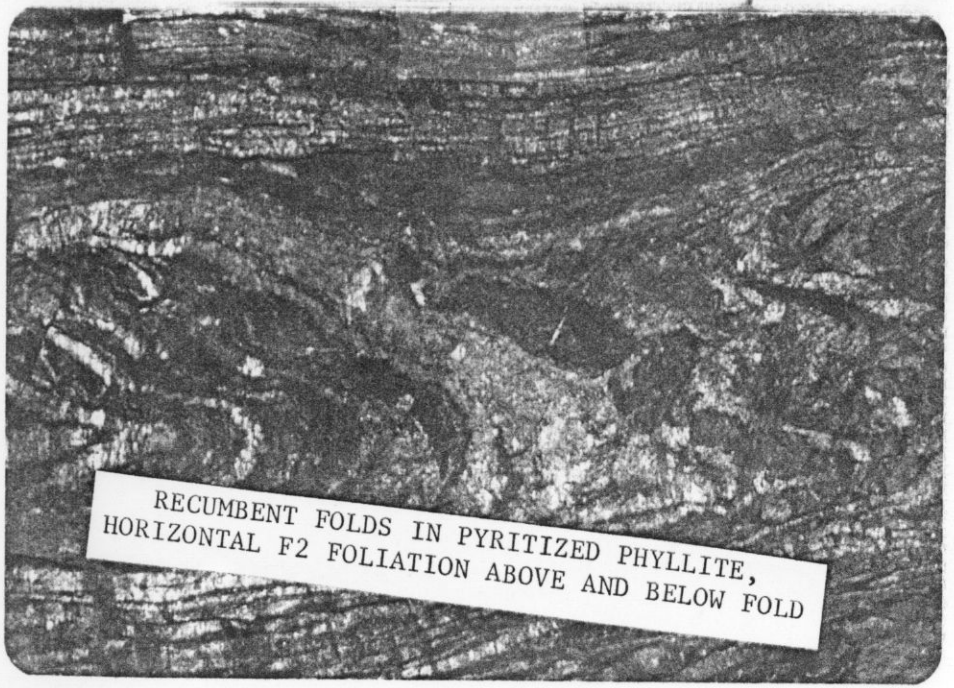
SECTION 84 W



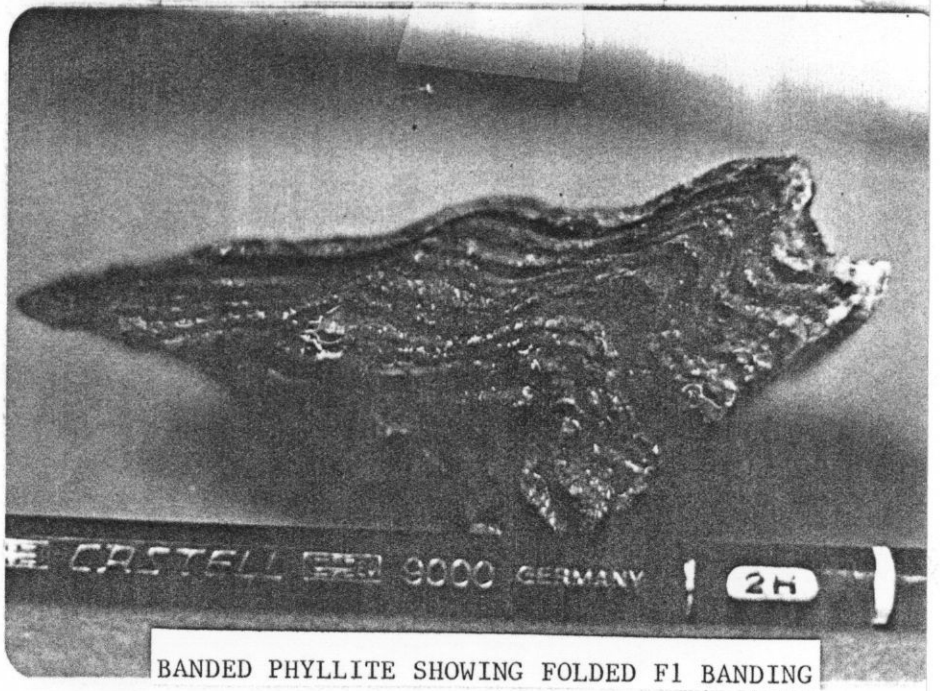
RECUMBENT CHEVRON FOLDS IN BANDED SULPHIDE LAYERS



SMALL CHEVRON FOLD IN BANDED SULPHIDES SHOWING BLEACHED PHYLLITE CONCORDANT WITH FOLDING

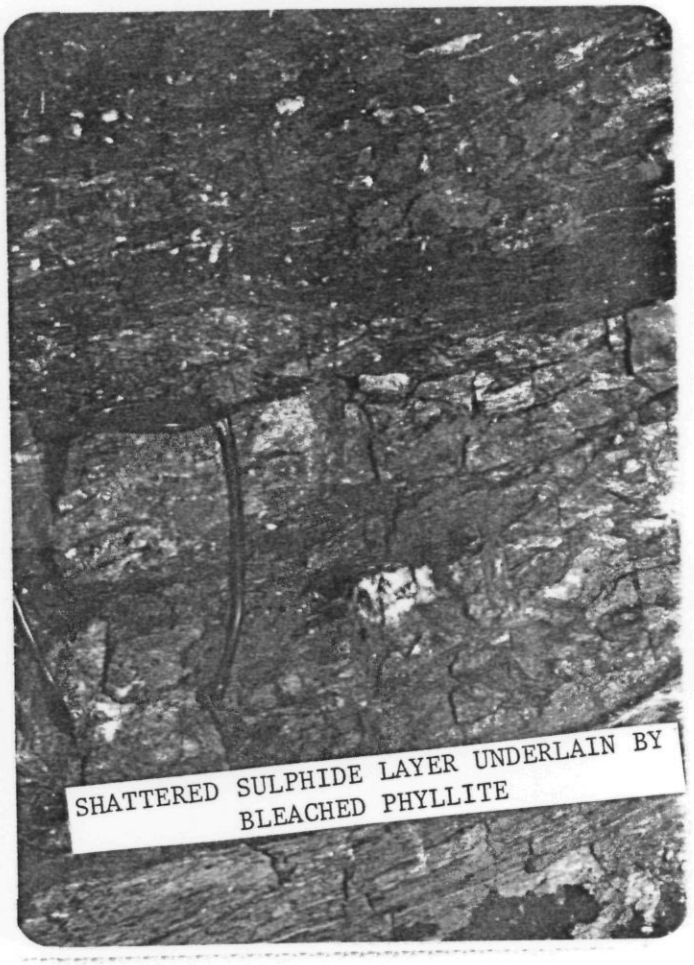


RECUMBENT FOLDS IN PYRITIZED PHYLLITE, HORIZONTAL F2 FOLIATION ABOVE AND BELOW FOLD

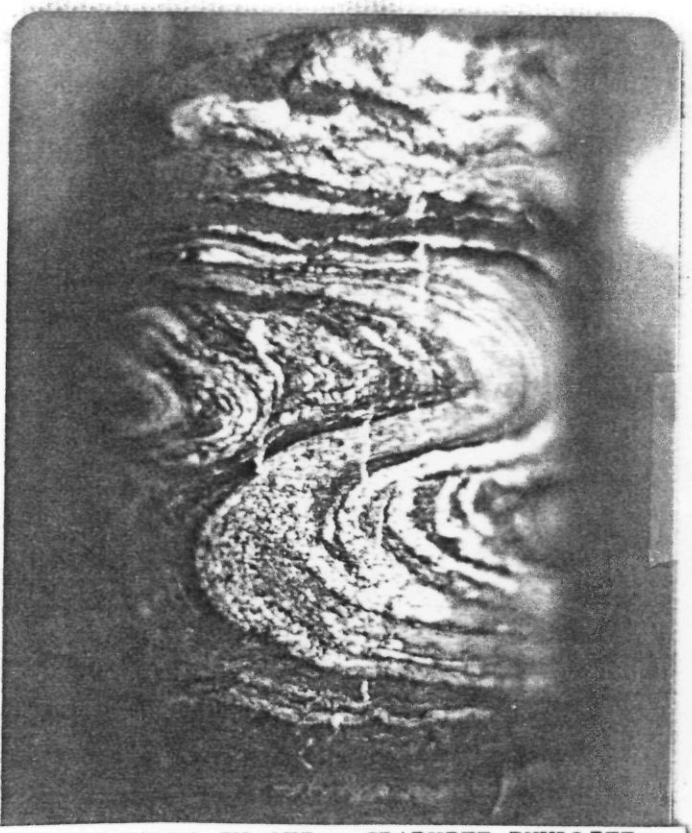


BANDED PHYLLITE SHOWING FOLDED F1 BANDING

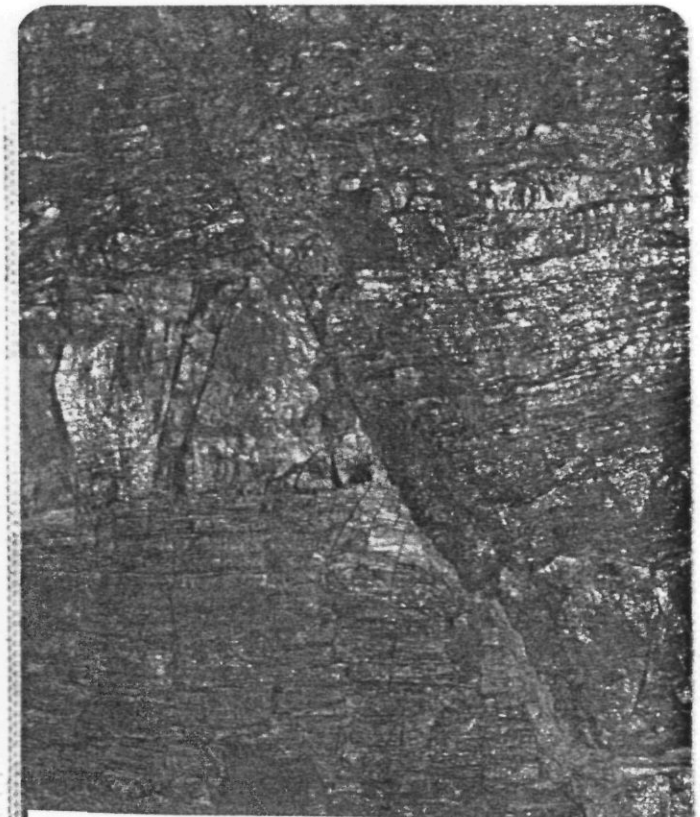
RECUMBENT FOLD IN BLACK GRAPHITIC PHYLLITE WITH FINE GRAINED MASSIVE SULPHIDE CORE



SHATTERED SULPHIDE LAYER UNDERLAIN BY BLEACHED PHYLLITE



RECUMBENT FOLDS IN QTZ - GRAPHITE PHYLLITE DRILL CORE. NOTE POSSIBLE EARLIER ISOCLINAL FOLDING WITHIN LARGER FOLD. F2 FOLIATION



SMALL NORMAL FAULT SHOWING FAULTED CONTACT OF BANDED SULPHIDES WITH OVERLYING BLEACHED PHYLLITE