COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1966/96

GEOCHEMICAL INVESTIGATIONS IN THE KALGOORLIE AND NORSEMAN AREAS, WESTERN AUSTRALIA

by

N.W. Le Roux

5928/65

GEOCHEMICAL INVESTIGATIONS IN THE KALGOORLIE AND NORSEMAN AREAS, WESTERN AUSTRALIA

by

N.W. Le Roux

Records 1966/96

CONTENTS

TABLES

APPENDIX B

FIGURES

SUMMARY

Results obtained from analytical work carried out on soil and rock samples from the Kalgoorlie and Norseman areas are presented. The elements examined were Ni, Co, Cu, V, Mo, Pb and As.

It is concluded that certain areas have anomalously high concentrations of trace elements, but without further information, such as drilling could provide, the significance of these anomalous values is unknown.

INTRODUCTION

LOCATION

The two areas covered by this report are:

(a) a forty-eight square mile rectangle about six miles north-west of Kalgoorlie township. (Figs. 1 and 2).

(b) forty square miles, six miles north-east of Norseman township. (Figs. 1 and 3).

HISTORY

The Kalgoorlie Goldfield has been in production since 1893, and more than 35 x 10^6 ozs. of gold have been won.

Although gold was discovered fourteen miles south of Norseman in 1892, the more important of the Norseman deposits were not mined until 1895. About 2.5 x 10^6 ozs. have been produced.

The areas described above have no record of known economic mineralisation but have been chosen by New Consolidated Goldfields (Australasia) as possible extensions of known mineralised structures.

New Consolidated Goldfields (Australasia) Pty Ltd, asked the Bureau of Mineral Resources for assistance in geochemical work, and it was agreed that a trace element survey on samples supplied by New Consolidated Goldfields from their prospect areas be carried out. (Le Roux & Pontifex, 1965).

SOIL, TOPOGRAPHY, VEGETATION AND CLIMATE

The area is flat-lying with red clay soil and limited rock outcrop. The vegetation consists mainly of salt bush and light timber. It is an 8" - 10" rainfall area with an average annual temperature range of 40°F - 92°F.

GEOLOGY AND MINERALISATION

The geology of the area is not known by the author but some subsurface geology has been compiled by N.C.G. from drill cuttings.

PREVIOUS WORK

Apart from extensive surface prospecting for gold no previous geochemical surveys have been carried out in these areas.

SAMPLING PROCEDURE

New Consolidated Goldfields undertook the collection of all samples. Sampling sites were located on a rectangular grid pattern (Figs. 2 and 3), and a Proline drill was used to obtain soil samples. In addition to these, four mill-feed samples and fifteen rock samples from unmineralised areas were collected. These were prepared by New Consolidated Goldfields. Details of depth, horizon, location, etc. are given in the relevant tables. The Bureau of Mineral Resources have retained portions of all samples, and duplicates of most of them are stored by New Consolidated Goldfields.

ANALYTICAL PROCEDURES AND RESULTS

The methods used may be conveniently divided into:-

(a) Spectrochemical

(i) emission

(ii) atomic absorption

(b) Colorimetric

(a)

(i) Emission Spectrography

The instrument used was a large Hilger Quartz Spectrograph, operated under the supervision of A.D. Haldane. Briefly the procedure adopted was as follows. The soil samples were oven dried at about 105°C and ground by hand to pass through an eighty mesh sieve. After preheating the samples to 500°C, they were loaded into hollow electrodes and arced to completion. Most of the samples were diluted 1:1 with pure washed silica sand to help the arcing behaviour. The resulting spectra were photographed and the location and intensities of the lines compared against standard plates.

Details:-

Plate type	N50
Arc length	6 mm
Arc current	10 amps
Slit	8 micron by 2 mm
Development	2½ minutes at 68°F
Developer	Hydroquinone/sodium carbonate
Range	3600-2480 Angstrom
Electrodes	L4206 + ⅛"C

The results of the emission spectrographic analyses are set out in Tables I, V, IX, X and Figs. 4-9, 11-16.

(a)

(ii) Atomic Absorption Spectrophotometry

This method of analysis was used to try to develop a technique for mercury determination. According to the literature (Williston, 1964) a detection limit of less than one part per million would be required for the geochemical problem. Under this condition the standard procedures used in atomic absorption work could not be followed. To overcome this problem, C. Rann, of the Australian National University, Canberra, was consulted to develop a suitable technique (Rann in press). The results quoted were obtained with the assistance of C. Rann.

To obtain a considerable gain in sensitivity over the normal atomic absorption technique, the mercury is vapourized by heating the sample and passing the vapour directly into the light beam. At the wavelength 2537, absorption also takes place due to the presence of sulphur dioxide, water vapour and organic matter, as well as mercury. To overcome sulphur dioxide formed by the oxidation of sulphides, argon is used to sweep out the air before heating begins. The argon is also used to drive the mercury vapour through the apparatus. A "cold-finger" technique was used to condense water vapour and organic matter. To check that absorption was due only to mercury, the monochromator was adjusted to a nearby aluminium line where virtually no absorption was found to take place. Twenty two samples plus 1 p.p.m. standard soil samples were analysed in this way. In order to obtain reliable quantitative results, heating rate, gas flow rate and the "cold-finger" temperature need to be standardised.

In these preliminary experiments wave amplitudes were measured to give comparative mercury values. Some samples were also sent to Barringer Research Limited and Barker and Associates Limited for mercury analysis.

Mercury results are listed in Tables III and VII.

(b) Colorimetric

(i) Arsenic

Arsenic was determined using a modified Gutzeit method (Sandell 1959).

0.2g of crushed sample (-100 mesh) were fused with 2g of potassium hydroxide in a nickel crucible. The contents of the crucible were transferred to a 100ml conical flask with water and concentrated hydrochloric acid. 14ml of the following solution were added:-

$$\left.\begin{array}{l} \text{30ml 10\% } SnCl_2 \\ \text{125ml conc. HCl} \\ \text{50ml 15\% KI} \end{array}\right\} \text{500ml with distilled water}$$

After placing a mercuric chloride paper in the Gutzeit head, 3g of zinc was added and the head replaced.

The stains on the paper due to the reaction of the liberated arsine were compared with standard colours.

Arsenic results are shown in Tables I, II, V, VI, IX, & X, Figs. 10 and 17.

Some checks were carried out using the Heteropoly Molybdenum Blue Method (Sandell, 1959).

(ii) Antimony

Antimony was determined using the Brilliant Green method. (Stanton & McDonald 1961-62).

The results are shown in Tables I and V.

DISCUSSION

It was originally intended that the Direct Reading Emission Spectrograph would be used to analyse the samples for about thirty trace elements. However, the instrument was not in operation when the results were required so the list of elements was amended and alternative methods had to be used.

At the time of writing there was no information available on subsurface geology. The results can therefore only be looked at objectively, on a statistical basis. The distribution and abundance of elements can be pointed out but no interpretation can be given.

The percentage distribution of values for each element and the sample number of those samples suggested as being anomalous are shown in Tables IV & VIII. Figs. 2 & 3 show the anomalous values plotted on grids.

The grid dimensions are large and high values could be reflective of an area of some 20,000 sq. yds., on the other hand they might only be representative of the hole sampled.

In the Kalgoorlie area, the samples called anomalous, as shown in Table IV, fall into half the grid area, viz. the area bounded by I15, D15, D31 and I31. Of the six elements presented as having anomalous values, arsenic is separate from lead, vanadium, nickel, cobalt and copper. These latter five are in the area D21, H27, F33 and D27, and arsenic in I20, I24, F17 and H15. (Fig. 2).

The only significant groupings of anomalous values in the Norseman area Table VIII are for molybdenum and arsenic at 35A, 37A and 39A, and molybdenum, arsenic and lead at 73C, 75C and 77C. (Fig. 3).

The few mercury results obtained for the Kalgoorlie area show a tendency to be highest in I18, I26, G16, and I32 regions. They fall in the zone of highest arsenic values. Too much weight cannot be placed on these mercury results however as they only represent 20% of the total number of samples.

The arsenic results from the analysis of profile samples (Tables II and VI) suggest that whereas 3' - 9' is a useful sampling horizon in the Kalgoorlie area, the suitable horizon in the Norseman area is deeper than 30'. All the arsenic values in the Norseman area, with the exception of 59C were still increasing in the deepest samples available (Table VI).

New Consolidated Goldfields will be carrying out I.P. work later and if the evidence warrants it, some deeper, more detailed drilling will be done.

Since this record was drafted, the Bureau of Mineral Resources has carried out a detailed aeromagnetic survey of the area (Dockery & Finney, 1965).

CONCLUSION

Zones of anomalously high values for some elements can be delineated. These elements are As, Pb, V, Cu, Co, Ni and Mo. (Figs. 2 and 3).

Although the distribution and abundance of the elements can be plotted on the grid pattern it is impossible to interpret the significance of their variations without detailed information about the origin and nature of the soils and also about the geology of the underlying rocks.

ACKNOWLEDGEMENTS

I should like to acknowledge the helpful discussions with members of the B.M.R. Laboratory and staff of New Consolidated Goldfields.

REFERENCES

DOCKERY, B.A., and FINNEY, W.A., 1965 - Kalgoorlie Detailed Aeromagnetic Survey, W.A. 1964. Bur. Min. Resour. Aust. Rec. 1965/26.

LE ROUX, N.W., and PONTIFEX, I.R., 1965 - Visit to Kalgoorlie and Norseman Goldfields by N.W. Le Roux and I.R. Pontifex, July 1965. Bur. Min. Resour. Aust. Rec. 1965/172 (unpubl.).

RANN, C.S., 1966 - A Method for the Determination of Trace Mercury in Soil. Bur. Min. Resour. Aust. Rec. (in prep.).

SANDELL, E.B., 1959 - COLORIMENTRIC DETERMINATION OF TRACES OF METALS. Third Edition. Interscience Pub. Ltd London.

STANTON, R.E., and McDONALD, A.J., 1961-2. Field Determination of Antimony in Soil and Sediment Samples. Trans. I.M.M. 71, 517-522.

WILLISTON, S.H., 1964 - The Mercury Halo Method of Exploration. Engineering and Mining Journal, vol. 165, 5, 98-101.

TABLE I.

SAMPLE DETAILS AND ANALYTICAL RESULTS - KALGOORLIE AREA (P.P.M.)

Grid No.	B.M.R.No.	Co-ords. North (Yards)	East	Footage Sampled	Description	Ni	Co	Cu	V	Mo	Pb	As	Sb	Remarks
D3	011100	1,120,1490	443, 660	3 - 6	T.Z.S. clay → shale	60	12	50	400	10	10	18		
D5	01	"	443, 440	4'6 - 7'6	" clay, ironstone - shale	15	5	25	200	10	10	8		Sn 50
D7	02	"	443, 220	3 - 6	" clay → shale	30	15	75	200	10	10	23		Sn 20
D9	03	"	443, 000	4'6 - 7'6	" clay → volcanic	30	15	50	300	10	10	8		Sn 50
D11	04	"	442, 780	3 - 6	B.H.S. probable transition zone	20	20	100	500	5	a	3-		Sn 200
D13	05	"	442, 560	15 - 18	" lateritic	15	20	50	300	7	a	5		
D15	06	"	442, 340	3 - 6	T.Z.S. soil to bedrock	60	25	50	300	5	10	8		Sn 200
D17	07	"	442, 120	6 - 9	" soil to tuffac. sed.	100	10	50	300	10	10	8		Sn 5
D21	08	"	441, 680	3 - 6	B.H.S. probable transition zone	"	20	200	500	5	20	13		Sn 5
D23	09	"	441, 460	1½ - 4½	T.Z.S. soil - greenstone	500	60	75	200	a	5	3-		
D25	10	"	441, 240	3 - 6	" "	700	100	100	200	a	5	3-		
D27	11	"	441, 020	6 - 9	" red clay with ironstone	700	100	100	300	10	a	3-		
D29	12	"	441, 820	6 - 9	" " "	700	100	50	200	5	a	3		Sn 20
D31	13	"	440, 580	2 - 5½	" soil to volcanic?	15	10	15	300	5	5	13		Sn 20
D33	14	"	440, 360	1½ - 4½	"	15	10	50	400	10	5	5		
D35	15	"	440, 140	5½ - 8	" clay - shale	100	12	50	200	10	5	5		
D37	16	"	439, 920	6 - 9	" clay w. ironstone-shale	150	20	50	200	5	10	5		
D39	17	"	439, 700	6 - 7½	" clay - shale	100	20	50	300	5	5	23		
E6	011086	1,201, 930	443 330	7'6 - 9'	" over weathered shale	10	10	50	100	10	10	23		
E8	87	"	443, 110	3 - 6	" "	30	12	70	300	10	10	18		
E12	88	"	442, 670	3 - 6	" " " "	60	20	70	300	5	10	5		
E14	89	"	442, 450	3 - 6	" clay w.greenstone	80	15	50	500	a	a	13		
E16	90	"	442, 230	9 - 12	B.H.S. ?Tertiary sediments	30	20	50	300	5	a	8		
E18	91	"	442, 010	3 - 6	T.Z.S. ?Volcanic - Basic? *	100	12	50	500	5	a	23		*(over weathered)
E22	92	"	441, 570	0 - 3	" Over weathered Basic volcanic and shale	200	15	100	400	a	20	23		
E26	93	"	441, 130	0 - 4	" Over weathered greenstone	1000	100	70	400	a	a	3-		
E28	94	"	440, 910	6 - 9	" " "	500	100	100	400	a	a	3-		
E30	95	"	440, 690	3 - 5	" " "	1000	200	50	200	a	a	3-		
E32	96	"	440, 470	3 - 5	" "(?)	200	20	70	500	a	a	8		
E34	97	"	440, 250	7 - 9	" ?Basic, volcanic? *	300	30	50	500	15	a	8		*(over weathered)
E36	98	"	440, 030	6 - 9	B.H.S.	200	15	50	300	10	10	3		
E38	99	"	439, 810	9 - 11	"	400	20	70	500	10	a	8		
F7	011069	1, 202, 370	443, 220	9 - 11	T.Z.S.from red clay soil w. ironstone to bedrock	30	5	50	500	15	a	13		
F9	70	"	443, 000	3 - 6	B.H.S. probable trans.zone over shale	30	12	75	300	5	a	13		
F11	71	"	442, 780	3 - 6	" "	20	10	75	400	5	10	13		
F13	72	"	442, 560	3 - 5'6	" "	30	12	50	400	5	10	8		
F15	73	"	442, 340	9 - 11	" "	60	12	50	200	5	10	8		
F17	74	"	442, 120	15 - 18	B.H.S. lateritic profile	10	12	20	500	5	a	43		
F19	75	"	441, 900	6 - 9	T.Z.S. probably above weathered shale	20	5	50	300	a	a	23		
F21	76	"	441, 680	6 - 9	T.Z.S. to shale (B.H.S.)	10	5-	50	300	10	20	23		
F23	77	"	441, 460	6 - 9	T.Z.S. to weathered shale	30	5	75	200	10	20	13		
F25	78	"	441, 240	3 - 6	T.Z.S. loam to poss.shale	5	5-	15	100	10	10	3-		
F27	79	"	441, 020	3 - 6	T.Z.S. to greenstone (BHS.)	2000	150	75	200	5	a	3-		
F29	80	"	440, 800	12 - 15	" "	1000	60	25	300	5	a	3-		
F31	81	"	440, 580	6 - 9	" loam with some ironst. to greenstone	1000	100	75	700	5	a	5		
F33	82	"	440, 360	3 - 6	T.Z.S. red clay w.ironstone to shale	400	60	100	400	10	a	18		
F35	83	"	440, 140	12 - 15	B.H.S. red clay w.ironstone	100	30	50	300	10	a	13		
F37	84	"	439, 920	6 - 9	B.H.S. "	100	15	25	150	5	a	8		
F39	85	"	439, 700	9 - 12	B.H.S. "	100	30	25	300	5	a	8		
G8	011052	1, 202, 810	443, 110	15 - 18	B.H.S. ? Trans zone	60	10	50	500	10	a	13		
G10	53	"	442, 890	9 - 12	T.Z.S. above weathered sst.	60	12	50	200	10	5	13		
G12	54	"	442, 670	3 - 6	" " shale	30	12	25	500	10	20	13		
G14	55	"	442, 450	0 - 3	" " "	30	12	100	500	5	20	23		
G16	56	"	442, 230	0 - 3	" " "	100	30	100	500	5	5	13	10-	
G18	57	"	442, 010	12 - 15	B.H.S. Lateritic	60	15	75	500	5	a	3-	10-	
G20	58	"	441, 790	27 - 30	" "	20	5-	15	400	10	a	425	10-	
G22	59	"	441, 570	15 - 18	" "	60	5-	50	500	10	a	5	10-	
G24	60	"	441, 350	9 - 10'3	" "	100	5-	50	500	10	a	23	10	
G26	61	"	441, 130	3 - 4'3	T.Z.S. Sandstone & shale	100	15	75	400	10	a	23	10	
G28	62	"	440, 910	12 - 15	" weathered greenstone	1000	100	100	500	10	a	3-	10-	
G30	63	"	440, 690	18 - 21	B.H.S. Blue lat. clay	500	60	50	700	10	a	3-	10-	
G32	64	"	440, 470	6 - 9	T.Z.S. ab. weathered greenstn.	500	100	100	500	10	a	5	10-	
G34	65	"	440, 250	12 - 15	" " " sediment	150	10	25	400	10	a	8		
G36	66	"	440, 030	21 - 24	B.H.S.sst. shale/tertiary sed.	15	5	20	150	5	a	3-		
G38	67	"	439, 810	15 - 17'6	" Tertiary or weathered clays	15	5-	15	300	7	a	3-		
G40	68	"	439, 590	12 - 13'6	" as for G38.	12	5-	25	200	7	a	3-		

Table I.

Grid No.	B.M.R. No.	Co-ords.		Footage Sampled	Description	Ni	Co	Cu	V	Mo	Pb	As	Sb	Remarks
		North	East											
H9	011034	1203, 250	443,000	12 - 15	B.H.S. red clay w.ironstone	60	5	25	200	5	5	13		Zn 100
H11	35	"	442,780	6 - 9	T.Z.S. Soil to weathered shale	30	5	15	200	10	5	18		
H13	36	"	442,560	6 - 9	T.Z.S. soil to sandstone	20	10	20	100	10	10	23		
H15	37	"	442,340	3 - 6	" "	12	5	15	100	5	10	50		
H17	38	"	442,120	$1\frac{1}{2}$ - $4\frac{1}{2}$	" "	30	12	15	200	5	5	23		
H19	39	"	441,900	6 - 9	" soil to weathered greenstone?	12	5	15	100	5-	5	23		
H21	40	"	441,680	6 - 9	" soil to weathered shale	60	12	20	100	5-	5	5		
H23	41	"	441,460	12 - 14	" to probable greenstone	60	10	25	200	10	a	3-		Zn 100
H25	42	"	441,240	9 - 12	" clay with festone, to probable weathered greenstone	100	10	15	100	5-	a	13		Zn100
H27	43	"	441,020	21 - 24	B.H.S. in clays	80	10	25	300	10	100	23		
H29	44	"	440,800	15 - 18	T.Z.S. soil to weathered shale	60	10	25	200	10	20	13		
H31	45	"	440,580	18 - 21	B.H.S. Probably in trans.zone above greenstone	100	12	20	300	10	20	3		
H33	46	"	440,360	12 - 15	" " "	300	20	50	200	15	5	3-		
H35	47	"	440,140	15 - 18	" trans.zone above shale	30	10	25	150	5	5	23		
H37	48	"	439,920	12 - 13'6	" clay w.ironstone nodules	15	5-	20	200	10	a	5		
H39	50	"	439,700	6 - 9	" ironstone clay,Tertiary clay?	100	15	25	500	10	a	13		
H41	51	"	439,480	6 - 9	" " "	30	5	25	500	15	a	8		
I10	011018	1203,690	442,890	6 - 9	T.Z.S. soil to weathered shale	100	40	25	150	5	10	13		
I12	19	"	442,670	6 - 9	" " "	12	5-	50	300	15	20	13		
I14	20	"	442,450	3 - 6	" " "	30	10	25	100	5-	10	18		
I16	21	"	442,230	3 - 6	" " "	30	10	25	100	5-	15	28	15	
I18	22	"	442,010	3 - 6	" to weathered greenstone ?	60	12	30	100	5	20	28	15	
I20	23	"	441,790	3 - 6	" " "	40	10	50	100	10	10	43	10	
I22	24	"	441,570	6 - 9	" " "	30	5	50	100	5	a	13	10-	
I24	25	"	441,350	3 - 6	" soil to weathered greenst.	5-	12	15	20	5	a	500	10-	
I26	09	"	441,130	3- 6	" soil to weathered shales	12	12	15	50	5-	10	8		
I28	26	"	440,910	6 - 9	B.H.S. prob.near trans. zone	15	10	20	200	5	5	8	10-	
I30	27	"	440,690	12 - 13	" prob. in trans. zone.	100	15	30	200	10	5	3-	10-	
I32	28	"	440,470	27 - 30	" in clay. prob. tertiary	200	30	25	100	5-	5	3	10	
I34	29	"	440,250	9 - 11'6	" in ironstone and clay	30	12	25	200	10	5-	3-	40	
I36	30	"	440,030	9 - 10'6	" " "	20	10	10	100	5	5-	3-	50+	
I38	31	"	439,810	15 - 16'6	" probably tertiary clay	100	12	15	100	5	5-	13		
I40	32	"	439,590	21 - 24	" " "	20	5	10	200	5-	20	3-		
I42	33	"	439,370	18 - 21	" " "	100	12	20	100	5	5-	13		

T.Z.S. = Transition Zone Sample. B.H.S. = Bottom Hole Sample.

TABLE II.

PROFILE SAMPLES - KALGOORLIE AREA

ANALYTICAL RESULTS AND SAMPLE DETAILS.

Grid No.	B.M.R.No.	Footage Sampled	Description	Arsenic p.p.m.
I28	011217	0 - 3	Light brown sandy loam.	3
I28	18	3 - 6	hard red clay with small ironstone nodules	3
I28	19	6 - 9	red clay, numerous iron nodules, with some quartz and shaly haematite.	20
I24	20	0 - 3	sandy clay loam grading to red clay	83
I24	21	3 - 6	red clay, grading to weathered greenstone	120
I22	22	0 - 3	light sandy loam, passing to red clay loam with gypsum and ironstone nodules.	3-
I22	23	3 - 6	red clay with small ironstone nodules and rare quartz grains	5
I22	24	9 - 12	reddish clay, turning yellow, then dark	3
I22	25	6 - 9	red clay	10
I20	26	0 - 3	loamy sand passing to sandy clay with fine ironstone nodules and gypsum	5
I20	27	3 - 6	red sandy clay with yellow brown variations	25
I20	28	6 - 9	as above, with ferruginous rock fragments.	25
I20	29	9 - 12	as above, Some greeny-white clayey material	20
H15	011230	0 - 3		3-
H15	31	3 - 6		35
G20	32	0 - 3	grey to yellow loam with limonite	370
G20	33	3 - 6	khaki loam with limonite, travertine	1240
G20	34	6 - 9	as above, with some gypsum	740
G20	35	9 - 12	light red loam, abundant iron, some travertine	740
G20	36	12 - 15	light red loam fair amount iron. Some travertine and rare shale fragments	740
G20	37	15 - 18	As above - fragments light coloured rock	553
G20	38	18 - 21	as above	553
G20	39	21 - 24	"	553
G20	40	24 - 27	"	615
G20	41	27 - 30	"	553
F17	011242	0 - 3	ferruginous rock fragments, travertine ironstone with clayey sand.	21
F17	43	3 - 6	ferruginous rock fragments. Ferruginous nodules and carbonate nodules.	115
F17	44	6 - 9	As above, with fragments , altered rock silicified - ferruginous	115
F17	45	9 - 12	ferruginous fragments:, some white weathered rock fragments.	115
F17	46	12 - 15	As above.	115
F17	47	15 - 18	As above; white rock fragments increasing.	115
I24	011283	6 - 9		100
H15	011284	6 - 9		90

TABLE III

MERCURY RESULTS - KALGOORLIE AREA

Grid No.	B.M.R. No.	Hg p.p.b. (1)	Hg p.p.b. (2)	Hg amplitude (3)
I16	011021	-	-	8
I18	022	7, 8	30	26
I20	023	6, 6	2	12
I22	024	4, 4	2	10
I24	025	5, 5	1-	11
I26	009	7, 7	8	-
I28	026	4, 4	1-	26
I30	027	-	-	26
I32	028	-	-	50
I34	029	4, 5	1-	-
I36	030	4, 4	1-	-
I38	031	3, 3	3	-
I40	032	4, 4	4	-
I42	033	2, 2	3	-
H15	037	2, 2	2	-
H25	042	2, 3	2	-
G16	056	6, 6	8	24
G18	057	3, 2	2	30
G20	058	2, 2	2	23
G22	059	3, 3	1-	6
G24	060	3, 3	1-	5
G26	061	4, 4	1-	-

(1) = Duplicate results by Cordero Mining Company

(2) = Barringer Research Limited

(3) = Bureau of Mineral Resources

TABLE IV.

ANOMALOUS VALUES AND FREQUENCY DISTRIBUTION - KALGOORLIE AREA

100 SAMPLES

ELEMENT ARSENIC

Values (p.p.m.)	3-	3	5	8	13	18	23	28	33	38	43	48	48+
Percentage of samples having this value.	22	4	10	16	21	5	15	2	0	0	2	0	3

95% of samples are less than 29 p.p.m.
Mean of these 95% approx. 10 p.p.m. (3- called 2)

Samples considered anomalous	Arsenic p.p.m.
F 17	43
G 20	425
H 15	50
I 20	43
I 24	500

ELEMENT LEAD

Values (p.p.m.)	absent	5-	5	10	15	20	20+
Percentage of samples having this value	44	4	18	21	1	11	1

99% of samples are less than 21 p.p.m.
Mean of these 99% approx. 5 p.p.m. (5- called 4)

Samples considered anomalous	Lead p.p.m.
H 27	100

ELEMENT MOLYBDENUM

Values (p.p.m.)	a	5-	5	7	10	15
Percentage of samples having this value	9	10	34	3	39	5

95% of samples are less than 11 p.p.m.

Mean of these 95% approx. 7 p.p.m. (5- called 4)

Samples considered anomalous	Molybdenum p.p.m.
E 34	15
H 33	15
H 41	15
F 7	15
I 12	15

ELEMENT VANADIUM

Values (p.p.m.)	20	50	100	150	200	300	400	500	500+
Percentage of samples having this value	1	1	16	4	25	21	11	20	1

99% of samples are less than 501 p.p.m.
Mean of these 99% approx. 282 p.p.m.

Sample considered anomalous	Vanadium p.p.m.
G 30	700

ELEMENT COPPER

Values (p.p.m.	10	15	20	25	30	50	70	75	100	200
Percentage of samples having this value.	2	12	8	19	2	32	5	9	10	1

99% of samples are less than 101 p.p.m.
Mean of these 99% approx. 46 p.p.m.

Sample considered anomalous	Copper p.p.m.
D 21	200

ELEMENT COBALT

Values (p.p.m.)	5-	5	10	12	15	20	25	30	40	60	100	150	200
Percentage of samples having this value	9	12	18	20	10	10	1	5	1	4	8	1	1

98% of samples are less than 101 p/p.m.
Mean of these 98% approx. 22 p.p.m. (5- called 4)

Samples considered anomalous	Cobalt p.p.m.
E 30	200
F 27	150

ELEMENT NICKEL

Values (p.p.m.)	5-	5	10	12	15	20	30	40	60	80	100	150	200	300	400	500	700	1000	2000
Percentage of samples having this value.	1	2	3	5	7	7	18	1	13	2	18	2	4	2	2	4	3	5	1

99% of samples are less than 1001 p.p.m.
Mean of these 99% approx. 155 p.p.m. (5- called 4)

Sample considered anomalous	Nickel p.p.m.
F 27	2000

TABLE V.

SAMPLE DETAILS AND ANALYTICAL RESULTS - NORSEMAN AREA (P.P.M.)

Grid No.	B.M.R. No.	Co-ords. North	East	Footage sampled	Description	Ni	Co	Cu	V	Mo	Pb	As	Sb	Remarks
35A	011214	1,033,940	491,650	27 - 30	B.H.S.-red clay with minor sand	5	10	15	30	5	5-	35	10-	
37A	215	"	491,870	12 - 13	" ironstone and clay	10	10	30	500	15	a	20	10-	
39A	216	"	492,090	15 - 18	" red & grey clay with ironstone	10	10	50	500	10	a	50	10-	
41A	204	"	492,310	21 - 23'6"	?T.Z.S.-ferruginous clay with rock fragments.	15	10	30	300	10	5-	5	10-	
43A	205	"	492,530	18 - 21	T.Z.S. -clay grading to coarse-grained gabbrcic rock.	40	20	70	500	7	5-	3-	15	
45A	206	"	492,750	12 - 16	" clay grading to weathered greenstone.	15	10	25	100	5	5-	3	10-	
47A	207	"	492,970	15 - 17 ?	" sandy clay grading to opaline ferruginous material	40	10	25	200	7	5-	3-	10-	
49A	208	"	493,190	9 - 13	" clay to ?greenstone	20	5	30	200	10	5-	3-		
51A	209	"	493,410	6 - 9	" clay to bedrock, probable sedimentary	20	20	25	100	1	5-	3-		
53A	210	"	493,630	3 - 6	" clay to greenstone	40	20	20	100	2	5-	3		
55A	211	"	493,850	6 - 9	" clay with fine qtz. & ironstone grading to schistose basic rock.	40	30	30	100	2	5-	4		
57A	212	"	494,070	4½ - 7½	" red clay with fine rock fragments, grading to ferruginous basic rock.	30	30	30	100	5	5-	3		
25C	011169	1,033,060	490,550	21 - 24	B.H.S. sandy clay	60	20	40	100	a	5-	3-		
27C	168	"	490,770	18 - 21	" clayey sand	80	30	40	150	a	5	3-		
29C	167	"	490,990	21 - 24	" clay and sand	40	15	15	50	1	5-	3		
31C	166	"	491,210	15 - 18	" clayey sand	60	20	25	100	2	5-	3		
33C	165	"	491,430	18 - 21	" sandy clay	60	15	30	200	5	5-	5		
35C	164	"	491,650	12 - 13'6	T.Z.S. clay to ?greenstone	60	30	100	500	5	5-	5		
37C	163	"	491,870	6 - 9	" loam with travertine to greenstone	30	15	100	300	a	5-	3-		
39C	133	"	492,010	3 - 6	" loam to greenstone	80	40	40	100	a	5-	3-		
41C	134	"	492,310	3 - 6	" loam to greenstone	80	40	50	150	a	5	3-		
43C	135	"	492,530	3 - 6	" clay loam to ?greenstone	60	40	150	300	a	10	3		
42C	202	"	492,420	3 - 6	" clay loam to sheared greenstone	15	10	20	50	1	a	3-		
44C	201	"	492,640	0 - 3	" " fine-grained "	30	15	20	100	a	a	3-		
45C	136	"	492,750	6 - 9	" clay to fine-grained greenstone	80	15	200	200	5	5-	3-		
46C	200	"	492,860	3 - 6	" clay to sheared greenstone	40	20	15	150	a	a	3-		
47C	137	"	492,970	7'6 - 10'6	" clay to greenstone	40	40	80	200	3	5-	3-		
48C	199	"	493,080	3 - 6	" loam to sheared greenstone	10	10	10	30	a	a	3-		
49C	138	"	493,190	6 - 9	" sandy clay to fine-gr.greenstone	60	30	100	200	2	5-	3-		
50C	198	"	493,300	6 - 9	" clay to med-grained greenstone	20	20	30	100	1	a	3-		
51C	197	"	493,410	9 - 12	" clay to fine-grained greenstone	?20	15	30	80	2	5-	3-		
53C	139	"	493,630	6 - 9	" clay to sheared greenstone?	?40	15	80	300	5	5	3-		
55C	140	"	493,850	3 - 6	" clay to fine-grained greenstone	?80	40	80	300	a	20	3-		
57C	141	"	494,070	6 - 9	" clay to fine-grained greenstone	60	30	100	300	5	20	3		
59C	142	"	494,290	6 - 9	" loamy clay to bedrock	40	20	100	150	2	5-	3-		
61C	143	"	494,510	3 - 6	" clay to sheared greenstone	30	15	70	300	1	5-	5		
* 63C	157	"	494,730	3 - 6	" clay to quartz veined greenstone	12	12	20	150	a	5-	5		
67C	217	"	495,170	0 - 1'6	B.H.S. loam to travertine	10	10	30	80	a	5	10		
69C	159	"	495,390	0'6 - 4'6	" loam and travertine	10	12	70	150	a	5-	3		
71C	160	"	495,610	0 - 3'6	T.Z.S. clay to sheared greenstone?	30	30	70	150	10	5-	10		
73C	161	"	495,830	6 - 9	" clay to ferruginous weathered greenstone?	70	5-	100	500	15	150	8		
75C	162	"	496,050	0 - 3	" loam to ferruginous rock (?greenstone)	80	30	50	500	10	5-	15		
77C	203	"	496,270	12 - 13'6	" clay to liminitic rock (?? greenstone)	80	5	20	30	7	a	35		
* 65C	158	"	494,950	6 - 9	" loam to bedrock	5	12	25	150	a	5-	3-		
17E	011118	1,032,180	489,670	27 - 30	B.H.S. clay with minor sand	60	20	25	80	1	5-	10		
21E	119	"	490,110	21 - 22'6	" clay with sand	80	20	40	150	2	5	5		
25E	120	"	490,550	9 - 15	" clay with minor sand	80	30	40	300	a	10	5		
27E	148	"	490,770	12 - 14'6	" clayey sand	80	80	70	300	2	5-	5		
29E	147	"	490,990	9 - 12	" clayey loam	100	60	70	300	5	5	3		
31E	146	"	491,210	18 - 19'6	" sandy clay	150	60	70	300	2	5-	5		
33E	145	"	491,430	16 - 19	T.Z.S.?? clay to ?bedrock	60	40	70	300	5	5-	3-		
35E	144	"	491,650	16'6 - 19'6	" clay to weathered bedrock	30	10	70	700	5	5-	5		
37E	121	"	491,870	12 - 14	" clay to weathered greenstone?	40	15	50	300	2	10	5		
39E	122	"	492,090	12 - 15	" clay to fine-gr. greenstone	80	40	70	300	2	10	5		
41E	123	"	492,310	10'6 - 13'6	" clay to weathered "	60	40	150	200	7	10	3		
43E	124	"	492,530	12 - 15	" clay to greenstone	60	30	50	150	3	5-	5		
45E	125	"	492,750	9 - 12	" clay to greenstone?	60	40	25	300	2	5	5		
47E	126	"	492,970	15 - 18	" clay to sheared greenstone	15	20	150	500	3	5-	3-		

(ii Table V)

Grid No.	B.M.R.No.	Co-ords North	East	Footage Sampled	Description	Ni	Co	Cu	V	Mo	Pb	As	Sb	Remarks
49E	011127	1,032,180	493,190	6 - 9 T.Z.S.	clay to weathered greenstone	40	30	100	300	5	5-	3		
51E	128	"	493,410	0 - 3 "	loam to " "	80	40	80	300	5	5-	3-		
53E	129	"	493,630	0 - 3 "	loam to " "	80	30	80	300	2	5	3-		
55E	130	"	493,850	3 - 6 "	clayey loam to greenstone	80	30	80	200	5	5	3-		
57E	131	"	494,070	0 - 3 "	loam & sand to 'sandstone'	40	20	80	150	a	5	3-		
59E	132	"	494,290	3 - 6 "	sand and clay to weathered granitic? rock	30	15	40	100	2	10	5		
61E	150	"	494,510	0 - 3 "	sandy loam to aplitic granite	30	20	50	150	a	5	3		
63E	151	"	494,730	0 - 3 "	loam to granitic rock	15	12	40	50	a	5-	3-		
65E	152	"	494,950	0 - 3 "	sandy loam to granite	30	10	70	100	a	70	3-		
67E	153	"	495,170	9 - 12 "	clay to metamorphosed greenstone??	15	15	20	100	5	5-	8		
69E	149	"	495,390	4'6 - 7'6 "	loamy clay, to granitic rock	20	10	40	150	10	5	10		
71E	154	"	495,610	1'6 - 4'6 "	to coarse granite	20	10	70	70	a	5	5		
73E	155	"	495,830	3 - 6 "	loam to talc schist, (prob. metamorphosed greenstone)	200	10	10	10	a	5-	3-		
75E	156	"	496,050	3 - 6 "	clay to ferruginous sheared greenstone?	40	12	15	300	5	5-	3-		
77E	213	"	496,270	2 - 4 "	clay to actinolite mica schist	100	20	20	20	1	a	3-		
25G	011196	1,301,300	490,550	12 - 13'6 B.H.S.	red clay and sand	40	20	25	80	1	7	3		
27G	195	"	490,770	12 - 14 "	clay and sand	30	10	15	50	1	7	4		
29G	194	"	490,990	9 - 12 "	clay and sand	20	10	15	80	1	5-	3		
31G	193	"	491,210	18 - 21 "	clayey sand	20	10	10	80	5	5-	3		
33G	192	"	491,430	9 - 12 T.Z.S.	clay to greenstone?	10	10	30	300	2	5-	3		
35G	191	"	491,650	6 - 9 "	clay,loam to weathered greenstone	20	20	15	200	a	a	3-		
37G	190	"	491,870	6 - 9 "	clay,loam to weathered greenstone	40	30	30	150	1	a	3-	5-	
39G	189	"	492,090	3 - 6 "	clay to greenstone	80	60	50	200	a	5-	3-	8	
41G	188	"	492,310	9 - 12 "	clay to weathered medium grained greenstone	40	15	50	80	2	5-	3	5	
43G	170	"	492,530	3 - 6 "	clay to weathered greenstone	100	60	50	150	a	5	3-	5-	
45G	171	"	492,750	3 - 6 "	clay to " "	60	40	50	150	a	5-	3-	5-	
47G	172	"	492,970	1½ - 4½ "	clay to weathered schistose greenstone	80	40	50	150	a	5-	3-	5	
49G	173	"	493,190	1 - 3 "	clay to weathered greenstone	80	30	40	200	a	5-	3-		
51G	174	"	493,410	0 - 3 "	clay " "	30	30	7	100	a	5-	3-		
53G	175	"	493,630	0 - 3 "	clay " "	80	40	50	150	a	5-	3-		
55G	176	"	493,850	1½ - 4½ "	clay to weathered medium-grained amphibolite	80	60	40	200	a	5-	3-		
57G	177	"	494,070	1 - 3 "	clay to ferruginous bedrock	100	40	50	200	a	5	3-	5-	
59G	178	"	494,290	9 - 11 "	? clay with ironstone and fine rock fragments	80	30	70	150	15	10	8	5	
61G	179	"	494,510	12 - 15 "	clay to feldspathic rock	20	12	40	100	5	5	3	5-	
63G	180	"	494,730	3 - 5 "	clay to quartz muscovite schist	40	40	25	150	2	5	5	5	
65G	181	"	494,950	9 - 12 "	clay to weathered granitic ?rock.	30	10	15	30	2	5-	10	5	
67G	182	"	495,170	9 - 12 "	? clay to siliceous rock	150	20	50	80	5	5-	10	10	
69G	183	"	495,390	27 - 28 B.H.S.	clay with quartz fragments	300	30	15	100	5	5-	4	5-	
71G	184	"	495,610	4½ - 7½ T.Z.S.	clay to fine-grained quartz feldspar rock	30	10	10	20	a	5-	3	10	
73G	185	"	495,830	3 - 4¾ "	sand and clay to granitic rock	40	12	25	100	a	5	3	10	
75G	186	"	496,050	18 - 20½ B.H.S.	probably Tertiary ferruginous sediments	40	5	40	500	30	5	3		
77G	187	"	496,270	8 - 10 T.Z.S.	Travertine to granitic rock	30	12	25	100	a	5-	3-		

B.H.S. = Bottom hole sample, where basement bedrock not reached by bore hole.

T.Z.S. = Transition Zone Sample from soil to basement bedrock.

a = absent

TABLE VI.

PROFILE SAMPLES - NORSEMAN AREA

(ANALYTICAL RESULTS AND SAMPLE DETAILS)

Grid No.	B.M.R.No.	Footage Sampled		Description	Arsenic p.p.m.
39E	011266	0 - 3		Sand with travertine	3
39E	267	3 - 6		Loam with travertine	5
39E	268	6 - 9		clay loam	5
39E	269	9 - 12		red clay with quartz and greenstone fragments	8
39E	122	12 - 15		T.Z.S. clay to fine-grained greenstone	13
43E	011270	0 - 3		brown loam	3
43E	271	3 - 6		loam with travertine	5
43E	272	6 - 9		sandy clay	5
43E	273	9 - 12		red clay	5
43E	124	12 - 15	*	T.Z.S. clay to greenstone	8
59C	011280	0 - 3		loam with travertine	3
59C	281	3 - 6		loamy clay	5
59C	142	6 - 9		T.Z.S. loamy clay to bedrock	3
59C	282	9 - 12		fine to medium grained greenstone?	3
73C	011278	0 - 3		clay loam	3
73C	279	3 - 6		loamy clay	5
73C	161	6 - 9		T.Z.S. clay to ferruginous weathered greenstone?	5
77C	011274	0 - 3		loamy clay	3
77C	275	3 - 6		red brown clay with minor sand	5
77C	276	6 - 9		red clay	5
77C	277	9 - 12		red clay	8
77C	203	12 - 13½		clay to limonitic rock (? greenstone)	35
35A	011248	0 - 3		red clay with sand	5
35A	249	3 - 6		"	5
35A	250	6 - 9		"	4
35A	251	9 - 12		"	4
35A	252	12 - 15		"	8
35A	253	15 - 18		"	30
35A	254	18 - 21		"	30
35A	255	21 - 24		"	40
35A	256	24 - 27		"	50
35A	214	27 - 30	**	B.H.S. - red clay with minor sand	60
37A	011257	0 - 3		red clay with sand	4
37A	258	3 - 6		"	5
37A	259	6 - 9		"	5
37A	260	9 - 12		"	10
37A	215	12 - 13		B.H.S. - ironstone and clay	30
39A	011261	0 - 3		red clay with sand	3
39A	262	3 - 6		"	3
39A	263	6 - 9		"	4
39A	264	9 - 12		"	10
39A	265	12 - 15		"	70
39A	216	15 - 18		B.H.S. - red and grey clay with ironstone	90

* T.Z.S. = Transition Zone Sample.   ** B.H.S. = Bottom Hole Sample

TABLE VII

MERCURY RESULTS - NORSEMAN AREA

Grid No.	B.M.R. No.	Hg p.p.b. (1)	Hg p.p.b. (2)	Hg amplitude (3)
42 C	011202	2, 2	1-	-
43 C	135	3, 3	1-	-
44 C	201	3, 3	1-	-
45 C	136	2, 2	2	-
46 C	200	2, 2	1-	-
67 C	217	5, 6	11	-
69 C	159	2, 2	2	-
71 C	160	3, 3	2	-
73 C	161	2, 2	7	-
75 C	162	2, 2	2	-
77 C	203	2, 2	3	-
35 A	214	2, 2	3	10
37 A	215	2, 2	2	17
39 A	216	2, 2	2	6
41 A	204	2, 2	2	15
43 A	205	2, 2	2	9
45 A	206	-	-	28
57 G	177	-	-	28
59 G	178	-	-	15
61 G	179	-	-	20
63 G	180	-	-	9
65 G	181	-	-	15
67 G	182	-	-	26
69 G	183	-	-	24
71 G	184	-	-	37

(1)= Duplicate results by Cordero Mining Company

(2)= Barringer Research Limited

(3)= Bureau of Mineral Resources

TABLE VIII

ANOMALOUS VALUES AND FREQUENCY DISTRIBUTION - NORSEMAN AREA (100 samples)

ELEMENT	ARSENIC									
Values (p.p.m.)	3-	3	4	5	8	10	15	20	35	50
Percentage of samples having this value	45	21	3	17	3	6	1	1	2	1

95% of samples are less than 11 p.p.m. Mean of these 95% approx. 4 p.p.m. (3- called 2)

Samples considered anomalous	Arsenic p.p.m.
35 A	35
37 A	20
39 A	50
75 C	15
77 C	35

ELEMENT	LEAD							
Values (p.p.m.)	absent	5-	5	7	10	20	70	150
Percentage of samples having this value	11	57	19	2	7	2	1	1

96% of samples are less than 11 p.p.m. Mean of these 96% approx. 4 p.p.m.

Samples considered anomalous	Lead p.p.m.
55 C	20
57 C	20
73 C	70
65 E	150

ELEMENT	MOLYBDENUM								
Values (p.p.m.)	absent	1	2	3	5	7	10	15	30
Percentage of samples having this value	34	11	18	3	20	4	6	3	1

96% of samples are less than 11 p.p.m. Mean of these 96% approx. 3 p.p.m.

Samples considered anomalous	Molybdenum p.p.m.
37 A	15
73 C	15
59 G	15
75 G	30

ELEMENT	VANADIUM											
Values (p.p.m.)	10	20	30	50	70	80	100	150	200	300	500	700
Percentage of samples having this value.	1	2	4	4	1	8	18	20	13	20	8	1

99% of samples are less than 501 p.p.m. Mean of these 99% approx. 190 p.p.m.

Sample considered anomalous	Vanadium p.p.m.
35 E	700

ELEMENT	COPPER												
Values (p.p.m.)	7	10	15	20	25	30	40	50	70	80	100	150	200
Percentage of samples having this value	1	4	10	7	10	11	12	14	13	7	7	3	1

96% of samples are less than 101 p.p.m. Mean of these 96% approx. 44 p.p.m.

Samples considered anomalous	Copper p.p.m.
43 C	150
45 C	200
41 E	150
47 E	150

ELEMENT	COBALT									
Values (p.p.m.)	5-	5	10	12	15	20	30	40	60	80
Percentage of samples having this value	1	3	20	8	12	17	18	15	5	1

99% of samples are less than 61 p.p.m. Mean of these 99% approx. 23 p.p.m.

Sample considered anomalous	Cobalt p.p.m.
27 E	80

ELEMENT	NICKEL													
Values (p. p.m.)	5	10	12	15	20	30	40	60	70	80	100	150	200	300
Percentage of samples having this value	2	6	1	6	10	14	19	13	1	20	4	2	1	1

98% of samples are less than 151 p.p.m. Mean of these 98% approx. 48 p.p.m.

Samples considered anomalous	Nickel p.p.m.
73E	200
69G	300

TABLE IX

MILL FEED

Locality	Analytical results p.p.m. Ni	Co	Cu	V	Mo	Pb	As
Lake View & Star	5	30	30	200	20	a	313
Gold Mines of Kalgoorlie	12	30	30	200	7	a	125
Great Boulder	10	60	100	500	15	a	125
North Kalgoorlie	15	60	100	500	20	100	75

TABLE X

REPRESENTATIVE ROCK SAMPLES

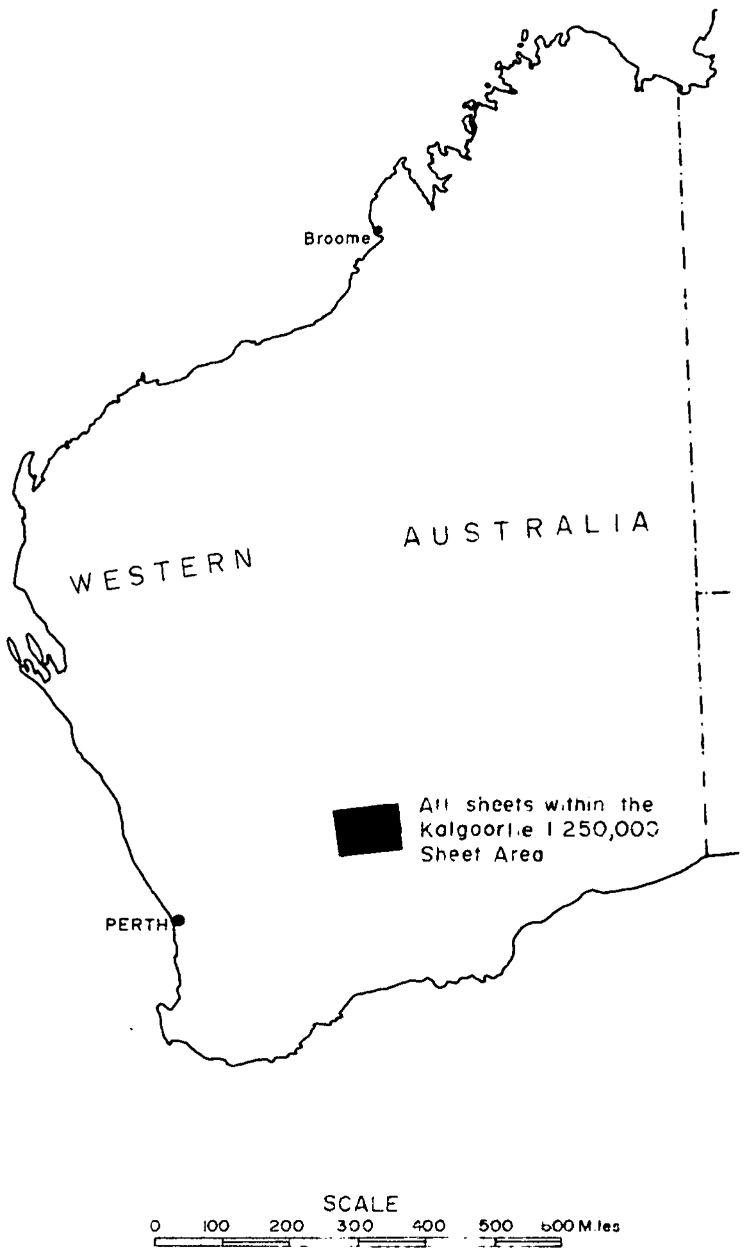
Sample details and analytical results p.p.m.

Sample No.	Map Reference	Grid Reference		Description of Sample	Ni	Co	Cu	V	Mo	Pb	As
M951	Boorabbin N.E.	N1, 160,525 yds.	E442,470 yds.	Graphitic schist	5	a	25	20	5	15	3-
M952	" "	N1, 160,000 yds.	E444,400 yds.	Med.-grained gabbro (=Younger Greenstone)	15	50	40	150	2	5	3-
M963	" "	"	"	Fine-grained basaltic volcanic	5-	10	5	10	3	10	$3\frac{3}{4}$-
M964	" "	"	"	Dolerite	5-	a	5	50	2	5-	3-
M953	" "	N1, 158,400 yds.	E451,050 yds.	Acid volcanic (quartz albite porphyry)	20	10	15	30	2	10	3-
M954	Widgiemooltha, N.W.	N1, 161,950 yds.	E453,650 yds.	Graphitic shale	80	30	2-	80	a	a	3-
M965	" "	N1, "	"	Sandstone	150	60	50	100	5	5-	3-
M955	" "	N1, 161,050 yds.	E461,760 yds.	Sheared amphibolite (=Younger Greenstone)	200	60	70	200	7	5-	3-
M956	" "	N1, 158,950 yds.	E462,800 yds.	Serpentinous amphibolite	1500	80	20	80	5	a	3-
M957	" "	N1, 157,200 yds.	E463,870 yds.	Medium-grained amphibolite (=Younger Greenstone)	150	60	80	300	a	a	3-
M958	" "	N1, 151,940 yds.	E463,870 yds.	Dolerite	30	a	100	300	10	5-	70
M959	Kalgoorlie North Prospecting Area N.C.G.F.A. Grid	11 chains South D23		Serpentinised basaltic volcanic	100	5	50	80	5	5-	15
M960	"	1 Chain West 122		Medium-grained amphibolite (=Younger Greenstone)	50	50	5	300	2	a	3-
M961	"	2 Chains West G13		Tuffaceous sediment	15	30	40	200	2	a	3-
M962	"	6 Chains South D18		Greywacke	10	a	5	5	5	5	3-

"a" = signifies absent

FIG. 1

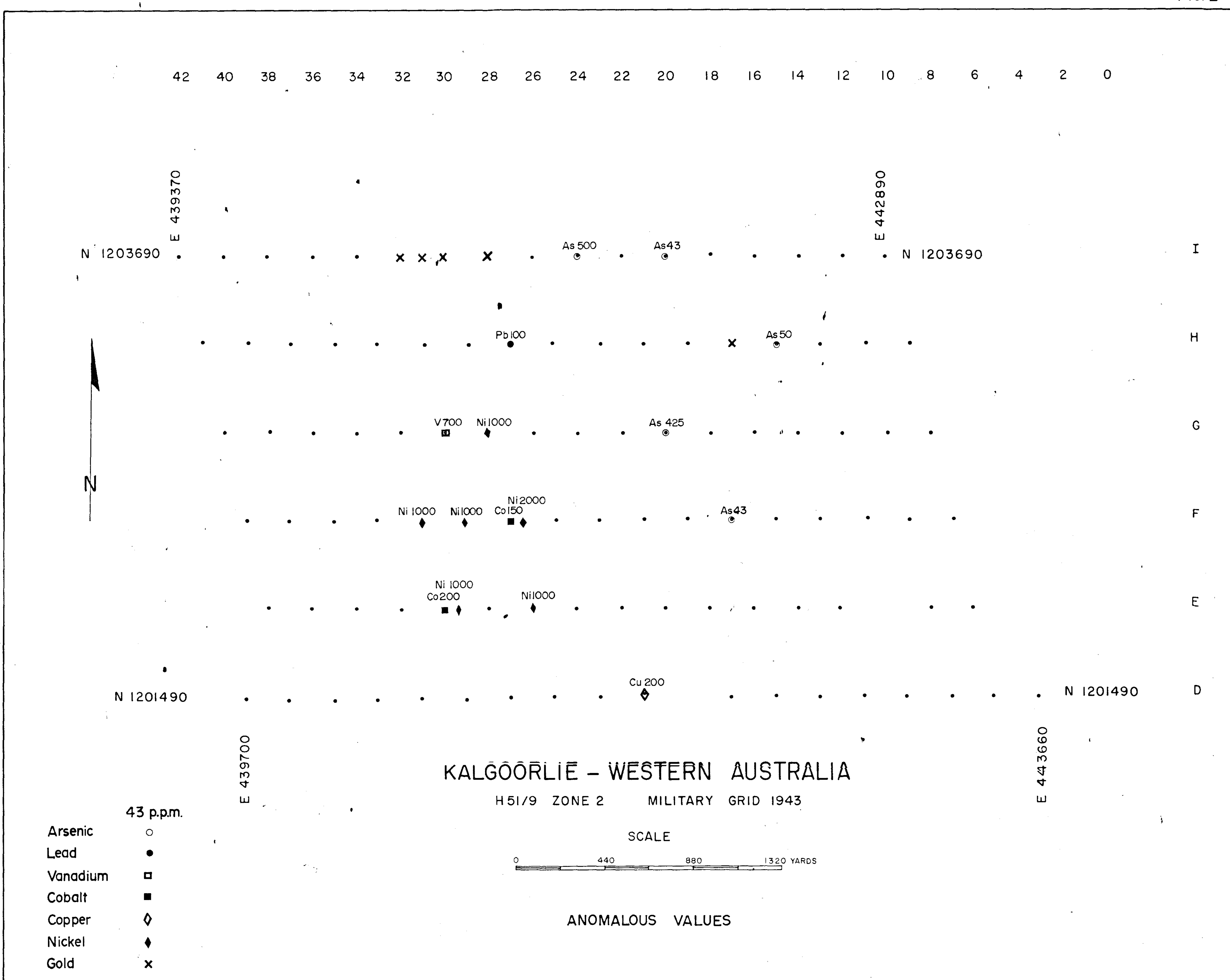
LOCALITY MAP



To accompany Record 966/96

H51/A9

FIG. 2



TO ACCOMPANY RECORD 1966/96

H51/A9/9

FIG. 3

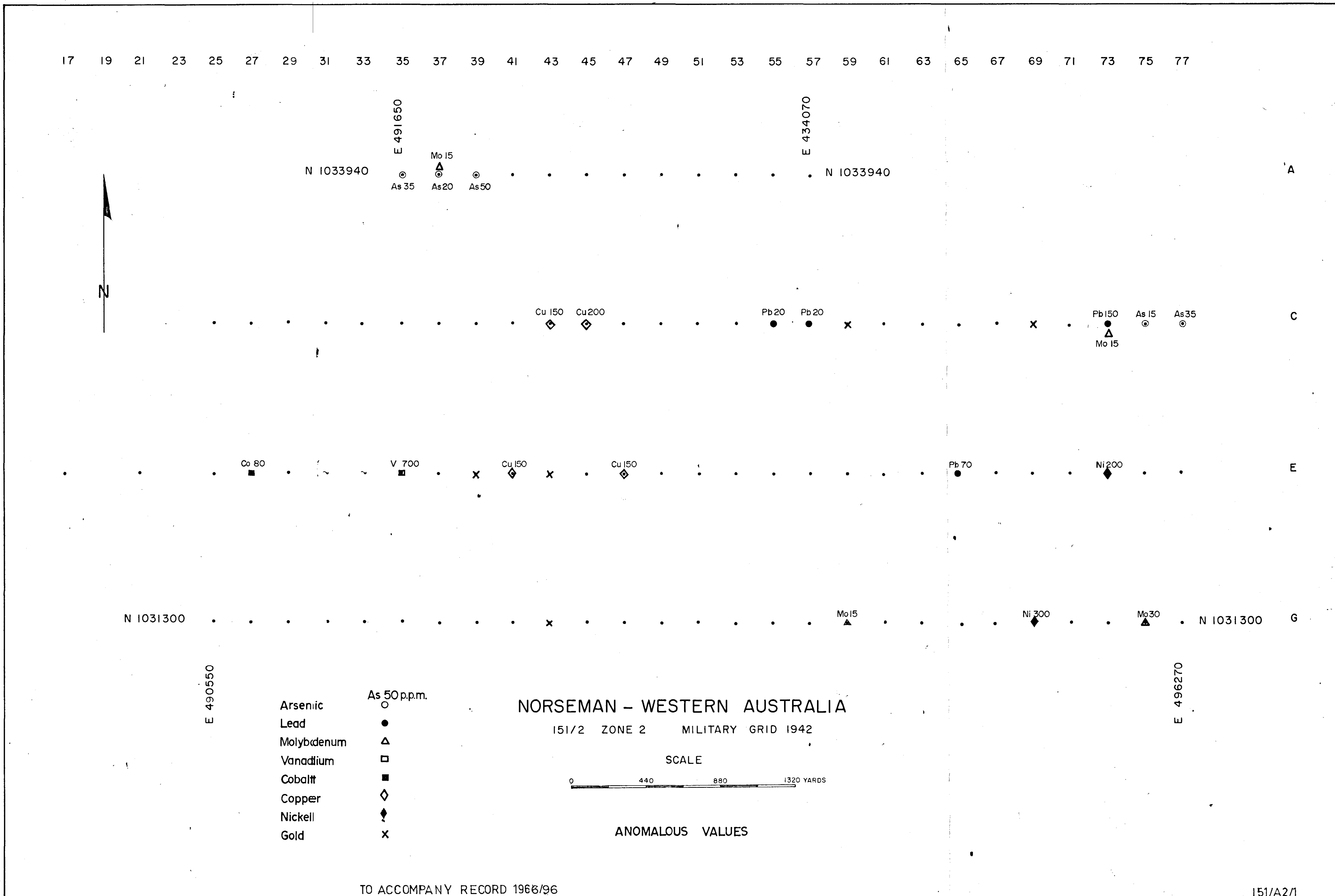
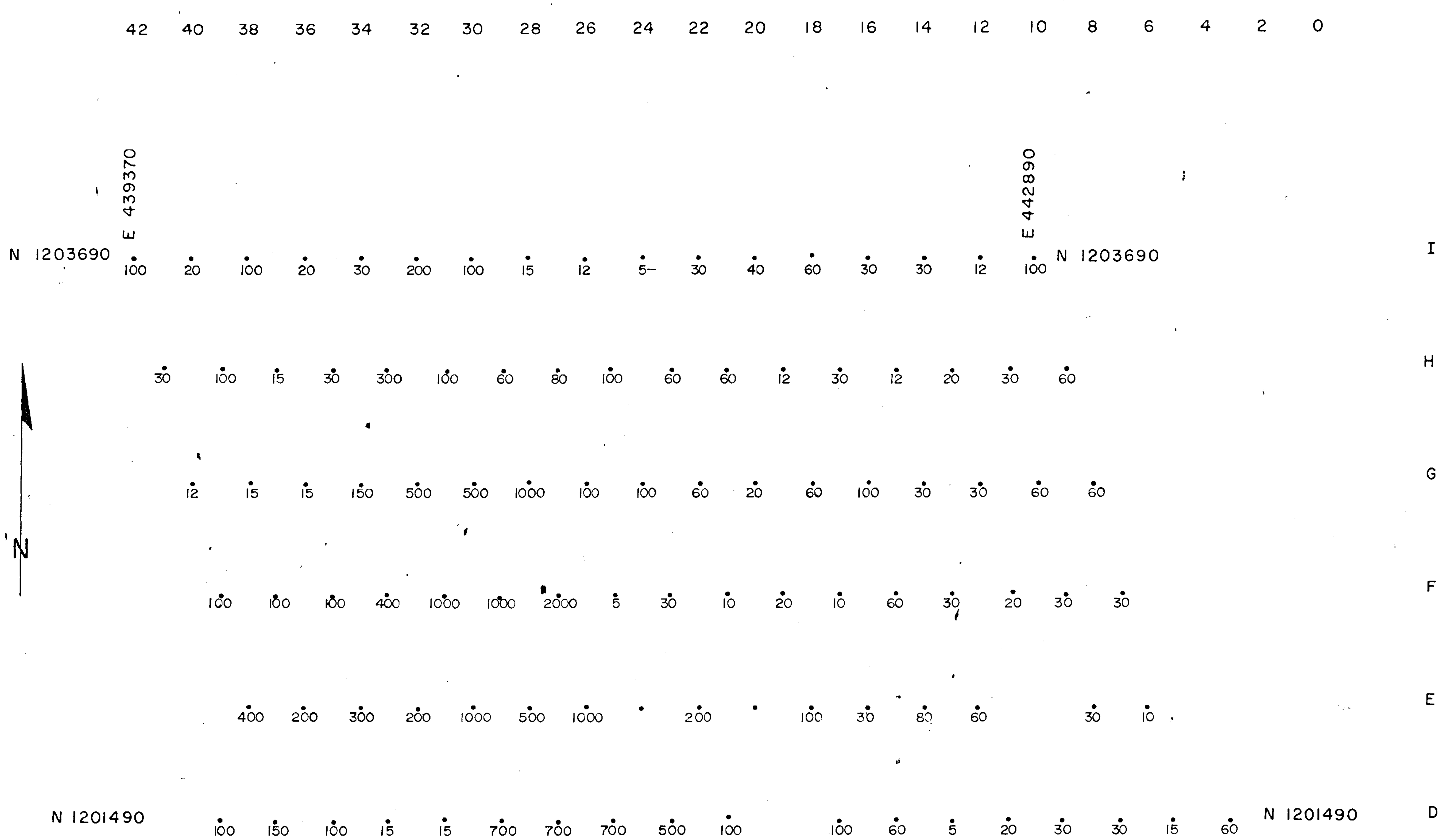

17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77
E 491650
E 434070
N 1033940
N 1033940
Mo 15
As 35
As 20
As 50
A
N
Cu 150
Cu 200
Pb 20
Pb 20
Pb 150
As 15
As 35
Mo 15
C
Co 80
V 700
Cu 150
Cu 150
Pb 70
Ni 200
E
N 1031300
Mo 15
Ni 300
Mo 30
N 1031300
G
E 490550
E 496270
As 50 p.p.m.
Arsenic
Lead
Molybdenum
Vanadium
Cobalt
Copper
Nickel
Gold
NORSEMAN – WESTERN AUSTRALIA
151/2 ZONE 2 MILITARY GRID 1942
SCALE
0 440 880 1320 YARDS
ANOMALOUS VALUES
TO ACCOMPANY RECORD 1968/96
151/A2/1

FIG. 4



E 439700

E 443660

KALGOORLIE – WESTERN AUSTRALIA

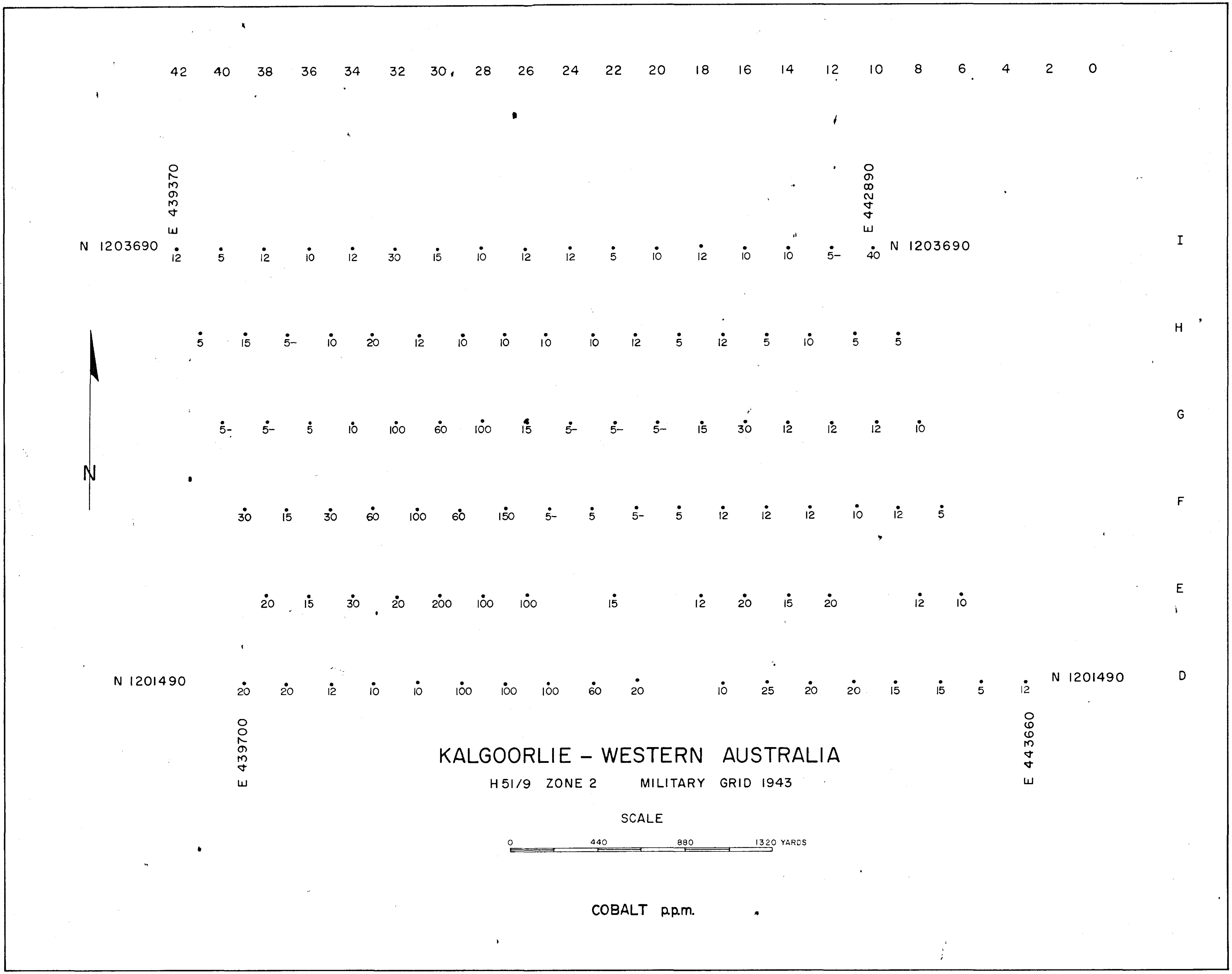
H 51/9 ZONE 2 MILITARY GRID 1943

SCALE

0 440 880 1320 YARDS

NICKEL p.p.m.

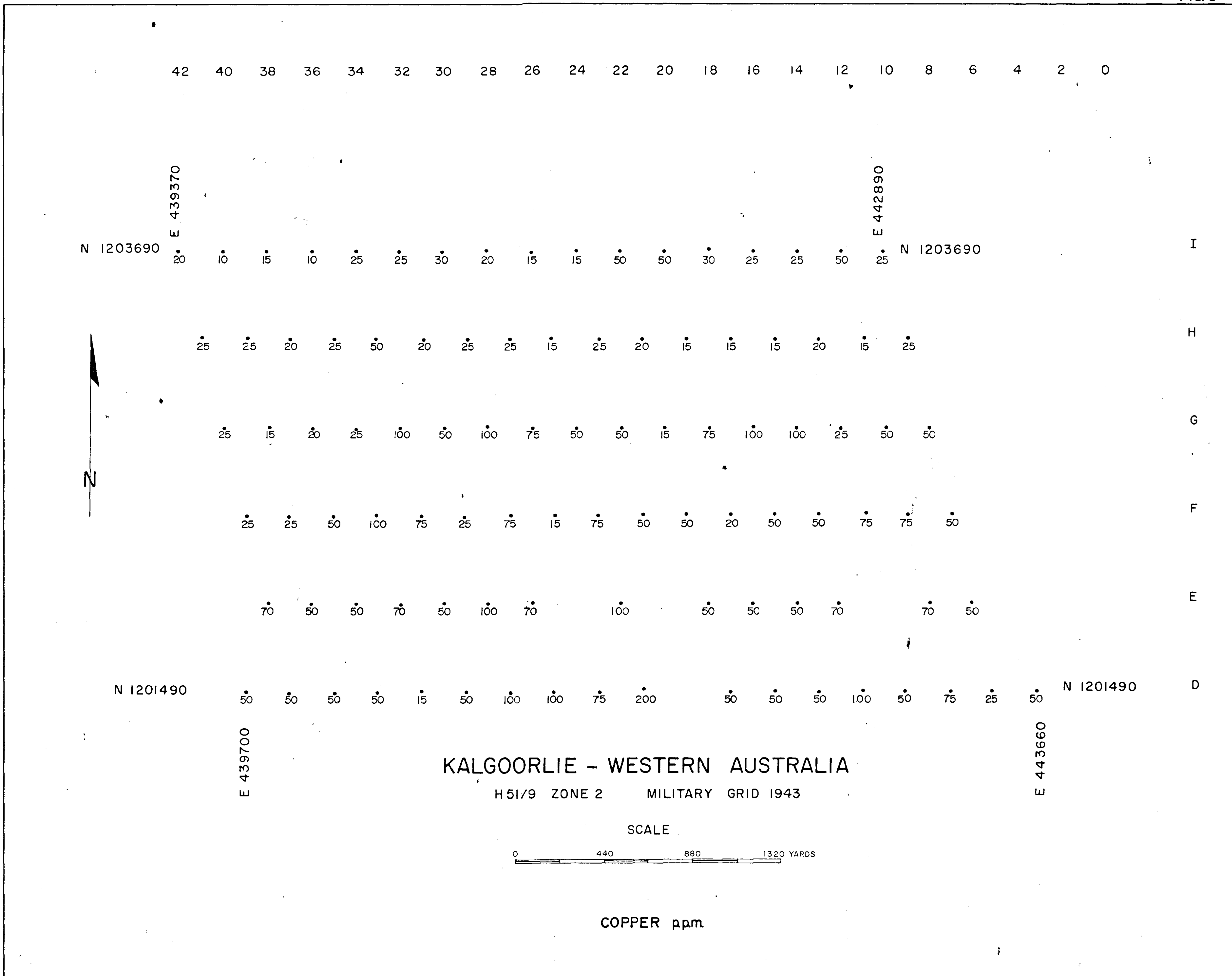
FIG. 5



TO ACCOMPANY RECORD 1966/96

H51/A9/16

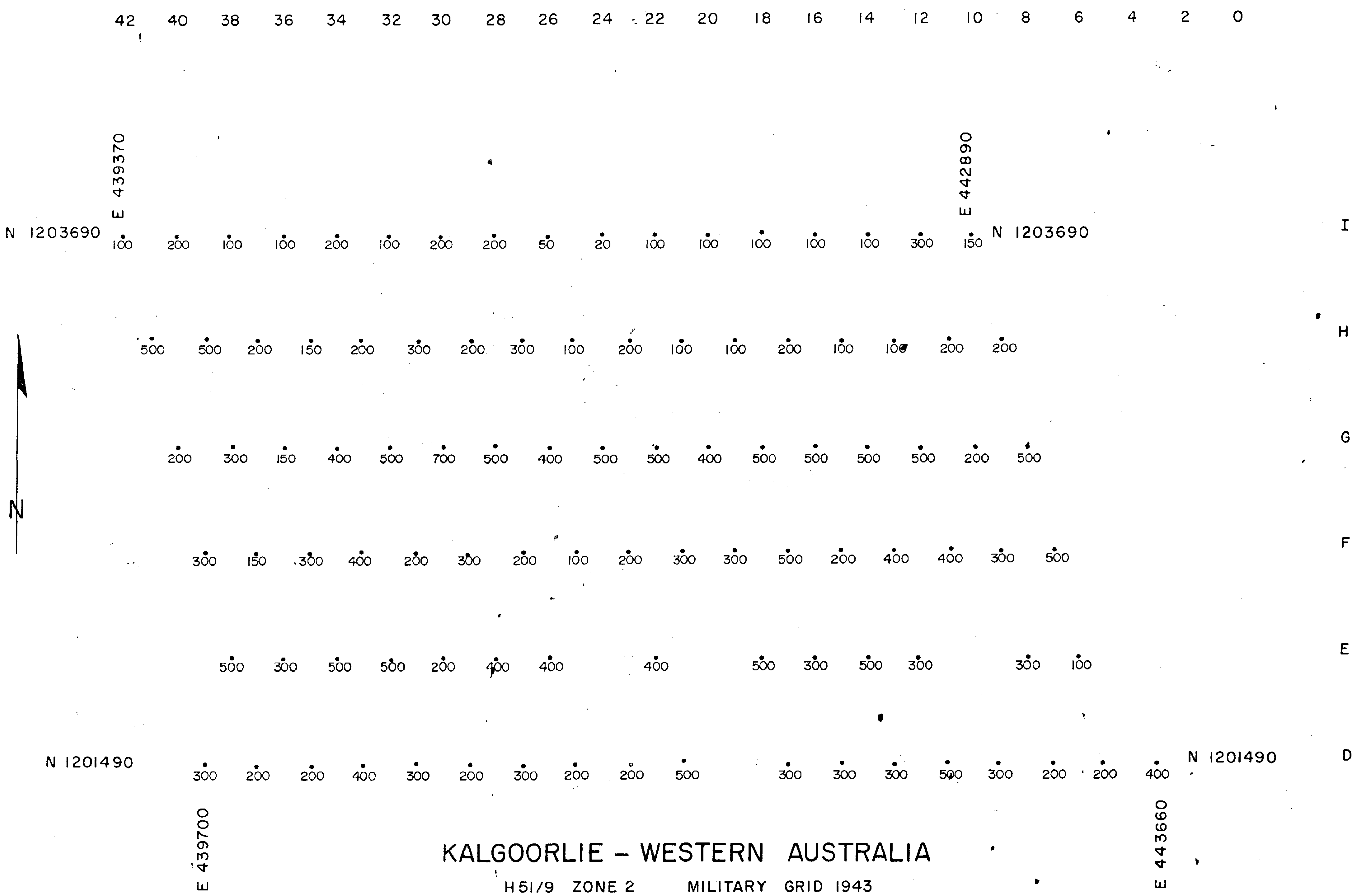
FIG. 6



TO ACCOMPANY RECORD 1966/96

H51 / A9 / 14

FIG. 7



KALGOORLIE – WESTERN AUSTRALIA

H 51/9 ZONE 2 MILITARY GRID 1943

SCALE

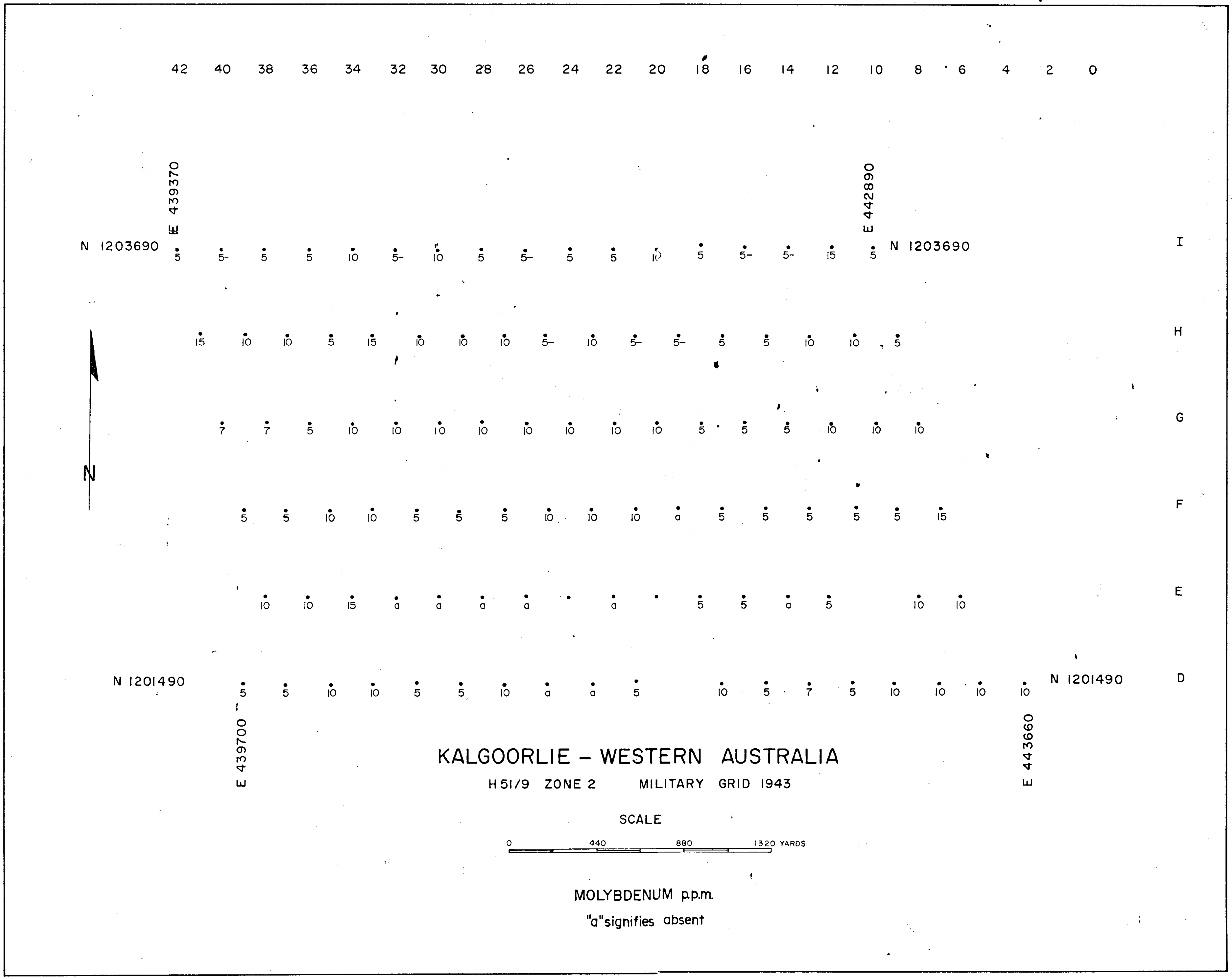
0 440 880 1320 YARDS

VANADIUM p.p.m.

TO ACCOMPANY RECORD/1966/96

H51/A9/12

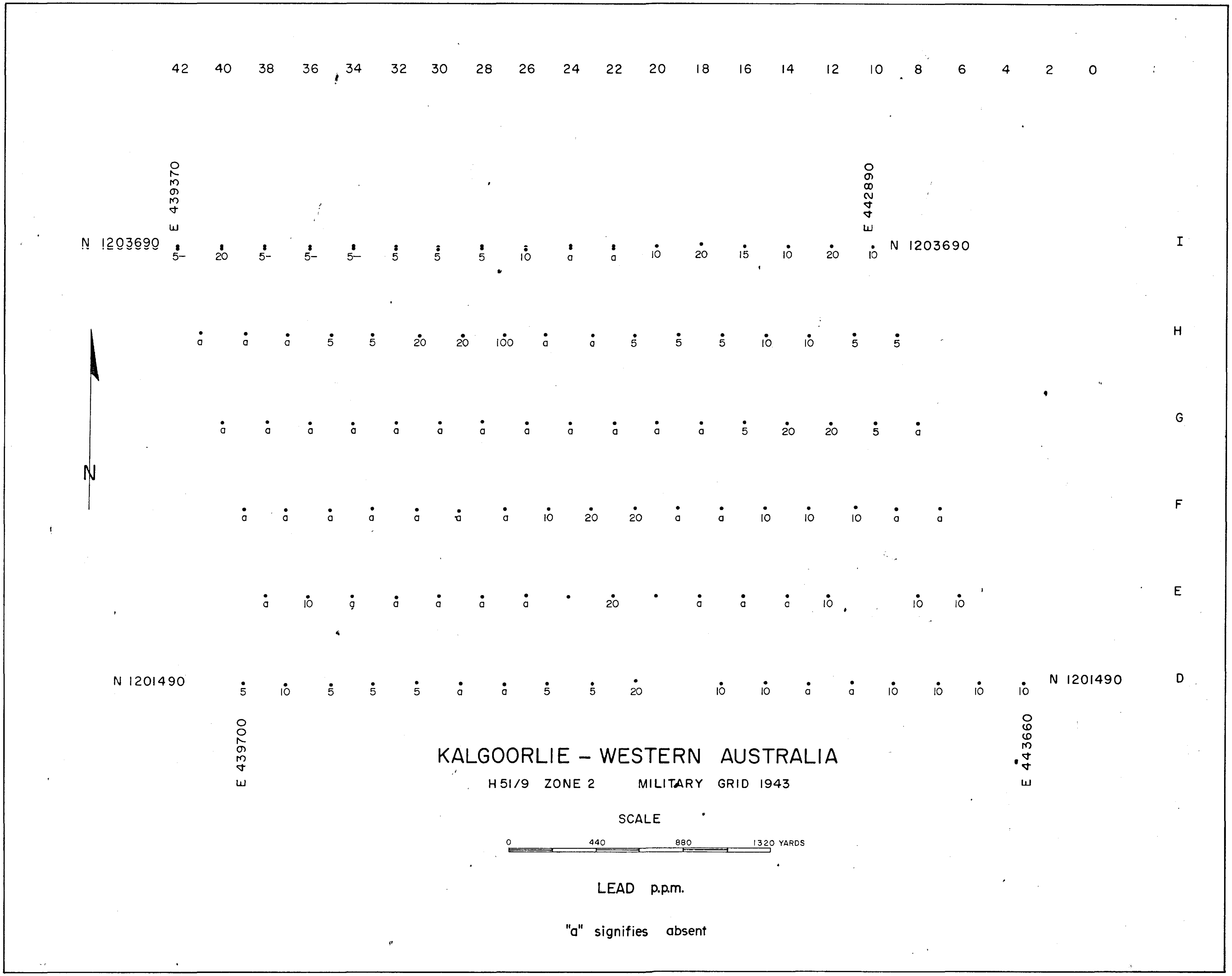
FIG. 8



TO ACCOMPANY RECORD 1966/96

H51/A9/11

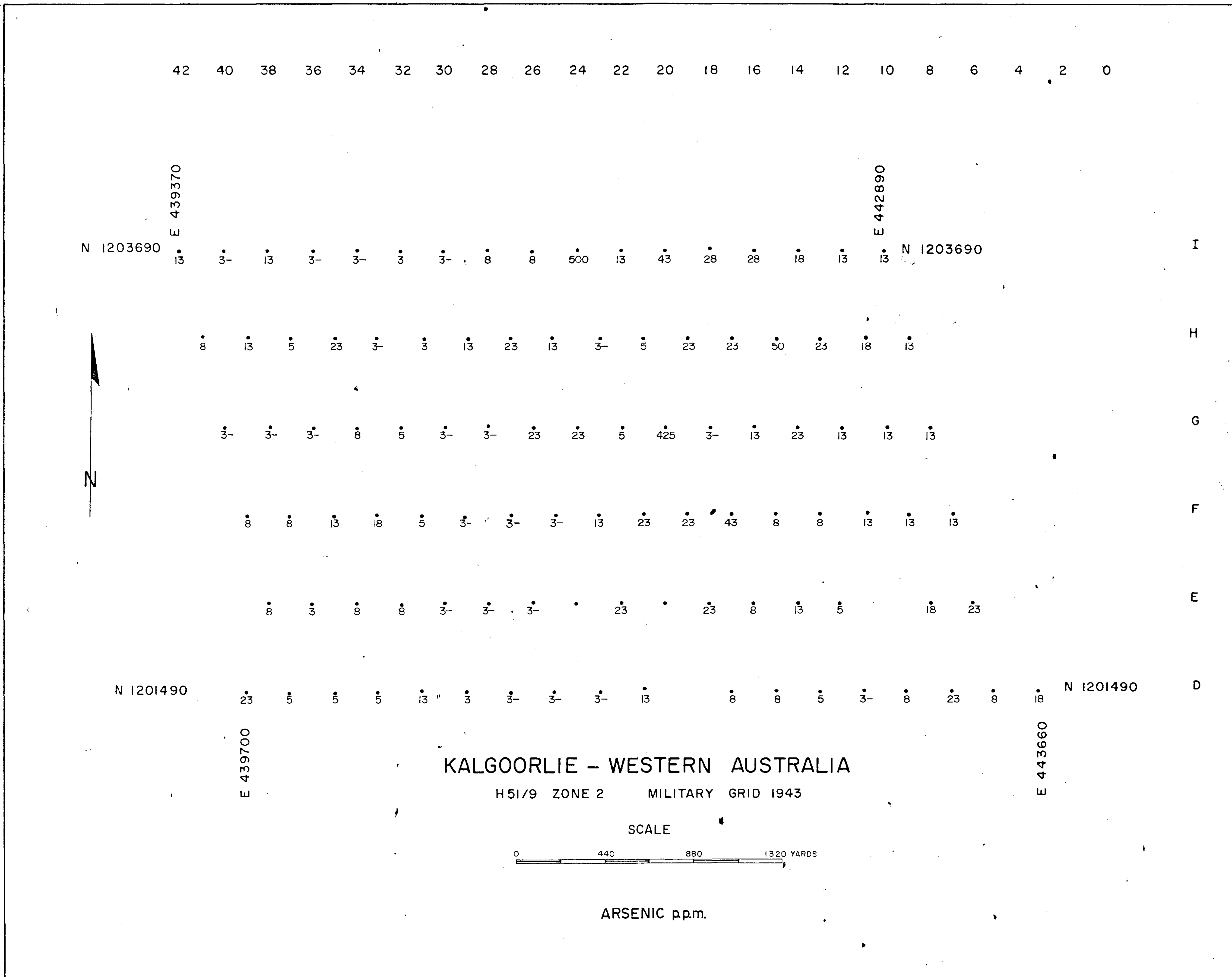
FIG. 9



TO ACCOMPANY RECORD 1966/96

H51/A9/10

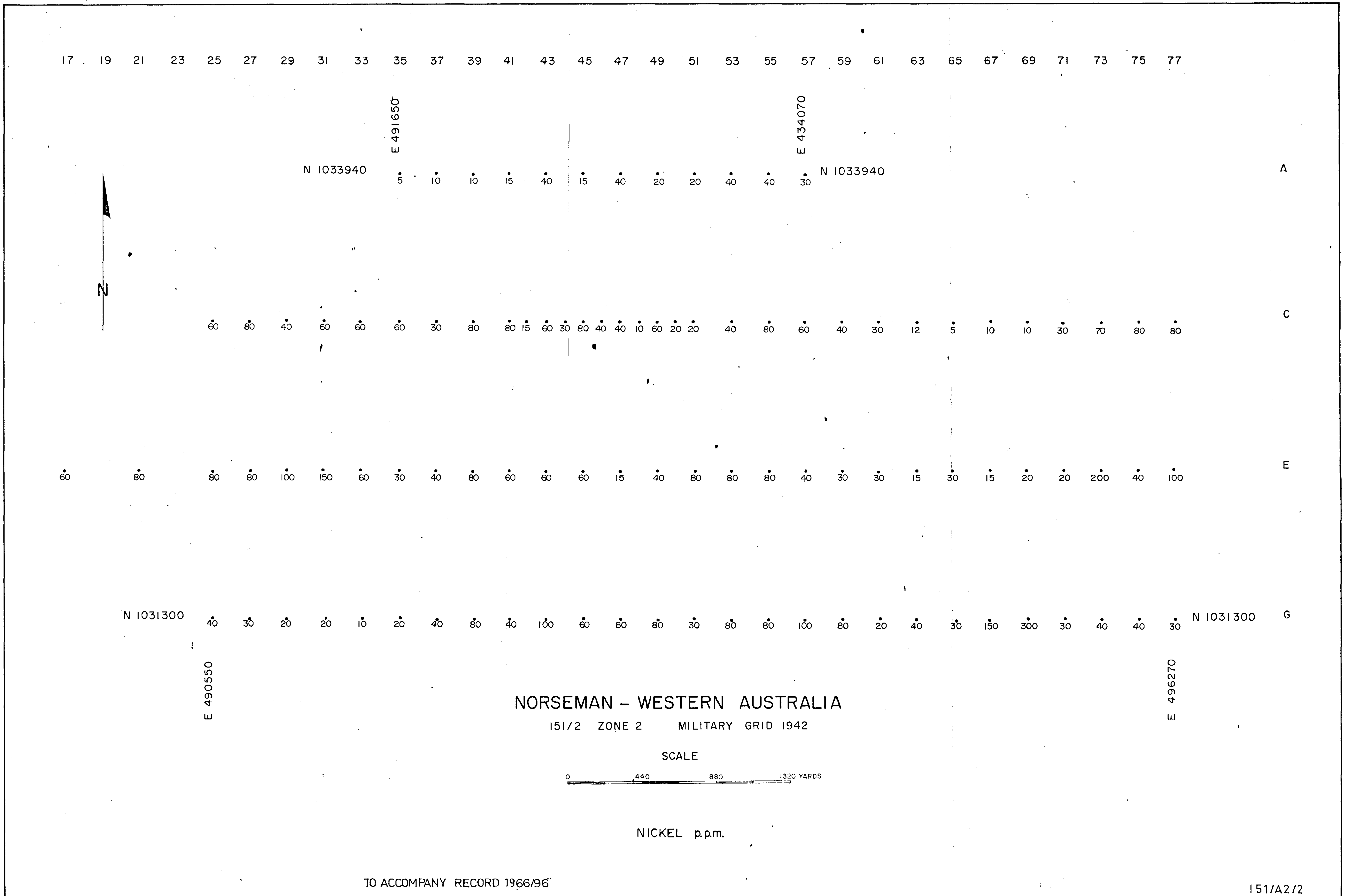
FIG. 10



TO ACCOMPANY RECORD 1966/96

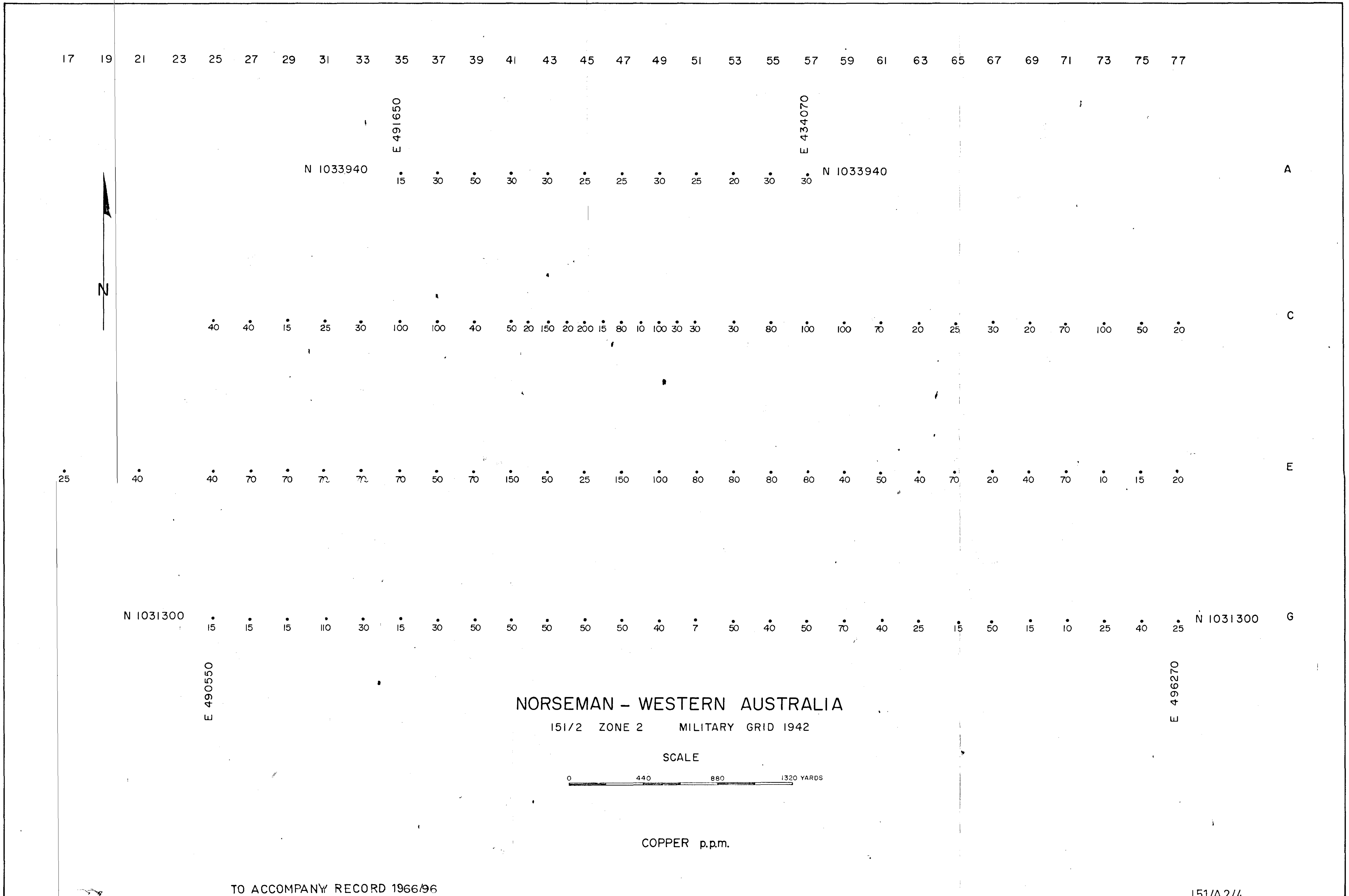
H51/A9/13

FIG. 11



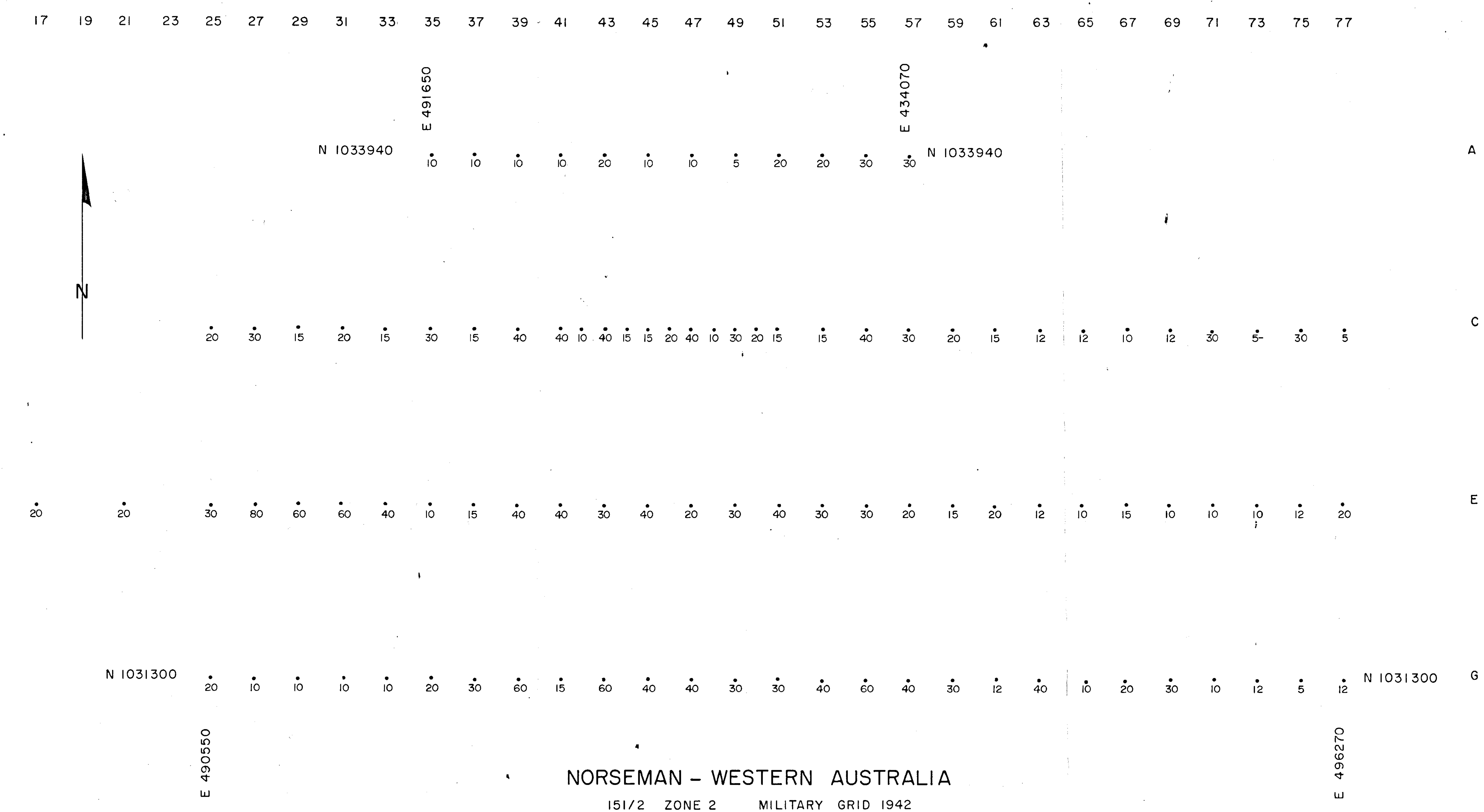
17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77
E 491650
E 434070
N 1033940
5 10 10 15 40 15 40 20 20 40 40 30
N 1033940
A
N
60 80 40 60 60 60 30 80 80 15 60 30 80 40 40 10 60 20 20 40 80 60 40 30 12 5 10 10 30 70 80 80
C
60 80 80 80 100 150 60 30 40 80 60 60 60 15 40 80 80 80 40 30 30 15 30 15 20 20 200 40 100
E
N 1031300
40 30 20 20 10 20 40 80 40 100 60 80 80 30 80 80 100 80 20 40 30 150 300 30 40 40 30
N 1031300
G
E 490550
E 496270
NORSEMAN - WESTERN AUSTRALIA
151/2 ZONE 2 MILITARY GRID 1942
SCALE
0 440 880 1320 YARDS
NICKEL p.p.m.
TO ACCOMPANY RECORD 1966/96
151/A2/2

FIG. 12



17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77
E 491650
E 434070
N 1033940
N 1033940
A
15 30 50 30 30 25 25 30 25 20 30 30
N
C
40 40 15 25 30 100 100 40 50 20 150 20 200 15 80 10 100 30 30 30 80 100 100 70 20 25 30 20 70 100 50 20
E
25 40 40 70 70 70 70 70 50 70 150 50 25 150 100 80 80 80 80 40 50 40 70 20 40 70 10 15 20
N 1031300
N 1031300
G
15 15 15 110 30 15 30 50 50 50 50 50 40 7 50 40 50 70 40 25 15 50 15 10 25 40 25
E 490550
E 496270
NORSEMAN – WESTERN AUSTRALIA
151/2 ZONE 2 MILITARY GRID 1942
SCALE
0 440 880 1320 YARDS
COPPER p.p.m.
TO ACCOMPANY RECORD 1966/96
151/A2/4

FIG. 13



NORSEMAN – WESTERN AUSTRALIA

151/2 ZONE 2 MILITARY GRID 1942

SCALE

0 440 880 1320 YARDS

COBALT p.p.m.

TO ACCOMPANY RECORD 1966/96

151/A2/8

FIG 14

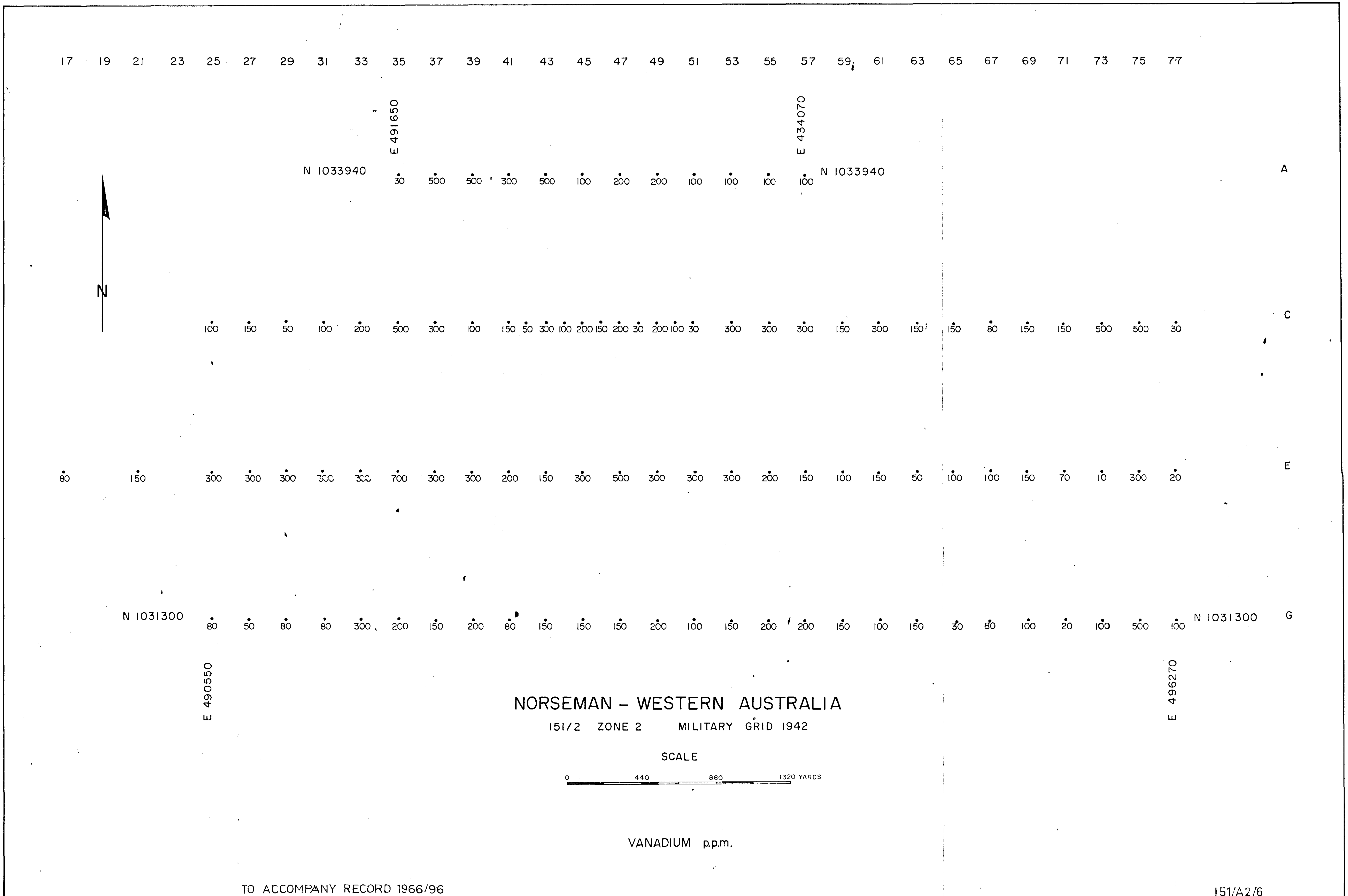

17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77
E 491650
E 434070
N 1033940
30 500 500 300 500 100 200 200 100 100 100 100
N 1033940
A
N
100 150 50 100 200 500 300 100 150 50 300 100 200 150 200 30 200 100 30 300 300 300 150 300 150 150 80 150 150 500 500 30
C
80 150 300 300 300 300 300 700 300 300 200 150 300 500 300 300 300 200 150 100 150 50 100 100 150 70 10 300 20
E
N 1031300
80 50 80 80 300 200 150 200 80 150 150 150 200 100 150 200 200 150 100 150 30 80 100 20 100 500 100
N 1031300
G
E 490550
E 496270
NORSEMAN – WESTERN AUSTRALIA
151/2 ZONE 2 MILITARY GRID 1942
SCALE
0 440 880 1320 YARDS
VANADIUM p.p.m.
TO ACCOMPANY RECORD 1966/96
151/A2/6

FIG. 15

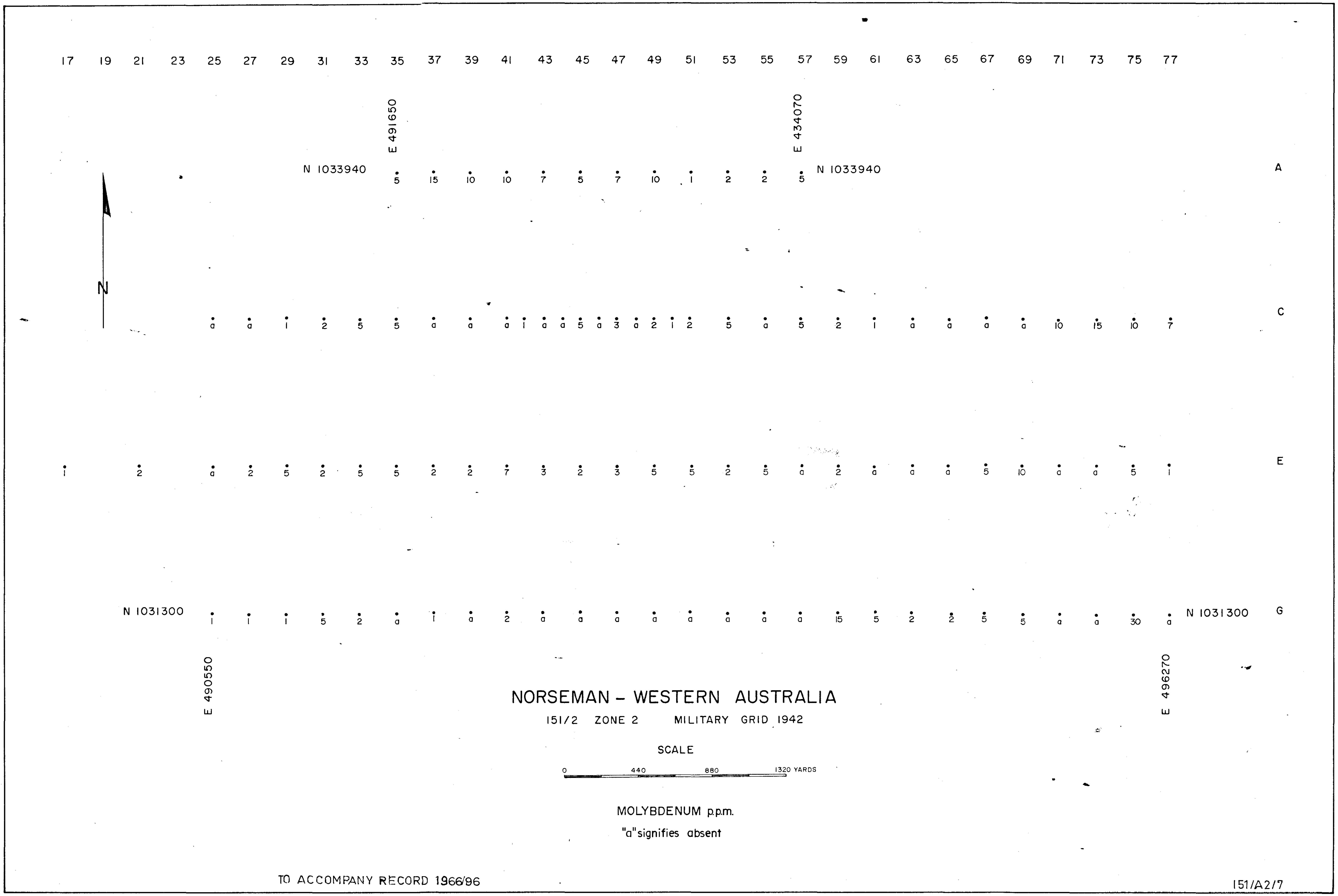
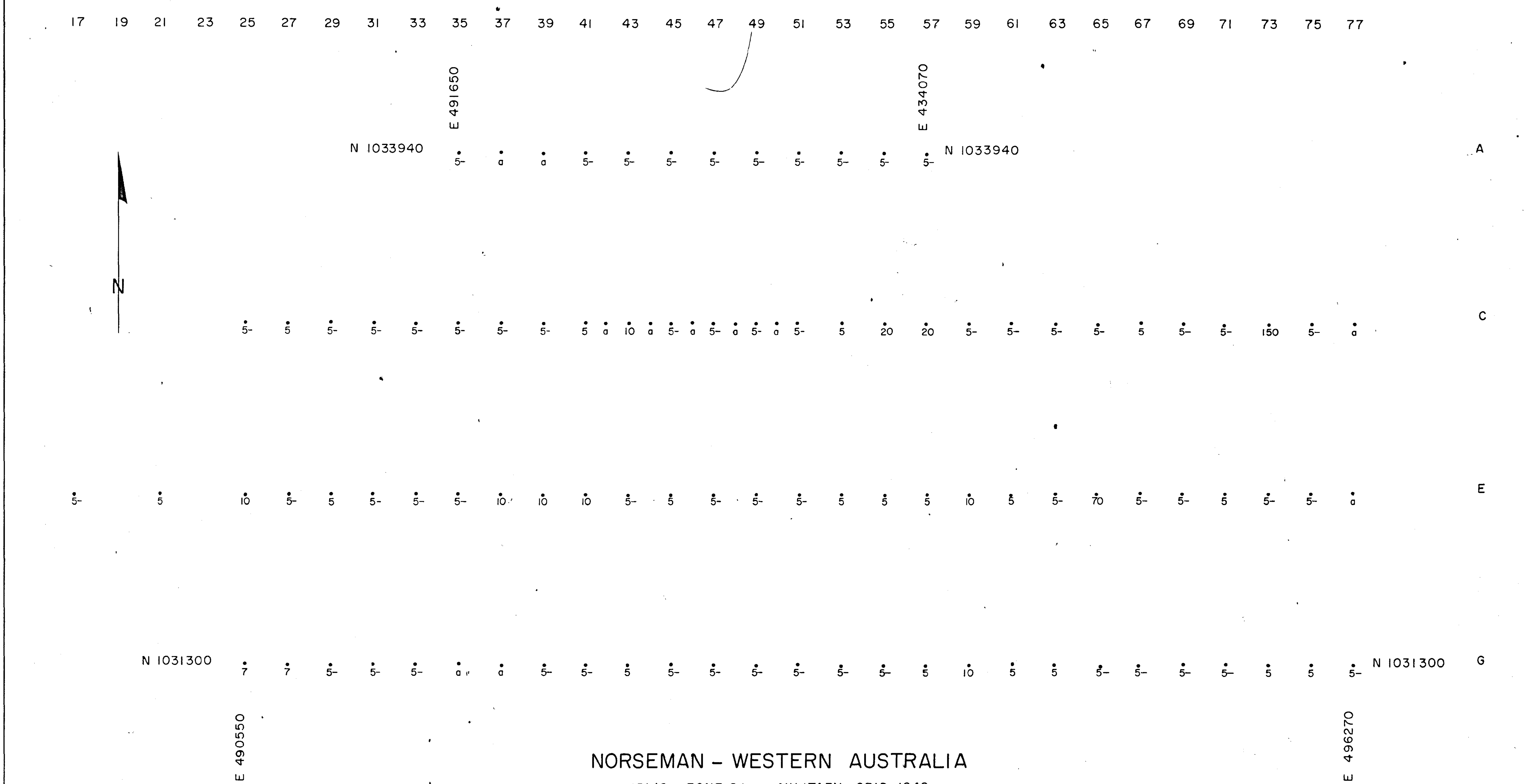

17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77
E 491650
E 434070
N 1033940
5 15 10 10 7 5 7 10 1 2 2 5
N 1033940
A
N
a a 1 2 5 5 a a a 1 a a 5 a 3 a 2 1 2 5 a 5 2 1 a a a a 10 15 10 7
C
1 2 a 2 5 2 5 5 2 2 7 3 2 3 5 5 2 5 a 2 a a a 5 10 a a 5 1
E
N 1031300
1 1 1 5 2 a 1 a 2 a a a a a a a a 15 5 2 2 5 5 a a 30 a
N 1031300
G
E 490550
E 496270
NORSEMAN – WESTERN AUSTRALIA
151/2 ZONE 2 MILITARY GRID 1942
SCALE
0 440 880 1320 YARDS
MOLYBDENUM p.p.m.
"a" signifies absent
TO ACCOMPANY RECORD 1966/96
151/A2/7

FIG. 16



NORSEMAN - WESTERN AUSTRALIA

151/2 ZONE 2 MILITARY GRID 1942

SCALE,

0 440 880 1320 YARDS

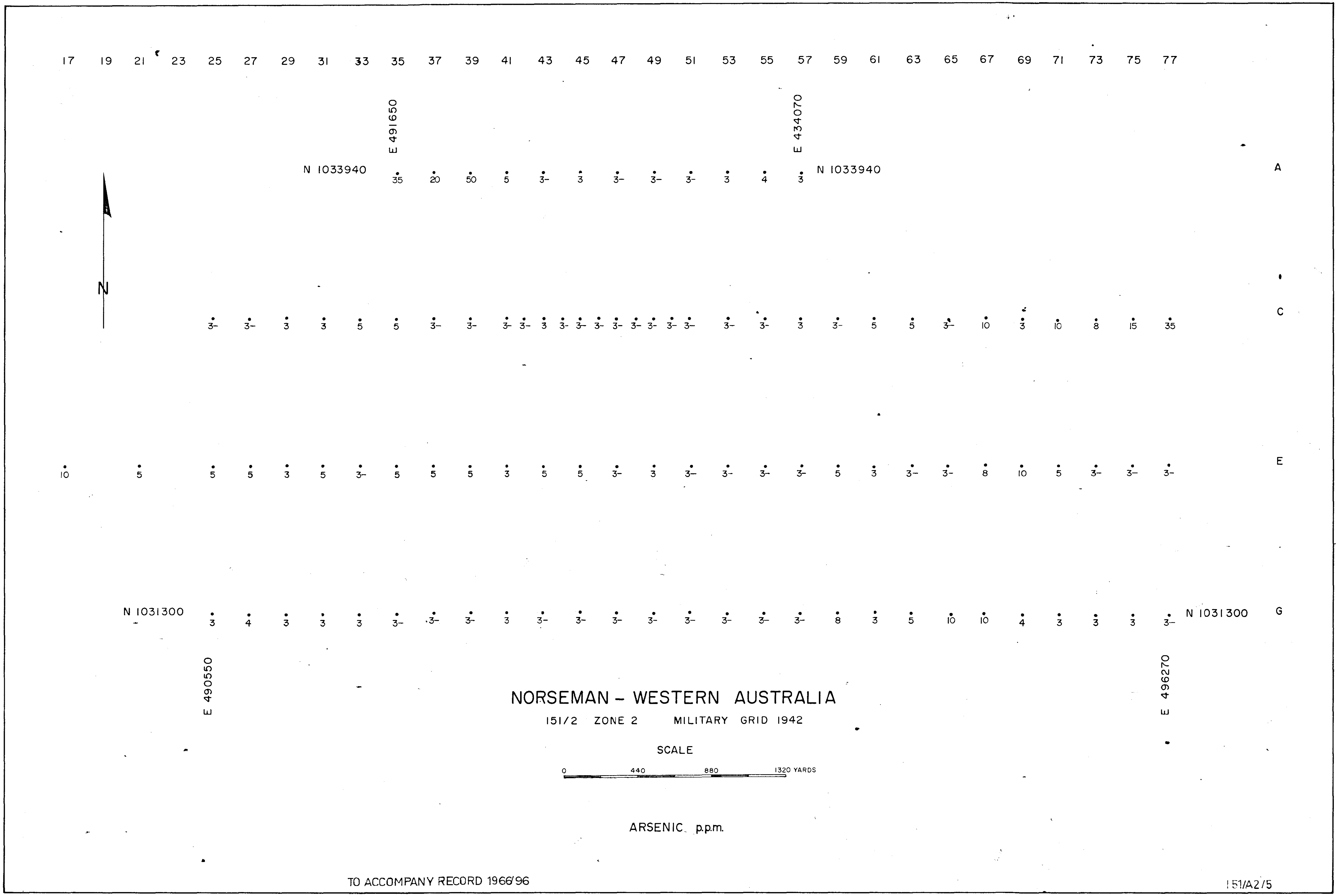
LEAD p.p.m.

"a" signifies absent

TO ACCOMPANY RECORD 1966/96

151/A2/3

FIG. 17


17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77
E 491650
E 434070
N 1033940
35 20 50 5 3- 3 3- 3- 3- 3 4 3
N 1033940
A
N
3- 3- 3 3 5 5 3- 3- 3- 3- 3 3- 3- 3- 3- 3- 3- 3- 3- 3- 3- 3 3- 5 5 3- 10 3 10 8 15 35
C
10 5 5 5 3 5 3- 5 5 5 3 5 5 3- 3 3- 3- 3- 3- 5 3 3- 3- 8 10 5 3- 3- 3-
E
N 1031300
3 4 3 3 3 3- 3- 3- 3 3- 3- 3- 3- 3- 3- 3- 3- 8 3 5 10 10 4 3 3 3 3-
N 1031300
G
E 490550
E 496270
NORSEMAN - WESTERN AUSTRALIA
151/2 ZONE 2 MILITARY GRID 1942
SCALE
0 440 880 1320 YARDS
ARSENIC p.p.m.
TO ACCOMPANY RECORD 1966/96
151/A2/5