COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

PRELIMINARY REPORT ON DIAMOND DRILLING AT ELLA CREEK PROSPECT. N.T.

by

J.D. Wyatt.

PRELIMINARY REPORT ON RADIOMETRIC BORE-LOGGING AND ASSAYING ELLA CREEK. NORTHERN TERRITORY.

by

I.A. Mumme.

DARWIN. N.T.

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C O N T E N T S

PLANS AND SECTIONS

Plate No.		Scale.
I	Geological Plan Ella Creek	1" = 100'
II	Section through DDH E1 E2 E3	1" = 40'
III	Radiometric Drill Hole Logs	1" = 40'

SUMMARY.

The Ella Creek Prospect was a first order anomaly discovered by the Bureau of Mineral Resources airborne scintillometer survey in 1952.

After a detailed examination by geologists and geophysicists, accompanied by intensive costeaning it was considered promising enough to warrant drilling. The three holes drilled were probed radiometrically and high counts ranging from 1,000 to 3,000 per minute were obtained.

No primary uranium mineralisation was encountered, and it is suggested that the source of the radioactivity, on chemical testing, may prove to be thorium.

INTRODUCTION.

The Ella Creek uranium prospect is a first order anomaly discovered by the Bureau of Mineral Resources airborne scintillometer survey of 1952. Subsequently the prospect was located on the ground by F.J. Frankovich, who made a preliminary inspection in December, 1952.

The prospect is one of a group of anomalies which is orientated in an easterly direction over a distance of 8 miles; the name of the prospect is derived from the fact that on the Marrakai Military Sheet, Ella Creek is the nearest named feature to the prospect

The results of surveys and subsequent costeaning indicated that drillingshould be carried out for a more thorough investigation.

GENERAL STATEMENT ON DRILLING.

The Ella Creek anomaly occurs in an area of folded slates and quartzites showing varying degrees of hematization and generally dipping to the north at a steep angle.

The anomaly is divided into two areas one to the west approximately 700 feet by 300 feet and a second to the east approximately 900 feet by 400 feet. (See PLATE 1.)

The western anomaly shows the highest counts at 4,000 to 10,000 per minute and drilling was commenced in this area.

Although it was not possible to orientate the core, bedding observed bore out the suggestion that it was dipping steeply to the north and contorted in places by folding.

The following is a summary of the reasons for the positioning of the drill holes and the results obtained from them.

Hole E 1

Coordinates: 327 S., 367,W.
Bearing: 179° True.
Depression: 35°.

Assuming a north dip hole E 1 was sited to intersect at depth the continuation of the high count areas situated at 502 S., 377 W. and 517 S., 287 W., (See PLATE 1.)

Encouraging signs were encountered at between 80 and 150 feet where counts per minute increased to a maximum of 3,000 at 133 feet 9 inches in the hematitic sandy shale zone. Counts then dropped bff steadily and the hole was abandoned at 300 feet.

Hole E 2.

Coordinates: 502 S., 377 W.
Depression: Vertical Hole.

This hole was intended to be one of a series of shallow 40 feet holes sited over a number of high spots to test their continuity below the surface.

However the Hindrill E 100 proved too light for the job and the hole was abandoned at 28 feet. Radiometric probing showed counts of 1,000 to 2,000 per minute for the whole of this depth.

Hole E 3.

Coordinates: 227 S., 387 W.
Bearing: 179° True.
Depression: 65°.

Diamond drill hole E 3 was sited to intersect the anomaly in the primary zone, assuming a continuation of high counts through the site of E 2 at an angle of approximately 50 degrees (See PLATE 11.) Target depth was 220 feet vertically below the surface.

However the results were disappointing, although hematitic shale giving counts of 2,200 per minute was intersected at 70 feet vertically below the surface. From then on counts diminished and the hole was abandoned at 319 feet.

Sulphide in the form of iron pyrites was encountered in carbonaceous shale at a drill depth of 273 feet and carbonaceous shale and pyrite were still in evidence when drilling ended at 319 feet.

DRILLING RESULTS.

The details of diamond drilling completed and also information regarding core recovery are given in the following tables.

TABLE 1

Drill Hole No.	Co-ords.	Reduced Level (Feet.)	Bearing (Degrees) True.	Depression (Degrees)	Drill Depth (Feet.)	Inst. Assay. % U_3O_8.	Remarks.
E1	327 S. 367 W.	567	179	35	300	90' - 95', .014 100 - 110, .015 110 - 120, .016 120 - 135, .024 135 - 145 .015	196' - 203' Sulphides
E2	502 S. 377 W.	567		Vertical	28	4' - 6', .018 6 - 15, .012 15 - 21' .016	
E3	227 S. 387 W.	570	179	65	319	45 - 80 . 015 80 -135 . 024 145 -170 . 015 170 -215 . 012	273' onwards Sulphides

TABLE 11

Drill	Hole	Depth (Feet.)	Core Recovered (Feet)	% Core Recovery	Date Comm.	Date Comp.	Rate per Week.
SULLIVAN 22 NX, HH, DX, EH, AX BITS USED.	E1	300	124	44.3	2. 11. 53	9. 12. 53	60'
HINDRILL E100 HH, BX, EH. AX BITS USED.	E2	28	2.8	10.1	25. 11. 53	4. 12. 53	28'
SULLIVAN 22 HH BIT USED.	E3	319	272.2	85.2	15. 12. 53	15. 1. 54	63' 9"

AVERAGE CORE RECOVERY = 61.6%

AVERAGE RATE PER WEEK = 58' 0"

TOTAL DRILLING = 647'

GEOLOGICAL LOGS.

Table III summarizes the geological information gained from the diamond drilling of Ella Crook Prospect.

The detailed field log sheets showing assay results, length of runs etc are available if required.

TABLE III

Drill No.	Depth in Feet	Geological Log.
E1	0' - 16'	Lateritic rubble
	16' - 36'	Grey and lateritic shale.
	36' - 58'	Hematised shale brecciated in parts.
	58' - 112'	Hematised and sheared shale with fine box works and brecciated zones at 103'- 1325 counts per minute.
	112' - 119'	Grey sheared shale with quartz. 550 counts per minute.
	119' - 132'	Sandy hematised shale 1500 - 3000 counts per minute.
	132' - 196'	Grey shale in places hematised and brecciated.
	196' - 203'	Black carbonaceous shale plus small amount of pyrite.
	203' - 245'	Hematised shale.
	245' - 250'	Cream shale.
	250' - 265'	No core.
	265' - 300'	Grey shale with hematised bands.
E2	0' - 4'	Shale rubble.
	4' - 22'	Sandy hematitic shale with quartz.
	22' - 28'	Dark grey shale plus quartz veinlets.
E3	0' - 150'	Sheared hematitic shale.
	150' - 250'	Grey and cream sheared shale.
	250' - 263'	Grey shale sandy.
	263' - 273'	Grey shale.
	273' - 319'	Carbonaceous shale with pyrite and quartz. Pyrite associated with shearing inclined at 30° to hole. Dodding 40° to hole.

GEOPHYSICAL LOGGING.

Diamond drill holes E1, E2, and E3 were radiometrically logged by geophysicist I.A. Hummo with drill hole logging equipment (Geiger Type) EA 191.

A graphical representation of the logging results is shown in PLATE III where results can be compared with the geological section of each hole.

ASSAY RESULTS.

Final assay results are determined by the Radiometric Section of Territory Enterprises Pty.,at Rum Jungle.

Table IV shows the relationship between drill depth and field assay results.

Radiometric logging agrees fairly closely with assay results.

TABLE IV

Drill Hole.	Depth in Feet.	Field Assay Result.
E1	90' - 95'	.014 % oU_3O_8
	100' - 110'	.015 "
	110' - 120'	.016 "
	120' - 135'	.024 "
	135' - 145'	.015 "
E2	4' - 6'	.018 "
	6' - 15'	.012 "
	15' - 21'	.016 "
E3	45 - 80	.015 "
	80 - 135	.024 "
	145 - 170	.015 "
	170 - 215	.012 "

CONCLUSIONS.

Diamond drilling has proved to be very disappointing in so far that no primary uranium mineralization has been located.

However radiometric probing has revealed that high radioactivity is associated with hematisation and when hematite is not present then counts drop appreciably.

This points to the radioactive source being finely disseminated through the hematite and either being syngenetic in origin or due to concentration by leaching from some unknown source.

It is suggested that further geological mapping be carried out in the Ella Creek Area in an effort to unravel the folded structure which is in evidence on the surface. This, when completed may provide a further clue to the location of any existing primary uranium.

Against this, the complete lack of either primary uranium at depth or secondary uranium products on the surface must lead to the conclusion that little or no uranium ore of commercial value will be found at Ella Creek.

It has been suggested that the source of radioactivity is probably thorium as at Madigans Prospect. This possibility will be proved or disproved as soon as chemical tests are completed and a definite answer provided.

REFERENCES.

Matheson, R.S. 1953: Rum Jungle Investigations 1951 and 1952. Progress Report. Bureau of Mineral Resources Geological Report 1953/24.

Mumme, I.A. 1953: Geophysical Report on the Ella Creek Radioactive Deposit, Northern Territory. Bureau of Mineral Resources. Geophysicist Report.

Smith, K.G. 1953: Preliminary Geological Report on the Ella Creek Uranium Prospect, Northern Territory. Bureau of Mineral Resources Geological Report 1953/120.

January, 1954. John Wyatt.

PLATE I

To Brodibb Highway.

CREEK BED

Quartz

550'

575'

600'

TRUE 4°30' MAG

CREEK BED

BASE LINE

CREEK BED

CREEK BED

E1 -35°

E3 -65°

E2 Q4000 c/s

10000 c/s

45°

70°

ELLA CREEK URANIUM PROSPECT

RUM JUNGLE AREA

NORTHERN TERRITORY., AUSTRALIA.

Adapted from p[illegible] by K. SMITH. Prepared by J. WYATT Jan. 1954.

100 0 100 200 feet.

SCALE.

REFERENCE

LOWER PROTEROZOIC

BROCKS CREEK GROUP

- Hematised Brecciated Quartzite
- Zone of silicification with veinlets of hematite
- Hematised silicified slates
- Grey slates

- 600 — Topographic contours
- 2x — Radiometric contours
- 60 — Strike and dip of beds
- 70 — Strike and dip of [illegible]

PLATE II

100S 200S 300S 400S 500S 600S 700S

600'

500'

400

300'

200'

120 — Counts per minute 4,000 — 120

N.B. E2 projected onto plane of E1 and E3

E2

Between 1000 2000 counts/min.

E2 at 4·12·58.

E3

E1

800/m 60'

Max. counts 2200/m at 87'

800/m 145'

180/m 85'

Max. counts 3000/m 133'

E1 AND E2

270/m 150'

PROJECTED TARGET THROUGH E1 AND E2

Banded blk & grey shale

No Core

300' 9·12·53

319' 15·1·54

ELLA CK PROSPECT

SECTION ALONG DDH E1 AND E3

BEARING 179° T LOOKING 89° T

0 40 80 ft.

Scale

LEGEND

- Laterite
- Grey and cream shale
- Hematized and sheared sh
- Brecciated shale
- Sandy shale
- Qtz veinlets
- Black shale + sulphides

PLATE II

ELLA CREEK RADIOACTIVE PROSPECT
RADIOMETRIC DRILL HOLE LOGS

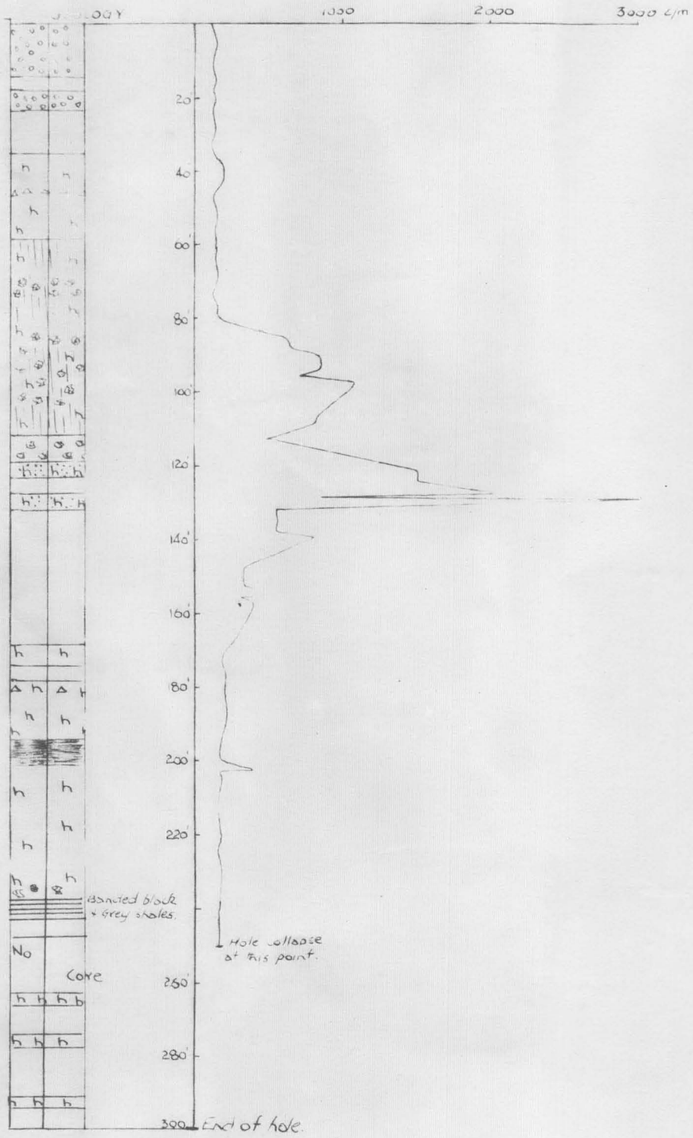
40 0 40 80 feet.

VERTICAL SCALE

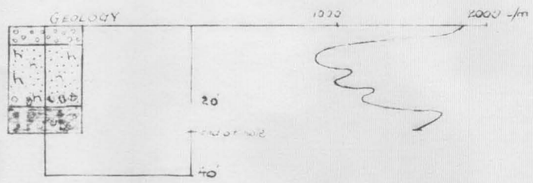
1000 0 1000 2000 c/m

HORIZONTAL SCALE

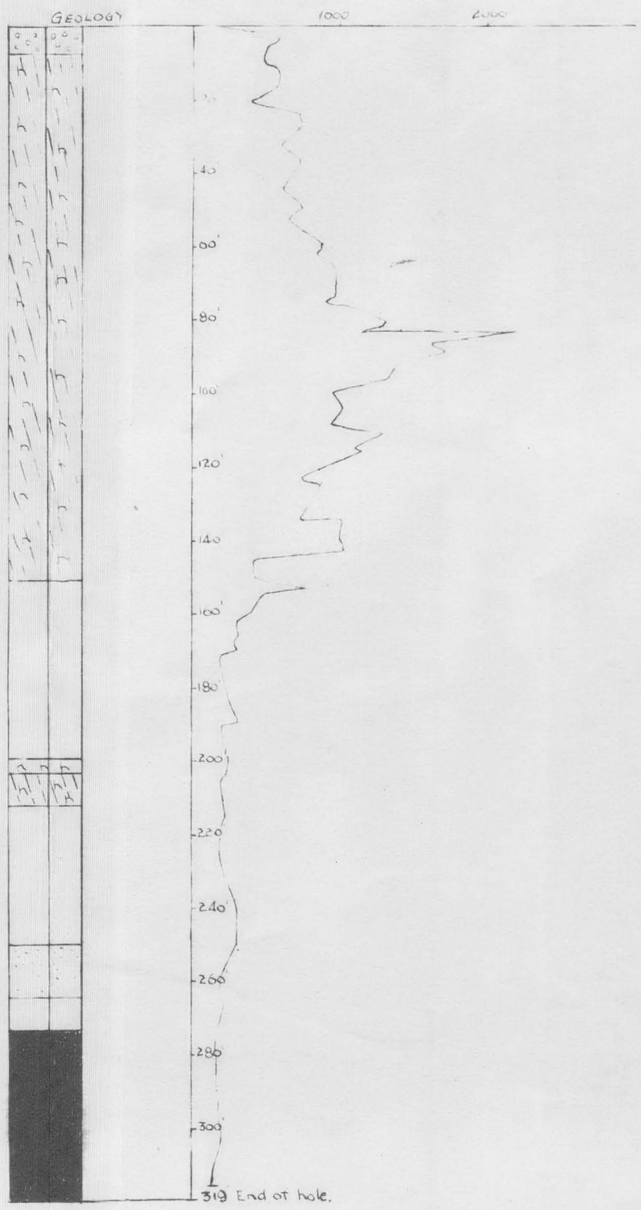
DRILL HOLE E1



DRILL HOLE E2



DRILL HOLE E3



REFERENCE

- LATERITE RUBBLE
- GREY SHALE
- HEMATIZED AND SHEARED SHALE
- BRECCIATED SHALE
- SANDY SHALE
- QUARTZ VEINLETS
- BLACK AND DARK GREY SHALE

Prepared by JDWYATT

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by

I.A. Humme.

RECORDS

C O N T E N T S

PLANS.

Plate No.		Scale:
		HORIZONTAL.
1	Instrument Calibration.	1" = 1000 counts per minute.
		VERTICAL.
		1" = 0.1 lbs of U_3O_8 per ton.

PRELIMINARY REPORT ON RADIOMETRIC BORE-LOGGING AND ASSAYING AT ELLA CREEK.

SUMMARY.

Geophysical work carried out at Ella Creek prospect suggests that the radioactivity of the rocks is due to a finely disseminated thorium mineral.

Uranium may occur associated with the thorium as a mineral but only as a trace element.

Many of the first, second and third order Scintillometer anomalies along the Ella Creek - Brodribb line of anomalies are possibly due to thorium bearing laterites and haematitic siliceous slates.

RADIOMETRIC LOGGING OF THE DIAMOND DRILL HOLES AT ELLA CREEK.

Three diamond drill holes were completed to intersect the radioactive zones to obtain information concerning the type and cause of radioactive mineralization.

The Diamond Drill holes E1 and E3 were drilled to a depth of 300 feet and 319 feet respectively with a Sullivan 22 Drill. A prospecting hole E2 was drilled with a Mindrill type drill to a depth of 28 feet.

The three drill holes intersected radioactive zones but these zones corresponded to low eU_3O_8 or eTh02 percentages. The drill hole E3 intersected pyrite in carbonaceous slates at depth but no radioactive minerals were identified in this zone. The radioactive zones were found to be invariably associated with sheared and brecciated siliceous and haematitic slates.

The following alternatives for the genesis of the radioactive rocks are possible:-

(a) The radioactive mineral is syngenetic and occurs on haematized siliceous slate.

(b) The radioactive mineral was introduced into brecciated and sheared slates from hypogene solutions accompanying quartz injections. Subsequently the mineral has possibly been concentrated at the surface by weathering processes and then in recent times the surface concentration blanketed by soil drift.

Radiometric logging was carried out with a drill hole geiger type EA-191 manufactured by the Electronic Associates Limited, Toronto Canada.

Essentially the drill hole geiger EA-191 consists of a special geiger counter circuit with enclosed supply batteries, a special probe containing a geiger tube enclosed in a brass shell with a rubber cover and designed to be waterproof at pressures existing in drill holes. An NE-51 tube is used in the probe.

The results of the radiometric bore logging are shown in Plate III of the "Preliminary Report on Diamond Drillings at Ella Creek Prospect, N.T." by J. Wyatt.

TABLE I.

Drill Hole.	Depth in Feet.	Calculated Assay eU_3O_8 from calibrated bore logging.	Field Assay Results $\%eU_3O_8$.
E1	80 - 85	.004%	. 01%
	85 - 90	.012%	. 01%
	90 - 95	.013%	.014%
	95 -100	.017%	.015%
	100 -110	.013%	.016%
	110 -120	. 04%	.024%
	120 -135	.025%	.015%
	135 -145	. 01%	. 01%
	145 -160	.007%	/ 01%
E2	4 - 6	. 03%	.018%
	6 - 15	.018%	.012%
	15 - 21	.019%	.016%

In the zones of activity there is a difference between sludge assays and the results of the radiometric probing but the results compare favourably with the sludge assays.

The difference may be due to:-

(a) Compaction coefficients.

(b) Thorium radioactive minerals.

(c) Presence of Thoron gas.

(d) Sampling of sludges.

(e) Sampling of portions of sludges for radiometric assaying.

CALIBRATION OF THE DRILL HOLE GEIGER.

A correlation between the percentages of Equivalent U_3O_8 from radiometric diamond drill hole logging and from core and sludge assays was attempted.

It is obvious if such a technique could be perfected then it would not be necessary to obtain core and sludge and a diamond drill programme would be speeded up in an area where a large number of drill holes were desired.

The drill hole geiger was standardized and a curve of counts per minute against pounds of uranium oxide per ton prepared using equipment at Rum Jungle. See Plate No. I.

Theoreticial equivalent U_3O_8 percentages were calculated for the drill holes E1 and E2. See Table No. I.

BETA - GAMMA RATIO TESTS.

At the request of the writer, beta - gamma ratio tests were carried out by T.E.P. at Rum Jungle and the following results obtained.

	Specimen.	$\frac{\beta+\gamma}{\beta}$ ratio
No.1	Radioactive haematite Rock from Brodribb Prospect.	5.8
No.2	Radioactive haematite Rock from Brodribb Prospect.	6.3
No.3	Uranium oxide.	11.0
No.4	Uranium oxide.	11.2
No.5	Thorium mineral.	5.3
No.6	Thorium mineral.	5.2
No.7	Secondary Uranium minerals from A.B.C. Prospect.	9.4
No.8	Secondary Uranium minerals from A.B.C. Prospect.	9.7
No.9	Radioactive haematite.	5.7
No.10	Rocks from Ella Creek.	6.0

A beta - gamma tube was used to obtain the total beta and gamma count over a period of time and then an aluminium shield introduced between the assay tube and the source and the gamma count obtained over the same interval of time. A background count was allowed for in this set of tests. The count was small due to shielding of the assay tube and specimens by a lead castle.

Results of tests carried out in Melbourne are as follows:-

Ella Creek Radioactive Sample	Radiometric Tests Equivalent Uranium Content.	Equiv. Thorium Content	Uranium Content Fluorimeter Tests.
No. 1	0.98%	2.5%	0.07%
No. 2	0.38%	1%	0.03%

These beta - gamma ratio tests and the low fluorimeter tests strongly suggest that the radioactivity of the samples is mainly due to a thorium mineral.

The beta - gamma ratio tests carried out in Melbourne obtained results $\beta+\gamma/\beta$ = 11.8 and 12.6 for specimen 1 and 2 respectively. The ratio $\beta+\gamma/\beta$ for the standard uranium sample = 24.2 and for the standard thorium sample =9.1. This suggests the presence of uranium in trace amounts.

Experience has shown that Fluorimeter results are reliable for cases where Uranium minerals are acid soluble. In refractory

minerals the processes needed to get the Uranium into solution appear to introduce errors.

Hence results of fluorimetric assay for these two samples are not necessary conclusive but strongly suggest low Uranium and a high thorium content.

CONCLUSIONS.

Fluorimeter and beta - gamma ratios strongly suggest the presence of thorium minerals at the Ella Creek and the Brodribb radioactive deposits. It appears that the Frazer Radioactive prospect may be a low grade thorium deposit as well.

Many of the first, second and third order anomalies along the Ella Creek - Brodribb line of radiometric anomalies are probably due to thorium bearing laterites and haematitic shales and suggest that the area is not favourable for prospecting for uranium minerals.

REFERENCES.

K. Smith. Preliminary Geological Report on the Ella Creek Radioactive Prospect.

I.A. Mumme. Preliminary Geophysical Report on the Ella creek Radioactive Prospect.

January 1954.

I.A. Mumme.

INSTRUMENT CALIBRATION

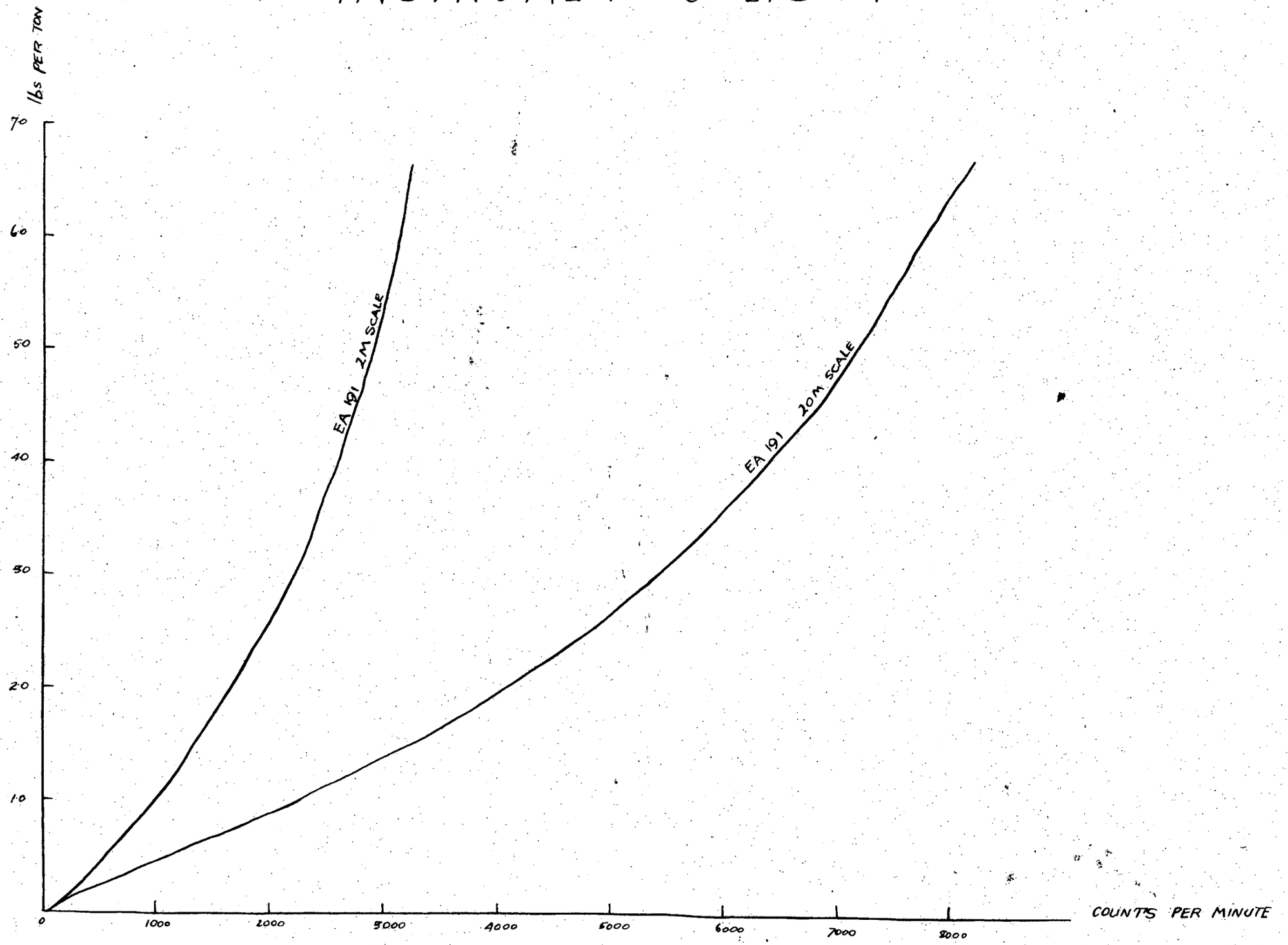

PLATE N° 1