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THE PROSPECTS FOR ALLUVIAL TIN BETWEEN THE PIONEER AND ENDURANCE MINES, AND NEAR MOORINA, NORTHEAST TASMANIA - EL.6/68

MICROFILMED

by

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DATED 27.1.69.

LAUNCESTON, TASMANIA, AUSTRALIA

AMG REFERENCE POINTS ADDED

M E M O

TO : R.H. BARTON

FROM : J.H. RATTIGAN

February 13, 1969.

TIN-PROSPECTS, SOUTH MOUNT CAMERON AREA, NORTHEAST TASMANIA, E.L. 6/68.

Attached is a report by Bruce Herd who was referred specifically to this area and did a survey of the details of more recent Utah and Government work after scouting the area.

This region has been one of the most significant producers of tin in Australia but the economics of working tin in recent years have been marginal - this being due to low to moderate grades, and the manner of working under low capitalisation and archaic methods. The world economic picture for tin is not particularly bright in the short term with production and export restrictions imposed by many producing countries.

I feel there are some grounds for scouting the area between the Pioneer and Endurance Mines for channels in the hope of finding targets for sample drilling that might yield yardage to justify production of cassiterite (and any other by-products such as gold and other heavy minerals) particularly if revised methods of treatment are investigated. A revolution in treatment of unconsolidated material has taken place within the last decade in the beach sands industry and more economic methods of extraction and recovery than used in most hydraulic workings in this area are probable.

Utah eventually restricted its operations to very shallow testing but other avenues are open for prospecting.

The tin prospects of the area lie firstly in shallow ground such as the areas partly tested in the most recent work by Utah; secondly in deeper, undiscovered leads tributary to main systems and other undiscovered wash bands; thirdly in extensions of the Pioneer and Echo Leads.

In this respect there are additional prospect lines that could be tested over those proposed by Bruce Herd.

In exploration there is little surface work that can be done in this featureless area that has not been done. Photogeologic work involving geomorphic analysis and perhaps inferences of shallowest cover on bedrock from photo lineaments may repay some study.

Geomorphic analysis and palaeogeomorphic study by studying surface levels, and reconstructing the bedrock surface from outcrop, old bore data and new borings is the most useful technique for exploring for bedrock channels.

I am not convinced that, after considerable testing in the area, either gravity or seismic techniques will ever define the weathered granite-sediment inter-face closely enough to merit a full scale independent programme, and would advise only scouting, rapid-footage rigs (suitable for boring to 300 feet) to define channels if we decide that tin should be one of our more immediate targets.

J.H. RATTIGAN.

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SUMMARY

Tin has been known and worked near the Ringarooma Area, northeastern Tasmania for nearly 100 years. Most of the workings are in shallow ground along the eastern edge of an ancestral river channel on short leads. These short leads are alluvial sediments containing cassiterite which was shed from the granites of the nearby ranges. The older adamellites of Devonian age were intruded by a late stage acid 'tin' granite which was subsequently weathered to form concentrations of cassiterite in the alluvial material of early Tertiary times. The leads were blanketed by valley fills and covered by basalt flows which caused probable river deflections such as that of the present Ringarooma river which is suspected to have flowed to the west of Mount Cameron at some time in the early Tertiary history of the district. The Tertiary river channels can sometimes be detected by their relation to basalt flows, and morphological and surface features. Limiting exploration areas for tin deposits depends upon the prediction of these ancestral river channels and their courses at the time of deposition. This is generally hazardous for new leads because of relatively featureless superficial cover.

The geophysical method that showed promise in the northeast has been gravity. Gravity surveys were run by the Department of Mines in

various areas and have been found to define the unweathered basement structure quite well but showed no relation to the weathered granite surface on which the tin bearing sediments lie. However the ability of this method to define the basement structure is of prime value in the locating of the river channels and systems.

The most precise method for defining the basement morphology is drilling. Of two useful types of drilling the choice depends upon the type of exploration desired. If one wishes only to define the basement contours any quick drilling method will be suitable. However, if the drilling is to be done for sample purposes the Utah Development Company considered an auger drill must be used because of the problems in retention of cassiterite in a sample. The Utah Development Co. drilled in the Dorset Flats Area and did some testing on the retention or recovery of tin in drilling various types of wash. The tests were done by drilling samples of known value from dummy holes and calculating the volume and grade recovery for each. Because they tested only ten samples it is felt that their results are not adequate enough to be of much value in the assessment.

The drilling done by the Department of Mines and Utah Development Company have shown that the basement surface in the area from Pioneer to the Endurance Mine is dipping to the west so that most of the mines in the area become uneconomical as the overburden increased with working methods used.

Drilling by the Department of Mines has established an old river channel to the north and west of Mt. Cameron which seems to verify the fact that the Ringarooma River flowed to the west of Mt. Cameron during early Tertiary times. I feel that the course of the ancestral river lay along the eastern side of the area as far as the Dorset flats and then trended to the west and north around the Mt. Cameron massif. Tributary leads to this might have ground shallow enough to be worked if they can be localised by any exploration method, so that drilling of gutters for values can be attempted. The exploration problem is mainly one of the subsurface geology and surface study, other than geomorphic analysis of the marginal bedrock areas is of little use.

INTRODUCTION

This report has been compiled from a study of the Utah Development Company's Reports on Area Four and the work done by them in this area, as well as a research of other old reports on the area held in the Department of Mines in Hobart, Tasmania, and in conversation with Messrs. I. Jennings and J. Noldart of the Tasmanian Department of Mines.

Location of Project Area

The area lies on the north-eastern sector of Tasmania approximately seventy miles north-east of Launceston, between Pioneer and South Mt. Cameron, on the west side of the Ringarooma River. The terrain is a broad alluviated area of button grass swamps and low scrub and open forest covered sandy rises, with no outcrops of basement rock except at the margins.

Access

There are numerous roads by which access may be gained in this area. The main road from Pioneer to Gladstone lies on the eastern edge while the old Boobyalla road lies on the west. These two roads are joined in several places by roads which cut across the area from east to west.

The area is of low relief and access by foot is extremely easy.

Previous Mining

There are, or were, three major worked leads and paddocks in the area. The Endurance and Wyniford leads and the Dorset Flats. The Endurance lies on the north, Wyniford on the south and the Dorset Flats along the east side.

The Wyniford Lead is the richest lead to date and was worked by the Pioneer Mine from 1882 until 1933. This mine averaged 1500 tons of concentrate for every 1000' of lead, and it's total winnings are estimated as 9100 tons for 4,000,000 cu. yds. of material mined. The Wyniford lead falls away to the west and it became uneconomical to mine when the overburden became too deep. The market price of tin at that time was of course much lower than at present. The mine was closed in 1933 when the Endurance Mining Co. bought out some assets of the Pioneer Mine.

The Endurance Mining Company which is at present working the Endurance Lead along the southern foothills of Mt. Cameron, was formed in 1922 and holds 750 acres under lease. The Endurance Lead has yielded about 450 tons for every 1000' of lead. After taking over the Pioneer Mine in 1933 the Endurance Mine used the Pioneer Hydro-Electric plant on the Frome River to deliver power for pumping water from the Ringarooma River to the working face at the mine.

The Dorset operation was a rather different proposition in that it was a river flat and a dredge was used to mine the area. The deposit was found in the redistributed Tertiary and Quarternary gravels at the junction of the Ringarooma River and Corduroy Creek. The area comprises about 600 acres. The dredge was floated by the Department of Supply and Shipping and has recovered 766 tons of metallic tin to the value of $930,000 and 2922 oz. of gold to the value of $60,000.

Almost all of the mines in the area have been along the eastern side of the Tertiary sediments where the leads head in shallow ground.

GEOLOGY

General

The oldest rocks in the area are the Mathinna sediments. These sediments are weathered, hardened and silicified lutites and arenites of Silurian age which strike generally north or north-east with steep dip. The Mathinna sediments were intruded by a coarse-grained, grey granodiorite or adamellite during the Devonian Epoch. This early Devonian intrusion was itself intruded some six times by differentiates of the same magma. One of these intrusives, a coarse uniform-grained biotite granite, contained the element tin and was the main tin-shedding formation. Along with the biotite granite were formed veins of griesen probably by metasomatism of "porphyritic granite." These griesen veins contain pockets or concentrations of tin. Near the end of this period the land was warped and finally block faulted.

Permian sediments of feldspathic sandstone and shale were deposited marginally probably after faulting or other coastal subsidence. Sills of dolerite which welled up between the Permian sediments during the Jurassic period were of of theolitic quartz dolerite and their weathering possibly produced much of the ilmenite found associated with early Tertiary sediments.

The Cainozoic history is complex. The period of sill intrusion was followed by an uplift of the land south of Derby and great block faulting which exposed the "tin granite" so that as the stream gradients became less severe, the lowest Tertiary gravels, the Lowest Unit containing, cassiterite, were deposited. These sediments were mostly discontinuous stream washes overlain by grey or brown humic clay containing lignite. The tin is distributed fairly regularly throughout this section.

An inferred gentle landward tilt caused the accumulation of granite drift, clay, siltstone and lignite in swamps. A further subsidence of Bass Strait caused a marine incursion resulting in a deposit of fine, white quartz sand overlying the Lower Unit, and is now considered the <u>Middle Unit</u> which is <u>barren</u> of any tin. However, terraces of tin-bearing shingle such as those of the Dorset Flats were inferred to be left behind by wave action on old foreshores in the area.

A later uplift of the land caused the stream gradients to steepen and deposition of an Upper Unit was started. These sediments are mostly a ferruginous concentration of "birds-eye" wash containing a small amount of tin. At the close of this period the land was subdued in relief with deeply alluviated flat-floored valleys. Stream migration started to occur.

A reactivation of the block faulting took place along with extrusions of basalt which covered the Tertiary river channels forcing the rivers to either divert along the side of the flows or else cut new channels in them. The faulting caused a complete disruption of the Tertiary lead systems. Seif dunes and Lunettes were created and these played a major part in the shaping of the present river systems by diverting some rivers and causing others to become captured by other river systems.

Deposition of Cassiterite

The primary source of tin was a coarse-grained, micaceous granite containing veins of griesen. Cassiterite is mostly concentrated in the griesen veins which were formed in altered, "porphyritic granite" and usually occur as zones of numerous small veins. Outcrops of this tin shedding material may still be seen on the Blue Tier, Branxton Area and north east of the Mt. Cameron ridge. The tin shedding 'granite 'was apparently contained in narrow zones just below the roof of the intrusives.

The best alluvial tin was found in the leads of the lower Tertiary sediments, which contain in places an abundance of nodular marcasite. The southern leads - Ruby Flats, Branxholm, Black Creek, Valley, Cascade and Echo - are derived from the northern parts of the Blue Tier while the Wyniford and Mussel Roe are extensions of a north westerly shedding area around Lottah and Poimena. The Endurance Leads originate in the southern slope of Mt. Cameron.

The distribution of tin, other than in the primary source relates to three types of deposit. One type includes deposits in several discrete layers through the section. In a second type cassiterite is partly dispersed throughout a whole section and partly occurs in gutters on a false bottom such as is seen in the Upper Horizon in this area. The third way in which tin may be distributed is in a lead such as in the Lower Unit of the Tertiary sediments.

The distribution of tin in a deposit depends upon the grain size of the cassiterite, the stream gradient at the time of deposition and the specific gravity of the transporting media.

The grain size of the tin determines whether or not a deposit will be formed in wash or in sand. If the grains are of a large size the tin will be transported as a bed load but if they are small it may be transported as a suspension.

Every time a stream changes speed by increasing or decreasing its gradient its ability to transport material changes so that every time the stream velocity decreases it dumps its load and everytime it increases velocity it picks up a larger load.

The density of a current is determined by the load it carries in suspension. The more material being transported the higher the density and the more able it becomes to carry heavy minerals. The density and thus the load change every time the stream area in cross-section changes - with a larger cross-sectional area flow is less and density drops.

GEOPHYSICS

Many geophysical prospecting techniques have been tried in northeast Tasmania but all have so far failed to closely trace the Tertiary lead gutters.

A seismic refraction survey was done in several areas by the Department of Mines. Later drilling of the lows on seismic profiles showed no close correlation of the survey to the unweathered granite basement. However, a gravimeter survey run in some of the areas by the Department showed a definite relation to the unweathered basement but failed to define the weathered surface on which the Tertiary sediments lie.

Adastra flew aeromagnetics over the area for Rio Tinto Australia Exploration and the dolerite and basalt were quite clearly shown at the sensitivity of the instrument used, but the known leads remained undetected as the Tertiary sediments could not be distinguished from weathered granite and meta-sediments. Ground magnetometer work over basalt covered areas was marked by the large anomalies due to basalt readings but thorough testing of areas with no basalt has not been done.

Resistivity methods gave some positive results but the anomalies were of such limited magnitude in relation to tolerances of the method that the surveys were considered.inconclusive.

The Utah Development Co. proposed the theory that I.P. methods would work using the nodular marcasite in the lower Tertiary unit as a target. Early in these surveys the results seemed quite promising but as the ground began to dry out a non-reproducibility of readings was noticed. It was inferred that they had been getting a hydrological response near the clay horizons. As water dried out a charging of electrode to ground contact effect became large enough to mask the anomalies. The correlation was found in drilling the ratio lows.

Drilling

Boring in north east Tasmania requires rather specialised techniques because of the various problems in drilling and sampling. The problems range from boulders and logs in the Tertiary sediments, to the major problem in appraisal which is recovery of all the tin in a hole. The water table is quite close to the surface in this area and therefore most of the drilling is done in water-logged ground. The cassiterite tends to settle out by gravity separation whenever it is disturbed. Several methods of drilling have been used in this area but only one has proved satisfactory for sample drilling.

Some drilling was done by a percussion type drill and the sampling is suspect (in the absence of details on techniques of sampling), in assessing the area but the definition of basement contours is of interest in all such work. Rio Tinto used care in penetrating wash horizons and recovery of tin fines from the whole bore depth.

The Utah Development Co. has used percussion, rotary and auger type drills in the area but they considered the auger drill was the one of greatest value in sample drilling.

Their first attempts at drilling were done with a percussion drill at Wood's Mussel Roe Mine. However, they considered this machine proved unsatisfactory for sample drilling as its recovery was too low. They next tried a rotary rig which put down a 6" pipe to basement and when removed held a sample over the entire depth. This machine failed because of too much friction on the inside and outside skin of the drill pipe so that the machine was incapable of turning the pipe. This machine may work if a cutter was mounted on the inside of the drill pipe and an auger flight on the outside.

They later chose a "Gemco" Auger drill to which they added 12' - 18' strings of rods at a time, removing the rods after each string was drilled to determine the lithology and sample the section.

However, earlier Dorset and Rio Tinto results with simple percussion and large diameter Conrad rigs probably gave a good estimate of ground, and working at Dorset effectively confirmed their bore results.

The major problem in sample drilling is the retention of cassiterite as the ground being drilled is saturated with water. Most of the tin may be lost in drilling. The Utah Development Co. did a number of tests on their percussion rig at Wood's Mussel Roe Mine to determine the grade and volume recovery of tin in drilling. The primary variables in the testing were the sizing of stanniferous wash, the grade of the tin in the wash and the grain size of the cassiterite. Ten samples of various compositions were made up and tested at the Department of Mines laboratory in Launceston . These known samples were then drilled from a dummy drill hole and the recovery noted. The drill sample was made up by inserting a 10' plug of barren material in a hole and placing a 5' section of the wash to be sampled on top of it. The whole section was then drilled out as one sample. It seems that only 10 samples were run and these were done with a percussion drill. (For test data see Appendix I).

It was found in their tests that the size of the wash material had little to do with recovery but the concentration of the tin in the wash did have a bearing on the recovery in that recovery increased until the concentrate was 4-5 lbs Sn/Cu.yd. The size of the tin grain did not seem to make any difference to the recovery either.

The factor which is of importance in these tests is finding the drill recovery for each type of wash so that an estimate of its recovery in the field may be made accurately. Once the tests are done one can adjust the field results by the use of two important factors - the grade recovery and the volume recovery.

The grade recovery is the grade established by drilling against the actual grade in situ.

We can find our field volume recovery by the ratio

= Tin recovery / Volume recovery

With these figures we can calculate more accurately the amount of tin per cu. yd in a drill hole.

— After completing their testing it was discovered that the treatment plant had not been functioning properly which meant that all of their results had to be checked against the loss in the treatment plant.

Comments on Ancient Drainage Systems

The work done in the Ringarooma District, south of Mt. Cameron by the Utah Development Co. was done on the theory that the Ringarooma River flowed to the east of Mt. Cameron during early Tertiary times and not to the west as was suggested by Nye. The drilling at Swains Creek, Watts workings, Dorset Flats and Pioneer show the basement surface to be dipping to the west. This they assume shows the basement structure of a Tertiary drainage channel which passes to the east of Mt. Cameron. Drilling done to the north and west of Mt. Cameron by the Department of Mines gives some ground for supposing the Tertiary river channel runs to the west of Mt. Cameron. I feel that Utah Development Company has not done enough drilling to determine the accuracy of their theory on the early Tertiary drainage system. I would propose there are grounds for assuming that this main river flowed along the Ringarooma valley to the northeast of Winnaleah and deflected around Mt. Cameron to the west. The inferred Tectonic history of the area would lead one to believe that a main lead may exist to the west of the known leads. All the known leads exist on the shallow eastern edge of the area and were probably uncovered by the migration of the Ringarooma in later Tertiary times. There is no evidence of the known leads disappearing but only a deepening of overburden as they fall away to the west. The possibility of mining of a lead in this deeper ground would be severely restricted as the grade may be low as there would be up to 200' of overburden to be removed in deeper places. However headward tributary leads may be economic but yardage cannot be assessed.

Methods of New Discovery

There are a number of factors to be considered in the exploration for deep Tertiary leads. One must consider the basement structure which determined the deposition of the leads, the various methods available for determining the basement structure and methods of sampling the suspected leads.

There are only two methods which have proved useful in determining the basement structure in the northeast, though none have been successful in tracing the actual gutters of leads. A most useful geophysical technique is gravity. The only other method of defining the basement structure is scout drilling on a pattern.

Drilling to obtain a representative sample of an area involves problems in the retention of tin because of the water logged ground. On some views only an auger drill has shown any reliability for this type of work but there is room for argument on this. I feel that the testing done by Utah Development Co. in their sample drilling was insufficient for full assessment of the area.

The Utah Development Co. did some drilling in the Eastern Leads area. They drilled forty-seven auger holes which defined the basement as a sinuous depression some four thousand feet long. Ten holes were then sunk in the lead to sample and determine the various lithologies. It was found that the Upper Horizon was a clayey sand(varying up to 15')with basal birds-eye wash. This was overlying approximately 50' of coarse grained clayey sand. The lower section was sub angular to sub rounded wash to 9' and lies on a decomposed granite surface. The lower unit contained no cassiterite. However, the upper unit gave 0.36 lbs. Sn/Cu.yd. to 6' depth. Though the values are doubtful the area would contain about 500,000 cu. yd. of material.

Past work on the Wyniford lead has shown that it falls away to the west. This was the main reason for the Pioneer Mine closing down for as the lead fell away to the west the overburden increased to the point where mining was no longer economic. The economics of tin and mining are however quite different today, Much of the area is now under lease by Mr. V. Wood who was reopening the mine by bringing in modern water supply equipment.

The leases have now been incorporated in the Endurance Mining Company's local - enterprises which embrace the Monarch, Endurance and Pioneer Projects. It would seem that the future of the Wyniford Lead as well as most of the others lies in the economic mining of the deeper ground to the west and some testing may be justified beyond the Pioneer leases.

Future production in the tin field will come from tributaries and extensions of old leads, terraces of undisturbed sediments and areas of redistributed (foreshore) sediments.

RECOMMENDATIONS

It would seem that the future production of tin from the tin fields of northeast Tasmania will be from the mining of the deeper extensions of the known leads and other deeper leads in the ground to the west of the Ringarooma River. Shallower tributaries to these leads will also exist and should be sought.

Immediate targets would in the Eastern Leads area near the Dorset Flats. The object of drilling would be to prove larger reserves of ore, than are already indicated, by following the Eastern lead depth in a north-westerly direction. I feel that this lead may run into a Dorset Lead somewhere near Corduroy Creek and the pair of them join a third lead to the north.

I would recommend that a gravity survey be run over the entire area and likely basement depression be traced by rapid scout drilling. Those areas which seem to indicate the ancestral river channels would then be drilled for samples and an estimate of the area made.

The gravity survey could be run in an orientation survey over the area around Dorset Flats and the Eastern Lead where Utah Development Company drilling shows the basement contours. This would determine the reliability of the method before running the complete survey.

The simplest way to check later gravity results would be to drill the basement with any rapid drill. A crawler drill using a 3½" bit could put holes down to 300' quite quickly in soft ground however there may be a tendency for the rods to stick as the water-logged ground flows in behind the bit. I would suggest a trial of this machine in the same area as the gravimeter. If this method proves fast enough it might even be used by itself to define the basement should the gravity meter prove ineffective.

Once the area for intensive exploration has been defined an auger or other suitable drill could be brought in to sample the bedrock depressions for cassiterite. Orientation testing for retention of tin by this machine could be done while the gravity survey and rapid drilling are in progress. I would suggest that each sample be run about three times to get the best and most accurate idea of the machines performance.

Two bore lines are proposed for projection of the Eastern Lead. These are shown on the geological map, Area 4 relating to this report. These two lines drilled at 500' intervals will provide an outline of the basement contours from which sample drill holes could be determined .

BRUCE R. HERD.

Geologist.

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APPENDIX I

(GEOPHOTO REPORT)

Report No. 139. **TABLE C**

Variations of composition and grain size of wash and tin concentrate used in tests of drill concentration plant performance

Average Wash	15% silt (-60 mesh), 40% fine sand (+60 mesh to -10 mesh), 30% coarse sand (+10 mesh to $-\frac{1}{4}$"), 15% gravel ($+\frac{1}{4}$" to -3").
Fine Wash	15% silt, 55% fine sand, 15% coarse sand, 15% gravel.
Coarse Wash	15% silt, 20% fine sand, 50% coarse sand, 15% gravel.
Average tin concentrate	50% -60 mesh, 50% +60 mesh to -30 mesh.
Fine tin concentrate	100% -60 mesh.
Coarse tin concentrate	50% +60 mesh to -30 mesh, 50% +30 mesh to -10 mesh.

Variable Stanniferous Values used:

2.4	lbs.	Sn/c.y.	over	5 ft.	equivalent to	0.3	lbs Sn/c.y.	over	40 ft.
4.8	"	"	"	5 ft.	" "	0.6	"	"	40 ft.
8.0	"	"	"	5 ft.	" "	1.0	"	"	40 ft.
12.0	"	"	"	5 ft.	" "	1.5	"	"	40 ft.
24.0	"	"	"	5 ft.	" "	3.0	"	"	40 ft.

Constant Stanniferous Values used;

8.0 lbs. Sn/c.y. over 5 ft. equivalent to 1.0 lbs Sn/c.y. over 40 ft.

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TABLE D.

RESULTS OF SAMPLE TESTING

Sample No.	Sn rec. lbs Sn/c.y.	Sn added lbs Sn/c.y.	Sn Recy. %	Sample Settlement-% (meas. volume in drillhole / initial vol. measurement) Plug	Wash	Total	Volume Recovery (Meas. vol. recovered / meas. vol. in drillhole) Plug	Wash	Total	Cal. grade (wt. rec. Sn / meas. vol. rec.)	Grade (wt. init. Sn / meas. vol. in drillhole)	Calc. grade / Theoretical grade %
1	0.0687	0.0991	69.3	81	57	73	90	114	96	0.840	1.134	74.1
2	0.1268	0.1983	63.9	76	61	71	112	152	124	1.236	2.400	51.5
3	0.3051	0.3300	92.5	70	105	82	102	80	92	3.453	3.423	100.9
4	0.4560	0.4956	92.0	71	82	75	102	105	103	5.053	5.637	89.6
5	0.7903	0.9905	79.8	100	73	91			91	8.237	9.343	88.2
6	0.2901	0.3300	87.9	88	101	93	99	73	89	2.994	3.036	98.6
7	0.2789	0.3300	84.5	101	78	93	92	101	94	2.718	3.036	89.5
8	0.2627	0.3138	83.7	93	78	87	95	83	91	2.822	3.067	92.0
9	0.2760	0.3561	77.5	63	103	76			102	3.026	3.978	76.1
10	0.2764	0.3300	83.8	84	70	77			97	4.041	4.692	86.1
11	0.0192	Nil										
12	0.2846	0.3300	86.2						102	25.640	29.491	86.9
13	0.0391	0.0476	82.1	)		)				1.470	1.160	126.7
14	0.0499	0.0516	96.7	) Not applicable		)	Not applicable			1.876	1.257	149.2
15	0.9103	0.9905	91.9	)		)				22.182		

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APPENDIX I.

TABLE J.

Comparison of Analyses of Sample Splits

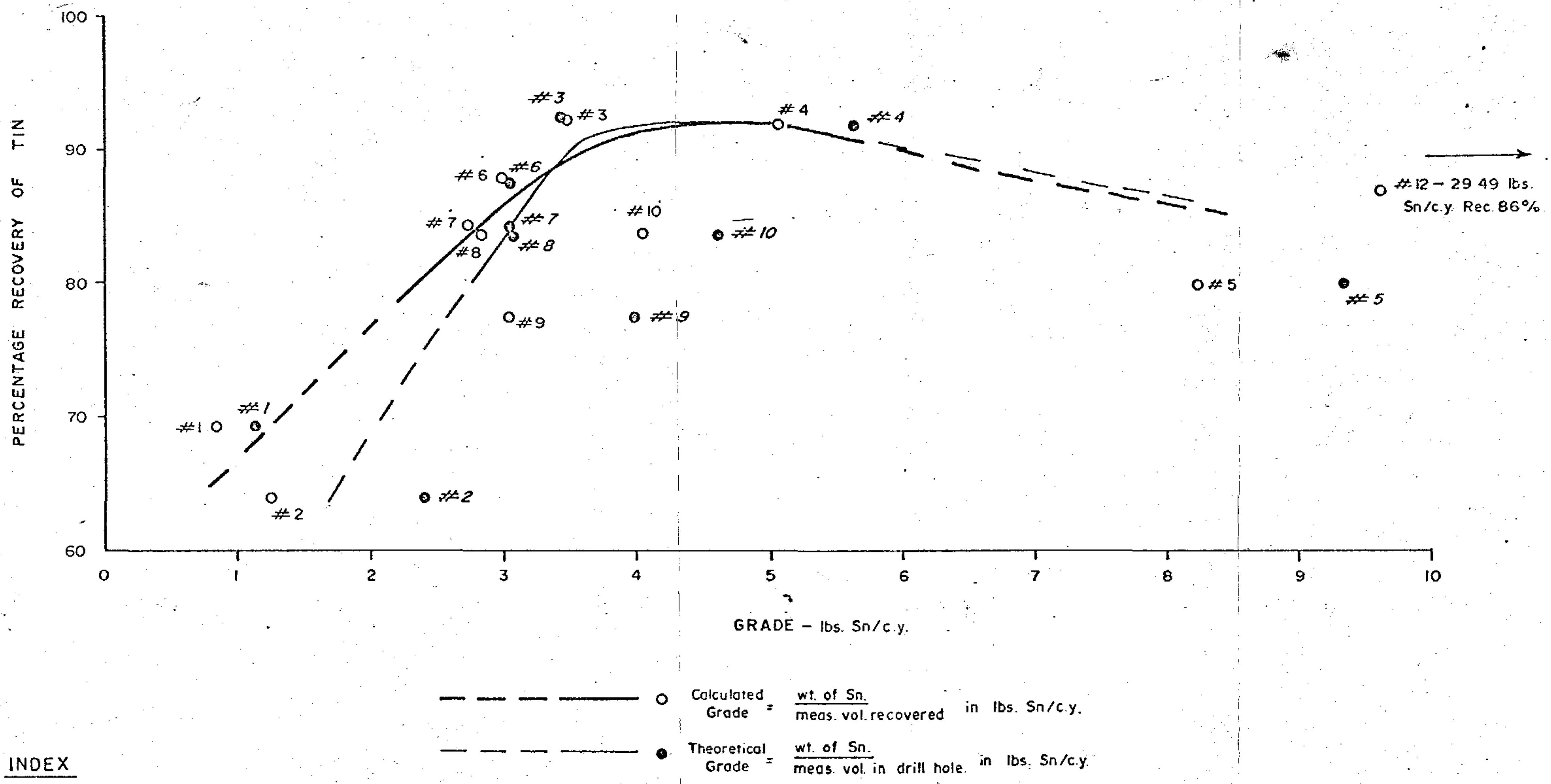
by

Department of Mines Laboratories, Launceston

and

Australian Mineral Development Laboratories, Adelaide.

Sample No.	Mines Dept. % Sn	A. M. D. L. % Sn	Actual Variation % Sn	Variation of AMDL with Mines Dept. Expressed as %.
1	0.56	0.65	0.09	+7.4
2	1.45	1.19	0.26	-21.8
3	5.94	6.40	0.46	+7.2
4	9.16	11.1	1.94	+17.5
5	24.2	17.5	6.7	-38.3
6	14.1	18.4	4.3	+23.4
7	31.5	33.0	1.5	+4.5
8	22.2	33.6	11.4	+33.9
9	41.5	44.2	2.7	+6.1
10	51.5	52.0	0.5	+1.0



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8.	Coarse tin.
9.	Fine tin.
10.	

Fig. II

PERCENTAGE TIN RECOVERY VERSUS GRADE.

Drawn by B. Madex.

Report No. 139

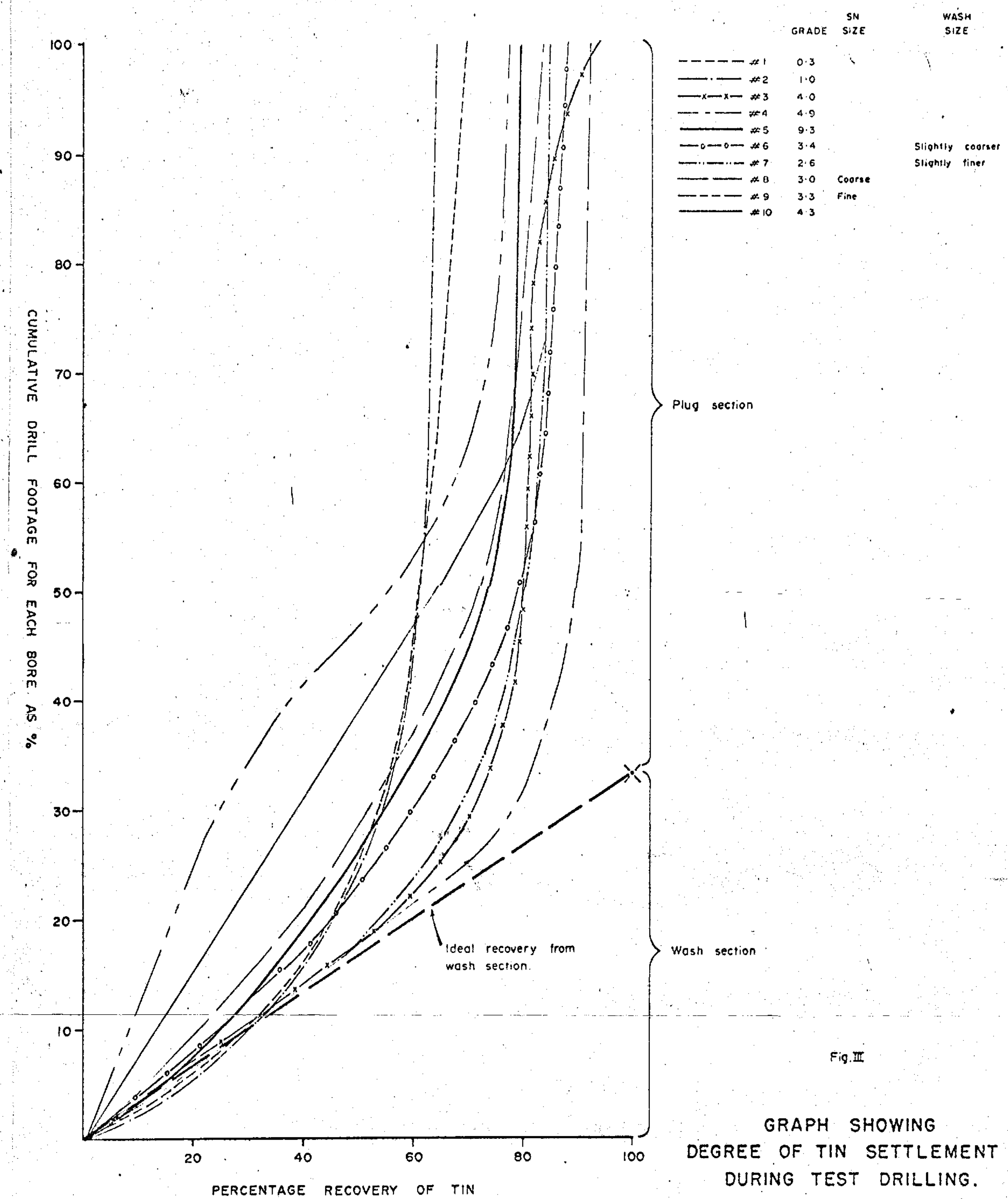


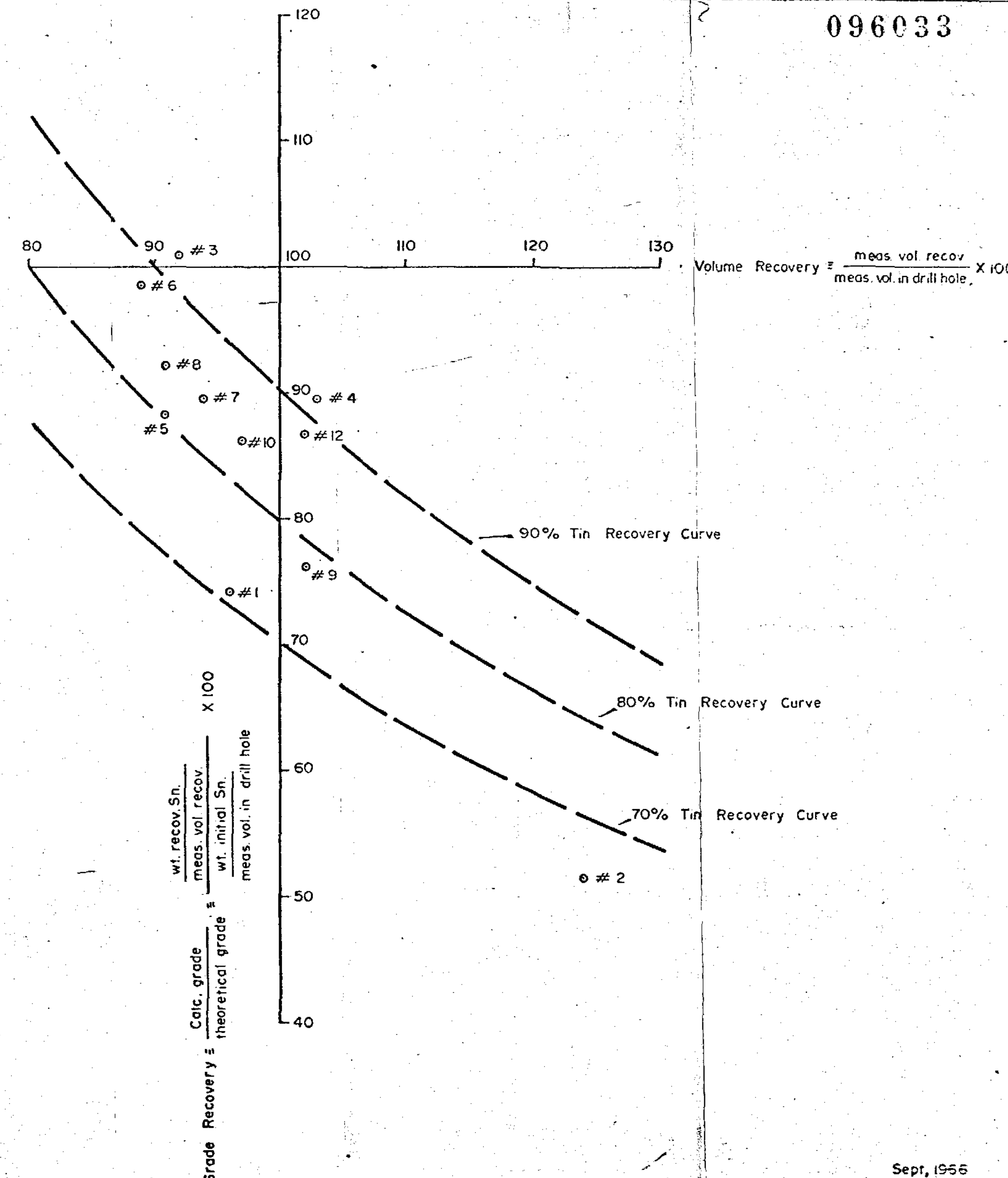
Fig. III

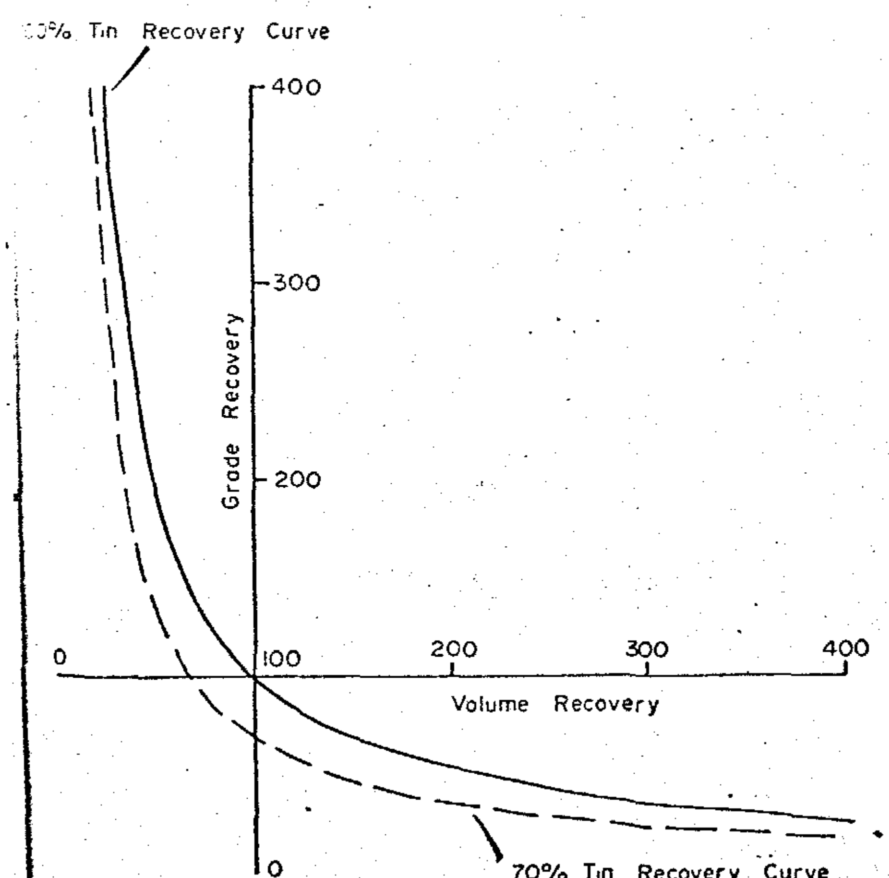
GRAPH SHOWING DEGREE OF TIN SETTLEMENT DURING TEST DRILLING.

096033

Fig. IV

GRADE — VOLUME RECOVERY GRAPH.





by B. Madex.

Sept, 1956
Report No. 139

APPENDIX II

(GEOPHOTO REPORT)

Report No. 139.

APPENDIX II

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 2 (cont'd):								
58	55	52	5 - 10	0.20	139	55	0.03	
59	60	55	0 - 5	0.01	100*	60	Tr.	
60	45	40	5 - 10	0.02	141	45	Tr.	
61	13	8	-	-	-	13	Nil	

Test Area 3:

No sample drilling carried out. Auger drilling totalled 1,417 ft. in 45 holes.

Test Area 4:

Bore No.	Depth (ft.)	Depth to basement	Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
13	12	Nil	-	-	-	-	Nil	
14	15	2	0 - 5	0.02	100	5	0.02	
15	5	Nil	-	-	-	-	Nil	
16	39	29	0 - 5	0.02	100	35	Nil	
17 (South of Cord. cn)	28	25	14 - 20	0.02	225	28	Nil	
18	32	29.5	5 - 10	0.20	95.5	32	0.05	
19	50	U/B	0 - 5	0.02	100	40	Nil	
201	130	113?	65 - 70	0.10	59	115	Tr.	Auger drilling comp-
202	145	U/B	60 - 65	0.08	62	145	0.01	leted 4,208 ft. in
203	145	U/B	105 - 110	0.06	75	145	0.04	45 holes.
204	136	130	100 - 105	0.07	46	136	Tr.	
205	135	129	-	-	-	135	Nil	
206	85	55	0 - 5	0.71	100	60	0.06)	
207	75	62	0 - 5	0.16	100	65	0.02)	
208	48	39	0 - 5	0.14	100	45	0.02)	
209	52	33	0 - 5	0.14	100	34	0.02)	Eastern Lead
210	51	46	0 - 4	0.20	100	51	0.03)	Auger drilling completed
211	66	61	0 - 5	0.22	100	66	0.02)	2,072 ft. in 47 holes.
212	54	49	10 - 15	1.35	120	54	0.19)	
213	62	57	0 - 5	0.34	100	62	0.03)	
214	53	48	0 - 5	0.08	100	53	Tr.)	
215	64	59	0 - 5	0.23	100	64	0.02)	

U/B - Unbottomed.
* - Sludge recovered - 100% recovery assumed.

(Cont'd)


R.L. 240'
Bore A 104
Bore A 119
Bore A 103
Bore A 118
Bore A 101
Bore A 276
Bore A 107
Bore A 105
Bore A 106
Bore 19
Bore A 108
Bore A 109
LINE 7
Bore A 117
Bore A 116
Bore A 274
Bore A 114
5 cm
Bore A 275
Bore A 111
Bore A 112
Bore A 113
Cordeaux Creek
Bore 18
Bore 16
Bore 17
R.L. 240'
W
Bore 201. (4500)
Bore 202. (4000')
LINE 12
Bore 203. (3500')
R.L. 240'
Bore 204. (3000')
Bore 205.
E

LINE 12

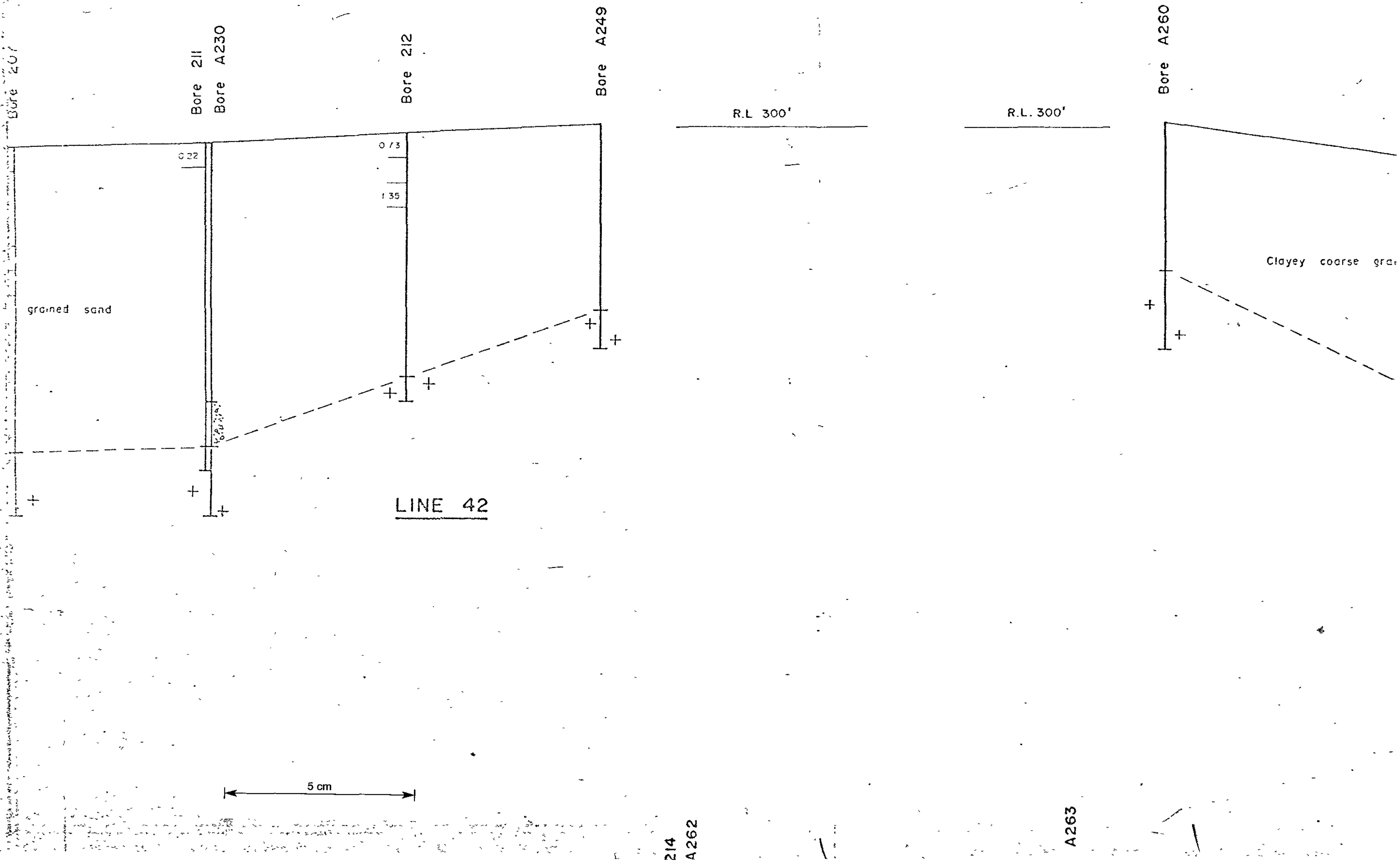
UTAH DEVELOPMENT COMPANY

SECTIONS
TEST AREA No. 4.
ENDURANCE – PIONEER

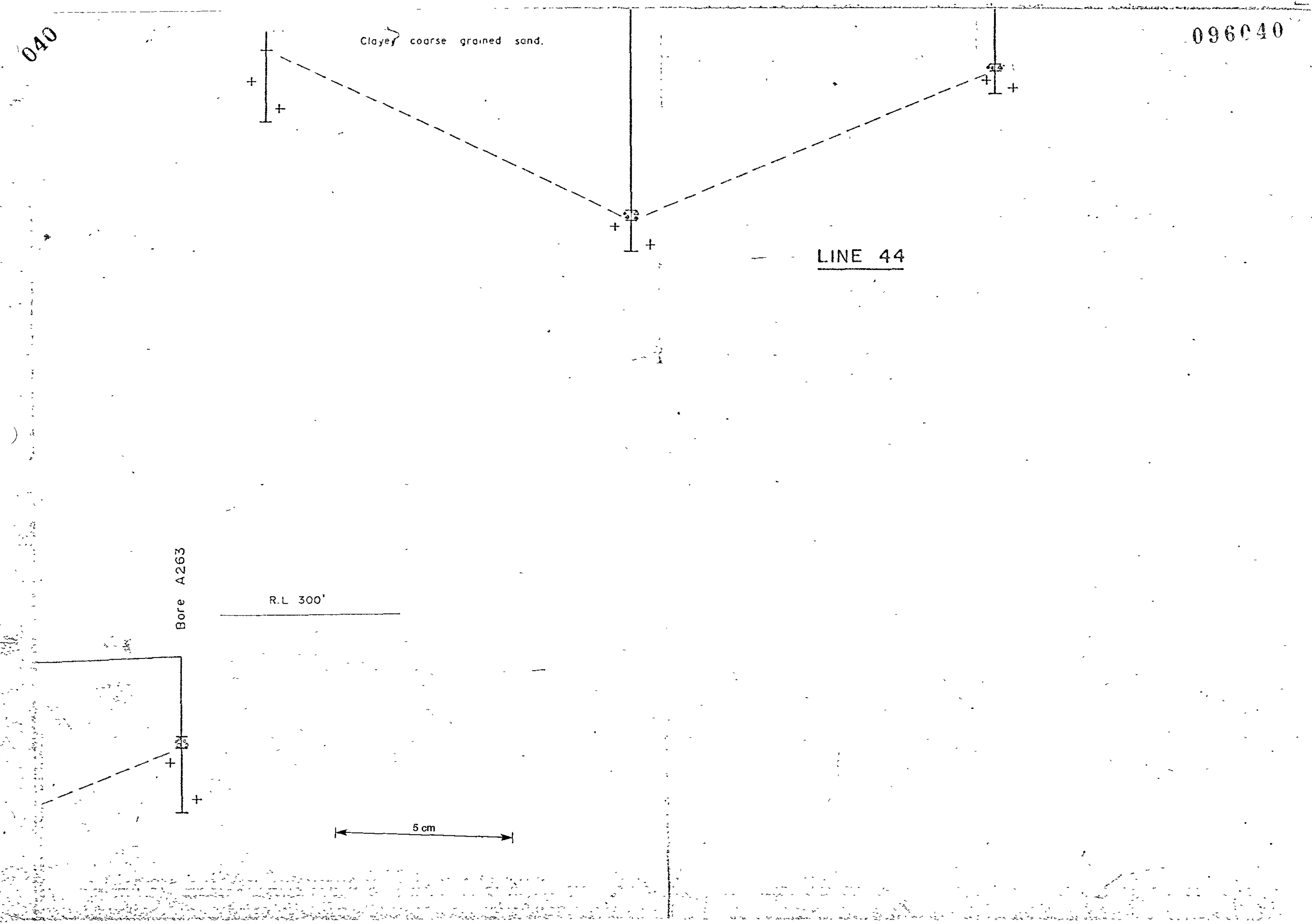
PLATE 13

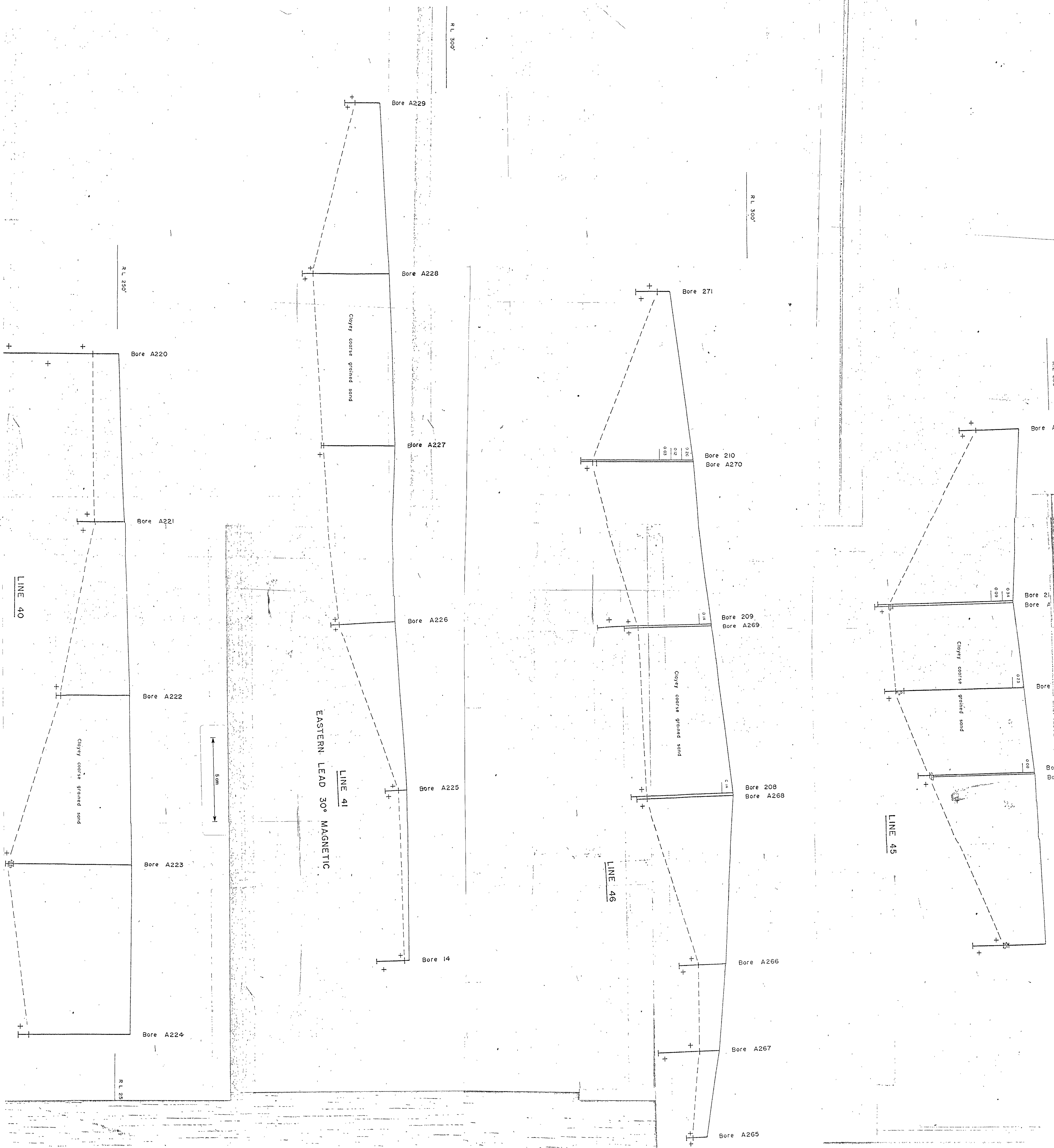
5 cm

SCALE Horiz 1 inch = 200 feet
Vert 1 inch = 20 feet


Bore 207
Bore 211
Bore A230
Bore 212
Bore A249
R.L. 300'
R.L. 300'
Bore A260
0.22
0.73
1.35
grained sand
Clayey coarse gra
LINE 42
5 cm
214
A262
A263


U38
R.L. 300'
e A248
Bore A255
Bore A247
re 206
re A246
Bore A254
ore 211
ore A230
LINE 43
Bore A253
Bore 212
Bore A249
Bore A252
Bore A251
Bore A260
Bore A250
A259
Clayey coarse grained sand
Bore A256
Bore A257
5 cm
R.L. 300'


Clayey coarse grained sand.
LINE 44
Bore A263
R.L 300'
5 cm


RL 300'
Bore A229
Bore A228
RL 250'
Bore A220
Clayey coarse grained sand
Bore A227
Bore A221
LINE 40
Bore A226
Bore A222
Clayey coarse grained sand
5 cm
EASTERN LEAD 30° MAGNETIC
LINE 41
Bore A225
Bore A223
Bore 14
Bore A224
RL 25
RL 300'
Bore 271
Bore 210
Bore A270
Bore 209
Bore A269
Clayey coarse grained sand
Bore 208
Bore A268
LINE 46
Bore A266
Bore A267
Bore A265
Clayey coarse grained sand
LINE 45

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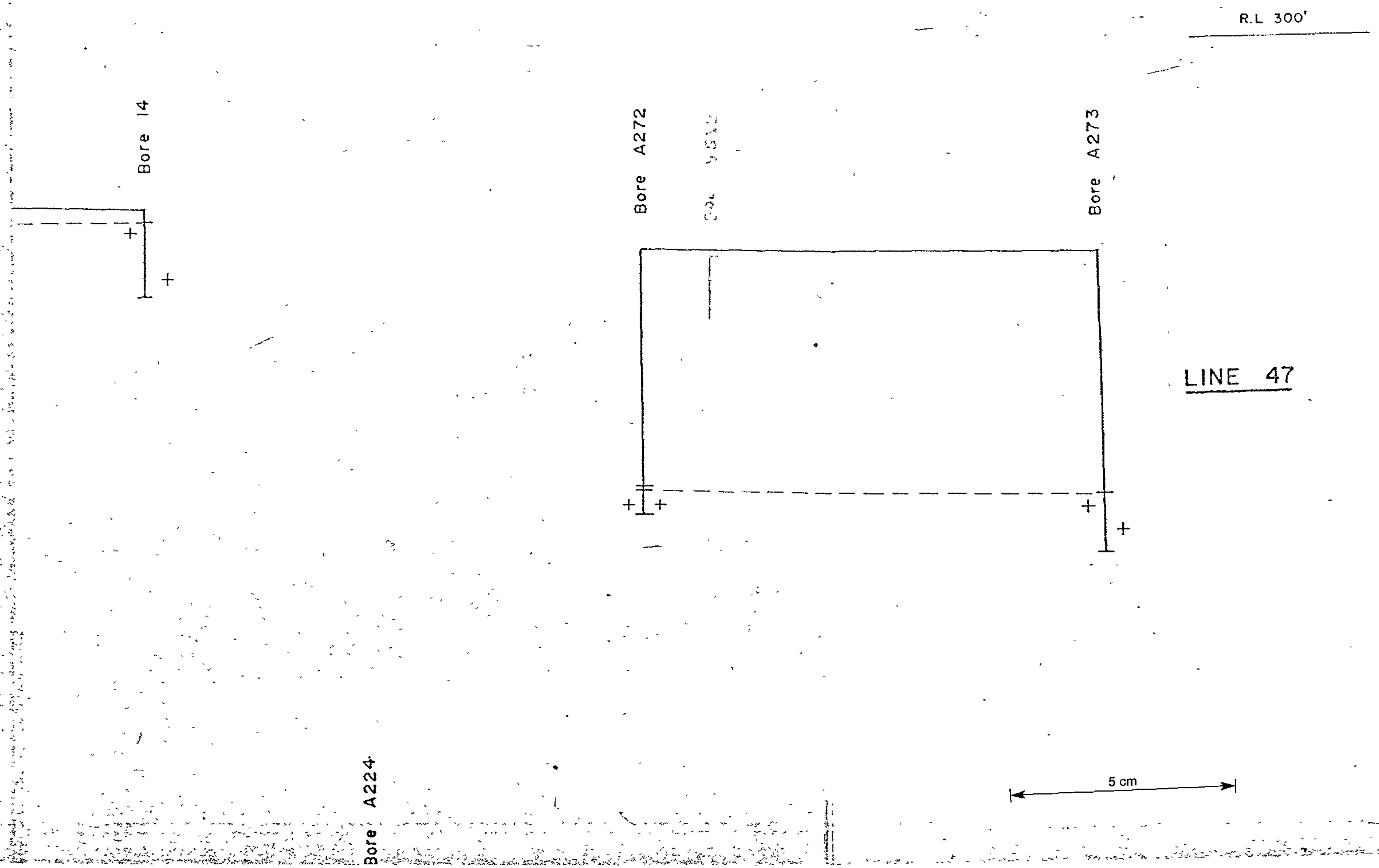
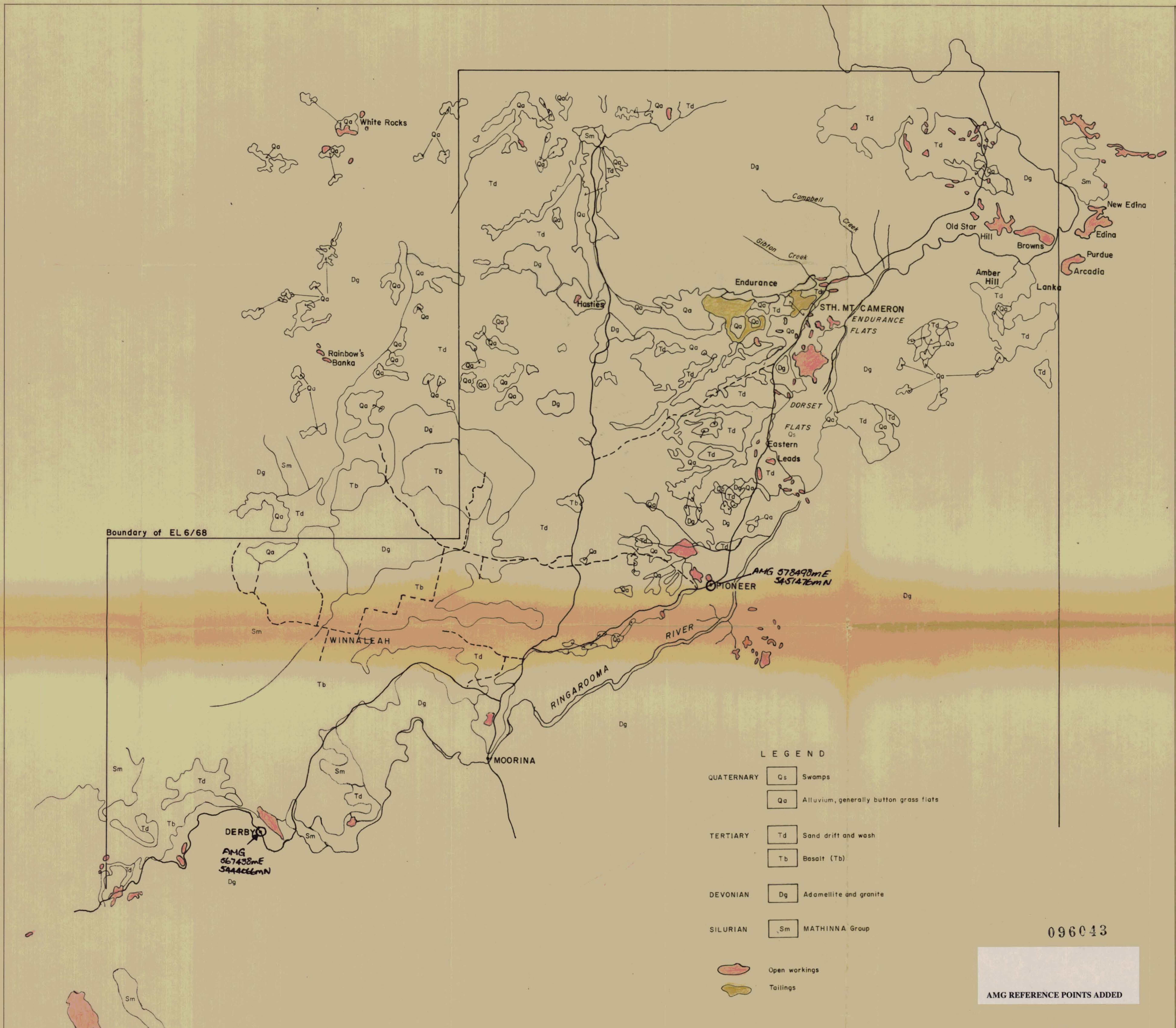




096043

AMG REFERENCE POINTS ADDED

69-543

GEOPHOTO

GEOLOGIC MAP
RINGAROOMA TIN PROJECT

JAN. 27, 1969

After geology by P.B. Nye, J.H. Rattigan, O. Warin, W.R. Appleby, and R. Jock

SCALE: 1 INCH : 1 MILE

5 cm

FIG. 1

2007

69-543

DETAILED GEOLOGIC MAP
EASTERN LEADS

SCALE: 1 INCH : 400 FEET

LEGEND

RECENT	Qa	Recent alluvium
	Qs	Swamps
TERTIARY	Td	Sandy rises – derived from weathering of Tertiary drift and sand
DEVONIAN	Dg	Adamellite and granite exposed
		Workings
	—x—	Proposed Geophoto scout drill hole
	• 206	Utah sample hole
	°A271	Utah augur hole
	200	Sub surface contour of granite basement

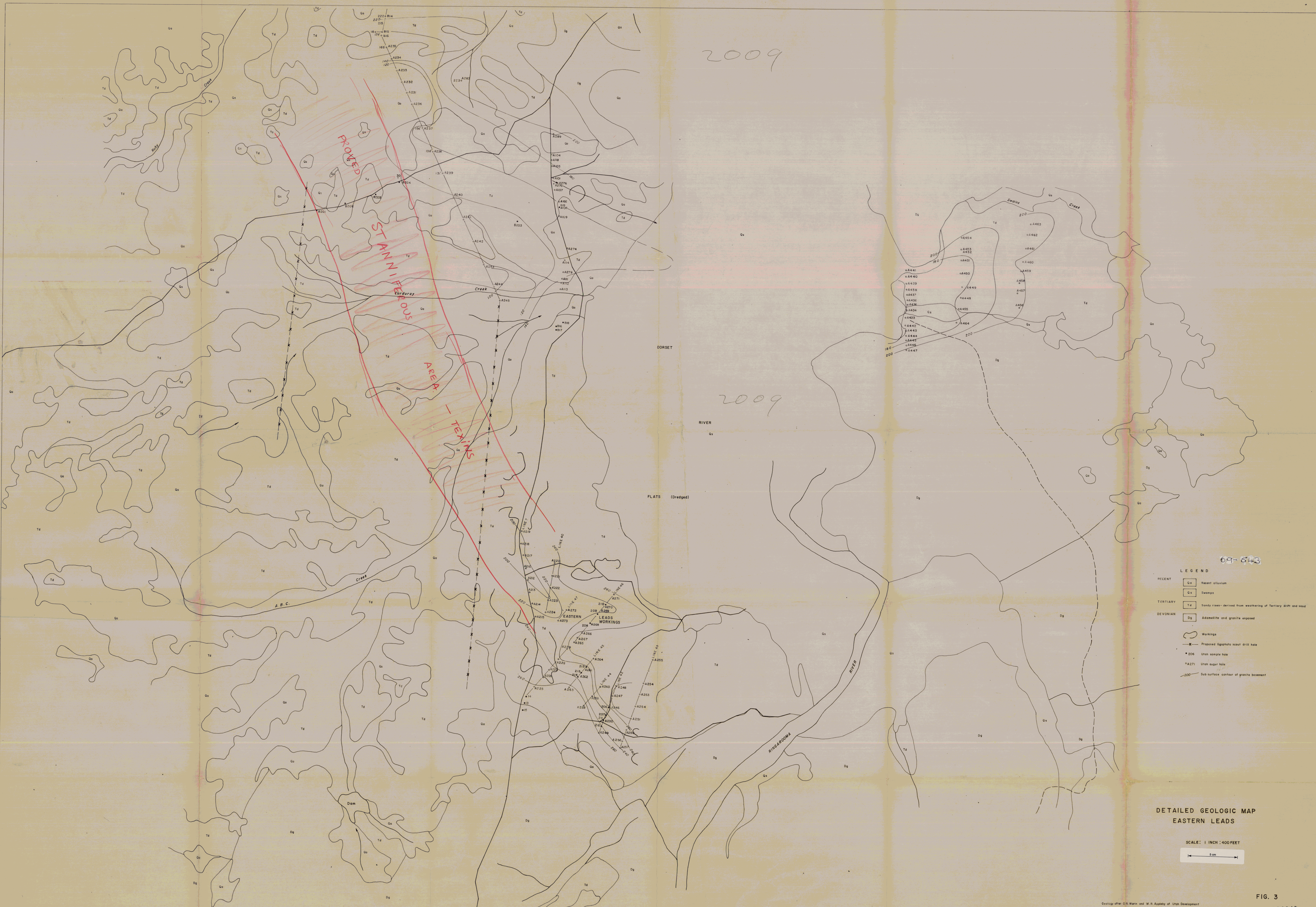
096044

5 cm

FIG. 3

Geology after O.N. Warin and W.R. Appleby of Utah Development

2008



DETAILED GEOLOGIC MAP
EASTERN LEADS

FIG. 3

096045

2009

GEOLOGIC MAP OF UTAH DEVELOPMENT CORPORATION AT SOUTH MOUNT CAMERON

SCALE: 1 INCH : 400 FEET

FIG. 4

69-543

096046

2010