

COMINCO LTD.

EXPLORATION

WESTERN DISTRICT

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OMINECA H.D.

1986 YEAR END REPORT

ALEY PROPERTY

A Report Submitted in Support of an Application for
Financial Aid to Mineral Exploration (FAME)

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

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FEBRUARY, 1987

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1986 YEAR END REPORT

ALEY PROPERTY

1.0 SUMMARY

1.10 Location and Access

The Aley property is located at 56°27'N and 123°45'W on NTS sheet 94B-5, approximately 20 kilometres northeast of the confluence of the Ospika River and Williston Lake. Access to the property is via helicopter from the Ingenika or Horn Creek airstrips, a distance of 80 km and 50 km respectively or from MacKenzie, a distance of 140 km. The mobilization of large equipment is achieved by barging up Williston Lake from MacKenzie to the mouth of the Ospika River. A 20 km cat trail from the barge landing to the base camp provides access for large track-mounted equipment. Approximately two days are required to mobilize equipment from MacKenzie to the Aley property. A Toyota Land Cruiser provides access throughout the property area.

1.20 Geology

The mineral claims cover a circular carbonatite complex roughly 4.0 km across which intrudes Cambrian to Silurian sedimentary rocks. A dolomitic carbonatite core contains substantial niobium reserves as fersmite with lesser pyrochlore and columbite and phosphate as apatite. Minor rare earth minerals are generally confined to the outer margins of the complex and occur as bastnaesite, monazite, and burbankite in thin iron-carbonate dikes.

1.30 1986 Field Program

From July 2, 1986 to September 3, 1986 field work consisted of road building, drill site preparation, cat trenching, chip sampling, contour soil sampling, magnetometer surveys and diamond drilling. Preliminary environmental baseline studies were also carried out.

Table 1

SUMMARY OF FIELD WORK

July 2 to September 3, 1986

	<u>Central</u>	<u>Saddle</u>	<u>Saddle West</u>	<u>Goat</u>
Road Building	2.0 km	-	-	1.20 km
Cat Trenching/ Chip Sampling	778 m	-	-	715 m
Road-Cut Soils	180			75
Contour Soils	103	-	-	100
Magnetometer Grid	15.77 km	-	-	-
Magnetometer Road	3.12 km	-	-	1.2 km
Diamond Drilling (1481.36 m)	A86-11 to A86-16 (882.64 m)	A86-17 A86-19 A86-20 (476.5 m)	A86-18 (122.22 m)	-

1.31 Road Building (John Deere 550)

This equipment was barged to the Ospika River on July 2 and arrived at the base camp on July 4. During the period July 5 to September 1 approximately 17 km of 4x4 road were built on the Aley property. Access, using the Toyota Land Cruiser, is possible to the East Zone, Saddle and Saddle West Zones and the Goat Zone.

1.32 Diamond Drilling

During the period July 4 to July 24 Thomas Drilling's Longyear Super 38 was used to drill 1481 metres of BQ core in 10 holes. Drilling was performed on the Central Zone (883 m in 6 holes), Saddle Zone (476 m in 3 holes) and Saddle West (122 m in 1 hole). Permafrost conditions at the Saddle and Saddle West Zones did not cause problems. Fractured and oxidized bedrock on the Saddle and Central Zones resulted in dry holes and stuck rods. Core recovery averaged greater than 85% and total field costs were \$90.57 per metre of core drilled.

1.33 Trenching and Chip Sampling

During 1986, 1493 m of trenching and chip sampling were performed. Chip sampling (all at 5 m lengths) was confined to outcrop on the Central Zone (778 m), and Goat Zone (715 m). All samples (each weighing 35 kg) were crushed and milled in camp and 1/8 splits were then sent to the Exploration Research Laboratory for niobium analyses by the pressed pellet XRF method.

1.34 Soil Geochemistry

Soil geochemistry continues to be an effective and inexpensive method of prospecting for niobium mineralization. The East, Central and Goat Zones were discovered initially, using contour soil sampling. Follow-up cat trenching across the anomalies revealed significant grades over significant widths. Visual prospecting and scintillometer surveys are less effective and generally unreliable because zones of economic niobium potential contain a wide range of thorium and below-detection uranium values.

1.35 Magnetometer Surveys

Two magnetometer surveys were conducted on the property using a Scintrex MP-2 proton magnetometer. The first type involved readings at 5 m intervals along road cuts in the Central and Goat Zones. The second type; a grid survey, involved close spaced readings at 5 m intervals along lines 20 m apart in the Central Zone where mineralization is associated with bands and swirls of magnetite, with accessory pyrite, pyrrhotite and phlogopite.

1.36 Environmental Baseline Studies

Norecol Environmental Consultants Ltd. was contracted to do a preliminary survey on stream water quality. Also, under the supervision of Norecol's principal Jim Malick, Cominco staff collected stream water and sediment samples and observed and recorded wildlife activities.

1.40 Results

Diamond drilling assay results from the Saddle, Saddle West and Central Zones can be seen in Table 2 below.

Trenching chip-sample assay results from the Central and Goat Zones can be seen in Table 3 below.

Table 2
1986 SIGNIFICANT DRILL INTERSECTIONS AT ALEY

<u>ZONE</u>	<u>HOLE</u>	<u>FROM (m)</u>	<u>TO (m)</u>	<u>LENGTH (m)</u>	<u>Nb₂O₅ (%)</u>
SADDLE	86-17	20.3	29.3	9.0	0.76
		57.2	69.1	11.9	0.70
		141.0	152.7	11.7	0.61
	86-19	20.5	83.0	62.5	0.60
	incl.	64.5	83.0	18.5	0.78
86-20	50.2	105.0	54.8	0.52	
SADDLE WEST	86-18	9.1	23.4	14.3	0.60
	86-18	31.4	41.0	9.6	0.72
CENTRAL	86-11	8.1	17.3	9.2	1.01
	86-12	33.9	53.9	20.0	0.86
	86-13	77.4	120.6	43.2	0.73
	incl.	93.9	120.6	26.7	0.81
	86-14	4.6	15.0	10.4	0.98
	86-15	59.3	111.0	51.7	0.77
	incl.	70.1	98.4	28.3	0.89
	86-16	12.1	41.1	29.0	1.08
	and	51.5	106.5	55.0	0.77
incl.	81.5	106.5	25.0	0.91	

Table 3
SUMMARY OF SIGNIFICANT 1986 TRENCH CHIP SAMPLE ASSAYS

Goat	GZ86-17	165.00	215.00	50.00	0.84
	GZ86-18	120.00	165.00	45.00	0.83
Central	CZ86-20	305.00	330.00	25.00	0.86

1.50 Conclusions and Recommendations

Although very limited diamond drilling (3056 m) has been performed at Aley to date, inferred grades are somewhat higher than those at Niobec, Quebec (10.7 million tonnes at 0.66% Nb₂O₅) but notably lower than those at Araxa, Brazil (462 million tonnes at 2.50% Nb₂O₅). At Aley the potential exists for open-pittable bodies of mineralization grading two thirds to three quarters of a percent Nb₂O₅. Results of preliminary drilling and surface trenching indicate four areas of niobium potential, the Goat, Central, Saddle and Saddle West Zones. The drilling program for 1986 focussed on the Central Zone where the possibility exists of an easily accessible, large, open-pittable zone of mineralization.

Even though drilling results from the 1986 program are encouraging, other concerns such as metallurgy should receive attention in lieu of diamond drilling in 1987.

2.00 PROPERTY AND OWNERSHIP

The Aley property is 100% Cominco owned and consists of 7 mineral claims and 9 placer leases in the Omineca Mining Division. (Plate 85-1)

Table 4

<u>Claim No.</u>	<u>Record or Lease No.</u>	<u>No. of Units</u>	<u>Recording Date</u>	<u>Due Date</u>
Aley 1	4792	20	October 7, 1982	October 7, 1996
Aley 2	4793	20	October 7, 1982	October 7, 1996
Aley 3	4794	20	October 7, 1982	October 7, 1996
Aley 4	4795	20	October 7, 1982	October 7, 1996
Aley 5	6770	8	October 16, 1984	October 19, 1996
Aley 6	6771	18	October 16, 1984	October 19, 1996
Aley 7	6772	6	October 16, 1984	October 19, 1996
Aley 8	N/A	20	March 14, 1986	March 14, 1987
Placer Al Creek	11882	1	February 14, 1984	July 18, 1989
Placer Al Creek	11883	1	February 14, 1984	July 18, 1989
Placer Al Creek	11884	1	February 14, 1984	July 18, 1989
Placer Steve Creek	11876	1	February 14, 1984	July 18, 1989
Placer Steve Creek	11877	1	February 14, 1984	July 18, 1989
Placer Steve Creek	11878	1	February 14, 1984	July 18, 1989
Placer Steve Creek	11879	1	February 14, 1984	July 18, 1989
Placer Steve Creek	11880	1	February 14, 1984	July 18, 1989
Placer Steve Creek	11881	1	February 14, 1984	July 18, 1989

3.00 GENERAL GEOLOGY

The Aley carbonatite complex, roughly circular in plan, is up to four km in diameter and intruded Cambrian and Ordovician sedimentary rocks in Mississippian time. It is composed of three major units: a two km diameter core of dolomite carbonatite with minor calcite carbonatite, an intermittent amphibolite annulus up to 500 m thick, and weakly altered sedimentary country rocks of the Kechika Group and Skoki Formation.

Numerous lamprophyre dikes and a small 50 m wide kimberlitic (?) diatreme intruded the sedimentary country rocks outside the carbonatite complex. These alkaline intrusives have not yet been dated.

Within the central core of the complex, dolomite is the most abundant carbonatite phase. The chief constituents are dolomite, calcite, and apatite with lesser phlogopite and pyrite. Accessory minerals include magnetite, monazite, fersmite, zircon and sphene with lesser fluorite and pyrrhotite. To date all known zones of economic niobium potential occur within the central dolomite carbonatite core.

The amphibolite annulus consists of a massive phase and a breccia phase. The chief constituents of the massive phase are the sodic amphiboles riebeckite, arfvedsonite, richterite and Fe-actinolite and the sodic pyroxene aegirine or acmite, and carbonate (calcite and dolomite). The accessory minerals are albite, phlogopite and pyrite with lesser pyrrhotite, magnetite and chalcopyrite. The breccia phase contains angular and rounded fragments of quartzite, siltstone and dolomite derived from the underlying Cambrian Gogg Formation and well rounded fragments of an alkaline intrusive rock (albitite or syenite) of unknown age. Fragments range from 1 cm to 50 cm across but are typically 5 to 10 cm. The well-rounded fragments are somewhat "milled" in appearance and may display thin reaction rims and penetrative fractures of sodic amphibole, sodic pyroxene and phlogopite. The matrix of the breccia phase consists of sodic amphibole, sodic pyroxene, carbonate, albite and phlogopite with many small (1-5 mm) fragments of rock similar in composition to those of the larger fragments. The alkaline intrusive fragments may have originated from the Archean basement or may be an early primary magma phase from which the carbonatite magma was derived. Attempts to age-date these alkaline fragments are currently underway at UBC. The amphibole is cut by numerous veins and dykes up to 50 m wide of dolomite and calcite carbonatite.

The Fenite Halo is made up of distinct annular zones which form partial or complete ellipses around the carbonatite complex. The annular zones are essentially lithological units of the Kechika Group with some metasomatic overprinting and enrichment in elements such as iron, fluorine, thorium, barium and magnesium. The fenitized rocks are mylonitized, isoclinally folded and weather bright yellow-orange to orange. Numerous rare earth dikes containing fluorite, barite, ankerite, siderite, pyrite, sphalerite, bastnaesite, monazite and burbankite cut the fenite halo.

Two features of the Aley carbonatite that are not common to most carbonatites are the widespread alteration of pyrochlore to fersmite, and the lack of nepheline-bearing syenites and associated aluminous rocks. The complex may have been emplaced at relatively shallow depths, perhaps along major cratonic fractures such as the MacDonald Fault and was then deformed somewhat by later folding and thrusting.

Several niobium zones occur in the carbonatite core, namely the Central, Saddle, Saddle West, Bear, Bear Extension, East and Ridge zones. The niobium-bearing minerals are mainly fersmite, a relatively unusual calcium niobate, as well as pyrochlore and minor columbite. Preliminary bulldozer trenching and diamond drilling show that these zones are large and high enough grade to warrant further exploration. Apatite is 5 to 10 percent of the carbonatite, and might provide an economical phosphate concentrate.

4.00 DIAMOND DRILLING

In 1986, 1481 metres of BQ core was drilled in three zones: the Central Zone (883 metres in 6 holes: A86-11 to A86-16), Saddle Zone (476 metres in 3 holes: A86-17, 19, 20) and Saddle West Zone (122 metres in 1 hole: A86-18).

J.T. Thomas Ltd., drilled 1481 metres in 10 holes (two 12 hour shifts) during the period July 7 to July 24, 1986. The loss of water circulation due to fractured and oxidized dolomite carbonatite resulted in dry holes and stuck rods. A mixture of 10 litres of alcomer and 10 litres of GS-500 per shift was used to seal the hole to permit recirculation of the water. Core recovery averages greater than 85% and the most core drilled and recovered in a single 12 hour shift was 91.46 metres or 300 feet. The drill site preparation and drill moves were carried out by the John Deere 550. Cominco Ltd. supplied the accommodations for the drill crew and fuel for the drill and ancilliary equipment. The total contractor charges were \$67.95/metre and total drilling costs were \$90.57/metre. The J.T. Thomas Longyear 38 is currently being stored at the Aley property.

All drill core was logged and sampled at 3 metre (approximately) intervals. For every interval of core sampled and assayed a 15-20 cm piece of core was sawn, and half was saved for future reference. The BQ core was crushed to 9 mm and 1/4 splits were sent to the ERL for niobium analyses by the pressed pellet XRF method.

TABLE 5

DIAMOND DRILLING DATA

<u>Hole #</u>	<u>Zone</u>	<u>Collar Elv. (m)</u>	<u>Azimuth</u>	<u>Dip</u>	<u>Length (m)</u>	<u>Date</u>
A86-11	Central	1550	030°	-45°	150.57	July 7-9
12	"	1580	020	-50	178.92	July 9-10
13	"	1615	020	-45	157.58	July 11-12
14	"	1615	020	-45	117.60	July 12-13
15	"	1675	030	-45	131.06	July 13-15
16	"	1760	030	-45	146.91	July 15-17
A86-17	Saddle	1980	160°	-50°	221.58	July 17-19
19	"	1915	165	-52	121.70	July 21-23
20	"	1893	165	-50	133.20	July 23-24
A86-18	Saddle W.	1950	165°	-50°	122.22	July 20-21

4.10 Diamond Drilling Results

A. Central Zone

Drilling in 1986 commenced on the Central Zone where 882.64 metres were cored in six holes: A86-11: 150.57 m; A86-12: 178.92 m; A86-13: 157.58 m; A86-14: 117.60 m; A86-15: 131.06 m; A86-16: 146.91 m.

Mineralization at the Central Zone was first detected in 1983 where two contour soil sample lines at elevation 1700 metres and 1850 metres produced niobium values ranging from 0.30% Nb₂O₅ to 0.96% Nb₂O₅. In 1984 road access to the Saddle and Saddle West Zones provided several cut-banks which were soil sampled at 10 metre intervals. The geometric mean of the results of 124 soil samples over an area of 300 metres by 500 metres was 0.75% Nb₂O₅. Individual samples ran as high as 2.75% Nb₂O₅. Trenching and chip sampling in 1985 along existing roadways exposed 10 metres to 30 metres thick magnetite-rich zones which contain 0.75% Nb₂O₅ to 1.10% Nb₂O₅.

A summary of significant drill intersection is given in Table 6 below.

Table 6
1986 SIGNIFICANT DRILL INTERSECTIONS, CENTRAL ZONE

ZONE	HOLE	FROM (m)	TO (m)	LENGTH (m)	Nb ₂ O ₅ (%)
CENTRAL	86-11	8.1	17.3	9.2	1.01
	86-12	33.9	53.9	20.0	0.86
	86-13	77.4	120.6	43.2	0.73
	incl.	93.9	120.6	26.7	0.81
	86-14	4.6	15.0	10.4	0.98
	86-15	59.3	111.0	51.7	0.77
	incl.	70.1	98.4	28.3	0.89
	86-16	12.1	41.1	29.0	1.08
	and	51.5	106.5	55.0	0.77
	incl.	81.5	106.5	25.0	0.91

Holes A86-11, 12, 14 (Plates 86-11 and 86-13)

These three holes are located 150 m apart on a section and tested a panel 400 metres wide and 200 metres deep. This fence was drilled to test the inferred width of the Central Zone as outlined by 1985 trenches CZ85-6, 7, 8 and 9. Several mineral layering measurements from outcrop exposures in trenches indicate a strike of 110° to 120° and a dip of 50° to 70° southwest. A summary of the Nb₂O₅ grade distribution for holes A86-11, 12 and 14 is given in Table 7 below.

Table 7
 Nb₂O₅ GRADE DISTRIBUTION: HOLES A86-11, 12, 14

<u>Hole No.</u>	<u>From</u>	<u>To</u>	<u>Length (m)</u>	<u>%Nb₂O₅</u>
A86-11	0	8.07	8.07	overburden
	8.07	17.27	9.20	1.01 Magnetite-Columbite
	17.27	34.18	16.91	0.21
	34.18	47.09	12.91	0.46
	47.09	75.29	28.20	0.29
	75.29	85.50	10.21	0.12
	85.50	104.00	18.50	0.31
	104.00	113.07	9.07	0.16
	113.07	140.77	27.70	0.40
	140.77	150.57	9.80	0.21
A86-12	0	7.60	7.70	overburden
	7.60	27.60	20.00	0.52
	27.60	33.90	6.30	0.24
	33.90	53.90	20.00	0.86 Magnetite-Columbite
	53.90	65.60	11.70	0.37
	65.60	79.90	14.30	0.57
	79.90	105.85	26.00	0.40
	105.85	116.20	10.35	0.22
	116.20	134.80	18.60	0.40
	134.80	141.70	6.90	0.24
	141.70	155.70	14.00	0.59
	155.70	178.92	23.22	0.16
A86-14	0	4.60	4.60	overburden
	4.60	15.00	10.40	0.98 Magnetite-Columbite
	15.00	40.50	25.50	0.38
	40.50	44.50	4.00	1.14
	44.50	79.40	35.00	0.35
	79.40	117.60	38.20	0.14

Hole A86-13 (Plates 86-10 and 86-14)

Hole A86-13, collared approximately 200 m west of the fence of holes A86-11, 12, 14 was designed to test the inferred western edge of mineralization encountered in the 1985 Central Zone trenches CZ85-7 and 8. The features and character of the mineralization and footwall units are very similar to the intersections in hole A86-12 and 14 which lie approximately 200 metres to the east. Hole A86-13 intersected magnetite-columbite mineralization 100 metres vertically below surface which assayed 0.81% Nb₂O₅ across 27.0 metres. This zone can be projected up the dip of mineral layering at 55° for a length of 200 metres to mineralization encountered at surface in trench CZ86-20 which assayed 0.86% Nb₂O₅ across 25.0 m. This indicates down plunge extent and continuity which is typical of ore shoots at the Niobec mine in Quebec. A summary of the Nb₂O₅ grade distribution for hole A86-13 is given in Table 8 below.

Table 8
Nb₂O₅ GRADE DISTRIBUTION: HOLE A86-13

<u>Hole No.</u>	<u>From</u>	<u>To</u>	<u>Length (m)</u>	<u>%Nb₂O₅</u>
A86-13	0	3.88	3.88	overburden
	3.88	35.75	31.87	0.35
	35.75	44.15	8.40	0.82 Minor Magnetite
	44.15	65.77	21.62	0.32
	65.77	77.40	11.63	0.51
	77.40	93.88	16.48	0.55 Minor Magnetite
	93.88	120.60	26.72	0.81 Magnetite-Columbite
	120.60	128.40	7.80	0.48 Minor Magnetite
	128.40	157.60	29.20	0.24

Hole A86-15 (Plates 86-12 and 86-15)

Hole A86-15 collared approximately 250 m east of the fence of holes A86-11, 12, 14 was designed to test the inferred eastern limit of mineralization encountered in 1985 trench CZ85-3, 0.94% Nb₂O₅ across 30 metres. Hole A86-15 intersected magnetite-columbite mineralization at approximately 85 metres vertically below surface and 130 metres down the dip of mineral layering (60°) from surface mineralization in trench CZ85-3. The hangingwall rocks are very different from those intersected in the previous holes and are typically strongly fractured and brecciated, moderately oxidized dolomite carbonates healed by later injections of dolomite carbonate. The entire section was then disrupted by later carbonatite dyke swarms. Ferromite is common in the matrix of the breccia and a section 14.8 metres wide assayed 0.73% Nb₂O₅. The more significant magnetite-columbite mineralization (0.89% Nb₂O₅ across 28.30 metres) is very similar to that intersected in holes A86-12, 13 and 14 except that it is more fractured and oxidized and generally contains less magnetite. The footwall rocks are typically characterized by amphibolite bands in barren coarse grained dolomite carbonatite with accessory biotite altering to chlorite. Typically, the niobium grade drops off sharply when amphibolitic footwall rocks are encountered. A summary of the Nb₂O₅ grade distribution for hole A86-15 is given in Table 9 below.

Table 9
Nb₂O₅ GRADE DISTRIBUTION: HOLE A86-15

<u>Hole No.</u>	<u>From</u>	<u>To</u>	<u>Length (m)</u>	<u>Nb₂O₅</u>
A86-15	0	3.90	3.90	overburden
	3.90	11.80	7.90	0.30
	11.80	26.60	14.80	0.73
	26.60	59.30	32.70	0.23
	59.30	70.10	10.80	0.55
	70.10	98.40	28.30	0.89 Magnetite-Columbite (0.77% across 51.7 m)
	98.40	111.00	12.60	0.69
	111.00	131.10	20.10	0.37

Hole A86-16 (Plates 86-12 and 86-16)

Hole A86-16, collared 200 metres east of and along projected mineral-layering trend from A86-15 and 600 metres east of A86-13 was a "wild cat" hole in the sense that the soil geochemistry and the chip sampling exhibited low niobium values. Like hole A86-15 the hangingwall section is fractured and strongly brecciated moderately oxidized dolomite carbonatite healed by later injections of the same. Ferromite is the dominant niobium phase, where as columbite and

magnetite are virtually absent. The mineralization occurs in two bands, a strongly oxidized breccia zone 10 metres vertically below surface which assayed 1.08% Nb₂O₅ across 29.0 metres and a strongly oxidized pyritic-calcite dolomite carbonatite zone approximately 100 metres vertically below surface which assayed 0.77% Nb₂O₅ across 55.0 metres including 0.91% Nb₂O₅ across 25.0 metres. Magnetite is a very minor component and occurs as lenses and bands varying from 2 to 10 cm in width. Pyrite and limonite after pyrite occurs in amounts up to 15%. Fersmite is typically coarse grained ranging in size from 1 mm to 8 mm and is associated with pyrite and limonitic-calcitic carbonatite phases.

The geology and mineralization encountered in hole A86-16 is very different than that encountered in the previous Central Zone holes and more closely resemble the mineralized intervals encountered in the Saddle Zone drilling.

A summary of the Nb₂O₅ grade distribution for hole A86-16 is given in Table 10 below.

Table 10
Nb₂O₅ GRADE DISTRIBUTION: HOLE A86-16

Hole No.	From	To	Length (m)	%Nb ₂ O ₅	
A86-16	0	4.40	4.40		overburden
	4.40	12.10	7.70	0.57	
	12.10	19.50	7.40	1.27	
	19.50	24.50	5.00	0.33	1.08% across
	24.50	36.00	11.50	1.51	29.0 metres
	36.00	41.10	5.10	0.56	
	41.10	51.50	10.40	0.32	
	51.50	54.50	3.00	0.52	
	54.50	65.80	11.30	0.83	0.77% across
	65.80	68.80	3.00	0.27	55.0 metres
	68.80	76.20	7.40	0.73	
	76.20	81.50	5.30	0.40	
	81.50	106.50	25.00	0.91	
	106.50	116.70	10.20	0.36	
	116.70	122.30	5.60	0.95	
	122.30	137.10	14.80	0.14	
137.10	146.90	9.80	0.37		

Geological Summary

Hangingwall Rocks

The hangingwall rocks are dominantly buff to brown weathering moderately fractured dolomite carbonatites. They are generally textureless and massive, weakly oxidized and contain very minor accessory apatite and very fine grained biotite. The niobium grade is very low and ranges from 0.05% to 0.29% Nb_2O_5 . The lower hangingwall is characterized by the transition from brownish slightly oxidized carbonatite to fresh relatively unfractured light-cream-yellow and light-grey dolomite carbonatite and a sharp increase in the accessory minerals such as biotite, pyrite, minor magnetite and minor columbite. These accessory minerals exhibit a strong preferred orientation or mineral banding. The niobium grade generally ranges from 0.30% to 0.49% Nb_2O_5 . This transitional zone, varying from 10 metres to 80 metres in width, forms both the immediate hangingwall and the immediate footwall to the mineralized zone. Numerous barren and massive dolomite carbonatite dykes and dyke swarms cut through the section.

Footwall Rocks

The footwall rocks are characterized by bands and swirls of amphibolite 1 m to 5 m thick which are altered to biotite and phlogopite. The occasional thin magnetite band 10 cm to 1 m thick and rafted blocks of magnetite 0.5 m to 1.0 m across are commonly found in dolomite and calcite carbonatite dykes and dyke swarms which cut the amphibolite sections. The niobium grade is generally low, ranging from 0.30 to 0.49% Nb_2O_5 , although the occasional thin magnetic band up to 4 m thick may contain niobium values up to 1.5% Nb_2O_5 . The lower portion of the footwall section consists of cream to light grey² coarse grained dolomite carbonatite characterized by coarse dark green to black chloritic patches 0.5 cm to 2.00 cm across and accessory pyrite. In the footwall section the niobium values drop off sharply, ranging from 0.05% to 0.20% Nb_2O_5 . The footwall section generally lacks accessory minerals and consequently lacks the well developed mineral layering or compositional banding more typical of the well mineralized zones.

Mineralization

Mineralization is magmatic in character as suggested by the preferred orientation of mineral crystals and grains, swirl-textures and flow-banding. The dolomite carbonatite host is strongly fractured in hole A86-11 but relatively fresh and unfractured in holes A86-12, 13 and 14. The main niobium phase is columbite which is altered from pyrochlore. Columbite occurs as pseudomorphous of the pyrochlore crystal form ranging in size from 0.10 mm to 1.00 mm. Columbite is concentrated in bands and swirls with magnetite and lesser pyrite and pyrrhotite. Accessory phlogopite and apatite are always present. In general on a large scale the highest columbite concentrations coincide with the strongest magnetite zones. On a smaller scale of 1-5 m columbite may or may not be present with magnetite. This is particularly true in the footwall where amphibolic bands with massive magnetite pods and bands are low in niobium mineralization.

Columbite occurs in two forms:

- 1) An earlier massive magnetite phase consisting of bands and pods of magnetite 5 to 10 m thick and 10+ metres long has been fragmented and rafted by a later injection of dolomite carbonatite magma. Columbite grains exhibit a locking relationship with the magnetite grains.
- 2) Later formed crystal-pseudomorphs after pyrochlore are free-floating with magnetite and pyrite grains in dolomite carbonatite magma. Mineral grains commonly exhibit flow-banding around larger magnetite fragments and pods of an earlier magnetite phase.

In drill hole A86-16 fersmite is the dominant niobium phase in dolomite carbonatite. The mineralization occurs in healed breccia zones related to large dolomite carbonatite dyke swarms. Columbite and magnetite are virtually absent.

B. Saddle Zone

During 1986, 476.5 metres were drilled in 3 holes; A86-17: 221.58 metres, A86-19: 121.70 metres and A86-20: 133.20 metres. A summary of significant drill intersections is given in Table 11 below.

Table 11
1986 SIGNIFICANT DRILL INTERSECTIONS, SADDLE ZONE

<u>Zone</u>	<u>Hole</u>	<u>From (m)</u>	<u>To (m)</u>	<u>Length (m)</u>	<u>Nb₂O₅</u>
Saddle	86-17	20.3	29.3	9.0	0.76
		60.1	66.1	6.0	1.06
		141.0	152.7	11.7	0.61
	86-19	20.5	83.0	62.5	0.60
	86-20	50.2	105.0	54.8	0.52

Hole A86-17 (Plates 86-3 and 86-17)

Hole A86-17, was designed to test the southern extent of mineralization at the Saddle zone.

A summary of the Nb205 grade distribution for hole A86-17 is given in Table 12 below.

Table 12
Nb205 GRADE DISTRIBUTION: HOLE A86-17

Hole No.	From	To	Length (m)	%Nb205
A86-17	0	10.00	10.00	overburden
	10.00	20.30	10.30	0.23
	20.30	29.30	9.00	0.76
	29.30	39.10	9.80	0.26
	39.10	51.20	12.10	0.45
	51.20	60.10	8.90	0.24
	60.10	66.10	6.00	1.06
	66.10	85.10	19.00	0.35
	85.10	107.00	21.90	0.56
	107.00	114.70	7.70	0.32
	114.70	123.20	8.50	0.52
	123.20	141.00	17.80	0.29
	141.00	152.70	11.70	0.61
	152.70	162.90	10.20	0.19
	162.90	169.40	6.50	0.56
	169.40	207.40	38.00	0.21
	207.40	217.80	10.40	0.54
217.80	221.60	3.80	0.31	

The results of hole A86-17 show that three narrow bands were intersected ranging from 9.0 m to 12.0 m wide and containing from 0.60% to 0.76% Nb205. The appearance of amphibolite 2/3 of the way down the hole and corresponding drop in the niobium content is indicative of the approximate southern limits of the Saddle zone. This carbonatite-amphibolite content can be located on surface in an area of poorly exposed amphibolite outcrops.

Mineralization is typical of the interesections encountered in the 1985 holes A85-1 to 3 and is characterized by medium to coarse grained fersmite 2mm to 5mm in size concentrated in bands 10 cm to 1 metre thick of ozidized limonitic-pyritic-calcitic carbonatite interlayered with bands of dolomite carbonatite. Common accessory minerals are biotite-phlogopite, apatite, and pyrite. Magnetite and columbite are virtually absent. The amphibolite zones in hole A86-17 are cut by calcite and dolomite carbonatite dykes which occasionally carry good niobium values of up to 0.86% Nb₂O₅ across narrow width of 1.0 to 3.0 metres.

Saddle - Saddle West Fence (Plates 86-3 and 86-18)

A fence of holes was designed to test the niobium potential of a continuous section of the carbonatite through the Saddle West and Saddle zones. This fence includes holes A85-4, A86-18, A86-19 and A86-20. The target depth of holes A86-18, 19 and 20 was not achieved due to caving conditions in the holes. The drill rods became stuck and these holes fell short of the designed target depth creating a 75 m gap between hole A86-18 and 19 and between A86-19 and 20 which resulted in a discontinuous or segmented section across the Saddle and Saddle West zones. In two cases, holes A86-18 and A86-19, mineralization was intersected in the bottom 6 to 10 metres of the hole. Hole A86-18 will be discussed under the section describing the Saddle West drilling results.

Hole A86-19 (Plates 86-3 and 86-18)

Hole A86-19 was collared 200 metres southeasterly along the fence-section from hole A86-18 and 250 m N.W. of hole A85-3. A summary of the Nb₂O₅ grade distribution for hole A86-19 is given in Table 13 below.

Table 13
Nb₂O₅ GRADE DISTRIBUTION: HOLE A86-19

Hole No.	From	To	Length (m)	%Nb ₂ O ₅	
A86-19	0	10.00	10.00		overburden
	10.00	12.60	2.60	0.46	
	12.60	20.50	7.90	0.53	
	20.50	36.60	16.10	0.64	
	36.60	64.50	27.90	0.45	0.60% across 62.50 metres
	64.50	83.00	18.50	0.78	
	83.00	111.70	28.70	0.18	
	111.70	121.70	10.00	0.68	The hole bottomed in mineralization

The results of hole A86-19 show that the mineralized intersections are significant but less spectacular than the results from hole A85-3. The elevation of the intersections in A86-19 were about 160 metres lower than the surface projected mineralization of hole A85-3 at 1975 metres. This confirms the down dip continuity of mineralization at the Saddle zone as first suggested by the 1985 drilling results. As drilling is wide spaced (200 metres) it is difficult to infer the continuity of mineralization along strike. Mineralization consists of fine to medium grained fersmite 1 mm to 3 mm in size concentrated in bands of oxidized pyritic-calcitic dolomite carbonatite 10 cm to 2 metres wide. Accessory minerals include apatite, pyrite, phlogopite-→chlorite whereas magnetite and columbite are virtually absent.

Hole A86-20 (Plates 86-3 and 86-18)

Hole A86-20 was collared 150 metres along the strike of the fence-section from hole A86-19 and 200 metres west of hole A85-3. In addition to contributing to the drill fence-section, hole A86-20 was designed to test for the southwestern limits of the Saddle zone mineralization. Adverse drilling conditions (dry holes) resulted in rods being stuck and the designed target depth was not achieved resulting in an incomplete test of the southwestern extension of the Saddle zone mineralization.

A summary of the Nb₂O₅ grade distribution for hole A86-20 is given in Table 14 below.

Table 14
Nb₂O₅ GRADE DISTRIBUTION: HOLE A86-20

Hole No.	From	To	Length (m)	%Nb ₂ O ₅	
A86-20	0	7.30	7.30	overburden	
	7.30	20.00	12.70	0.44	
	20.00	50.20	30.20	0.29	
	50.20	61.90	11.70	0.58	
	61.90	81.00	19.10	0.44	
	81.00	93.00	12.00	0.54	0.52 across 54.8 m
	93.00	105.00	12.00	0.55	
	105.00	133.20	28.20	0.34	

The results show that mineralization is of low grade and probably represents a transition between Saddle zone mineralization and very low grade dolomite carbonatite.

C. Saddle West Zone (Plates 86-3 and 86-18)

During 1986, hole A86-18 was drilled as part of a fence comprising A85-4, A86-19 and A86-20. It was collared at the same location as A85-4 but drilled in the opposite direction and was designed to test the width of the Saddle West zone. The lower part of the hole encountered an amphibolitic band 35 metres wide which corresponds to an apophysis of amphibolite mapped on surface. The amphibolite is cut by numerous dolomite and calcite carbonatite dykes 0.5 m to 5 metres wide. The hole was stopped shortly after passing through the amphibolite band because rods were getting stuck. The last 6 metres of the hole consisted of well mineralized dolomite carbonatite which may represent the western edge of the Saddle zone mineralization. It appears that the amphibolite apophysis forms the boundary between Saddle and Saddle West. It appears that the Saddle West zone may be completely enveloped by a remnant amphibolite annulus. A summary of the Nb₂O₅ grade distribution for hole A86-18 is given in Table 15 below.

Table 15
Nb₂O₅ GRADE DISTRIBUTION: HOLES A86-18

Hole No.	From	To	Length (m)	Nb ₂ O ₅	
A86-18	0	9.14	9.14		overburden
	9.10	23.40	14.30	0.60	
	23.40	31.40	8.00	0.34	0.57% across 31.86 m
	31.40	41.00	9.60	0.72	
	41.00	74.93	33.93	0.28	
	74.93	96.57	21.64	0.43	
	96.57	116.45	19.88	0.20	
	116.45	122.22	5.77	0.65	The hole bottomed in mineralization

The results show that the upper 1/3 of the hole is mineralized and in conjunction with the results of hole A85-4, show an approximate true width of the Saddle West zone to be about 80 metres and averaging 0.65% Nb₂O₅.

D. Distribution of Niobium Phases at Aley

It appears that the niobium phases at Aley are zoned within the carbonatite complex, namely,

- 1) Pyrochlore occurs at the top and outer margins of the carbonatite plug.
- 2) Columbite occurs lower and at the central core of the carbonatite plug.
- 3) Fersmite occurs at the transition between pyrochlore and columbite.

Pyrochlore-rich zones, although small, generally occur in calcite carbonatite dykes and sills at the higher elevations near the outer margins of the carbonatite plug.

<u>Niobium Zone</u>	<u>Niobium Phase</u>
Central	columbite >> fersmite > pyrochlore
Saddle	fersmite >> pyrochlore
Saddle West	pyrochlore = fersmite

5.00 BULLDOZER TRENCHING AND CHIP SAMPLING

During 1986 approximately 1493 metres of cat trenching and bedrock-chip sampling was performed on the Central zone (778 metres) and the Goat zone (715 metres). The 5 metre chip sampling interval produced 35 kg of material which was crushed to 9 mm size and 1/8 splits were then sent to the Exploration Research Laboratory for niobium analyses by the pressed pellet XRF method.

5.10 Trenching Results

A. Central Zone (Plates 86-10, 86-11, 86-12)

During 1986 five trenches were excavated on the Central zone (778 metres). Continuous outcrop was not achieved in most instances so therefore subcrop rubble and talus were included for completeness.

Table 16
1986 REPRESENTATIVE TRENCH ASSAYS AT CENTRAL ZONE

<u>Zone</u>	<u>Trench</u>	<u>From (m)</u>	<u>To (m)</u>	<u>Length</u>	<u>Nb₂O₅ (%)</u>
Central	CZ86-13 including	0	175	175	0.24
		70	90	20	0.42
		120	145	25	0.43
	CZ86-14	0	100	100	0.25
	CZ86-20	0	35	35	T111
		35	145	110	0.44
		145	245	100	0.25
		245	305	60	0.48
		305	330	25	0.86
		330	391	61	T111
		391	401	10	0.77
		401	468	67	0.36
	CZ86-22	0	10	10	0.84
		10	20	10	Talus
		20	30	10	0.82
CZ86-23	0	41	41	Talus	
	41	81	40	0.46	

Trench CZ 86-13 (Plate 86-11)

This trench, located 70 metres north of Trench CZ85-6 (0.80% Nb₂O₅ across 55.0 metres) and 100 metres north of hole A86-14 was designed to test the north limit of mineralization encountered at the Central zone. The low niobium results in fact confirm that CZ86-13 was located outside or north of the mineralization of the Central zone. The rocks consist of coarse grained fresh dolomite carbonatite with rare small bands of magnetite and no visible fersmite or columbite.

Trench CZ86-14 (Plate 86-12)

This trench was located along a dead-end road 200 metres north of hole A86-16 and corresponds to a soil geochem anomaly where 12 samples at 15 m intervals average 0.68% Nb₂O₅. The bedrock exposures were scarce and any results were low. The higher geochem values originate from dark red-brown recessive oxidized zones which rarely produce fresh bedrock exposures. The entire 100 m of chip sampling average 0.25% Nb₂O₅, 0.64% Nb₂O₅ across 5.00 metres. The geology and assay values in trench CZ86-14 resemble those in trench CZ86-13, located 350 metres to the west. This might suggest that trench CZ86-14 is also north of the Central zone mineralization.

Trench CZ86-20 (Plate 86-10)

The trench was excavated along the 1660 m contour interval approximately 100 metres west of known mineralization encountered in trench CZ85-7 and 50 metres west of the surface projection of mineralization encountered in hole A86-13. Bedrock exposures are intermittent and inhibited by a thick cover of glacial till. The entire trench was soil sampled at 15 metre intervals. Values range from 0.32% to 2.96% Nb₂O₅ and the average of 19 soil samples was 0.73% Nb₂O₅. Magnetite-columbite mineralization (0.86% Nb₂O₅ across 25 m) was encountered in proximity to the up-dip surface projection of the magnetite-columbite mineralization intersected in hole A86-13.

Trench CZ86-20 was extended along the road cut where CZ86-20 was sampled. Glacial till inhibited good bedrock exposures. A 10 metre section of bedrock adjacent to glacial till assayed 0.77% Nb₂O₅.

Trench CZ86-23 (Plate 86-10)

This trench was located on a switchback above the end of CZ86-20 and tested the western extension of the mineralization. Only weak magnetite was observed in the outcrops and assays were generally low.

Trench CZ86-22 - Bear Creek (Plate 86-11)

This trench is located 120 metres east of hole A86-12 in Bear Creek where large pods and swirls of magnetite up to 5 metres across are exposed in glacially polished bedrock surfaces. The host dolomite carbonatite is cream to yellow-brown and resembles the dolomite carbonatite encountered in hole A86-12. The mineralized zone is roughly 30 metres wide and assayed 0.83% Nb₂O₅.

B. Goat Zone (Plate 86-19)

During 1986 four trenches were excavated on the Goat Zone (715 m). Continuous outcrop was not achieved in most instances so therefore subcrop rubble and talus material was sampled. Like the Central zone, the Goat zone was initially a soil geochem anomaly first detected during 1983 by 2 contour soil lines. Detailed contour soil sampling in 1984 and follow-up road bank soil sampling in 1985 produced a large anomalous area which was trenched and chip sampled in 1986. A summary of representative assays for the 1986 trenching program can be seen in Table 17 below.

Table 17
1986 REPRESENTATIVE TRENCH ASSAYS - GOAT ZONE

<u>Zone</u>	<u>Trench</u>	<u>From (m)</u>	<u>To (m)</u>	<u>Length</u>	<u>Nb₂O₅ (%)</u>
Goat	GZ86-15 including	0	150	150	0.33
		20	50	30	0.45
	GZ86-16	0	35	35	0.38
	GZ86-17	0	65	65	0.31
		65	140	75	0.53
		140	165	25	0.35
		165	215	50	0.84
		215	265	50	0.34
	GZ86-18	0	15	15	Talus
		15	120	105	0.32
		120	165	45	0.83
		165	185	20	0.27
		185	250	65	0.46
		250	280	30	0.32

Trench GZ86-15 (Plate 86-19)

This trench was designed to test the northern limit of the Goat zone soil anomaly where road bank soil values range from 0.25% to 0.83% Nb₂O₅ along a 150 metre section of road. The chip sample assay values are very low and suggest that the soil anomaly has been dispersed down slope from its bedrock source.

Trench GZ86-16 (Plates 86-19)

This trench was designed to test the ridge area which separates the Central zone from the Goat zone. Here, soil sample values range from 0.59% to 1.14% Nb₂O₅ along a 35 metre section of road. The chip sample assay values are very low and suggests a down-slope dispersion from its initial bedrock source.

Trench GZ86-17 (Plate 86-19)

This trench was designed to test a 265 metre long contour road cut where road bank soil values range from 0.47% to 2.76% Nb₂O₅, average 0.78% Nb₂O₅. The chip sampling encountered a 50 metre section of oxidized dolomite carbonatite with minor magnetite which assayed 0.84% Nb₂O₅. The bedrock is strongly oxidized and no details of the mineralized interval could be seen except for the occasional 5 cm band of unoxidized magnetite. Resampling of this zone occurred after some slumpling; the assay was 0.78% Nb₂O₅.

Trench GZ86-18 (Plate 86-19)

This trench was designed to test a 280 metre long contour-road cut 50 metres south and downslope from trench GZ86-17. Contour soil sampling returned values ranging from 0.56% to 1.02% Nb₂O₅ and average 0.79% Nb₂O₅ along a 75 metre section. Due to an impassible rib of bedrock, this trench failed to reach the projected strike extension of the mineralization encountered in trench GZ86-17. The chip sampling encountered a 45 metre section of very strongly oxidized material (soil and rubble) which assayed 0.83% Nb₂O₅. Due

to the lack of outcrop, no details of the mineralized interval were observed except for the occasional piece of magnetite. The mineralized interval does not correspond to the one encountered in trench GZ86-17, 50 metres up-slope.

6.00 GEOCHEMISTRY

Soil geochemistry has proven to be an effective and inexpensive method of prospecting for niobium mineralization. Contour soil sampling and road bank soil sampling have been instrumental in locating both the Central and Goat zones. Follow-up cat trenching and chip sampling have located mineralized bedrock which have helped to establish drill targets.

Procedure

The soil samples were routinely collected from the "B" Horizon, placed in Kraft envelopes and shipped to Cominco's Exploration Research Laboratory in Vancouver, B.C. At the Cominco lab the samples were dried and sieved and 50 gm of -80 mesh material saved for processing. Analyses for Nb ppm by the pressed pellet XRF method was achieved by:

- (a) Mixing 4 gm of -80 mesh material with 4 gm of Boric Acid.
- (b) Milling this mixture for 3 minutes.
- (c) Pouring the mixture into a 40 mm diameter by 3 mm high aluminum cup.
- (d) Compressing the mixture in the aluminum cup to 40,000 psi to make the pressed pellet.
- (e) The preserved pellet is analyzed by XRF to determine the Nb content.

During 1986 detailed contour soil sampling was performed on the Central zone (283 samples) and on the Goat zone (100 samples). Preliminary contour soil sampling (75 samples) was performed on the slopes east-northeast of the Goat zone to the eastern amphibolite contact.

6.10 Contour and Road-Bank Soil Sampling

A. Central Zone Results (Plates 86-4 and 86-5)

During the first season of exploration in 1983, the results of two contour soil lines identified a small area anomalous in niobium. In 1984 follow-up road excavation and detailed road bank soil sampling at 15 metre intervals revealed a large geochem anomaly measuring 300 metres by 500 metres. The niobium values in soils ranged from 0.30% to 2.00% Nb₂O₅ and the average of 124 samples was 0.75% Nb₂O₅. Cat trenching and chip sampling in 1985 exposed magnetite-columbite mineralization in dolomite carbonatite. High grade zones of 1.04% Nb₂O₅ across 20 metres were encountered. Diamond drilling in 1986 encountered similar mineralized zones 100 metres below surface. Detailed contour soil sampling at 20 metres apart was designed to identify the subsurface trace of the high grade mineralization encountered in holes A86-15 and A86-16. Part of the objective of these two holes was to define the southern limit of the Central zone mineralization. A significant soil anomaly, measuring 250 metres long (slope distance) and 40 m to 80 m wide (horizontal contour distance) and averaging 0.70% Nb₂O₅ is located from 20 m to 100 m south of hole A86-15 and strikes upslope 250 metres easterly to hole A86-16. This soil anomaly also coincides with a strong magnetic anomaly of similar dimensions. A large relatively untested area occurs between the subsurface mineralization in hole A86-16 of the Central zone and mineralization exposed on the Goat zone. Soil sampling at the 1825 m elevation contour encountered niobium values which ranged from 0.38% Nb₂O₅ to 0.81% Nb₂O₅ and averaged 0.65% Nb₂O₅ across 40 m along strike 100 m to the east from hole A86-16. Another segment of the 1825 m contour 50 metres to the north contains 0.67% across 180 metres. Further detailed diamond drilling will be required to trace and identify the strike extensions of mineralized zones encountered in hole A86-16 and determine whether Central and Goat zone mineralization is continuous. Table 18 below summarizes the anomalous contour intervals.

Table 18
CENTRAL ZONE CONTOUR SOIL ANOMALIES

<u>Elevation Contour Sampled (m)</u>	<u>Anomalous Interval Length (m)</u>	<u>Average Grade Nb₂O₅</u>
1625	20	0.68
1650	40	0.85
	20	0.71
1675	60	0.73
1700	70	0.68
1750	20	0.72
	250	0.71
1825	40	0.65
	180	0.67

7.00 GEOPHYSICS

7.10 Introduction

During 1985, Cat trenching and chip sampling on the Central zone exposed several areas of magnetite-rich dolomite carbonatite characterized by small scale bands of disseminated magnetite, columbite and Fe-sulphides and larger scale bands, swirls and lenses of massive magnetite with fine grained (1.0 mm) intergrowths of columbite. Assayed intervals of approximately 20 m to 50 m contained significant niobium ranging from 0.80% Nb₂O₅ to 1.04% Nb₂O₅.

The magnetite-niobium correlation was further substantiated by the 1986 drilling on the Central zone where 20+ metre thick zones of magnetite-rich dolomite carbonatite containing correspondingly high values in Nb₂O₅ were intersected at 150 metres below surface. Due to extensive overburden cover, tracing surface mineralization tends to be difficult. Testing by closely spaced shallow drill holes would be expensive so a detailed ground magnetic survey was initiated as an alternate method of tracing and determining the strike continuity of known magnetite (niobium?) zones beyond their trench exposures.

7.20 Data Collection (Scintex MP-2 Magnetometer)

An orientation magnetic survey along roads in the Central zone with a 5 metre reading interval showed promise for magnetics as a mineralization-tracing technique. An area of approximately 700 metres by 400 metres over the Central zone was selected for detailed magnetics. Five, 700 metre long E-W trending chained and slope-corrected baselines were installed 100 metres apart. Magnetic readings were recorded at 5 metre intervals along chained and slope-corrected N-S trending cross-lines space 20 metres apart. The entire grid, located above tree-line permitted easy and accurate installation of the 20 metre spaced cross-lines. The survey team consisted of three men: a 2 man crew sighting, chaining and marking the stations on the ground followed by the instrument operator.

A total of 16-line kilometers was surveyed during a 1 week period. Fifteen base stations were installed throughout the survey area and readings were recorded and compared on an hourly basis. During the survey period there were no major magnetic disturbances (< 50 gamma variations) and thus no corrections of the data were made. Magnetic susceptibility readings also were recorded for every metre of drill core from the Central zone, using a Scintex SM-5.

7.30 Data Presentation (Plates 86-6 to 86-9)

The total field magnetic data were plotted and hand contoured with a geological bias on 1:500 scale maps. The background value for unmineralized dolomite carbonatite in the survey area was 58,000 gammas. The readings throughout the survey area ranged from 56,000 gammas to 67,000 gammas, and 50,000 gammas was subtracted from the field-recorded magnetic readings prior to plotting.

7.40 Data Interpretation

The survey area is dominated by large lobate magnetic anomalies which exhibit a distinctive linear coincidence with the inferred geological trend of the mineralization. Generally, field readings of 59,000 gammas correspond to small amounts of visible magnetite as either float or as disseminated bands in outcrop. Significant bands (1 m to 5 m) of massive magnetite correspond to readings of $\geq 60,000$ gammas. A more detailed magnetic picture was obtained from magnetic susceptibility values over a corresponding interval of drill core. These showed that not all niobium mineralization (columbite) is associated with magnetite. The converse is also true, in that not all magnetite contains niobium mineralization. The strongest magnetic anomalies overlie the western portion of the grid (0 metres west to 380 metres west) and coincide with the significant occurrences of magnetite associated with the niobium mineralization encountered in holes A86-12, 13 and 14. The weaker magnetic anomalies overlie the eastern portion of the grid (0 metres to 300 metres east) and coincide with very minor magnetite but significant niobium mineralization encountered in holes A86-15 and A86-16. The magnetic susceptibility readings recorded on these two holes are relatively very low.

7.50 General Remarks

No direct, unique correlation exists between magnetite and the niobium minerals (pyrochlore, fersmite, columbite). A magnetic survey will not likely identify the highest grade zone of mineralization but will identify the general zone of interest into which a hole or series of holes should be drilled. It would not be wise to drill test only the strongest magnetic anomalies.

Further close-spaced drilling (50 m) will be necessary to fully test the effectiveness of the ground magnetic survey and will be necessary to address problems of identifying trends and strike-continuity of 10 to 50 metre wide zones of magnetite-rich niobium mineralization.

Had these magnetic data been available prior to selecting drill targets, some holes would have been collared somewhat differently, to better test magnetic highs as well as to search for mineralization.

8.00 CONCLUSIONS

1. Drilling at Central zone has tended to confirm the presence of niobium-mineralized zones inferred from trenching done in 1985.
2. Trenching at Goat zone suggests that additional niobium-mineralized zones exist east of Central zone: these may be one continuous roughly E-W mineralized trend which roughly bisects the carbonatite.
3. Drilling at Saddle and Saddle West zones has found extensions to mineralized zones first intersected in 1985, and has helped establish the edges for these zones.

4. Contour soil geochemistry is an effective method of generally locating favourable areas within the area underlain by carbonatite. Anomalies should be trenched and sampled.
5. Detailed magnetic surveys on surface backed up comparison of magnetic susceptibility and grade data on core offers some promise as a method of tracing mineralized zones in overburden-covered areas, albeit indirectly.
6. Significant bodies of mineralization grading two thirds to three quarters of a percent Nb₂O₅ can likely be delineated with further drilling at Aley.
7. Metallurgical test work on drill core and trench samples is warranted.

Reported by

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Project Geologist

Endorsed by

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- W.D.

APPENDIX "A"

1986 DRILL LOGS GEORES FORMAT

DEFINITION OF ABBREVIATIONS

Major Units

OVBD	overburden
OXID	oxide
SHER	shear zone
M	magnetite - disseminated
MM	magnetite - massive
AM	amphibolite
CC	calcite carbonatite
CD	dolomite carbonatite
CC-CD	calcitic-dolomitic carbonatite
A+MX	amphibolite and mixed CC-CD
A+CC	amphibolite and calcite carbonatite
A+CD	amphibolite and dolomite carbonatite

Modifiers

a	amphibolite
b	explosion breccia
c	calcitic
d	dolomitic
p	phlogopite
x	carbonate breccia
y	dyke

 * ID: A86-11 *

DRILLHOLE HEADER

 * ID: A86-11 *

LATITUDE 11128.0
 DEPARTURE 10374.0
 ELEVATION 1550.00
 DIP -45.0
 AZIMUTH 30.0
 LENGTH 150.57
 OVERBURDEN 0.00

DRILLHOLE TYPE
 SELECTION CODE
 COLLAR CODE 1
 LOGGER INITIALS RJS
 DATE DRILLED 86
 RATIONALIZE NO
 REVISION DATE JAN 13/87
 UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
150.00	-57.0	30.0

UNITS/PARTING DATA

UNITS

PARTINGS

NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		3.28	BOT			
CD	3.28	TOP		150.57	BOT			
M	8.07	TOP		15.02	BOT			
P	40.52	TOP		40.90	BOT			
Y	40.52	TOP		40.90	BOT			
X	45.15	TOP		49.39	BOT			
X	65.72	TOP		69.20	BOT			
Y	83.55	TOP		85.50	BOT			
Y	96.05	TOP		96.43	BOT			
Y	105.00	TOP		106.05	BOT			
M	126.30	TOP		126.40	BOT			
MM	126.40	TOP		126.50	BOT			
M	126.50	TOP		128.44	BOT			

 * ID: A86-12 *

DRILLHOLE HEADER

 * ID: A86-12 *

LATITUDE 11245.0
 DEPARTURE 10443.0
 ELEVATION 1580.00
 DIP -50.0
 AZIMUTH 20.0
 LENGTH 178.92
 OVERBURDEN 0.00

DRILLHOLE TYPE
 SELECTION CODE
 COLLAR CODE 1
 LOGGER INITIALS KRP
 DATE DRILLED 86
 RATIONALIZE NO
 REVISION DATE JAN 13/87
 UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
157.60	-60.0	20.0

UNITS/PARTING DATA

UNITS

PARTINGS

NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
QVBD	0.00	TOP		6.56	BOT			
CD	6.56	TOP		12.65	BOT			
CD	12.65	TOP		50.90	BOT			
M	33.90	TOP		40.73	BOT			
CC	50.90	TOP		53.90	BOT			
M	50.90	TOP		62.63	BOT			
CD	53.90	TOP		62.63	BOT			
CD	62.63	TOP		87.50	BOT			
CD	87.50	TOP		105.85	BOT			
M	89.00	TOP		90.50	BOT			
A+CD	105.85	TOP		109.15	BOT			
A	105.85	TOP		109.15	BOT			
B	105.85	TOP		109.15	BOT			
CD	109.15	TOP		117.80	BOT			
A+CD	117.80	TOP		120.30	BOT			
A	117.80	TOP		120.30	BOT			
B	117.80	TOP		120.30	BOT			
CD	120.30	TOP		129.60	BOT			
A+MX	129.60	TOP		134.80	BOT			
M	132.50	TOP		133.75	BOT			
A+CD	134.80	TOP		138.70	BOT			

 * ID: A86-12 *

UNITS/PARTINGS DATA

 * ID: A86-12 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS					PARTINGS				
NAME	FROM	TYPE	CONF	TD	TYPE	CONF	FROM	TO	
CD	138.70	TOP		161.30	BOT				
M	145.60	TOP		149.00	BOT				
AM	161.30	TOP		163.35	BOT				
CC	163.35	TOP		165.05	BOT				
M	164.60	TOP		165.05	BOT				
CD	165.05	TOP		166.22	BOT				
M	165.05	TOP		166.22	BOT				
CD	166.22	TOP		178.92	BOT				

 * ID: A86-13 *

DRILLHOLE HEADER

 * ID: A86-13 *

LATITUDE 11175.0
 DEPARTURE 10219.0
 ELEVATION 1615.00
 DIP -45.0
 AZIMUTH 20.0
 LENGTH 157.60
 OVERBURDEN 0.00

DRILLHOLE TYPE
 SELECTION CODE
 COLLAR CODE 1
 LOGGER INITIALS KRP
 DATE DRILLED 86
 RATIONALIZE NO
 REVISION DATE JAN 13/87
 UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
76.20	-55.0	20.0
151.50	-55.0	20.0

UNITS/PARTING DATA

UNITS				PARTINGS				
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		3.88	BOT			
CD	3.88	TOP		13.62	BOT			
CD	13.62	TOP		24.62	BOT			
CD	24.62	TOP		25.86	BOT			
CD	25.86	TOP		35.75	BOT			
M	25.86	TOP		26.36	BOT			
CD	35.75	TOP		44.15	BOT			
M	42.50	TOP		42.80	BOT			
CD	44.15	TOP		46.12	BOT			
Y	44.15	TOP		46.12	BOT			
MM	46.12	TOP		46.86	BOT			
CD	46.86	TOP		50.74	BOT			
Y	50.74	TOP		53.15	BOT			
CD	50.74	TOP		53.15	BOT			
CD	53.15	TOP		61.60	BOT			
CD	61.60	TOP		65.77	BOT			
Y	61.60	TOP		65.77	BOT			
CD	65.77	TOP		77.45	BOT			
M	68.87	TOP		70.75	BOT			
M	77.45	TOP		78.10	BOT			

 * ID: A86-13 *

UNITS/PARTINGS DATA

 * ID: A86-13 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS					PARTINGS			
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
CD	77.45	TOP		80.00	BOT			
M	78.90	TOP		80.00	BOT			
CD	80.00	TOP		85.55	BOT			
M	84.43	TOP		85.00	BOT			
CD	85.55	TOP		88.55	BOT			
Y	85.55	TOP		88.55	BOT			
CD	88.55	TOP		89.57	BOT			
MM	88.75	TOP		89.57	BOT			
CD	89.57	TOP		93.88	BOT			
CD	89.57	TOP		93.88	BOT			
Y	89.57	TOP		93.88	BOT			
CC	93.88	TOP		96.97	BOT			
MM	94.00	TOP		94.50	BOT			
M	94.50	TOP		96.97	BOT			
CD	96.97	TOP		98.70	BOT			
M	96.97	TOP		98.70	BOT			
CCCD	98.70	TOP		99.18	BOT			
MM	98.70	TOP		99.18	BOT			
M	99.18	TOP		100.94	BOT			
CC	99.18	TOP		100.94	BOT			
B	99.18	TOP		100.94	BOT			
CD	100.94	TOP		103.86	BOT			
MM	102.25	TOP		102.55	BOT			
CD	103.86	TOP		105.44	BOT			
MM	103.86	TOP		105.44	BOT			
CD	105.44	TOP		114.44	BOT			
C	111.44	TOP		114.44	BOT			
CC	114.44	TOP		117.19	BOT			
M	114.44	TOP		115.44	BOT			
MM	115.44	TOP		116.44	BOT			
M	116.44	TOP		117.19	BOT			
P	117.19	TOP		120.06	BOT			
CD	117.19	TOP		120.06	BOT			
A	117.19	TOP		120.06	BOT			
A	120.06	TOP		122.40	BOT			
CC	120.06	TOP		122.40	BOT			
P	120.06	TOP		122.40	BOT			
A	122.40	TOP		125.40	BOT			
P	122.40	TOP		125.40	BOT			
CD	122.40	TOP		128.40	BOT			
MM	122.90	TOP		123.00	BOT			

 * ID: A86-13 *

UNITS/PARTINGS DATA

 * ID: A86-13 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS					PARTINGS			
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
CD	128.40	TOP		130.63	BOT			
CD	130.63	TOP		134.45	BOT			
CD	134.45	TOP		136.55	BOT			
CD	136.55	TOP		137.25	BOT			
M	136.55	TOP		137.25	BOT			
CD	137.25	TOP		139.30	BOT			
B	139.30	TOP		142.43	BOT			
CD	139.30	TOP		142.43	BOT			
MM	139.30	TOP		142.43	BOT			
A	139.30	TOP		142.43	BOT			
CD	142.43	TOP		145.30	BOT			
M	144.80	TOP		145.30	BOT			
A+CD	145.30	TOP		148.96	BOT			
P	145.30	TOP		148.96	BOT			
CD	148.96	TOP		157.58	BOT			

* ID: A86-14 *

DRILLHOLE HEADER

* ID: A86-14 *

LATITUDE 11363.0
DEPARTURE 10489.0
ELEVATION 1650.00
DIP -45.0
AZIMUTH 20.0
LENGTH 117.65
OVERBURDEN 0.00

DRILLHOLE TYPE
SELECTION CODE
COLLAR CODE 1
LOGGER INITIALS KRP
DATE DRILLED 86
RATIONALIZE NO
REVISION DATE JAN 13/87
UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
61.00	-55.0	20.0
116.70	-52.0	20.0

UNITS/PARTING DATA

UNITS				PARTINGS				
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		4.50	BOT			
CD	4.50	TOP		15.00	BOT			
MM	8.70	TOP		9.75	BOT			
M	10.95	TOP		12.40	BOT			
MM	14.90	TOP		15.00	BOT			
CD	15.00	TOP		18.00	BOT			
CD	18.00	TOP		24.00	BOT			
M	23.20	TOP		23.60	BOT			
CD	24.00	TOP		27.00	BOT			
CD	27.00	TOP		30.00	BOT			
MM	29.27	TOP		29.57	BOT			
CD	30.00	TOP		36.00	BOT			
CD	36.00	TOP		38.00	BOT			
Y	36.00	TOP		38.00	BOT			
CD	38.00	TOP		40.50	BOT			
M	40.50	TOP		42.50	BOT			
CD	40.50	TOP		46.70	BOT			
B	42.50	TOP		44.50	BOT			
M	42.50	TOP		44.50	BOT			
M	44.80	TOP		45.15	BOT			

 * ID: A86-14 *

UNITS/PARTINGS DATA

 * ID: A86-14 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS					PARTINGS			
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
B	44.80	TOP		45.15	BOT			
CD	46.70	TOP		59.50	BOT			
MM	57.75	TOP		58.35	BOT			
CD	59.50	TOP		63.00	BOT			
Y	59.50	TOP		63.00	BOT			
CD	63.00	TOP		67.15	BOT			
A+CD	67.15	TOP		69.85	BOT			
M	68.00	TOP		68.95	BOT			
A+CC	69.85	TOP		71.10	BOT			
CC	71.10	TOP		72.62	BOT			
A+MX	72.62	TOP		75.20	BOT			
M	72.62	TOP		75.20	BOT			
A+CC	75.20	TOP		77.00	BOT			
M	75.20	TOP		76.00	BOT			
MM	76.80	TOP		77.00	BOT			
AM	77.00	TOP		79.40	BOT			
CD	79.40	TOP		81.00	BOT			
Y	79.40	TOP		81.00	BOT			
CD	81.00	TOP		82.95	BOT			
CD	82.95	TOP		86.00	BOT			
Y	82.95	TOP		86.00	BOT			
A+CC	86.00	TOP		87.35	BOT			
CD	87.35	TOP		91.00	BOT			
CD	91.00	TOP		93.65	BOT			
Y	93.65	TOP		94.90	BOT			
CD	93.65	TOP		94.90	BOT			
CD	94.90	TOP		117.65	BOT			

* ID: A86-15 *

DRILLHOLE HEADER

* ID: A86-15 *

LATITUDE 11344.0
DEPARTURE 10736.0
ELEVATION 1675.00
DIP -45.0
AZIMUTH 30.0
LENGTH 131.10
OVERBURDEN 0.00

DRILLHOLE TYPE
SELECTION CODE
COLLAR CODE 1
LOGGER INITIALS RJS
DATE DRILLED 86
RATIONALIZE NO
REVISION DATE JAN 13/87
UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
130.00	-54.0	30.0

UNITS/PARTING DATA

UNITS				PARTINGS				
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		3.90	BOT			
CD	3.90	TOP		10.00	BOT			
CD	10.00	TOP		11.80	BOT			
Y	10.00	TOP		11.80	BOT			
CD	11.80	TOP		26.60	BOT			
X	11.80	TOP		26.60	BOT			
CD	26.60	TOP		35.00	BOT			
Y	26.60	TOP		35.00	BOT			
CD	35.00	TOP		45.00	BOT			
X	35.00	TOP		45.00	BOT			
CD	45.00	TOP		59.30	BOT			
Y	45.00	TOP		59.30	BOT			
CD	59.30	TOP		71.00	BOT			
CD	71.00	TOP		72.00	BOT			
M	71.00	TOP		72.00	BOT			
CD	72.00	TOP		88.70	BOT			
MM	74.00	TOP		75.00	BOT			
MM	76.50	TOP		77.00	BOT			
MM	78.60	TOP		80.00	BOT			
MM	80.00	TOP		81.20	BOT			
MM	85.00	TOP		85.70	BOT			

 * ID: A86-15 *

UNITS/PARTINGS DATA

 * ID: A86-15 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS				PARTINGS				
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
MM	87.50	TOP		88.00	BOT			
CD	88.70	TOP		94.30	BOT			
MM	91.00	TOP		91.30	BOT			
MM	92.00	TOP		92.90	BOT			
CD	94.30	TOP		95.40	BOT			
Y	94.30	TOP		95.40	BOT			
CD	95.40	TOP		111.00	BOT			
M	95.40	TOP		111.00	BOT			
CD	111.00	TOP		113.40	BOT			
Y	111.00	TOP		113.40	BOT			
CD	113.40	TOP		116.60	BOT			
M	113.40	TOP		116.60	BOT			
A+CD	116.65	TOP		118.20	BOT			
MM	118.20	TOP		118.50	BOT			
CD	118.20	TOP		120.10	BOT			
M	118.70	TOP		119.10	BOT			
A+CD	120.10	TOP		126.50	BOT			
M	121.00	TOP		121.50	BOT			
M	122.80	TOP		123.50	BOT			
MM	125.00	TOP		125.50	BOT			
CD	126.50	TOP		129.60	BOT			
Y	126.50	TOP		129.60	BOT			
CD	129.60	TOP		131.06	BOT			

 * ID: A86-16 *

DRILLHOLE HEADER

 * ID: A86-16 *

LATITUDE 11147.0
 DEPARTURE 10865.0
 ELEVATION 1760.00
 DIP -45.0
 AZIMUTH 30.0
 LENGTH 146.91
 OVERBURDEN 0.00

DRILLHOLE TYPE
 SELECTION CODE
 COLLAR CODE 1
 LOGGER INITIALS RJS
 DATE DRILLED 86
 RATIONALIZE NO
 REVISION DATE JAN 13/87
 UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
146.00	-54.0	30.0

UNITS/PARTING DATA

UNITS					PARTINGS			
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		4.40	BOT			
CD	4.40	TOP		7.20	BOT			
MM	7.20	TOP		7.80	BOT			
OXID	7.20	TOP		7.80	BOT			
CD	7.80	TOP		11.10	BOT			
CD	11.10	TOP		12.10	BOT			
Y	11.10	TOP		12.10	BOT			
CD	12.10	TOP		14.10	BOT			
OXID	14.10	TOP		15.25	BOT			
CD	15.25	TOP		17.10	BOT			
OXID	17.10	TOP		18.05	BOT			
CD	18.05	TOP		19.50	BOT			
Y	18.05	TOP		19.50	BOT			
CD	19.50	TOP		32.20	BOT			
MM	32.20	TOP		33.00	BOT			
OXID	32.20	TOP		33.00	BOT			
CD	33.00	TOP		43.10	BOT			
CD	43.10	TOP		48.50	BOT			
Y	43.10	TOP		48.50	BOT			
CD	48.50	TOP		67.70	BOT			
M	54.00	TOP		55.00	BOT			

 * ID: A86-16 *

UNITS/PARTINGS DATA

 * ID: A86-16 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS				PARTINGS			
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM TO
CD	67.70	TOP		68.80	BOT		
Y	67.70	TOP		68.80	BOT		
CD	68.80	TOP		76.20	BOT		
C	68.80	TOP		76.20	BOT		
CD	76.20	TOP		81.50	BOT		
CD	81.50	TOP		94.50	BOT		
C	82.00	TOP		85.60	BOT		
MUD	94.50	TOP		95.20	BOT		
CD	95.20	TOP		99.10	BOT		
CD	99.10	TOP		100.40	BOT		
Y	99.10	TOP		100.40	BOT		
CD	100.40	TOP		106.40	BOT		
Y	106.40	TOP		109.40	BOT		
CD	106.40	TOP		109.40	BOT		
CD	109.40	TOP		114.70	BOT		
C	109.40	TOP		114.70	BOT		
Y	114.70	TOP		116.70	BOT		
CD	114.70	TOP		116.70	BOT		
CD	116.70	TOP		122.30	BOT		
C	116.70	TOP		122.30	BOT		
Y	122.30	TOP		125.50	BOT		
CD	122.30	TOP		125.50	BOT		
CD	125.50	TOP		139.41	BOT		
SHER	139.40	TOP		140.50	BOT		
CD	140.50	TOP		142.80	BOT		
SHER	142.80	TOP		143.50	BOT		
CD	143.50	TOP		146.91	BOT		

 * ID: A86-17 *

DRILLHOLE HEADER

 * ID: A86-17 *

LATITUDE 12035.0
 DEPARTURE 10490.0
 ELEVATION 1980.00
 DIP -50.0
 AZIMUTH 160.0
 LENGTH 221.60
 OVERBURDEN 0.00

DRILLHOLE TYPE
 SELECTION CODE
 COLLAR CODE 1
 LOGGER INITIALS RJS
 DATE DRILLED 86
 RATIONALIZE NO
 REVISION DATE JAN 13/87
 UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
117.00	-56.0	160.0
221.58	-56.0	160.0

UNITS/PARTING DATA

UNITS				PARTINGS				
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		10.00	BOT			
A+CC	10.00	TOP		12.50	BOT			
CD	12.50	TOP		14.25	BOT			
C	12.50	TOP		14.25	BOT			
CD	14.25	TOP		15.90	BOT			
A+CD	15.90	TOP		17.25	BOT			
CD	17.25	TOP		83.40	BOT			
C	42.50	TOP		51.20	BOT			
A+CD	83.40	TOP		85.05	BOT			
CD	85.05	TOP		98.05	BOT			
A+CD	98.05	TOP		104.00	BOT			
C	98.05	TOP		104.00	BOT			
CD	104.00	TOP		120.70	BOT			
C	111.70	TOP		117.90	BOT			
A+CD	120.70	TOP		123.20	BOT			
CD	123.20	TOP		130.90	BOT			
A+CD	130.90	TOP		138.00	BOT			
CD	138.00	TOP		151.25	BOT			
A+CC	151.25	TOP		152.70	BOT			
CC	152.70	TOP		154.10	BOT			

 * ID: A86-17 *

UNITS/PARTINGS DATA

 * ID: A86-17 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS					PARTINGS			
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
A+MX	154.10	TOP		161.30	BOT			
CD	161.30	TOP		169.35	BOT			
AM	169.35	TOP		174.85	BOT			
CC	174.85	TOP		180.85	BOT			
AM	180.85	TOP		183.90	BOT			
A+CC	183.90	TOP		192.30	BOT			
CD	192.30	TOP		194.90	BOT			
A+CD	194.90	TOP		198.15	BOT			
C	194.90	TOP		198.15	BOT			
CC	198.15	TOP		201.90	BOT			
A+MX	201.90	TOP		204.15	BOT			
CC	204.15	TOP		211.70	BOT			
D	204.15	TOP		211.70	BOT			
AM	211.70	TOP		213.35	BOT			
CC	213.35	TOP		214.70	BOT			
CD	214.70	TOP		220.35	BOT			
A+CD	220.35	TOP		221.58	BOT			
C	220.35	TOP		221.58	BOT			

 * ID: A86-18 *

DRILLHOLE HEADER

 * ID: A86-18 *

LATITUDE 12406.0
 DEPARTURE 10165.0
 ELEVATION 1950.00
 DIP -50.0
 AZIMUTH 165.0
 LENGTH 122.22
 OVERBURDEN 0.00

DRILLHOLE TYPE
 SELECTION CODE
 COLLAR CODE 1
 LOGGER INITIALS KRP
 DATE DRILLED 86
 RATIONALIZE NO
 REVISION DATE JAN 13/87
 UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
110.00	-59.0	165.0

UNITS/PARTING DATA

UNITS				PARTINGS				
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		9.97	BOT			
CD	9.97	TOP		15.50	BOT			
CC	15.50	TOP		28.40	BOT			
CD	28.40	TOP		79.05	BOT			
X	46.75	TOP		49.82	BOT			
X	51.42	TOP		56.35	BOT			
X	67.83	TOP		68.93	BOT			
AM	79.05	TOP		80.45	BOT			
CC	80.45	TOP		85.00	BOT			
CD	80.45	TOP		85.00	BOT			
AM	85.00	TOP		86.06	BOT			
CC	86.06	TOP		87.83	BOT			
CD	86.06	TOP		87.83	BOT			
AM	87.83	TOP		89.15	BOT			
CD	89.15	TOP		96.57	BOT			
AM	96.57	TOP		102.57	BOT			
CD	102.57	TOP		103.85	BOT			
C	102.57	TOP		103.85	BOT			
AM	103.85	TOP		108.37	BOT			
CD	108.37	TOP		113.38	BOT			
AM	113.38	TOP		114.15	BOT			

* ID: A86-18 *

UNITS/PARTINGS DATA

* ID: A86-18 *

***** NOTE: -99 INDICATES A MISSING VALUE. *****

UNITS					PARTINGS			
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
CD	114.15	TOP		115.55	BOT			
AM	115.55	TOP		116.45	BOT			
CD	116.45	TOP		122.22	BOT			

* ID: A86-19 *

DRILLHOLE HEADER

* ID: A86-19 *

LATITUDE 12225.0
DEPARTURE 10218.0
ELEVATION 1915.00
DIP -52.0
AZIMUTH 165.0
LENGTH 121.70
OVERBURDEN 0.00

DRILLHOLE TYPE
SELECTION CODE
COLLAR CODE 1
LOGGER INITIALS KRP
DATE DRILLED 86
RATIONALIZE NO
REVISION DATE JAN 13/87
UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
65.50	-59.0	165.0

UNITS/PARTING DATA

UNITS

PARTINGS

NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		10.00	BOT			
CD	10.00	TOP		20.50	BOT			
Y	19.65	TOP		20.50	BOT			
P	19.65	TOP		20.50	BOT			
CC	20.50	TOP		21.60	BOT			
CD	21.60	TOP		121.00	BOT			
Y	30.60	TOP		33.60	BOT			
X	52.50	TOP		55.50	BOT			
Y	83.00	TOP		84.75	BOT			
Y	87.75	TOP		90.75	BOT			

 * ID: A86-20 *

DRILLHOLE HEADER

 * ID: A86-20 *

LATITUDE 12092.0
 DEPARTURE 10258.0
 ELEVATION 1893.00
 DIP -50.0
 AZIMUTH 165.0
 LENGTH 133.20
 OVERBURDEN 0.00

DRILLHOLE TYPE
 SELECTION CODE
 COLLAR CODE 1
 LOGGER INITIALS RJS
 DATE DRILLED 86
 RATIONALIZE NO
 REVISION DATE JAN 13/87
 UNITS METRIC

SURVEY DATA

SURVEY POINTS

DEPTH	DIP	AZIMUTH
77.40	-58.0	165.0

UNITS/PARTING DATA

UNITS				PARTINGS				
NAME	FROM	TYPE	CONF	TO	TYPE	CONF	FROM	TO
OVBD	0.00	TOP		7.30	BOT			
CD	7.30	TOP		20.45	BOT			
C	16.80	TOP		20.45	BOT			
CD	20.45	TOP		22.80	BOT			
Y	20.45	TOP		22.80	BOT			
MUD	22.80	TOP		23.00	BOT			
Y	23.00	TOP		28.30	BOT			
CD	23.00	TOP		28.30	BOT			
CD	28.30	TOP		113.19	BOT			
X	44.00	TOP		50.20	BOT			
CD	52.50	TOP		65.00	BOT			
CD	65.00	TOP		68.00	BOT			
Y	65.00	TOP		68.00	BOT			
CD	68.20	TOP		77.42	BOT			
X	77.42	TOP		79.00	BOT			
C	79.00	TOP		81.80	BOT			
X	81.80	TOP		83.35	BOT			
X	93.00	TOP		96.00	BOT			
C	108.30	TOP		111.30	BOT			
CD	113.19	TOP		120.60	BOT			
Y	114.30	TOP		120.60	BOT			

ARIS SUMMARY SHEET

Regional Geologist, Prince George

Off Confidential: 92.03.31

ASSESSMENT REPORT 15721

MINING DIVISION: Omineca

PROPERTY: Aley
 LOCATION: LAT 56 28 00 LONG 123 44 00
 UTM 10 6258048 454815
 NTS 094B05E
 CLAIM(S): Aley 1,Aley 3,Aley 4
 OPERATOR(S): Cominco
 AUTHOR(S): Pride, K.R.
 REPORT YEAR: 1986, 40 Pages

COMMODITIES

SEARCHED FOR: Niobium/Columbium,Apatite

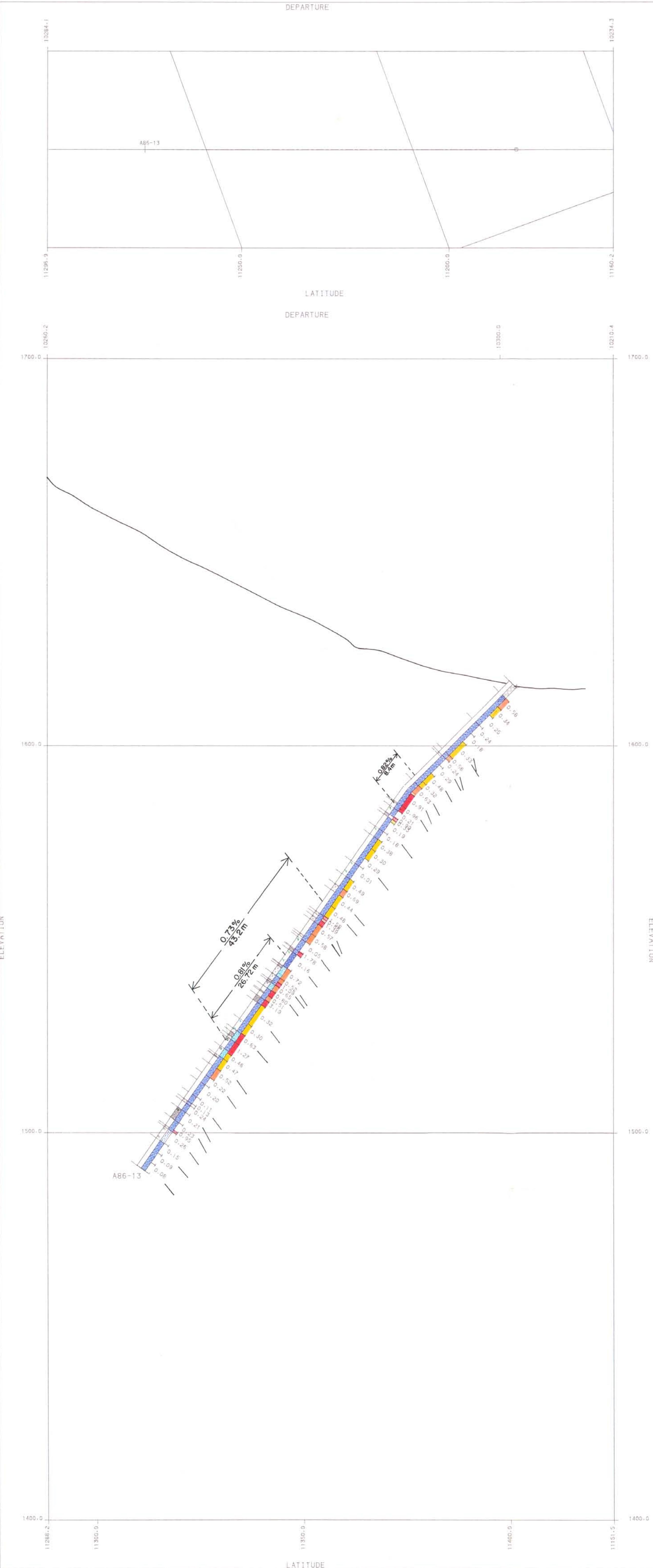
GEOLOGICAL

SUMMARY: A roughly circular (4 kilometre diameter) carbonatite complex of Mississippian age has intruded carbonate and clastic sedimentary rocks of the Lower Paleozoic Kechika Group and Skoki Formation. The intrusive is composed of a dolomitic core, an ultramafic annulus and a halo of altered sedimentary host rocks. Seven niobium-bearing zones have been identified within the core.

WORK

DONE: Geophysical,Geochemical,Drilling,Physical
 DIAD 1481.4 m 10 hole(s);BQ
 Map(s) - 7; Scale(s) - 1:10 000,1:500
 MAGG 20.1 km
 ROAD 3.2 km
 SAMP 790 sample(s) ;NB
 SOIL 458 sample(s) ;NB
 TREN 1493.0 m 9 trench(es)

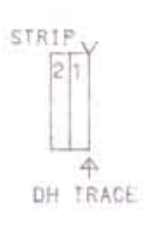
MINFILE: 094B 027



LEGEND

- NB205 %**
- LT D:30
 - D:30 TO D:50
 - D:50 TO D:74
 - DT D:74

- NB**
- NR SHADED



- STRIP 1 UNITS**
- AM AMPHIBOLITE
 - CC CARBONATITE / CALCITE
 - CD CARBONATITE / DOLomite
 - SHR SHEAR ZONE
 - OXD OXIDE
 - OVB OVERBURDEN
 - CCD CARBONATITE / CALCITE / DOLomite
 - A+M AMPHIBOLITE AND MIXED CC / CD
 - A+CC AMPHIB & CARBONATITE / CALCITE
 - A+CD AMPHIB & CARBONATITE / DOLomite

- STRIP 2 UNITS**
- M MAGNETITE / MASSIVE

- STRIP 2 MODIFIERS**
- A AMPHIBOLITIC
 - B FRAGMENTAL BRECCIA
 - C CALCITIC
 - D DOLOMITIC
 - F FALGOPYLITIC
 - X CARBONATE BRECCIA
 - T DIKE

Mineral Layering

GEOLOGICAL BRANCH ASSESSMENT REPORT

15,721

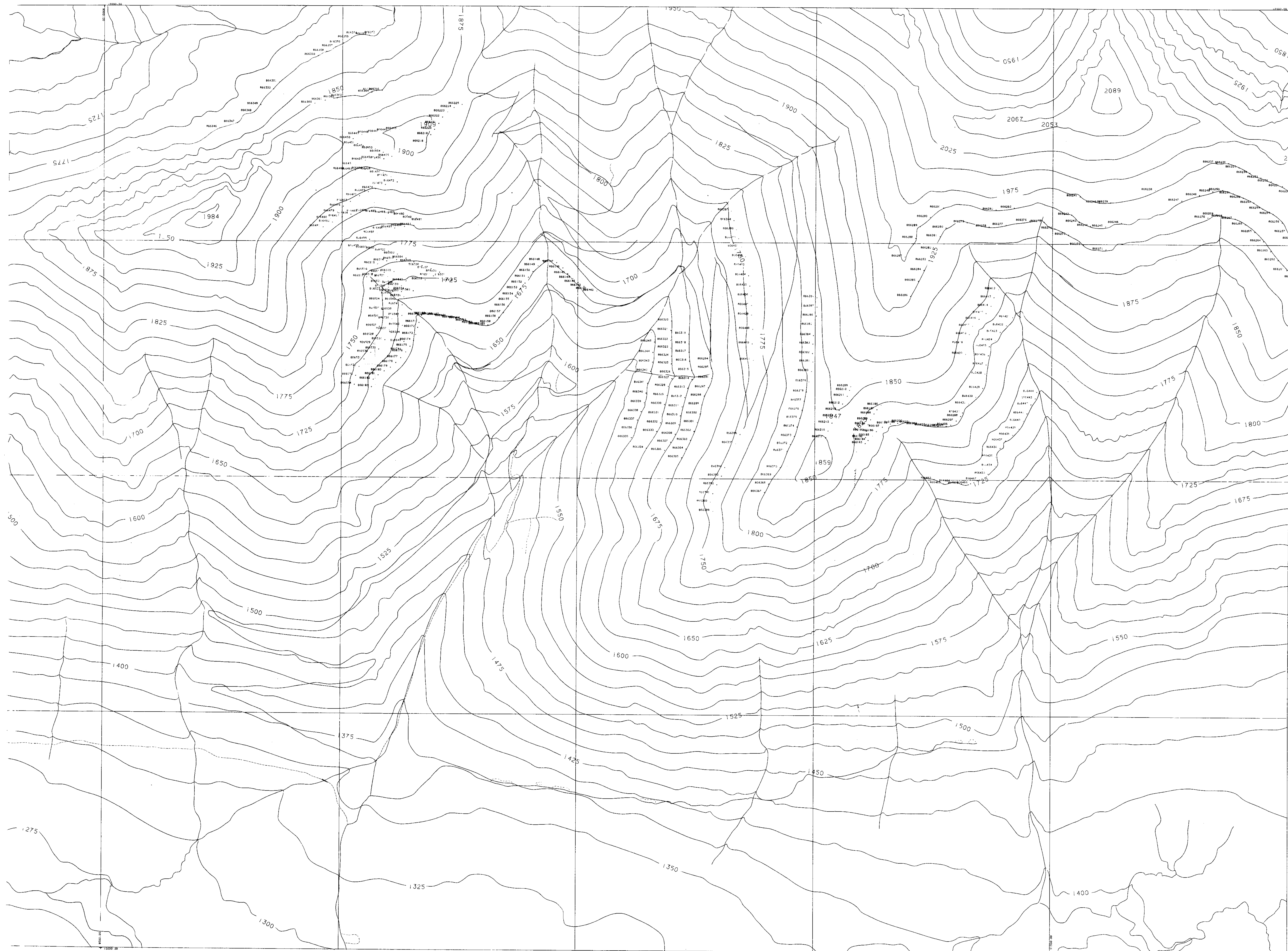


VOLUME SPECIFICATIONS				SCALE: 1 CM = 500.0M
N	11266.2	E	10260.2	RANGE: 10. SECTION: 1
	11151.5	EL	1700.0	

ALEY CENTRAL ZONE

DRAWN BY: GEORES	TRACED BY:
REQUESTED BY: K. R. PRIDE	REVISOR: MARK
DATE: 1986	

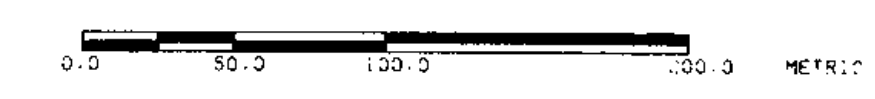
**D.D.H. SECTION
A86-13**



GEOLOGICAL BRANCH
ASSESSMENT REPORT

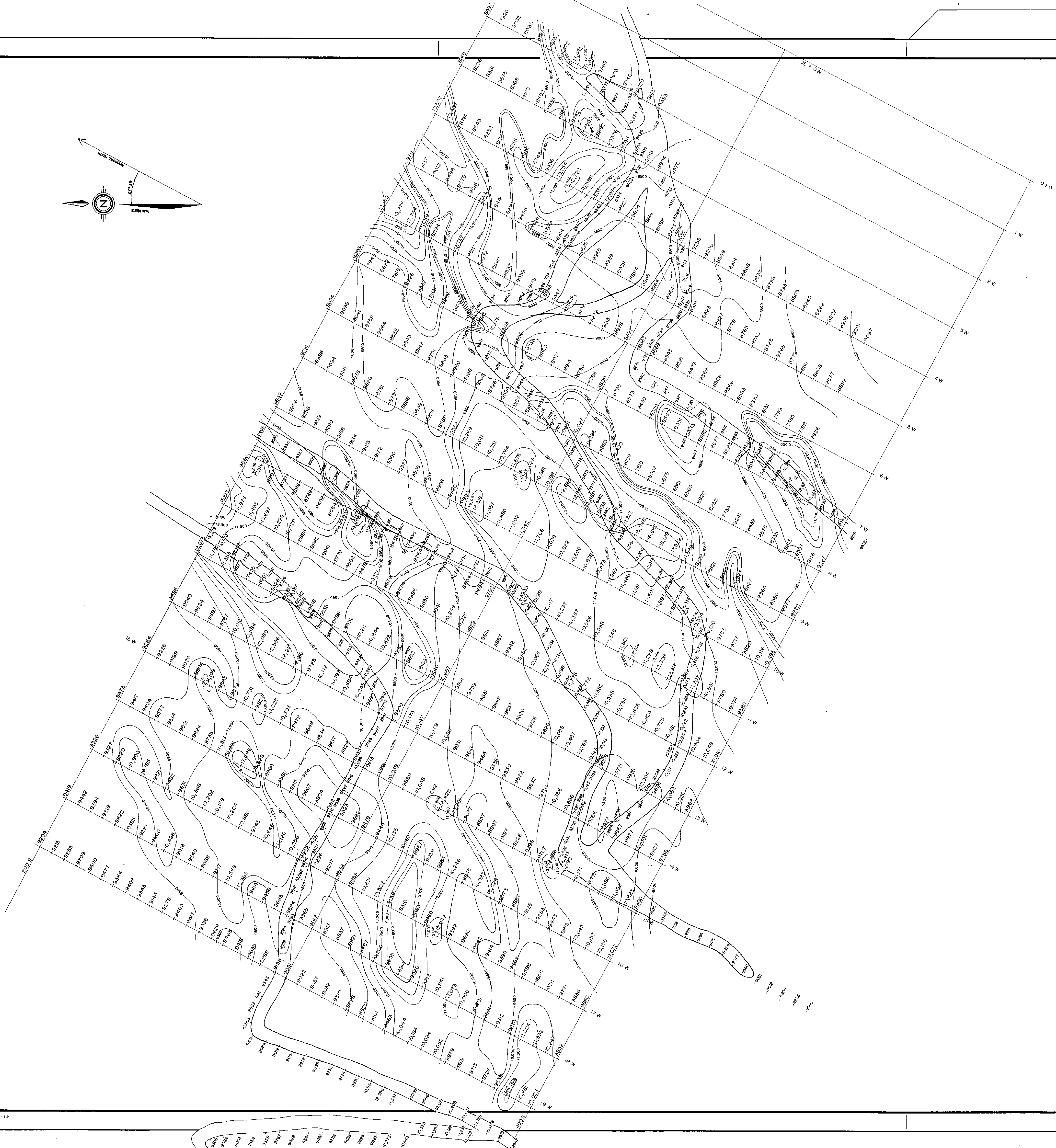
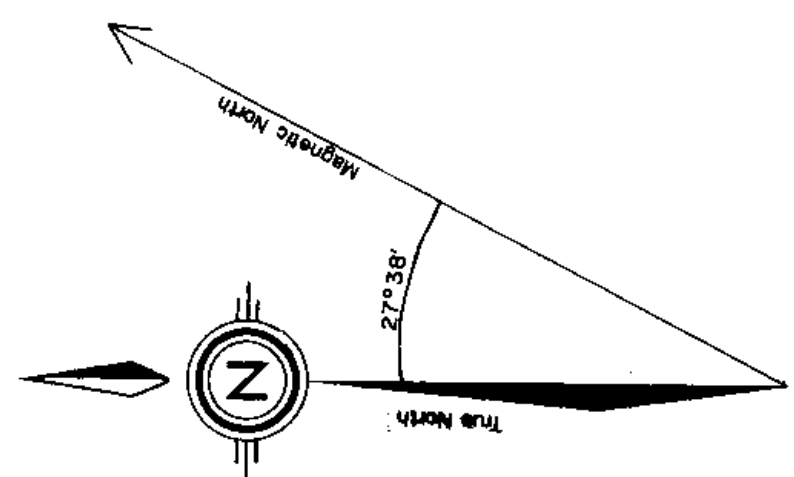
15,721

FIELD



ALEY PROPERTY	
DRAWN BY:	TRACED BY:
DATE:	DATE:
SCALE: 1" = 2500'	DATE: 06FEB87
PLAT: 08-4	

1986 SOIL GEOCHEMISTRY
FIELD NUMBER

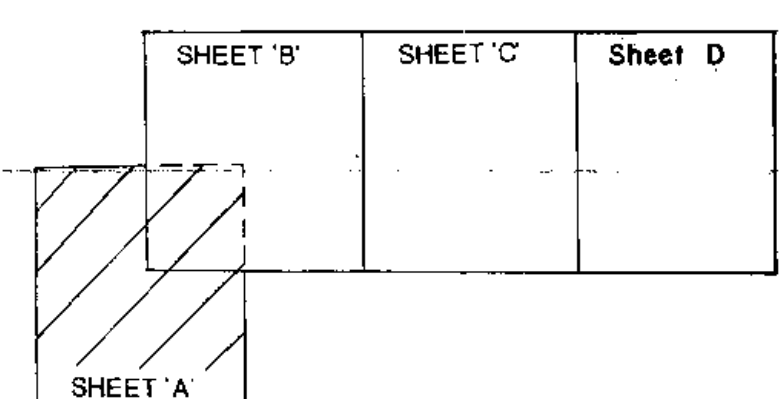


LEGEND

SCINTREX MAGNETOMETER
MODEL MP-2 #767010
SERIAL NO. 506142

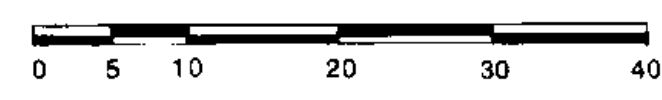
Total Field Values

50,000 GAMMAS SUBTRACTED OUT

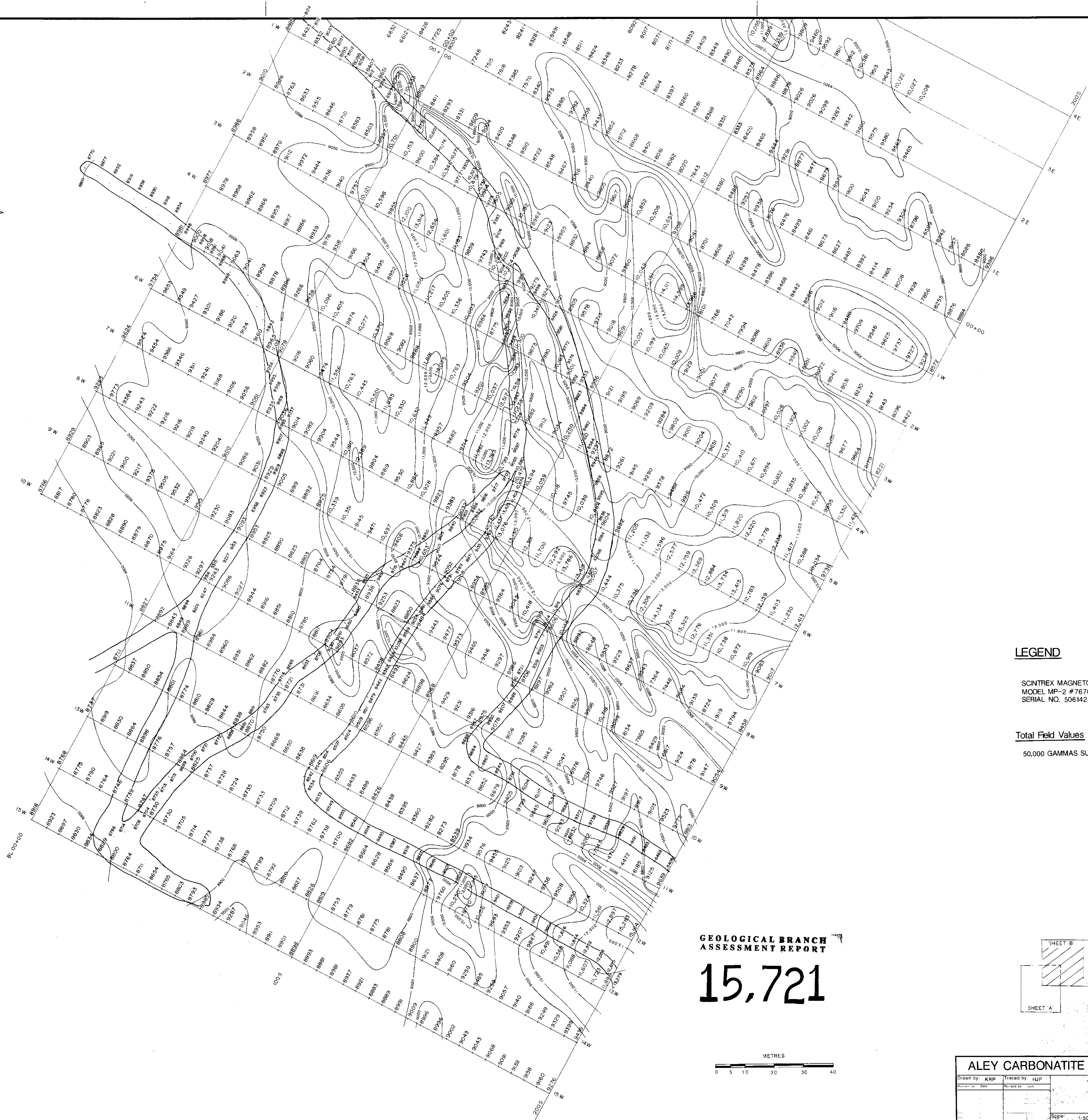
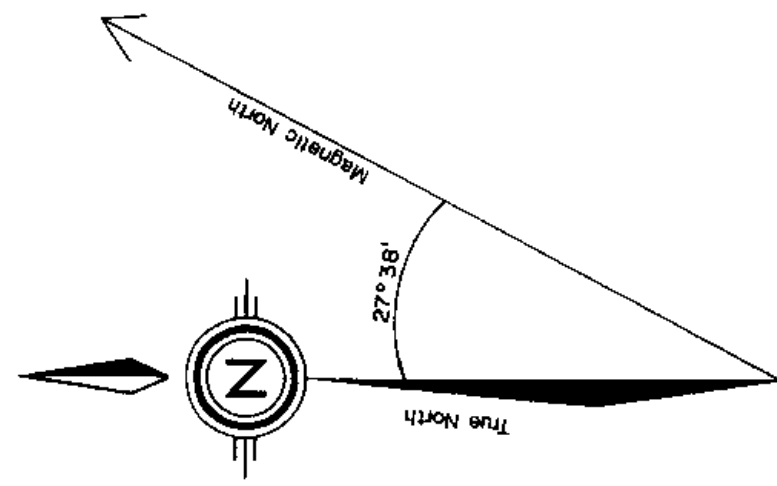


**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

15,721
METRES



ALEY CARBONATITE - CENTRAL ZONE		N.T.S. 9485
Drawn by: KRP	Traced by: HJP	
Checked by: [blank]	Reviewed by: [blank]	
TOTAL FIELD MAG.		
SHEET 'A'		
Scale: 1:500	Date: JAN, 1987	Plate: 05-6



LEGEND

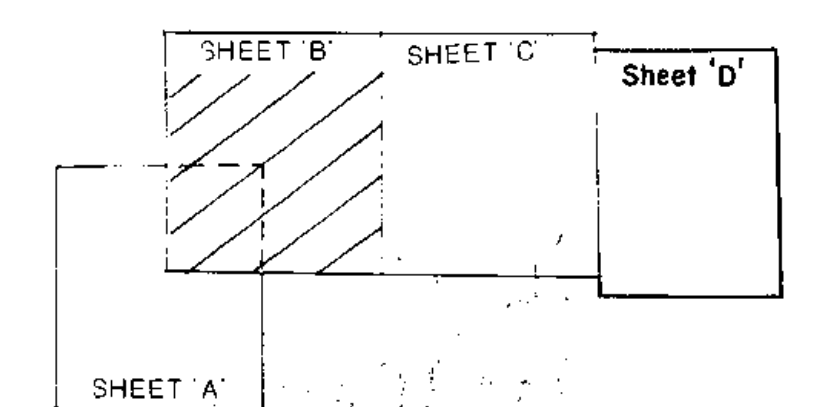
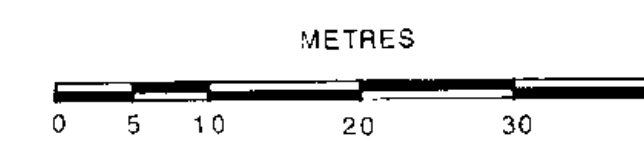
SCINTREX MAGNETOMETER
MODEL MP-2 #767010
SERIAL NO. 506142

Total Field Values

50,000 GAMMAS SUBTRACTED OUT

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

15,721



ALEY CARBONATITE - CENTRAL ZONE		N.T.S. 9485	
Drawn by: KAP	Traced by: HJP	TOTAL FIELD MAG.	
Checked by: DMR	Reviewed by: DMR	SHEET 'B'	
Scale: 1:500	Date: JAN 1987	Plate: 86-7	

DEPARTURE

LATITUDE
DEPARTURE

LEGEND



NB
NB SHADED

STRIP
DM TRACE

STRIP 1 UNITS

- AM AMPHIBOLITE
- CC CARBONATITE CALCITE
- CS CARBONATITE SOLPHIDE
- SHR SHEAR ZONE
- OV OVID
- SHD SHARDOLITE
- CCS CARBONATITE CALCITE SOLPHIDE
- AMM AMPHIBOLITE AND MINER SOIDS
- AMC AMPHIBOLITE + CARBONATITE - CALCITE
- AMS AMPHIBOLITE + CARBONATITE - SOLPHIDE

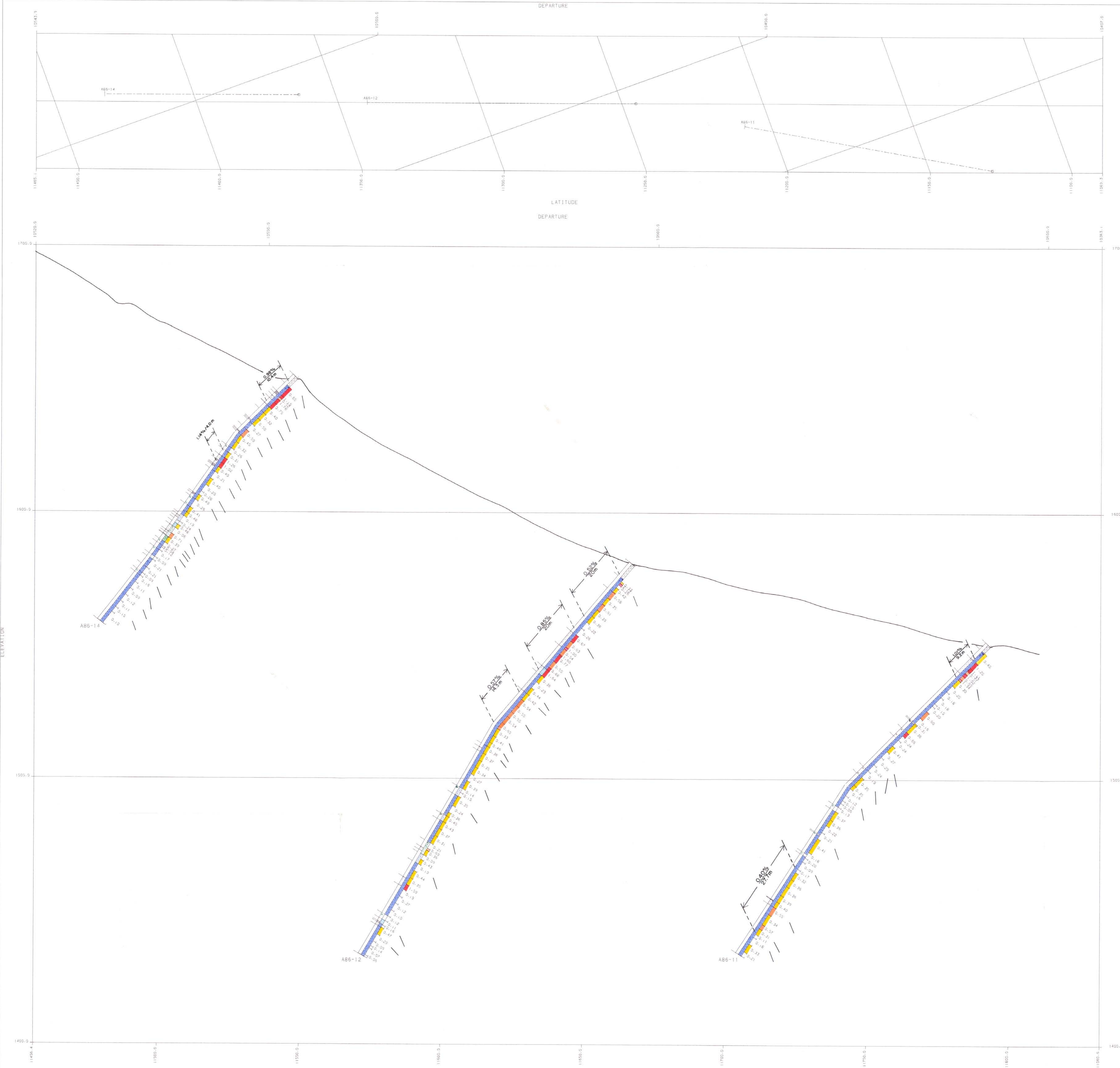
STRIP 2 UNITS

- M MAGNETITE - GUGGENHEIMITE
- MY MAGNETITE - NICKELITE

STRIP 2 MODIFIERS

- A AMPHIBOLITE
- B FERRUGINOUS BELLITE
- C CALCITE
- S SOLPHIDE
- F FERRUGINOUS
- X CARBONATE BELLITE
- Y BULK

Mineral Layering



GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,721

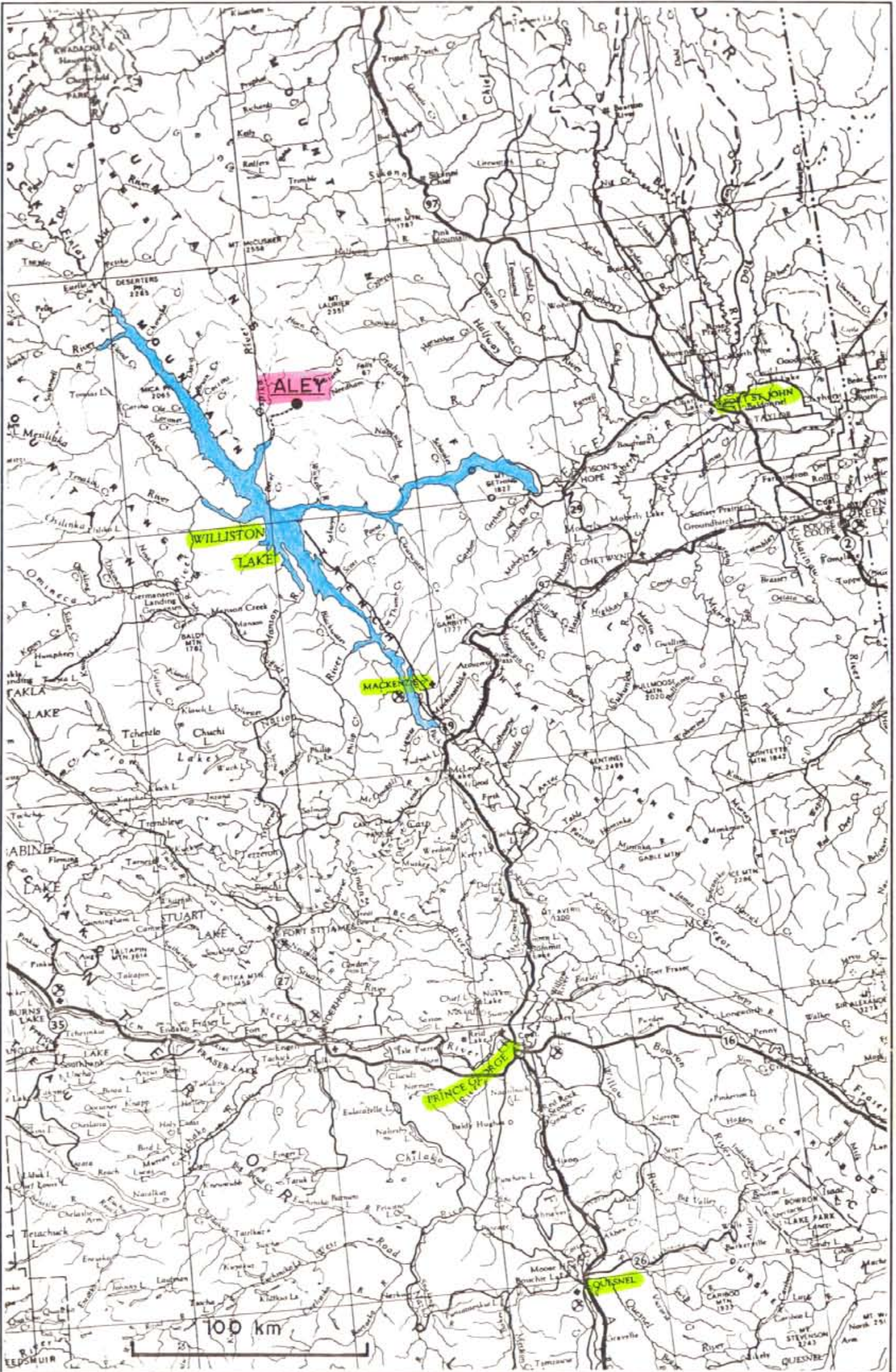


VOLUME SPECIFICATIONS		SCALE	
N	11458.4	EL	1400.0
E	11720.0	RANGE	30.
	11283.1	SECTION	

ALEY GEORES CENTRAL ZONE

D.D.H. SECTION HOLES
A86-11, 12, 14

SCALE: 1:500 DATE: DEC 23 1988
1 CM = 50M TIME: 09:25:18



Drawn by: K.R.P.	Traced by:
Revised by	Date
Revised by	Date

ALEY PROPERTY

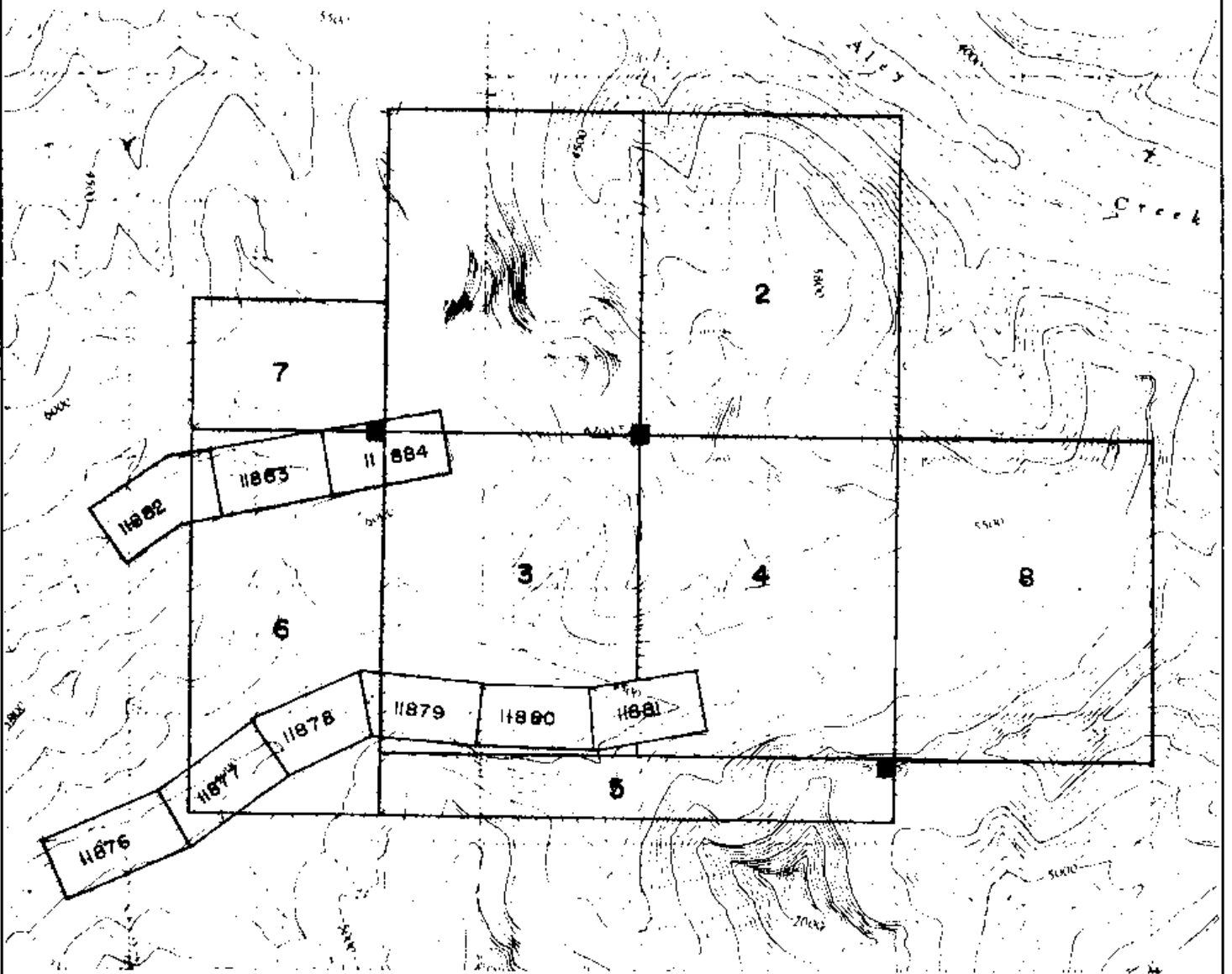
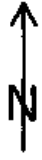
LOCATION MAP

Scale: 1:2,000,000

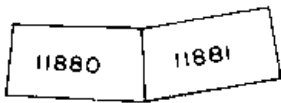
Date: JAN. 1985

Plate: 1

ALEY PROPERTY



LEGEND



PLACER LEASE



MINERAL CLAIM



N.T.S.
94 B/5

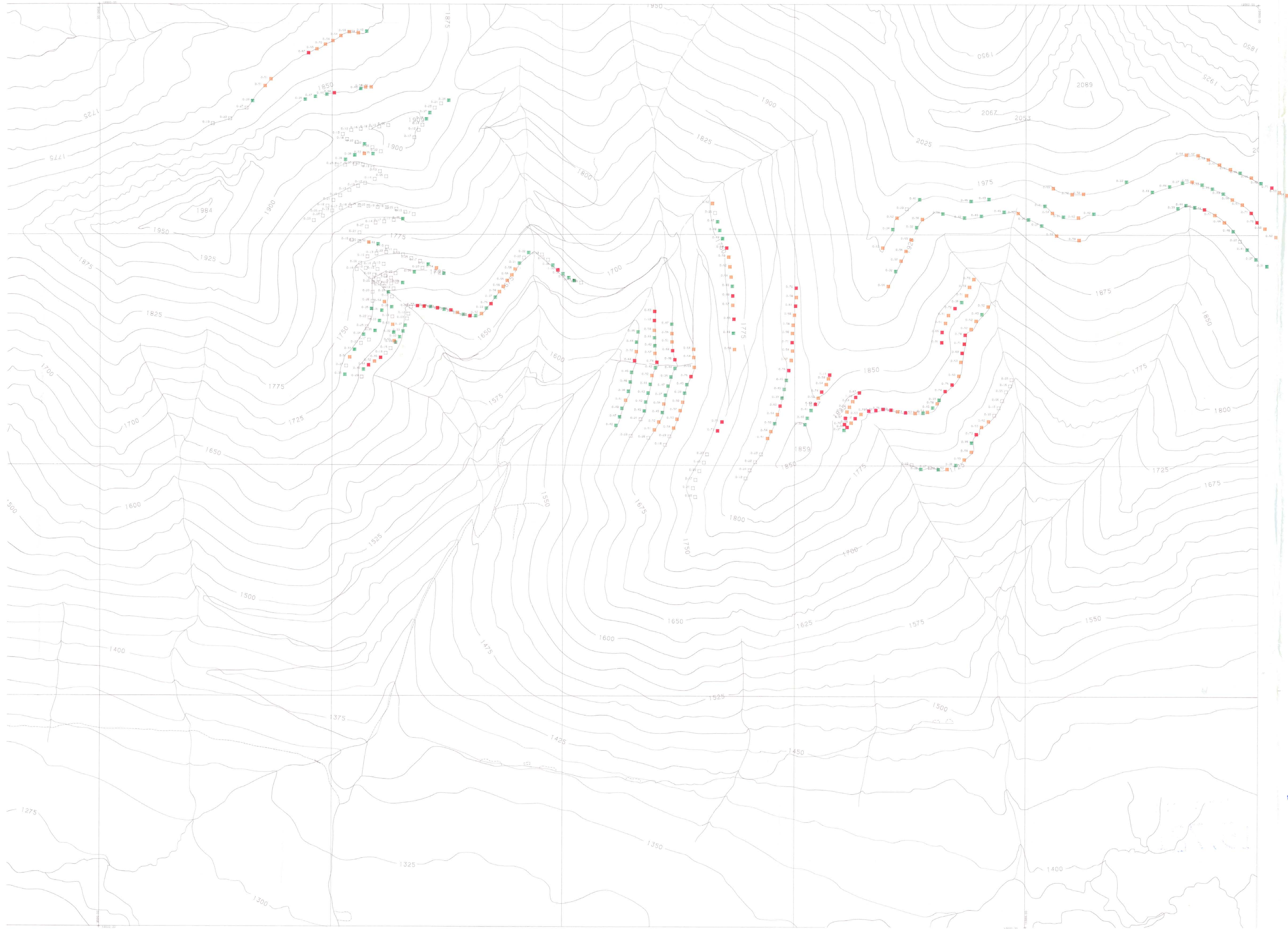
Drawn by		Traced by:	
Revised by	Date	Revised by	Date

CLAIM LOCATION MAP

Scale. 1:50,000

Date FEB., 1987

Plate 86-2



**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

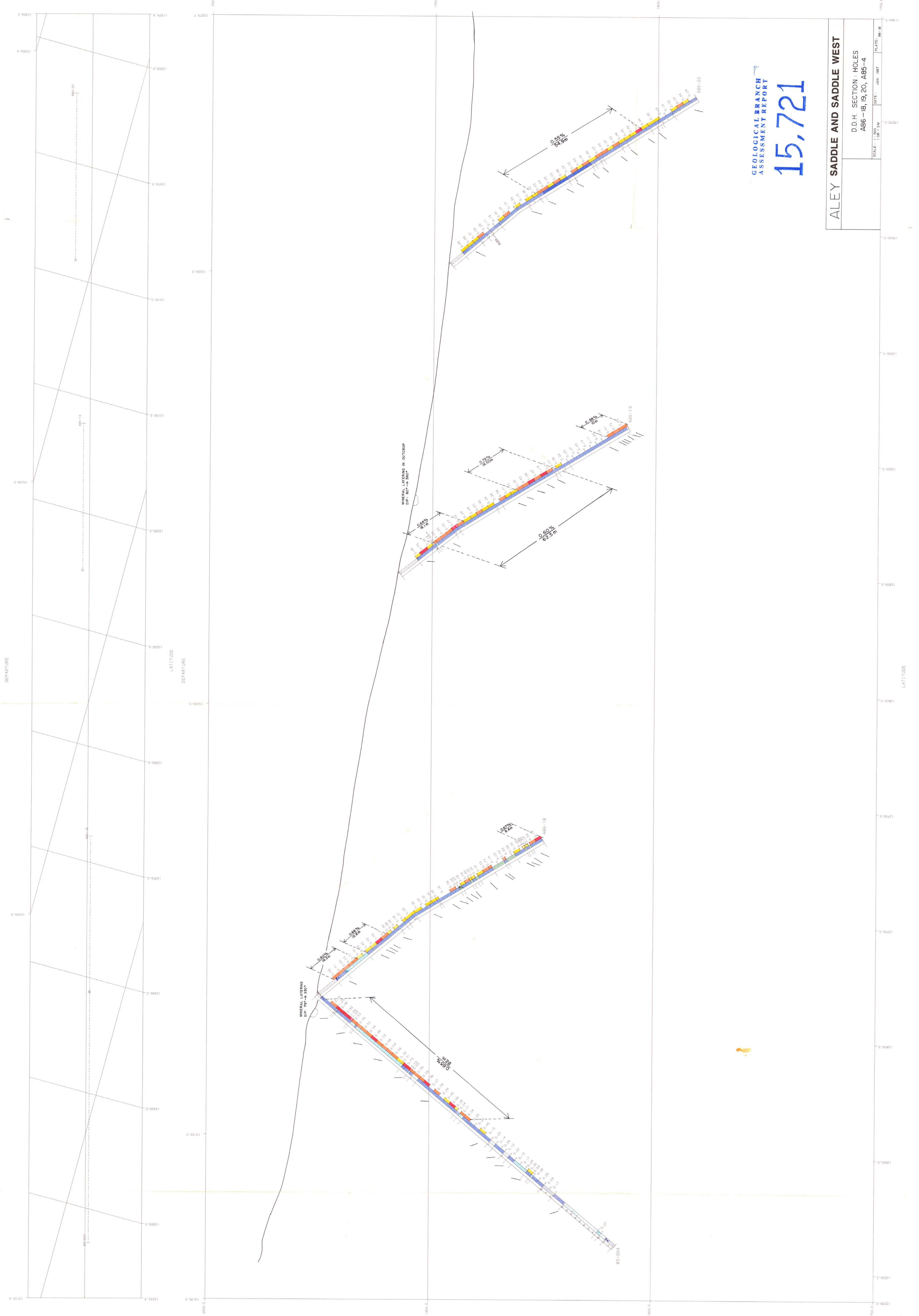
15,721

- CUT-OFFS FOR NB205 LV %**
- >0.70
 - 0.50 TO 0.70
 - 0.30 TO 0.50
 - <0.30



ALEY PROPERTY

DRAWN BY:	TRACED BY:	1986 SOIL GEOCHEMISTRY
DATE: 1/24/87	REVISOR: JAC	PERCENT NB205
SCALE: 1" = 250'	DATE: 04FEB87	PLANT: 86-5



GEOLOGICAL BRANCH
ASSESSMENT REPORT

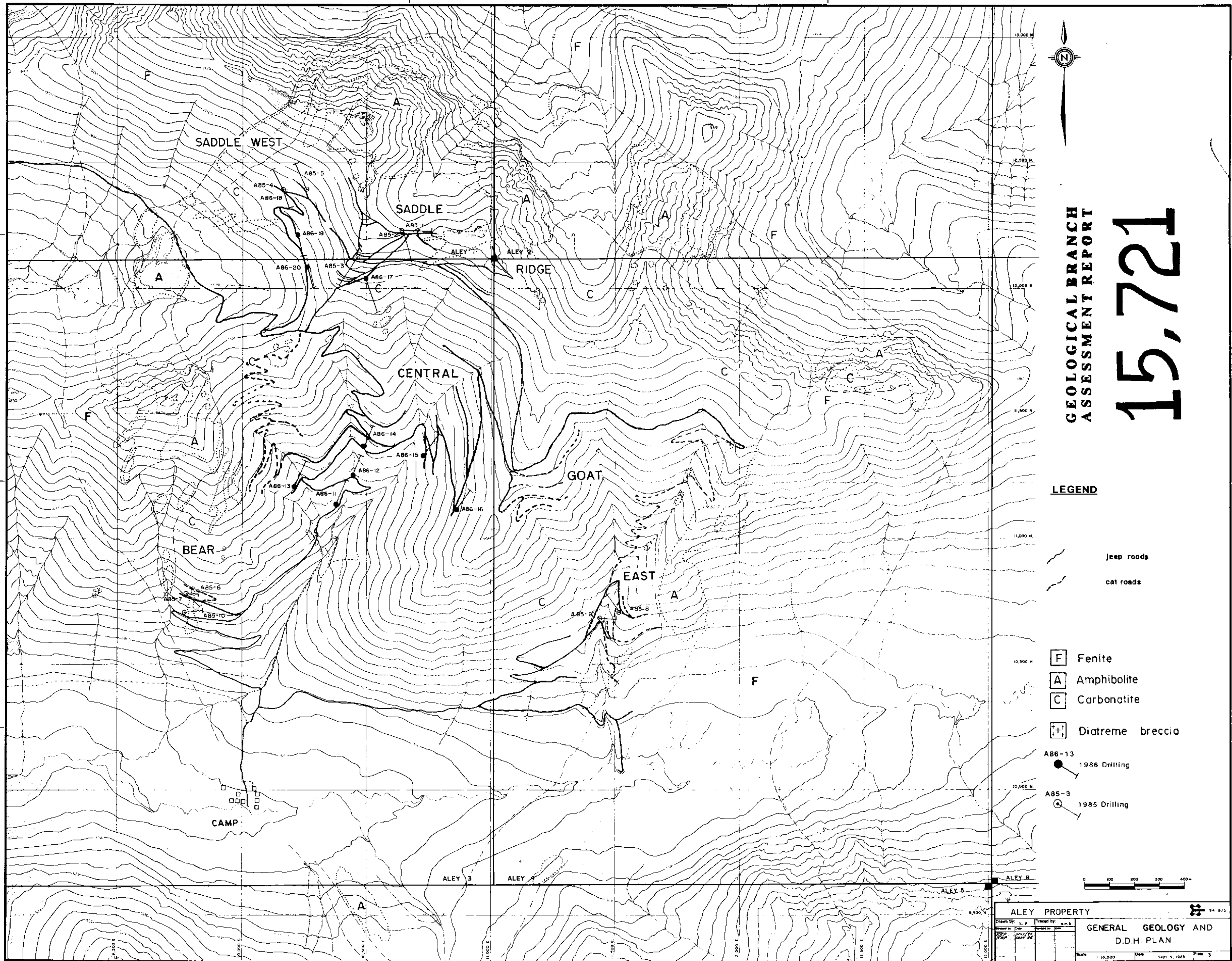
15,721

ALEY SADDLE AND SADDLE WEST

D.D.H. SECTION - HOLES
ABB-18, 19, 20, A85-4

SCALE: 1:500
DATE: JAN. 1997
PLATE: 06-18









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**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

15,721

LEGEND

-  jeep roads
-  cat roads
-  Fenite
-  Amphibolite
-  Carbonatite
-  Diatreme breccia
-  A86-13 1986 Drilling
-  A85-3 1985 Drilling



ALEY PROPERTY

Drawn by: <i>[Signature]</i>	Checked by: <i>[Signature]</i>
Date: <i>[Date]</i>	Date: <i>[Date]</i>

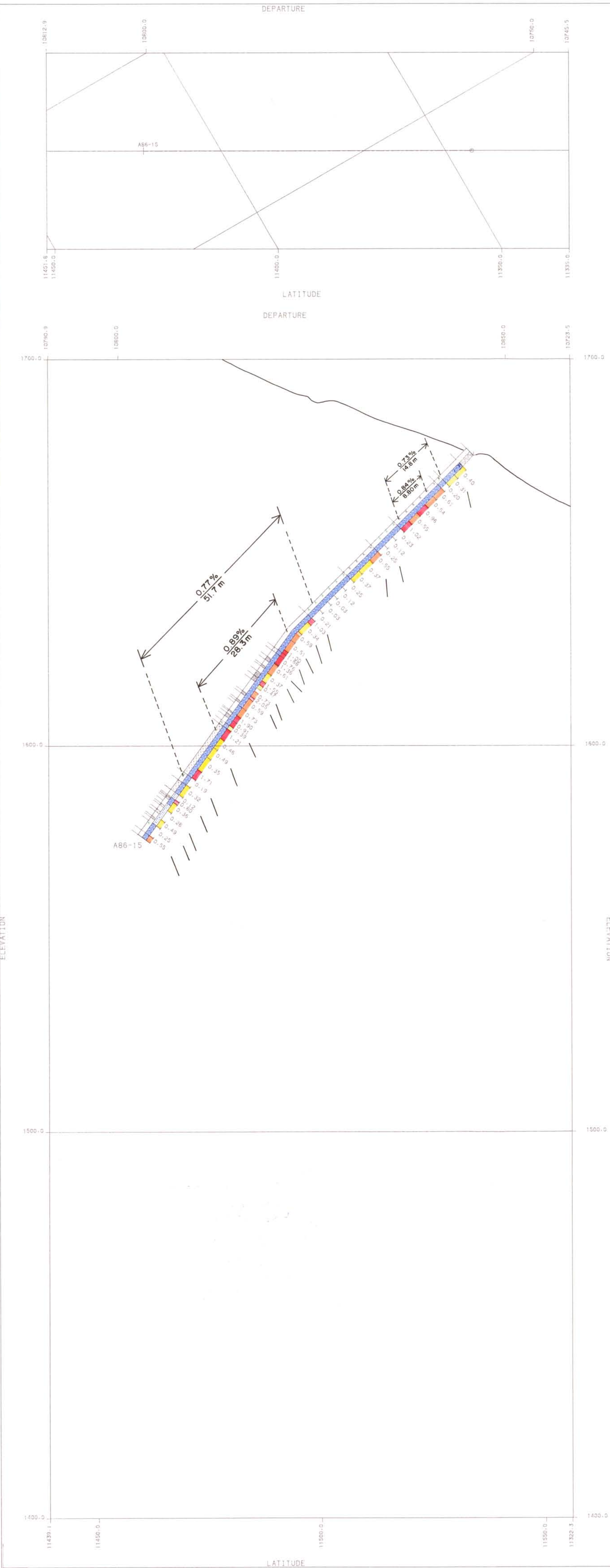
**GENERAL GEOLOGY AND
D.D.H. PLAN**

Scale: 1:10,000 Date: Sept 9, 1985 Page: 3

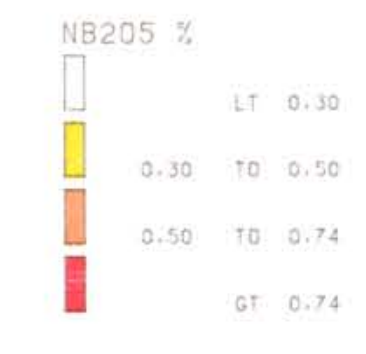


GEOLOGICAL BRANCH
ASSESSMENT REPORT
15,721

GOAT ZONE	
Drawn by	Traced by
Checked by	Reviewed by
Date	Date
TRENCH ASSAY PLAN GZ86-15, 16, 17 & 18	
Scale: 1:500	Date: December 1986
Sheet D	



LEGEND



NB
NB SHADED

STRIP
DH TRACE

STRIP 1 UNITS

- AR AMPHIBOLITE
- CC CARBONATITE CALCITE
- CD CARBONATITE DOLOMITE
- SMZ SHEAR ZONE
- OXD OXIDE
- COB COBALT ORE
- CCD CARBONATITE, CALCITIC DOLOMITIC
- ACD CARBONATITE AND MIXED CC-CD
- ACF AMPHIB & CARBONATITE, CALCITIC
- ACD AMPHIB & CARBONATITE, DOLOMITIC

STRIP 2 UNITS

- M MAGNETITE, DISSEMINATED
- MS MAGNETITE, MASSIVE

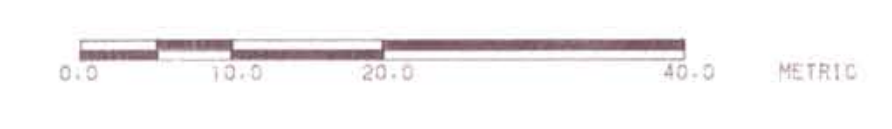
STRIP 2 MODIFIERS

- A AMPHIBOLITIC
- B FRAGMENTAL BROCCIA
- C CALCITIC
- D DOLOMITIC
- F FALDOPHITIC
- X CARBONATE BROCCIA
- Y DIKE

Mineral Layering

GEOLOGICAL BRANCH
ASSESSMENT REPORT

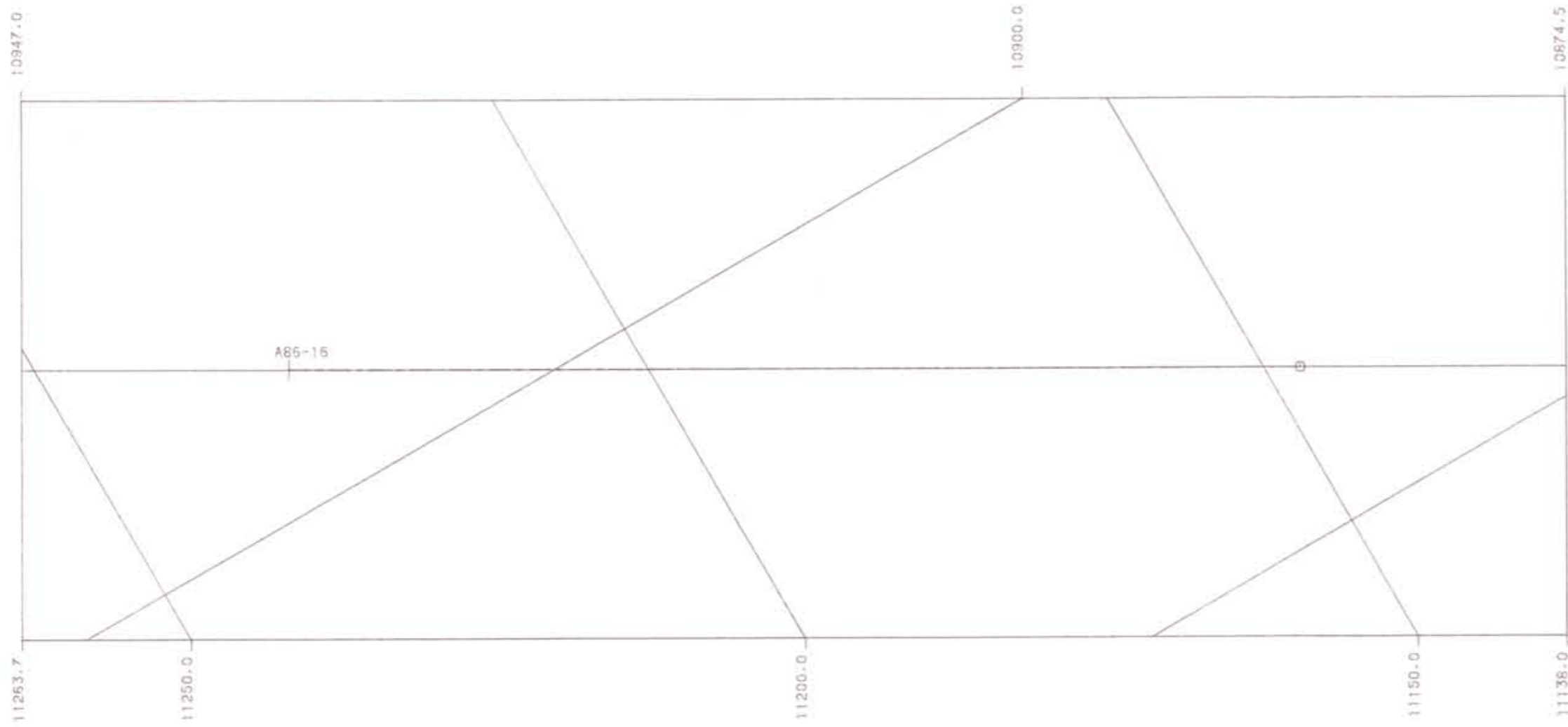
15,721



VOLUME SPECIFICATIONS				SCALE: 1 CM = 500. SM	
N	11439.1	E	10790.9	EL	1400.0
	11322.3		10723.5		1700.0
				RANGE:	10.
				SECTION:	

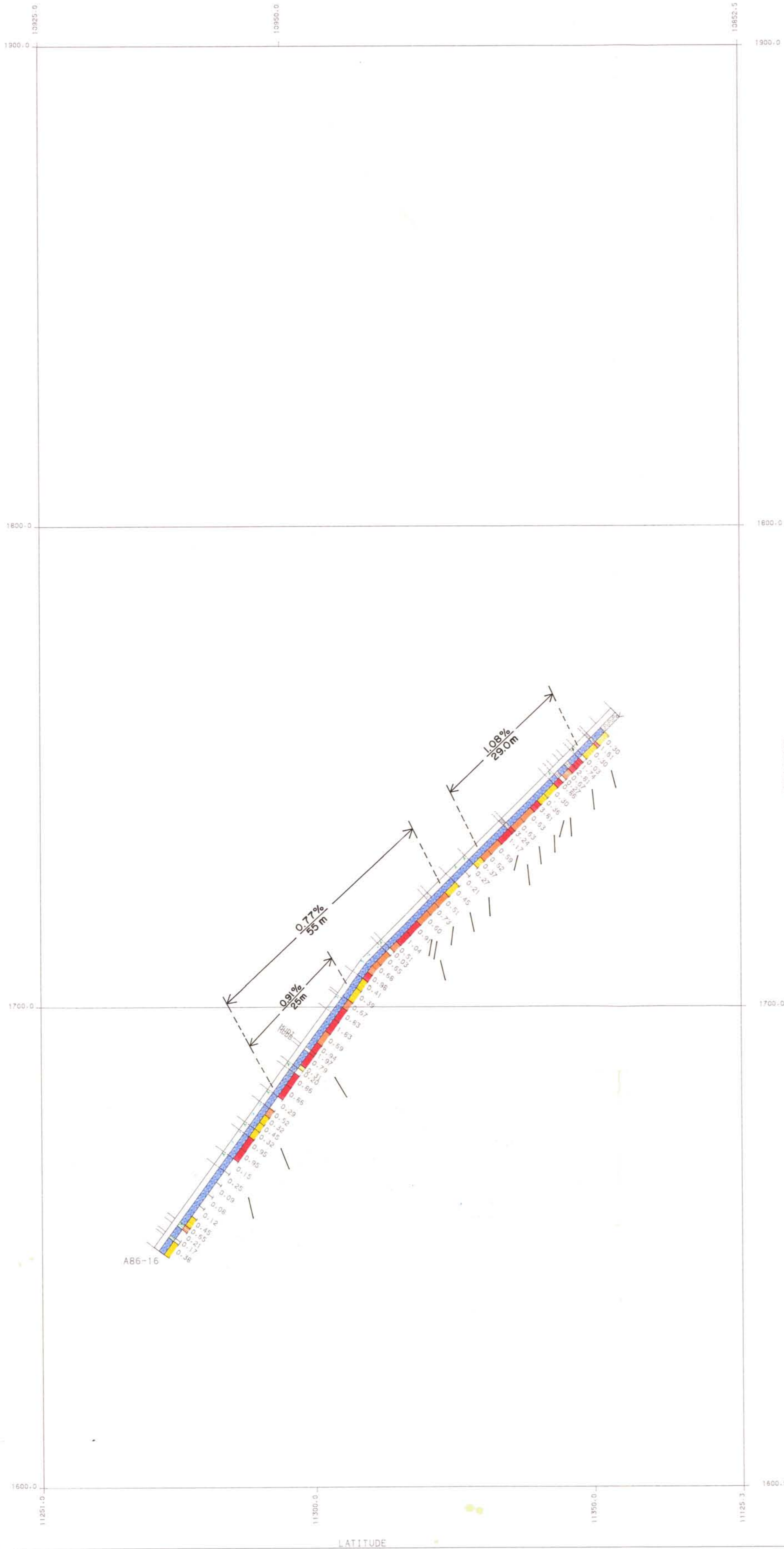
ALEY		CENTRAL ZONE		
DRAWN BY: GEORES REQUESTED BY: K. R. PRIDE REVISION: 01	TRACED BY: REVISION: 01	D.D.H. SECTION A86-15		
SCALE: 1 CM = 500. SM		DATE: DEC 23 1986 TIME: 08:42:24		PLATE: 86 - 15

DEPARTURE



LATITUDE

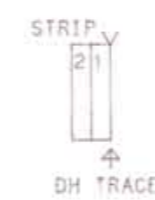
DEPARTURE



LEGEND

- NB205 %
- LT 0-30
 - 0-30 TO 0-50
 - 0-50 TO 0-74
 - GT 0-74

- NB
- NB SHADED



STRIP 1 UNITS

- AM AMPHIBOLITE
- CG CARBONATITE, CALCITE
- CD CARBONATITE, DOLOMITE
- SHZ SHEAR ZONE
- OXD OXIDE
- OVLD OVERLOOK
- CCD CARBONATITE, CALCITIC, DOLOMITIC
- AMX AMPHIBOLITE AND MIXED CG CD
- AVC ANHYD & CARBONATITE, CALCITIC
- AVD ANHYD & CARBONATITE, DOLOMITIC

STRIP 2 UNITS

- M MAGNETITE, DISSEMINATED
- MX MAGNETITE, MASSIVE

STRIP 2 MODIFIERS

- A AMPHIBOLITIC
- B FRAGMENTAL BIFERROUS
- C CALCITIC
- D DOLOMITIC
- F PHYLLOCLASTIC
- X CARBONATITE, BIFERROUS
- Y DIKE

Mineral Layering

GEOLOGICAL BRANCH ASSESSMENT REPORT

15,721

0.0 10.0 20.0 40.0 METRIC

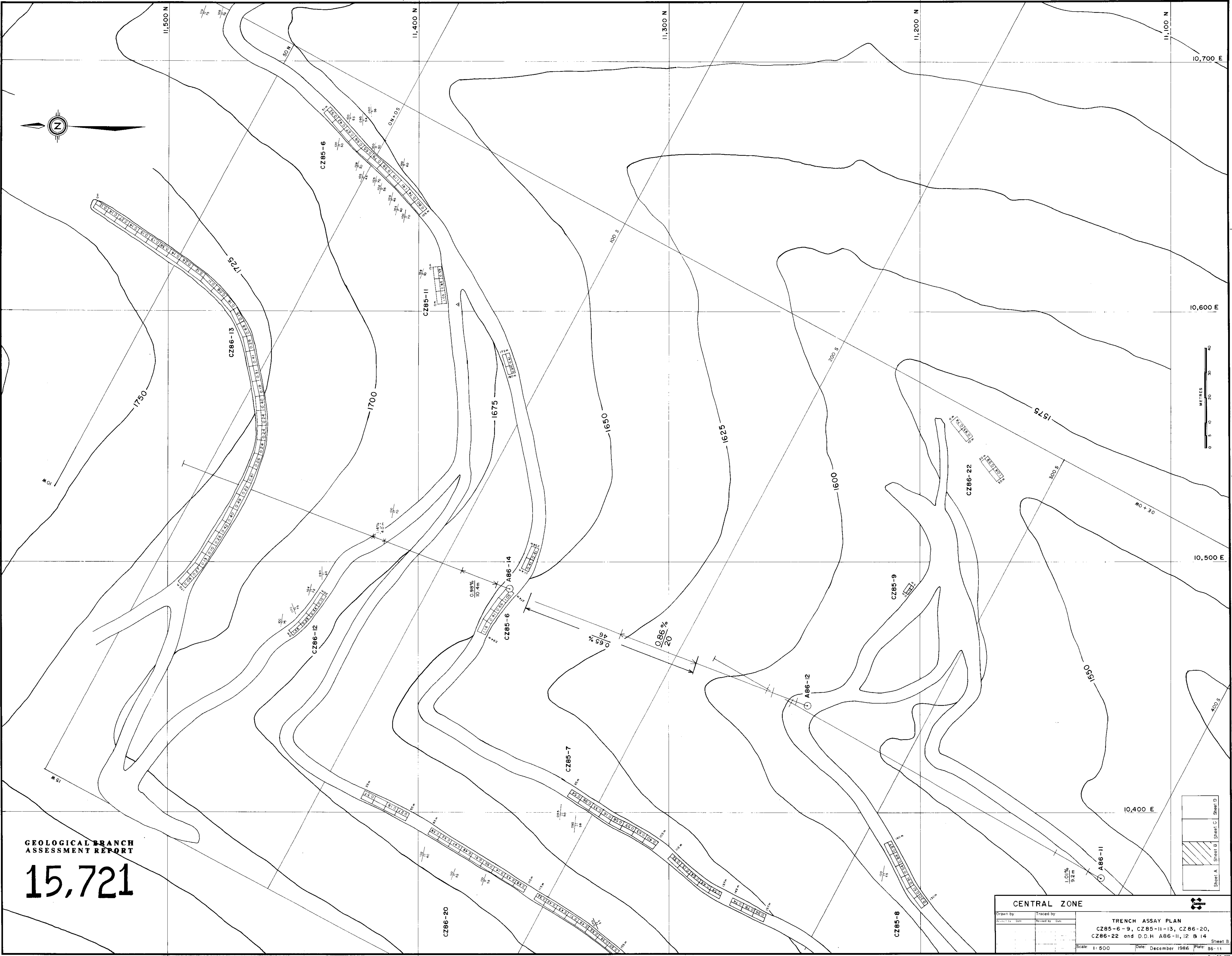
VOLUME SPECIFICATIONS		SCALE: 1 CM = 500. SM
N	11251.0 E 10925.0 EL 1600.0	RANGE: 10.
	11125.3 10852.5 1900.0	SECTION:

ALEY		CENTRAL ZONE	
DRAWN BY: GEORES	TRACED BY:	D.D.H. SECTION	
REQUESTED BY: K. R. PRIDE	RETURN TO: BULK	A86-16	
REVISION: BULK		SCALE: 1 CM = 500. SM	DATE: DEC 23 1986
			TIME: DR 142124
			PLATE: 80 - 16



GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,721

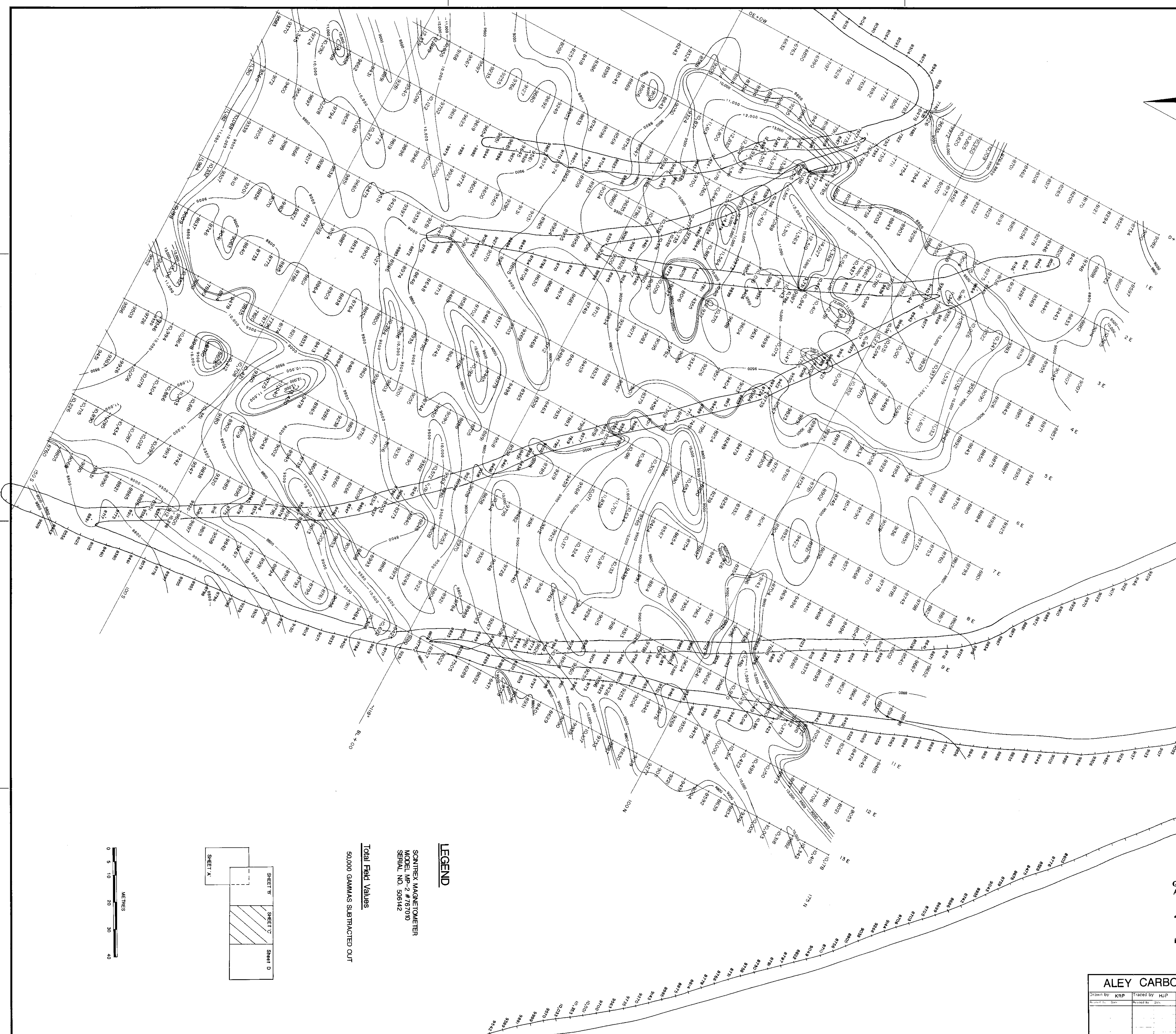
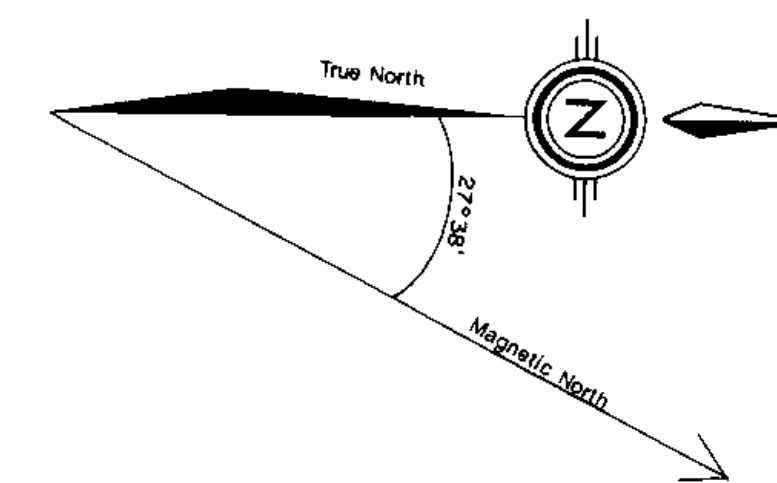


CENTRAL ZONE

Drawn by	Traced by

TRENCH ASSAY PLAN
CZ85-6-9, CZ85-11-13, CZ86-20,
CZ86-22 and D.H. AB6-11, 12 & 14

Scale: 1:500 Date: December 1986 Plate: 96-11



GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,721

ALEY CARBONATITE - CENTRAL ZONE N.T.S.
9485

TOTAL FIELD MAG.

SHEET 'C'

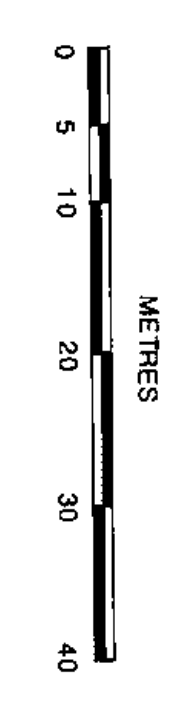
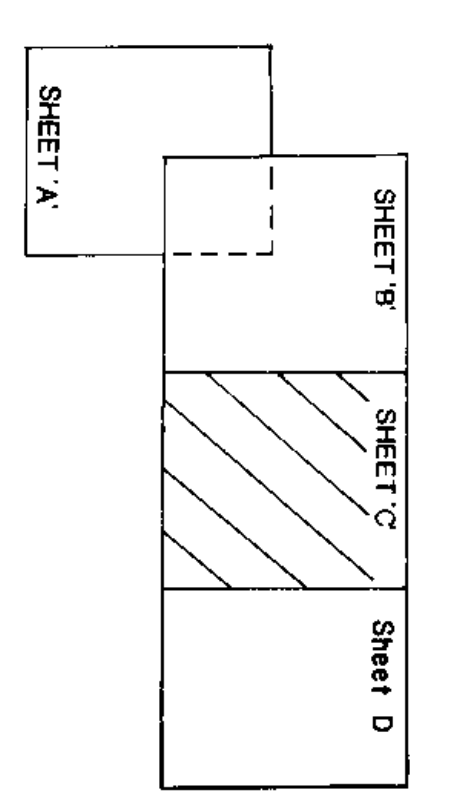
Drawn by KRP	Traced by HJP
Checked by	Approved by
Date	Date

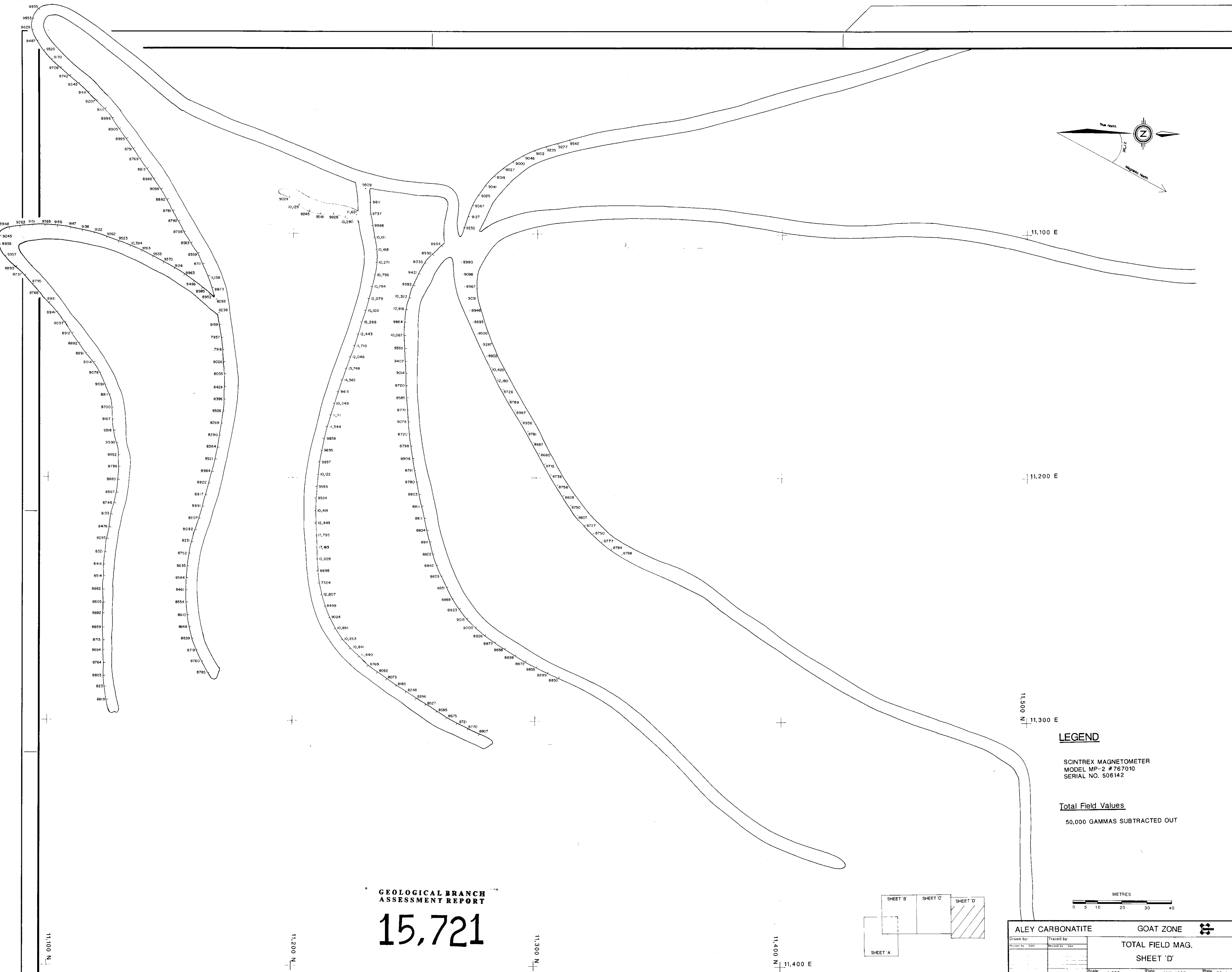
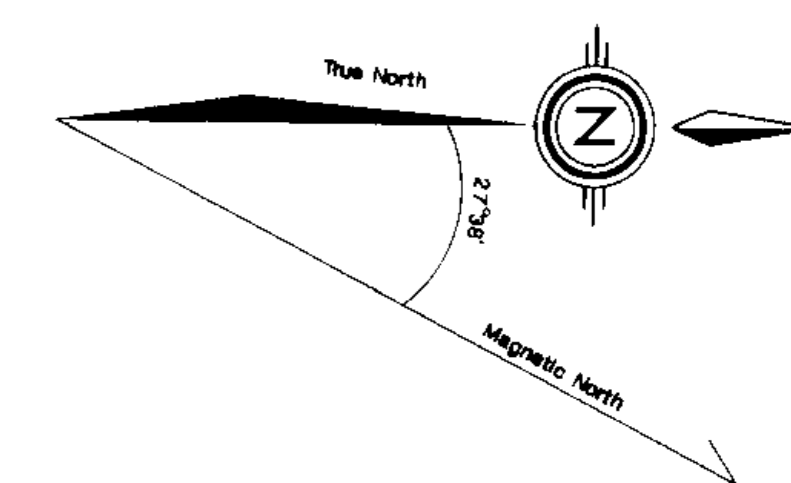
Scale: 1:500 Date: JAN. 1987 Plate: 86-8

LEGEND

SONITEX MAGNETOMETER
MODEL MP-2 #76710
SERIAL NO. 506142

Total Field Values
50,000 GAMMAS SUBTRACTED OUT

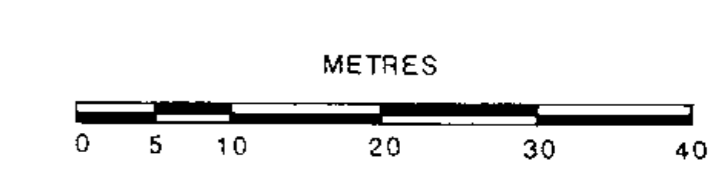




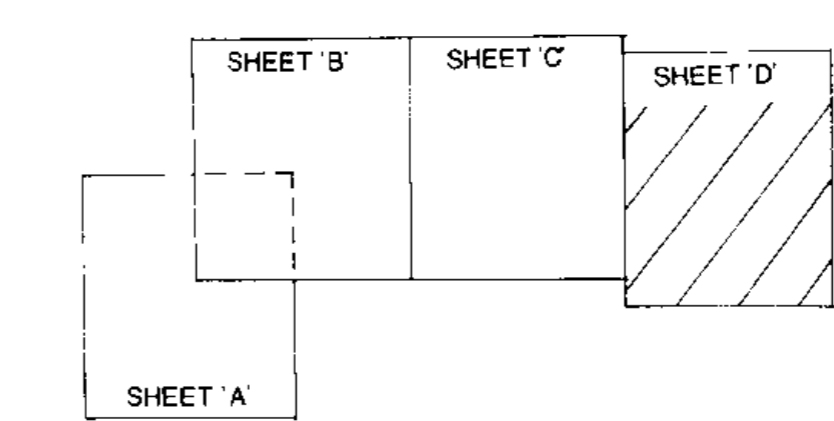
LEGEND

SCINTREX MAGNETOMETER
MODEL MP-2 #767010
SERIAL NO. 506142

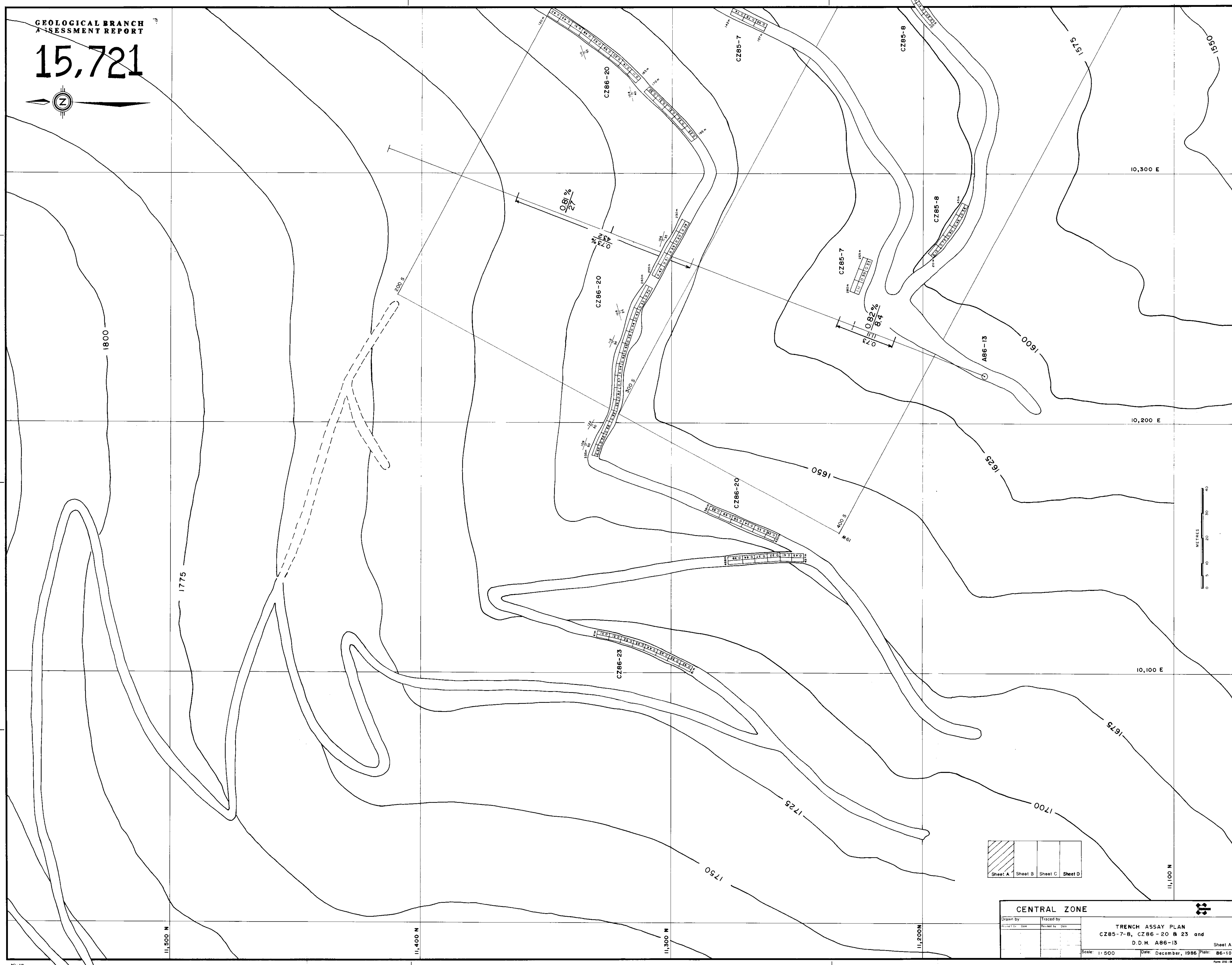
Total Field Values
50,000 GAMMAS SUBTRACTED OUT



**GEOLOGICAL BRANCH
ASSESSMENT REPORT**
15,721



ALEY CARBONATITE		GOAT ZONE	
Drawn by:	Traced by:	TOTAL FIELD MAG.	
Checked by:	Checked by:	SHEET 'D'	
Scale: 1:500	Date: JAN. 1987	Plate: 86-9	



Sheet A	Sheet B	Sheet C	Sheet D

CENTRAL ZONE	
Drawn by	Traced by
Checked by	Revised by
Date	Date
TRENCH ASSAY PLAN CZ85-7-8, CZ86-20 & 23 and D.D.H. A86-13	
Scale: 1:500	Date: December, 1986 Plate: 86-10

DEPARTURE

LEGEND

NB205 %

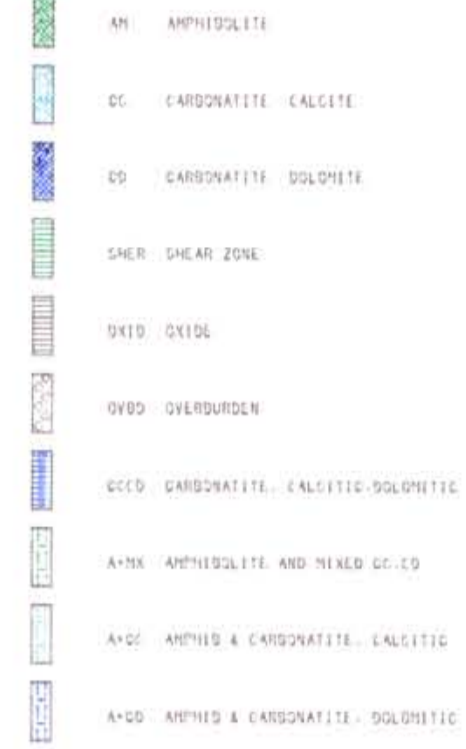


NB
NB SHADED

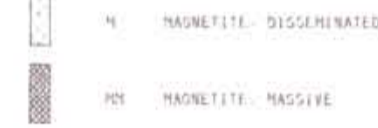
STRIP

DH TRACE

STRIP 1 UNITS



STRIP 2 UNITS



STRIP 2 MODIFIERS



Mineral Layering

LATITUDE
DEPARTURE

LATITUDE

ELEVATION

ELEVATION

ELEVATION

ELEVATION

ELEVATION

ELEVATION

LATITUDE

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,721



VOLUME SPECIFICATIONS

N	12056.5	E	10481.4	EL	1700.0
	11692.5		10542.6		2000.0

SCALE:	1 CM = 500.0 M
RANGE:	10.
SECTION:	

ALEY

SADDLE ZONE

DRAWN BY:	CEGRES	TRACED BY:	
REQUESTED BY:	M. R. PRIDE	REVISOR:	
REVISION:	DATA		

D.D.H. SECTION
A86-17

SCALE: 1 CM = 500.0 M DATE: DEC 23 1965 TIME: 06:42:24

PLATE 86 - 17

