



An associate of the Normandy Group

NORTH FLINDERS MINES LIMITED

ANNUAL REPORT

OPEN FILE

FIRST ANNUAL REPORT FOR EL8287 (SORE TOOTH NORTH)
FOR THE YEAR ENDING 11 SEPTEMBER 1996

1:250,000 Sheet Reference:

Mt Solitaire

SF52-4

1:100,000 Sheet Reference:

Mines & Energy

National Mapping

Davidson
Reiff

56/1
56/2

5057
5157

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1. INTRODUCTION

Soretooth North EL 8287 is located 85 kilometres northeast of The Granites Gold Mine. Figure 1 indicates the position of the licence area in relation to other NFM tenements.

Quartz vein systems mapped within EL8287 by the BMR on the Mt Solitaire 1:250 000 geological map sheet provided the Company with the initial gold exploration targets it sought in the area. During the first year of tenure, exploration activity comprised appraisal of Tanami Joint Venture reports, assessment of remotely sensed data, lag sampling, composite rock chip sampling and petrological study of rock chips.

Some difficulty has been experienced gaining permission from traditional owners to access specific target areas.

2. TENEMENT DETAILS

EL8287 was applied for on the 6th of July 1993, and granted on September 12, 1995 (see Figure 1 for location). It comprises 168 blocks. A 50% reduction of the licence area is due to be notified by August 11, 1997.

Table 1 - Tenement Details for EL8287

Grant Date	Expiry Date	Name	No of Blocks	Covenant (\$)
12/09/95	11/09/01	Sore Tooth North	168	35, 000

3. LOCATION AND ACCESS

Situated within the 1:250 000 map sheet SF52-4, the Sore Tooth North EL8287 lies approximately 85 kilometres northeast of The Granites Gold Mine (see Figure 1). Access from The Granites is via a well established track which services the Mt Davidson Outstation and then continues to the northeast until EL8287 is reached. This track, and others in the licence area, are shown on Figure 2.

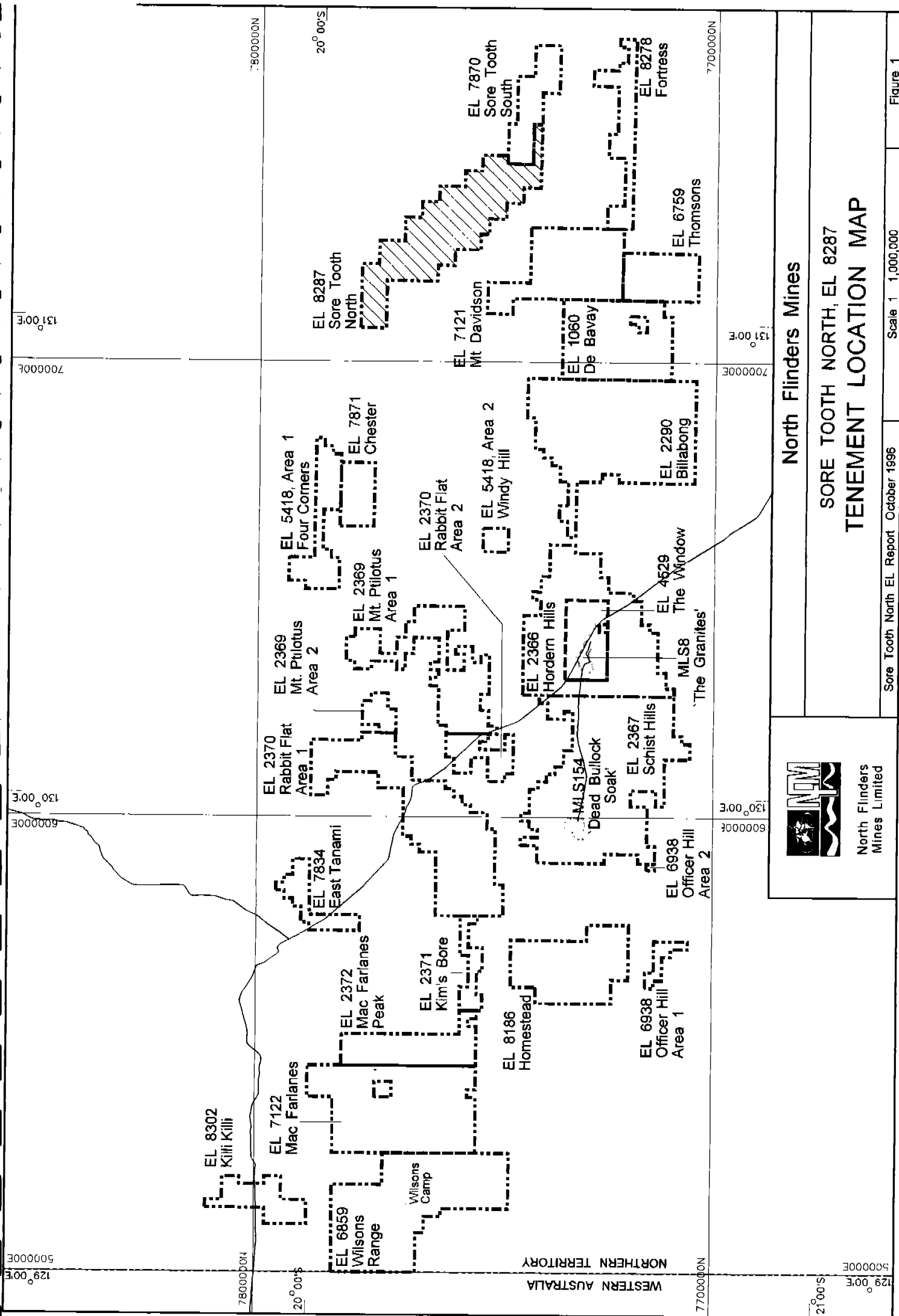
4. EXPLORATION OBJECTIVES

During the first year of tenure the exploration objectives were to :-

- assess work already undertaken by Zapopan NL
- interpret airborne magnetic data in combination with SPOT satellite imagery
- undertake a detailed regional lag sampling programme over the entire licence area
- undertake a composite rock chip sampling programme wherever outcrop or subcrop existed

Exploration targets can be defined as :-

- Potential gold mineralisation associated with the mapped quartz vein systems.



5. PREVIOUS EXPLORATION

There has been little previous exploration over EL8287. Between 1962 and 1978 the BMR carried out a regional mapping programme and a helicopter supported gravimetric survey of the Mt Solitaire sheet.

In 1989 the Tanami Joint Venture partners commissioned an airborne magnetic/radiometric survey (terrain clearance 90m, flight line spacing 500m) which covered much of the area currently held as EL8287. Shortly afterward, in May 1989, Harlock Pty Ltd was granted exploration licences 5419 (which includes much of the central and northern parts of EL8287) and 5420 (which includes a small southern portion of EL8287). The TJV team were initially attracted to the more magnetically responsive zones away from the area covered by this report.

In August 1990 a helicopter supported geochemical sampling programme was carried out. Outcrop, subcrop, laterite and quartz-ironstone gravel were collected and subjected to multi-element assay. However, only about five samples were collected from ground subsequently relinquished by the TJV out of EL5419 & 5420 and later granted to North Flinders Mines Ltd as EL 8287.

6. GEOLOGY

6.1 Regional Geology

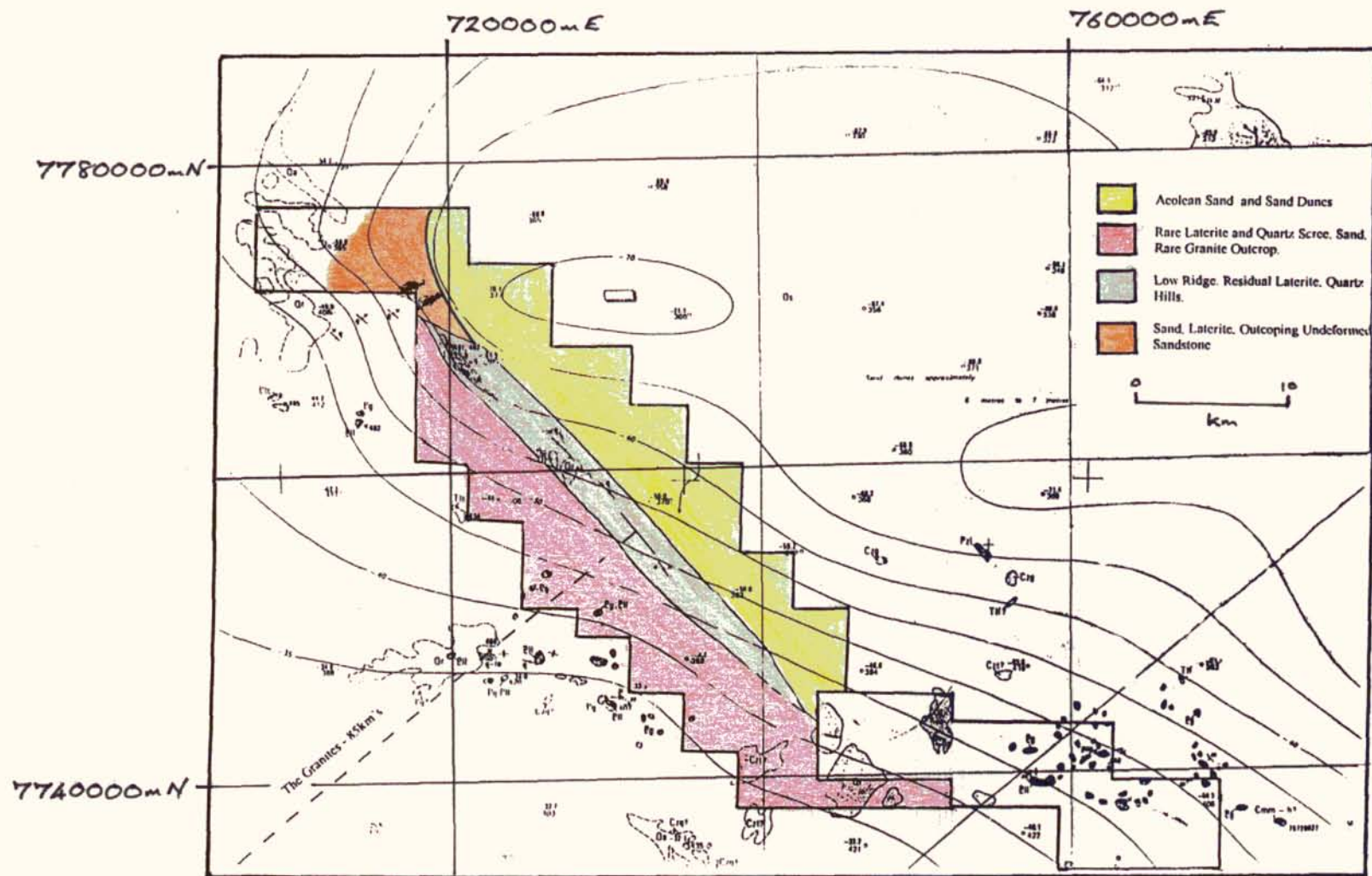
Sore Tooth North (EL8287) is interpreted to lie on the margin of the Wiso Basin. Rare granitic exposures in the southwest of the licence area indicate the presence of Proterozoic basement below thin sand cover. Younger basin sediments are thought to exist beneath cover to the northeast, in an area characterised by low magnetic response and a negative gravimetric anomaly. The location of these rock types is shown in Figure 3.

6.2 Local Geology

A low topographic ridge runs in a northwesterly direction along the axis of this elongated exploration licence. Southwest of this ridge the landscape is flat, with rare occurrences of pisolitic laterite and quartz scree. There are also scattered outcrops of foliated and unfoliated Proterozoic granite in this area. Sands derived from these granites contribute to the surficial cover.

The highest parts of the central ridge rise tens of meters above the surrounding plain and are marked by exposures of quartz vein (breccia) systems, which have been mapped by the BMR. Abundant residual laterite flanks these topographic features.

The portion of the tenement northeast of the ridge is largely covered by wind blown sand and sand dunes. Sediments of the Wiso Basin are thought to lie beneath the aeolian cover. Low outcrops of undeformed sandstone mapped in the far north of EL8287 may represent Lake Surprise basinal sandstones. The age relationship of this sandstone is not clear from field evidence, but it is clearly younger than Proterozoic age. The sandstone could represent part of the Wiso Basin sediments, or perhaps a younger capping unit.



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EL8287, SORE TOOTH NORTH

BMR GEOLOGY (Interpretation)

FIGURE 3

7. EXPLORATION ACTIVITY FOR THE FIRST YEAR OF TENURE

A summary of work completed during the first year of tenure is provided in the table below:-

Table 2 - Fieldwork Undertaken During the Year to September 11, 1996

Year	Rockchip (samples)	Lag (samples)	Petrology (samples)
1	76	244	3

7.1 Airborne Geophysics

Available airborne magnetic and radiometric data with a flight line spacing of 500m was imaged and interpreted at a scale of 1:50,000. Total magnetic intensity (TMI) images were used for the identification of magnetic features and first vertical derivative images were employed for feature enhancement and the identification of linears. TMI contours defined the extent of features. Refer to Figures 4 & 5 for TMI and Total Count Radiometric images (presented here at 1:250,000).

Results

The processed TMI image indicated a linear change in magnetic domains, probably representing the change from Proterozoic rocks to the Wiso Basin sediments. This feature has a northwesterly trend through the centre of the tenement.

Within the basin margin are two linear magnetic features, possibly representing basement highs. There are few magnetic features to the south of the basin margin.

7.2 Lag Sampling

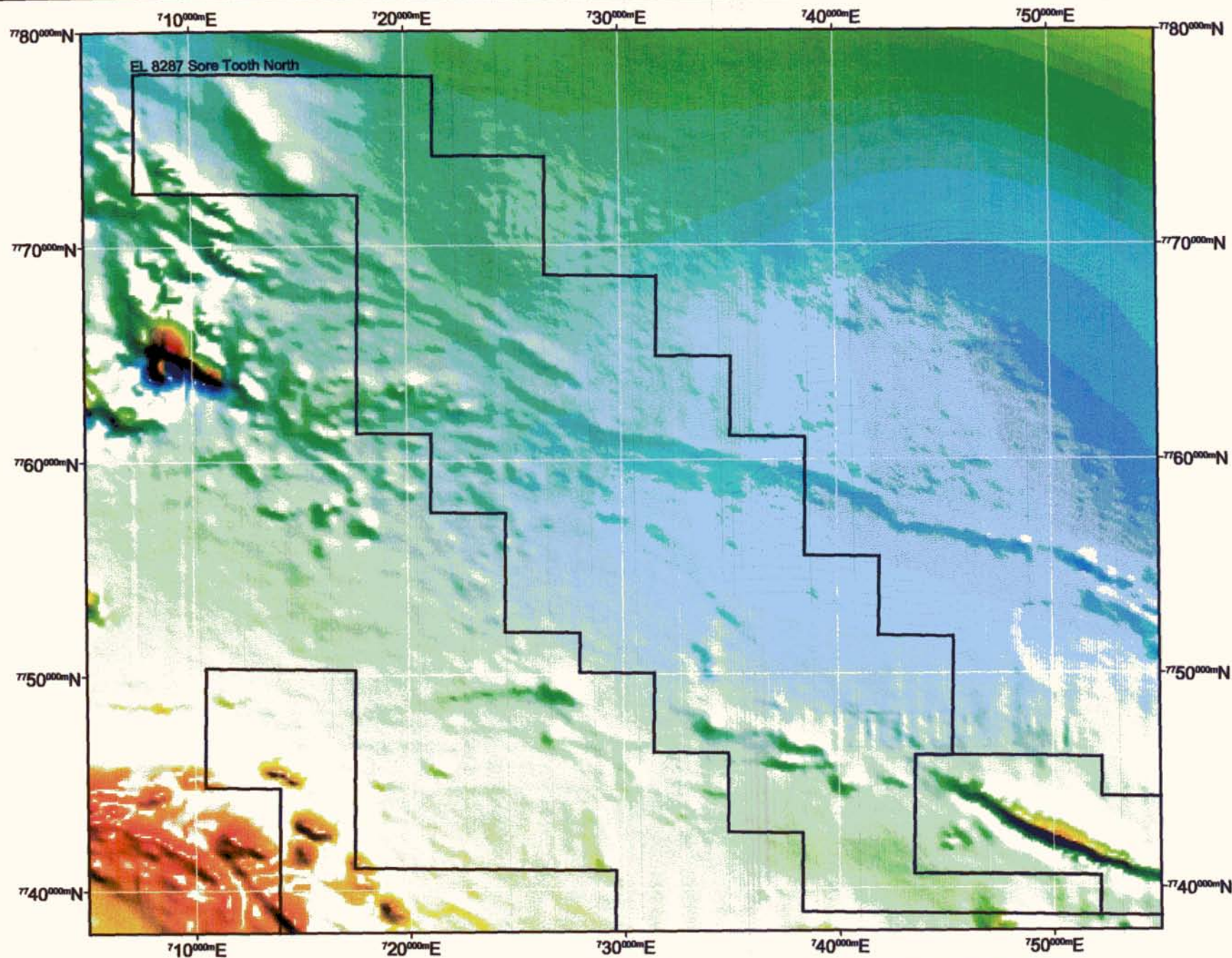
A total of 244 samples were collected (Sample numbers 3013401 to 3013646, two not submitted). 3660 analyses were performed.

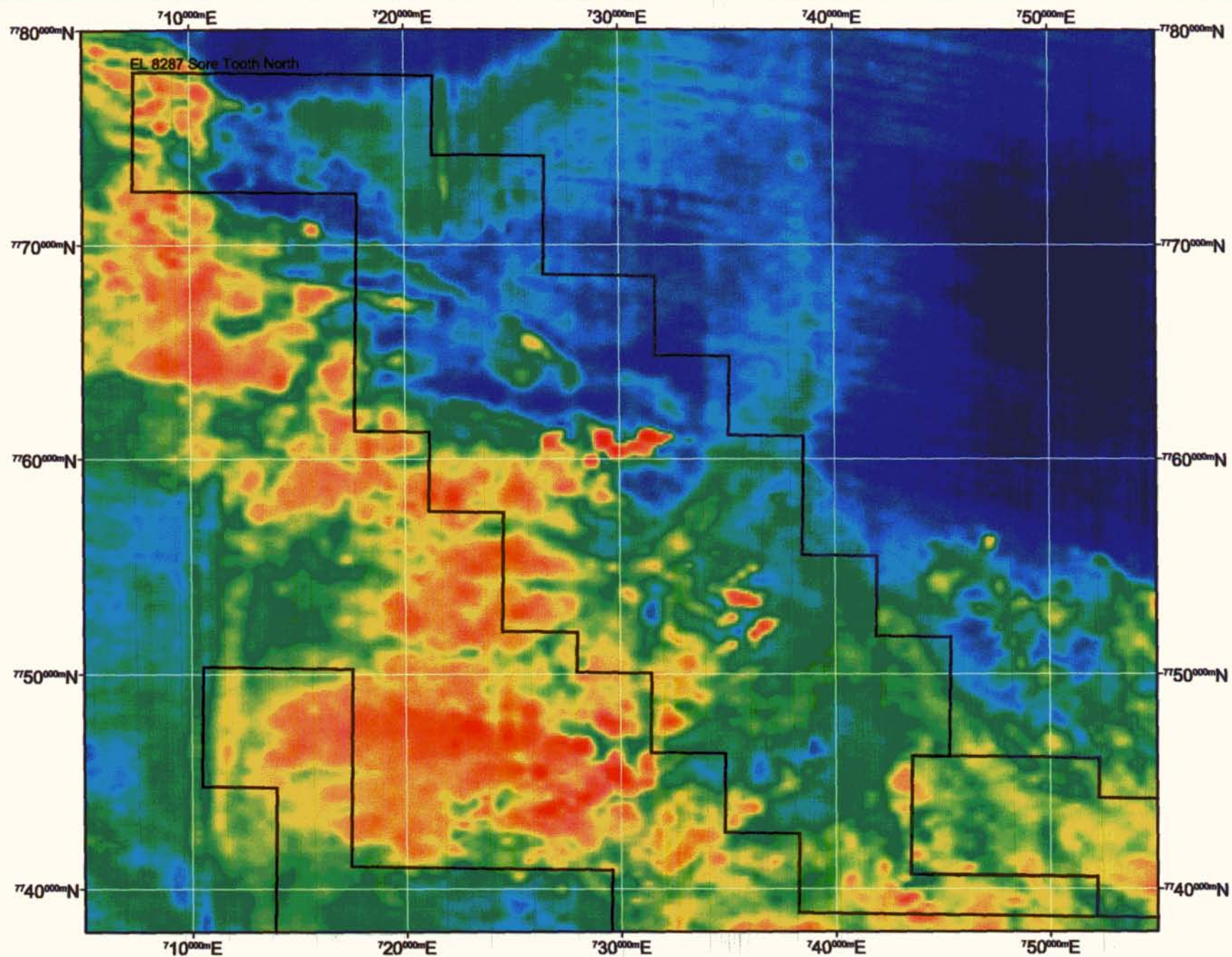
Lag samples were collected at a spacing of 1000m x 500m wherever possible over the Soretooth North EL. A Global Positioning System (GPS), utilising a Trimble Transpac II instrument with external aerial, was used for sample location as well as for navigation along north-south orientated AMG traverses. These lines commence on the northeast - southwest access track. Traverses were extended from this road at regular (AMG) eastings 1000m apart, and identified for possible future follow-up access by a single grid peg with the relevant easting noted (see Figure 6 for locations).

The limited occurrence of suitable material at surface left some areas untested by either lag or rock chip sampling. Where a lag sample could not be taken at the 500m interval, then another was taken prior to the next 500m interval, if lag material was available. Where lag was identified for sampling at the five hundred metre interval, flagging tape was tied to a nearby tree. An average of thirty sites per day were visited using this method.

As lag material is not abundant in this tenement, less than 30% of the planned sites were sampled. Though the actual coverage of the lag sampling programme shrank below the planned level, this was offset by increasing in sample density where lag material was available.

All samples were sieved to +2 mm and a 100g - 500g amount was double bagged and retained for analysis. Notes were made regarding the sample type, quality, description and grain size of the lag.





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SORE TOOTH NORTH - EL 8287
RADIOMETRICS - TOTAL COUNT

Quartz scree constituted the most frequently sampled material. This quartz was commonly 10 - 35 mm in size with patches of scree often found in the centre of small evaporative clay pans. These samples were obviously transported, but were sampled in the absence of better material. The central topographic ridge which runs along the axis of this elongated tenement was commonly covered by a capping of residual ironstone pisolites and where possible these concretions were collected.

Samples were sent to Genalysis Laboratory Services Pty (Perth) for assay by the methods outlined in Table 3. Assay results are shown in Appendix 1.

Table 3 - Lag Sampling Analytical Techniques / Detection Limits (Genalysis Laboratory Services)

Genalysis Method	Element [detection limit]
B/ETA (Type B Graphite Furnace Atomic Absorption Spectrometry)	Au [1 ppb]
AMS (Digestion/Induced Coupled Plasma Mass Spectrometry)	As Pb [2ppm] Co Sn [1ppm] Sb [0.2ppm] Mo Bi [0.5ppm] W U [0.1ppm]
A/AAS (Type A Atomic Absorption Spectrometry)	Ni [2ppm] Zn Cu [1ppm] Fe [0.1%]
B/AAS (Type B Atomic Absorption Spectrometry)	Ag [0.1ppm]

Results

Orientation studies undertaken in other parts of the Tanami indicated statistically anomalous thresholds suitable for this geochemical survey. Table 4 identifies the best anomalies identified.

Table 4 - Anomalous Lag Results

Sample	Easting	Northing	Sample Type	Anomalous Values
3013420	742753	7743851	Laterite	11ppm U
3013426	743034	7739517	Laterite/ Rock	0.3ppm Ag, 12ppm Sn, 6.6ppm U
3013442	738985	7745259	Laterite	23ppm Co, 8.8ppm U
3013458	742932	7745103	Laterite	34ppm U
3013480	737045	7756884	Laterite	106ppm Pb
3013497	733931	7752329	Rock	116 ppm Zn
3013500	732980	7748345		12ppm Sn, 13 ppm W, 7.2ppm U.
3013505	731964	7748168	Laterite + Quartz	23ppm Co
3013509	729895	7752273	Laterite + Quartz	8ppm W
3013515	728880	7751891	Quartz	9ppm W
3013517	728102	7750874	Quartz	8ppm W
3013531	725046	7757630	Quartz	11ppm W
3013533	725129	7755464	Quartz	8 ppm W
3013535	724642	7752215	Quartz + Rock	10ppm W, 6.6ppm U
3013567	709086	7773177	Quartz + Granite	47ppm Co
3013575	711010	7776200	Laterite	82ppm Co, 145ppm Ni, 155ppm Zn.
3013587	712015	7776620	Laterite	10ppm Sn

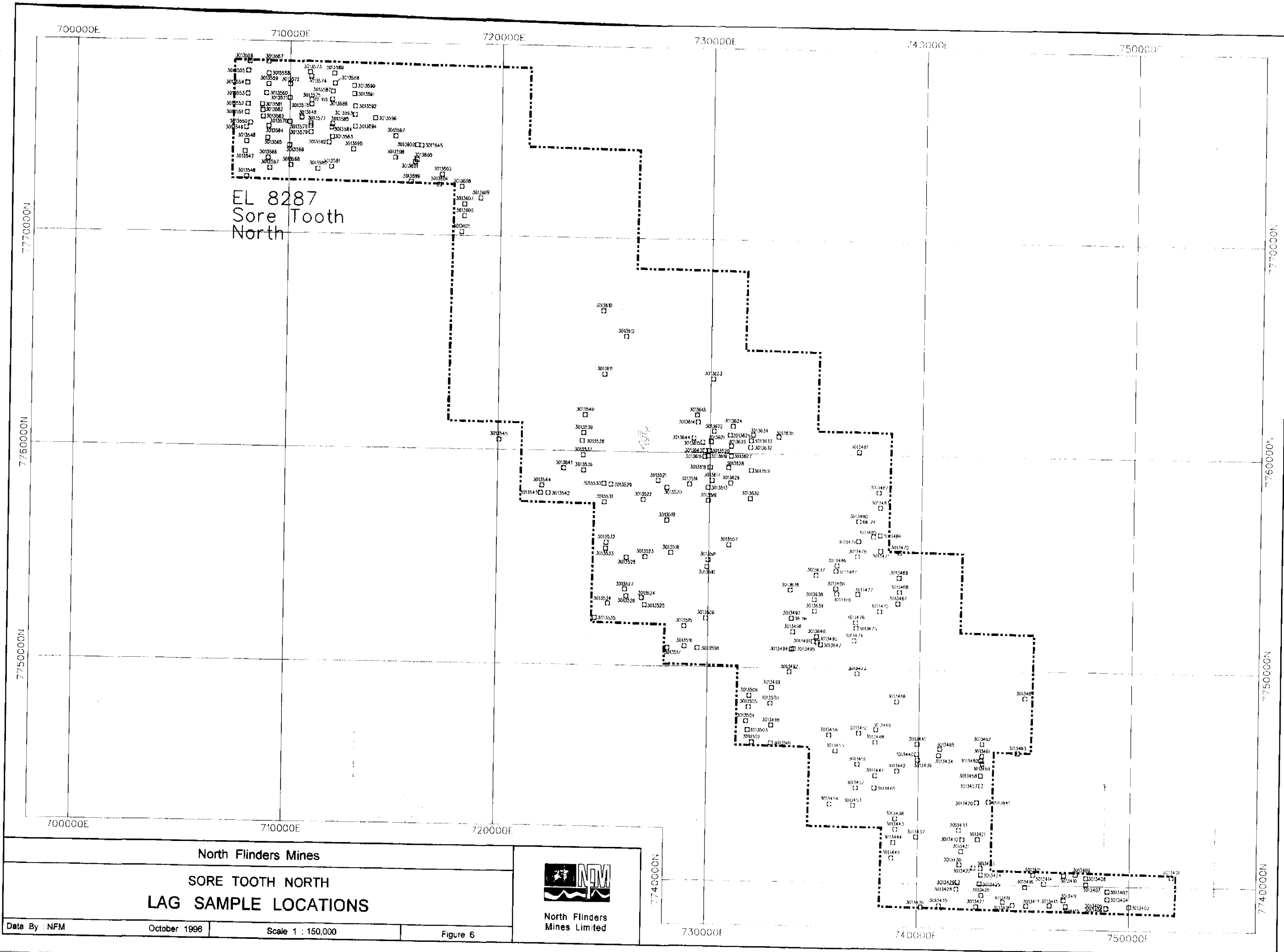


Table 4 - Anomalous Lag Results (continued)

Sample	Easting	Northing	Sample Type	Anomalous Values
3013590	713011	7776910	Laterite	10ppm Sn
3013632	731905	7760284	Laterite	29ppm Co
3013635	733227	7760788	Rock + Quartz	0.3ppm
3013641	743340	7743889		13ppm U

Results

Numerous lag samples returned uranium values between 5.5ppm and 10ppm. The analyses are unusually high, but probably correlate to the abundant granite underlying the southwestern portion of the licence area. These values have been excluded from the above table. Anomalous tungsten and tin results may also reflect the geochemistry of proximal granites.

The results of greatest interest were the three anomalous lead and zinc assays. Sample No 3013575 (from laterite) yielded 22ppm Pb & 155ppm Zn. It was located within the margin of the Wiso Basin and lay adjacent to a low amplitude magnetic feature which may represent a basement high. Sample No 3013480 (from transported laterite) yielded 106ppm Pb & 29ppm Zn. It lay proximal to, but 1km from the interpreted basin margin. Sample No 3013497 (from quartz fragments) yielded 38ppm Pb & 116ppm Zn. It was probably related to fault breccias, 10 kilometres distant from the interpreted basin margin.

7.3 Composite Rock Chip (CRC) Sampling

A total of 56 composite rock chip samples were collected (Sample numbers 757238, 757296 - 757300, and 757531 - 757581). 748 analyses were performed.

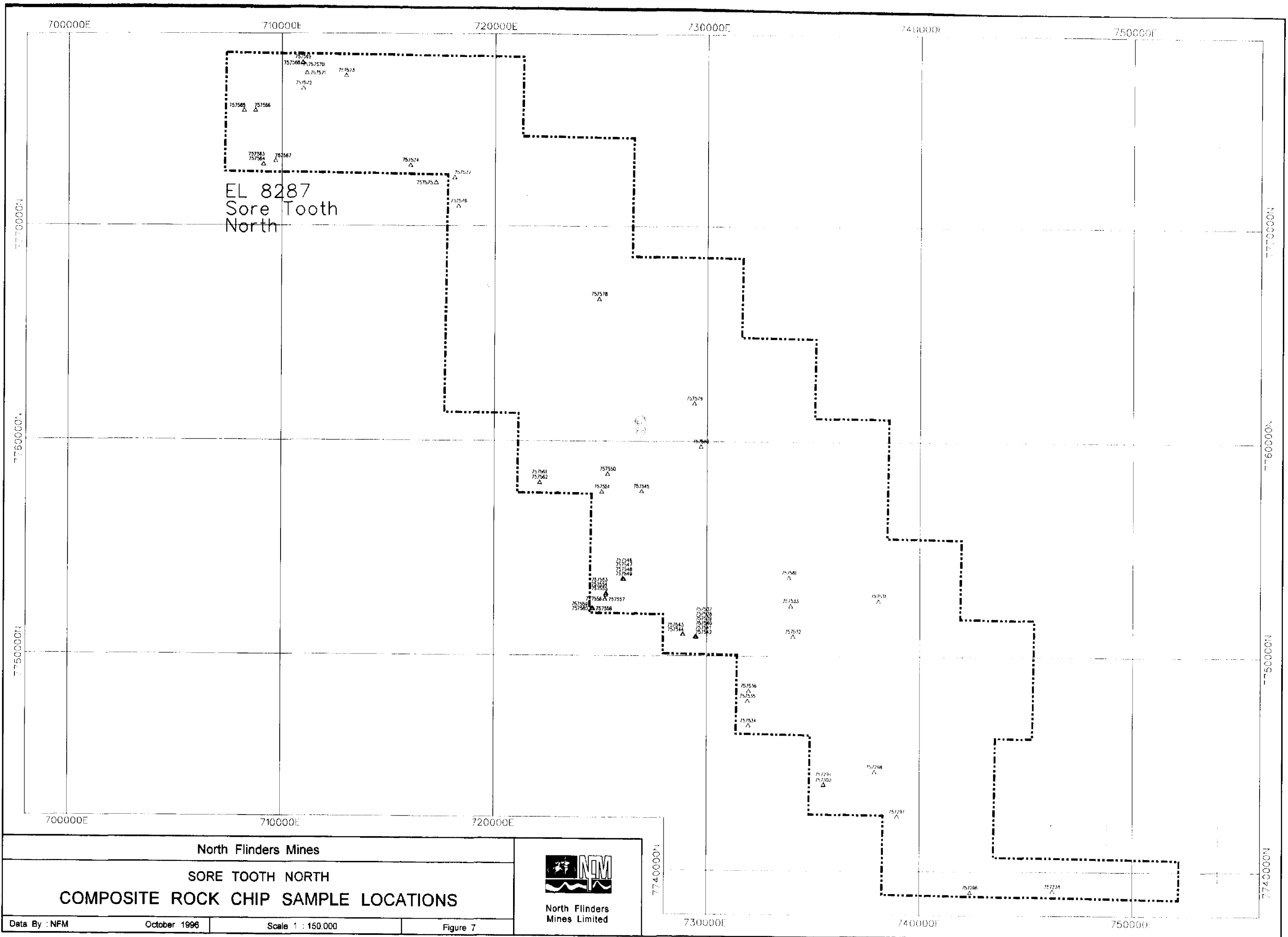
Rock chip sampling was undertaken as a secondary sampling technique in conjunction with lag sampling. Material was collected from outcrop, sub-outcrop and scree patches (see Figure 7 for locations).

CRC samples consisted of granite, foliated granite, schists, quartz, undeformed sandstone and laterite.

A Global Positioning System (GPS), utilising a Trimble Transpac II instrument with external aerial, was used for sample location. All rock chip sample sites were marked with an aluminium tag displaying the sample number, and wrapped, face down, around a fragment of the rock sampled, with flagging tape. The samples consisted of 10-15 chips with a combined weight of 1.0 - 1.5kg. Samples were assayed by Analabs (Adelaide) by the methods described in Table 5.

Table 5 - Composite Rock Chip Sampling Analytical Techniques / Detection Limits (Analabs)

Analabs Method	Element [detection limit, ppm]
334 30g sample, aqua regia digest, carbon rod	Au[0.01]
115 30g sample, perchloric acid digest/hydride generation, AAS	As[5]
GA115 30g sample, aqua regia digest, carbon rod	Ag[0.1], Co[0.5], Cu[0.5], Mo[1], Ni[0.5], Pb[0.5], Zn[0.5]
GS201 aqua regia/perchloric acid/hydrofluoric acid digest; ICP	Sb[0.1], W[0.1], Bi[0.1], Sn[0.5], U[0.05]



Results

Assay results are shown in Appendix 2. Anomalous samples are shown below in Table 6.

Table 6 - Anomalous Rock Chip Results

Sample No	Easting	Northing	Description	Result
757238	746238	7739070	Quartz	5ppb Au
757296	742384	7739013	Quartz	14.5 ppm U
757300	735495	7744000	Quartz veins in Granite	3ppb Au

7.4 Petrology

Mineralogical examination of 3 rock chip samples was undertaken by consultant petrologists Pontifex and Associates Pty Ltd. All samples were collected from the area interpreted as being part of the Wiso Basin sequence from geophysical data.

Results

Summary descriptions are presented in Table 7 below. Appendix 3 contains full mineralogical descriptions of the samples listed in the table.

Table 7 - Summary Description of Samples Submitted for Petrological Examination

Sample Number	Sample Description
757576	Undeformed quartz rich coarse grained sandstone
757577	Undeformed well bedded medium to coarse grained sandstone with some lithic grains
757578	Poorly sorted, grain supported lithic sandstone

8. EXPENDITURE INCURRED FOR THE TWELVE MONTH PERIOD TO SEPTEMBER 1996

EL 8287 (SORE TOOTH NORTH)

ACTIVITY	\$
Geologist (28 days @ \$400/day)	11,200.00
Field Assistant (19 days @ \$250/day)	4,750.00
Track Establishment (bulldozer)	4,250.00
Analyses (Surface Sampling)	8,125.00
Geophysical Data Processing	1,000.00
Petrology	347.00
Accommodation	1,140.00
Vehicles	1,520.00
Air Fares	980.00
Base Support Costs	3,331.00
Administration	5,496.00
TOTAL	42,139.00

Covenanted expenditure for the period was set at \$35 000.

9. PROPOSED WORK

9.1 Follow-up Exploration

Access restrictions will hinder further exploration of quartz vein hosted gold targets and extensions to the lag sampling coverage are prevented by the lack of suitable sample material. Some form of shallow drill testing of weathered bedrock may be implemented in the future.

There is scope for infill lag sampling around locations known to have generated anomalous base metal samples in the initial regional programme. Shallow drill testing of the margins of the Wiso Basin for base metal may be undertaken, perhaps in the vicinity of magnetic anomalies identified by the airborne survey.

9.2 Proposed Expenditure

Exploration expenditure on EL8287 is anticipated to exceed \$20,000 for the twelve month period to 11 September 11,1997.

10. REFERENCES

Zapopan NL (Tanami Joint Venture), 1990. First Annual Report for EL5419 (CR90/396)

Zapopan NL (Tanami Joint Venture), 1990. First Annual Report for EL5420 (CR90/393)

Zapopan NL (Tanami Joint Venture), 1991. Second Annual Report for EL5419 (CR91/346)

Zapopan NL (Tanami Joint Venture), 1991. Second Annual Report for EL5420 (CR91/345)

APPENDIX 1

LAG SAMPLE DATA

ANALYSIS REPORT

REPORT NUMBER - REPORT DATE & ASSAY

TESTED 10/10/83 BY J. J. J.

PERCENTAGE

PAGE 1

20012400 0.00 0.10 8287

TESTED	PERCENTAGE	REPORT	DATE	ASSAY	ANALYSIS	TESTED	PERCENTAGE	REPORT	DATE	ASSAY	ANALYSIS
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1. **U.S. DEPARTMENT OF AGRICULTURE**
 2. **WASHINGTON, D.C. 20250**
 3. **OFFICE OF THE SECRETARY**
 4. **ATTENTION: ASSISTANT SECRETARY FOR**
 5. **REGISTRATION AND COMPLIANCE**
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LOCATION NUMBER	DEPTH	REFR	LEASE	SAME DEPTH	LOCAL EASTING	LOCAL NORTHING	DATE	TIME	COLLECTION METHOD	DATE-TIME	TYPE	QUAL	RECD	SIZE	TIME	DATE	TIME	DATE	TIME
3017550	0.00	0.10 8287		AA CU 26	PPM AA	FE 22.30	PCT AA	NI 27	PPM AA	2N 22	PPM AA	2N 22	PPM AA	2N 22	PPM AA	2N 22	PPM AA	2N 22	PPM AA
				AM PB 24	PPM AM	SB 3.5	PPM AM	SN 5	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM
				L86 N	M	N 708986.00	7775511.00	1390.00											
				AA CU 25	PPM AA	FE 22.50	PCT AA	NI 28	PPM AA	2N 24	PPM AA	2N 24	PPM AA	2N 24	PPM AA	2N 24	PPM AA	2N 24	PPM AA
				AM PB 30	PPM AM	SB 2.6	PPM AM	SN 1	PPM AM	U 2.0	PPM AM	U 2.0	PPM AM	U 2.0	PPM AM	U 2.0	PPM AM	U 2.0	PPM AM
				L86 N	M	N 708986.00	7775507.00	1390.00											
	0.00	0.10 8287		AA CU 25	PPM AA	FE 23.50	PCT AA	NI 25	PPM AA	2N 19	PPM AA	2N 19	PPM AA	2N 19	PPM AA	2N 19	PPM AA	2N 19	PPM AA
				AM PB 42	PPM AM	SB 2.4	PPM AM	SN 5	PPM AM	U 5.6	PPM AM	U 5.6	PPM AM	U 5.6	PPM AM	U 5.6	PPM AM	U 5.6	PPM AM
				L86 N	M	N 708719.00	7775210.00	1390.00											
	0.00	0.10 8287		AA CU 14	PPM AA	FE 40.00	PCT AA	NI 7	PPM AA	2N 12	PPM AA	2N 12	PPM AA	2N 12	PPM AA	2N 12	PPM AA	2N 12	PPM AA
				AM PB 28	PPM AM	SB 4.4	PPM AM	SN 4	PPM AM	U 2.8	PPM AM	U 2.8	PPM AM	U 2.8	PPM AM	U 2.8	PPM AM	U 2.8	PPM AM
				L86 N	M	N 7089749.00	7775497.00	1390.00											
	0.00	0.10 8287		AA CU 10	PPM AA	FE 37.00	PCT AA	NI 11	PPM AA	2N 13	PPM AA	2N 13	PPM AA	2N 13	PPM AA	2N 13	PPM AA	2N 13	PPM AA
				AM PB 22	PPM AM	SB 1.4	PPM AM	SN 3	PPM AM	U 4.3	PPM AM	U 4.3	PPM AM	U 4.3	PPM AM	U 4.3	PPM AM	U 4.3	PPM AM
				L86 N	M	N 709014.00	7774972.00	1390.00											
	0.00	0.10 8287		AA CU 25	PPM AA	FE 36.00	PCT AA	NI 22	PPM AA	2N 10	PPM AA	2N 10	PPM AA	2N 10	PPM AA	2N 10	PPM AA	2N 10	PPM AA
				AM PB 32	PPM AM	SB 1.8	PPM AM	SN 4	PPM AM	U 3.2	PPM AM	U 3.2	PPM AM	U 3.2	PPM AM	U 3.2	PPM AM	U 3.2	PPM AM
				L86 N	M	N 7089565.00	7774425.00	1390.00											
	0.00	0.10 8287		AA CU 23	PPM AA	FE 22.50	PCT AA	NI 19	PPM AA	2N 15	PPM AA	2N 15	PPM AA	2N 15	PPM AA	2N 15	PPM AA	2N 15	PPM AA
				AM PB 36	PPM AM	SB 3.2	PPM AM	SN 4	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM	U 2.5	PPM AM
				L86 N	M	N 7088999.00	7773590.00	1390.00											
	0.00	0.10 8287		AA CU 40	PPM AA	FE 17.00	PCT AA	NI 20	PPM AA	2N 20	PPM AA	2N 20	PPM AA	2N 20	PPM AA	2N 20	PPM AA	2N 20	PPM AA
				AM PB 45	PPM AM	SB 1.5	PPM AM	SN 1	PPM AM	U 7.8	PPM AM	U 7.8	PPM AM	U 7.8	PPM AM	U 7.8	PPM AM	U 7.8	PPM AM
				L86 N	M	N 7090866.00	7773374.00	1390.00											
	0.00	0.10 8287		AA CU 10	PPM AA	FE 3.10	PCT AA	NI 25	PPM AA	2N 22	PPM AA	2N 22	PPM AA	2N 22	PPM AA	2N 22	PPM AA	2N 22	PPM AA
				AM PB 14	PPM AM	SB 0.5	PPM AM	SN 2	PPM AM	U 0.9	PPM AM	U 0.9	PPM						

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APPENDIX 2

CRC SAMPLE DATA

REPORT - DATA - NORTH REGION

REGIONAL DISTRICT

PRINTED: 11-08-75 10:50:45

REPORT NUMBER - REPORT SAMPLES & RESULTS

PAGE: 1

REPORT - DATA - NORTH REGION

ADDRESS	DEPTH	DATE	TIME	COORDINATE	EASTING	NORTHING	WESTING	ALTITUDE	COLLECTION	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
757272	0.00	0.10	8297	CRC	M	M	M	744215.00	773933.00	7273.00							
				115 AS 0.1	PPM	115 AS 0.5	PPM	115 CO 0.5	PPM	115 CU 4.2	PPM	115 MO 1.9	PPM	115 NI 4.8	PPM	115 PB 0.5	PPM
				201 SI 0.2	PPM	201 SB 0.1	PPM	201 SN 0.5	PPM	201 U 0.10	PPM	201 W 0.2	PPM	334 AU 0.005	PPM		
757273	0.00	0.10	8297	CRC	M	M	M	744215.00	773933.00	1390.00							
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				201 SI 0.1	PPM	201 SB 0.2	PPM	201 SN 1.4	PPM	201 U 14.5	PPM	201 W 0.4	PPM	334 AU 0.002	PPM		
757297	0.00	0.10	8297	CRC	M	M	M	738945.00	774255.00	1390.00							
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				201 SI 0.1	PPM	201 SB 0.1	PPM	201 SN 0.5	PPM	201 U 0.11	PPM	201 W 0.2	PPM	334 AU 0.002	PPM		
757298	0.00	0.10	8297	CRC	M	M	M	737896.00	774499.00	1390.00							
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				201 SI 0.1	PPM	201 SB 0.1	PPM	201 SN 2.2	PPM	201 U 11.05	PPM	201 W 0.4	PPM	334 AU 0.002	PPM		
757299	0.00	0.10	8297	CRC	M	M	M	733500.00	774425.00	1390.00							
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				201 SI 0.1	PPM	201 SB 0.1	PPM	201 SN 1.2	PPM	201 U 4.22	PPM	201 W 3.6	PPM	334 AU 0.002	PPM		
757300	0.00	0.10	8297	CRC	M	M	M	733495.00	774400.00	1390.00							
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757323	0.00	0.10	8297	CRC	M	M	M	733521.00	775246.00	1390.00							
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				201 SI 0.1	PPM	201 SB 0.1	PPM	201 SN 1.2	PPM	201 U 1.4	PPM	201 W 0.1	PPM	334 AU 0.001	PPM		
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				201 SI 0.1	PPM	201 SB 0.1	PPM	201 SN 1.2	PPM	201 U 1.4	PPM	201 W 0.1	PPM	334 AU 0.001	PPM		

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2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818

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APPENDIX 3

PETROLOGICAL DESCRIPTIONS

Cover (?Wiso Basin) SORETOOTH NORTH (EL 8287).

757576 **Quartz-rich coarse grained sandstone with some vein**
718216 E, 7770945 N **quartz and quartz-muscovite-biotite schist grains, also**
 tourmaline and zircon.

Field Note: Arenite.

The dominant components in this sample are elongate to subrounded single crystal quartz grains to 0.8 mm long, plus minor polycrystalline quartz (?vein quartz) and fine quartz-muscovite-biotite schist fragments. Accessory brown to green tourmaline is present, and there is about 35% limonitic clays as a cement. Rare zircons are to 0.1 mm in size, consistent with a coarse grained sandstone. There is no sign of metamorphism, and this sample may be part of the Wiso Basin sequence, as suggested in your letter.

757577 **Well-bedded medium to coarse grained sandstone with**
718096 E, 7772238 N **some lithic grains and tourmaline, in a limonite cement.**

Field Note: Arenite.

There seem to be some bedding laminations in this sample, which is dominated by generally elongate single crystal quartz grains, with maximum grain sizes in different layers from 0.3 to 0.6 mm. There are rare polycrystalline quartz grains ($\pm$ sericite, biotite) and accessory tourmaline is present, as in the previous sample. However the quartz grains typically have a common elongation direction, defining a bedding-parallel foliation. There is an abundant limonite cement, which may have been carbonate, although this is not certain. In some of the coarser layers the cement has been leached rather than limonitised.

757578
724897 E, 7766579 N

Poorly sorted but grain supported medium to coarse grained sandstone with common lithic grains (largely fine quartz-rich quartz-sericite schist), also tourmaline. Clay-filled microfaults with comminuted quartz fragments and some possibly stylolitic grain boundaries.

Field Note: Arenite.

This is a poorly sorted but massive sandstone, with more rounded, less elongate single crystal quartz grains than those in the previous samples, ranging from 0.1 to 0.8 mm in size, but largely > 0.25 mm (medium to coarse grained sandstone). Lithic grains, commonly quartz-rich quartz-sericite schists, are more abundant (to 10%) than in the previous samples, and there is some green to blue tourmaline as well as leucoxene after opaque oxide and rare detrital muscovite. However, this sample has a narrow clay-rich zone containing comminuted fragments of quartz. This zone is possibly a microfault. There is only minor porosity in this sample, rarely containing limonite, and many stylolitic grain boundaries seem to have developed.

757582

Quartz-rich apparently bimodal quartz-sericite schist with a quartz-sericite schist matrix, some detrital tourmaline and leucoxene after opaque oxides, also abundant limonite. Some broad similarities with Madigan Beds arenites, but less clearly matrix-supported.

Field Note: (None, not listed).

There are abundant single crystal quartz grains in this sample, but this sandstone seems to be bimodal, with well-rounded grains from 0.5 to 1 mm in length, as well as smaller grains about 0.1 mm in diameter, typically with fine schistose muscovite to sericite. There are some quite large tourmaline grains (some of which are blue), to 0.3 mm long, as well as zircons to 80 µm long, consistent with the larger single crystal quartz grains. There is some leucoxene after rounded detrital opaque oxides and abundant supergene limonite.

The schistosity in this sample suggests that it is a metasandstone and has some similarities with Madigan Beds arenites, without the obviously matrix-supported character of such sediments.