TANAMI JOINT VENTURE

ZAPOPAN N L

KUMAGAI GUMI CO LTD

KINTARO METALS PTY LTD

EXPLORATION LICENCE 5419

TANAMI REGION

NORTHERN TERRITORY

SECOND ANNUAL REPORT - 1991

CR91/3746

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1. SUMMARY

A helicopter-borne geochemical sampling programme collected 76 rock-chip and laterite samples. A large magnetic anomaly, cut by a northwest trending regional lineament was identified as the main target zone. Sampling in this area returned elevated values of Co, Ba, Cu, Pb, Zn, Ni and Au. The majority of the licence area has a low magnetic character and does not offer significant exploration targets.

2. INTRODUCTION

Exploration Licence 5419 was granted on 3 May 1989 to Harlock Pty Ltd. A 50% interest was subsequently transferred to Zapopan NL. Harlock's interest is held in trust on behalf of Kumagai Gumi Co Ltd (30%) and Kintaro Metals Pty Ltd (20%). Zapopan, Kumagai and Kintaro comprise the Tanami Joint Venture "TJV".

The EL covers an area of 998sq km, equivalent to 310 blocks, and is located approximately 70km north-east of the Granites gold mine. There are no access roads into the area, the nearest road being at Mt Davidson Outstation, 20km south of the licence area (Figures 1 and 2).

The EL is totally on Aboriginal land within the Central Desert Land Trust area.

The area is predominantly a sandplain with scattered low rises and pediments, red earth plains and quartz ridges.

A brief outline of previous geological work, local geology and landforms is to be found in the first annual report. Year 1 exploration comprised data acquisition and interpretation.

This report details exploration carried out in the second year of the licence which comprised predominately rock chip sampling.

Prior to undertaking this sampling, the Central Land Council and Aboriginal Traditional Owners carried out a Sacred Site clearance of the licence area.

3. PREVIOUS WORK

In the first year of EL 5419, the following exploration was completed.

- acquisition of colour aerial photography over the licence area.
- compilation and preliminary interpretation of available open-file reports, airborne magnetic data, aerial photography and Landsat imagery.

This work is detailed in the first annual report for EL 5419.

4. EXPLORATION COMPLETED IN YEAR 2

4.1 Geochemical sampling

Data interpretation carried out in the first year of the licence showed that there was one main target area within EL 5419. This is a broad magnetic anomaly, measuring approximately 4Km x 2Km and elongated to the south-east. A regional north-west trending lineament traverses the anomaly.

The area of the anomaly comprises two low ridges of subcropping phyllite, banded ferruginuous quartzite, and graphitic quartz-schist. The ridges are surrounded by flat plains of wind-blown aeolian sand. Lack of good outcrop made it difficult to determine strike, dip, folding etc., however, the quartzite/BIF appears to strike to the east and south-east and dip to the north, with purple phyllite in the footwall and graphitic quartz-schist in the hanging-wall. A similar sequence is observed in target 1 in EL 5418.

A helicopter-borne geochemical sampling programme was carried out in August 1990 to test the main magnetic anomaly and other low priority targets.

A total of 45 samples were collected in this area, with 31 samples collected elsewhere in the licence area. All samples were submitted to Analabs for "Gold + 26" analyses by NAA and Cu, Pb, Zn and Ni by method 140.

Sample locations are shown in figure 3.

Sample descriptions and results are appended (Appendices I and II).

Petrographic descriptions of samples 80021, 80031, 80033, and 80042 are appended (Appendix III).

Elevated base-metal values to a maximum of 34ppm Co, 6500ppm Ba, 105ppm Ni, 570ppm Cu, 1800ppm Zn and 305ppm Pb occur in the main target area. Minor gold anomalism up to 17 ppb occurs in the same area.

5. EXPENDITURE

	$
Aerial Photography	681.00
Assaying	2285.27
Consumables	779.84
Drafting/Printing	176.15
Geological Consultants	384.17
Helicopter Hire	3780.00
Land Councils	4573.76
Report Preparation	500.00
Salaries and Wages	8214.25
Surveying/Gridding	2107.00
Travel and Accommodation	3050.00
Vehicle Expenses	2899.58
Administration Costs	2943.10
	32,374.12

6. FORWARD PROGRAMME

The proposed exploration programme for year 3 comprises follow-up geochemical sampling, and geological mapping of the anomalous area identified in year 2. A budget of $31,000 has been allocated for this work.

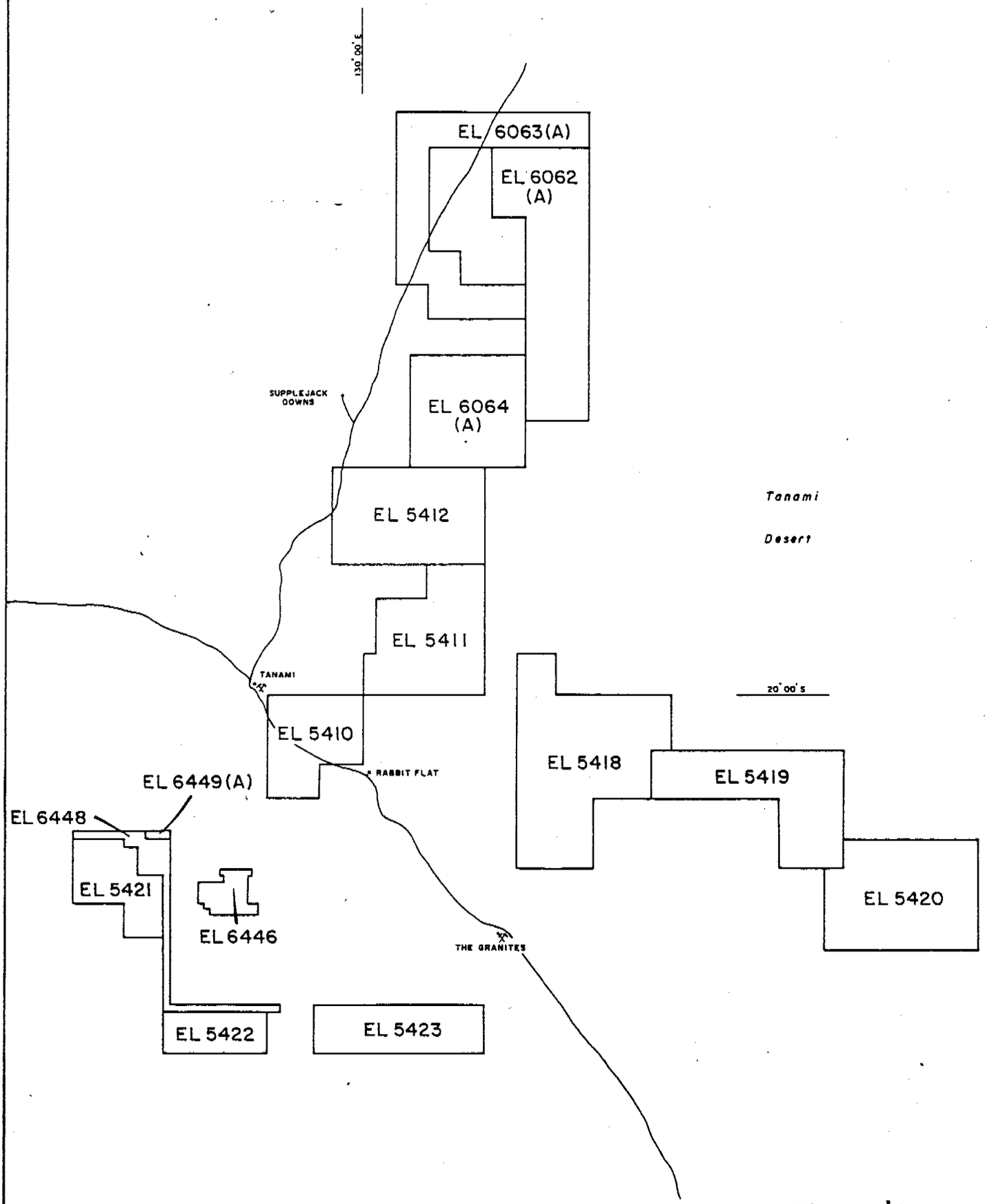


Figure 1

TANAMI JOINT VENTURE		
Scale: 1:1000000	Compiled:	Date:
	Drawn: C.S.M.	
TENEMENTS		

Original reduced to A4

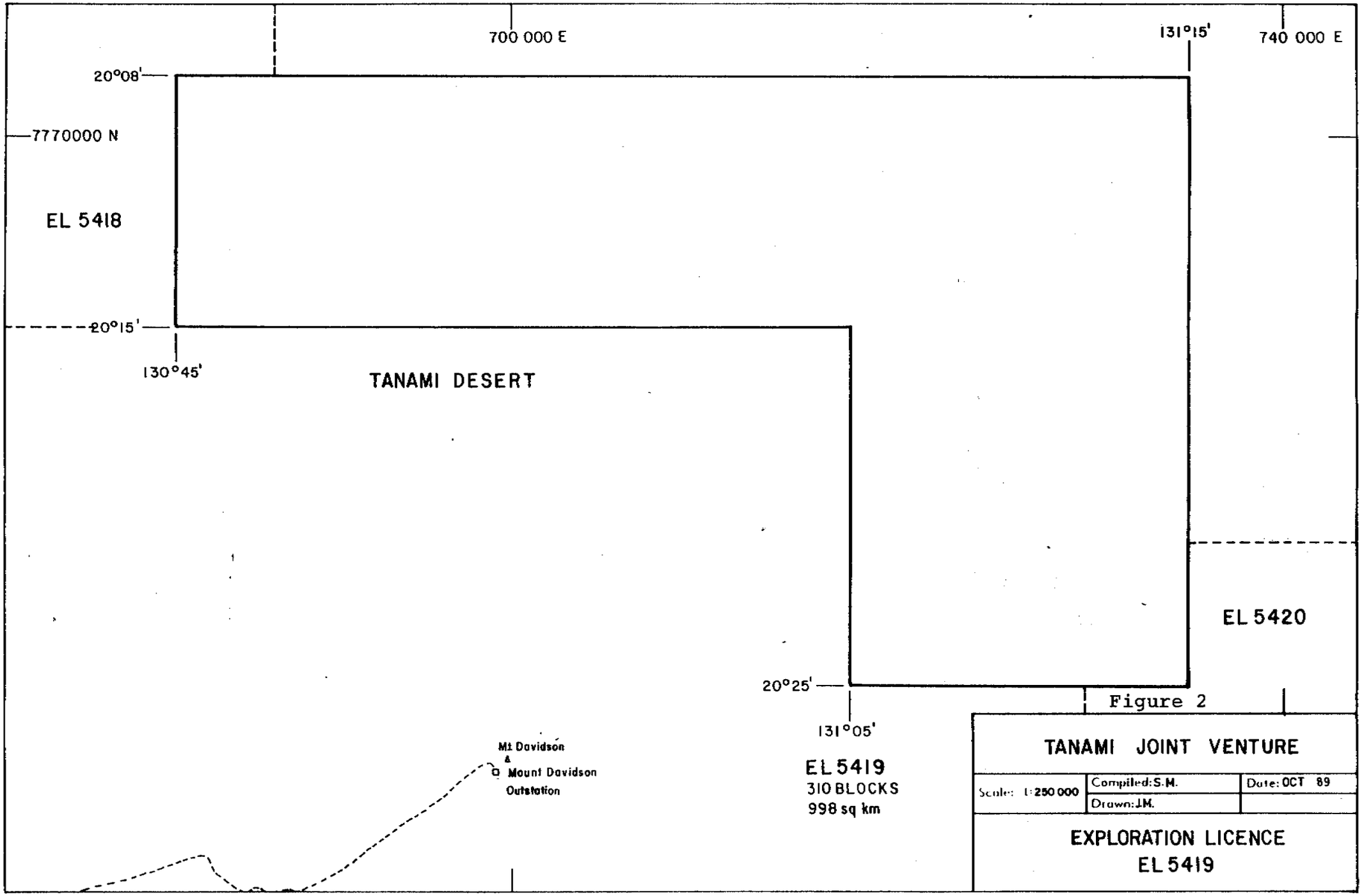
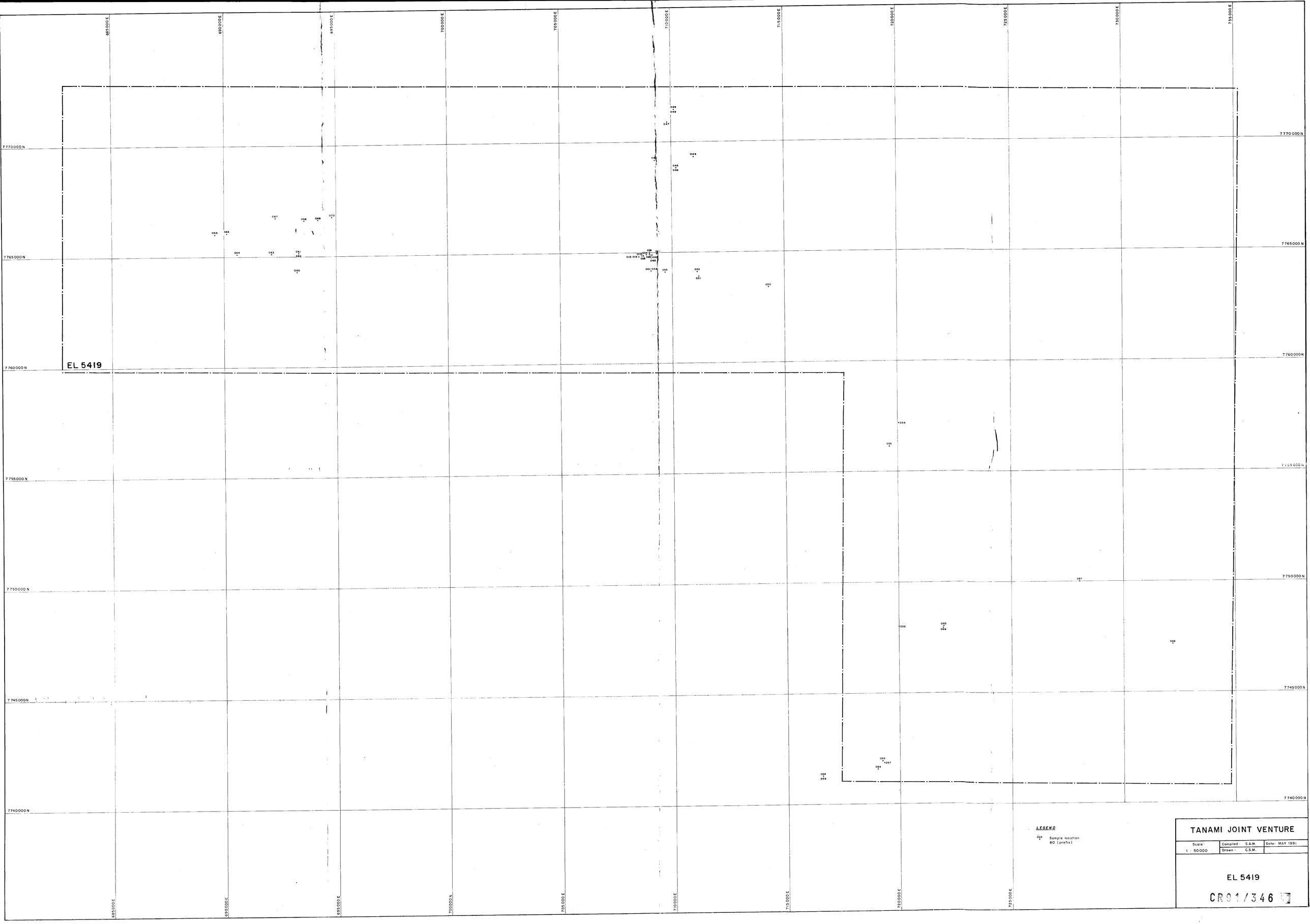

700 000 E
131°15'
740 000 E
20°08'
7770000 N
EL 5418
20°15'
130°45'
TANAMI DESERT
EL 5420
20°25'
131°05'
EL 5419
310 BLOCKS
998 sq km
Mt Davidson
&
Mount Davidson
Outstation
TANAMI JOINT VENTURE
Scale: 1:250 000
Compiled: S.M.
Date: OCT 89
Drawn: J.M.
EXPLORATION LICENCE
EL 5419

Figure 2


685000E
690000E
695000E
700000E
705000E
710000E
715000E
720000E
725000E
730000E
735000E
7770000N
7765000N
7760000N
7755000N
7750000N
7745000N
7740000N
EL 5419
LEGEND
Sample location
BO (prefix)
TANAMI JOINT VENTURE
Scale: 1 : 50000
Compiled: S.A.M.
Drawn: C.S.M.
Date: MAY 1991
EL 5419
CR91/346

APPENDIX I

EL 5419 - SAMPLE DESCRIPTIONS

EL 5419

Sample Number	Type	Run No. Photo No	Co-ordinates	Description	Comments
80001	RC	9/116		purple ferrug. phyllite	80001 – 80009 80020–80029 Same ridge
02	RC	9/116		ferruginous quartzite with some sericitic, maroon phyllite	
03	RC	9/116		ferrug, sugary quartzite	80010–80013 Same ridge.
04	RC	9/116		bedded fe-ox rich quartzite	
05	RC	9/116	20°12'31"/131°00'02" 7764165N/709025E	quartzite	
06	RC	9/116		fe-ox rich quartzite	80031–80034 Same ridge
07	RC	9/116		goethitic quartzite	
08	RC	9/116		ferrug. quartzite	
09	RC	9/116		ferrug. sugary quartzite	
10	RC	9/116		sugary quartzite	
11	RC	9/116		sugary quartzite	
12	RC	9/116		ferrug. quartzite	
13	RC	9/116		quartzite	
14	RC	9/116		cemented clay	250m South of main ridge.
15	RC	9/116		banded, ferrug. quartzite ; glassy.	
16	RC	9/116		banded iron formation	
17	RC	9/116		glassy quartzite, 10% Fe ox in fractures	

EL 5419

Sample Number	Type	Run No. Photo No	Co-ordinates	Description	Comments
80018	RC	9/116		semi-lat. banded iron-formation	
19	RC	9/116		— ditto —	
20	RC	9/116		quartzite - wh-p.br - with 10% Fe ox.	
21	RC	9/116		fe-rich, siliceous, sandy sediment with fine chalcedonic veins.	
22	RC	9/116		glassy banded quartzite	
23	RC	9/116		ferrug, garnet quartzite	
24	RC	9/116		banded quartzite with black-coloured sediment.	tm?
25	RC	9/116		brecciated glassy quartzite 20% Fe ox.	Eastern end of outcrop.
26	RC	9/116		goethitic quartzite	
27	RC	9/116		goethitic b.i.f.	
28	RC	9/116		blk-br ferrug. ironstone / quartzite.	
29	RC	9/116		goethitic quartzite	
30	RC	9/116		goethitic quartzite + massive goethite	
31	RC	9/116		bedded, garnet quartzite with fine "ashy" bands + some muscovite	
32	RC	9/116		ferrug. bedded "ashy" sediment	
33	RC	9/116		v. ferrug. garnet-musc-quartz rock.	in v. thick veg.
34	RC	9/116		blk-pu "gossanous", "ashy" sediment + some glassy quartz.	20m South of 80033

EL 5419

Sample Number	Type	Run No. Photo No	Co-ordinates	Description	Comments
80035	RC	9/116		BIF	200m NE 80015/19
36	RC	9/116		BIF ± 100m NE 80035	Strike 020° dip N ?
37	RC	9/116		brecciated BIF	±200m NE 80036
38	RC	9/116		brecciated BIF	200m NE 80037 N. side of ridge
39	RC	9/116		BIF with sugary + glassy quartz(ite)	50m South of 80038
40	RC	9/116	20° 12' 07" / 131° 00' 02" 7764903N 709034E	BIF + some haem-musc-sericite? phyllite	100m NE of 80039 – top of ridge
41	RUBBLE RC	9/116		lateritized bedded ferrug. quartzite	250m NE of 80040
42	FLOAT R.C.	9/116		gy-green f.gr. ? sediment	
43	LAT	9/116	20° 09' 48"S / 131° 00' 07"E 7769176N / 709230E	coarse + goethite frags.	
44	RC	8/102	20° 09' 43"S / 131° 01' 08"E 7769308N / 711004E	banded ferrug. quartzite	
45	RC	8/102	20° 09' 59"S / 131° 00' 43"E 7768804N / 712014E		
46	RC	8/102	—ditto—	quartz-muscovite rock (pegmatite?)	
47	RC	8/102	7770870N 709840E	silcrete + fe ox.	
48	RC	8/102	7771450N 710150E	Quartz-tourmaline rock.	
49	RC	8/102	—ditto—	v. weath. yw-br f.gr. granite	
50	RC	8/102	20° 12' 56" / 131° 03' 02" E 7763332N / 714241E	f.gr. biotite granite	
51	RC	8/102	7763900N 711200E	Quartz	

EL 5419

Sample Number	Type	Run No. Photo No	Co-ordinates	Description	Comments
80052	RC	9/116	20° 12' 32" S/131° 01' 14" 7764109N/711115E	banded quartzite ; sugary quartz + 40% Fe ox	
53	RC	9/116	20° 12' 33" S/131° 00' 25" 7764095N/709692E	banded quartzite (b.i.f.)	
54	LAT	7/093	20° 16' 13" S/131° 06' 25" E 7757199N/720057E	lat. ferrug. quartzite	
55	RC	7/093 8/106	7756130N 719610E	ferruginous quartzite	
56	RC	8/106	774800N 720000E	siliceous ? rock	fault infill ?
57	LAT	8/109	20° 24' 32" S/131° 05' 06" E 7741859N/719281E	m-c ;	
58	LAT	8/109	20° 24' 52" S/131° 04' 31" E 7741279N/716548E	medium ; small sample.	
59	RC	8/108	20° 24' 52" S/131° 04' 31" E 7741279N/716548E	Quartz - white	
60	RC	11/135	7764300N 693290E	white quartz Strike N-S jointing at 115°	
61	RC	11/135	7765130N 693350E	Quartz	
62	RC	11/135	-ditto-	yw-br f-gr. micaceous sediment	
63	RC	11/135	20° 12' 07" S/130° 50' 19" E 7765099N/692108E	pu-red, massive, micaceous sediment	
64	RC	11/135	7765100N 690600E	pu-blk, ferruginous 'cmd'	
65	LAT	11/135	7766000N 689620E	coarse ; nodular, laterite	
66	RC	11/135	7766130N 690150E	Sheared, purple, mica-quartz rock. fine-gr.	
67	LAT	11/135	7766720N 692300E	m-c ; laterite	
68	LAT	11/135	7766600N 693600E	medium laterite ; good sample.	

EL 5419

Sample Number	Type	Run No. Photo No	Co-ordinates	Description	Comments
80069	LAT	11/135	7766650N 694200E	m-c ; laterite	
80070	LAT	11/135	7766750N 694820E	m-c ; incl. lat. ferrug. quartzite	
80093	LAT	8/108	7741950N 719220E	m-c ; "gritty" laterite	
94	LAT	8/108	7741580N 719000E	m-c ; laterite	
80095	R/C	7/091	7748000N 722000E	siliceous , fault breccia	
80098	RC	6/067	7747700N 732200E	green-br. weath qz-mica schist	
80096	RC	7/091	7747900N 722000E	sheared ; chlorite-quartz schist	Strike 260° Dip. vertical
80097	RC	7/091	7750000N 728050E	brown weath ; qz-mica rock , f-gr.	

APPENDIX II

EL 5419 - SAMPLE RESULTS

ANALABS

A Division of Inchcape Inspection and Testing Services, Australia, Pty. Ltd.
Division of Inchcape Inspection and Testing Services Pty Ltd

(089) 47 2355 | Cnr Coonawarra & Mataram Rds, Winnellie | Fax: (089) 84 3984

ANALYTICAL REPORT No. 999.16.21.04530

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:
TANAMI JOINT VENTURE
P.O.BOX 625

DARWIN NT 0801

ORDER No.	PROJECT
DN 50387	

DATE RECEIVED	RESULTS REQUIRED
04/09/90	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
16	04/10/90	1	73

SAMPLE NUMBERS	SAMPLE DESCRIPTION	ELEMENT/METHOD
80001/49,80051/70,80093/5,80098	PC Prep: 019	Cu,Pb,Zn,Ni/140
80001/49,80051/70,80093/5,80098	PC	Au,Ag,As,Ba,Br,Ce,Co,Cr,Cs,Eu,Fe,Hf,Ir,La,Lu,Mo

EL5419

RESULTS TO
STEVE MILNER
TANAMI JOINT VENTURE
GPO BOX 625

DARWIN NT 0801

RESULTS TO

RESULTS TO

REMARKS

AUTHORISED OFFICER

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A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	1 OF 16

TUBE No.	SAMPLE No.	Sc	Cr	Fe	Co	Ni	Cu	Zn	Zn	As
1	80001	3.5	250	21.90	2	<5	38	96	110	23
2	80002	4.0	240	23.30	2	<5	42	32	<100	27
3	80003	4.3	190	22.50	3	<5	102	26	<100	28
4	80004	4.6	210	13.60	2	<5	106	24	<100	18
5	80005	0.9	370	2.90	2	15	12	26	<100	6
6	80006	5.6	230	30.80	2	15	32	272	310	5
7	80007	5.8	240	29.30	12	10	56	144	150	17
8	80008	4.0	270	16.20	4	15	34	102	100	15
9	80009	0.9	390	4.20	4	5	18	28	<100	4
10	80010	7.4	260	19.60	3	5	36	258	270	15
11	80011	4.2	320	8.99	5	5	12	8	<100	8
12	80012	8.6	300	10.20	6	5	28	32	<100	8
13	80013	4.6	310	9.44	2	<5	30	10	<100	10
14	80014	5.0	210	3.10	9	10	18	26	<100	4
15	80015	8.2	220	24.50	2	5	94	150	150	14
16	80016	11.3	190	35.10	5	10	142	250	270	28
17	80017	0.3	310	1.10	<1	5	8	<2	<100	3
18	80018	8.9	150	42.40	2	10	86	330	350	27
19	80019	10.9	130	45.00	11	25	128	478	560	30
20	80020	2.4	270	11.90	3	5	32	64	<100	23
21	80021	6.9	87	20.00	12	20	56	348	320	46
22	80022	2.3	310	12.10	6	10	54	92	100	25
23	80023	13.1	130	29.70	14	85	188	730	720	30
24	80024	3.5	230	22.70	7	5	62	106	<100	77
25	80025	3.1	340	11.20	1	5	42	48	<100	38

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	2 OF 16

TUBE No.	SAMPLE No.	Sc	Cr	Fe	Co	Ni	Cu	Zn	Zn	As
1	80026	9.1	140	43.50	4	15	38	344	370	40
2	80027	10.0	63	48.00	2	20	54	526	610	28
3	80028	6.2	92	41.20	5	15	46	442	490	14
4	80029	9.3	82	45.00	6	20	42	506	540	17
5	80030	8.6	88	48.40	8	20	34	342	330	6
6	80031	8.1	73	50.20	7	35	104	1500	1300	170
7	80032	5.1	170	30.30	3	5	106	164	190	46
8	80033	7.1	170	33.70	6	15	58	134	130	43
9	80034	3.5	110	41.20	1	<5	50	82	<100	45
10	80035	3.5	190	24.70	<1	5	26	80	<100	18
11	80036	7.0	160	32.30	3	20	58	290	330	41
12	80037	2.1	200	29.50	<1	<5	26	92	<100	16
13	80038	1.9	180	26.70	4	5	20	120	120	12
14	80039	3.1	160	37.20	1	5	28	256	270	23
15	80040	7.2	140	36.50	2	10	66	1800	1700	32
16	80041	5.6	250	29.00	13	15	52	170	170	27
17	80042	2.2	87	0.93	34	105	570	700	700	<2
18	80043	48.4	722	38.10	8	15	22	8	<100	27
19	80044	34.4	260	16.40	8	15	34	72	110	9
20	80045	0.1	410	0.48	<1	<5	2	<2	<100	<2
21	80046	20.1	260	14.70	10	20	22	62	<100	5
22	80047	16.4	290	14.00	20	35	34	74	<100	7
23	80048	2.9	430	1.10	4	5	2	<2	<100	<2
24	80049	30.9	380	8.41	7	10	28	20	<100	9
25	80051	0.6	350	0.39	<1	5	2	<2	<100	<2

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	3 OF 16

TUBE No.	SAMPLE No.	Sc	Cr	Fe	Co	Ni	Cu	Zn	Zn	As
1	80052	5.3	190	21.60	22	45	72	444	470	8
2	80053	6.6	290	22.90	6	25	44	184	190	18
3	80054	10.0	320	34.10	8	10	20	6	<100	37
4	80055	10.0	170	33.80	3	5	32	10	<100	12
5	80056	13.1	78	0.19	1	5	4	<2	<100	<2
6	80057	10.3	220	20.20	9	15	20	4	<100	22
7	80058	14.0	500	21.70	9	15	22	8	<100	23
8	80059	0.2	420	0.68	<1	5	2	<2	<100	<2
9	80060	0.1	380	0.40	<1	<5	<2	<2	<100	<2
10	80061	0.1	340	0.38	<1	<5	2	<2	<100	<2
11	80062	24.6	1100	11.00	8	20	38	18	<100	<2
12	80063	19.3	180	6.82	12	15	26	50	<100	<2
13	80064	21.0	190	35.50	1	<5	14	<2	<100	26
14	80065	15.9	260	24.60	6	10	10	<2	<100	34
15	80066	14.6	200	25.50	2	5	28	<2	<100	10
16	80067	34.1	480	34.20	7	20	14	<2	<100	72
17	80068	28.8	1180	34.40	10	30	20	<2	<100	28
18	80069	49.7	977	33.00	7	25	22	<2	<100	24
19	80070	25.8	786	32.90	10	20	22	2	<100	29
20	80093	14.1	260	24.00	5	10	16	<2	<100	27
21	80094	8.8	310	21.70	5	10	18	<2	<100	23
22	80095	9.3	220	0.28	<1	5	4	<2	<100	<2
23	80098	11.5	170	4.10	12	20	24	78	100	9
24										
25										

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
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	999.16.21.04530	04/10/90	DN 50387	4 OF 16

TUBE No.	SAMPLE No.	Sc	Cr	Fe	Co	Ni	Cu	Zn	Zn	As
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22	DETECTION	0.1	5	0.05	1	5	2	2	100	2
23	UNITS	ppm	ppm	%	ppm	PPM	PPM	PPM	ppm	ppm
24	METHOD	1801	1801	1801	1801	140	140	140	1801	1801
25										

Results in ppm unless otherwise specified
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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	5 OF 16

TUBE No.	SAMPLE No.	Se	Br	Rb	Mo	Ag	Sb	Cs	Ba	La
1	80001	<5	<2	48	<5	<5	<0.5	<1	660	4.6
2	80002	<5	<2	79	<5	<5	<0.5	3	210	6.3
3	80003	<5	<2	31	<5	<5	0.9	<1	1900	20.0
4	80004	<5	<2	<20	<5	<5	<0.5	<1	6500	28.0
5	80005	<5	<2	<20	<5	<5	<0.5	<1	400	2.0
6	80006	<5	<2	67	<5	<5	<0.2	<1	1700	16.0
7	80007	<5	<2	72	<5	<5	<0.5	<1	880	5.0
8	80008	<5	<2	68	10	<5	<0.2	2	460	4.6
9	80009	<5	<2	<20	<5	<5	<0.2	<1	200	2.3
10	80010	<5	<2	39	<5	<5	<0.5	<1	110	9.3
11	80011	<5	<2	<20	<5	<5	<0.5	<1	<100	2.7
12	80012	<5	<2	<20	<5	<5	<0.5	<1	160	3.3
13	80013	<5	<2	21	<5	<5	<0.5	<1	<100	3.6
14	80014	<5	4	63	<5	<5	<0.5	3	1300	26.0
15	80015	<5	<2	60	<5	<5	0.8	<1	130	3.5
16	80016	<5	<2	65	<10	<5	1.3	<1	240	8.9
17	80017	<5	<2	<20	<5	<5	<0.5	<1	<100	1.1
18	80018	<5	<2	32	<5	<5	1.1	1	240	10.0
19	80019	<5	<2	39	<5	<5	0.8	1	200	8.9
20	80020	<5	<2	<20	<5	<5	0.9	<1	2700	7.9
21	80021	<5	<2	140	<15	<5	<0.5	3	2900	45.0
22	80022	<5	<2	46	<10	<5	<0.5	<1	<100	1.7
23	80023	<5	<2	120	<10	<5	<0.5	5	180	2.0
24	80024	<5	<2	46	<5	<5	<0.2	<1	370	8.5
25	80025	<5	<2	26	<10	<5	<0.2	<1	470	5.0

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
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— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	6 OF 16

TUBE No.	SAMPLE No.	Se	Br	Rb	Mo	Ag	Sb	Cs	Ba	La
1	80026	<5	<2	31	<5	<5	<0.5	2	280	7.7
2	80027	<5	<2	21	<5	<5	<0.5	2	730	64.9
3	80028	<5	2	22	<5	<5	<0.5	<1	520	8.5
4	80029	<5	2	<20	<5	<5	<0.5	<1	480	5.5
5	80030	<5	<2	29	<5	<5	<0.2	<1	2200	6.2
6	80031	<5	<2	68	<5	<5	<0.5	1	160	12.0
7	80032	<5	3	82	14	<5	0.9	<1	1500	11.0
8	80033	<5	<2	80	<5	<5	0.7	2	630	1.8
9	80034	<5	<2	<20	<5	<5	1.3	<1	<100	2.9
10	80035	<5	<2	76	<5	<5	<0.5	2	1200	4.5
11	80036	<5	<2	62	18	<5	0.9	2	1400	17.0
12	80037	<5	<2	58	<6	<5	<0.5	2	550	3.1
13	80038	<5	<2	51	<5	<5	0.6	<1	260	6.3
14	80039	<5	<2	73	<10	<5	0.6	<1	470	3.6
15	80040	<5	<2	68	<10	<5	1.0	<1	1000	11.0
16	80041	<5	<2	58	<5	<5	0.7	1	450	25.0
17	80042	<5	<2	<20	<5	<5	0.8	<1	<100	24.0
18	80043	<5	<2	20	<5	<5	1.3	<1	<100	4.3
19	80044	<5	3	23	<5	<5	<0.5	<1	120	2.1
20	80045	<5	<2	<20	<5	<5	<0.2	<1	<100	<0.5
21	80046	<5	<2	50	<5	<5	<0.2	2	140	2.4
22	80047	<5	<2	44	<5	<5	0.5	<1	190	3.1
23	80048	<5	<2	<20	<5	<5	<0.2	<1	<100	<0.5
24	80049	<5	<2	42	<5	<5	0.5	3	340	1.5
25	80051	<5	<2	88	<5	<5	<0.2	3	<100	1.0

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	7 OF 16

TUBE No.	SAMPLE No.	Se	Br	Rb	Mo	Ag	Sb	Cs	Ba	La
1	80052	<5	<2	44	<5	<5	<0.5	<1	390	19.0
2	80053	<5	<2	41	<5	<5	<0.5	<1	160	7.4
3	80054	<5	<2	84	14	<5	0.9	<1	120	4.6
4	80055	<5	2	91	<5	<5	<0.5	<1	150	12.0
5	80056	<5	<2	<20	<5	<5	<0.2	<1	<100	10.0
6	80057	<5	<2	58	<5	<5	0.6	1	<100	9.4
7	80058	<5	<2	42	<5	<5	1.0	<1	<100	7.5
8	80059	<5	<2	<20	<5	<5	<0.2	<1	<100	1.2
9	80060	<5	<2	<20	<5	<5	<0.2	<1	<100	<0.5
10	80061	<5	<2	<20	<5	<5	<0.2	<1	<100	<0.5
11	80062	<5	<2	38	<10	<5	<0.5	2	670	1.6
12	80063	<5	<2	73	<10	<5	<0.2	9	180	1.5
13	80064	<5	4	<20	<5	<5	0.9	1	590	22.0
14	80065	<5	<2	<20	<5	<5	1.8	1	<100	5.8
15	80066	<5	<2	110	<5	<5	<0.5	3	960	6.3
16	80067	<5	<2	21	<5	<5	6.4	2	330	11.0
17	80068	<5	<2	<20	<5	<5	1.4	2	130	4.2
18	80069	<5	<2	28	<5	<5	1.0	<1	<100	4.4
19	80070	<5	<2	32	<5	<5	1.3	2	<100	10.0
20	80093	<5	<2	<20	<5	<5	0.6	<1	110	11.0
21	80094	<5	<2	<20	<5	<5	0.8	<1	<100	5.9
22	80095	<5	<2	<20	<5	<5	<0.2	<1	<100	17.0
23	80098	<5	<2	230	<5	<5	<0.2	27	740	45.0
24										
25										

Results in ppm unless otherwise specified
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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	8 OF 16

TUBE No.	SAMPLE No.	Se	Br	Rb	Mo	Ag	Sb	Cs	Ba	La
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22	DETECTION	5	2	20	10	5	0.5	1	100	0.5
23	UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
24	METHOD	1801	1801	1801	1801	1801	1801	1801	1801	1801
25										

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	9 OF 16

TUBE No.	SAMPLE No.	Ce	Sm	Eu	Yb	Lu	Hf	Ta	W	Ir
1	80001	<10	1.1	<0.5	0.5	<0.2	<1	<1	<2	<20
2	80002	15	1.0	<0.5	<0.5	<0.2	2	<1	<2	<20
3	80003	31	1.5	<0.5	<0.5	<0.2	<1	<1	<2	<20
4	80004	43	2.5	<0.5	<0.5	<0.2	<1	<1	<2	<20
5	80005	<10	0.6	<0.5	<0.5	<0.2	<1	<1	<2	<20
6	80006	<10	2.3	0.5	1.0	<0.2	<1	<1	<2	<20
7	80007	<10	1.4	<0.5	0.7	<0.2	<1	<1	<2	<20
8	80008	<10	1.3	<0.5	0.8	<0.2	<1	<1	<2	<20
9	80009	<10	0.6	<0.5	<0.5	<0.2	<1	<1	<2	<20
10	80010	<10	0.9	<0.5	0.6	<0.2	<1	<1	<2	<20
11	80011	<10	0.4	<0.5	<0.5	<0.2	<1	<1	<2	<20
12	80012	<10	0.6	<0.5	<0.5	<0.2	<1	<1	<2	<20
13	80013	<10	0.5	<0.5	<0.5	<0.2	<1	<1	<2	<20
14	80014	45	4.5	0.7	2.0	0.3	9	<1	<2	<20
15	80015	<10	1.0	<0.5	0.6	<0.2	1	<1	<2	<20
16	80016	14	2.4	<0.5	1.4	0.2	2	<1	9	<20
17	80017	<2	<0.2	<0.5	<0.5	<0.2	<1	<1	<2	<20
18	80018	<10	2.0	<0.5	1.1	<0.2	1	1	<2	<20
19	80019	<2	2.0	<0.5	1.2	<0.2	1	<1	<2	<20
20	80020	<10	1.1	<0.5	<0.5	<0.2	<1	<1	<2	<20
21	80021	70	4.9	1.3	2.0	0.4	3	2	<2	<20
22	80022	<10	0.9	<0.5	<0.5	<0.2	<1	<1	<2	<20
23	80023	<10	1.4	<0.5	0.9	<0.2	<1	<1	<2	<20
24	80024	22	1.8	<0.5	<0.5	<0.2	<1	<1	<2	<20
25	80025	10	1.0	<0.5	<0.5	<0.2	<1	<1	<2	<20

Results in ppm unless otherwise specified
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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	10 OF 16

TUBE No.	SAMPLE No.	Ce	Sm	Eu	Yb	Lu	Hf	Ta	W	Ir
1	80026	<2	1.3	<0.5	0.7	<0.2	1	<1	<2	<20
2	80027	40	2.7	<0.5	1.1	<0.2	1	<1	15	<20
3	80028	<2	1.7	<0.5	0.9	<0.2	1	<1	<2	<20
4	80029	<2	2.1	<0.5	1.2	<0.2	1	<1	<2	<20
5	80030	<2	1.1	<0.5	0.7	<0.2	<1	<1	<2	<20
6	80031	<10	2.3	0.6	1.0	<0.2	<1	<1	<2	<20
7	80032	18	1.6	<0.5	0.8	<0.2	2	<1	<2	<20
8	80033	<10	1.5	<0.5	0.7	<0.2	<1	<1	<2	<20
9	80034	<2	0.6	<0.5	<0.5	<0.2	<1	<1	<2	<20
10	80035	<10	1.1	<0.5	0.7	<0.2	1	<1	<2	<20
11	80036	15	2.0	<0.5	0.8	<0.2	<1	<1	<2	<20
12	80037	<10	1.2	<0.5	0.6	<0.2	<1	<1	<2	<20
13	80038	<10	1.2	<0.5	0.5	<0.2	<1	<1	<2	<20
14	80039	<10	1.7	<0.5	0.9	<0.2	<1	<1	<2	<20
15	80040	19	3.6	0.8	1.7	0.3	<1	<1	<2	<20
16	80041	51	2.4	0.5	1.0	<0.2	<1	<1	<2	<20
17	80042	39	6.4	0.9	2.8	0.5	2	<1	<2	<20
18	80043	<2	1.6	<0.5	1.0	<0.2	6	<1	<2	<20
19	80044	<10	1.0	<0.5	0.9	<0.2	<1	5	<2	<20
20	80045	<2	<0.2	<0.5	<0.5	<0.2	<1	<1	<2	<20
21	80046	<10	0.8	<0.5	1.2	<0.2	7	<1	<2	<20
22	80047	<10	1.0	<0.5	1.0	<0.2	2	1	<2	<20
23	80048	<2	<0.2	<0.5	<0.5	<0.2	<1	<1	<2	<20
24	80049	<10	0.6	<0.5	0.7	<0.2	4	<1	<2	<20
25	80051	<2	0.2	<0.5	<0.5	<0.2	<1	<1	<2	<20

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	11 OF 16

TUBE No.	SAMPLE No.	Ce	Sm	Eu	Yb	Lu	Hf	Ta	W	Ir
1	80052	58	5.6	1.3	2.0	0.3	<1	<1	<2	<20
2	80053	12	1.1	<0.5	<0.5	<0.2	2	<1	<2	<20
3	80054	11	1.6	<0.5	2.1	0.3	8	2	4	<20
4	80055	10	1.3	<0.5	0.7	<0.2	3	<1	<2	<20
5	80056	18	1.8	<0.5	0.8	0.2	7	2	<2	<20
6	80057	28	1.8	<0.5	1.3	0.2	10	2	<2	<20
7	80058	17	1.5	<0.5	1.8	0.3	10	1	<2	<20
8	80059	<2	0.2	<0.5	<0.5	<0.2	<1	<1	<2	<20
9	80060	<2	<0.2	<0.5	<0.5	<0.2	<1	<1	<2	<20
10	80061	<2	<0.2	<0.5	<0.5	<0.2	<1	<1	<2	<20
11	80062	<2	0.5	<0.5	<0.5	<0.2	2	<1	<2	<20
12	80063	<10	0.5	<0.5	1.1	<0.2	5	1	<2	<20
13	80064	13	2.6	<0.5	1.2	<0.2	4	1	<2	<20
14	80065	10	1.4	<0.5	1.8	0.3	8	2	<2	<20
15	80066	<10	1.3	<0.5	2.0	0.3	3	1	<2	<20
16	80067	30	2.2	0.6	2.4	0.3	10	1	<2	<20
17	80068	<2	1.2	<0.5	0.8	<0.2	7	2	<2	<20
18	80069	<2	1.7	<0.5	1.1	<0.2	7	1	<2	<20
19	80070	14	1.9	<0.5	1.3	<0.2	6	1	<2	<20
20	80093	20	2.4	0.6	1.8	0.3	18	3	<2	<20
21	80094	<10	1.6	<0.5	2.3	0.3	11	1	<2	<20
22	80095	33	3.5	<0.5	1.7	0.4	3	<1	<2	<20
23	80098	88	7.1	1.1	2.5	0.4	6	2	6	<20
24										
25										

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	12 OF 16

TUBE No.	SAMPLE No.	Ce	Sm	Eu	Yb	Lu	Hf	Ta	W	Ir
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22	DETECTION	10	0.2	0.5	0.5	0.2	1	1	2	20
23	UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb
24	METHOD	1801	1801	1801	1801	1801	1801	1801	1801	1801
25										

Results in ppm unless otherwise specified
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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	13 OF 16

TUBE No.	SAMPLE No.	Au	Pb	Th	U					
1	80001	<5	115	4.5	<2					
2	80002	<5	35	5.7	<2					
3	80003	<5	190	5.6	<2					
4	80004	<5	25	6.5	<2					
5	80005	5	<5	0.6	<2					
6	80006	<5	20	4.8	<2					
7	80007	<5	10	3.1	<2					
8	80008	<5	5	3.8	<2					
9	80009	<5	5	1.1	<2					
10	80010	<5	10	5.9	<2					
11	80011	<5	5	4.1	<2					
12	80012	<5	10	6.6	<2					
13	80013	<5	10	7.0	<2					
14	80014	<5	10	10.0	<2					
15	80015	<5	10	8.7	<2					
16	80016	<5	20	13.0	<2					
17	80017	<5	<5	0.5	<2					
18	80018	<5	15	11.0	3					
19	80019	<5	30	10.0	3					
20	80020	8	10	2.0	<2					
21	80021	<5	65	13.0	7					
22	80022	6	<5	0.9	6					
23	80023	<5	5	1.7	14					
24	80024	<5	5	2.9	5					
25	80025	8	5	3.0	<2					

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	14 OF 16

TUBE No.	SAMPLE No.	Au	Pb	Th	U					
1	80026	<5	25	12.0	<2					
2	80027	<5	45	8.5	<2					
3	80028	<5	20	5.1	<2					
4	80029	<5	20	9.3	<2					
5	80030	<5	10	4.2	2					
6	80031	<5	5	4.3	6					
7	80032	<5	10	8.2	5					
8	80033	<5	5	4.0	<2					
9	80034	<5	5	5.2	<2					
10	80035	<5	25	5.3	<2					
11	80036	17	25	3.3	4					
12	80037	<5	25	3.8	<2					
13	80038	<5	5	3.6	<2					
14	80039	6	5	4.1	14					
15	80040	8	305	4.0	11					
16	80041	<5	35	5.7	2					
17	80042	13	10	11.0	2					
18	80043	<5	30	37.0	4					
19	80044	<5	15	5.5	<2					
20	80045	<5	<5	<0.5	<2					
21	80046	<5	10	15.0	<2					
22	80047	<5	10	7.3	<2					
23	80048	<5	<5	0.6	<2					
24	80049	<5	5	13.0	2					
25	80051	<5	<5	<0.5	<2					

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	15 OF 16

TUBE No.	SAMPLE No.	Au	Pb	Th	U					
1	80052	<5	50	2.1	4					
2	80053	<5	25	6.7	3					
3	80054	<5	25	53.9	4					
4	80055	<5	20	32.0	<2					
5	80056	<5	10	26.0	<2					
6	80057	<5	25	23.0	2					
7	80058	<5	25	45.0	<2					
8	80059	<5	<5	0.7	<2					
9	80060	<5	<5	<0.5	<2					
10	80061	<5	5	<0.5	<2					
11	80062	<5	10	5.8	5					
12	80063	<5	10	5.4	9					
13	80064	<5	25	34.0	<2					
14	80065	<5	35	58.7	5					
15	80066	<5	35	31.0	<2					
16	80067	<5	25	54.8	<2					
17	80068	<5	25	24.0	<2					
18	80069	<5	20	33.0	8					
19	80070	<5	30	22.0	<2					
20	80093	<5	20	37.0	4					
21	80094	<5	25	69.1	3					
22	80095	<5	<5	9.0	<2					
23	80098	<5	15	19.0	4					
24										
25										

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	999.16.21.04530	04/10/90	DN 50387	16 OF 16

TUBE No.	SAMPLE No.	Au	Pb	Th	U					
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22	DETECTION	5	5	0.5	2					
23	UNITS	ppb	PPM	ppm	ppm					
24	METHOD	1801	140	1801	1801					
25										

Results in ppm unless otherwise specified
T = element present, but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER

APPENDIX III

EL 5419 - PETROGRAPHIC DESCRIPTIONS

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MINERALOGICAL REPORT NO. 5734
by A.C. Purvis, PhD
and I.R. Pontifex, MSc.

October 16th, 1990

TO : Mr S. Milner
Senior Geologist
Tanami Joint Venture
Level 1
48 Woods St
DARWIN NT 0800

YOUR REFERENCE : Your letter SAM:NA:90.66

MATERIAL : Rock samples

IDENTIFICATION : 80021 to 80095

WORK REQUESTED : Section preparation, petrographic description

SAMPLES & SECTIONS : Returned to you with this report.

I.R. Pontifex
Pontifex & Associates Pty Ltd

INTRODUCTION

This report covers 12 rock samples from the Tanami Complex, Northern Territory. [Note that sample 80095 was received but not included in your list of comments.]

Of these samples, nine were made into thin sections and three, with significant secondary iron oxides, (which were possibly gossanous), were examined in polished thin sections. The transmitted light study of the thin sections was augmented by examination in low angle incident light to discriminate minor graphite in some samples; and one sample (No. 80021) was stained for potassium felspar.

Six of the rocks appear to be of regional amphibolite facies, with quartz, mica and graphite variably present. Silver-grey crystalline graphite occurs in 80021, 42, and 83. Possible andalusite is present in 80021 and 83, although this andalusite differs from the contact metamorphic andalusite in 80292. Garnet occurred within boudinaged layers in 80154.

Two of the rocks were initially low grade metasediments rich in graphite (80095, 80292), but have abundant tourmaline (80095), or randomly oriented 'matchstick-like' andalusite crystals (80292), altered to sericite. The sample 80095, a very fine, folded and laminated graphitic quartz tourmaline schist, is an unusual rock, which may be a primary chemical facies or a pervasively metasomatised slate, originally similar to 800292. Sample 80292 formed by contact metamorphism.

One of the rocks (80248) was a quartz-poor, granitoid gneiss.

The three samples with relatively abundant and concentrated limonite examined in polished thin section, are (rather tentatively) interpreted as:

80153 quartzose, biotite-bearing skarn, (with patches of 'gel-limonite' of broadly lateritic genesis).

80155 (?felspar)-quartz-mica schist, altered and limonitised (meta sediment or possible meta fine granitoid)

80279 original BIF, with minor (oxidised) magnetite, abundant quartz (with minute inclusions) and abundant leached and oxidised silicate minerals.

Introduction continued :

The possible skarn, as well as the BIF, represent iron rich sediments, and as recorded in the literature, iron-rich sediments, particularly in a graphitic sequence, can react with dissolved AuHS complexes to precipitate gold and sulphide.

The anomalous zinc values reported in Nos 80021, 42, are common in graphitic sediments and may be accompanied by Ni and Cu, as in No. 80042. The zinc in No. 80031 is less easily accounted for, but could possibly derive from a spinel phase or from biotite. The zinc in 80155 could also be in biotite.

INDIVIDUAL DESCRIPTIONS

80021 Quartz-microcline-graphite-muscovite schist with supergene silica (chalcedony and opal); altered porphyroblasts, possibly of andalusite.

Field Note : Silvery-grey-purple fine-grained sediment. Interested in coarse-grained white phenocrysts-metamorphic origin?, detrital?. Any clues to metamorphic grade? Sample is anomalous in zinc.

There is a broadscale compositional layering in this rock, with diffuse layers containing 5 to 40% microcline, 1 to 5% graphite, 1 5o 2% muscovite and up to 95% quartz. The microcline is stained yellow on the section offcut, treated with sodium cobalti nitrite.

The white "phenocrysts" referred to in the field note are muscovite-clay-chalcedony ± opal pseudomorphs of metamorphic porphyroblasts, possibly andalusite or cordierite, and are mostly 1 to 4mm long. This compares with an average grain size in the matrix of 0.2mm.

There is a somewhat contorted schistosity defined by graphite and muscovite flakes, roughly layer-parallel.

Supergene chalcedony and minor opal occur as lenses possibly replacing a pre-existing metamorphic mineral.

The original rock was a carbonaceous and potassium rich sediment. It has been metamorphosed to amphibolite facies grade.

80031 Weathered, biotite bearing quartzite with limonite-rich layers after a granular mineral (?garnet or magnetite).

Field Note : Banded garnetiferous, ferruginous quartzite.
Interested in composition of layers on either side of the quartzose band. Garnet-variety? Metamorphic grade? Sample is highly anomalous in zinc-gahnite??

Most of this rock consists of a metamorphic mosaic of 6mm long, showing exaggerated grain growth, a feature most typical of middle to high amphibolite facies metamorphism.

Some of the limonite through the quartz has been derived from biotite, but some layers have relatively concentrated limonite derived from a granular mineral, possibly garnet, magnetite, and/or gahnite? At least two different minerals appear to have been present, as there are two different textures visible in the limonite. One of the minerals appears to have had a strong cleavage or parting, but the other was more or less internally structureless.

80033

Weathered quartzite, with minor, evenly scattered limonite after
(1) biotite
(2) a fine granular mineral, possibly garnet and/or magnetite.

Field Note : Quartz-mica-garnet-goethite rock.
Bedded sediment in outcrop.

The metamorphic quartz mosaic which dominates this rock is strongly inequigranular, with grains from 0.2mm to about 3mm in size, partly reflecting exaggerated grain growth as in 80031.

"Impurities" as in minor pre-existing apparently Fe-rich minerals scattered through the quartz mosaic to form 15 to 20% of the rock, have been altered to limonite, and as in 80031, include biotite and at least one other mineral.

Some fresh biotite is present, contrasting with 80031. The other mineral(s) may have included garnet and/or magnetite.

Limonite has also quite extensively permeated along grain boundaries and fractures, including a set of anastomosing veins.

80042 Fine layered, graphitic quartz schist flooded by post tectonic carbonate.

Field Note : Silvery grey fine-grained quartz-rich sediment.
What is silvery-grey mineral - mica? Metamorphic grade?
Sample is anomalous in Ni, Cu, Zn.

The abundantly disseminated, silvery grey mineral in this rock is graphite, as in 80021, typically finer grained (0.02 to 0.1mm size). This graphite forms variably 5% to 15% of different layers, i.e. overall, more abundant than in 80021.

The bulk host rock to this graphite consists of metamorphic quartz mosaic, as grains about 0.1mm in size, set in a very fine granular to fibrous aggregate of carbonate.

The carbonate appears to represent a post tectonic, possibly supergene flooding of the rock, commonly invading along quartz-quartz grain boundaries, also in patches with growth zoning, in veins, lining voids, and in fibrous areas. The carbonate locally shows limonite staining.

A single grain of an unidentified uniaxial positive mineral accompanies the carbonate in one area.

80095 Folded and laminated, garphitic quartz tourmaline schist, with abundant quartz veins containing fibrous tourmaline.

This is an unusual graphitic slate in that it contains poorly defined lenses dominated by extremely fine tourmaline, to 2mm wide, some of which show complex fold patterns.

These lenses are separated by extremely fine graphitic chert, with pods of vein quartz to 2mm in diameter, and several generations of quartz veins from 0.01mm to 0.3mm wide, commonly containing fibrous tourmaline.

The tourmaline is essentially colourless and probably close to the Mg end members (dravite [Na], or uvite [Ca]).

This rock resembles the host to gold in some Brazilian Gold Mines, and may be a primary chemical deposit, or a metasomatised slate originally similar to 80292.