Results of
Bulk Sediment Sample Orientation Survey

TAM PROPERTY

Greenwood Area
British Columbia

Prepared by:
Barry W. Smee
June 1991

825650

Results of
Bulk Sediment Sample Orientation Survey

TAM PROPERTY

Greenwood Area, B.C.

Prepared For:
Minnova Inc.
3rd Floor, 311 Water Street
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June, 1991

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1.0 INTRODUCTION

The use of stream sediment sampling as a regional exploration technique has been the mainstay of Cordilleran explorationists for decades. The routine technique of sampling -80 mesh sediment was successful in delineating many of the porphyry copper occurrences in the 1960's and early 1970's, and consequently was used throughout British Columbia and the Yukon.

More recently, many companies have attempted to use heavy mineral sampling as their principal regional exploration tool. The purpose of this technique was:

1. To discover mineralization which was undetected by previous -80 mesh sampling;

2. To cover a larger area with fewer samples;

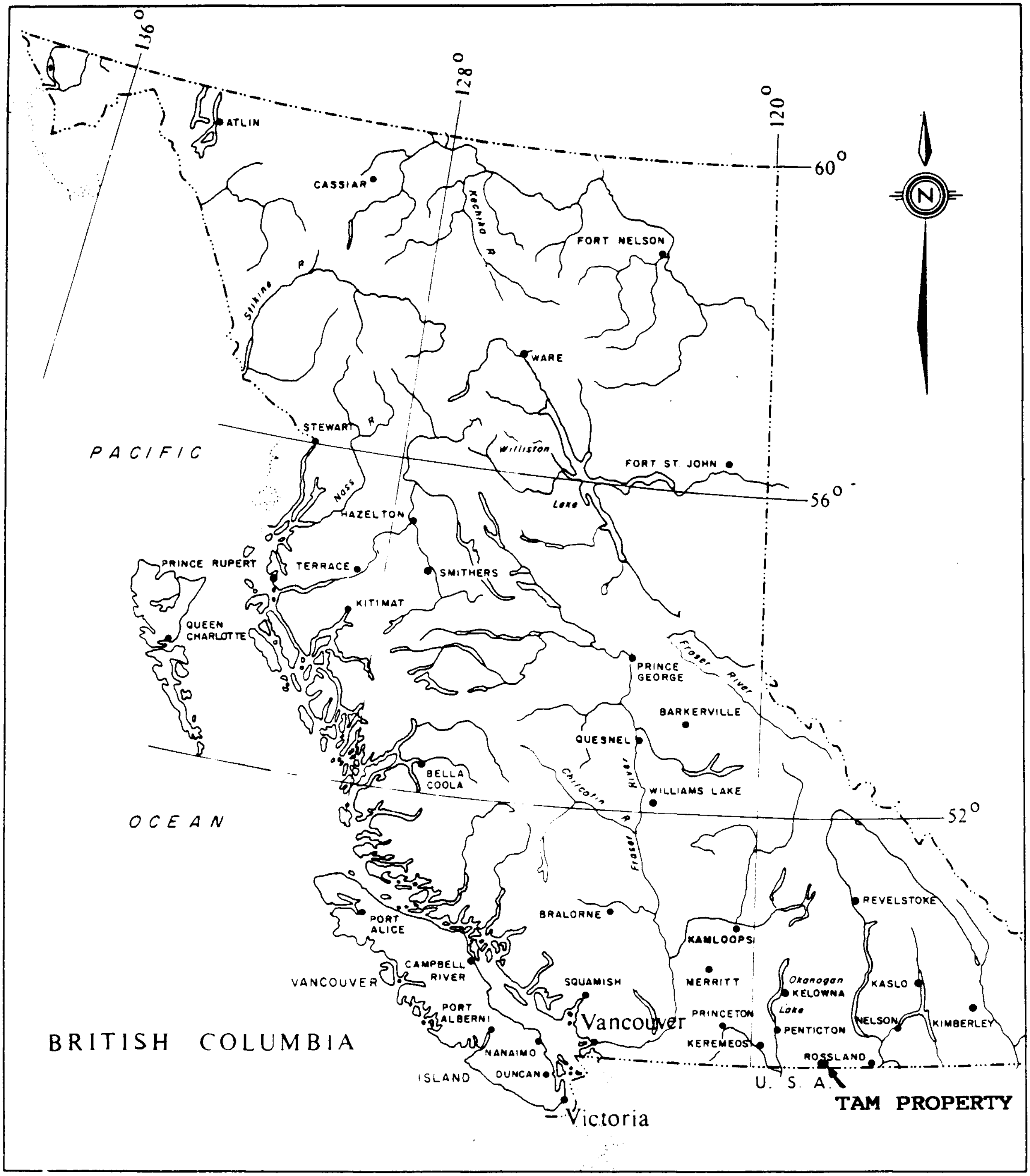
3. To detect precious metals by utilizing a larger initial sample and selectively concentrating the minerals of higher specific gravity.

Although promising in theory, many interpretational difficulties were encountered which prevented the logical follow-up of heavy mineral anomalies. These difficulties were recognized some time ago by Dr. Kay Fletcher of U.B.C. Dr. Fletcher initiated a long term study of Cordilleran fluvial clastic dispersion and collection processes and has recently published the results of the first few years of work. Some of his conclusions impact adversely on the methods which have been in use by most exploration companies, however, his results also suggest a preferred method of sample collection and analysis. His suggested methods should produce results which can be followed up to source and which lesson the impact of severe nugget effects within the sediment samples.

These methods were used by the author in an orientation area during the summer of 1990. The results were extremely promising, with several different styles of sulphide and precious metal mineralization clearly outlined. Upstream cut-offs were sharp and occurred near the metal source. Precious metal anomalies were repeatable when a second sample split was reanalyzed.

A proposal was submitted to Minnova in February, 1991 which suggested that these methods could be of use to the Minnova exploration effort. The proposal suggested that an orientation area be chosen by Minnova to test the applicability of the techniques under conditions which would provide useful information to Minnova's ongoing exploration program.

The proposal was accepted and an orientation area was chosen. This area covered two main drainages originating from the Tam Project near Greenwood, B.C. (Figure 1). This report presents the results of this orientation sampling program which was undertaken from June 4 to 6, 1991.



MINNOVA INC.

TAM PROPERY
PROPERTY LOCATION

Scale: 1 : 7500000	By :
Date :	Figure : 1

BARRY W. SMEE CONSULTING

2.0 METHODS USED

2.1 Field Sampling

Sample locations were chosen at 1-kilometre intervals along the stream courses of Ingram and Jolly Jack Creeks, and their tributaries. Each sample site was located at the downstream end of a gravel bed whenever possible. These occurred usually on the inside of bends or where the streams changed either flow pattern or speed.

A vertical hole was dug through the gravel bar to a depth of approximately 20-30 centimetres. Each shovelful of sediment was placed on a 15-inch diameter stainless steel -6 mesh screen and wet sieved into an aluminum catchment bucket. Approximately 4 kilograms of sample was collected, then transferred into a 10" x 17" Hubco sand bag. A total of 26 samples were taken over a two-day period. The sample sites are plotted on Figure 2.

2.2 Analytical Methods

The samples were submitted to Chemex Labs Ltd., Vancouver. Each sample was air dried and then sieved to -150 mesh. Three 30-gram splits were analyzed for gold using neutron activation, which produces a 1 ppb detection limit. An analytical package was chosen to reflect both the epithermal and skarn-type of target thought to be possible on the Tam property. The elements Sb, As, Bi, Cu, Pb, Hg, Mo, Ag, and Zn were included utilizing techniques which provided the detection limits necessary to establish background concentrations.

Three separate analysis for gold were selected to provide information on sample reproducibility and nugget effect problems. Although sample weight was in excess of 4 kilograms, four out of 26 samples contained insufficient -150 mesh material to provide a third set of gold analysis. This confirms that the original sample weight is the minimum necessary to undertake a regional sampling program for precious metals.

2.3 Interpretation Methods

All analytical data was entered into a database and is listed as Table 1. The three sets of gold analysis were averaged to produce a value for plotting on the maps. Variation in the three analysis suggests the presence of nugget effects, and by inference, native gold particles. The threshold chosen for arsenic is 7 ppm, and for copper, 25 ppm. No other elements in this data set produce clear anomalies which might be related to either epithermal or skarn-type mineralization.

The gold, arsenic, and copper values were plotted on Figure 3. Gold is colour coded according to concentration as shown in the legend. Anomalous arsenic and copper are shown as underlined values.

3.0 RESULTS

Ingram Creek is clearly anomalous in gold near its confluence with the Kettle River. An attempt to obtain a sample between MM-01 and MM-03 proved futile, as a steep canyon prevented access. It is doubtful that a suitable sample site would have been found in the canyon at any event. The western tributary to Ingram Creek is clearly

TABLE 1

MINNOVA INC.
TAM PROPERTY, GREENWOOD B.C.
BULK SEDIMENT ORIENTATION SURVEY

SAMPLE NUMBER	ppb AU1	ppb AU2	ppb AU3	ppb AU AVG	ppm AG	ppm AS	ppm BI	ppm CU	ppm HG	ppm MO	ppm PB
MM -1	62	372	735	390	0.10	4.5	-0.2	20.0	-0.1	0.5	21
MM -2	70	117	NSF	62	0.05	5.0	0.6	13.5	-0.1	0.5	11
MM -3	58	29	17	35	0.05	3.5	0.2	13.0	-0.1	0.5	14
MM -4	17	51	66	45	0.15	4.0	-0.2	32.5	-0.1	0.5	12
MM -5	371	94	353	273	0.05	7.5	0.2	20.5	-0.1	0.5	10
MM -6	141	432	34	202	0.10	7.0	0.2	25.5	-0.1	0.5	17
MM -7	20	11	11	14	0.10	2.0	-0.2	27.5	-0.1	-0.5	9
MM -8	13	11	9	11	0.10	14.5	-0.2	32.0	-0.1	6.0	8
MM -9	25	212	31	89	0.10	4.0	-0.2	14.0	0.1	0.5	25
MM -10	8	23	NSF	10	0.10	4.0	-0.2	12.0	-0.1	0.5	16
MM -11	3	1	13	6	0.05	2.5	-0.2	30.5	-0.1	0.5	15
MM -12	143	53	12	69	0.05	3.5	-0.2	12.5	-0.1	0.5	14
MM -13	698	16	21	245	0.05	2.5	-0.2	11.5	-0.1	0.5	13
MM -14	15	8	33	19	0.05	2.0	-0.2	10.5	-0.1	0.5	10
MM -15	17	5	42	21	0.15	2.5	-0.2	24.5	0.1	0.5	11
MM -16	-1	7	NSF	2	0.05	4.0	-0.2	16.0	-0.1	0.5	16
MM -17	17	1	2	7	0.05	2.0	-0.2	13.0	-0.1	-0.5	10
MM -18	151	106	207	155	0.05	2.0	-0.2	17.0	-0.1	0.5	14
MM -19	1	-1	-1	0	0.05	1.5	-0.2	14.5	-0.1	0.5	11
MM -20	18	-1	2	6	-0.05	1.0	-0.2	10.5	-0.1	0.5	11
MM -21	5	3	4	4	0.05	2.0	-0.2	20.0	-0.1	-0.5	11
MM -22	20	5	11	12	0.05	1.0	-0.2	14.0	-0.1	-0.5	12
MM -23	2	1	2	2	0.05	1.0	-0.2	15.5	-0.1	0.5	11
MM -24	4	-1	NSF	1	0.10	2.0	-0.2	18.0	-0.1	-0.5	22
MM -25	14	10	8	11	0.15	1.5	-0.2	55.5	-0.1	0.5	16
MM -26	2	2	14	6	0.05	-0.5	-0.2	14.0	-0.1	-0.5	13

NEGATIVE VALUE= BELOW DETECTION LIMIT
NSF= NOT SUFFICIENT SAMPLE

28-Jun-91

TABLE 1

SAMPLE NUMBER		ppm SB	ppm ZN	SAMPLE QUALITY
MM	-1	0.2	71	GOOD
MM	-2	-0.2	78	GOOD
MM	-3	0.4	62	GOOD
MM	-4	0.2	60	GOOD
MM	-5	-0.2	55	GOOD
MM	-6	0.2	65	GOOD
MM	-7	-0.2	29	GOOD
MM	-8	-0.2	45	MODERATE
MM	-9	-0.2	104	GOOD
MM	-10	-0.2	60	GOOD
MM	-11	-0.2	51	POOR
MM	-12	-0.2	53	GOOD
MM	-13	-0.2	57	GOOD
MM	-14	-0.2	49	GOOD
MM	-15	0.2	40	MODERATE
MM	-16	-0.2	62	GOOD
MM	-17	-0.2	58	GOOD
MM	-18	-0.2	60	GOOD
MM	-19	-0.2	49	MODERATE
MM	-20	-0.2	54	POOR
MM	-21	-0.2	50	POOR
MM	-22	-0.2	50	GOOD
MM	-23	-0.2	45	GOOD
MM	-24	-0.2	54	GOOD
MM	-25	-0.2	49	GOOD
MM	-26	-0.2	53	MODERATE

anomalous in gold, arsenic, and copper. The intensity of the average gold value increases to the north, suggesting a source entering that drainage. These are the only sample sites which exhibit a multi-element signature with gold. A skarn-type of mineralization would be consistent with a copper-arsenic-gold association.

The main fork of Ingram Creek also contains anomalous gold, and one high copper value. Sample MM-13 shows a marked nugget effect, but tributaries from the east and upstream do not contain anomalous gold or pathfinder elements. This suggests that the source of the gold is originating from the west, and could be the same source which is contributing to samples MM-02 to MM-08. Had this orientation been part of a regional program, the area upstream from MM-05 and between Ingram Creek would certainly have been chosen for follow-up.

Only one sample on Jolly Jack Creek contained anomalous gold, but no pathfinder elements. Sample MM-18 in located in the immediate vicinity of the road and might be caused by contamination from road fill, however, all three sample splits were anomalous. The sample must be taken seriously, with the source located somewhere between sample MM-18 and MM-21.

A weak copper anomaly occurs in sample MM-25, but no other element supports the copper. This response may reflect a rock type change. There does not appear to be a significant source of precious metal entering the Jolly Jack drainage.

4.0 CONCLUSIONS

1. At least 4 kilograms of -6 mesh sediment must be collected in the Greenwood area in order to obtain sufficient -150 mesh material for three 30-gram gold analysis.

2. The Ingram Creek drainage contains a source of precious metal mineralization. This survey suggests that the mineralization is entering the drainage from the west bank, about two-thirds of the way up Ingram Creek. Weak copper and arsenic values suggest a skarn-type source.

3. No obvious source of mineralization was detected in Jolly Jack Creek. One high gold sample was cut-off upstream, suggesting a source near the lower part of the creek. Contamination from road fill cannot be discounted.

4. The validity of these targets must be determined by Minnova geologists prior to undertaking further sampling. Should the interpretation prove valid, further sampling using these techniques should be undertaken on smaller tributaries to Ingram Creek.

Respectfully submitted,

Barry W. Smee, Ph.D., P.Geol.

APPENDIX I

GEOCHEMICAL ANALYSIS CERTIFICATES

Chemex Labs Ltd.
Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221

To: SMEE, BARRY

3626 HANDEL AVE.
VANCOUVER, BC
V5S 4G8

A9116064

Comments: CC: MINNOVA

CERTIFICATE A9116064

SMEE, BARRY

Project: TAM
P.O. # :

Samples submitted to our lab in Vancouver, BC.
This report was printed on 27-JUN-91.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
216	26	sieve to -150 mesh
240	26	Surcharge: -10 mesh sieve
202	26	save reject

* NOTE 1:

The 32 element ICP package is suitable for trace metals in soil and rock samples. Elements for which the nitric-aqua regia digestion is possibly incomplete are: Al, Ba, Be, Ca, Cr, Ga, K, La, Mg, Na, Sr, Ti, Tl, W.

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
993	26	Au ppb: Fuse 30 g sample	FA-NAA	1	10000
1941	26	Ag ppm: Ultra trace package	EXT-ICP	0.05	200
1092	26	As ppm: Ultra trace package	EXT-ICP	0.5	5000
1094	26	Bi ppm: Ultra trace package	EXT-ICP	0.2	5000
1097	26	Cu ppm: Ultra trace package	EXT-ICP	0.5	5000
1935	26	Hg ppm: Ultra trace package	EXT-ICP	0.1	5000
1939	26	Mo ppm: Ultra trace package	EXT-ICP	0.5	5000
1933	26	Pb ppm: Ultra trace package	EXT-ICP	1	5000
1089	26	Sb ppm: Ultra trace package	EXT-ICP	0.2	1000
1946	26	Zn ppm: Ultra trace package	EXT-ICP	1	5000

Chemex Labs Ltd.

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3626 HANDEL AVE.
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Project: TAM
Comments: CC: MINNOVA

Page Number :1
Total Pages :1
Certificate Date: 27-JUN-91
Invoice No. : I9116064
P.O. Number :

CERTIFICATE OF ANALYSIS A9116064

SAMPLE DESCRIPTION	PREP CODE		Au NAA ppb	Ag ppm	As ppm	Bi ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Zn ppm
MM-01 A	216	240	62	0.10	4.5	< 0.2	20.0	< 0.1	0.5	21	0.2	71
MM-02 A	216	240	70	0.05	5.0	0.6	13.5	< 0.1	0.5	11	< 0.2	78
MM-03 A	216	240	58	0.05	3.5	0.2	13.0	< 0.1	0.5	14	0.4	62
MM-04 A	216	240	17	0.15	4.0	< 0.2	32.5	< 0.1	0.5	12	0.2	60
MM-05 A	216	240	371	0.05	7.5	0.2	20.5	< 0.1	0.5	10	< 0.2	55
MM-06 A	216	240	141	0.10	7.0	0.2	25.5	< 0.1	0.5	17	0.2	65
MM-07 A	216	240	20	0.10	2.0	< 0.2	27.5	< 0.1	< 0.5	9	< 0.2	29
MM-08 A	216	240	13	0.10	14.5	< 0.2	32.0	< 0.1	6.0	8	< 0.2	45
MM-09 A	216	240	25	0.10	4.0	< 0.2	14.0	0.1	0.5	25	< 0.2	104
MM-10 A	216	240	8	0.10	4.0	< 0.2	12.0	< 0.1	0.5	16	< 0.2	60
MM-11 A	216	240	3	0.05	2.5	< 0.2	30.5	< 0.1	0.5	15	< 0.2	51
MM-12 A	216	240	143	0.05	3.5	< 0.2	12.5	< 0.1	0.5	14	< 0.2	53
MM-13 A	216	240	698	0.05	2.5	< 0.2	11.5	< 0.1	0.5	13	< 0.2	57
MM-14 A	216	240	15	0.05	2.0	< 0.2	10.5	< 0.1	0.5	10	< 0.2	49
MM-15 A	216	240	17	0.15	2.5	< 0.2	24.5	0.1	0.5	11	0.2	40
MM-16 A	216	240	< 1	0.05	4.0	< 0.2	16.0	< 0.1	0.5	16	< 0.2	62
MM-17 A	216	240	17	0.05	2.0	< 0.2	13.0	< 0.1	< 0.5	10	< 0.2	58
MM-18 A	216	240	151	0.05	2.0	< 0.2	17.0	< 0.1	0.5	14	< 0.2	60
MM-19 A	216	240	1	0.05	1.5	< 0.2	14.5	< 0.1	0.5	11	< 0.2	49
MM-20 A	216	240	18	< 0.05	1.0	< 0.2	10.5	< 0.1	0.5	11	< 0.2	54
MM-21 A	216	240	5	0.05	2.5	< 0.2	20.0	< 0.2	< 0.5	11	< 0.2	52
MM-22 A	216	240	20	0.05	1.0	< 0.2	14.0	< 0.1	< 0.5	12	< 0.2	50
MM-23 A	216	240	2	0.05	1.0	< 0.2	15.5	< 0.1	0.5	11	< 0.2	45
MM-24 A	216	240	4	0.10	2.0	< 0.2	18.0	< 0.1	< 0.5	22	< 0.2	54
MM-25 A	216	240	14	0.15	1.5	< 0.2	55.5	< 0.1	0.5	16	< 0.2	49
MM-26 A	216	240	2	0.05	< 0.5	< 0.2	14.0	< 0.1	< 0.5	13	< 0.2	53

CERTIFICATION: [signature]

Chemex Labs Ltd.
Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221

To: SMEE, BARRY

3626 HANDEL AVE.
VANCOUVER, BC
V5S 4G8

Comments: CC: MINNOVA

CERTIFICATE A9116310

SMEE, BARRY

Project: TAM
P.O. # : NONE

Samples submitted to our lab in Vancouver, BC.
This report was printed on 27-JUN-91.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
299	26	Sample split from other certif

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
993	22	Au ppb: Fuse 30 g sample	FA-NAA	1	10000

Chemex Labs Ltd.

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Project : TAM
Comments: CC: MINNOVA

Page Number :1
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Certificate Date: 27-JUN-91
Invoice No. :I9116306
P.O. Number :NONE

CERTIFICATE OF ANALYSIS A9116306

SAMPLE DESCRIPTION	PREP CODE		Au NAA ppb
MM-01 B	299	--	372
MM-02 B	299	--	117
MM-03 B	299	--	29
MM-04 B	299	--	51
MM-05 B	299	--	94
MM-06 B	299	--	432
MM-07 B	299	--	11
MM-08 B	299	--	11
MM-09 B	299	--	212
MM-10 B	299	--	23
MM-11 B	299	--	1
MM-12 B	299	--	53
MM-13 B	299	--	16
MM-14 B	299	--	8
MM-15 B	299	--	5
MM-16 B	299	--	7
MM-17 B	299	--	1
MM-18 B	299	--	106
MM-19 B	299	--	< 1
MM-20 B	299	--	< 1
MM-21 B	299	--	3
MM-22 B	299	--	5
MM-23 B	299	--	1
MM-24 B	299	--	< 1
MM-25 B	299	--	10
MM-26 B	299	--	2

CERTIFICATION:

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PHONE: 604-984-0221

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Comments: CC: MINNOVA

CERTIFICATE A9116306

SMEE, BARRY

Project: TAM
P.O. # : NONE

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SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
299	26	Sample split from other certif

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
993	26	Au ppb: Fuse 30 g sample	FA-NAA	1	10000

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V5S 4G8

Project : TAM
Comments: CC: MINNOVA

Certificate Date: 27-JUN-91
Invoice No. : I9116310
P.O. Number : NONE

CERTIFICATE OF ANALYSIS A9116310

SAMPLE DESCRIPTION	PREP CODE		Au NAA ppb									
MM-01 C	299	--	735									
MM-02 C	299	--	not/ss									
MM-03 C	299	--	17									
MM-04 C	299	--	66									
MM-05 C	299	--	353									
MM-06 C	299	--	34									
MM-07 C	299	--	11									
MM-08 C	299	--	9									
MM-09 C	299	--	31									
MM-10 C	299	--	not/ss									
MM-11 C	299	--	13									
MM-12 C	299	--	12									
MM-13 C	299	--	21									
MM-14 C	299	--	33									
MM-15 C	299	--	42									
MM-16 C	299	--	not/ss									
MM-17 C	299	--	2									
MM-18 C	299	--	207									
MM-19 C	299	--	< 1									
MM-20 C	299	--	2									
MM-21 C	299	--	4									
MM-22 C	299	--	11									
MM-23 C	299	--	2									
MM-24 C	299	--	not/ss									
MM-25 C	299	--	8									
MM-26 C	299	--	14									

CERTIFICATION: [signature]