

Assessment Report

on

Prospecting Activities

on the

**Laird Lake Property,
Killala and Baird Townships
Medicine Stone Lake and Faulkenham Lake Areas**

**Red Lake Mining Division
Northwestern Ontario**

NTS: 52 L/16 and 52 k/13

Written by:

**Graham Stone
RR#1, Parry Sound, Ontario
P2A 2W7**

December 2010

For

Larry Kenneth Herbert

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Introduction:

The Laird Lake Property is located in Killala and Baird Townships, also referred to as the Medicine Stone Lake Area, and the Faulkenham Lake Area. The claims are within the Red Lake Mining Division, District of Kenora.

The property itself is comprised of 19 contiguous claims (209 units) covering an area of 3344hectares.

The property is within the historic Red Lake Gold Camp and as such has seen a fair bit of exploration over the years.

The purpose of this prospecting program was to try to locate and sample as many of the historical showings as possible and to conduct detailed reconnaissance prospecting of the property in the hope of finding new showings.

Location and Access:

The general location is approximately 150km NW of Dryden Ont., and 250km NE of Winnipeg Manitoba, see Figure 1.

Highway 105 connects Red Lake with the trans-Canada highway to the south. From the town of Red Lake access to the claim group is via hwy 618 and the Flat Lake – Suffel Lake gravel forestry road.

Highway 618 extends southwesterly from Red Lake to the town of Madsen and 2km south of Madsen the Flat Lake road begins. From this logging road there are many secondary roads, ATV trails and Drill roads that can be used to access the various parts of the property, see Figure 2.

Regional Geology:

The Red Lake greenstone belt occurs in the Uchi Subprovince which is part of the Superior Province of Archean age. Both tholeiitekomaite and calc-alkaline volcanic rocks are present in the district. Narrow exhalite units of ferruginous sedimentary rocks and cherts are interlayered with the mafic and felsic volcanic rocks. Sedimentary rocks overlie the mafic volcanics. Late ultramafic to felsic intrusions are intrusive into the volcanic rocks. With minor exceptions, the gold deposits of the Red Lake District are hosted by rocks associated with the tholeiitekomaite volcanic sequence. Several major NW to NE trending zones of ductile deformation have been recognized in the Red Lake area. The present and past producing gold mines are located within these deformation zones.

Property Geology:

The geology of the Laird Lake property consists mainly of basalt with minor ultramafic flows of tholeiitic and komatiite affiliation and a variety of granodiorites associated with the Killala Batholith and Medicine Stone Lake Intrusion. Ferruginous sedimentary and chert exhalite horizons exist with the volcanic sequence. Small intrusions ranging from ultramafic to felsic in composition occur as late dykes and stocks.

A prominent east – west trending deformation zone of up to 500 metres in width runs through the center of the property. This is likely an extension of the Flat Lake-Howey Bay deformation zone which hosts the past producing Madsen and Starret Olsen mines. Variable silica and biotite alteration with local pyrite enrichment are commonly developed within the mylonite units. Foliation is generally east-west with vertical to sub-vertical dips.

Historical Work:

The earliest recorded staking in the Laird Lake area was in 1936 when T. Christianson and E. Fredrickson staked 45 claims (ODM Vol. 49pt II, p 48).

T. Johnson, 1937: optioned the claims and carried out exploration and prospecting, trenching and sampling (ODM Vol. 49 pt II, p.148).

J. E. Hammel, 1938: in addition to trenching and sampling, Hammel completed 19 drill holes totaling 2,000 ft on the same claims (ODM Vol. 49 pt II, p.148 - 149).

Up until 1938, two gold showings were outlined:

- (a) No. 1 Showing: situated southeast of the Laird Lake Peninsula on the south shore (likely within current claim 4229698. This showing is described as a narrow quartz vein (4") hosted by a shear zone within altered greenstone. Visible gold was reported and assays ran to greater than 1opt Au. 16 drill holes were completed to test the vein but results are not available.
- (b) NO, 2 Showing: on the south shore of Laird Lake at the eastern end, several 7 ft wide pyritic shears containing quartz were reported. These were trenched and drilled. Trench assays were .1 to.2 opt Au. The drilling returned .2opt Au as it's best result. No logs are available.

Further work in the form of diamond drilling continued from 1950 into the mid 1960's. There are no quantitative results available for this period, only verbal descriptions ranging from poorly, well, to very well mineralized.

Later work in the form of drilling, trenching , geophysics and prospecting has continued on and off until the present, but no record of detailed geological mapping is apparent.

Personnel

The following personnel worked on this property and conducting the following work activities summarized below:

Personnel	Activity	Dates Worked	Man Days
Dean Fraser	Logistics(pre job)	Oct 1,2 2010	2 days
Graham Stone	Mob	Oct 6 2010	1 day
	Logistics(Access etc) Assessment Office	Oct 7, 2010	1 day
	Research	Oct 14 2010	1 day
	Prospecting	Oct 8,9,10,11,13,15,16,17,18 19,20,21,22,23,24,25,26 2010	17 days
	Standby(rain)	Oct 12 2010	1 day
	Data/sample prep	Oct 27 2010	1 day
	Demob	Oct 28 2010	1 day
	Report	Dec 27,28,29,30,31 2010	5 days
Claudia Wilck	Mob	Oct 6 2010	1 day
	Logistics(Access etc) Assessment Office	Oct 7, 2010	1 day
	Research	Oct 14 2010	1 day
	Prospecting	Oct 8,9,10,11,13,15,16,17,18, 19,20,21,22,23,24,25,26 2010	17 days
	Standby(rain)	Oct 12 2010	1 day
	Data/sample prep	Oct 27 2010	1 day
	Demob	Oct 28 2010	1 day
Roland Quinlan	Mob	Oct 5 2010	1 day
	Logistics(Access etc)	Oct 7, 2010	1 day
	Prospecting	Oct 6,8,9,10,11,13,14,15,16, 17,18,19,20,21,22,23,24,25,26	19 days
	Standby(rain)	Oct 12 2010	1 day
	Data/sample prep	Oct 27 2010	1 day
	Demob	Oct 28 2010	1 day
Mervin Quinlan	Mob	Oct 5 2010	1 day
	Logistics(Access etc)	Oct 7, 2010	1 day
	Prospecting	Oct 6,8,9,10,11,13,14,15,16, 17,18,19,20,21,22,23,24,25,26	19 days
	Standby(rain)	Oct 12 2010	1 day
	Data/sample prep	Oct 27 2010	1 day
	Demob	Oct 28 2010	1 day

Conclusions and Recommendations:

After studying the location of anomalous gold samples in relation to the large magnetic high which lies underneath Laird Lake there appears to be a spatial relationship (see figure 15). The highest gold values sit on the southern edge of this magnetic feature, or just off it. The cause of this feature is unknown at present but it could be an ultramafic intrusion based on the fact that there are exposures of ultramafic rock on the peninsula near the western end of the lake.

Since the northern edge of this intrusion is under the lake, a detailed magnetometer survey followed by IP is highly recommended. This would show if there are any anomalies that could be followed up perhaps with lake bottom sediment sampling and possibly drilling. Stripping of overburden in the vicinity of other anomalies might help to understand the geology better and hopefully extend the occurrences.

Qualifying Statement

I, Graham Stone, residing at RR #1, Parry Sound, ON, P2A 2W7 state the following with respects to this report:

I wrote this report and produced the accompanying tables and maps based on information provided by Champlain Resources Inc., of #1614, 246 Stewart Green SW Calgary, Alberta, T3H 3C8

Respectfully Submitted

A handwritten signature in cursive script that reads "Graham Stone".

Graham Stone

in Parry Sound, ON
December 31, 2010

References:

- a) Report on the geology and Mineralization of the Laird Lake Property of Tasu Resources Ltd., by N.O. Willoughby, January 1988
- b) Report on a Geochemical and Prospecting Program of the Laird Lake Property of Laird Lake Resources Inc., by Kenneth Guy, Pgeo(Ont), Dec 2009.

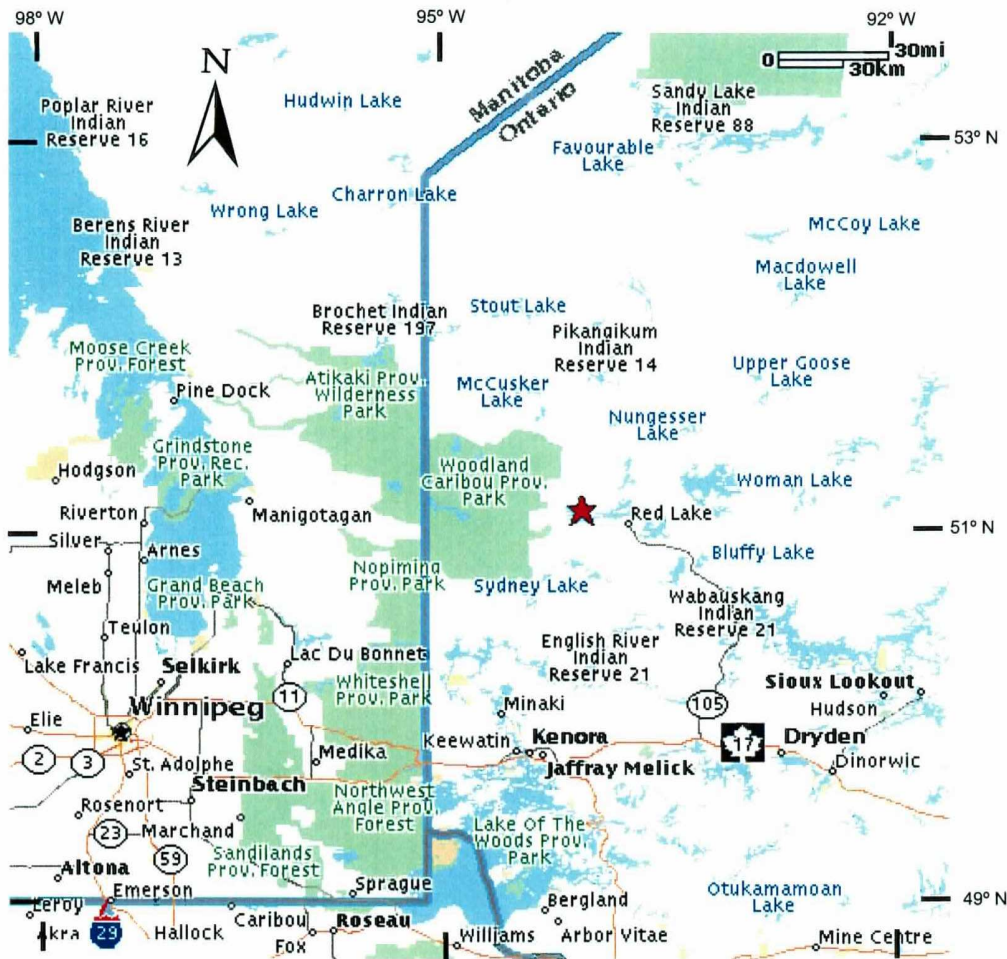


Figure 1:
Key Location Map

Figure 2

Access to Claims and Work Location Map

UTM Grid: NAD83 Zone 15N

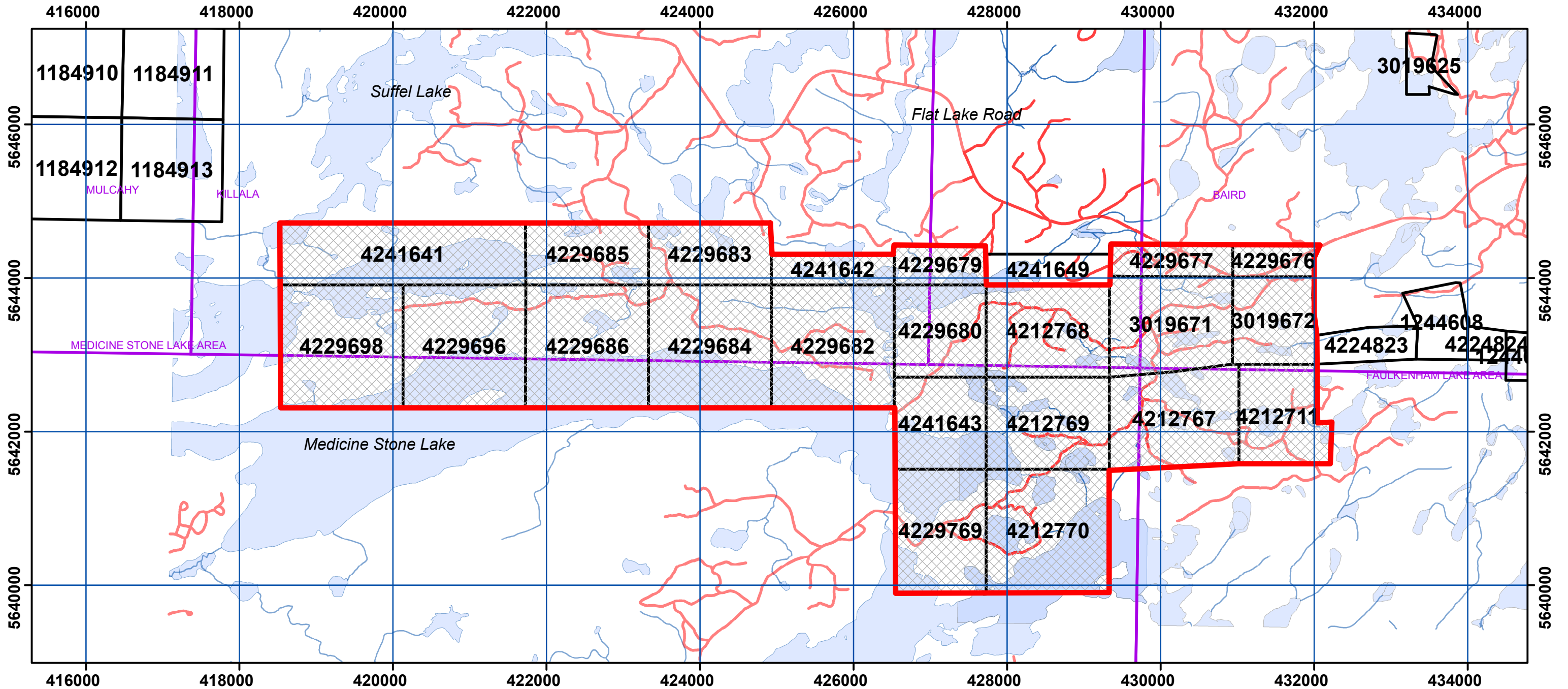
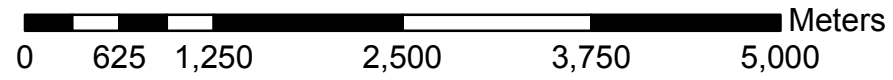


Figure 3

Rock Sample Location Map Location Map (West End of Grid)

UTM Grid: NAD83 Zone 15N

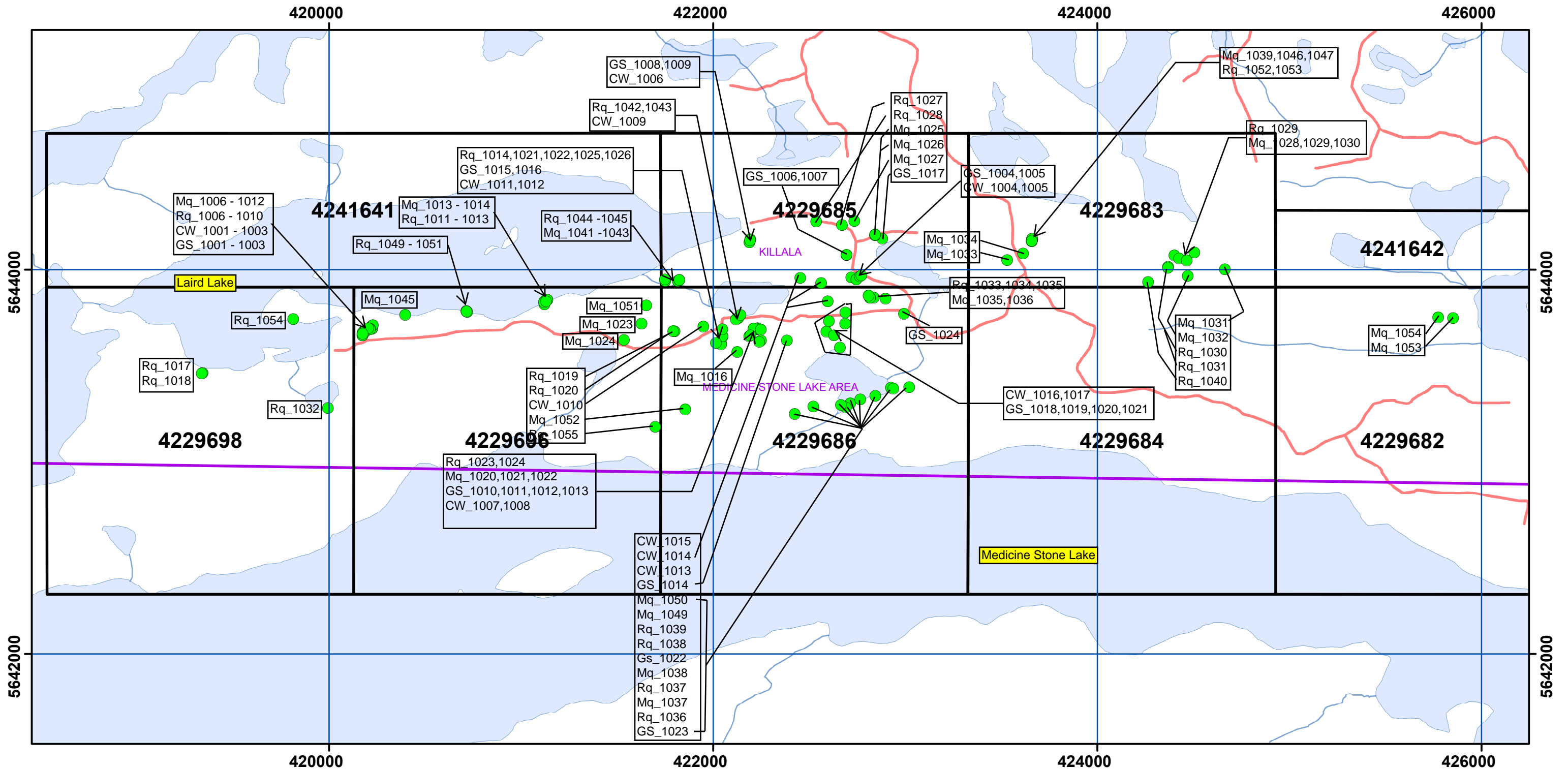
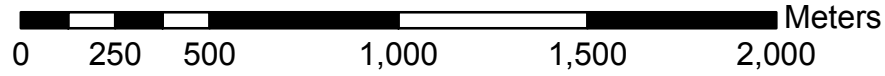
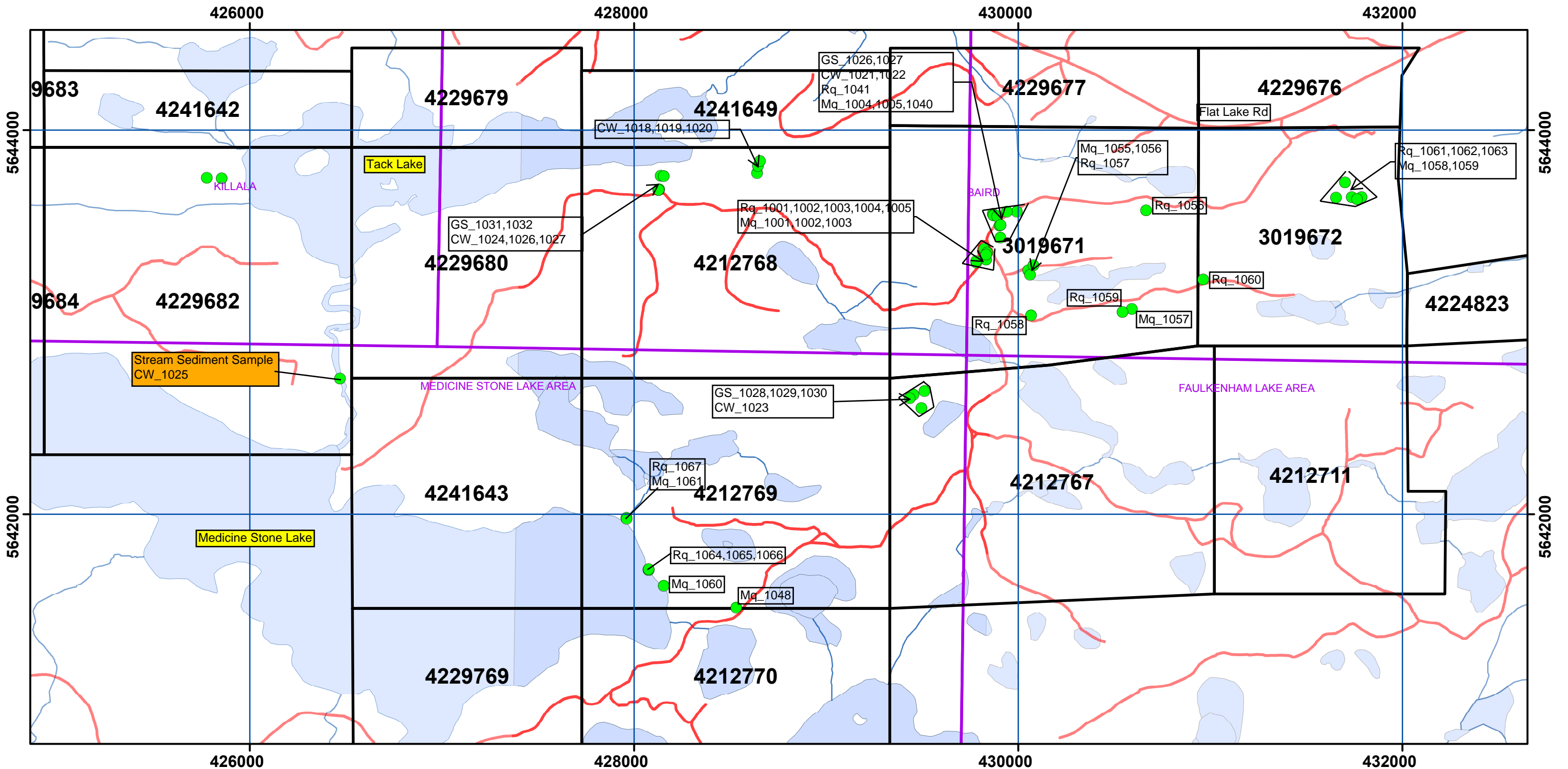
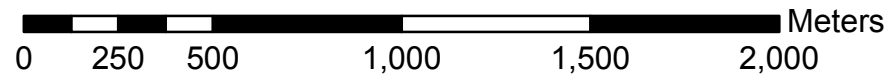


Figure 4

Rock Sample Location Map (East End of Grid)

UTM Grid: NAD83 Zone 15N



Legend

- Prospecting Waypoints
- Rq_tracks
- Mq_tracks
- GS_tracks
- CW_tracks
- ▬ trench outlines

Figure 5

Prospecting Tracks (1)

UTM Grid: NAD83 Zone 15N

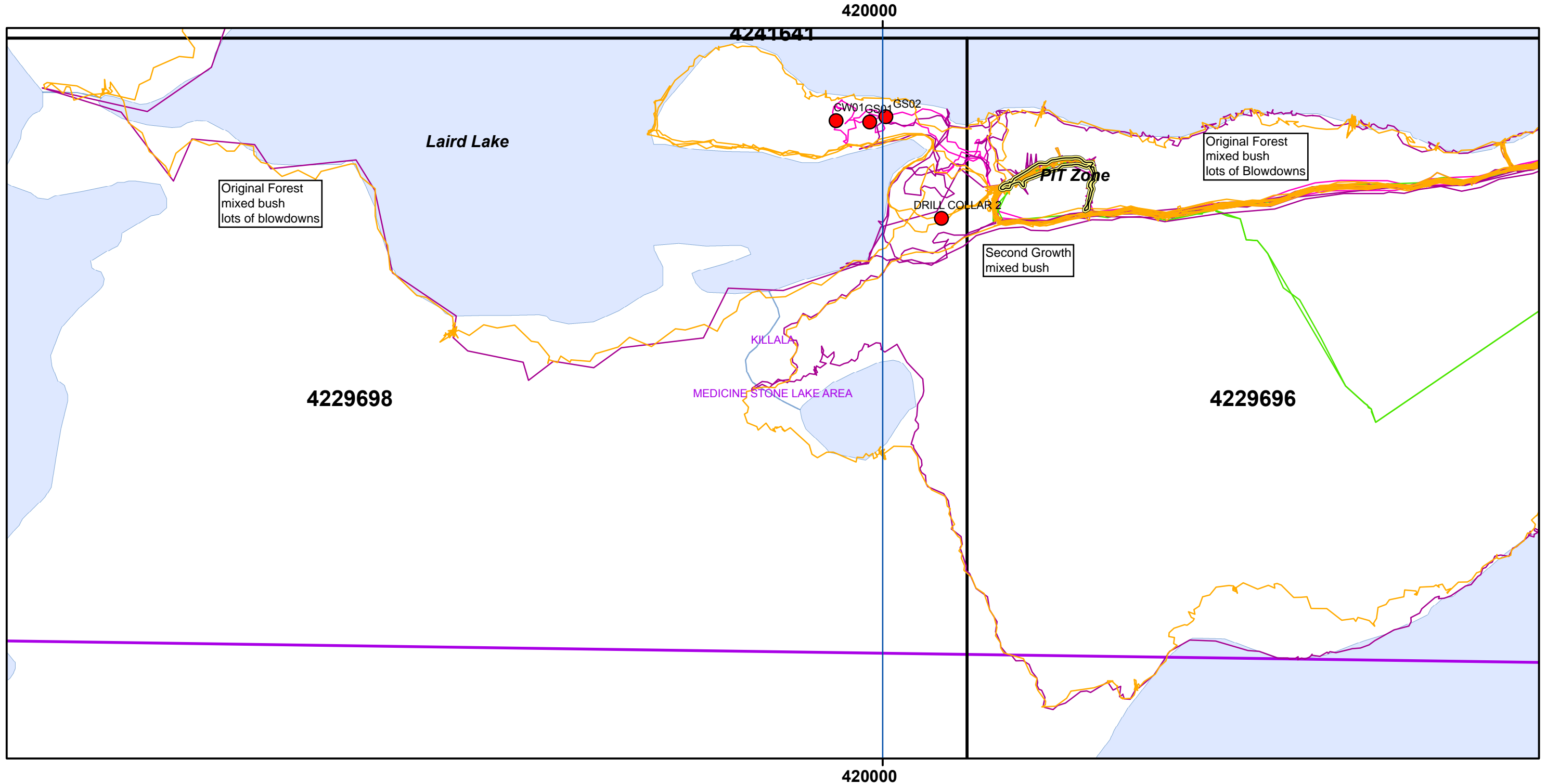
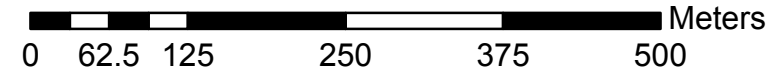


Figure 6 **Prospecting Tracks (2)**

UTM Grid: NAD83 Zone 15N

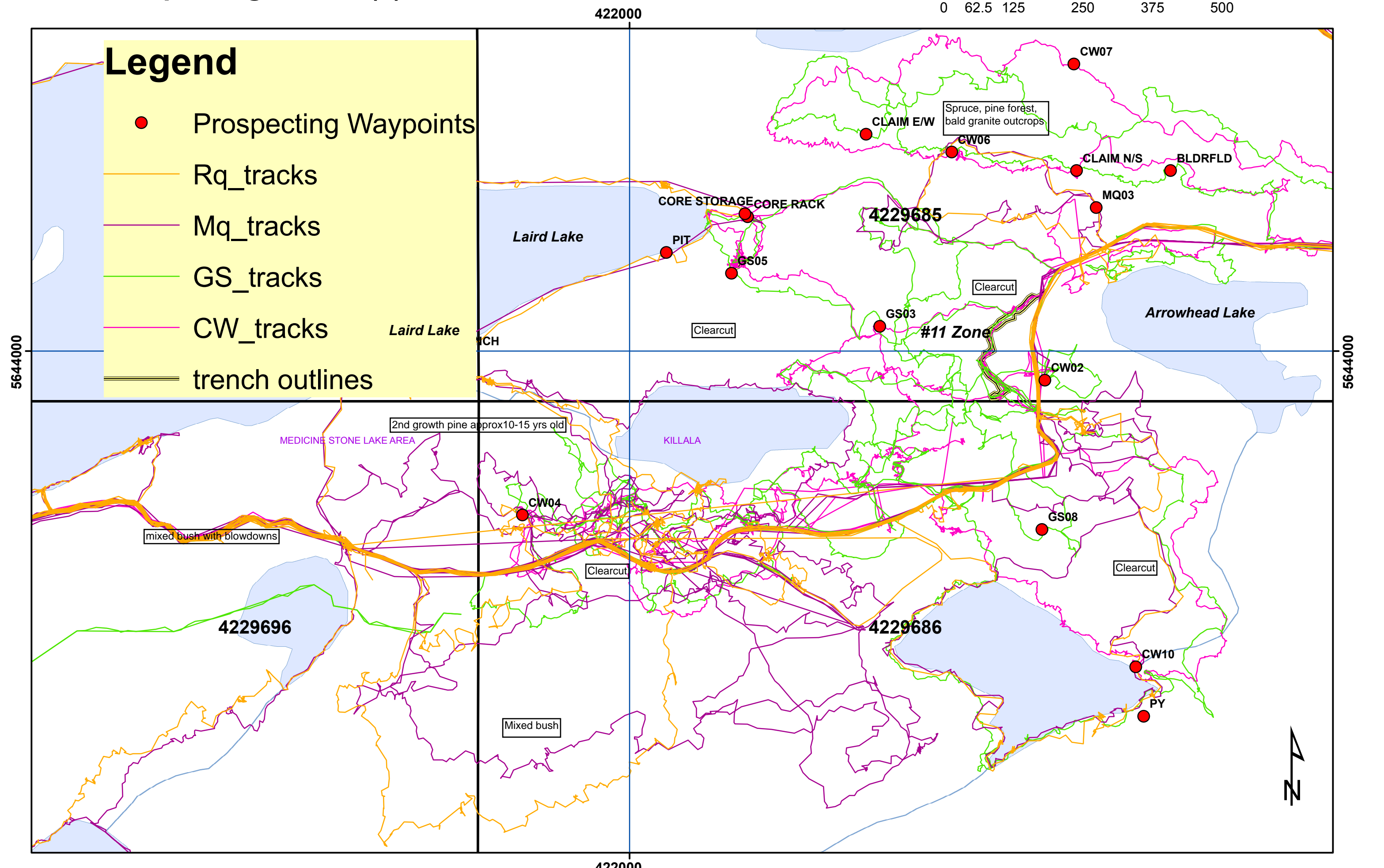
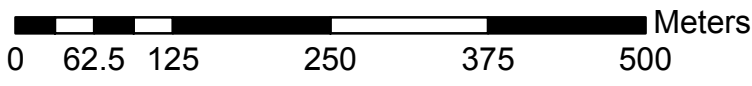
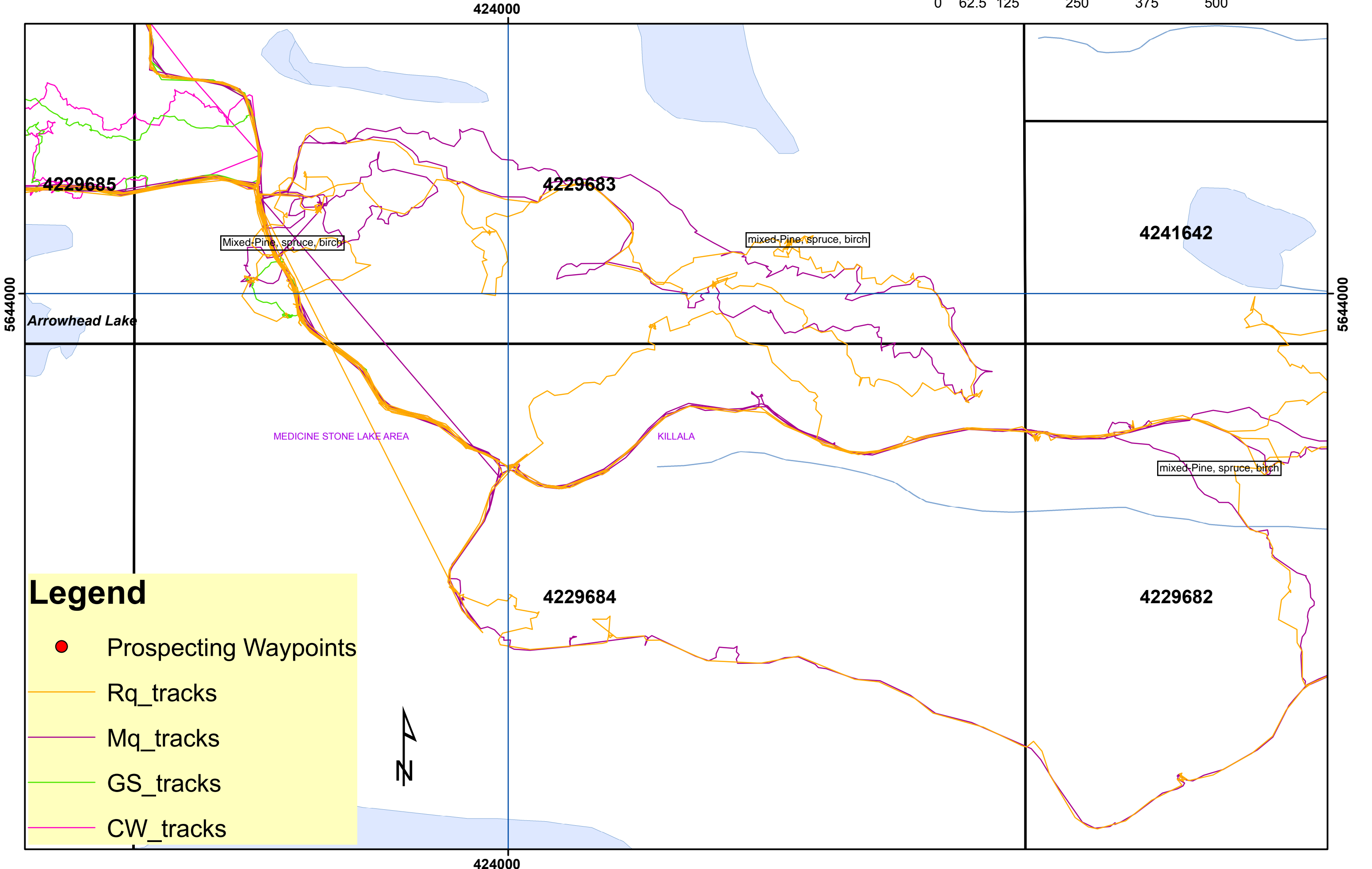
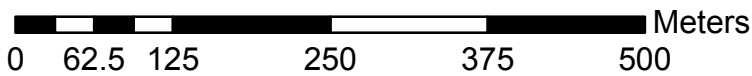


Figure 7 **Prospecting Tracks (3)**

UTM Grid: NAD83 Zone 15N



Legend

- Prospecting Waypoints
- Rq_tracks
- Mq_tracks
- GS_tracks
- CW_tracks

Figure 8 **Prospecting Tracks (4)**

UTM Grid: NAD83 Zone 15N

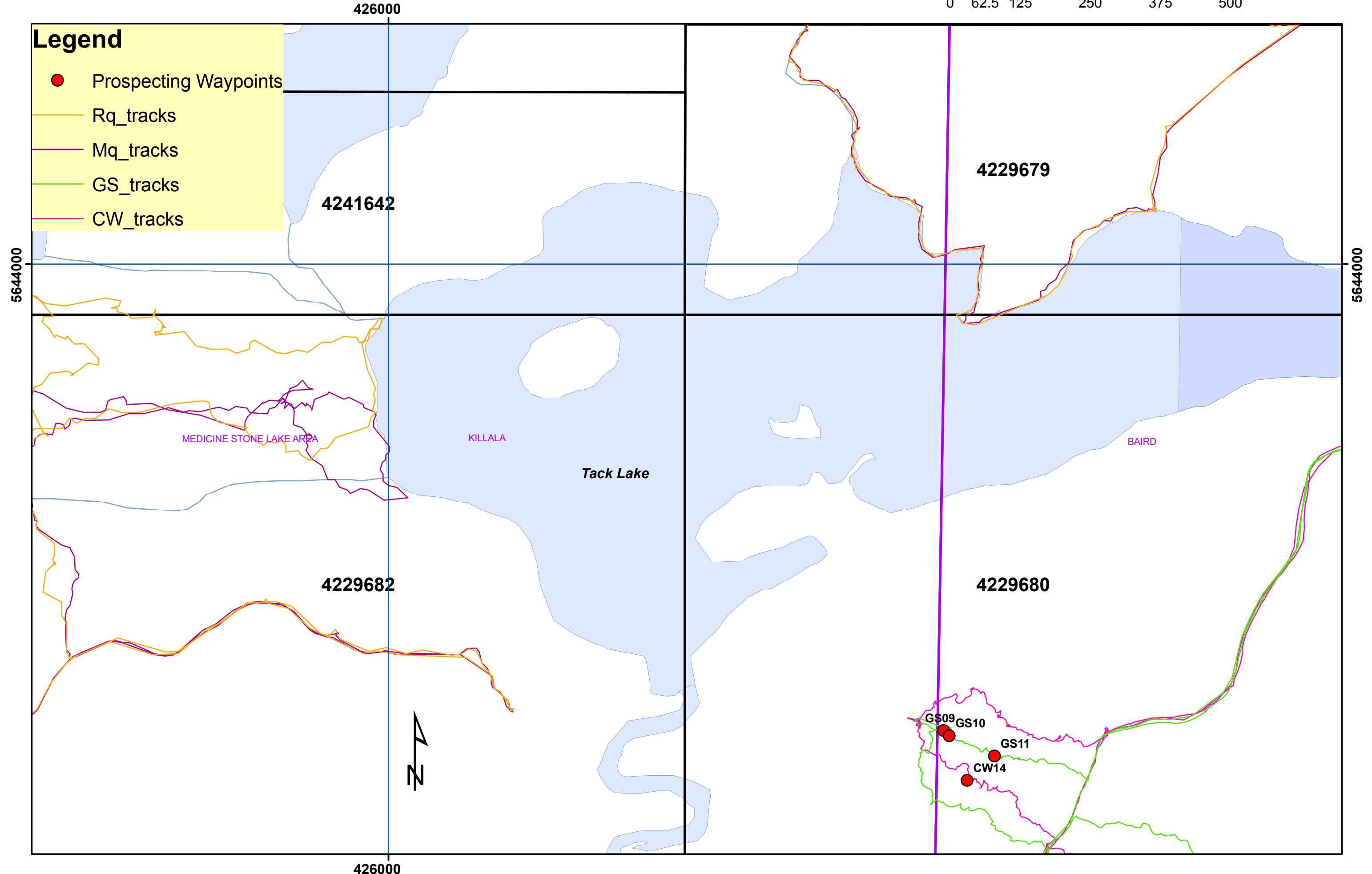
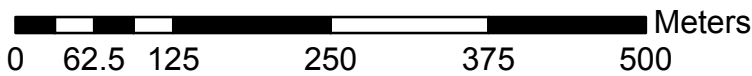
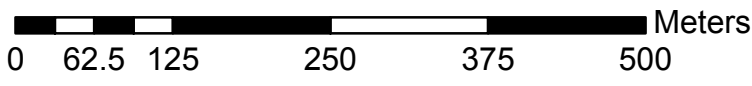


Figure 9 **Prospecting Tracks (5)**

UTM Grid: NAD83 Zone 15N



Legend

- Prospecting Waypoints
- Rq_tracks
- Mq_tracks
- GS_tracks
- CW_tracks

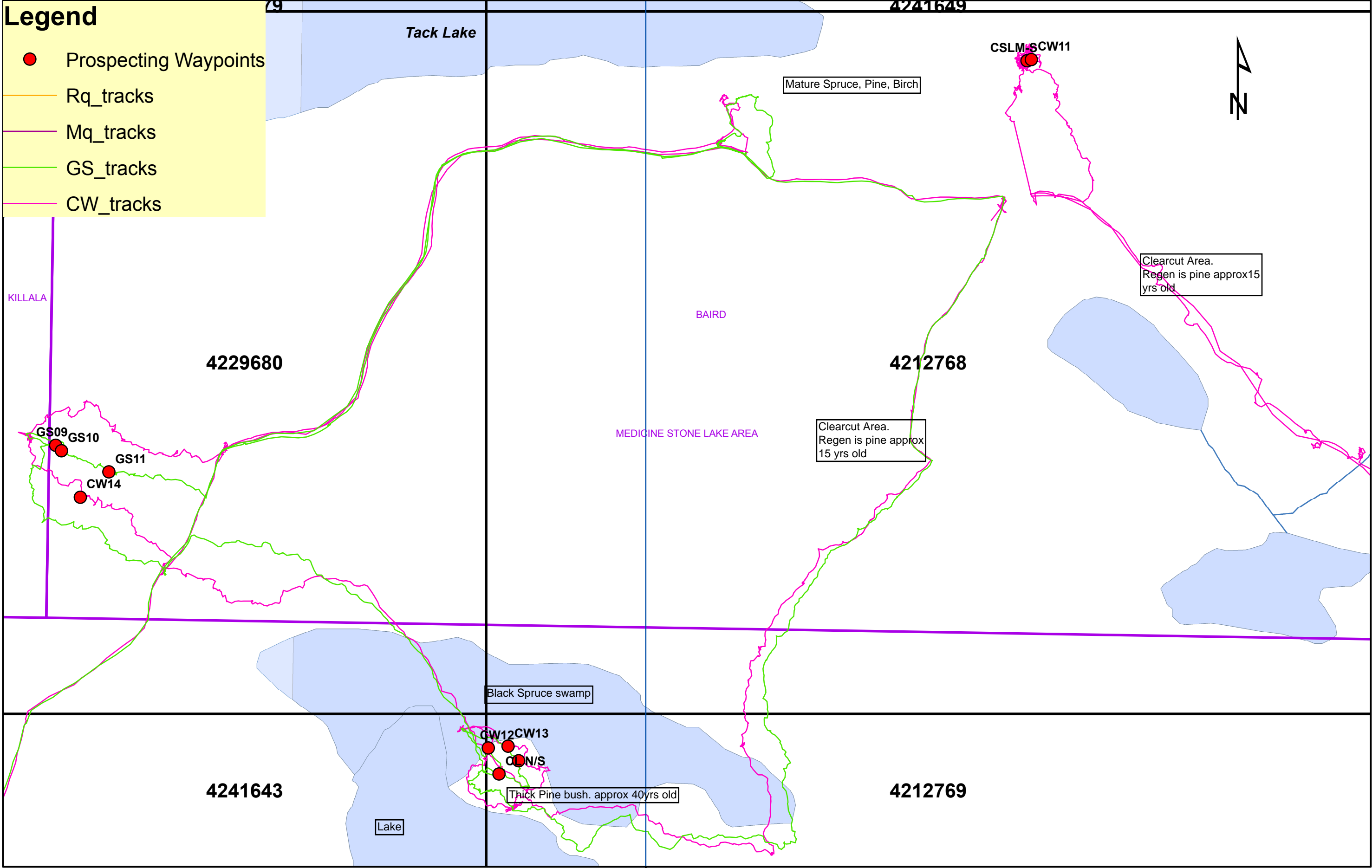


Figure 10 **Prospecting Tracks (6)**

UTM Grid: NAD83 Zone 15N

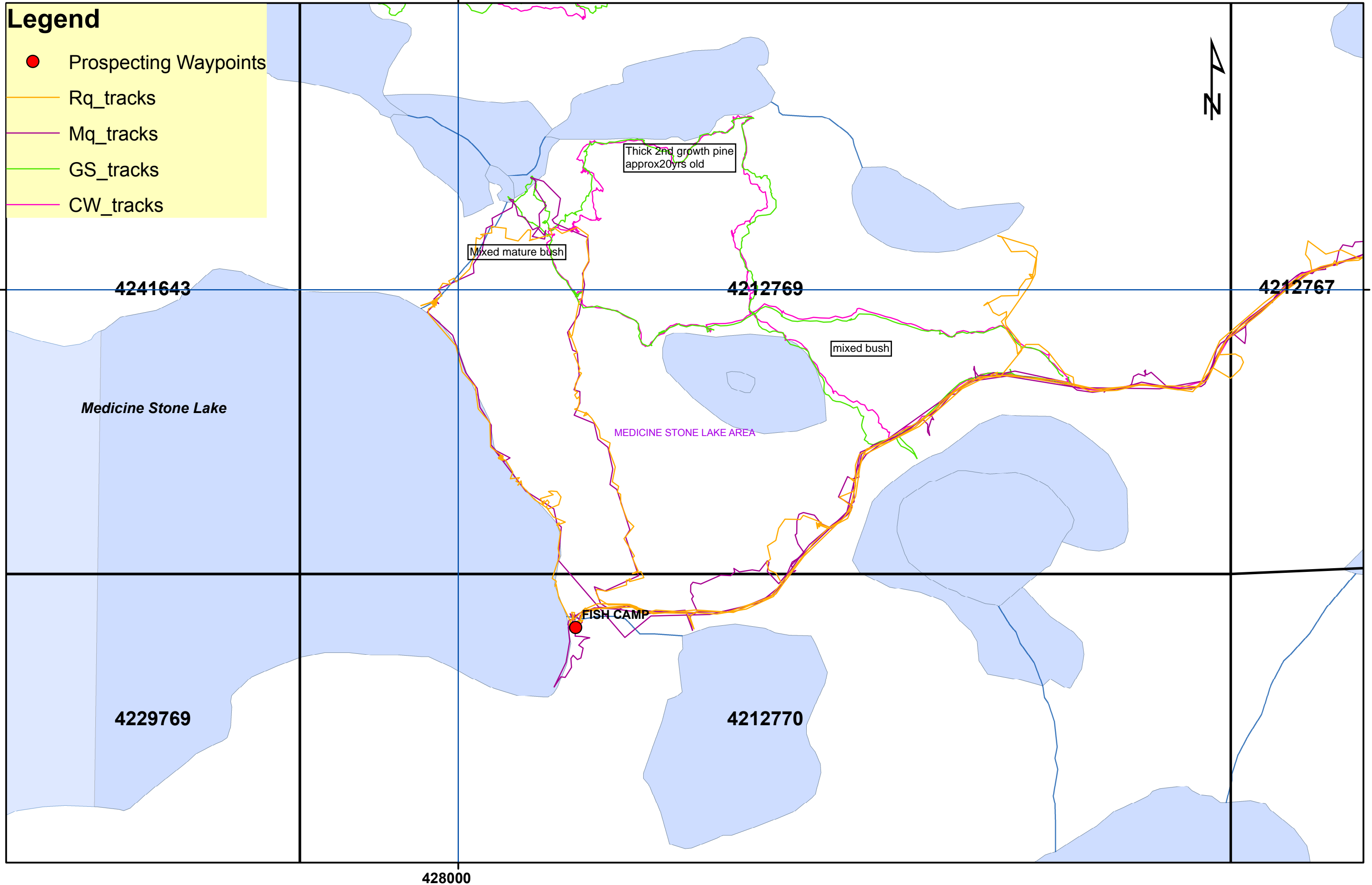
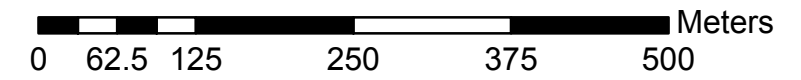
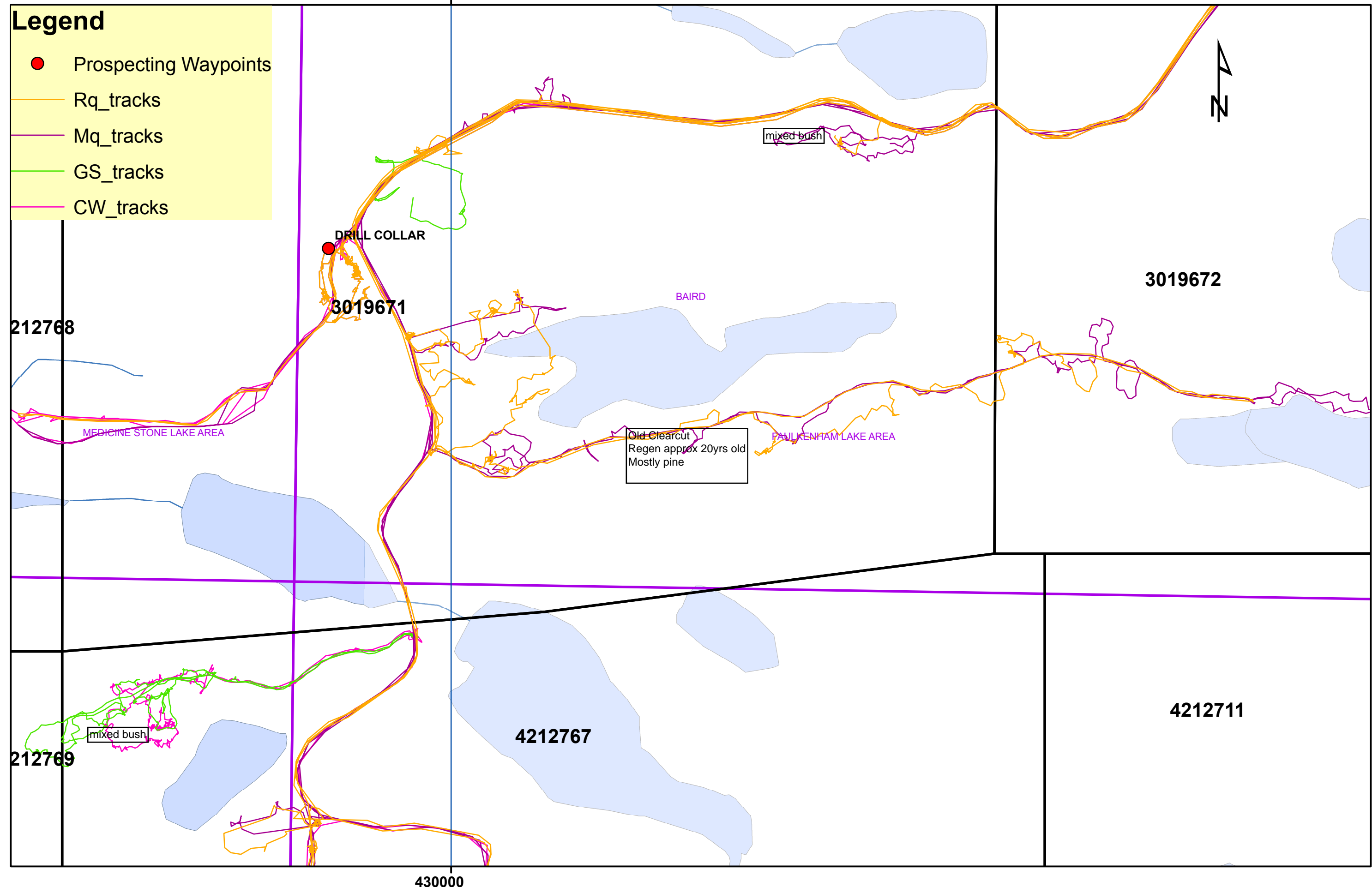
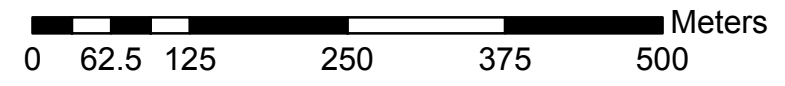


Figure 11 **Prospecting Tracks (7)** UTM Grid: NAD83 Zone 15N



Legend

- Prospecting Waypoints
- Rq_tracks
- Mq_tracks
- GS_tracks
- CW_tracks



DRILL COLLAR
3019671

Old Clearcut
Regen approx 20yrs old
Mostly pine

3019672

4212711

4212767

212768

212769

430000

430000

MEDICINE STONE LAKE AREA

BAIRD

PAULKENHAM LAKE AREA

MIXED BUSH

MIXED BUSH

Figure 12 **Prospecting Tracks (8)**

UTM Grid: NAD83 Zone 15N

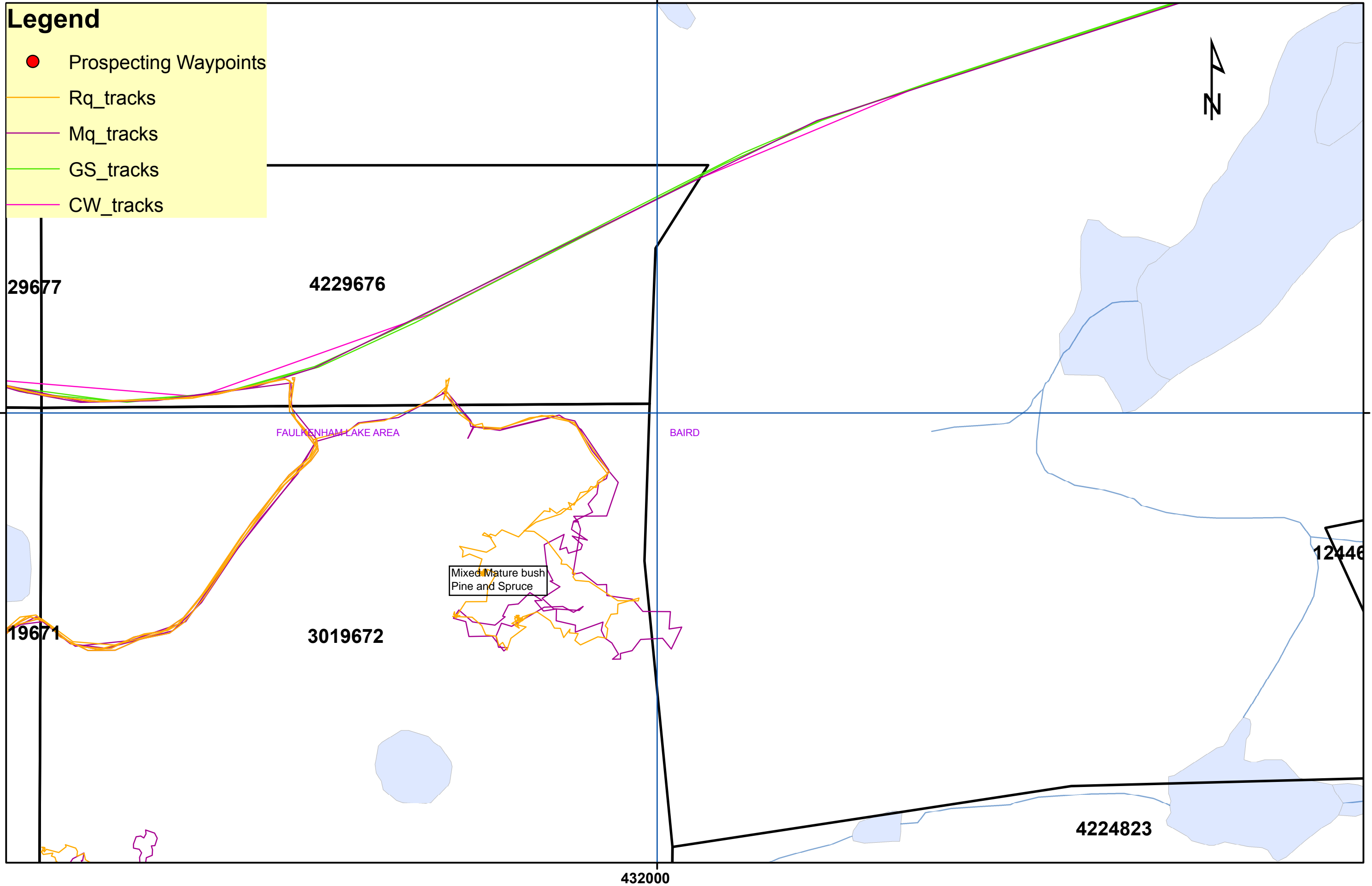
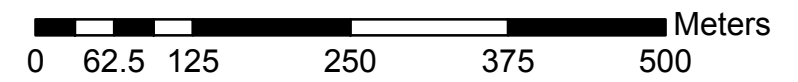
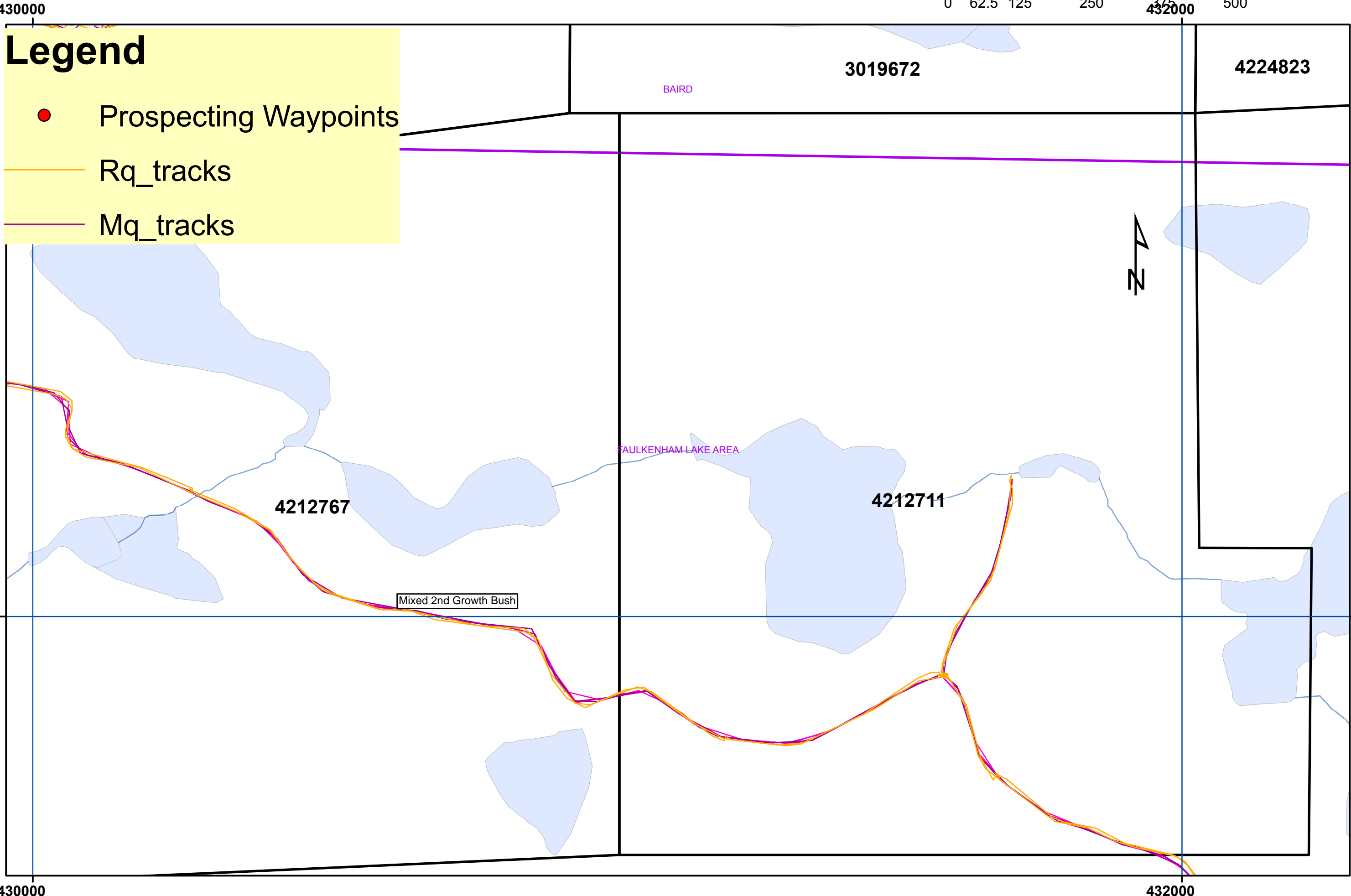
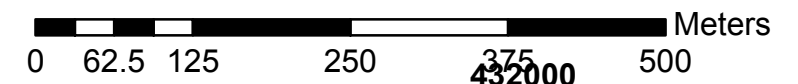


Figure 13 **Prospecting Tracks (9)**

UTM Grid: NAD83 Zone 15N



Legend

- Prospecting Waypoints
- Rq_tracks
- Mq_tracks

3019672 4224823

BAIRD

4212767

4212711

FAULKENHAM LAKE AREA

Mixed 2nd Growth Bush



430000

432000

5642000

5642000

Figure 14

Prospecting Tracks (10)

UTM Grid: NAD83 Zone 15N

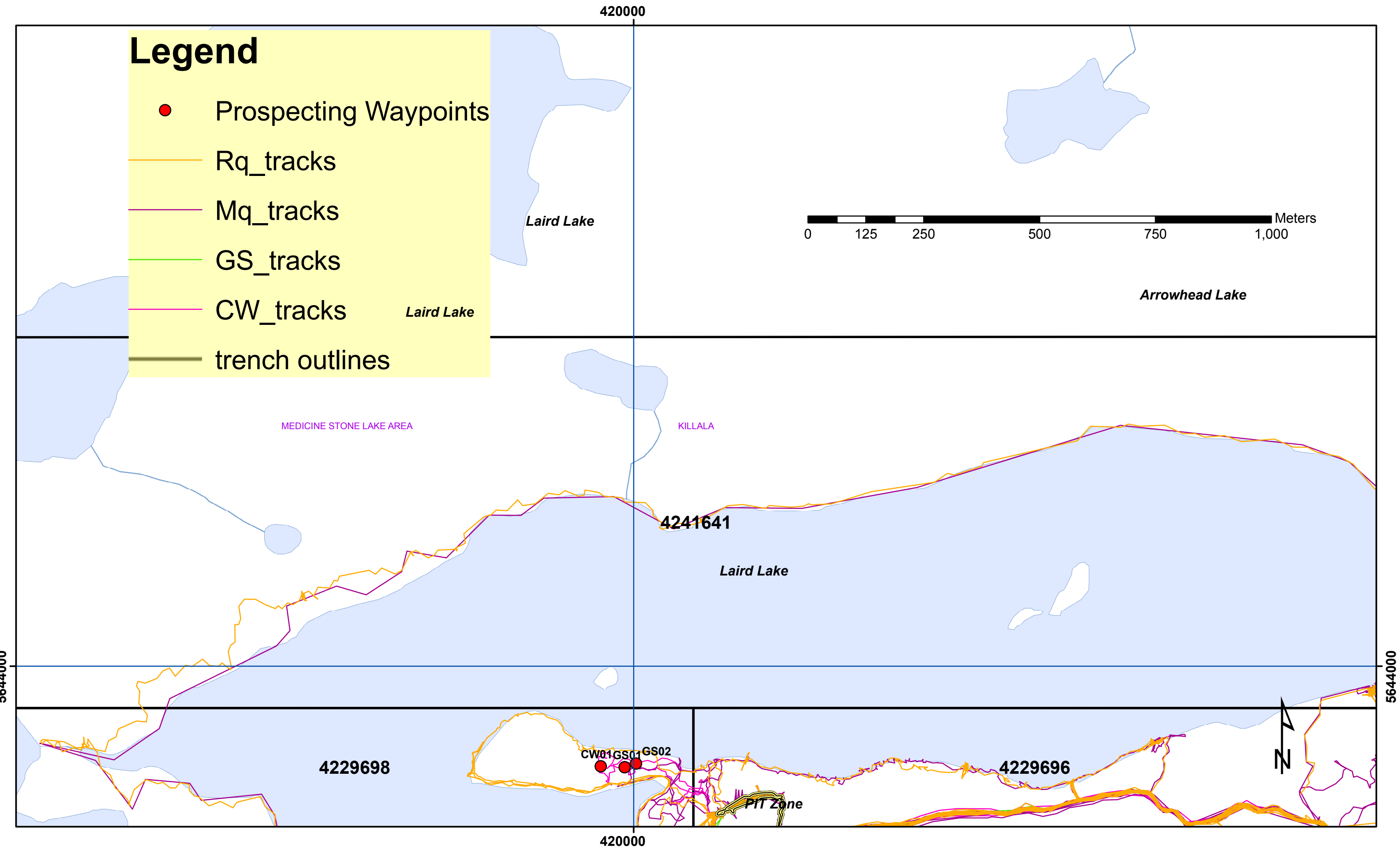
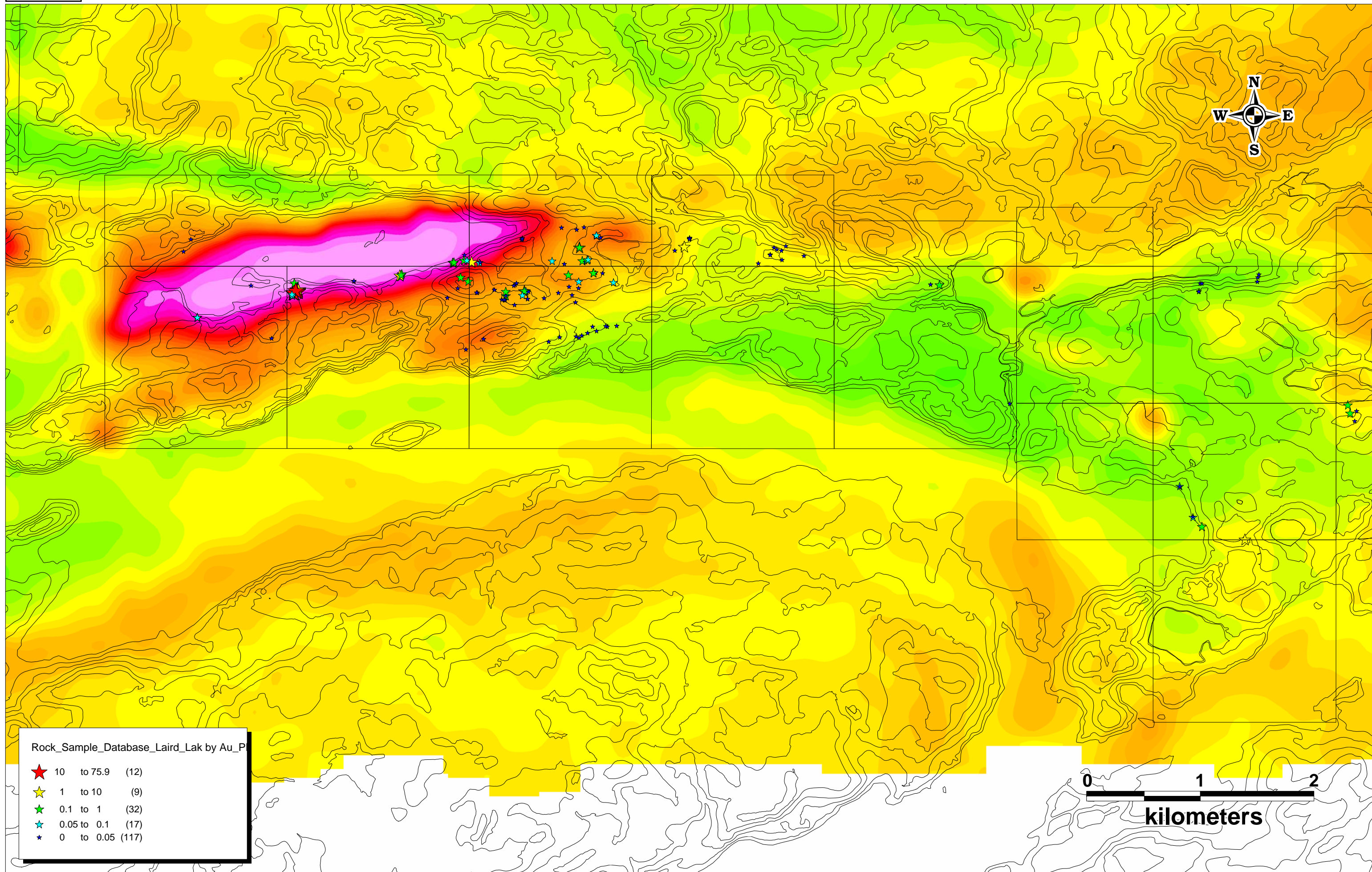


Figure 15

Laird Lake Mag Anomaly and Gold Sample Locations



Appendix I

Tabulation of Rock Sample Data

Sample #	UTM Zone	NAD83 Easting	NAD83 Northing	Rock Type	Type	Date	Sampler	Claim#	Comments
CW_1001	15U	420224	5643707	dark grey smokey Qtz	qtz vein	9-Oct-10	Claudia Wilck	4229696	10" wide qtz vein with 2% Cpy(possible VG in qtz) 1ft west of channel # 20950
CW_1002	15U	420182	5643680	clear to smokey qtz	qtz vein	9-Oct-10	Claudia Wilck	4229696	clear to smokey qtz vein 2" wide. 1% Py with 2% Cpy rusty stains. Surrounded by dk green/grey mafic volcanic with 15% disseminated sulphides very rusty take 4m east of 20911channel
CW_1003	15U	420182	5643680	meta volcanic	wall rock	9-Oct-10	Claudia Wilck	4229696	meta volcanic wall rock surrounding qtz vein in sample CW1002. Very rusty with 15% sulphides Py and Cpy. Non magnetic. 4m east of 20911 and 3m N of 20913
CW_1004	15U	422719	5643959	mafic volcanic	Subcrop or float?	10-Oct-10	Claudia Wilck	4229685	mafic volcanic fine grained with epidote seams. White/greenish weathering on surface. Disseminated Sulphides less than 1% Py and hematite. Surface has slight sugary texture, magnetic and +ve acid just west of access road
CW_1005	15U	422746	5643949	mafic volcanic	outcrop	10-Oct-10	Claudia Wilck	4229685	mafic volcanic same as CW1004 but has more sulphides, Cpy,and no hematite(possible VG?) magnetic and +ve acid
CW_1006	15U	422193	5644159	qtz vein	qtz vein	11-Oct-10	Claudia Wilck	4229685	mafic volcanic with rusty Qtz vein 1" wide. Trace Cpy and Py 10 metres north of trench. 60 m east of east end of Laird Lake
CW_1007	15U	422212	5643686	mafic volcanic	local float	13-Oct-10	Claudia Wilck	4229686	Older pitted area, 10m north of access road; clear cut, local blder's from pitted area. Rusty surface - smokey qtz in f. gr. Mafic volcanic; non-magnetic, acid + on carbonate spots; pyrite & chalco through out.
CW_1008	15U	422211	5643693	mafic volcanic	outcrop	13-Oct-10	Claudia Wilck	4229686	outcrop inside old pit area. Mafic volcanic rock with white to smokey qtz - both have sulfides - pyrite and chalco, non-mag., acid + only on carbonates. Clear cut - pit has 6' spruce trees; 15m north of access road.
CW_1009	15U	422130	5643748	felsic volcanics	local float	13-Oct-10	Claudia Wilck	4229686	Float - felsic - pinkish @ .5m angular blder with rusty surface & inside fracture surfaces - sulfides on rusty surface & dissem. Sulfides in rock; f. gr. Whitish rhyolitic texture. 15m south of lake on side of hill under moss. Looks to be close to source.
CW_1010	15U	421949	5643704	Intermed. Volcanics - Tuff?	outcrop	13-Oct-10	Claudia Wilck	4229686	O/C in clear cut. Rusty surface. Interm. Volc. - tuff? Acid spotty, non-mag.; few dissem. Sulfides - some smokey qtz; med - f.gr. Light to dk gy.
CW_1011	15U	422035	5643616	Quartz vein	outcrop	15-Oct-10	Claudia Wilck	4229686	Qtz vein in outcrop @ 2" wide - white to smokey grey , rusty surface with a few sulphides and epidote seams; acid neg; @ 5m north of access road. Wall rock med to f. gr. Mafic volcanic with sulphides - 3m east of skarn blder Graham found.
CW_1012	15U	422038	5643617	mafic volcanic	outcrop	15-Oct-10	Claudia Wilck	4229686	o/c mafic volc. Wall rock (from qtz vein sample CW1011); sulphides - some chalco; med to f. gr., gray, magnetic with some qtz. 5m N of rd.
CW_1013	15U	422597	5643835	mafic volcanic	local float	16-Oct-10	Claudia Wilck	4229686	Blder's very close to o/c - in place - top of ridge @ 100m north of access rd., Qtz vein mostly white, few sulphides - chalco. Host rock mafic volcanic - gray, f. gr., acid + on host rock, non-mag., qtz rusty; little vegetation.
CW_1014	15U	422562	5643931	Porphyritic	outcrop	18-Oct-10	Claudia Wilck	4229685	O/C in clear cut. Spotted porphre - quartz feldspar with sulphides - pyrite - soome chalco. Qtz vein rusty in spots - white to smokey grey; sulphides in both host rock and qtz. Acid + / non-mag. Biotite in host rock; edge of swampish - small 6' spruce trees
CW_1015	15U	422454	5643957	Pyroxenites	outcrop	18-Oct-10	Claudia Wilck	4229685	O/C pyroxenites with very rusty surface. Sulphides mixed with contact zone of mafic volcanics. Mostly pyrite - small amt of chalco. Epidote seams on o/c. Acid neg / magnetic. Small coniferous trees on o/c - clear cut area.
CW_1016	15U	422589	5643678	local float	float	19-Oct-10	Claudia Wilck	4229686	Large angular porphyre blder (elongated feldspar & qtz crystals) @ .5m in length; sitting within o/c of same. Chalco - small amts & some pyrite; dk gray matrix; non-mag / acid spotty, some rusty surfaces; West side of hill - south of access rd; juniper bushes
CW_1017	15U	422688	5643777	Quartz vein	outcrop	19-Oct-10	Claudia Wilck	4229686	White to smokey gray qtz vein just off south side of access rd; very rusty - few sulphides @ 3" wide at widest point; in spotty porphyre o/c
CW_1018	15U	428641	5643776	mafic volcanic	outcrop	20-Oct-10	Claudia Wilck	4212768	O/C @ 25m from top of N. side of hill; mafic volcanic, acid very spotty / non-mag.; some finely dissem. Sulphides, bit of biotite & feldspar, rusty surfaces; spruce trees & moss covered; @ 50m south of historic gold showing
CW_1019	15U	428645	5643814	intermed. Volcanic	outcrop	20-Oct-10	Claudia Wilck	4212768	O/C @ 5m from base of N. side of hill - intermed. Volc. Gray, f. gr. Lots of dissem. Sulphids, rusty surfaces, acid spotty / non-mag.; mature birch and spruce trees. @ 15m west of historic gold showing.
CW_1020	15U	428655	5643839	intermed. Volcanic	outcrop	20-Oct-10	Claudia Wilck	4212768	O/C 1m from DDH (Cw11); Altered intermed. To mafic volcanic, gray / green, med to f. gr. with sulphides; epidote & small qtz seams; very rusty surfaces, acid spotty / non-mag.
CW_1021	15U	429903	5643503	mafic volcanic	outcrop	21-Oct-10	Claudia Wilck	3019671	O/C stripped area - mafic volcanic with qtz sulphides - some chalco & malachite; non-mag., acid + 50%; south of access road
CW_1022	15U	429868	5643563	felsic dyke	outcrop	21-Oct-10	Claudia Wilck	3019671	O/C - felsic dyke, pinkish in stripped area North of access road; sulphides - a little chalco, rusty surface, non-mag. / acid neg.
CW_1023	15U	429496	5642552	sheared interm. Volcanic	float	22-Oct-10	Claudia Wilck	4212767	Local float- sheared intermed. Volc. Boulder @ .5m in length and diam. Same o/c all around; @ 25m south of top of ridge. Acid-neg / magnetic very rusty almost ragolithic on one side of blder; some sulphides, med gr., dk gray & white, lots of mica, some epidote
CW_1024	15U	428130	5643692	mafic volcanic	float	23-Oct-10	Claudia Wilck	4212768	Local float - mafic volcanic with sulphides, very rusty, f.gr. Non-mag / acid neg.; @ 5m north of access rd.; surrounded by coniferous trees.
CW_1026	15U	428126	5643687	mafic volcanic	float	24-Oct-10	Claudia Wilck	4212768	local float right beside o/c of same- mafic volcanic with white rusty qtz seams up to 1/2" wide; lots of sulphides, very rusty, med. to f.gr. Non-mag / acid neg.; @15m north of access rd.; surrounded by coniferous trees.
CW_1027	15U	428139	5643762	felsic volcanics	outcrop	24-Oct-10	Claudia Wilck	4212768	o/c felsic volcanic @ 50m N side of steep hill - small amt of sulphides; non-magnetic; @ 75m South of Tack Lake
GS_1001	15U	420223	5643701	grey smokey Qtz	qtz vein	9-Oct-10	Graham Stone	4229696	approx 8" wide qtz vein with approx 1% py approx, non magnetic, possible VG
GS_1002	15U	420223	5643701	grey smokey Qtz	qtz vein	9-Oct-10	Graham Stone	4229696	Same as GS1001, but with more sulphides and Cpy present.(taken 2m east of the north end of channel sample 20937

GS_1003	15U	420192	5643680	grey smokey Qtz	qtz vein	9-Oct-10	Graham Stone	4229696	Adjacent to old pit, possible VG
GS_1004	15U	422763	5643966	mafic volcanics	outcrop	10-Oct-10	Graham Stone	4229685	narrow 12" wide silicious, iron stained vein in mafic volcanics. Pinches and swells and may or may not be continuous. Non magnetic and -ve acid stk 95 dip 50 sw. Near site of supposed Arrowhead Lake discretionary Gold Occurrence. Not sampled previously
GS_1005	15U	422771	5643970	magnetite Iron formation	float	10-Oct-10	Graham Stone	4229685	float found in skidder track, no other in immediate vicinity
GS_1006	15U	422694	5644076	mafic volcanic - rhyolitic tuff	outcrop	11-Oct-10	Graham Stone	4229685	previously sampled as #20307(1550ppb). Small 1mm qtz eyes, trace sulphides at best. Took chip sample from alongside of original channel over 1.5m. Some epidote present in fractures. Original description called it a biotite and feldspar rich rhyolitic tuff
GS_1007	15U	422694	5644077	mafic volcanic	outcrop	11-Oct-10	Graham Stone	4229685	mafic volcanic with grey to white qtz. Sulphide present. Rusty, iron stained surfaces, non magnetic. Taken 1.5 meters away from GS1006
GS_1008	15U	422189	5644143	mafic volcanic	outcrop	11-Oct-10	Graham Stone	4229685	mafic volcanic with carbonate veins iron stained, qtz present, trace Cpy and Py, with tourmaline. Non magnetic and reacts to acid in spotty areas. Sample taken from bottom of old trench. flat bedrock, hard to get sample sides are slumped in.
GS_1009	15U	422192	5644152	mafic volcanic	outcrop	11-Oct-10	Graham Stone	4229685	mafic volcanic, very silicious, Py stringers, non magnetic and -ve acid. Old ribbon found under moss at this point "6D" written on it and still plainly visible.
GS_1010	15U	422230	5643695	mafic volcanic	outcrop	12-Oct-10	Graham Stone	4229686	Historical workings small pit in side of outcrop - 1m x 1m with large amt of rubble nearby; foliated mafic volcanic, strongly magnetic, acid neg, dissem. sulphides, qtz rich, stk @ 235°, dip vertical
GS_1011	15U	422228	5643691	mafic volcanic	outcrop	12-Oct-10	Graham Stone	4229686	Historical workings small pit in side of outcrop - 1m x .5m with large; foliated mafic volcanic, strongly magnetic, trace sulphides, stk @ 235°, dip vertical
GS_1012	15U	422225	5643693	mafic volcanic	outcrop	12-Oct-10	Graham Stone	4229686	Historical workings small pit in side of outcrop - 1m x 2m; foliated mafic volcanic, non-magnetic, acid neg, dissem. sulphides, stk @ 235°, dip vertical
GS_1013	15U	422210	5643694	qtz vein	rubble	12-Oct-10	Graham Stone	4229686	Qtz vein with wallrock from rubble pile beside pit; mafic volcanic, non-magnetic, acid spotty
GS_1014	15U	422384	5643631	Porphyritic	float	12-Oct-10	Graham Stone	4229686	Qtz porphyry - sampled blder that had broken off outcrop adjacent - local float; non-mag / acid neg., cpy & py. See photo for texture.
GS_1015	15U	422041	5643615	skarn	float	15-Oct-10	Graham Stone	4229686	Float - skarn type of alteration, non-magnetic, acid neg., greenish alteration
GS_1016	15U	422033	5643618	skarn	float	15-Oct-10	Graham Stone	4229686	Skarn blder @ 1m x .5m in situ - broken off outcrop beside it; magnetic / acid spotty
GS_1017	15U	422880	5644162	tuff	outcrop	15-Oct-10	Graham Stone	4229685	Very silicious - cherty band within tuff's; non-magnetic / acid neg., rusty stained, py & qtz.
GS_1018	15U	422687	5643719	intermed. Volc. Porphyry	outcrop	18-Oct-10	Graham Stone	4229686	Fine gr. Intermed. Porphyry - foliated; Cpy & py present, non-mag. / acid neg.
GS_1019	15U	422603	5643731	mafic volcanic	float	19-Oct-10	Graham Stone	4229686	Local float disturbed in skidder track. A few pieces likely in Situ or rubble crop. Iron staining, Py & trace Cpy; F. gr. Mafic volcanic; Py semi massive in small patches; acid neg.
GS_1020	15U	422629	5643658	Porphyritic	outcrop	19-Oct-10	Graham Stone	4229686	Qtz / feldspar porphyry elongated phenocrysts; non-mag; Cpy & trace Py
GS_1021	15U	422660	5643595	Ultramafic	outcrop	19-Oct-10	Graham Stone	4229686	Altered Gabbro or Pyroxenite ultramafic; acid + in patches; trace Cpy present, non-magnetic outcrop
GS_1022	15U	422714	5643304	felsic tuff	outcrop	19-Oct-10	Graham Stone	4229686	Felsic tuff with mineralization bands of Py & Cpy non-mag / acid neg; likely outcrop on shore of small lake
GS_1023	15U	423021	5643388	intermed. Volcanic	outcrop	19-Oct-10	Graham Stone	4229686	o/c intermed. Volcanic, silicious; Py & trace Cpy, non-mag. / acid + in fractures
GS_1024	15U	422993	5643770	felsic tuff	outcrop	19-Oct-10	Graham Stone	4229686	Felsic tuff ? < 1mm dk gray / blue qtz eyes, Py & trace Cpy; outcrop, non-mag. / acid neg.
GS_1025	15U	432244	5642718	sheared mafic volcanic	float	20-Oct-10	Graham Stone	off property	Sheared mafic volcanic blder; non-mag. / acid neg.; just off property
GS_1026	15U	429871	5643555	porphyritic felsic volcanic	outcrop	21-Oct-10	Graham Stone	3019671	Previously blasted and stripped. Narrow stripped area @ 25m long and 4m wide; trench @ 275°; non-mag./ acid neg, hosted in porphyritic felsic volcanic; Py present
GS_1027	15U	429891	5643551	porphyritic felsic volcanic	outcrop	21-Oct-10	Graham Stone	3019671	Dissem. Py; South end of stripped area @ 20m S of GS1026, porphyritic felsic volcanic; non-mag / acid neg. rusty weathered surface
GS_1028	15U	429455	5642622	felsic porphyritic	outcrop	22-Oct-10	Graham Stone	4212767	Resample of #9202 which gave 1870 ppb, original sample seems to be from a piece of rock that has splayed off of outcrop beside it. O/C is moss covered & rounded & very difficult to get a chunk of. This sample taken from original piece that had flagging ar
GS_1029	15U	429512	5642641	ultramafic	float	22-Oct-10	Graham Stone	4212767	small @ 1' x 1' angular blder (local float likely) ultramafic f. gr. Gabbro Py / Cpy present with rounded biotite flakes; strongly mag / acid neg.
GS_1030	15U	429435	5642604	felsic-interm. Sheared volc or porphyry	outcrop	22-Oct-10	Graham Stone	4212767	O/C f. gr. Felsic-intermed. Sheared volcanic or porphyry; Py & biotite; non-mag / acid neg.
GS_1031	15U	428128	5643689	mafic volcanic	outcrop	24-Oct-10	Graham Stone	4212768	f. gr mafic volcanic o/c possibly gabbroic; non-mag; trace Py & Cpy; scrub jack pine & spruce - old cut over beside road

GS_1032	15U	428155	5643760	mafic volcanic	float	24-Oct-10	Graham Stone	4212768	f. gr. Mafic volcanic boulder - angular - likely local on north side of steep hill; Py & Cpy, non-mag / acid neg.
Mq_1001	15U	429833	5643364	felsic contact with mafic o/c	O/C	6-Oct-10	MQ	3019671	10% PYRITE, EPIDOTE FROM BLASTED TRENCH
Mq_1002	15U	429835	5643363	felsic O/C		6-Oct-10	MQ	3019671	2CM QUARTZ VEIN CONTAINING MINOR PYRITE FROM BLASTED TRENCH
Mq_1003	15U	429833	5643326	felsic vol.	O/C	6-Oct-10	MQ	3019671	6 CM QUARTZ VEIN IN FELSIC VOL. PYRITE IN WALLROCK FROM BLASTED TRENCH
Mq_1004	15U	429907	5643440	felsic vol.	O/C	6-Oct-10	MQ	3019671	QUARTZ RICH FELSIC BOTH QUARTZ AND WALLROCK CONTAIN PY FROM BLASTED TRENCH
Mq_1005	15U	429908	5643505	felsic vol. O/C		6-Oct-10	MQ	3019671	3CM WIDE Q VEIN BOTH Q AND WALLROCK CONTAIN PYRITE AND EPIDOTE
Mq_1006	15U	420223	5643695	mafic vol.	O/C	9-Oct-10	MQ	4229696	10 CM SMOKEY Q VEIN TRACE PYRITE
Mq_1007	15U	420223	5643694	mafic vol.	O/C	9-Oct-10	MQ	4229696	10 CM SMOKEY Q VEIN TRACE PYRITE
Mq_1008	15U	420223	5643692	mafic vol.	local float	9-Oct-10	MQ	4229696	1X1 FT BOULDER Q RICH RUSTY, SMOKEY 20%PY AND MINOR CHALCO
Mq_1009	15U	420228	5643710	mafic vol.	O/C	9-Oct-10	MQ	4229696	1FT Q VEIN IN MAFIC BOTH Q AND WALLROCK MINERALIZED WITH PY AND CHALCO
Mq_1010	15U	420174	5643672	mafic vol.	O/C	10-oct-10	MQ	4229696	SMOKEY Q, HEM. TRACE PY. AND CHALCO
Mq_1011	15U	420174	5643658	mafic vol.	subcrop	10-Oct-10	MQ	4229696	SHEARED Q VEIN 10%-15% PY. AND MINOR CHALCO
Mq_1012	15U	420188	5643681	mafic vol.	O/C	10-Oct-10	MQ	4229696	1 FT Q VEIN TRACE PY. AND CHALCO VG?
Mq_1013	15U	421136	5643844	q vein	subcrop	10-Oct-10	MQ	4229696	SILICIFIED Q 2% PY HIGHLY MAGNETIC, MAGNETITE?
Mq_1014	15U	421136	5643844	q vien	O/C	10-Oct-10	MQ	4229696	HIGHLY SILICIFIED MAFIC VOL. WITH VEINLETS OF PY. PYRRHOTITE
Mq_1015	15U	421122	5643819	mafic vol.	local float	11-Oct-10	MQ	4229696	HIGHLY SILICIFIED MAFIC ,Q RICH ,10%PY. VERY MAGNETIC
Mq_1016	15U	422125	5643572	mafic vol.	O/C	11-Oct-10	MQ	4229686	12CM Q VEIN IN MAFIC VOL. NO VISIBLE SULPHIDES
Mq_1017	15U	421601	5643964	mafic vol.	O/C	11-Oct-10	MQ	4241641	Q IN MAFIC FINE DISSEMINATED PY WEAKLY MAGNETIC PHRR.? FROM A OLD TRENCH
Mq_1018	15U	421686	5644010	mafic vol.	local float	11-Oct-10	MQ	4241641	Q VEIN WITH LARGE CUBIC PY. AND CHALCO AND MAGNETIC
Mq_1019	15U	419221	5644041	felsic	O/C	11-Oct-10	MQ	4241641	FELSIC DIKE WITH A SMALL Q VEIN WITH MINOR PY. AND CHALCO
Mq_1020	15U	422248	5643688	mafic vol.	local float	13-Oct-10	MQ	4229686	2X2 FT. RUSTY BOULDER WITH 2CM QUARTZ VEIN WITH VERY FINE DISSEMATED PYRITE
Mq_1021	15U	422188	5643654	felsic	O/C	13-Oct-10	MQ	4229686	BLASTED QUARTZ ROCK FROM A TRENCH WITH CUBIC PYRITE
Mq_1022	15U	422194	5643657	mafic vol.	O/C	13-Oct-10	MQ	4229686	QUARTZ RICH BLASTED ROCK FROM A TRENCH CONTAINING MINOR PYRITE
Mq_1023	15U	421627	5643718	felsic	O/C	13-Oct-10	MQ	4229696	QUARTZ RICH BLASTED ROCK FROM A TRENCH CONTAINING MINOR PYRITE
Mq_1024	15U	421535	5643634	mafic vol.	local float	13-Oct-10	MQ	4229696	BIOTITE RICH, TRACE PYRITE, TOURMALINE
Mq_1025	15U	422842	5644180	mafic vol.	O/C	14-Oct-10	MQ	4229685	ROCK USED IN CONSTRUCTION OF THE ROAD. HIGHLY SILICIFIED, 30% PYRITE
Mq_1026	15U	422843	5644183	felsic	O/C	14-Oct-10	MQ	4229685	1 FT. QUARTZ VEIN, 10% PYRITE SOME WALLROCK ADDED TO SAMPLE
Mq_1027	15U	422735	5644253	gabbro	O/C	14-Oct-10	MQ	4229685	1 FT. SUGARLY QUARTZ VEIN IN GABBRO, 5% CUBIC PYRITE
Mq_1028	15U	424401	5644075	felsic	O/C	14-Oct-10	MQ	4229683	5 CM SMOKEY QUARTZ VEIN FELSIC WALLROCK MINERALIZED WITH MINOR PYRITE

Mq_1029	15U	424426	5644059	felsic	O/C	14-Oct-10	MQ	4229683	FELSIC ROCK WITH PYRITE AND CHALCO. WITH A SMALL AMOUNT OF QUARTZ
Mq_1030	15U	424466	5644048	felsic	local float	14-Oct-10	MQ	4229683	1CM VEINLETS OF QUARTZ CONTAINING CUBIC PYRITE
Mq_1031	15U	424664	5644002	felsic	local float	14-Oct-10	MQ	4229683	VEINLETS OF QUARTZ CONTAINING LARGE CUBIC PYRITE
Mq_1032	15U	424471	5643967	felsic	O/C	14-Oct-10	MQ	4229683	QUARTZ VEIN IN DIORITE PORPHYRY CONTAINING PYRITE AND CHALCO.
Mq_1033	15U	423531	5644049	felsic	O/C	16-Oct-10	MQ	4229683	QUARTZ RICH FELSIC ROCK CONTAINING MINOR AMOUNT OF PYRITE
Mq_1034	15U	423614	5644083	mafic vol.	O/C	16-Oct-10	MQ	4229683	HIGHLY MINERALIZED QUARTZ VEIN 20% PYRITE
Mq_1035	15U	422897	5643850	mafic vol.	local float	16-Oct-10	MQ	4229686	QUARTZ VIEN WITH PYRITE, HORNBLLENDE AND BIOTITE
Mq_1036	15U	422836	5643855	mafic vol.	local float	16-Oct-10	MQ	4229686	5CM QUARTZ VEIN TOURMALINE WITHIN THE QUARTZ,PYRITE,CHALCO AND MALACHITE STAIN
Mq_1037	15U	422925	5643386	mafic vol.	O/C	16-Oct-10	MQ	4229686	2M HIGHLY SILICIFED QUARTZ VEIN WITH 5% CUBIC PYRITE
Mq_1038	15U	422766	5643325	felsic	O/C	16-Oct-10	MQ	4229686	A SHEARED AND BANDED SILICIFED QUARTZ 10% PYRITE AND TRACE CHALCO
Mq_1039	15U	423661	5644155	mafic vol.	O/C	16-Oct-10	MQ	4229683	35CM QUARTZ VEIN CONTAINING CHALCO. AND MINOR PYRITE IN DIORITE PORPHYRY
Mq_1040	15U	429992	5643576	felsic	O/C	18-Oct-10	MQ	3019671	FELDSPAR PORPHYRY QUARTZ STRINGERS BLASTED FROM TRENCH 5% PYRITE
Mq_1041	15U	421816	5643941	felsic	O/C	18-Oct-10	MQ	4229685	FELSIC VOL. QUARTZ STRINGERS WITH PYRITE AND HEMATITE
Mq_1042	15U	421824	5643946	felsic	O/C	18-Oct-10	MQ	4229685	FELSIC VOL. QUARTZ RICH 30-40% PYRITE FLEDSPAR AND OLIVINE
Mq_1043	15U	421824	5643946	felsic	O/C	18-Oct-10	MQ	4229685	SAME AS SAMPLE N# Mq 1042
Mq_1044	15U	421582	5643943	felsic	O/C	18-Oct-10	MQ	4241641	FELSIC VOL. 20-30 % PYRITE IN FRACTURES HIGHLY SILICIFED AND WEATHERED
Mq_1045	15U	420396	5643765	mafic vol.	O/C	19-Oct-10	MQ	4229696	DARK SMOKEY QUARTZ IN MAFIC VOL. MINOR PYRITE AND CHALCO
Mq_1046	15U	423661	5644161	felsic	O/C	19-Oct-10	MQ	4229683	15CM QUARTZ VEIN IN DIORITE PORPHYRY MINOR PYRITE TRACE CHALCO
Mq_1047	15U	423660	5644160	felsic	O/C	19-Oct-10	MQ	4229683	15CM QUARTZ VEIN IN GRANODIORITE MINOR PYRITE AND TRACE CHALCO
Mq_1048	15U	428532	5641514	felsic	local float	20-Oct-10	MQ	4212769	GRANOPHYRE BOULDER 1X2M CAVITIES FILLED WITH PY
Mq_1049	15U	422521	5643288	mafic vol.	O/C	21-Oct-10	MQ	4229686	QUARTZ STRINGER, MINOR CHALCO AND TRACE PYRITE, SOME FELDSPARS
Mq_1050	15U	422424	5643249	felsic	O/C	21-Oct-10	MQ	4229686	SMALL CLEAR QUARTZ VIEN WITH SOME CARBONATE
Mq_1051	15U	421652	5643814	felsic	O/C	21-Oct-10	MQ	4229696	HIGHLY SILICIFED LAYERED QUARTZ VEIN 20% PYRITE, HEMATITE STAINING
Mq_1052	15U	421854	5643273	mafic vol.	O/C	21-Oct-10	MQ	4229686	4 CM QUARTZ VEIN, PYRRHOTITE, MINOR PYRITE AND TRACE CHALCO
Mq_1053	15U	425853	5643748	felsic	local float	22-Oct-10	MQ	4229682	3 CM QUARTZ VEIN IN FELSIC WALLROCK BOTH MINERALIZED WITH PYRITE AND CHALCO
Mq_1054	15U	425775	5643751	mafic vol.	subcrop	22-Oct-10	MQ	4229682	6 CM QUARTZ VEIN IN FELSIC WALLROCK BOTH BIOTITE RICH
Mq_1055	15U	430052	5643269	mafic vol.	O/C	23-Oct-10	MQ	3019671	5 CM QUARTZ VEIN FROM A TRENCH MINOR PYRITE AND CHALCO SOME HORNBLLENDE
Mq_1056	15U	430062	5643247	mafic vol.	O/C	23-Oct-10	MQ	3019671	QUARTZ VEIN FROM THE SAME TRENCH AS Mq 1055 WITH TRACE CHALCO
Mq_1057	15U	430592	5643069	mafic vol.	O/C	23-Oct-10	MQ	3019671	QUARTZ VEIN HIGHLY ALTERED AND SILICIFED 30%-40% PYRITE

Mq_1058	15U	431788	5643650	mafic vol.	O/C	24-Oct-10	MQ	3019672	1 CM QUARTZ VEIN IN MAFIC WALLROCK BOTH CONTAINING LARGE CUBIC PYRITE
Mq_1059	15U	431737	5643650	mafic vol.	local float	24-Oct-10	MQ	3019672	A FRACTURED MAFIC AND FRACTURES FILLED WITH PYRITE AND QUARTZ
Mq_1060	15U	428155	5641627	felsic	local float	24-Oct-10	MQ	4212769	VERY RUSTY .75X .30 M BOULDER HIGHLY SILICIFIED DISSEMINATED PYRITE THOUGHOUT
Mq_1061	15U	427960	5641981	felsic tuff	O/C	24-Oct-10	MQ	4212769	BANDED FELSIC TUFF CONTACT WITH MAFIC 15-20% PYRITE SOME FELDSPARS
Rq_1001	15U	429822	5643381	mafic volcanics	outcrop	6-Oct-10	RQ	3019671	Large area, trenched and washed in Medicine Stone lodge road,contact zone with felsics, silicified, minor cubic pyrite, trace chalco, magnetite
Rq_1002	15U	429838	5643361	massive pyrite	outcrop	6-Oct-10	RQ	3019671	same area, 20m south, massive pyrite vein 2-5 inches, pinches out quickly, highly magnetic, from blasted trench
Rq_1003	15U	429833	5643351	mafic volcanics	outcrop	6-Oct-10	RQ	3019671	same area, 50% pyrite 50% mafic volcanics with felsic contamination, epidote altered, very magnetic, from blasted trench
Rq_1004	15U	429782	5643311	mafic volcanics	outcrop	6-Oct-10	RQ	3019671	second area to the SW, moderately silicified, minor epidote, 2-8% pyrite locally, again felsic contamination in a contact area
Rq_1005	15U	429781	5643317	felsic volcanics	outcrop	6-Oct-10	RQ	3019671	4m north of 1004, rhyolite with minor to 5%py locally
Rq_1006	15U	420213	5643694	Quartz vein	outcrop	9-Oct-10	RQ	4229696	Glassy, blackish quartz vein in trenched area, striking roughly E-W, very minor pyrite and chalco, discontinuous along strike
Rq_1007	15U	420213	5643690	Quartz vein	outcrop	9-Oct-10	RQ	4229696	1m SE, branch of main vein converging along strike, very minor chalco, vein material is grey to black, 4 inches with two to three flecks of VG
Rq_1008	15U	420204	5643695	Quartz vein	outcrop	9-Oct-10	RQ	4229696	8m west, vein pinched but begins again here, zone of wallrock is very rusty and weathered, very minor pyrite
Rq_1009	15U	420174	5643657	mafic volcanics	outcrop	9-Oct-10	RQ	4229696	Further west turning up in trench, adjacent to sample Mq1011, rusty weathered amphibolite, wallrock to vein 5% sulfides, minor chalco
Rq_1010	15U	420175	5643665	Quartz vein	outcrop	10-Oct-10	RQ	4229696	western end of trench, pinch and swell, glassy, blackish vein on top of trench, 6-8 inches wide locally, minor to nil sulfides
Rq_1011	15U	421122	5643836	mafic volcanics	outcrop	10-Oct-10	RQ	4229696	rusty with layering, alternating bands of calcite and volcanics, minor to 3% pyrr locally, chloritic, blasted rock from trench
Rq_1012	15U	421119	5643831	Quartz vein	outcrop	10-Oct-10	RQ	4229696	weakly developed quartz vein in mafics, chloritic, very minor to trace sulfides, blast rock from trench
Rq_1013	15U	421129	5643835	mafic volcanics	outcrop	10-Oct-10	RQ	4229696	eastern end of blasted area area, highly silicified mafic volcanics, almost to a quartz vein, up to 5% very fine pyrr locally, sample has 2-3% pyrr
Rq_1014	15U	422041	5643612	Quartz vein	outcrop	10-Oct-10	RQ	4229686	mafic intrusive? With 4 inch quartz vein, trace sulfides at wallrock contact, minor hematite stain
Rq_1015	15U	421588	5643938	mafic volcanics	outcrop	11-Oct-10	RQ	4241641	Old pit near SE end of Laird Lake, chips from rock samples, silicified, very rusty, minor pyrr and pyrite, moderately magnetic, blasted rock from pit
Rq_1016	15U	419285	5644147	Quartz vein	subcrop	11-Oct-10	RQ	4241641	6-8 inch subcropping glassy quartz vein, pinches out quickly, minor carbonate, trace pyrite
Rq_1017	15U	419342	5643462	felsic volcanics	outcrop	11-Oct-10	RQ	4229698	along strike from pit zone, highly silicified felsic tuffs or rhyolite, very minor quartz with <1% sulfides
Rq_1018	15U	419337	5643459	felsic volcanics	outcrop	11-Oct-10	RQ	4229698	along strike from pit zone, highly silicified felsic tuffs with pegmatite veins, 1-2% pyrite in wallrock and pegmatites, minor granular quartz
Rq_1019	15U	421799	5643679	felsic volcanics	outcrop	13-Oct-10	RQ	4229686	silicified and slightly sheared felsic volcanics, minor to <1% small euhedral pyrite
Rq_1020	15U	421792	5643680	mafic volcanics	outcrop	13-Oct-10	RQ	4229686	4m west, silicified mafic volcanics, 2-3% medium grain pyrite, little magnetism
Rq_1021	15U	422049	5643652	felsic volcanics	outcrop	13-Oct-10	RQ	4229686	felsic volcanics cut by small pegmatite vein, feldspar rich, minor pyrite in wallrock and pegmatite
Rq_1022	15U	422049	5643654	felsic volcanics	outcrop	13-Oct-10	RQ	4229686	1m south, small 2 inch glassy quartz vein with minor pyrite in wall rock
Rq_1023	15U	422249	5643631	Quartz vein	subcrop	13-Oct-10	RQ	4229686	2 inch dull white glassy quartz vein, trace chalco, no visible pyrite, abundant biotite in wallrock
Rq_1024	15U	422240	5643624	mafic volcanics	subcrop	13-Oct-10	RQ	4229686	3 m west, mafic volcanics to amphibolite, small 2 inch blackish quartz vein, trace chalco and pyrite, biotite altered
Rq_1025	15U	422014	5643618	syenite or granophyre	subcrop	13-Oct-10	RQ	4229686	little if any quartz, potassium feldspar rich felsic intrusion, 1-2% coarse pyrite

Rq_1026	15U	422048	5643690	Quartz vein	outcrop	13-Oct-10	RQ	4229686	same area just 50 m east, on the hillside,two 1-2inch quartz tourmaline veins with4-5 % coarse pyrite
Rq_1027	15U	422670	5644232	gabbro	subcrop	14-Oct-10	RQ	4229685	gabbro with felsic contamination,(pinkish feldspars) with epidote alteration,5-10% pyrite
Rq_1028	15U	422537	5644250	quartz vein	outcrop	14-Oct-10	RQ	4229685	west toward laird lake, 4-8 inch quartz vein in mafic volcanics, pinches out quickly, minor pyrite in wallrock, trace hematite
Rq_1029	15U	424505	5644088	mafic volcanics	outcrop	14-Oct-10	RQ	4229683	east toward Tack lake across access road,large cutover,mafic volcs with quartz stringers,<1% pyrite in wallrock and stringers, trace chalco
Rq_1030	15U	424368	5644015	quartz vein	outcrop	14-Oct-10	RQ	4229683	18 inch quartz vein in mafic volcanics,oxidized and stained red, trace pyrite on contact
Rq_1031	15U	424367	5644010	Quartz vein	outcrop	14-Oct-10	RQ	4229683	2m along strike, another sample of vein, brittle with pinkish alteration, trace pyrite at wall rock contact
Rq_1032	15U	419994	5643279	rhyolite	outcrop	15-Oct-10	RQ	4229698	altered pinkish to redish rhyolite, 2-5 % fine pyrite, no carbonate, no other visible sulfides
Rq_1033	15U	422816	5643854	Quartz vein	outcrop	16-Oct-10	RQ	4229686	two parallell 4-5 inch quartz veins with abundant tourmaline at wallrock contact, appears to pinchs out quickly,no visible pyrite
Rq_1034	15U	422817	5643853	Quartz vein	outcrop	16-Oct-10	RQ	4229686	same area, same vein, a one inch tourmaline vein within the quartz, very minor gold coloured pyrite
Rq_1035	15U	422809	5643866	Quartz vein	outcrop	16-Oct-10	RQ	4229686	a few m NE,highly contorted and disjointed and smokey quartz vein, 5-10- inches widein felsics,no visible sulfides
Rq_1036	15U	422938	5643381	felsic volcanics	outcrop	16-Oct-10	RQ	4229686	small hand dug pitin outcrop,2-3% pyrite locally, one 5mm quartz stringer
Rq_1037	15U	422844	5643343	granite?	subcrop	16-Oct-10	RQ	4229686	further west along bank of pond, small one inch quartz vein, minor pyrite in quartz and contact
Rq_1038	15U	422691	5643283	granite?	outcrop	16-Oct-10	RQ	4229686	200m further west, same unit, more foilated almost to a gneiss appearance,3-10% pyrite locally
Rq_1039	15U	422665	5643295	banded tuff?	outcrop	16-Oct-10	RQ	4229686	western end of pond,well banded tuff or rhyolite,near contact with mafics, moderatly silicified, 5-10 % py locally
Rq_1040	15U	424264	5643936	intermediate intrusive	subcrop	17-Oct-10	RQ	4229683	In skidder road on side of hill, intermediate
Rq_1041	15U	429941	5643576	mafic volcanics	outcrop	17-Oct-10	RQ	3019671	blast trench , mafic intermixed with felsics,epidote altered,10-15 % pyrite locally
Rq_1042	15U	422118	5643741	Quartz vein	outcrop	18-Oct-10	RQ	4229686	glassy quartz vein,2-4 inches, devoid of sulfides or carbonate, unable to get a good sample, to much overburden
Rq_1043	15U	422142	5643763	Quartz vein	outcrop	18-Oct-10	RQ	4229686	15 m east,<1 inch quartz vein in welde tuff, very minor pyrite in quartz and wall rock
Rq_1044	15U	421751	5643940	diorite porphyry	outcrop	18-Oct-10	RQ	4229685	north on stream from pinky lake,1-3% pyrite, rusty outcrop
Rq_1045	15U	421748	5643949	mafic volcanics	outcrop	18-Oct-10	RQ	4229685	5 m north on stream,some relict felspars, finer grain, slightly sheared and foilated,10-30 % pyrite locally with trace pyrr,chloritic
Rq_1046	15U	421593	5643947	mafic volcanics	outcrop	18-Oct-10	RQ	4241641	silicified,steeply dipping volcanics,chloitic, minor to 5 % pyrite locally
Rq_1047	15U	421712	5643966	mafic volcanics	outcrop	18-Oct-10	RQ	4241641	quartz rich section, greenish in color, epidote? Minor to abundant pyrite in wallrock, very minor in quartz
Rq_1048	15U	421707	5643963	mafic volcanics	outcrop	18-Oct-10	RQ	4241641	same area,contact to mafics has abundant chalcedonic quartz stringers, minor to 5% pyrite in wallrock and quartz
Rq_1049	15U	420719	5643779	mafic volcanics	outcrop	19-Oct-10	RQ	4229696	near historical showing?moderately silicified and sheared mafic volcanics near granite contact, 10 % pyrite
Rq_1050	15U	420715	5643784	mafic volcanics	outcrop	19-Oct-10	RQ	4229696	2m west, closer to granite contact, mafic and felsic mixing,3-5% pyrite, trace chalco
Rq_1051	15U	420716	5643783	mafic volcanics	outcrop	19-Oct-10	RQ	4229696	same area, 0.5 m south, more silicified with more quartz,<2% pyrite,more skarn like
Rq_1052	15U	423659	5644148	quartz vein	outcrop	19-Oct-10	RQ	4229683	0.5 milky white quartz vein Merv found in diorite porphyry, felsic mixing, sample 50-50 wallrock & quartz,locally abundant coarse pyrite
Rq_1053	15U	423659	5644150	Quartz vein	outcrop	19-Oct-10	RQ	4229683	second sample,abundant coarse pyrite along wallrock margins but well less then 1% overall, quartz stained red
Rq_1054	15U	419813	5643742	ultramafic	float	22-Oct-10	RQ	4229698	flat local float, silicified and quartz veined, minor cubic pyrite in quartz stringers

Rq_1055	15U	421698	5643181	granite?	outcrop	22-Oct-10	RQ	4229696	altered and quartz veined granite, <1% pyrite in coarse grained dull looking quartz
Rq_1056	15U	430666	5643582	mafic volcanics	outcrop	23-Oct-10	RQ	3019671	moderately silicified,with 2-3% pyrite, no visible chalco
Rq_1057	15U	430080	5643295	mafic volcanics	subcrop	23-Oct-10	RQ	3019671	madsen like rock, small 1-2 inch vein material with very minor pyrite and trace chalco
Rq_1058	15U	430067	5643035	diorite porphyry	outcrop	23-Oct-10	RQ	3019671	small area of very minor quartz-epidote stringers, very minor to trace chalco in stringers
Rq_1059	15U	430544	5643053	mafic volcanics	outcrop	23-Oct-10	RQ	3019671	small area of mineralization,4-5 % pyritewith very minor pyrr, no visible chalco
Rq_1060	15U	430963	5643222	mafic volcanics	outcrop	23-Oct-10	RQ	3019672	madsen like rock,biotite and amphibole rich rock, very minor disseminated chalco
Rq_1061	15U	431701	5643727	flow banded rhyolite?	outcrop	24-Oct-10	RQ	3019672	near discretionary gold showing, flow banded rhyolite? with minor quartz stringers,trace pyrite and biotite in stringers
Rq_1062	15U	431655	5643648	mafic volcanics	outcrop	24-Oct-10	RQ	3019672	contact between mafic and felsics,moderately silicified with 2-5% cubic pyrite disseminated throughout
Rq_1063	15U	431764	5643641	mafic volcanics	outcrop	24-Oct-10	RQ	3019672	madsen like rock, moderately fractured and silicified, minor to 1% pyrite with trace chalco and pyrr
Rq_1064	15U	428075	5641711	mafic volcanics	Local float	24-Oct-10	RQ	4212769	angular local float, very flat, contact between mafics and felsics,with quartz rich areas,epidote altered,2% pyrite
Rq_1065	15U	428076	5641709	banded rhyolite	Local float	24-Oct-10	RQ	4212769	same area,banded felsics,semi-masive bands of pyrite with disseminated pyrite throughout, smaller rock,10x14 inches
Rq_1066	15U	428076	5641713	quartz feldspar quartz vein	Local float	24-Oct-10	RQ	4212769	same area,local float pulled out of bank, quartz feldspar vein 2-3 inches wide, with minor <1% pyrite and chalco
Rq_1067	15U	427961	5641977	granite	subcrop	24-Oct-10	RQ	4212769	subcropping material near Merv's 1051, quartz vein in reddish granite or granophyre, stringers of pyrite in quartz, dissem in wallrock

Appendix II

Tabulation of Stream Sample Data

Unique ID	UTM Zone	NAD83 Easting	NAD83 Northing	Rock Type	Date	Sampler	Claim#	Comments
CW_1025	15U	426469	5642705	stream sediment	24-Oct-10	Claudia Wilck	4229682	Stream sediment sample taken behind granite blders in river flowing north betwn Medicine Stone and Tack Lake @ half way up; tag alders & black spruce along shore - swampy edge - no o/c

Appendix III

Tabulation of Prospecting Waypoints

Prospecting Waypoint	UTM Zone	NAD83 Easting	NAD83 Northing	Date	Sampler	Claim#	Comments
Cw08	15U	422482	5643798	18-Oct-10	Claudia Wilck	4229686	2 drill holes @ 3' apart - 1" diam. Holes - west hole - 198°, east hole - 182° dip @ 50°; almost on top of ridge @ 100m north of access road; o/c mafic volcanic with several white, pinkish and smokey qtz veins, seams of biotite crystals, non-mag., bit of f
Cw09	15U	422473	5643789	18-Oct-10	Claudia Wilck	4229686	Trench running 156° @ 16' long; @ 25m SW of DDH's; 15' spruce trees growing in the trench.
Cw10	15U	422910	5643432	19-Oct-10	Claudia Wilck	4229686	#2 post of claim 3018673; 1240 m west to M south of #1 3008243; #2 post of claim 1244649
Cw11	15U	428659	5643827	20-Oct-10	Claudia Wilck	4212768	DDH at base of hill - O/C - edge of swamp and o/c hill. Should be very close to historic gold showing; DDH 2" in diam. Angled south into O/C @ 186°, dip @ 65°
Cw12	15U	427732	5642650	23-Oct-10	Claudia Wilck	4212769	edge of bush & swamp - looking for Mag. High; @ 20m west of mafic volcanic o/c; non-mag, no sulphides; gry/green with biotite
Cw13	15U	427764	5642653	23-Oct-10	Claudia Wilck	4212769	highly magnetic granite bldr's in bush @ 25m south of swamp; edge of ridge, lots of black spruce
Cw14	15U	427033	5643079	23-Oct-10	Claudia Wilck	4229680	highly magnetic granite bldr's surrounded by black spruce & jack pine - mossy ground, no visible o/c; S side of ridge @ 20m from mag high
Cw15	15U	426550	5642700	24-Oct-10	Claudia Wilck	4241643	New claim post - #4 post 4241643 staked by J. Grapstrom 9/14/10; L.P. 1200ms of #1 post 4229622; old claim post #4 post 4212771
Gs01	15U	419980	5643781	10-Oct-10	Graham Stone	4229698	.5m x .5m x .5m hand dug pit. No rock available
Gs02	15U	420005	5643790	10-Oct-10	Graham Stone	4229698	1m x 1m x 1m overgrown hand dug pit, appears to have been dug down to bedrock but all slumped in now and no rock available
Gs03	15U	422450	5644044	11-Oct-10	Graham Stone	4229685	Ultramafic outcrop, possible gabbro/peroxenite, no visible sulphides
Gs04	15U	422212	5644242	11-Oct-10	Graham Stone	4229685	LL series core storage rack. Poor condition, likely to collapse in the next year or two. Tags visible are LL89-1, -3, -4, -7, -8, -10, -12, -14, -15, -16, -19, -20
Gs05	15U	422183	5644140	11-Oct-10	Graham Stone	4229685	Old trench, overgrown. Trench is 35m long and trends 42 degrees
Gs06	15U	422651	5644342	17-Oct-10	Graham Stone	4229685	Shearing @ 310°, 5° dip down to N. Try to find talc schist along Granite ridge / fault zone / contact area east of Laird Lake
Gs07	15U	422513	5643991	18-Oct-10	Graham Stone	4229685	coarse grained Pyroxenite
Gs08	15U	422741	5643679	18-Oct-10	Graham Stone	4229686	Trench N-S, 10m long in overburden - no outcrop visible
Gs09	15U	426991	5643167	23-Oct-10	Graham Stone	4229680	o/c very f. gr. Silicious felsic-intermed. Volcanic patchy mag., under overturned stump; slightly foliated; mixed mature bush, fairly open country with deadfall
Gs10	15U	427001	5643158	23-Oct-10	Graham Stone	4229680	f. gr. Silicious foliated felsic-intermed. Volcanic (tuff)? Non-mag / acid neg.
Gs11	15U	427082	5643122	23-Oct-10	Graham Stone	4229680	Felsic tuff; spotty mag / acid neg; outcrop
LP	15U	423363	5644316	17-Oct-10	Graham Stone	4229683	Line post - 400 m S of #1 post of claim 4229685
Mq 01	15U	421667	5643995			4241641	25 m trench very little bedrock bearing 360
Mq 02	15U	422066	5644177			4229685	2m x 2m pit filled with water, leaves and trees. Depth unknown
Rq01	15U	429822	5643381		RQ	3019671	Large area that has been recently trenched and washed , no channels only a few grabs taken
Rq02	15U	429789	5643401		RQ	3019671	Large area that has been recently trenched and washed , one drill hole located, Bearing 310 , dip 45 degrees
Rq03	15U	421122	5643836		RQ	4229696	Very old pit - trenched blasted area bordering lake (appears to be a number of workings)
Rq04	15U	421588	5643938		RQ	4241641	very old pit - trenched blasted area bordering lake (appears to be a number of workings)

Appendix IV

**ALS Minerals Canada Ltd.,
Rock and Stream Sediment Geochemistry Results
And Certificates**



ALS Canada Ltd.
 2103 Dollarton Hwy
 North Vancouver BC V7H 0A7
 Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: **RDF CONSULTING LTD**
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

Page: 1
 Finalized Date: 8-NOV-2010
 This copy reported on
 9-NOV-2010
 Account: RDFCON

CERTIFICATE TB10158259

Project:
 P.O. No.:
 This report is for 53 Rock samples submitted to our lab in Thunder Bay, ON, Canada on 28-OCT-2010.

The following have access to data associated with this certificate:

DEAN FRASER

TROY MOCHORUK

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
ME-MS41	51 anal. aqua regia ICPMS	
PGM-MS23	Pt, Pd, Au 30g FA ICP-MS	ICP-MS
Au-AA25	Ore Grade Au 30g FA AA finish	AAS
Au-AA23	Au 30g FA-AA finish	AAS

To: **RDF CONSULTING LTD**
ATTN: DEAN FRASER
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

TB10158259 - Finalized																																							
CLIENT : RDFCON - RDF Consulting Ltd																																							
# of SAMPLES : 53																																							
DATE RECEIVED : 2010-10-28 DATE FINALIZED : 2010-11-08																																							
PROJECT :																																							
CERTIFICATE COMMENTS : ME-MS41:Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5g).																																							
PO NUMBER :																																							
	Au-AA23	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
SAMPLE	Au	Ag	Al	As	Au	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb							
DESCRIPTION	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm						
CW1001	>10.0	2.28	0.54	0.8	17.4	<10	20	0.08	5.96	0.37	0.24	4.66	15.5	18	0.39	1820	2.98	2.72	0.06	0.11	0.02	0.051	0.11	2.3	8.3	0.35	168	3.26	0.03	0.16	25.4	190	6.9						
CW1002	>10.0	1.09	0.08	0.5	13.8	<10	<10	<0.05	0.27	0.06	0.15	0.84	5.7	13	0.05	80.4	0.78	0.44	<0.05	0.02	0.01	0.005	0.01	0.4	1.8	0.06	62	0.91	<0.01	0.1	5.3	30	4.9						
CW1003	5.75	1.92	1.04	1.7	1.3	<10	110	0.15	1.36	0.76	0.16	10.2	37.8	23	1.48	690	4.7	4.66	0.1	0.19	0.02	0.029	0.23	4.5	19.9	0.9	314	5.23	0.06	0.17	37	640	11.4						
CW1004	0.198	0.11	2.27	1.5	<0.2	<10	140	0.28	0.09	1.69	0.03	57.9	22.2	3	13.75	22.4	4.65	9.97	0.13	0.39	<0.01	0.012	0.71	26	81.6	1.68	739	0.1	0.06	0.35	6.3	1290	3.7						
CW1005	0.01	0.04	2.31	2.3	<0.2	<10	150	0.37	0.11	1.44	0.02	52.6	20	1	14.45	32.4	4.34	8.72	0.12	0.36	<0.01	0.013	0.76	23.2	86.6	1.58	718	0.11	0.05	0.43	4.6	1280	2.5						
CW1006	0.027	0.28	2.93	0.8	<0.2	<10	10	<0.05	0.09	0.43	0.04	2.34	22.1	53	0.35	417	6.39	6.54	0.13	0.1	<0.01	0.023	0.02	1	26.8	2.36	654	0.49	0.02	0.09	32.9	120	4.2						
CW1007	0.92	0.26	2.37	96.9	0.9	<10	10	0.54	0.12	1.93	0.06	66.6	21.6	3	0.62	192.5	6.98	13.1	0.21	0.31	0.02	0.026	0.1	32	28.9	1.27	780	1.3	0.05	0.44	5.1	2140	2.5						
CW1008	1.015	0.23	2.21	83.1	1	<10	40	0.45	0.11	1.61	0.04	58.8	21.6	3	2.93	153.5	6.52	12.4	0.21	0.31	0.05	0.026	0.29	27.8	30.4	1.17	680	0.8	0.05	0.41	4.8	2050	2.5						
CW1009	0.018	0.21	0.19	3.5	<0.2	<10	20	<0.05	0.34	0.03	<0.01	18.8	0.4	2	0.11	26.5	1	1.31	<0.05	0.3	<0.01	<0.005	0.04	9.3	0.5	0.02	29	0.95	0.09	1.63	0.3	50	1.6						
CW1010	0.012	0.38	2.32	5.3	<0.2	<10	30	0.53	0.09	2.12	0.11	53.6	16	29	5.24	117	4.54	7.55	0.18	0.36	0.01	0.02	0.49	26.3	17.4	0.63	966	2.89	0.17	0.87	28	910	15.5						
CW1011	<0.005	0.01	0.14	0.5	<0.2	<10	<10	<0.05	0.03	0.11	0.01	13.8	1.2	8	0.07	14.2	0.66	0.95	<0.05	0.04	<0.01	<0.005	0.01	6.5	1.7	0.08	73	0.12	0.01	0.28	1.2	110	0.4						
CW1012	<0.005	0.08	2.05	2.4	<0.2	<10	60	0.26	0.12	1.28	0.03	68.4	24.7	2	1.48	245	8.76	14.35	0.21	0.36	<0.01	0.031	0.24	32.4	25.1	1.37	758	1.37	0.08	0.34	7.4	2820	1.9						
CW1013	0.157	0.29	1.8	0.8	<0.2	<10	280	0.19	0.73	2.06	0.06	58.7	16.9	3	4.2	720	4.25	8.13	0.15	0.37	<0.01	0.031	0.96	26.6	20.2	0.92	528	0.9	0.1	0.21	4.2	2100	1						
CW1014	0.016	0.07	0.77	1.3	<0.2	<10	40	0.08	0.14	0.95	0.02	25	6.7	19	1.38	69	1.92	4.46	0.07	0.22	<0.01	0.008	0.28	12.2	12	0.54	249	0.23	0.07	0.53	9.3	440	1.5						
CW1015	0.093	0.09	1.45	3.9	<0.2	<10	10	0.25	0.3	1.49	0.02	42.1	16.9	41	0.09	227	4.69	6.12	0.19	0.28	0.01	0.013	0.04	18.1	8	0.64	349	2.89	0.03	0.94	16.1	1580	3.2						
MQ1001	1.5	0.6	0.55	3.9	1	<10	20	0.1	1.99	0.24	0.03	38	12.7	12	0.18	181.5	6.69	3.77	0.09	0.36	<0.01	0.009	0.11	15.9	6	0.17	191	6.32	0.04	0.75	18.1	380	4						
MQ1002	0.009	0.14	0.67	0.6	<0.2	<10	20	0.12	0.86	0.73	0.01	31.7	8.6	14	0.87	55.6	2.17	3.54	0.05	0.43	<0.01	0.006	0.18	15.9	15.7	0.51	243	0.63	0.06	0.44	9.5	510	1.6						
MQ1003	0.014	0.12	1.66	0.7	<0.2	<10	10	0.12	0.08	0.51	0.02	36.7	16.1	35	0.28	72.1	2.92	6.24	0.08	0.24	<0.01	0.01	0.05	16.1	24.9	1.27	306	0.37	0.04	0.17	35.9	550	1.7						
MQ1004	0.007	0.16	0.83	0.9	<0.2	<10	20	0.12	0.84	0.52	0.05	70.1	7.2	5	0.46	37	2.93	5.6	0.08	0.32	<0.01	0.021	0.09	31.1	9.5	0.25	417	5.29	0.05	0.78	1.1	520	1.8						
MQ1005	0.196	0.06	0.56	0.2	0.2	<10	10	0.14	0.08	0.39	0.01	53.8	2.6	5	0.09	50.3	2.48	4.87	0.08	0.37	<0.01	0.009	0.05	23.5	4.5	0.28	185	2.15	0.05	1.3	1	270	0.9						
MQ1006	>10.0	15.5	0.06	0.2	>25.0	<10	<10	<0.05	4.36	0.04	0.04	1.54	0.9	11	<0.05	164.5	0.41	0.31	<0.05	<0.02	0.08	0.007	0.01	0.7	1.3	0.04	42	0.28	<0.01	0.09	2.3	20	0.4						
MQ1007	>10.0	3.08	0.07	0.2	6.6	<10	<10	<0.05	2.68	0.05	0.54	1.26	3.4	17	0.06	1260	0.68	0.32	<0.05	<0.02	0.02	0.053	0.01	0.6	1.2	0.05	50	0.62	<0.01	0.06	8.3	10	1.7						
MQ1008	>10.0	1.7	0.52	2.1	3.5	<10	10	0.08	6.86	0.22	0.25	4.48	44	22	0.38	1670	3.44	2.88	0.06	0.08	0.01	0.055	0.11	1.9	9.6	0.36	147	5.22	0.02	0.12	27.2	190	5.4						
MQ1009	5.84	0.82	0.48	0.8	5.9	<10	20	0.09	0.69	0.6	0.04	5.34	50.1	14	0.38	412	3	2.28	0.07	0.11	0.05	0.021	0.11	2.4	5.7	0.37	273	1.43	0.05	0.14	18.7	320	5						
MQ1010	0.337	0.13	0.1	1.3	0.3	<10	<10	<0.05	0.11	0.47	0.01	1.89	8.1	13	0.08	83.4	1.55	0.37	<0.05	<0.02	0.01	<0.005	0.01	0.9	2.2	0.24	146	0.3	0.01	0.06	8.1	170	2						
MQ1011	0.033	0.57	0.33	1.3	<0.2	<10	10	<0.05	0.14	4.12	0.14	2.02	2	13	0.16	1425	6.16	3.05	0.33	0.02	0.14	0.026	0.02	0.8	1.2	0.12	1660	5.2	0.01	0.1	9.9	160	0.5						
MQ1012	>10.0	0.32	0.07	0.6	7.8	<10	<10	<0.05	7.01	0.06	0.01	1.44	2	21	0.07	24.7	0.59	0.47	<0.05	0.02	<0.01	<0.005	0.01	0.6	1.6	0.06	61	0.62	<0.01	0.1	3	30	0.4						
MQ1013	0.024	0.21	0.3	1.7	<0.2	<10	10	0.12	0.2	1.68	0.05	10.25	3.6	27	0.46	208	4.95	1.32	0.12	0.07	0.01	0.019	0.08	4.5	3.5	0.22	724	0.84	0.02	0.18	17	270	3.3						
MQ1014	0.17	0.86	4.59	3	<0.2	10	40	1.08	0.73	2.09	0.62	22.3	54.4	39	1.75	342	7.08	13.7	0.16	0.34	0.01	0.116	0.81	10.7	29.8	1.25	554	4.53	0.14	0.25	155.5	380	12.7						
MQ1015	0.64	0.59	0.73	2.6	1	<10	<10	0.08	0.28	4.48	0.15	11.15	8.2	10	0.27	458	6.58	3.11	0.49	0.16	0.13	0.056	0.03	5.4	0.8	0.1	1920	8.35	0.02	0.36	11.5	170	4.2						
MQ1016	<0.005	0.03	0.57	0.7	<0.2	<10	<10	<0.05	0.02	0.05	0.01	1.57	4.6	11	0.32	23.9	1.56	3.71	<0.05	<0.02	<0.01	0.005	0.02	0.8	6.9	0.36	147	0.19	<0.01	0.28	6.4	10	0.3						
MQ1017	0.225	0.27	2.32	8.2	0.2	<10	10	0.4	0.2	1.96	0.23	19.95	22.1	110	1.27	262	5.07	7.28	0.1	0.23	0.02	0.039	0.36	9.9	16.4	0.71	384	1.88	0.08	0.47	131	430	8.2						
MQ1018	0.009	0.04	0.52	3.3	<0.2	<10	10	<0.05	0.02	2.74	0.11	30.6	12.8	27	0.08	167	3.18	3.31	0.06	0.45	<0.01	0.02	0.02	14.7	7.2	1.53	760	0.12	0.07	0.07	29.4	1070	1.3						
MQ1019	0.006	0.08	0.26	1	<0.2	<10	10	0.05	0.08	0.25	0.01	9.14	6.2	10	0.17	94	0.85	1.41	<0.05	1.08	<0.01	0.005	0.08	4.3	5.3	0.88	81	0.26	0.06	0.17	6.8	10	8.4						
MQ1020	0.005	0.42	5.84	40.1	<0.2	<10	40	0.19	0.15	1.11	0.06	12.85	33.6	94	0.78	91.1	10.2	15.25	0.28	0.17	<0.01	0.054	0.35	5.7	19	1.88	382	0.86	0.06	0.16	110	350	5						
MQ1021	0.026	0.16	0.87	5.3	<0.2	<10	10	0.17	0.26	0.72	0.04	90.8	5.8	5	0.19	77.7	2.32	6.12	0.1	0.48	0.01	0.014	0.03	42.4	19.6	0.43	629	0.22	0.08	1.78	3.7	390	2.6						
MQ1022	0.081	0.29	0.72	4.8	0.2	<10	40	0.62	0.45	0.91	0.43	76.6	1.8	9	1.1	36.2	1.79	5.35	0.18	1.38	0.02	0.059	0.15	36.4															

ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	PGM-MS23	PGM-MS23	PGM-MS23	Au-AA25
Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr	Au	Pt	Pd	Au	
ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
5	0.001	1.34	0.24	5.4	1.1	0.3	9.3	<0.01	1.31	0.3	0.159	0.32	0.11	63	12.65	3.95	54	2.2				39.1	
0.4	<0.001	0.24	0.13	0.8	0.2	<0.2	1.6	<0.01	0.21	<0.2	0.019	0.04	<0.05	7	0.71	0.66	27	<0.5				70.6	
14	0.002	2.49	0.3	9.4	1.4	0.4	13.4	<0.01	1.34	0.6	0.267	0.56	0.14	104	14.2	9.49	34	4					
38.3	<0.001	0.41	0.25	3.1	0.4	0.5	82.5	0.01	0.03	3.8	0.283	0.25	0.72	90	0.26	13.95	96	14.3					
47.8	<0.001	0.33	0.24	2.8	0.4	0.5	97.4	0.01	0.02	3.4	0.286	0.27	0.62	81	0.39	13.5	102	12.5					
1.3	0.002	0.31	0.08	13.9	1.1	<0.2	2.2	<0.01	0.04	1.3	0.074	0.04	0.23	110	0.31	2.66	64	2.8					
2.9	0.001	1.91	0.17	8.9	1	0.5	28.4	0.01	0.04	4.5	0.314	0.02	0.52	60	25.5	20.2	105	8.9					
17	0.001	1.85	0.21	10	1	0.5	28.7	0.01	0.04	3.8	0.315	0.14	0.44	60	47.6	21.5	86	8.7					
1.2	0.001	0.08	0.23	0.2	0.3	<0.2	6	<0.01	0.14	3.8	0.012	<0.02	0.63	6	0.43	1.28	<2	14.2					
47.3	0.001	0.16	0.48	6.2	0.8	0.9	88.3	0.01	0.03	4.2	0.197	0.24	0.69	54	1.71	50.2	189	10.7					
0.4	<0.001	0.02	0.07	0.7	<0.2	<0.2	12.5	<0.01	<0.01	0.2	0.043	<0.02	0.09	5	0.11	1.83	8	1.2					
12.1	0.001	0.19	0.25	10.2	0.8	0.5	22.7	0.01	0.02	4.9	0.352	0.07	0.94	92	0.31	26.7	103	10					
34.6	0.001	0.11	0.08	8.3	1	0.3	15.7	0.01	0.12	3.6	0.271	0.1	0.5	50	0.29	20.7	69	14.2					
15.4	<0.001	0.46	0.14	2.5	0.5	0.6	26.7	<0.01	0.04	2.1	0.134	0.08	0.5	26	1.81	3.6	37	5.6					
0.8	0.003	1.49	0.34	3.3	1.5	0.4	204	0.01	0.08	2	0.273	<0.02	0.3	49	0.44	7.46	26	6.6	0.073	0.002	0.002		
3.5	0.003	5.3	<0.05	0.9	0.5	0.4	27.2	<0.01	0.26	3	0.049	0.02	0.3	9	0.38	1.89	44	14.4					
10.6	<0.001	1.58	0.06	2.2	0.4	0.4	35.3	<0.01	0.11	2.6	0.11	0.06	0.55	24	1.43	4.08	26	13.2					
2.4	<0.001	0.15	<0.05	2.9	0.3	0.2	37.5	<0.01	0.06	5.2	0.166	<0.02	0.84	48	0.4	5.9	50	8.3					
4.5	<0.001	0.82	<0.05	0.6	0.3	0.8	23.5	0.01	0.19	4.5	0.058	0.03	0.33	5	0.53	2.07	91	14.5					
1.7	<0.001	0.15	0.06	0.3	0.2	1.1	68.3	0.01	0.03	3.3	0.068	<0.02	0.26	5	0.89	0.78	39	15.4					
0.5	<0.001	0.04	0.06	0.2	<0.2	<0.2	1.8	<0.01	2.18	<0.2	0.008	<0.02	<0.05	2	0.26	0.24	5	0.5				36.1	
0.8	<0.001	0.28	0.07	0.3	0.2	<0.2	2.3	<0.01	1.08	<0.2	0.006	0.03	<0.05	3	0.69	0.19	57	<0.5				10.85	
5.6	0.001	2.45	0.18	3.7	1.1	0.3	3.8	<0.01	1.22	0.3	0.096	0.46	0.08	45	4.8	2.82	41	2				33.4	
4.5	0.002	1.58	0.21	5.9	0.7	0.2	6.7	<0.01	0.23	0.2	0.174	0.07	0.05	61	39.7	5.79	12	1.9					
1.1	<0.001	0.36	0.06	0.8	0.7	<0.2	13.3	<0.01	0.15	<0.2	<0.005	0.1	<0.05	5	4.77	1.82	3	<0.5					
0.9	0.001	1.88	<0.05	3.3	3.5	0.6	5.8	<0.01	0.17	<0.2	0.008	0.14	0.15	28	131	4.99	9	0.8					
0.4	<0.001	0.11	0.08	0.4	<0.2	<0.2	1.5	<0.01	3.16	<0.2	0.015	0.02	0.05	5	1.01	0.43	2	0.5				18.7	
5.3	<0.001	1.34	0.12	0.8	1	0.3	14.6	<0.01	0.19	1.1	0.026	0.09	0.24	9	7.25	3.32	16	3.2					
35.4	0.011	4.39	0.23	6.5	4.4	1.7	39.1	0.01	1.07	3.8	0.183	0.49	0.46	66	6.12	8.21	292	14.6					
1.3	0.001	1.54	0.13	2.2	1.4	1.2	7.7	0.01	0.29	0.9	0.038	0.07	0.26	17	122	5.28	10	6.5					
1.1	<0.001	0.02	<0.05	1.5	<0.2	0.3	1.1	<0.01	0.01	<0.2	0.059	<0.02	<0.05	24	0.97	0.24	22	<0.5					
19.8	0.007	1.79	0.47	5	2.2	0.9	20.5	0.01	0.16	2.7	0.184	0.21	0.38	98	14.55	11.4	140	7					
0.5	<0.001	0.97	0.17	8.1	0.5	<0.2	34.5	<0.01	0.01	2.4	<0.005	<0.02	0.35	46	0.21	4.77	20	17.9					
3.4	<0.001	0.21	0.13	0.6	0.9	<0.2	6.5	<0.01	0.01	11.5	0.011	0.2	3.98	4	0.23	1.97	4	29.8					
11.9	0.002	1.37	1.05	20	1.2	0.2	14.2	<0.01	0.33	1.4	0.09	0.1	0.21	236	2.12	11	159	7.6					
1.2	<0.001	0.34	0.31	1.2	0.5	0.6	17.5	0.01	0.06	6.8	0.105	<0.02	0.65	21	2.39	8.15	34	19.9					
13.9	<0.001	0.27	1.39	1.1	0.9	1.6	23.8	0.02	0.04	6.2	0.041	0.06	0.99	10	7.09	26.2	113	46.5					
42.8	0.001	0.02	0.16	1.8	1.6	5.6	15	0.04	<0.01	15.5	0.074	0.29	2.54	2	0.8	56.8	49	211					
0.8	0.004	>10.0	7.23	0.5	1.6	<0.2	1	<0.01	0.3	<0.2	<0.005	0.08	0.18	4	0.37	0.9	<2	1.1					
19.4	<0.001	1.39	0.42	3.4	0.6	1.9	53.5	0.01	0.04	6.6	0.155	0.11	0.73	23	16.35	13.5	54	47.5					
6.4	0.002	1.81	0.22	3.7	0.6	1.9	19.5	0.02	0.04	10.6	0.1	0.03	0.96	6	4.91	18.1	18	57.4					
3.1	0.001	0.15	<0.05	5.6	0.3	<0.2	4	<0.01	0.02	<0.2	0.026	0.03	<0.05	47	2.69	3.31	9	0.5	0.037	0.0037	0.004		
4.9	<0.001	0.03	0.33	0.9	0.6	1.1	41.6	0.02	0.02	5.2	0.029	<0.02	0.74	1	0.23	24	15	20.3					
1.7	<0.001	1	0.14	6.8	1.2	0.7	42.1	0.01	0.08	3.9	0.303	<0.02	0.62	69	0.49	18.75	52	16.9					
3.6	0.002	1.15	0.06	8.5	1.7	0.5	64.4	0.01	0.12	3	0.299	0.02	0.54	80	0.3	13.85	51	7.5					
1	0.001	0.65	0.06	9.4	1.9	0.5	38.5	0.01	0.04	3	0.289	<0.02	0.45	86	0.34	15	61	7					
10	<0.001	0.03	0.06	3	0.2	0.2	18.1	<0.01	0.06	1.1	0.12	0.05	0.13	43	23.2	3.66	29	2.7					
13.2	0.001	0.25	0.24	1.3	1.5	1.6	6	0.04	0.06	10	0.044	0.05	1.48	3	1.24	55.1	23	67.3					
2.1	0.002	1.7	0.09	3.9	2.1	0.4	70.7	<0.01	0.2	1.9	0.207	<0.02	0.24	49	5.72	7.76	75	7.4					
19.3	0.002	0.33	0.29	8.3	1.5	0.3	15.3	<0.01	0.04	2	0.197	0.12	0.29	146	0.21	7.2	42	5.7					
0.3	<0.001	0.07	0.11	1.5	0.4	<0.2	25.4	<0.01	0.03	0.4	0.077	<0.02	0.06	15	0.2	2.65	19	1.9					
3.9	<0.001	1.26	0.08	2.5	0.3	0.2	13.7	<0.01	0.09	2.7	0.067	0.03	0.43	22	0.13	2.43	23	9.1					
13.7	<0.001	1.15	0.21	3	0.5	0.2	12.3	<0.01	0.05	2.6	0.064	0.13	0.54	27	<0.05	2.7	31	13.5					



ALS Canada Ltd.
 2103 Dollarton Hwy
 North Vancouver BC V7H 0A7
 Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: **RDF CONSULTING LTD**
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

Page: 1
 Finalized Date: 10-NOV-2010
 This copy reported on
 12-NOV-2010
 Account: RDFCON

CERTIFICATE TB10159170

Project:
 P.O. No.:
 This report is for 48 Rock samples submitted to our lab in Thunder Bay, ON, Canada on 28-OCT-2010.

The following have access to data associated with this certificate:

DEAN FRASER

TROY MOCHORUK

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
ME-MS41	51 anal. aqua regia ICPMS	
ME-OG46	Ore Grade Elements - AquaRegia	ICP-AES
Cu-OG46	Ore Grade Cu - Aqua Regia	VARIABLE
Au-AA25	Ore Grade Au 30g FA AA finish	AAS
Au-AA23	Au 30g FA-AA finish	AAS

To: **RDF CONSULTING LTD**
ATTN: DEAN FRASER
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

TB10159170 - Finalized																																			
CLIENT : RDFCON - RDF Consulting Ltd																																			
# of SAMPLES : 48																																			
DATE RECEIVED : 2010-10-28 DATE FINALIZED : 2010-11-10																																			
PROJECT :																																			
CERTIFICATE COMMENTS : ME-MS41:Interference: Ca>10% on ICP-MS As ICP-AES results shown. ME-MS41:Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5g).																																			
PO NUMBER :																																			
SAMPLE	Au-AA23	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41							
DESCRIP	Au	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb		
ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm			
MQ1039	0.005	0.05	0.15	1	<0.2	<10	<10	<0.05	0.1	0.15	0.01	1.63	4.9	14	0.06	61.5	0.64	0.71	<0.05	0.15	0.24	<0.01	<0.005	0.01	0.12	29.9	2	0.09	59	0.61	0.01	0.1	15.8	30	0.5
MQ1040	0.342	0.35	1.23	90	0.2	<10		20	0.3	0.84	1.96	1.17	69.1	5.7	17	0.36	25.8	3.31	8.85	0.15	0.24	0.03	0.05	0.12	29.9	17.9	0.65	475	10.15	0.02	1.28	14.9	5840	12.3	
MQ1041	0.086	0.33	1.13	16.8	<0.2	<10		10	0.22	0.11	1.14	0.07	5.78	50.8	214	0.33	149	4.12	2.83	0.11	0.15	0.02	0.008	0.11	3.1	20.9	0.45	202	0.83	0.03	0.18	242	190	5.5	
MQ1042	0.029	0.59	0.53	29	<0.2	<10		10	0.17	0.67	1.31	0.24	17.2	81.5	63	0.12	616	4.64	1.9	0.12	0.23	0.02	0.03	0.03	9.4	2.5	0.26	317	2.15	0.03	1.1	233	400	16.4	
MQ1043	0.017	0.43	1.01	30.4	<0.2	<10		10	0.18	0.45	1.11	0.14	12.65	37.2	148	0.17	528	5.08	3.33	0.12	0.19	0.01	0.019	0.06	6.8	5.8	0.66	404	0.92	0.04	0.6	181.5	520	7	
MQ1044	0.452	0.31	0.58	7.7	0.3	<10		10	0.13	0.21	1.88	0.08	10.6	24.4	32	0.33	324	5.01	2.49	0.1	0.1	0.01	0.023	0.08	5.1	3.1	0.29	560	2.56	0.07	0.19	61.8	1650	1.4	
MQ1045	0.107	0.13	0.31	3	<0.2	<10	<10		0.1	0.08	1.54	0.03	2.66	9.6	15	0.16	146.5	2.26	2.17	0.25	<0.02	0.36	0.02	0.01	1.4	1.4	0.12	352	11.65	0.01	0.6	15.1	290	1.4	
MQ1046	0.012	0.04	0.69	2	<0.2	<10		10	0.13	0.2	0.58	0.03	3.98	5.1	23	0.2	36	1.46	2.98	0.07	0.09	<0.01	0.011	0.04	2.1	8.9	0.39	152	1.39	0.04	0.38	16.8	120	1	
MQ1047	<0.005	0.03	0.4	0.9	<0.2	<10		10	0.07	0.09	0.33	0.04	5.06	5.3	28	0.1	28.1	1	1.82	0.05	0.05	<0.01	0.006	0.02	2.6	7	0.3	123	0.37	0.02	0.17	14.8	150	1	
MQ1048	2.75	8.66	0.19	0.9	2.6	<10		40	<0.05	19.6	0.09	<0.01	6.92	6.4	48	0.11	53.1	2.65	2.17	0.09	0.49	<0.01	0.011	0.17	4.3	1	0.05	24	229	0.02	0.82	33.1	390	41.9	
MQ1049	0.03	0.11	2.86	0.3	<0.2		20	20	0.55	0.35	2.8	0.04	31.9	10.3	47	2.25	216	1.75	9.33	0.14	0.32	<0.01	0.012	0.09	17.3	44.5	1.03	228	1.15	0.11	0.18	22	780	2.2	
MQ1050	0.007	0.08	0.21	0.8	<0.2	<10		10	0.19	0.31	0.37	0.05	2.82	3.6	14	0.11	23.9	0.76	1.19	0.06	0.03	0.05	0.01	0.01	1.3	1	0.11	143	1.9	0.01	0.59	10.5	310	12	
MQ1051	0.431	1.89	1.02	30.5	0.3	<10		40	0.32	1.08	0.2	0.14	25.3	24.7	21	1.24	124.5	6.4	4.75	0.11	0.69	0.01	0.049	0.34	10.3	16.6	0.44	270	2.87	0.04	2.12	36.8	420	21.5	
MQ1052	<0.005	0.03	0.52	0.6	<0.2		10	30	0.09	0.05	2.09	0.08	16.1	5.5	15	0.24	20.3	1.14	2.41	<0.05	0.12	<0.01	0.008	0.1	8.4	6.9	0.27	498	0.5	0.02	0.63	12.3	390	1.3	
MQ1053	0.178	0.12	0.78	0.9	<0.2	<10		20	0.2	0.12	1.15	0.03	49	8.9	33	0.27	20.5	2.18	5.82	0.1	0.51	<0.01	0.01	0.09	24.1	9.7	0.62	440	0.55	0.04	0.58	27.4	650	3.3	
MQ1054	<0.005	0.04	1.65	0.2	<0.2	<10		270	0.1	0.04	0.53	0.02	57.5	16	17	6.36	48.3	3.4	6.59	0.14	0.28	<0.01	0.015	0.89	28.6	70.5	1.05	345	1.81	0.09	0.26	14.8	410	3.5	
MQ1055	0.025	0.12	2.08	0.5	<0.2	<10		10	0.18	0.04	3.55	0.03	12.75	10	26	0.12	262	1.31	4.32	0.11	0.17	<0.01	0.008	0.03	6.3	19.2	0.42	219	0.34	0.03	0.18	70.2	350	1.9	
MQ1056	0.009	0.07	1.53	1.5	<0.2	<10	<10		0.14	0.03	3.27	0.01	19.4	6.8	26	0.1	188	1.02	4.06	0.13	0.16	<0.01	0.009	0.02	9.6	13.3	0.3	176	0.33	0.02	0.3	25.4	320	0.9	
MQ1057	0.008	0.23	1.62	0.7	<0.2	<10		40	0.16	0.29	2.23	0.04	20.4	18.2	45	0.14	316	3.82	3.98	0.16	0.13	<0.01	0.009	0.15	9.7	9.3	0.73	654	80.7	0.12	0.31	61.6	680	3	
MQ1058	0.005	0.09	1.59	8.5	<0.2	<10		10	0.83	0.32	1.18	0.15	97.6	10.1	18	0.15	29.2	2.01	9.39	0.25	1.83	<0.01	0.079	0.06	44.1	21.9	0.57	244	1.77	0.04	2.28	15.7	120	7.7	
MQ1059	<0.005	0.08	2.21	1.5	<0.2	<10	<10		0.17	0.2	1.59	0.08	21	33.1	4	0.21	134	4.31	9	0.22	0.22	<0.01	0.03	0.05	10.3	29.2	1.21	379	0.86	0.09	0.14	18.3	770	3.8	
MQ1060	0.268	5.33	0.39	0.5	0.4	<10		30	<0.05	8.19	0.21	0.04	10.3	9.3	18	0.1	>10000	3.41	3.23	0.09	0.25	0.01	0.064	0.08	5	4.1	0.24	72	12.75	0.05	0.74	14.8	450	9.3	
MQ1061	0.05	0.55	1.06	7.9	<0.2	<10		50	0.22	2.79	0.55	0.06	53.9	51.8	37	0.15	72.7	3.47	6.36	0.13	0.45	<0.01	0.007	0.08	25.2	17.6	0.92	1040	5.32	0.04	0.53	34.7	870	6.2	
RQ1001	0.009	0.12	0.72	0.6	<0.2	<10		10	0.21	0.33	0.7	0.07	44.4	5.5	6	0.37	38.8	1.3	4.37	0.08	0.29	<0.01	0.014	0.1	17.3	4	0.1	141	5.67	0.05	1.9	5.9	550	2.4	
RQ1002	0.067	0.87	0.49	11.8	<0.2	<10	<10		0.05	2.02	0.26	0.06	11.45	968	9	0.28	991	32.4	2.2	0.61	0.12	0.02	0.005	0.03	4.5	4.2	0.2	116	2.07	0.02	0.83	40.1	210	3.9	
RQ1003	0.048	0.29	0.91	2.2	<0.2	<10	<10		0.22	0.49	1.34	0.03	31.1	16.9	24	0.11	166.5	8.13	3.45	0.21	0.28	<0.01	0.015	0.04	12.6	4.8	0.35	256	3.57	0.05	1.12	57	1610	2.5	
RQ1004	0.009	0.17	1.01	1.1	<0.2	<10		10	0.14	0.17	1.3	0.03	44.2	25.6	26	0.31	74.3	2.66	3.73	0.15	0.23	<0.01	0.013	0.09	19.9	11.6	0.67	308	16.7	0.09	0.69	52.6	1050	1.9	
RQ1005	0.017	0.11	0.72	1.6	<0.2	<10		20	0.11	0.34	0.8	0.13	60.6	10.8	4	0.46	33.1	2.32	4.35	0.1	0.37	<0.01	0.023	0.11	25.4	8.1	0.16	360	7.57	0.07	1.19	5.2	1480	3.1	
RQ1006	>10.0	5.18	0.82	1	>25.0	<10		30	0.05	16.1	0.37	0.18	9.2	14.7	54	0.62	3340	2.65	2.83	0.07	0.11	0.06	0.142	0.11	3.8	15.2	0.77	220	1.31	0.04	0.12	48.5	200	2.8	
RQ1007	>10.0	1.01	0.31	0.5	13.5	<10		30	0.05	1.97	0.27	0.02	6.69	6	57	0.5	415	0.74	1.16	<0.05	0.05	0.02	0.027	0.09	2.6	7.3	0.32	109	0.37	0.03	0.08	33.2	140	0.4	
RQ1008	>10.0	1.99	0.23	0.4	>25.0	<10	<10		<0.05	6.34	0.09	0.09	2.37	11.7	23	0.16	1525	2.56	0.9	0.05	0.03	0.04	0.205	0.03	1.1	2.6	0.17	68	2.76	0.01	0.08	75.4	40	3.3	
RQ1009	0.069	0.88	0.31	2.2	<0.2	<10	<10		<0.05	0.27	4.74	0.14	2.41	10	9	0.24	1795	9.88	2.99	0.41	<0.02	0.08	0.027	0.01	0.8	1	0.15	2270	3.03	0.01	0.17	14.4	150	1	
RQ1010	0.066	0.05	0.19	0.8	<0.2	<10	<10		<0.05	0.11	0.58	0.03	7.56	5.8	30	0.17	41	0.86	0.66	<0.05	0.03	<0.01	<0.005	0.03	3.1	2.7	0.24	150	0.92	0.02	0.09	22.2	240	0.3	
RQ1011	0.028	0.06	0.27	9	<0.2	<10	<10		0.07	0.09	17.15	0.1	3.62	18.8	100	0.25	135	1.38	1	0.07	0.02	0.01	<0.005	0.01	1.9	4.1	0.51	1860	0.32	0.04	0.14	353	60	1.2	
RQ1012	9.33	0.42	0.22	3.8	8.3	<10	<10		<0.05	0.05	0.95	0.02	1.6	6.5	18	0.15	61.9	1.11	0.81	0.06	0.06	0.03	0.005	0.02	0.6	1.3	0.15	121	0.19	0.03	0.2	13.6	20	0.8	
RQ1013	0.167	0.18	0.92	15.1	<0.2	<10		10	0.09	0.19	1.25	0.25	13.3	14.6	26	0.6	251	5.52	4.12	0.12	0.17	0.02	0.022	0.18	6.7	6.8	0.31	579	0.79	0.02	0.37	111	90	3.5	
RQ1014	<0.005	0.03	1.11	0.6	<0.2	<10		10	0.2	0.08	0.92	0.03	38.2	10.3	9	0.18	41.2	2.																	

ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	Cu-OG46	Au-AA25
Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr				
ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
0.5	<0.001	0.21	0.05	0.7	0.2	<0.2	9.1	<0.01	0.05	<0.2	0.025	<0.02	<0.05	6	0.07	0.57	4	0.6				
5.2	0.001	1.51	0.52	4.6	0.9	0.7	83.9	0.01	0.15	6.2	0.136	0.03	0.99	22	21.7	34.4	372	11.9				
7.6	0.002	2.4	0.33	3.5	2.2	0.4	12.9	<0.01	0.32	0.6	0.124	0.24	0.12	48	18.55	5.16	34	3.9				
1.6	0.006	3.73	0.3	1.4	6	0.5	40.1	<0.01	0.45	2	0.088	0.23	0.33	13	8.31	7.33	87	6				
2.4	0.003	3.34	0.31	2.9	5.1	0.3	44.7	<0.01	0.3	1.5	0.133	0.2	0.23	29	2.47	5.94	60	4.7				
2.3	0.01	2.63	0.18	1.9	2.8	0.3	12.9	<0.01	0.43	0.8	0.041	0.05	0.16	32	5.32	12.2	41	2.6				
1.1	0.006	0.5	0.15	1.2	1.7	1.1	6.9	<0.01	0.09	<0.2	0.014	0.06	0.35	21	390	4.54	7	0.5				
1.9	<0.001	0.05	0.08	2.2	0.3	0.6	21.2	<0.01	0.04	0.3	0.137	<0.02	0.18	28	0.76	2.04	17	2.1				
0.9	<0.001	0.06	0.05	1.2	<0.2	0.2	17.6	<0.01	0.03	0.2	0.053	<0.02	0.06	15	1.25	1.33	17	1.8				
4.2	0.038	0.88	0.14	0.8	3.2	0.7	34.8	<0.01	14.3	3.4	0.175	0.03	2.85	26	1.62	1.18	4	15.9				
4.2	<0.001	0.08	0.09	4.1	0.3	0.3	81.8	<0.01	0.08	4	0.155	<0.02	1.47	69	0.51	6.31	21	9				
0.8	0.001	0.02	<0.05	0.9	<0.2	0.4	8.8	<0.01	0.12	<0.2	0.026	0.02	0.39	9	53.4	0.73	60	1.2				
25	0.001	5.18	1.21	2.7	0.8	2.2	18.6	<0.01	0.17	8.3	0.073	0.47	1.81	24	2.58	4.47	38	21.5				
5.8	<0.001	0.03	0.05	2	0.2	0.2	87.8	<0.01	0.01	1.4	0.062	0.02	0.26	24	0.61	4.52	22	4				
3.9	0.001	0.18	0.1	2.5	0.4	0.5	79.2	<0.01	0.03	5.1	0.19	0.02	0.95	45	1.28	8.53	48	16.9				
60.3	0.001	0.05	<0.05	6.4	0.4	0.3	9.1	<0.01	0.03	18.7	0.221	0.41	1.76	89	0.17	6.8	59	10.7				
1.6	<0.001	0.08	0.06	3.9	0.4	0.2	29	<0.01	0.02	0.9	0.181	<0.02	0.14	54	0.59	7.21	16	4.5				
1.2	<0.001	0.03	0.06	4.2	0.4	0.2	53	<0.01	0.01	0.9	0.189	<0.02	0.14	46	0.46	7.01	7	3.4				
2.9	0.027	0.43	0.05	5	1	0.2	37	<0.01	0.2	1.4	0.132	0.04	0.25	39	0.41	4.44	34	3				
1.8	0.001	0.33	0.41	2.5	1.4	3.7	31.7	0.04	0.12	11.6	0.067	<0.02	1.76	22	0.55	42.7	33	44.3				
1.8	0.002	0.49	0.14	8.1	1.5	0.5	9.5	0.01	0.15	1.1	0.166	0.02	0.15	99	0.55	11.2	35	6.5				
3.4	0.001	1.68	0.07	1.5	4.8	0.3	64	<0.01	2.1	3.4	0.141	0.02	0.87	21	0.67	0.87	15	10	1.305			
3.5	0.002	2.26	0.12	2.3	1.6	0.3	124	<0.01	0.72	6.3	0.141	0.14	1.22	29	0.57	5.32	54	16.8				
6.2	0.001	0.42	0.08	0.7	0.2	0.9	78.4	0.01	0.08	4.8	0.093	0.03	0.4	3	0.58	2.59	41	11.2				
1.8	0.002	>10.0	0.05	0.9	20.7	<0.2	14.1	<0.01	2.36	1.2	0.055	0.02	0.17	34	0.42	2.15	24	3				
1.4	<0.001	6.45	0.1	3.4	2	0.5	76.7	0.01	0.34	3.4	0.19	<0.02	0.52	43	0.62	6.72	32	7.8				
4.4	0.005	1.17	0.1	3.5	0.6	0.3	57	0.01	0.12	4.6	0.204	0.03	0.65	49	0.66	8.09	40	5.7				
6.7	0.001	0.49	0.07	0.7	0.2	0.7	24.8	0.01	0.07	4.5	0.056	0.05	0.42	6	0.84	3.07	102	16.6				
6.2	<0.001	1.15	0.15	4.3	0.8	0.2	6.7	<0.01	1.07	0.8	0.069	0.22	0.14	42	7.81	2.3	29	3.6		35.8		
5.8	<0.001	0.11	0.08	1.2	0.2	<0.2	7.4	<0.01	1.26	0.3	0.047	0.04	0.06	13	6.76	1.37	12	1.5		24.4		
1.1	0.001	1.52	0.11	1.3	1.6	<0.2	3.1	<0.01	0.9	<0.2	0.016	0.37	0.05	11	3.95	0.66	10	0.7		27		
2.1	0.001	3.01	0.07	2.7	5	0.4	4.2	<0.01	0.3	<0.2	0.006	0.41	0.13	17	61.6	6.25	9	0.5				
2	<0.001	0.13	0.08	0.9	0.2	<0.2	17.2	<0.01	0.05	0.2	0.021	0.02	0.07	9	1.83	2.14	8	0.6				
0.9	0.001	0.45	0.16	1.3	2.2	<0.2	95.1	<0.01	0.17	<0.2	0.017	0.02	0.05	4	3.62	10.45	7	0.7				
2.2	<0.001	0.27	0.4	1.7	0.3	<0.2	11.2	<0.01	0.06	<0.2	0.095	<0.02	<0.05	11	15.15	2.95	6	1.1				
5	0.002	1.7	0.19	2.7	1.8	0.2	8.3	<0.01	0.42	1.7	0.073	0.1	0.15	27	3.23	4.2	144	6.8				
1.1	0.001	0.04	0.11	5	0.5	0.4	24.5	0.01	0.01	1.8	0.139	<0.02	0.36	26	0.26	12.4	46	12.2				
0.6	0.003	1.75	0.27	0.3	1.4	0.2	6.2	<0.01	0.4	0.4	0.006	0.03	0.06	4	1.71	2.55	61	1				
0.3	<0.001	0.09	0.07	1.3	0.7	<0.2	2.2	<0.01	0.01	<0.2	<0.005	<0.02	<0.05	6	0.47	1.79	8	<0.5				
5.7	<0.001	0.09	0.16	0.6	1.1	1.1	13	0.04	0.08	10.9	0.014	0.04	1.81	1	2.06	43.5	128	31.3				
4.1	<0.001	0.63	0.14	0.7	1	1	9.2	0.02	0.1	12.4	0.021	0.04	2.73	3	0.67	40.4	16	36.9				
3.3	0.001	0.22	0.2	1.8	1	3.1	49.4	0.05	0.09	11.6	0.072	<0.02	1.63	5	0.78	51.2	56	43.8				
6.8	<0.001	1.4	0.17	15.3	1	0.7	30.9	0.02	0.11	4.8	0.311	0.06	0.56	105	1.73	23.6	102	14.1				
13.4	<0.001	0.44	0.21	1.1	0.3	0.9	3.5	0.01	0.02	10.1	0.032	0.07	2.07	9	3.96	13.55	39	23.4				
7.5	<0.001	0.53	0.16	4.1	0.7	1	18.8	0.02	0.05	5	0.117	0.04	0.86	31	2.73	24.4	55	17.2				
13.2	<0.001	0.01	0.07	8.2	0.4	0.3	15.6	0.01	0.01	2.6	0.236	0.04	0.31	44	0.22	13.15	42	9.5				
43.3	0.002	0.1	0.12	9.1	1.2	0.7	20.9	0.01	0.02	5.1	0.289	0.15	0.94	48	0.22	24.6	87	19.1				
3.3	<0.001	0.47	0.1	0.2	0.3	0.4	4.9	0.01	0.09	5.4	0.046	<0.02	0.59	9	0.49	1	4	11				



ALS Canada Ltd.
 2103 Dollarton Hwy
 North Vancouver BC V7H 0A7
 Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: **RDF CONSULTING LTD**
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

Page: 1
 Finalized Date: 9-NOV-2010
 Account: RDFCON

CERTIFICATE TB10159171

Project:
 P.O. No.:
 This report is for 42 Rock samples submitted to our lab in Thunder Bay, ON, Canada on 28-OCT-2010.

The following have access to data associated with this certificate:

DEAN FRASER

TROY MOCHORUK

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
ME-MS41	51 anal. aqua regia ICPMS	
ME-OG46	Ore Grade Elements - AquaRegia	ICP-AES
Cu-OG46	Ore Grade Cu - Aqua Regia	VARIABLE
PGM-MS23	Pt, Pd, Au 30g FA ICP-MS	ICP-MS
Au-AA23	Au 30g FA-AA finish	AAS

To: **RDF CONSULTING LTD**
ATTN: TROY MOCHORUK
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

TB10159171 - Finalized																																	
CLIENT : RDFCON - RDF Consulting Ltd																																	
# of SAMPLES : 42																																	
DATE RECEIVED : 2010-10-28 DATE FINALIZED : 2010-11-09																																	
PROJECT :																																	
CERTIFICATE COMMENTS : ME-MS41:Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5g).																																	
PO NUMBER :																																	
SAMPLE	Au-AA23	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
DESCRIPTION	Au	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb
ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	
RQ1026	0.142	0.57	0.47	13	<0.2	<10	10	<0.05	0.85	0.31	0.01	9.57	38	6	0.75	170	4.36	2.06	0.11	0.13	0.02	0.01	0.05	3.8	3.1	0.25	116	2.41	0.04	0.35	45.8	540	1.8
RQ1027	0.031	0.07	1.21	1.9	<0.2	<10	10	0.15	0.11	1.2	0.04	17.2	44.4	59	0.14	431	3.85	3.99	0.14	0.42	0.01	0.017	0.07	6.4	21.2	1.13	333	0.44	0.07	0.54	56.3	1350	2.2
RQ1028	<0.005	0.03	0.2	1.2	<0.2	<10	<10	<0.05	0.02	2.91	0.05	1.36	3.2	13	0.08	28.4	2.27	0.83	0.14	<0.02	0.01	<0.005	<0.01	0.6	2	0.1	593	1.73	0.01	0.1	3.7	130	0.6
RQ1029	<0.005	0.08	1.8	3.4	<0.2	<10	<10	0.1	0.09	1.07	0.03	23.5	31.7	3	0.21	191.5	4.81	8.34	0.18	0.23	<0.01	0.02	0.05	12	16.1	0.93	590	0.67	0.12	0.25	6.1	710	1.9
RQ1030	0.005	0.08	0.29	0.8	<0.2	<10	<10	<0.05	0.04	0.17	0.01	3.6	2.7	9	0.07	41.4	1.03	1.21	<0.05	0.04	<0.01	<0.005	0.01	1.3	4.1	0.17	89	0.2	0.02	0.29	5.9	180	1.1
RQ1031	<0.005	0.12	0.05	0.2	<0.2	<10	<10	<0.05	0.02	0.04	<0.01	0.54	0.6	9	<0.05	9.3	0.28	0.22	<0.05	<0.02	<0.01	<0.005	<0.01	0.3	0.5	0.02	28	0.08	0.01	0.08	1.3	30	0.5
RQ1032	0.006	0.16	0.19	1.3	<0.2	<10	30	1.52	0.2	0.39	0.01	77.8	2.2	9	0.13	11.2	1.94	2.1	0.09	1.36	0.01	0.017	0.1	32.2	2.6	0.04	51	1.13	0.03	6.97	1.9	50	3.2
RQ1033	0.229	0.34	0.19	1.5	<0.2	<10	<10	<0.05	0.4	0.09	0.06	4.44	3.7	7	0.14	456	1.05	0.84	<0.05	0.04	<0.01	0.055	0.01	2	2.4	0.1	97	0.11	0.01	0.2	5.3	140	0.5
RQ1034	0.495	0.5	0.08	9.3	0.5	<10	<10	<0.05	0.71	0.02	0.04	0.89	2.5	6	0.15	580	1.09	0.54	<0.05	0.03	0.01	0.088	<0.01	0.4	0.8	0.03	35	0.27	<0.01	0.11	3.7	80	0.6
RQ1035	<0.005	0.03	0.03	0.6	<0.2	<10	<10	<0.05	0.03	0.03	0.01	0.84	0.5	7	0.08	6.2	0.21	0.16	<0.05	<0.02	<0.01	<0.005	0.01	0.4	0.5	0.01	53	0.37	<0.01	0.05	1.2	10	0.7
RQ1036	0.014	0.3	0.65	8.1	<0.2	<10	20	0.05	0.61	0.15	0.01	21.6	7.6	17	1.21	33.6	1.55	3.46	<0.05	0.21	<0.01	0.005	0.15	9.4	11.1	0.37	144	7.85	0.02	0.1	16.6	360	8.9
RQ1037	<0.005	0.07	0.43	2.9	<0.2	<10	20	0.1	0.21	0.13	0.01	20	2.1	10	0.47	6.3	0.83	2.49	<0.05	0.41	<0.01	<0.005	0.1	9.6	9.1	0.26	109	7.56	0.04	0.13	6.6	110	11
RQ1038	0.013	0.11	0.75	8	<0.2	<10	50	0.07	0.12	0.52	0.03	24.5	7.7	25	4.38	16.8	1.96	3.69	0.05	0.41	<0.01	0.01	0.38	10.8	20	0.6	200	0.94	0.05	0.3	14.5	380	2.7
RQ1039	<0.005	0.09	0.95	12.5	<0.2	<10	90	0.07	0.18	0.32	0.02	19.8	6	19	5.04	21.1	1.93	5.16	0.05	0.33	0.01	0.011	0.36	9.2	29.3	0.79	279	0.51	0.05	0.08	12.2	300	2.8
RQ1040	<0.005	0.06	0.64	3.4	<0.2	<10	10	<0.05	0.18	0.22	0.03	10.65	5.2	35	0.19	14.3	1.24	2.85	<0.05	0.11	<0.01	<0.005	0.04	4.2	11.8	0.37	263	0.24	0.02	0.4	13	230	4
RQ1041	0.899	0.54	1	116.5	0.7	<10	10	0.16	1.06	0.4	0.06	38.4	5.4	3	0.23	31.4	4.88	5.56	0.12	0.46	0.01	0.03	0.09	15.4	12.8	0.5	480	3.89	0.04	0.37	2.2	720	8.1
RQ1042	0.007	0.07	1.41	2.1	<0.2	<10	180	0.1	0.11	0.62	0.03	30.1	8.5	59	1.48	42.2	2.05	6.17	0.08	0.39	<0.01	0.013	0.65	13.9	26.4	0.88	372	1.18	0.05	0.28	26.9	280	4
RQ1043	<0.005	0.07	1.68	1.8	<0.2	<10	150	0.09	0.07	0.55	0.02	31.6	12.7	16	1.92	22	3.11	8.26	0.11	0.63	<0.01	0.02	0.94	13.5	37.9	1.18	355	0.44	0.07	0.36	20.4	780	1.4
RQ1044	0.01	0.05	3	3.1	<0.2	<10	20	0.27	0.07	1.25	0.02	13.95	55.7	11	2.03	318	5.96	11.7	0.16	0.55	0.01	0.026	0.09	4.6	45.6	3.1	514	0.69	0.13	0.14	70.9	320	1.1
RQ1045	2.96	1.03	1.41	22.1	<0.2	<10	20	0.44	1.44	0.81	0.38	15.65	70.2	24	1.19	355	8.42	4.16	0.12	0.3	0.03	0.087	0.25	7.1	28.2	0.49	235	3.22	0.01	0.17	106	450	16.8
RQ1046	0.121	0.09	0.67	12.4	<0.2	<10	10	0.14	0.1	2.38	0.44	15.05	7.5	13	0.49	124.5	2.45	2.51	0.06	0.21	0.01	0.013	0.13	7.3	6.5	0.27	204	0.82	0.03	0.54	24	260	2.1
RQ1047	0.025	0.38	0.57	7.4	<0.2	<10	10	0.44	0.14	3.31	0.12	7.66	15.5	8	0.77	110.5	6.07	2.21	0.14	0.07	<0.01	0.074	0.07	3	13.5	0.92	661	0.48	0.02	0.12	17.4	330	19.8
RQ1048	0.09	0.19	2.85	6.1	<0.2	<10	20	1.3	0.27	3.03	0.03	39.3	32.5	47	0.47	383	2.51	11.7	0.21	0.68	0.01	0.015	0.09	18	48	1.05	334	0.2	0.03	0.23	20.3	770	2.2
RQ1049	0.689	0.18	2.25	8.8	0.4	<10	10	0.07	0.32	0.54	0.01	17.9	46.2	10	0.79	18.1	8.18	8.46	0.15	0.24	0.01	0.013	0.03	7.5	15.7	1.45	732	3.27	0.02	0.53	26.9	780	2
RQ1050	0.043	0.1	1.23	18.1	<0.2	<10	10	0.28	0.25	1.26	0.02	44.9	21.2	12	0.11	311	3.57	4.51	0.19	0.25	<0.01	0.012	0.03	19.5	6.1	0.49	283	0.97	0.02	0.82	18.4	950	2.4
RQ1051	0.024	0.06	1.28	7.7	<0.2	<10	10	0.29	0.1	2.34	0.03	45.7	30	5	0.1	120.5	3.15	4.94	0.16	0.27	<0.01	0.013	0.05	19.4	8	0.57	414	0.69	0.03	0.66	16.1	1140	1.3
RQ1052	<0.005	0.04	1.03	2.4	<0.2	<10	<10	0.12	0.15	0.7	0.02	6.12	16.1	30	0.1	163.5	2.6	3.72	0.09	0.12	<0.01	0.013	0.04	2.6	14.1	0.72	238	0.69	0.05	0.12	35.9	210	0.5
RQ1053	<0.005	0.05	0.45	4.6	<0.2	<10	<10	0.05	0.13	0.37	0.01	2.34	13.9	19	0.12	141.5	1.55	1.76	0.05	0.06	<0.01	0.007	0.03	0.9	5.6	0.3	118	0.75	0.03	0.1	31.3	80	0.5
RQ1054	0.027	0.09	0.14	337	<0.2	<10	<10	<0.05	0.04	0.02	0.13	0.97	5.4	5	0.06	60.5	3.46	0.4	0.05	<0.02	0.27	0.021	0.01	0.5	0.8	0.07	746	0.16	<0.01	0.05	7.5	40	3.2
RQ1055	0.021	3.74	0.45	21.3	<0.2	<10	30	<0.05	54.2	0.1	0.03	8.59	7.1	5	0.41	112.5	1.8	4.05	<0.05	0.22	<0.01	0.015	0.1	3.6	4	0.16	121	0.63	0.05	0.61	3.6	210	22.3
RQ1056	0.021	0.23	1.17	3.9	<0.2	<10	10	0.17	1.26	0.56	0.06	45.9	6.2	6	0.11	21.8	2.81	5.92	0.14	0.39	<0.01	0.02	0.02	18.7	15.6	0.64	337	9.39	0.04	0.9	2.2	610	5.7
RQ1057	0.023	0.08	3.88	0.2	<0.2	<10	10	0.54	0.27	4.89	0.13	16.05	16.4	25	0.15	31.4	1.86	10.05	0.16	0.22	0.25	0.019	0.07	6.8	32.7	0.71	265	1.16	0.04	0.06	23.3	460	2.7
RQ1058	<0.005	0.11	2.1	0.9	<0.2	<10	20	0.19	0.06	1.66	0.03	52.4	20.5	64	0.22	302	3.4	6.73	0.12	0.19	<0.01	0.008	0.07	24.3	30.2	1.57	477	0.38	0.06	0.3	60.9	1470	1.2
RQ1059	<0.005	0.11	1.03	1.6	<0.2	<10	20	0.22	0.16	1.08	0.02	111	17.4	23	0.29	172.5	2.12	4.42	0.17	0.33	<0.01	0.015	0.06	47.1	14.7	0.69	258	0.21	0.08	0.64	28.1	1310	2.1
RQ1060	0.011	0.16	2.18	0.2	<0.2	<10	90	0.38	0.08	1.85	0.05	67.5	15.6	20	2.45	233	4.51	9.51	0.18	0.28	<0.01	0.028	0.91	30.2	18.5	0.65	1070	0.65	0.12	0.29	18.4	2320	2.1
RQ1061	<0.005	0.05	0.66	3.7	<0.2	<10	20	0.26	0.11	0.11	0.04	28.8	1.2	3	0.59	12.6	1.44	6.89	0.06	1.88	<0.01	0.06	0.17	11.9	10.1	0.32	200	0.8	0.02	5.31	2.7	50	3.3
RQ1062	<0.005	0.15	3.5	6.8	<0.2	<10	10	1.28	0.23	4.55	0.02	79.6	20	132	0.13	4.9	1.52	11.6	0.38	0.43	<0.01	0.013	0.04	31.7									

ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	Cu-OG46	PGM-MS2	PGM-MS2	PGM-MS23
Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr		Cu	Au	Pt	Pd	
ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	
2.7	0.001	2.37	0.09	2.6	2.9	<0.2		5.7	<0.01	0.15	0.9	0.056	0.03	0.18	24	0.13	3.73	14	4.1					
2.2	0.002	2.23	0.08	8.5	3.5	0.4		54.6	<0.01	0.04	1.5	0.261	<0.02	0.39	66	0.64	9.28	32	10.3					
0.3	0.001	0.24	<0.05	2.3	0.4	<0.2		7.4	<0.01	0.02	<0.2	0.007	<0.02	<0.05	7	2.87	3.69	5	0.6					
1.6	0.002	0.57	0.13	9.3	1.1	0.2		16	<0.01	0.06	2.6	0.199	<0.02	0.32	105	0.45	7.98	57	7					
0.7	<0.001	0.01	<0.05	1.2	0.2	<0.2		3.9	<0.01	0.05	0.4	0.045	<0.02	0.06	10	0.11	1.69	11	1.6					
0.1	<0.001	<0.01	<0.05	0.3	<0.2	<0.2		1.2	<0.01	0.02	<0.2	0.006	<0.02	<0.05	2	<0.05	0.3	3	<0.5					
2.6	0.001	1.46	0.18	1.1	1.5	1.8		19.1	0.02	0.12	10.2	0.032	<0.02	1.2	4	0.31	39.4	<2	39.3					
0.7	<0.001	0.01	<0.05	1.2	0.3	<0.2		1.8	<0.01	0.08	0.3	0.018	<0.02	0.05	8	<0.05	1.66	10	1.5					
1.3	<0.001	0.06	0.05	0.3	0.5	0.2		1.6	<0.01	0.14	<0.2	0.008	<0.02	0.06	4	<0.05	0.36	3	1.1					
0.7	<0.001	0.02	<0.05	0.2	<0.2	<0.2		0.9	<0.01	<0.01	<0.2	<0.005	<0.02	0.06	1	<0.05	0.12	2	<0.5					
7.8	0.001	0.75	0.08	1.6	0.2	<0.2		9.9	<0.01	0.05	3.2	0.035	0.06	0.75	15	0.12	2.77	19	6.7					
3.9	0.004	0.24	0.07	1.2	<0.2	<0.2		9.2	<0.01	0.01	5	0.03	0.03	1.4	10	0.08	4.49	15	11.8					
25.2	<0.001	1.11	0.27	3.8	0.2	0.3		16.9	<0.01	0.07	2.9	0.115	0.21	0.67	32	0.07	3.72	34	12.8					
23.8	<0.001	1.04	0.22	3.2	0.2	0.2		14.8	<0.01	0.01	2.4	0.082	0.18	0.41	29	<0.05	2.56	47	10.9					
2.2	<0.001	0.06	0.05	1.7	<0.2	0.2		16.4	<0.01	0.05	2.5	0.059	<0.02	0.37	16	0.2	2.73	19	3.2					
4.2	0.001	3.8	0.3	7	0.6	0.4		25.8	0.01	0.12	5.3	0.088	0.02	0.66	10	8.44	16.35	39	15.5					
28.2	0.001	0.07	0.08	6.4	0.2	0.4		13.9	<0.01	0.02	5.2	0.128	0.18	1.11	42	0.2	6.16	40	12.1					
31.2	<0.001	0.13	0.06	6.3	0.3	0.6		12.7	<0.01	0.02	3.5	0.235	0.16	0.4	54	0.2	9.15	63	23.4					
4.3	<0.001	0.71	0.1	12.7	0.9	0.5		31.4	<0.01	0.02	2.2	0.43	0.03	0.32	336	0.63	12	56	13.7					
12.2	0.006	6.56	0.79	3.5	4.8	0.9		11.3	<0.01	1.12	1.7	0.07	0.47	0.31	37	2.83	6.23	159	12.4					
7.5	0.003	0.88	0.27	2.6	1	0.3		10.9	<0.01	0.18	1.8	0.08	0.09	0.23	15	5.61	6.12	184	7.1					
3	0.002	1.54	0.27	3.5	1.1	0.6		24.4	<0.01	0.16	0.3	0.05	0.16	0.07	28	1.79	9.39	66	1.7					
3	<0.001	0.81	0.21	2.3	1.2	0.6		27.8	<0.01	0.06	3.7	0.115	0.02	0.73	36	0.54	10.15	18	22.3					
1.4	0.004	4	0.18	2.9	3	0.3		42.3	0.01	0.14	4.3	0.212	<0.02	0.41	57	0.52	7.05	121	6.4					
1	0.001	2.04	0.51	3.3	0.9	0.3		113.5	0.01	0.07	2.3	0.242	<0.02	0.26	49	0.7	7.99	31	5.4					
1.4	0.001	0.95	0.28	3.7	0.4	0.3		108.5	0.01	0.05	2.7	0.235	<0.02	0.33	62	0.98	7.65	32	5.8					
1.5	<0.001	0.52	0.09	3.5	0.4	0.5		21	<0.01	0.05	0.3	0.138	<0.02	0.12	36	0.21	4.01	29	2.7					
1.4	<0.001	0.58	0.06	1.8	0.4	0.2		11.5	<0.01	0.07	<0.2	0.059	<0.02	0.05	17	0.11	1.57	13	1.2					
0.3	0.001	0.58	7.54	1.1	0.8	<0.2		0.9	<0.01	0.09	<0.2	<0.005	<0.02	<0.05	4	0.08	0.51	18	<0.5		0.027	<0.0005	<0.001	
6	<0.001	0.53	0.14	0.8	0.4	0.2		8.8	<0.01	24.9	1.8	0.042	0.06	0.27	8	0.39	1.16	17	6.5					
1.2	0.001	0.71	0.12	3.6	0.6	0.6		68.5	0.01	0.27	4	0.168	<0.02	0.42	16	0.52	12.6	38	11.3					
1.9	0.003	0.04	<0.05	7.2	0.3	0.2		11.2	<0.01	0.1	1.2	0.159	0.04	0.17	89	220	7.78	106	8					
2.1	<0.001	0.02	0.05	4.8	0.2	0.3		59.4	0.01	0.03	4.5	0.272	<0.02	0.51	58	1.51	8.51	54	4.6					
1.5	<0.001	0.48	0.08	4	0.9	0.4		58.3	0.01	0.07	7.9	0.179	<0.02	1.09	35	1.61	18.55	29	8.2					
50.6	<0.001	0.03	<0.05	10.2	0.5	0.6		18.5	0.01	0.03	5.4	0.385	0.13	0.58	110	0.36	14.05	79	6.4					
10.9	<0.001	0.04	0.05	1.3	0.5	2.7		9.5	0.01	0.02	7.7	0.053	0.05	1.14	3	0.8	20.1	42	54.3					
1.4	<0.001	0.68	0.17	1.8	0.4	0.5		27.1	<0.01	0.05	3.4	0.152	<0.02	0.47	32	0.6	6.45	10	19.2					
1.9	0.002	0.41	0.1	10.5	1	0.3		14.1	<0.01	0.14	1.1	0.144	<0.02	0.18	103	0.22	10.8	39	3.7					
53.6	0.002	0.66	0.07	4.7	0.9	5.8		56.6	<0.01	0.45	2.9	0.161	0.54	0.79	47	0.63	3.08	62	25.6					
2.2	0.003	5.51	0.08	1.6	5.1	0.5		91.4	<0.01	3.45	3.1	0.123	0.02	0.57	17	0.4	2.86	33	7.3	1				
13.7	0.001	0.55	0.06	2	0.8	0.2		42.5	<0.01	0.52	1.3	0.068	0.12	0.67	22	0.92	1.6	24	11.2					
2.6	0.014	0.76	0.05	1.2	0.9	0.2		91.1	<0.01	1.04	2.4	0.053	0.02	0.49	16	0.65	1.85	17	7.9					



ALS Canada Ltd.
 2103 Dollarton Hwy
 North Vancouver BC V7H 0A7
 Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: **RDF CONSULTING LTD**
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

Page: 1
 Finalized Date: 3-NOV-2010
 This copy reported on
 5-NOV-2010
 Account: RDFCON

CERTIFICATE TB10159172

Project:
 P.O. No.:
 This report is for 1 Sediment sample submitted to our lab in Thunder Bay, ON,
 Canada on 28-OCT-2010.

The following have access to data associated with this certificate:

DEAN FRASER

TROY MOCHORUK

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-AA23	Au 30g FA-AA finish	AAS
ME-MS41	51 anal. aqua regia ICPMS	

To: **RDF CONSULTING LTD**
ATTN: DEAN FRASER
26 BLUE RIVER PLACE
ST. JOHNS NL A1E 6C3

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

Colin Ramshaw, Vancouver Laboratory Manager



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 2103 Dollarton Hwy
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Page: 1
 Finalized Date: 14-NOV-2010
 This copy reported on
 15-NOV-2010
 Account: RDFCON

CERTIFICATE TB10159173

Project:
 P.O. No.:
 This report is for 43 Rock samples submitted to our lab in Thunder Bay, ON, Canada on 28-OCT-2010.

The following have access to data associated with this certificate:

DEAN FRASER	TRDY MOCHORUK
-------------	---------------

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
ME-MS41	51 anal. aqua regia ICPMS	
PGM-MS23	Pt, Pd, Au 30g FA ICP-MS	ICP-MS
Au-AA23	Au 30g FA-AA finish	AAS
Au-AA25	Ore Grade Au 30g FA AA finish	AAS

To: **RDF CONSULTING LTD**
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ST. JOHNS NL A1E 6C3

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:


 Colin Ramshaw, Vancouver Laboratory Manager

TB10159173 - Finalized																																				
CLIENT : RDFCON - RDF Consulting Ltd																																				
# of SAMPLES : 43																																				
DATE RECEIVED : 2010-10-28 DATE FINALIZED : 2010-11-14																																				
PROJECT :																																				
CERTIFICATE COMMENTS : ME-MS41:Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5g).																																				
PO NUMBER :																																				
SAMPLE	Au-AA23	Au-AA25	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
DESCRIPTION	Au	Au	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P			
	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm		
CW1016	0.021		0.08	1.67		<0.2	<10	100	0.27	0.07	2.71	0.02	80.8	14.5	14	0.5	356	3.22	6.72	0.16	0.39	<0.01	0.022	0.24	37.5	14.6	0.65	616	0.65	0.16	0.89	27.1	2630			
CW1017	0.082		0.02	0.11	9.3	<0.2	<10	10	0.07	0.03	0.02	0.01	8.27	0.4	7	0.07	3.7	0.47	0.59	0.08		0.01	<0.005	0.06	2.9	1	0.02	52	0.17	0.01	0.36	3.3	40			
CW1018	0.014		0.07	1.54	1.8	<0.2	<10	20	0.18	0.12	1.26	0.02	78.7	23.5	78	0.37	221	2.86	7.16	0.11	0.33	<0.01	0.01	0.12	36.8	24.3	1.32	291	0.99	0.07	0.68	53.9	2220			
CW1019	0.012		0.13	2.01	2.3	<0.2	<10	40	0.17	0.26	1.66	0.02	73.3	31.1	63	0.35	438	4.25	7.25	0.12	0.34	<0.01	0.011	0.14	33.6	32	1.72	413	1.6	0.07	0.42	33.7	2720			
CW1020	0.006		0.05	2.01	0.9	<0.2	<10	20	0.21	0.11	1.25	0.03	33	30	75	0.27	64.2	3.68	8.54	0.12	0.18	<0.01	0.012	0.09	15	31.5	1.79	466	0.14	0.08	0.2	59.9	1060			
CW1021	0.199		0.15	1.52	0.6	0.2	<10	20	0.31	0.13	1.23	0.02	57.8	17	56	0.25	372	2.84	8.57	0.13	0.43	<0.01	0.023	0.08	27.3	15.2	1.3	407	1.2	0.08	0.39	46.1	1040			
CW1022	0.214		0.26	0.41	15.8	0.2	<10	10	0.1	0.58	0.25	0.39	43.3	3.5	6	<0.05	103.5	2.02	2.78	0.07	0.68	<0.01	0.005	0.05	20.9	2	0.07	120	4.91	0.14	3.13	3.1	50			
CW1023	<0.005		0.07	2.49	0.3	<0.2	<10	630	0.2	0.15	0.88	0.02	40.7	26.4	184	10.3	77.8	5.3	12.95	0.18	0.23	<0.01	0.021	1.72	16.3	71.7	2.05	389	0.57	0.08	0.21	120.5	1360			
CW1024	<0.005		0.07	1.6	0.6	<0.2	<10	30	0.15	0.12	0.98	0.03	40.2	26.3	22	0.43	137.5	3.63	6.94	0.2	0.21	<0.01	0.02	0.12	18	18.8	1.02	341	0.55	0.15	0.18	22.7	980			
CW1026	0.022		0.27	1.37	1.3	<0.2		10	30	0.18	0.22	1.15	0.07	45.2	34.3	13	0.28	400	4.67	6.71	0.18	0.34	0.01	0.021	0.09	21.1	13	0.91	439	1.09	0.13	0.24	25.3	1510		
CW1027	<0.005		0.08	1.48	1.5	<0.2	<10	80	0.11	0.12	0.53	0.33	39.2	10.5	45	0.58	23.9	2.87	8.81	0.1	0.2	<0.01	0.027	0.22	21.7	20.8	0.92	816	0.33	0.07	0.23	17.4	370			
GS1001	>10.0	75.9	4.88	0.06	0.8	>25.0	<10	<10	<0.05	23.9	0.04	0.25	1.36	99.9	14	0.06	446	2.48	0.53	<0.05	0.02	0.06	0.02	0.02	0.7	0.9	0.04	47	3.54	0.01	0.08	12.7	20			
GS1002	>10.0	73.6	10.2	0.32	1	>25.0	<10	10	0.06	12.5	0.15	0.15	6.61	91	28	0.28	568	3.09	2.07	0.05	0.1	0.16	0.037	0.09	3	6.9	0.23	105	3.31	0.02	0.2	22.7	140			
GS1003	>10.0	15.95	0.46	0.35	0.9		6	<10	10	0.09	5.6	0.22	0.04	15.3	8	42	0.4	90.3	1.17	2.26	<0.05	0.15	0.01	0.009	0.13	6.9	9.8	0.27	106	0.49	0.03	0.27	20.7	240		
GS1004	0.225		0.5	0.66	11.9	<0.2	<10	40	0.39	0.23	0.14	0.2	28.7	2.4	9	0.53	145.5	3.36	6.2	0.07	1.6	0.06	0.098	0.19	12.6	4.7	0.12	106	7.78	0.03	6.5	2.5	40			
GS1005	0.08		0.86	0.34	7.4	<0.2	<10	50	0.21	0.34	0.01	<0.01	10.45	1.3	7	2.29	75.4	11.7	13.1	0.16	1.22	0.02	0.068	0.25	5.4	1.5	0.03	61	4.54	0.04	6.87	1.3	70			
GS1006	1.03		0.17	1.15	1.4		1.2	<10	20	0.48	0.1	0.65	0.14	103	1.9	7	0.71	9.5	2.29	8.16	0.16	1.33	0.01	0.08	0.14	44.4	11.2	0.18	379	3.32	0.02	4.86	1.9	160		
GS1007	0.193		0.04	0.53	13.4	<0.2	<10	10	0.15	0.22	0.28	0.04	10.25	2.2	13	0.13	12.7	1.86	3.57	0.07	0.59	<0.01	0.026	0.04	4.6	5.7	0.14	175	4.33	0.03	4.29	4.9	130			
GS1008	0.009		0.02	2.05	1.3	<0.2	<10	20	0.12	0.03	1	0.03	17.75	23.7	93	0.56	54.6	3.32	5.51	0.09	0.14	<0.01	0.011	0.06	7.9	44.1	1.74	467	0.48	0.11	0.14	61.5	340			
GS1009	0.011		0.13	4	1.4	<0.2	<10	10	0.07	0.09	1.07	0.06	3.75	51.3	76	1.01	162.5	6.73	8.06	0.12	0.11	<0.01	0.015	0.08	1.9	71.4	2.91	791	0.53	0.18	0.09	77.7	270			
GS1010	0.009		0.11	2.67	0.7	<0.2	<10	300	0.36	0.09	1.71	0.05	77.1	27	5	6.02	182	8.25	14.3	0.26	0.3	<0.01	0.05	1.15	38.2	35.9	1.43	873	1.09	0.15	0.42	10.5	2580			
GS1011	0.011		0.09	2.31	0.8	<0.2	<10	230	0.35	0.05	1.71	0.05	80.2	23.4	1	4.97	202	7.25	13.1	0.24	0.37	<0.01	0.04	0.88	38.8	29.7	1.31	739	0.68	0.15	0.4	6.1	2700			
GS1012	0.083		0.19	2.08	72	<0.2	<10	120	0.6	0.41	1.88	0.05	208	24	8	6	52.6	4.58	10.15	0.33	0.61	<0.01	0.029	1.04	91.9	52.5	1.63	686	0.16	0.12	0.83	40.3	2550			
GS1013	0.105		0.15	2.18	6.6	<0.2	<10	20	0.54	0.07	1.76	0.05	70.1	48	2	0.58	467	7.85	12.35	0.25	0.4	0.01	0.04	0.14	31.5	18.2	1.11	606	1.34	0.16	0.47	11.3	2450			
GS1014	0.035		0.13	1.95	0.6	<0.2	<10	160	0.27	0.08	2.15	0.04	74.6	15.3	20	3.37	290	3.89	7.81	0.17	0.29	<0.01	0.023	0.65	37.1	20.6	0.93	459	0.61	0.17	0.51	23	2730			
GS1015	<0.005		0.03	0.96	1.8	<0.2	<10	30	0.28	0.09	1.59	0.03	47.5	5.3	10	0.29	18.5	2.24	7.46	0.19	0.46	<0.01	0.018	0.08	21.2	1.4	0.15	147	0.28	0.08	1.25	3.9	1230			
GS1016	0.011		0.16	2.3	3.3	<0.2	<10	190	0.7	0.28	2.51	0.03	68.1	26.1	3	1.53	218	5.35	10.45	0.24	0.4	0.06	0.037	1.05	31.8	16.8	0.7	719	2.2	0.12	0.63	7.8	2650			
GS1017	0.038		0.11	0.69	80.7	<0.2	<10	40	0.39	0.17	0.28	0.05	72.2	1.1	6	0.66	26.5	2.11	4.78	0.1	1.06	0.01	0.077	0.23	34.1	5.9	0.14	147	3.79	0.04	3	2.1	160			
GS1018	0.027		0.08	2.25	0.9	<0.2	<10	230	0.25	0.07	1.64	0.06	43	21	11	0.64	120	4.34	8.48	0.19	0.4	<0.01	0.037	0.52	19.4	19.9	0.94	504	0.76	0.23	0.18	19.3	1480			
GS1019	0.021		0.17	1.33	4	<0.2	<10	110	0.34	0.22	2.47	0.07	47.3	25.2	2	1.08	624	6.14	8.27	0.2	0.55	0.01	0.051	0.16	24.7	11.3	0.71	479	2.88	0.08	1.07	5.4	2460			
GS1020	0.032		0.07	2.16	0.6	<0.2	<10	360	0.36	0.05	2.16	0.04	86.3	18.8	16	3	344	4.34	8.89	0.2	0.41	<0.01	0.027	0.83	40.4	23.7	0.87	499	0.26	0.2	0.48	28.8	2750			
GS1021	0.013		0.07	1.91	0.7	<0.2	<10	40	0.45	0.06	2.43	0.02	94.3	23.2	99	0.47	304	4.64	8.98	0.18	0.38	<0.01	0.025	0.19	44.2	16.2	0.85	1040	1.66	0.17	0.94	61.3	3080			
GS1022	0.017		0.07	0.68	25.5	<0.2	<10	40	0.1	0.26	0.13	<0.01	21.9	5.7	26	3.77	7.7	2.23	4.13	<0.05	0.27	<0.01	0.013	0.33	11.1	14.4	0.53	144	0.4	0.08	0.09	12.3	300			
GS1023	0.006		0.3	3.5	1.6	<0.2	<10	20	0.47	0.14	1.92	0.12	71.2	31.3	16	0.7	369	7.85	14.1	0.2	0.34	<0.01	0.02	0.05	31.6	57	1.62	918	1.19	0.06	0.61	28.7	3000			
GS1024	0.094		0.16	0.47	16.2	<0.2	<10	30	0.3	0.17	0.08	0.22	80.9	3.5	8	0.38	25.5	2.42	5.72	0.11	2	<0.01	0.079	0.17	36.2	7.9	0.17	201	1.21	0.05	1.17	1.8	80			
GS1025	0.006		0.18	1.41	0.7	<0.2	<10	30	0.17	0.56	1.35	0.05	22.8	21.4	78	0.3	135	2.95	4.58	0.12	0.17	0.07	0.013	0.07	10.9	16.2	1.15	389	8.55	0.13	0.3	51.8	860			
GS1026	0.096		0.27	1.1	68.5	<0.2	<10	10	0.37	0.66	0.65	0.15	37.1	5.3	7	0.09	23.5	3.47	7.05	0.21	0.34	0.01	0.033	0.06	15.6	13	0.5	534	13.3	0.05	0.86	2.5	650			
GS1027	0.397		0.36	1.18	111.5		0.4	<1																												

Appendix V

ALS Laboratories

Sample Preparation and Analytical Procedures



Sample Preparation

The range of geological samples includes soils, silts, lake and stream sediments, rock, rock chips, drill core, percussion drill samples, panning concentrates and vegetation. Many of these sample types may be large, wet and heterogeneous. The purpose of sample preparation is to produce a smaller, dry and manageable sample suitable for laboratory scale analysis while at the same time ensuring that the prepared sample is homogeneous and fully representative of the original field material. A reduction of particle size through crushing and pulverizing is required for rock and drill core materials whereas it is usually sufficient to sieve soil and sediment samples to obtain suitable material for analysis.

It is essential that a geological sample be properly prepared prior to analysis. At ALS we have always maintained that a poorly prepared sample is simply not worth analyzing.

The risk of sample contamination is greater in the sample preparation process than in any other section of the laboratory. It is essential that a clean work environment be maintained through the enforcement of good work practices. Routine cleaning of workstation surfaces and crushing and grinding machinery is essential as is the use of a comprehensive dust control collection system.

Over the years ALS has developed its exclusive, patented Dustbox technology to ensure efficient extraction of dust during the sample preparation process. This technology provides sufficient extraction to avoid cross contamination of samples, while at the same time avoiding over-extraction of fine material. You can see the Dustbox in operation at all of our sample prep laboratories around the globe.

One essential feature of ALS operations is our insistence on sample classification and sorting according to sample type and expected metal concentrations. In this way we can separate high grade and low grade samples and reduce chances for cross contamination. Separate process lines are also maintained for high and low grade samples to minimize the effects of carryover within the sample preparation machinery. You, the client can help this process further by making note of any expected high grade material in the relevant boxes on the Sample Submission Form

Introduction

Geological samples are highly variable and encompass a broad range of sample types that includes soils, silts, drill core, rocks and panning concentrates. The purpose of sample preparation is to produce a small, dry and manageable sample suitable for laboratory scale analysis while at the same time ensuring that the prepared sample is homogeneous and fully representative of the original field material. Experience has shown that the potential risk for contamination is greater in the sample preparation process than in any other part of laboratory operations. For this reason particular care and attention must be paid to sample handling and there must be strict adherence to standard operating procedures and good work practices. The physical plant facilities must be designed for an orderly workflow, possess sufficient crushing and grinding equipment to allow for specialized usage, and have a comprehensive dust control system.



Sample Tracking System

ALS has developed a unique sample tracking system that is an integral part of the company's new Laboratory Information Management System (LIMS). This system utilizes bar coding and scanning technology that provides, for the first time by any laboratory, complete chain of custody records for every stage in the sample preparation and analytical process.

Upon receipt of samples at any of the ALS worldwide locations, a bar code label is attached to the original sample bag. This label is then scanned and the weight of sample recorded together with information such as date, time, equipment used and operator name. The scanning process is repeated for each subsequent activity performed on the sample from sample preparation to analysis through to the storage or disposal of the pulp and reject material. Sample labels are also scanned at the shipping and destination locations whenever samples are transported locally or internationally between ALS facilities. The system has also been designed to accept client supplied bar coded labels that are attached to the sample bags in the field.

The benefits to our clients of this system are:

- Complete traceability of the sample through the entire laboratory process.
- Sample integrity is guaranteed by scanning the sample label at every stage.
- Record of every sample weight submitted to the laboratory from the field.

Contamination Control during Sample Preparation

We take many steps to minimize the risk of cross contamination between samples during the preparation process. One of the most important steps is to sort and classify samples according to matrix type and expected metal concentrations as soon as they enter the laboratory. The samples will then be routed through the laboratory in different batch streams. Physically separated areas are maintained as much as possible so that, for example, concentrates and vegetation samples would never be processed in the same area.

Once samples are classified, they are prepared using equipment that has been designated for certain matrix types and expected metal concentration ranges. Equipment is color-coded and numbered so that it is clear for which sample type it is intended to be used.

In addition, our routine operating procedures call for the use of barren wash material to clean out sample preparation equipment between batches of submitted samples, drill holes (if identified) and samples that appear to be of a substantially different type than those submitted in the same batch. However, if the client expects significant mineralisation, we recommend that they identify the samples and request a clean wash between samples. The wash material is tested for the elements of interest prior to use in the laboratory, and on a routine basis once in use.

Our Dustbox dust extraction system is a key component of our sample preparation laboratories. The Dustbox ensures that crushing and grinding equipment is virtually completely enclosed. Our experience has shown that the fine dust, which can otherwise collect, will invariably

contain trace amounts of gold and base metals. The end result is an improved dust control system which reduces the risk of sample contamination and provides a healthier workplace environment for our employees.

It is unfortunate that all grinding surfaces impart some degree of metal content to samples during pulverisation. As a result, there will always be some degree of contamination when crushing and grinding procedures are used. However, at ALS we have a great variety of grinding surfaces that vary widely in their chemical composition. We offer equipment made of hardened manganese steel, chrome steel or carbon steel as well as non-ferrous materials such as zirconia and tungsten carbide. Hence an Explorer can choose one of these options in such a way as to eliminate the possibility of contaminating a sample with an element of potential exploration significance. In the following table is a typical chemical composition for a Chrome Free and Chrome Steel Pulveriser bowl. More

information on this topic follow in the Contamination Introduced by Sample Preparation Equipment section.

Sample Preparation Equipment



The main equipment in use at ALS consists of:

- Drying ovens • Crushers (roll, traditional jaw and oscillating jaw)
- Pulverisers (small ring, large ring, flying saucer style puck)
- Ball mills • Screens
- Riffle splitters, and Rotary splitters

Drying Ovens

The sample drying process is more critical than may appear at first. Many samples arrive at the laboratory sopping wet. Drying time for these samples is invariably a major contributor to lengthened turnaround times. Hence it would be tempting to improve turnaround time by using blast furnace drying techniques. However there is a considerable risk to sample integrity by taking such an approach in that some samples will appreciably oxidize at higher temperatures (especially sulfides) and some potentially volatile elements (arsenic, antimony, mercury; all key pathfinder elements for gold exploration will be lost at elevated drying temperatures. Of course, even if these elements are not of immediate interest, the samples will be rendered useless for any future analysis.

At ALS we use two different drying temperatures and once again the choice of temperature depends on the sample classification. For rocks, rock chips, drill core and other "coarse" material with a relatively low surface area, we employ a drying temperature in the range of 110-120 C (230-250 F). Independent studies of these sample types have shown that the potentially volatile elements will not be lost at this temperature. However for soils, silts, sediments and other "fine" materials with a proportionately higher surface area, we limit the drying temperature to 60 C (140 F).

Our ovens are all large, gas-heated forced air furnaces; samples are pre-loaded onto moveable drying racks before being rolled into an oven. This avoids the potential contamination risk that is inherent in fixed shelving units. Large samples are placed into stainless steel trays to ensure efficient heat transfer and minimal drying times.

Crushers

In recent years improvements have been made to the traditional jaw crusher by the introduction of the oscillating jaw crusher. These new crushers, built specifically for laboratory usage, provide enhanced crushing by ensuring that the sample receives continuous grinding as it passes between the plates. The end result is a finer product in a single step, typically >50% is <1mm whereas only about 10% is <1mm in the traditional jaw crusher. These new crushers are also much easier to clean and therefore chances of cross contamination between samples are reduced.

Pulverisers

At ALS we use ring pulverisers. Ring pulverisers have become the industry standard in recent years. Basically they consist of a bowl that contains either a small puck and one or more rings, or a large saucer. Crushed samples are added to the bowl, the bowls are sealed and then subjected to centrifugal force by mechanical action. The puck and/or ring(s), being free to move inside the bowl, subject the sample to considerable grinding action, resulting in a very fine sample. Bowls are manufactured in different sizes ranging from 50 g capacity to 4 kg capacity. At ALS we use two sizes primarily, 250 g and 3 kg. The bowls themselves are made of different materials including manganese steel, chrome steel, zirconia and tungsten carbide so that it is easy to avoid contaminating a sample with an element of potential interest.



Screens

Screens are used to sieve soil samples in order that the fine fraction can be analyzed. At ALS we use stainless steel screens with stainless steel or nylon mesh depending on the application. Brass screens are a potential source of contamination for both copper and zinc, especially if the sample contains hard, abrasive particles.

Contamination Introduced by Sample Preparation Equipment

The intense grinding action produced by crushers and pulverisers results in wear metals being added to the samples being ground. The elements that are added will depend on the composition of the grinding surfaces. The concentration of the elements added is harder to determine as it will depend on a number of factors including the hardness of the grinding surface, the hardness of the sample and the length of grinding time.

Before putting any new sample preparation equipment into use we perform tests using ultra trace methods to ensure no significant amounts of elements are imparted to the samples being prepared.

The table below shows typical levels of elements that can be carried over for each type of grinding medium. It must be stressed that these are typical ranges that may not apply to exceptional samples.

Element	Manganese steel (ppm)	Chrome steel (ppm)	Carbon steel (ppm)	Zirconia (ppm)	Tungsten carbide (ppm)
Chromium	2-10	20-500	5-25	<1	
Iron	0.2-1.5%	0.1-0.5%	0.2-1.5%	<10	
Manganese	10-100	5-50	10-125	<1	
Molybdenum	<1	<1	1	<1	
Nickel	1-2	1-5	6	<1	
Lead		2	3	<1	
Vanadium		1	<1	<1	
Tungsten					30-300
Cobalt					10-100
Zirconium				30-300	
Hafnium				1-5	

Sample Preparation Procedures

Crushing

Samples that require crushing are dried at 110-120 C and then crushed with either an oscillating jaw crusher or a roll crusher. Note that if the whole sample is required to be pulverized, then this condition becomes irrelevant. Crushing charges are based on the sample weight. The entire sample is crushed, but depending on the method only a portion of the crushed material may be carried through to the pulverizing stage. That amount, typically 250 g to 1 kg, is subdivided from the main sample by use of a riffle splitter. If splitting is required, a substantial part of the sample (the "reject" or spare) remains.

Pulverising

A whole or split portion derived from the crushing process is pulverised using a ring mill. The size of the split is determined by the client based on the pulverising procedure that is selected. Split sizes for manganese or chrome steel rings are typically 250 g to 4 kg; however split sizes for zirconia

rings are 100 g and those for tungsten carbide rings are only 75 g. Because of the relative lightness of these latter two materials, the size of the sample to be pulverized must necessarily be reduced to these weights in order to achieve the ALS QC specification for final pulverizing, namely that >85% of the sample be less than 75 microns (200 mesh) (see graph below).

For those samples which require enhanced homogeneity, such as samples which are known to exhibit coarse gold behavior, intermediate pulverization of the entire sample (or a representative split) is also available.

Screening

Soil and sediment samples are typically sieved through a 180 micron (-80 mesh) screen and the fine fraction is retained for analysis. This procedure is satisfactory for smaller (i.e. 500 g or less) samples where the exploration target is base metals. However, when gold is the exploration target, we recommend that the particle size of the minus fraction be further reduced using ring mill pulverization to > 85% - 75 microns (150 mesh) in order to obtain more reproducible gold data.

For gold exploration, many "soil" samples weigh in at several kilograms or more. In this latter case, the samples often contain larger components such as pebbles or agglomerations of clay and other material. For samples like this, we recommend that after disaggregation the sample is sieved through a -2 mm (10 mesh) screen to remove the coarse material. Following this intermediate screening, the -2 mm (10 mesh) material is then split to about 500g using a riffle screen and then sieved through a standard -180 micron (80 mesh) to obtain a minimum of 150 g of fine material. We still recommend further pulverization if gold is the exploration target, for the reasons outlined above.

Special Procedures

Vegetation and humus samples require special procedures because they are easily contaminated, difficult to reduce in particle size and awkward to homogenize. This type of sample tends to be highly variable, ranging from well-rotted humus to bits of tree trunk. Vegetation sample preparation is done in our Vancouver and Brisbane laboratories because we have special facilities available. Samples submitted to

regional offices will be shipped to the Vancouver or Brisbane laboratories and this may result in some extra shipping charges to the client if the weights or volumes are judged to be excessive.

Composites

Composite samples are normally prepared on a volumetric basis and the composite is homogenised either by: repulverisation, or; mixing the samples in vials which are mounted in dual orbiting mixers. Composites can be prepared on a weight basis if desired but the charges are greater because the labor costs are significantly higher.

Quality Control Procedures for Sample Preparation

QC Specifications for Crushing and Grinding

As mentioned in the Crushing and Pulverising sections, ALS does sizing test to ensure specifications for these procedures. A range of specifications are available for crushing and pulverising so that clients can select protocols that best meet their project needs. Statistics are maintained for each sample preparation workstation, permitting an assessment of all pieces of machinery. Not only does this data ensure sample preparation specifications are being met, but it also allows us to optimise the sample preparation process and helps us in the purchase of new equipment.

Sample Sequence Logs

For any sample preparation activities we maintain sample sequence logs at all workstations. These logs detail which samples have been prepared in what order and are very helpful for investigative purposes.

Pulp and Reject Policy

Materials that have been submitted for analysis are retained at our laboratories for a limited time only. The prepared master pulps are stored free of charge for 90 days from the time that we issue the final certificate of analysis. Coarse and fine reject fractions are stored free of charge for the first 90 days, except for large reject fractions (>3 Kg) which are stored for a nominal charge from day one. Monthly charges will be levied for storage of all sample types beyond the first 90 days. Instructions for pulp and reject handling can be placed in the relevant boxes of the Sample Submission Sheet as per the accompanying illustration:

We can provide reports about your pulps and rejects at any time upon request. These reports will include information about ALS workorder numbers, your project name or number, and numbers of samples. Please note that when local tipping fees are significant, we reserve the right to bill clients for the cost of disposing rejects to landfill.

Exploration Geochemistry

How to Select Analytical Procedures

Detection Limits

In making analytical selections, clients should carefully consider the detection limits achievable by the various procedures. Every measurement over the entire analytical range has some degree of uncertainty associated with it. A detection limit stated by ALS has an uncertainty of +/- 100%; in other words, a detection limit of 1 ppm implies an uncertainty of 1 ppm +/- 1 ppm. Our procedures have been developed to provide the best precision across the widest concentration ranges.

If a client requires very precise data in the region of 1-5 times the detection limit of a particular method, then we recommend that an alternative procedure be selected that offers a lower detection limit.

For example, if an explorer requires very precise data in the range of 1-5 ppm for base metals, then we would recommend ICP-MS procedures that offer superior detection limits and hence better precision in the required range.

Technical Limitations

All methods have limitations to some degree. For example, an aqua regia digestion for gold is suitable for soils and sediments because the gold is expected to be largely available for chemical attack. The same cannot be said for an aqua regia digestion of rocks and drill cuttings where the gold may be retained in an insoluble quartz matrix or otherwise encapsulated. For rocks and drill cuttings, a fire assay fusion is clearly the superior method of gold analysis.

Analysis of elements other than gold also requires attention be paid to the digestion procedures and their applicability to the geology and sample matrix. Sample Decomposition and Pre-Treatment has information on a range of dissolution methods.

The various ICP-MS packages offer an attractive mix of elements and detection limits but these packages are applicable only to trace level materials. Mineralized material is not suitably analysed by this technique. We would recommend that samples with higher metal content be analyzed by other methods such as OG46, OG62 or ICP81.

Contamination Control

Everyone recognizes the need to control potential contamination during laboratory analysis and this is best accomplished by a cooperative effort between clients and laboratories. Good communication between the laboratory and the client ensures that the best analytical procedures are selected. Within the laboratory one of the best means of contamination control is to classify all samples according to their expected metal concentrations and to route them through separate analytical batch streams. ALS has always been a proponent of this system and since our inception we have encouraged clients to identify their samples as trace level (i.e. geochemical) or ore grade (i.e. assay), based on the likely upper concentration levels expected.

In order for us to produce accurate data, it is important for clients to assist us by screening out samples having elevated concentrations (i.e. >1% of an individual metal, or >3% total base metals).

Sample Decomposition and Pre-Treatment

When batches of samples have been prepared for analysis and routine quality control testing has confirmed that the samples have met or exceeded specifications, the analytical process is ready to begin. One common process is to dissolve the geological samples in hot concentrated acid(s) in

order to solubilise the element(s) of interest. This process readily dissolves most base elements but in some cases, alternative methods are preferred. A chemical fusion (that is, attacking the geological matrix with a high temperature molten flux) can frequently be more effective in dissolving resistant minerals and liberating constituents. The classical fire assay for gold and precious metals analysis is an example of a chemical fusion. Pelletisation is an example of a process that does not require chemical treatment at all.

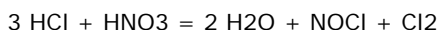
Acid dissolution

The use of acids to attack geological samples can be accomplished in many different ways. A weak acid attack is generally referred to as a "leach" and while it may result in a quantitative extraction of the element(s) of interest, most of the sample will remain undissolved. A series of leaches utilizing different acids or other chemical reagents is sometimes referred to as a "sequential extraction".

Strong acid attacks are generally referred to as "digestions" and these are more powerful than leaches. At ALS, we classify digestions as "near total" or "partial" depending whether they are capable or not of fully dissolving the element(s) of interest. Some of our more common digestions are as follows:

Aqua Regia Digestion

The standard aqua regia digestion consists of treating a geological sample with a 3:1 mixture of hydrochloric and nitric acids. Nitric acid destroys organic matter and oxidizes sulphide material. It reacts with concentrated hydrochloric acid to generate aqua regia:



Aqua regia is an effective solvent for most base metal sulphates, sulphides, oxides and carbonates but only provides a partial digestion for most rock forming elements and elements of a refractory nature..

Nitric-Perchloric-Hydrofluoric Acid Digestion

This triple acid digestion system is the most powerful acid dissolution procedure that we use at ALS. Hydrofluoric acid is capable of reacting with silica to completely destroy silicate matrices and thus liberate all trace constituents. This acid mixture must be taken to incipient dryness in order for the reaction to go to completion. The resulting cake is leached with Hydrochloric acid. All elements for determination following this digestion are normally considered to be "near total". Highly resistant minerals are better analyzed using a fusion procedure hence the presence of large amounts of sulphide will result in the formation of sulphate, which may cause premature precipitation of insoluble sulphates such as barium and lead.

Reverse Aqua Regia Digestion

In this digestion system, nitric acid and hydrochloric acid are combined in a 3:1 proportion, exactly the reverse of the standard aqua regia digestion. The high nitric acid content is efficient in destroying sulphides and the acid combination is still sufficiently strong to solubilize easily soluble metals. The reverse aqua regia digestion is used for the analysis of copper concentrates for example.

Hydrochloric Acid-Potassium Chlorate Digestion

The reaction of chloride and chlorate generates chlorine at a relatively low temperature, thus producing a highly oxidizing environment capable of dissolving many elements of interest and without the loss of potentially volatile elements such as arsenic and antimony.

Hydrobromic Acid-Bromine Digestion

Elemental bromine can also act as an effective oxidant for elements such as tellurium and some precious metals. An excess of bromide helps to keep the elements soluble through the formation of bromide complexes.

Selective Leaches

Selective leaches, as the name implies, are designed to extract specific elements while leaving the bulk of the geological sample intact. There are many different variants that have been developed by researchers over the years. We offer a variety of non-proprietary methods, all involving the use of ICPMS technology. Although none have become the universal standard, several of the following leaches continue to offer great appeal:

- Cold hydroxylamine: This leach dissolves manganese oxides which are extremely powerful scavengers of mobile metal ions. Iron oxides remain substantially undissolved.
- Hot Hydroxylamine This leach dissolves amorphous iron oxides but leaves crystalline iron oxides substantially undissolved.
- Sodium pyrophosphate: This leach liberates organically-bound heavy metals. It does not attack sulfide minerals nor does it dissolve crystalline iron oxides.
- Ionic Leach: This new and innovative leach technique is designed for near surface soil samples to improve geochemical mapping and enhance the potential to detect and resolve subtle geochemical anomalies over "blind" mineralisation. It is suitable for gold, silver, PGM, uranium and base metal exploration. This procedure employs a heavily buffered alkaline cyanide solution in conjunction with other complexing agents to selectively dissolve or solubilise metal ions that have been leached from the primary source, migrated and then redeposited near the surface.

Alkaline digestion procedures

Alkaline digestion procedures are used rarely at ALS because of the efficiency and ease of acid digestions. However one very important alkaline digestion is the cyanide leach for extractable gold. Not only is cyanide very efficient in extracting gold in an alkaline environment but it would be lethally dangerous in an acid environment due to the formation of deadly hydrogen cyanide.

Fusions

Fire assay fusion is discussed in the Precious metals section.

Sodium Peroxide Fusion

Sodium peroxide (Na_2O_2) is a very powerful and aggressive flux ideally suited to the attack and dissolution of high grade sulphide minerals and refractory or resistant minerals. Because sodium peroxide is such an aggressive flux, sample dissolution is complete and this results in a very high salt content in the analyte solution. Typically this solution must be significantly diluted prior to analysis and this can result in elevated detection limits for trace elements. However the procedure is ideal for major and minor elements and for the determination of certain base metals in high sulphide ores.

Lithium Borate Fusions

A lithium borate fusion is the preferred fusion for whole rock analysis (WRA) in which rock characterisation can be made through an analysis of major and minor elements. Tantalum also responds well to this fusion with follow up by ICPMS. The fusion melts from a lithium metaborate sample dissolution can be poured into disks in preparation for X-ray fluorescence (XRF) analysis or they can be dissolved in acid for subsequent ICPMS analysis.



Other Fusion Techniques

A number of individual elements require specific fusion techniques. For example, samples for fluoride analysis are fused with sodium carbonate and potassium nitrate to solubilise fluoride in an alkaline environment in order to prevent its loss by volatilisation. Samples for geochemical tungsten analysis are fused with potassium persulfate to solubilise tungsten minerals such as wolframite.

Pelletisation

Many samples to be analysed by X-Ray Fluorescence (XRF) do not require any chemical manipulation prior to analysis. Pulverised material is simply weighed into an aluminium cap with a bonding agent and pelletised with high pressure to ensure sample integrity under the vacuum and a consistent surface to receive the x-rays. Samples are then ready for irradiation.

Separation of the Element(s) of Interest

When samples have been successfully dissolved, many of the elements can then be determined directly using one or more of the spectroscopic techniques available in our laboratories. However, in some cases, it is necessary to do more chemical manipulation in order to separate the element(s) of interest. This is done for a number of reasons:

- Chiefly to lower the detection limit of the element to a level that is useful for the Explorer.
- It may also be done in order to remove an element from a potential interference or to convert the element into a more easily measured form or oxidation state.

Solvent Extraction

Solvent extraction is the process whereby an element is extracted from its analyte solution through the use of an organic solvent, often in conjunction with a chelating agent. In this way, an element may be concentrated from a large volume into a smaller volume, thus making it easier to measure and lowering its detection limit. If the analytical technique to be used is atomic absorption spectroscopy, then there is usually an additional benefit of increased metal sensitivity due to alteration of flame characteristics caused by the presence of the organic solvent. The most common organic solvent that we use at ALS is Diisobutyl ketone (DIBK), while some of the common chelating agents that we use are:

- Trioctylphosphine oxide (TOPO)
- Aliquat-336

Several methods for gold analysis require solvent extraction.

- Aqua Regia Digestions down to 1ppb detection limit gold.
- Cyanide Leach Procedures down to 0.05ppb detection limit gold.
- Metallurgical Samples.

Volatilisation

Volatilisation can be successfully used to separate some low boiling metals or metal compounds. In the case of mercury analysis for instance, mercury can be reduced to its elemental state by reaction with stannous chloride. This elemental mercury can then be volatilised by purging with air or an inert gas such as nitrogen and swept into an absorption cell. The net effect of this separation is to produce a mercury analysis with the extremely low detection limit of 10 ppb.



Precipitation

A classical chemical procedure is the precipitation of an element of interest. This procedure can be used for elements such as barium that typically occurs in significant concentrations. It can also be used to separate picogram amounts of radioactive species such as the daughters of uranium and thorium which can be separated by precipitation with lanthanum fluoride.

Ignition

Ignition of geological samples can be used to successfully separate elements such as carbon and sulfur by converting them to their gaseous oxide forms. These oxides can then be trapped and measured by various means.

Hydride Generation

A number of elements such as arsenic, antimony, bismuth and tellurium can be reduced and separated as their volatile hydrides. It can be tricky however to determine all members of this group simultaneously by hydride generation as it is necessary to reconcile some fundamental differences within the complex chemistry of the group

For example, complete hydride reduction may not occur if an element (such as arsenic) is present in two different oxidation states. The net result is that it is frequently easier to determine these elements individually rather than as a group.

The hydride separation scheme is susceptible to some significant interferences (such as elevated levels of copper) that can prevent quantitative hydride generation. The useful working range of hydride generation is quite small and limited to low concentrations. At higher concentrations, it is usually necessary to revert to other methods of measurement.

Analytical Methodologies

At ALS we operate several full service analytical laboratories with a wide range of analytical techniques. These techniques can be divided fundamentally into spectroscopic techniques and non-spectroscopic techniques.

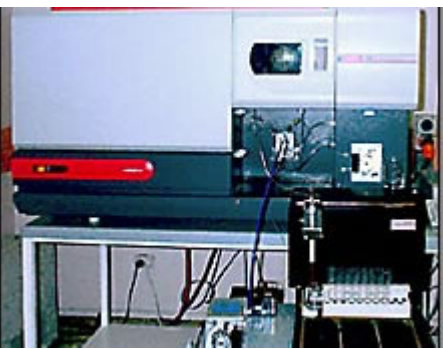
All elements absorb and emit radiation at specific and characteristic wavelengths. Spectroscopic techniques are used for measuring the absorption and emission of this characteristic radiation. In this way an element may be identified by its characteristic radiation and the spectroscopic technique may be used for its quantitative measurement.

Non-spectroscopic techniques utilize other measurement methods to carry out quantitative analysis; for example, an element may be isolated through basic chemical procedures and then quantified by volumetric or gravimetric methods.

Spectroscopic techniques

Atomic Absorption Spectroscopy (AAS)

In atomic absorption spectroscopy, an element in its atomic form is introduced into a light beam of appropriate wavelength causing the atom to absorb light (atomic absorption) and enter an excited state. At the same time there is a reduction in the intensity of the light beam which can be measured and directly correlated with the concentration of the elemental atomic species. This is carried out by comparing the light absorbance of the unknown sample with the light absorbance of known calibration standards.



A typical atomic absorption spectrometer consists of an appropriate light source (usually a hollow cathode lamp containing the element to be measured), an absorption path (usually a flame but occasionally an absorption cell), a monochromator (to isolate the light of appropriate wavelength) and a detector.

The most common form of atomic absorption spectroscopy is called flame atomic absorption. In this technique, a solution of the element of interest is drawn through a flame in order to generate the element in its atomic form. At the same time, light from a hollow cathode lamp is passed through the flame and atomic absorption occurs. The flame temperature can be varied by using different fuel and oxidant combinations; for example, a hotter flame is required for those elements which resist atomisation by tending to form refractory oxides.

There are alternative ways of generating the atomic species of an element which do not require the use of a flame. These "flameless" methods generally offer a superior detection limit. One of the more common flameless methods involves vapour generation of the element of interest. As described in volatilisation, mercury can be easily reduced to its elemental form and then swept into an absorption cell through which a light beam is passed. Similarly, a number of elements may be chemically converted to their volatile hydride forms and swept into an absorption cell. See Hydride Generation. A second common flameless method involves the use of a graphite furnace to electrically heat and volatilise an element of interest into an absorption cell.

Advantages of Atomic Absorption Spectroscopy

The main advantages of atomic absorption spectroscopy are as follows:

- The principles of measurement are straightforward and well understood.
- The technology is relatively inexpensive and the equipment is relatively easy to use.
- The technique is well-suited to the measurement of gold, gold pathfinders and base metals
- There are relatively few matrix and other interference effects
- Sample throughput is high as each measurement can take only seconds when the instrument is calibrated.
- The technique is applicable over a wide range of concentrations for most elements.

Limitations of Atomic Absorption Spectroscopy

- All measurements are made following chemical dissolution of the element of interest. Therefore the measurement can only be as good as the quality of the sample digestion.
- AAS is a sequential (that is, one element at a time) analytical technique. It is better suited to the measurement of small suites of elements as larger suites become progressively uneconomic.
- Occasionally interferences from other elements or chemical species can reduce atomisation and depress absorbance, thereby reducing sensitivity.
- Some elements such as Li, Na, K, Rb and Cs ionise rather easily, again reducing atomisation and complicating the measurement technique

Inductively Coupled Plasma Emission Spectroscopy (ICP-AES)

In plasma emission spectroscopy, a sample solution is introduced into the core of an inductively coupled argon plasma (ICP) at a temperature of approximately 8000 C. At this temperature all elements become thermally excited and emit light at their characteristic wavelengths. This light is collected by the spectrometer and passes through a diffraction grating that serves to resolve the light into a spectrum of its constituent wavelengths. Within the spectrometer, this diffracted light is then collected by wavelength and amplified to yield an intensity measurement that can be converted to an elemental concentration by comparison with calibration standards. This measurement process is a form of atomic emission spectroscopy (AES).



Advantages of ICP-AES Spectroscopy

- Many elements (up to 70 in theory) can be determined simultaneously in a single sample analysis; the largest ICP only package offered by ALS includes 34 elements.
- Instrumentation is readily amenable to automation, thus enhancing accuracy, precision and throughput.
- High instrumental productivity permits very competitive pricing of analytical packages, thus giving the explorer a significant return on a relatively small expenditure.
- Electronic data capture and transfer to the LIMS ensures that no manual data transcription errors occur.
- ICP-AES offers a useful working range over several orders of magnitude.

Limitations of ICP-AES Spectroscopy

- Complex instrumentation requires highly skilled staff both for routine operations and for repairs and maintenance.
- The emission spectra are complex and inter-element interferences are possible if the wavelength of the element of interest is very close to that of another element; for example, one of the phosphorus wavelengths suffers from both copper and aluminum interference.
- As with atomic absorption spectroscopy, the sample to be analysed must be digested prior to analysis in order to dissolve the element(s) of interest. In certain ICP packages (e.g., the ME-ICP41), a significant number of elements are only partially digested. • Rigid temperature and humidity control is required for best stability of the spectrometer.

Inductively Coupled Plasma Mass Spectroscopy (ICP-MS)

In plasma mass spectroscopy, the inductively coupled argon plasma (ICP) is once again used as an excitation source for the elements of interest. However in contrast to plasma emission spectroscopy, the plasma in ICP-MS is used to generate ions that are then introduced to the mass spectrometer. These ions are then separated and collected according to their mass to charge ratios. The constituents of an unknown sample can then be identified and measured. ICP-MS offers extremely high sensitivity to a wide range of elements.

Advantages of ICP-MS Spectroscopy

- ICP-MS is a multielement analytical technique capable of determining an extremely wide range of elements to very low detection limits (typically sub ppb), better than those of graphite furnace atomic absorption spectroscopy.
- The technique is ideally suited for ultratrace geochemical methods such as sequential extractions and selective leaches.
- Analytical sensitivity is sufficiently good to allow for the determination of isotopes.
- ICP-MS offers a large linear working range of several orders of magnitude.
- The technique is a useful alternative measurement method for those elements not easily measured by emission or absorption spectroscopy.

Limitations of ICP-MS Spectroscopy

- The total dissolved salt content of the analyte solution must be kept low or else instrument performance is adversely affected; this dilution can result in less attractive detection limits for some elements.

- Common matrix elements and other molecular species can interfere with the determination of some base metals; for example, chloride will interfere with a number of elements and ArCl has the same mass as As.
- Some doubly charged ionic species create difficulties.
- Ultrapure acids are required for leaches and digestions and this will increase the cost of measurements.

X-ray Fluorescence Spectroscopy (XRF)

In X-ray fluorescence spectroscopy, a beam of electrons strikes a target (such as Mo or Au) causing the target to release a primary source of X-rays. These primary X-rays are then used to irradiate a secondary target (the sample), causing the sample to produce fluorescent (secondary) X-rays. These fluorescent X-rays are emitted with characteristic energies that can be used to identify the nucleus (i.e. element) from which they arise. The number of X-rays measured at each characteristic energy can therefore in principle be used to measure the concentration of the element from which it arises.

The fluorescent X-rays are then dispersed and sorted by wavelength using a selection of different diffraction crystals, hence the term wavelength-dispersive X-ray fluorescence. The dispersed X-rays are then detected with a thallium-doped sodium iodide detector or a flow proportional counter. Each X-ray striking the detector causes a small electrical impulse which can be amplified and measured using a computer-controlled multichannel analyzer. Samples of unknown concentration are compared with well-known international standard reference materials in order to define precise concentration levels of the unknown sample.

- A lithium borate fusion or simple pelletisation can be used to prepare both samples and calibration standards prior to measurement.

Advantages of XRF Spectroscopy

The technique is ideal for the measurement of major and minor elements and is thus a preferred technique for Iron Ore, Bauxite, and Whole Rock characterization.

- The fusion technique minimises particle size effects that could otherwise cause problems with the measurement process.
- Numerous trace elements can also be determined from the same fused disk, e.g. Y, Nb, Zr. The disks themselves can be stored indefinitely.

Limitations of XRF Spectroscopy

- Fluorescent X-rays can be easily absorbed by the sample itself (self-absorption). It is therefore important that the sample matrix match as closely as possible to that of the calibration standards. If this is not possible, then empirical correction factors must be applied.
- Lighter elements are not easily determined by XRF as they have inherently less sensitivity. The lower energy XRF emission from these elements means that they have less penetrating power and hence less sensitivity. ICP-AES spectroscopy is the preferred technique for these lighter elements.
- Sample fusion enhances the XRF measurement technique by minimizing particle size effects but sometimes refractory minerals dissolve slowly and do not give satisfactory fusions.
- Samples high in sulphide minerals do not fuse well with lithium borate and are best analyzed using an AAS or ICP package or alternative fusion prior to the XRF procedure. See Ores and High Grade Material

Classical and Other

Many traditional chemistry techniques are non-spectroscopic in nature. These techniques rely on chemical separation of the element of interest followed by a quantification of that element by a non-



spectroscopic method. These methods include volumetric or titrimetric methods, gravimetric methods and conductivity methods.

Gravimetric Methods

Gravimetric methods involve the use of balances to weigh the element of interest, either in its pure elemental form or as a chemical compound. One of the most common gravimetric determinations is that of gold and silver following a Fire Assay Fusion and cupellation. The precious metal bead that remains following cupellation is an alloy of silver and gold. Weighing this bead will give the total weight of silver and gold. If the bead is then treated with dilute nitric acid, it is possible to remove the silver quantitatively. The residual mass consists of pure gold which can then be weighed separately, thus allowing the silver to be determined by difference. The balances used for this purpose are microbalances capable of weighing to the nearest microgram (one millionth of a gram). Analysis of Bullion for gold, silver and base metal content is another common procedure.

Another common gravimetric method is the determination of barium by the chemical precipitation and weighing of barium sulfate, a highly insoluble compound. Copper in concentrate can be measured by electroplating and weighing the copper deposit.

Volumetric or Titrimetric Methods

In volumetric methods of analysis, the analyte is determined titrimetrically through a chemical reaction with a reacting species of known concentration. A knowledge of the volume and concentration of the reacting species allows the analyst to determine the total amount of analyte present. A chemical indicator is frequently used to indicate the end of the reaction by signalling that the analyte has been fully consumed. The major elements of base metal concentrates such as lead, zinc and copper can be measured in this way.

Specific Ion Electrode Methods

Specific ion electrode methods are based on the principle of measuring the potential difference that exists between a standard ion electrode and a solution of the same ion.

- The technique is most frequently used for the determination of fluoride or chloride in solution following a chemical fusion.

Induction Furnace Methods

High temperature induction furnaces can be used to rapidly pyrolyze a sample and thereby convert some common chemical species to volatile forms in order to separate and measure them. This process is useful for elements such as carbon and sulfur which can be found in a number of forms (for example, carbon can be present as carbonate, graphite or organic carbon;; sulfur can be present as sulphate, sulphide or sulphur). Induction furnace pyrolysis converts both elements quantitatively to their oxides which can then be measured by other standard volumetric or titrimetric methods.

Ultra-Trace Geochemical Analysis

Inductively Coupled Plasma Mass Spectroscopy (ICP-MS) is an excellent technique for the measurement of many trace elements to extremely low detection limits. By combining ICP-MS with

conventional atomic emission plasma spectroscopy (ICP-AES), we have designed a number of interesting analytical packages, which are particularly attractive for ultra-trace metal exploration and reconnaissance programs.

We offer three such extended sensitivity packages, denoted ME-MS41, ME-MS61 and ME-MS81. Samples submitted for any of these packages will initially be analyzed by ICP-AES to pre-screen samples to make sure that no elevated metal concentrations are present. Elevated metal concentrations (defined as >1% of an individual base metal, or >3% cumulative) cannot be introduced to a plasma mass spectrometer without causing cross contamination. Samples showing elevated metal concentrations will not be analyzed by ICP-MS but will only have ICP-AES data reported. For higher grade samples where the accompanying pathfinder elements are of critical interest, a diluted sample can be introduced to the ICP-MS machine with an accompanying loss of sensitivity.

ME-MS41 Ultra-Trace Package

In this package, elements are reported following an aqua regia digestion. As for any aqua regia digestion, many minerals will be incompletely dissolved. For a description of elements determined and their

ME-MS61 Ultra-Trace Package

Elements are reported following HF-HNO₃-HClO₄ digestion, HCl leach. Only the most resistive elements, such as Zircons, are incompletely dissolved using this procedure.

Trace Level Methods by ICP Analysis

Inductively coupled plasma atomic emission spectroscopy (ICP-AES) is a popular analytical technique owing to the amount of information generated for a relatively small cost to the explorer. This section details information on our new range of packages.

ME-ICP41: Aqua Regia and ICP-AES.

Data for elements are reported giving the explorer the widest possible range of information. Even though the leach is considered "partial", in most cases it is still sufficiently strong to dissolve over half of the elements in a quantitative manner. The remaining elements are dissolved in a manner that is usually incomplete. These elements are outlined both in our Service Schedule and on our Certificates of Analysis. In addition to offering the widest range of information about elemental concentrations, the ME-ICP41 package is also the most economical of the multi-element packages, thus providing extremely good value.

This package has been designed for soils, silts, lake and stream sediment analysis. Rock characterization is better accomplished using the ME-ICP61 package outlined below.

Notes: Detection Limits

Detection limits vary from element to element. Several different factors such as analytical sensitivity of an elemental spectral line and interelement interferences can have a major effect on the detection limit offered.

Interelement Effects

The concentration values of some elements in the ME-ICP41 package are routinely corrected for interelement effects caused by spectral line overlap. Great care and attention is taken to ensure that these corrections are properly made. High Concentrations of certain major elements, such as Aluminum and Iron can interfere upon trace elements (e.g. Beryllium), depending on the analytical wavelength that has been selected. Although these interferences can usually be compensated for, in

extreme cases the effect may be sufficiently great as to prevent the measurement of a small number of elements.

Evaluation of data for incompletely dissolved elements

Silicates, clays and resistant minerals are incompletely dissolved in aqua regia digestions. Elements such as Aluminum, Barium, Titanium, Sodium and Potassium will rarely be fully dissolved. Hence, data for these elements will typically not match those generated by more aggressive dissolution techniques such as total digestions or whole rock fusions.

ME-ICP41m: Elements by Aqua Regia Acid ICP-AES with Quantitative Low Detection Mercury by AAS.

The analytical sensitivity for mercury using ICP spectroscopy is adequate for some sample types, but in many cases explorers require a better sensitivity than the 1 ppm detection limit offered by conventional ICP-AES. In this package, we substitute a quantitative geochemical procedure for mercury. This procedure uses conventional cold vapour atomic absorption spectroscopy with a detection limit for Hg of 10 ppb, a one hundred fold improvement over that offered in the ME-ICP41.

ME-ICP61: Elements by HF-HNO₃-HClO₄ Acid Digestion, HCl Leach and ICP-AES.

This package utilises a near total digestion so that data reported for nearly all elements is considered quantitative. It is considered most appropriate for rock characterization as it includes data for all major and minor elements except silicon.

Notes: Digestion For this digestion, the acid mixture must be taken to incipient dryness. This process ensures the best possible dissolution, but also results in the loss of volatile mercury. In addition, this particular acid mixture results in the loss of silicon, an element not normally considered to be volatile.

To assist in the final dissolution of the sample residue, hydrochloric acid is added and then sample analysis is carried out in a dilute hydrochloric acid matrix.

This digestion will be "total" for most rock samples. Certain types of highly resistant minerals, for example zircons, may not be totally attacked. In these limited cases, we recommend that the Whole Rock fusion technique be used.

Re-precipitation

Certain mineral species, though capable of fully dissolving during the digestion process, are prone to re-precipitation as a result of their fundamental chemistry. Barium, even if present in relatively low concentrations, is susceptible to re-precipitation, and may co-precipitate other elements such as silver and lead. Laboratory technicians are trained to watch for this phenomenon and preventative action is taken where possible by quickly analyzing solutions following the digestion process.

ME-ICP61m: Elements by HF-HNO₃-HClO₄ Acid Digestion, HCL Leach and ICP-AES with Quantitative Low Detection Mercury by AAS.

As discussed in ME-ICP41m, a cold vapour mercury add-on is also available for ME-ICP61. Simply request ME-ICP61m.

FAQs

Why are my barium results by the ME-ICP61 procedure lower than those that I got by your whole rock procedure?

In ME-ICP61, samples are digested using the triple acid combination of nitric, perchloric and hydrofluoric acids with a final hydrochloric acid leach. A sample containing a significant amount of sulphides will produce sulphate ions during the digestion and this can occasionally cause re-precipitation of barium as barium sulphate, resulting in low barium recoveries. In the whole rock procedure, the samples are greatly diluted following the whole rock fusion preparation stage, and this helps prevent precipitation of barium. Similarly with the pelletisation process, barium does not precipitate, as this is a non-destructive preparation step.

Why do you have an upper limit on your ME-ICP41 package Some other labs don't have upper limits on their ICP packages?

There are a number of reasons why we adopt this approach. The main one is our insistence on contamination control by sorting samples according to expected metal concentrations and routing them through separate batch streams. In this way we can provide better service for all clients by minimizing chances of cross contamination. We prefer that samples expected to exceed our ME-ICP41 upper limits be analyzed by one of our ore and high grade assay procedures, which have been especially designed for this purpose. The digestions for these packages take place in a physically separate part of the laboratory designed for handling high grade samples. In addition, even though ICP-AES has linear calibration curves over several orders of magnitude, these curves cannot be extended indefinitely to higher concentrations. Alternatively, diluted solutions can be introduced for the ME-ICP41 procedure.

Litho geochemistry

- Introduction
- Whole Rock Analysis by X-Ray Fluorescence
- The ME-XRF06 Basic Whole Rock Package
- Whole Rock Analysis by ICP Spectroscopy
- The ME-ICP06 Whole Rock Analysis Package by ICP Spectroscopy
- Add-on Options for Whole Rock Analysis o Basic Add-Ons
- The ME-MS81 Extended Whole Rock Add-on Package by ICP-MS
- Quality Control procedures for Whole Rock Analysis
- FAQs

Whole rock analysis (WRA) is used to identify the essential rock type of geological samples. At ALS, we offer two possible alternatives: wavelength dispersive X-ray fluorescence spectroscopy (XRF) and inductively coupled plasma atomic emission spectroscopy (ICP-AES). XRF has traditionally been the technique of preference for analytical chemists, although ICP-AES works equally well for the majority of samples. A description of the technique in the Analytical Methodologies section helps to explain why XRF is so well accepted for most types of geological samples.

Whole Rock Analysis by X-Ray Fluorescence

Samples for whole rock analysis by XRF are fused using a lithium borate fusion. The melt is then poured into a mould and cooled to yield a solid glass disk. The disks can then be analysed and the elements determined by comparison with standard reference materials.

The ME-XRF06 package offers thirteen major and minor elements (reported as oxides), plus loss on ignition (LOI), and the sum of the elements reported.

Whole Rock Analysis by ICP Spectroscopy

For whole rock analysis there are occasions when XRF is inappropriate (see limitations of XRF Spectroscopy). Samples high in sulphides, or metal concentrates, are difficult to fuse with lithium borate. These samples are best fused by sodium peroxide.

The ME-ICP06 package offers the same thirteen major and minor elements, plus loss on ignition (LOI) and the sum of the elements reported, as does the ME-XRF06 package.

Add-on Options for Whole Rock Analysis

We offer basic add-on packages, which can be requested in addition to either the ME-XRF06 or ME-ICP06 packages. These packages cover: Total Carbon; Inorganic Carbon; Ferrous Iron; Moisture Water; Water of Crystallisation and Total Sulphur. The ME-MS81 Extended Whole Rock Add-on Package by ICP-MS. This package offers a comprehensive suite of 38 elements by lithium metaborate fusion.

FAQs

The sum of oxides for several of my samples is only in the range of 92-94%. Why wasn't it in the range of 100 +/- 1.5%

The whole rock analysis only sums thirteen major and minor elements plus LOI. When a sum does not reach 100 +/- 1.5%, it usually indicates that other metals are present in significant quantities; for example, base metals such as Cu, Pb, Zn; or compounds such as fluorite (CaF₂). A sum value of 92-94% does not necessarily indicate that the analysis is in error.

On one of my samples, the barium by XRF was higher than by your ME-ICP61 package. Why is that?

The four acid digestion used for the ME-ICP61 package converts sulphide to sulphate as part of the digestion process. Since barium sulphate is extremely insoluble, it may have prematurely precipitated if significant amounts of either barium or sulphate were present. Alternatively, barium may have co-precipitated with another species such as lead sulphate, which is also relatively insoluble.

I asked for an XRF analysis on my copper concentrate but the Certificate of Analysis indicates it was run by ICP. Why did you switch it?

Samples such as metal concentrates and others high in sulphides do not fuse properly with lithium borates. They also cause significant damage to the platinum equipment that we use. Therefore, we switch the samples to our alternative procedure in order to give you better results.

What does the term Loss on Ignition mean How do I interpret it?

Loss on ignition refers to the weight loss experienced by a sample when it is placed in a furnace at a specific temperature and for a specific time period. It is used to give a general indication of the "volatile" species in a sample. The LOI s are carried out at a temperature of 1010 C for one hour, so the weight loss reflects all of those species that are lost at this temperature and for this time period. It would include water (both surficial moisture as well as water of crystallization) and organic carbon species. In addition, carbonates decompose to oxides with the loss of carbon dioxide and sulphates decompose (but usually only partially) to oxides with the loss of sulphur trioxide. Fluorides may also be partially lost. As a result of the complex nature of these reactions, the LOI value is best used as a general indicator of the amount of volatile species present. It cannot be used to determine the presence of individual species. Some base metals such as As will also be lost in this process.

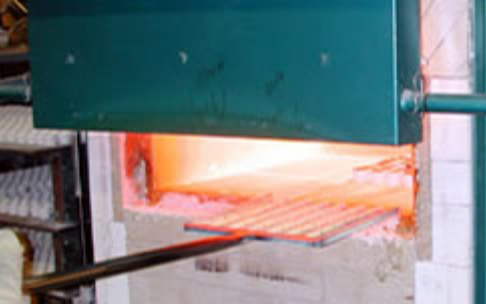
Why do I have a negative LOI result?

For samples that are high in Iron, the LOI procedure will convert elemental Fe to Fe₂O₃, thereby leading to a gain in sample mass.

Rare Earth Analysis

We have been offering trace rare earth packages for a number of years. Initially, this data was generated exclusively using neutron activation analysis (NAA). The more recent availability of

inductively coupled plasma mass spectroscopy (ICP-MS) provides a better option; not only are the detection limits in general lower than those provided by NAA, but the technique itself is less prone to interference than NAA. The ME-MS81 includes all the rare earths plus uranium, thorium and yttrium.



Precious Metals Analysis

Gold Analysis

There are many different methods available to analytical chemists for the determination of gold. These include:

- The classical fire assay fusion collection followed by a gravimetric spectrometric finish to determine ore grade.
- Cyanide Leach to determine the recovery potential for mine development samples. This may also be used as a very sensitive and cost effective grassroots exploration tool ?
- Aqua regia digestion for soil and stream sediment exploration samples.
- A "metallics" or screen fire assay for samples containing "coarse" gold.

Each of these methods has its application and these will be outlined below. All methods have limitations to some degree. For example, an aqua regia digestion for gold is suitable for soils and sediments because the gold is expected to be largely available for chemical attack. The same cannot be said for an aqua regia digestion of rocks and drill cuttings where the gold may be retained in an insoluble quartz matrix or otherwise encapsulated. For rocks and drill cuttings, a fire assay fusion is clearly the superior method of gold analysis.

Fire Assay Process

Lead Collection

The standard fire assay procedure has been used for millennia to dissolve and separate gold, silver and other precious metals. In the first part of the fire assay, precious metals are dissolved using an aggressive fusion mixture consisting of litharge (lead oxide) and a variety of other fluxes such as sodium carbonate, borax, silica, potassium nitrate and household flour. During the complex reactions that occur between sample and the flux mixture, the litharge is reduced to molten lead and the silica within the sample is oxidized to a borosilicate slag. The molten lead that is produced within the reaction mixture forms as tiny droplets throughout. Because of the high specific gravity of the lead droplets, they filter down through the reaction mixture, dissolving and collecting the precious metals as they do so. In an ideal fusion, the end result is a clean two-phase melt in which the barren borosilicate slag floats on top of the molten lead containing the precious metals. When this two-phase melt is poured into an iron mold to cool, the lead solidifies and can be recovered. The subsequent separation of lead and precious metals occurs during the next step known as cupellation.

Cupellation

Cupellation most commonly refers to that part of the fire assay process. Following a successful fusion, the analyst is left with a lead "button" which contains all the precious metals from a particular sample. Cupellation is the process by which the lead is separated from the precious metals. Cupellation is considered "total" if the lead is removed in its entirety and "partial" if it is not. For the determination of gold, silver, platinum, palladium, a total cupellation is standard. In this case, the lead button is placed on a magnesia cupel in a furnace at 960-1000°C. At this temperature, the lead melts and is simultaneously oxidised. Part of the lead is volatilised and part is drawn into the cupel by capillary attraction. Eventually the lead is entirely removed and what remains behind is a small precious metal bead that represents the entire precious metal content of the original sample. This bead can then be analysed by a variety of methods

A partial cupellation can be used for the analysis of platinum group metals (PGM) following a lead collection. A total cupellation cannot be used as losses in ruthenium, rhodium, osmium and iridium would result. However, if the cupellation is partial then the bulk of the lead is removed and losses of PGM can be avoided. Further chemical manipulations are required however to dissolve and remove the remainder of the lead

The Fire Assay-Gravimetric Procedure for Ore Grade Samples

Gravimetric methods involve the use of balances to weigh the element of interest, either in its pure elemental form or as a chemical compound. One of the most common gravimetric determinations is that of gold and silver following a fire Assay Fusion cupellation. The precious metal bead that remains following cupellation is an alloy of silver and gold. Weighing this bead will give the total weight of silver and gold. If the bead is then treated with dilute nitric acid, it is possible to remove the silver quantitatively. The residual mass consists of pure gold which can then be weighed separately, thus allowing the silver to be determined by difference. The balances used for this purpose are microbalances capable of weighing to the nearest microgram (one millionth of a gram). Analysis of Bullion for gold, silver and base metal content is another common procedure. The classical technique for determining gold is the fire assay fusion followed by cupellation and a gravimetric finish (method codes Au-GRA21, Au-GRA22 and Au-GRA24). This is still the preferred procedure for the analysis of high grade ores. There is no upper quantitative limit applied for these procedures but clients should note that the detection limit is significantly higher than for procedures that use spectroscopic measurement techniques.

Fire Assay-Atomic Absorption procedures for Exploration and Low to Medium Grade Ore Samples

Exploration samples (particularly soils) may require a better detection limit than that offered by the above procedures. Method codes Au-AA21 and Au-AA22, which include a fire assay collection followed by cupellation, dissolution of the precious metal prill and a pre-concentration solvent extraction step. The final determination is by flame AAS, providing a detection limit of 1 ppb. It is a more expensive technique than the conventional fire assay /AAS procedure, but for explorers looking for the best resolution of low level gold anomalies, this procedure is excellent.

In recent times, we have turned to ICPMS technology to offer trace level gold. See method codes Au-ICP21 and Au-ICP22. In addition to a detection limit of 1ppb, the advantage offered by this technique is the ability to determine platinum and palladium together with gold.

Many samples arriving at our laboratories have "intermediate" levels of gold; that is in the range of 3-10 g/t (0.1-0.3 oz/ton). These samples are best analyzed using FA-AAS procedures Au-AA23, Au-AA24. If samples contain higher concentrations of gold, procedures Au-AA25 or Au-AA26 would be a more appropriate technique.

Advantages of the Fire Assay Process

- A large sub-sample (10-50g or more) can be taken for analysis, helping to ensure that the analytical sub-sample is truly representative of the sample submitted to the laboratory \
- The fire assay fusion is considered to provide a "total" gold.
- All samples are amenable to the fire assay procedure in the hands of a skilled assayer.
- The fire assay procedure is universally accepted as the definitive method for the analysis of gold.
- The fire assay fusion quantitatively dissolves and extracts the entire platinum metal group in addition to gold and silver.

Limitations of the Fire Assay Process

- When a gravimetric finish is used, it is essential that the separation ("parting") of silver and gold is complete. If the silver is incompletely removed, then the gold results will be artificially high and the silver results will be low.
- A certain amount of silver (usually estimated to be in the range of 2%) is lost by volatilization during the cupellation process.
- When an atomic absorption spectroscopy finish is selected, the upper reporting limit is set at 10 g/t (0.3 oz/ton) and samples higher than this must be re-analyzed using additional silver in the firing process and a larger dilution factor. Alternatively, gravimetric finish can be used.

- Samples containing coarse gold can give erratic results making it difficult to determine the true ore grade; however, sample heterogeneity rather than the fire assay process causes this problem. • Soil samples (typically -180um(-80 mesh material)) can also give erratic results but again for the same reason
- It can take many years of experience before a fire assayer has the necessary degree of skill and knowledge to flux difficult ore types. • Some ores such as chromites and tellurides can be more difficult to fuse, resulting in the need to take smaller subsamples for analysis and consequently yielding higher detection limits than normal.

Cyanide Leach

Cyanide Extraction

One very important alkaline digestion is the cyanide leach for extractable gold. Not only is cyanide very efficient in extracting gold in an alkaline environment but it would be lethally dangerous in an acid environment due to the formation of deadly hydrogen cyanide.

BLEG for Trace Level Gold

The treatment of gold exploration samples with alkaline cyanide solutions can be successfully applied to soil and stream sediment samples. The cyanide solutions are very dilute and as a result it is economically feasible to leach very large samples (up to 2,500 g) in contrast to fire assay. The ability to leach very large samples (Bulk Liquid Extractable Gold-BLEG) helps counteract the problem of sample heterogeneity. The gold is dissolved through formation of its cyanide complex, which can be concentrated through the process of solvent extraction to an organic solvent. The combination of large sample weight and solvent extraction gives an extremely low detection limit. As low as 0.1 ppb. This method is a very cost effective grassroots exploration tool to detect low grade gold dispersions.

Cyanide Leach for Ore Grade Samples

Smaller sub-sample weights are generally taken for ore grade samples because of the greater amount of gold that will be dissolved in contrast to exploration samples.

In the case of ore grade samples, the solvent extraction step is omitted because low detection limits are not generally required. The leach solutions are analyzed directly by flame AAS. The main objective for testing ore grade samples is to determine the cyanide solubility and recovery of gold in a mining situation. Cyanide extraction using an accelerant may also be used in a grade control situation.

Advantages of Cyanide Leach

- The combination of a large sub-sample and solvent extraction lead to a very low detection limit for gold (as low as 0.1 ppb) in exploration samples.
- The large sub-sample weights help to counteract heterogeneity problems.
- Cyanidation of ore grade samples closely approximates the gold plant leach process and permits the evaluation of recovery potentials.

Limitations of Cyanide Leach

- The procedure is not as aggressive as fire assay procedures and so gold values will be lower; the recovery of gold is typically in the 90% range.
- The technique is generally ineffective for the leaching of encapsulated gold.
- Recovery potential can vary with leach temperature and leach time so caution is needed when comparing data from different sources.

Aqua regia acid digestion

The aqua regia digestion is an effective way of dissolving and measuring gold in soil and stream sediment samples. Gold in these sample types is typically amenable to an aqua regia acid attack and in many cases the data is comparable to that produced with fire assay procedures. The advantage of this method is primarily associated with its cheaper cost; acids being cheaper than fire assay fluxes. A disadvantage is that encapsulated gold will not be dissolved by aqua regia. Another limitation can be poor precision. This is especially true for samples with coarse gold, a common occurrence for these sample types which are usually only screened to -80 mesh (180 micron). We recommend that samples be pulverized to 85% -75microns(200 mesh) to avoid this problem.

The Problem of Coarse Gold Samples

Many exploration samples exhibit a pronounced "nugget" effect due to the presence of particulate gold in coarse fragments. The net result is a pronounced and unacceptable scatter in the gold analytical results making it difficult to assess the true gold concentration. There are a number of steps that can be taken to improve analytical reproducibility in these kinds of samples and usually it is possible to improve the situation, although perhaps not always to the degree sought by the client.

The first place to improve the analytical reproducibility is the sample preparation process. Essentially it is advantageous to prepare a larger and finer sub-sample so as to increase the chances that the sub-sample is more representative of the field sample and also more homogeneous. This can be achieved by crushing the sample to a degree finer than the standard 70% -2mm (10 mesh), or indeed pulverising the whole sample to a nominal 75 microns. See method code PUL-21. With the preparation of a finer and more representative sample, it is now possible to enhance the analytical process.

The ALS recommended analytical procedure is to select a 1000 gram "metallics" or screen fire assay (method codes Au-SCR21 (100 micron dry screen) or Au-SCR22 (75 micron wet screen)). In the Au-SCR22 procedure, 1000grams of the final prepared pulp is washed through a 75micron(200 mesh) screen to separate any coarse (+75 micron) material. Any +75micron material remaining on the screen is dried, weighed and analyzed in its entirety. The 75micron fraction is dried and homogenized. Duplicate sub-samples are analyzed using the standard fire assay procedures. The gold values for both +75micron and 75micron fractions are reported together with the weight of each fraction as well as the calculated total gold content of the sample. In this way a client can evaluate the magnitude of the coarse gold effect as demonstrated by the levels of the +75micron material.

An alternative to improve analytical reproducibility is to carry out an initial cyanide leach of a large subsample of ore followed by a fire assay analysis of the residual material. As much as 3000 g of ore grade material can be leached with cyanide (method codes Au-AA14 and Au-AA15) and typically around 90% of the gold will be extracted. The balance of the gold can be measured by carrying out a total gold fire assay fusion on the residue. It is then possible to calculate the total gold content of the original ore.

The Analysis of Problematic Ores such as Tellurides and Chromites

A number of ores such as tellurides and chromites present unique challenges to the fire assayer. Tellurium can cause low values for both silver and gold during the cupellation process by reducing the surface tension of the precious metal prill leading to losses into the cupel. However, if tellurium is prevented from being in the lead button in the first place, then the problem is eliminated. This is accomplished by ensuring that the flux mixture in the fire assay fusion is strongly oxidizing in order to oxidize tellurium and have it report to the slag component rather than to the lead component. If a sample containing significant tellurides is not recognized initially, the presence of remnant Te would be revealed at the cupellation stage by leaving a "color de rosa" residue on the cupel. The sample would then be re-analyzed with a different flux mixture.

Chromite ores, being highly refractory, are problematic because they do not melt readily with a normal flux mixture at 1000 deg. C. Furthermore, if the chromium oxidizes to a higher state (Cr 6+) then lead "shotting" occurs and it is impossible to bring about a two-phase separation into slag and molten lead. The analyst must therefore maintain a stronger reducing fusion environment by

increasing the amount of reducing agents such as flour, minimizing oxidizing agents such as litharge (lead oxide) and substituting sodium carbonate and silica instead. This kind of modification is also helpful for ores containing tin or ores high in iron oxides.

For all problematic ores, it is generally helpful to reduce the sample weight in order to increase the flux to sample ratio. This increases the likelihood of a successful fusion resulting in a clean 2-phase separation; however, the reduction in sample weight means that the detection limit will be elevated over the normal limits stated in our literature.

Quality Control Procedures for the Determination of Gold in Geological Samples

Fire Assay: Our assayers take numerous additional steps in the fire assay process. Fusion crucibles are carefully checked to ensure that no boilovers have occurred in the furnace. A boilover requires re-analysis of not just that sample but also of all its nearest neighbours in the furnace. We do visual checks of the fusion mixture to make sure that there has been a clean fusion with no lead "shotting". The size of the lead button is assessed and if it is either too small or too large, the fusion will be repeated. After cupellation, the precious metal bead is checked for size, colour and surface texture. A large bead or a gold hue will indicate a sample high in silver or gold, or both, and it must be handled with special care to control possible contamination. A pebbled bead surface can indicate the presence of platinum metals. A 'color de rosa' in the cupel can indicate the presence of tellurium, in which case the analysis will have to be repeated.

FAQs

Is it true that the fire assay procedure will not extract gold from certain types of samples?

Some ore types are very difficult to fuse, (see Problematic Ores) but in our experience a skilled fire assayer is always able to make the necessary adjustments to obtain a successful fusion. Unfortunately, unscrupulous promoters often make unsubstantiated claims to the effect that standard methods of fire assay do not work. We recommend that clients evaluate these claims by analyzing the samples by fire assay and also by aqua regia digestion.

Why do gold checks on my soil samples often show no gold even when the original analysis showed several hundred ppb gold?

This problem has been discussed in part in Coarse Gold Problems. Soils are typically screened to - 180 micron (80 mesh) and this is a relatively coarse sample that can easily contain particulate gold. Hence, it is quite common for one subsample to contain a flake of gold whereas another does not. Pulverizing these samples may help reduce the variability of the assays. As part of our normal quality control procedures, we perform random checks on samples that have shown anomalous values. We choose to report these check values to the client (at no charge), even where the agreement with the original value is not as good as we would like to see, in order that the client may have the additional information that the gold present is likely to be of a particulate nature.

How much gold does an aqua regia digestion dissolve in comparison to a fire assay fusion?

In our experience, it depends entirely on how available the gold is for attack. If the gold is readily accessible, (free gold), then the aqua regia digestion can provide data that is virtually identical to that of a fire assay. However if the gold is encapsulated, or contained within a mineral that is not easily attacked by aqua regia, then the recovery of gold can be as low as about 80%. A typical recovery range would be from 85% to 95% but exceptions abound. The presence of carbon in the sample may lead to almost zero recovery of the gold.

Silver Analysis

Silver can be determined by a variety of analytical methods. Spectroscopic methods such as atomic absorption spectroscopy and inductively coupled plasma emission spectroscopy are most applicable for the trace silver analysis of exploration samples. The fire assay procedure for precious metals and ore grade acid digestion with atomic absorption finish are alternatives for the determination of silver in ore grade samples. The advantages and limitations of each of these techniques is outlined in their relevant sections.

Methods of Silver Dissolution

The standard digestion procedure for trace and ore grade silver analyses is the aqua regia digestion. This digestion is effective for exploration and mineralised samples as is the triple acid digestion system of nitric-perchloric-hydrofluoric acids. Ordinarily the aqua regia digestion is effective for dissolving most forms of silver mineralisation. For high ore grade silver, fire assay gravimetric silver is applicable.

The Fire Assay Gravimetric Analysis for Silver

The fire assay gravimetric procedure is only applicable to the determination of silver in concentrates or high grade silver ores. It can not be used to determine low concentrations of silver due to the necessity to inquart with silver to obtain a acceptably sized prill. The uncertainty inherent in quantifying the silver recovery of the inquart would far exceed the accuracy requirements for this determination.

Ore Grade Digestions for Silver

Using the Ag-OG46 analytical procedure, higher grades (up to 1,500ppm(50 oz/t)) of silver can be digested with aqua regia. This method is suitable for most silver ores with the exception of halide salts, where we recommend Ag-OG62. Both are cheaper, quicker alternatives to fire assay procedures and equally accurate. In some cases, depending on mineralogy, there may be still precipitation of Silver as its Sulphate salt. We recommend sending in a test batch for verification by alternative methods before deciding on the most appropriate assay procedure.

Limitations of Silver Analytical Methodology

In the determination of silver using acid digestions, the analyst must be aware that silver has a propensity to precipitate from solution in the presence of trace halides. Silver may also co-precipitate with insoluble sulfates. Strong hydrochloric acid will stabilise silver in solution or it may be complexed with sodium thiosulfate. For routine geochemical analysis it is advantageous to determine the silver as soon as possible after bulking to volume.

When silver is determined by ICP-AES, there can be a significant spectral interference from iron. If samples contain "normal" levels of iron, i.e. in the range of several percent, a successful correction can be made. However for samples containing elevated iron concentrations, we recommend that AAS techniques be used in preference to ICP. As part of our Quality Assurance program, we do carry out random AAS checks of ICP-generated silver data where it is suspected that elevated levels of iron may be present. The

limitations of the fire assay procedure have been discussed elsewhere on this website. The principal limitations in the measurement of silver are the inability to determine trace concentrations plus the silver losses that occur during cupellation. Cupelling at a lower temperature can reduce cupellation losses. The concurrent analysis of proof silver inquarts may be used to quantify these losses and corrections made based on these recoveries

How do I know if my samples require a total digestion for silver assay?

If your samples contain silver halide minerals and originate in the U.S. Southwest or Mexico, then it may be necessary to use a total digestion silver assay (Ag-OG62). We recommend talking to an ALS Client Services representative regarding the analysis of a limited batch of test samples.

When is an aqua regia digestion adequate for a silver assay?

The aqua regia digestion is ordinarily adequate for a reliable silver assay. However, if silver halide minerals are present, we recommend a total digestion. It is always possible to analyse a small test batch by both methods in order to confirm the validity of the aqua regia digestions.

Platinum Group Elements Analysis

Platinum group elements (PGE's) are rarely found in significant concentrations in any kind of mineralisation. As a result, the fire assay fusion is the universally preferred method for collecting and concentrating platinum group elements.

The platinum group metals can be successfully collected using a lead collection fire assay fusion but several (Ir, Os, Ru) can be lost during the subsequent cupellation process. An alternative fusion process that does not require the cupellation step is a nickel sulphide fusion. In this fusion, samples are mixed with a variety of fluxes including nickel oxide, elemental sulfur and sodium carbonate and melted together in a high temperature furnace. Nickel sulphide is formed in this process and because it possesses a high affinity for the PGM, they are collected together with the nickel sulphide as it forms. The nickel sulphide-PGM matte can be analyzed by neutron activation analysis (NAA) directly or by plasma mass spectroscopy (ICP-MS) following chemical dissolution. It should be noted that gold is only qualitative by this process.

Fire Assay Lead Collection

All of the PGE's are collected in the lead button, but only gold, platinum and palladium are determined routinely using this technique. During cupellation, osmium and ruthenium are partly volatilised and iridium is partly absorbed by the cupel. Rhodium, although quantitatively retained in the prill, may only partially dissolve in the aqua regia unless additional gold is added prior to the fusion process. The PGE's in solution are determined by inductively coupled plasma mass spectroscopy (ICPMS)

Fire Assay Nickel Sulphide Collection

This is a modified fire assay technique for recovering all of the PGE's using a Nickel Sulphide Matte instead of lead. The nickel sulphide matte dissolved in hydrochloric acid. The undissolved PGE's and Gold sulphides are recovered, and then dissolved in Aqua Regia prior to ICPMS determinations. However, gold is not quantitative by this method due to the poor solubility of gold sulphide in hydrochloric acid. See method PGM-MS26 and PGM-NAA26

Limitations of PGE Analytical Methodology

PGM's occur most commonly in placer deposits or in ultrabasic intrusives with nickel sulfides. High nickel samples require special fluxing to ensure that cupellation is not impeded. Alluvial samples will usually require a large excess of silver to facilitate parting. Chromite may also be present with PGE's and will also require special fluxing. Unless the laboratory has the expertise to recognise and compensate for these situations poor recoveries will inevitably occur.

Appendix VI

Authorization to act on Behalf of Claim Holder

Forestry Road, P.O. Box 1059
Red Lake, Ontario, P0V 2M0

Phone: (807) 735-2302

Fax: (807) 735-2372

I, Larry Kenneth Herbert (143905) of:

Red Lake, Ontario

Authorize, Dean Fraser (26 Blue River Place, St. John's, NL, A1E 6C3) and/or Graham Stone ,
all representing Champlain Resources Inc. (#1614, , 246 Stewart Green, S.W. Calgary, AB, T3H
3C8 -Tel: 403-618-8989),

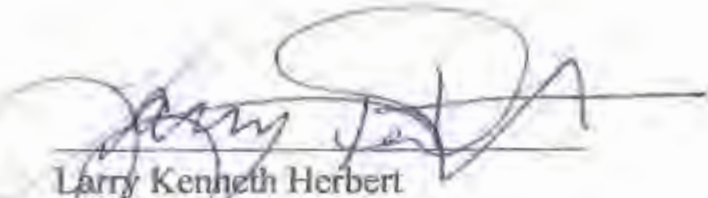
To act as my agent on the following claims recorded in my name in Faulkenham Lake and
Medicine Lake areas,

Claims #'s

4212767, 4212768, 4212769, 4212770, 4212771, 4212772, 3019671, 3019672, 4212711,
4229676, 4229677, 4229678, 4229679, 4241643, 4229769, 4241642, 4241641, 4229680,
4229681, 4229682, 4229683, 4229684, 4229685, 4229686, 4229687, 4229696, 4229697,
4229698

Red Lake Mining District Ontario

Signed,



Larry Kenneth Herbert

January 5, 2011