



ISO/IEC
17025:2005

1490-1506 Glendale Ave., SPARKS, NV 89431-5902
www.aallabs.com **775-356-0606**

ADMINISTRATION

BATCH FEE	Computer batch tracking generation charge
MINIMUM ORDER	Batch Fee + order minimum cost
PICK-UP	Sample on site pick up
RESEARCH	Special Project research and development
SPECIAL PROJECT	Concentrates or Metallurgical samples
TURNAROUND	Guaranteed 48 hour (\$3000 minimum) Guaranteed 5 day (\$1200 minimum) Guaranteed 10 day (\$600 minimum)
LOG-IN	Barcode log in of samples
CORE CUT	Cut to client specification
DENSITY / SG	Bulk Density by water displacement waxed Specific Gravity by pycnometer

Code

BATCH	\$100
	\$400
	\$155 per hour
	\$300 per hour
SP	4x book price
48H	6x book price
5D	4x book price
10D	2x book price
LOG	\$1 per sample
CCUT	\$90 per hour plus blade cost
SG-DSP	\$20 per sample
SG-PYC	\$20 per sample

SAMPLE PREPARATION

TRAY	Transfer plastic or broken bag samples to drying tray	TRAY	\$1.50 per sample
DRY	Drying of excessively wet samples (>5% moisture)	DRY	\$5 + \$1 per kg
CRUSH	Fine Crushing of dried sample to 70% passing 2mm Fine Crushing of dried sample to 90% passing 2mm	FC70	\$3 + \$1 per kg
		FC90	\$5 + \$2 per kg
SPLIT	Jones Riffle Split Rotary Split	JRS	\$2 + \$0.60 per kg
		ROS	\$4 + \$1 per kg
REJECT SAVE	Save reject sample	REJ	\$2 + \$0.50 per kg
PULVERIZE	Pulverize 1 Kg split to 85% passing 75 micron Pulverize 0.3 Kg to 85% passing 75 micron	PV1	\$9 per sample
		PV03	\$7 per sample
BARREN WASH	Barren Wash where speciifed	WASH	\$3 per wash
HOMOGENIZE	Pulp homogenization	HOMG	\$1 per sample
COMPOSITE	Compositing Volumetric Compositing Gravimetric	COMV	\$1 per pulp
		COMG	\$3 per pulp
CUSTOM PREP	Client Specific custom preparation	CUST	\$90 per hour
STORAGE	Large (>1kg) storage in AAL containers Small (<1kg) storage in AAL warehouse	STOR>	\$1 per sample
		STOR<	\$0.50 per sample
DISPOSAL	Disposal or return	DISP	At Cost

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FIRE ASSAY

		Code
FIRE-ICP	Fire Assay 30 g Au (0.003-10 ppm) ICP-OES Pd (0.003-10 ppm) Pt (0.005-10 ppm) ICP-OES Ag (0.2-100 ppm) D2A ICP-OES	FAICP \$18 per sample FAPdPt \$5 extra D2Ag \$7 extra
SCREEN FIRE	1kg pulp screened at 100 microns Au (0.1-1,000,000 ppm) GRAVIMETRIC Au fire assay on oversize and 2 undersize assays and calculated head assay	SFAu \$60 per sample
FIRE-GRAV	Fire Assay 30 g Au (0.1-1,000,000 ppm) GRAVIMETRIC Fire Assay 30 g Au (0.003-10 ppm) ICP + Ag (10-1,000,000 ppm) GRAVIMETRIC Fire Assay 30 g Ag (10-1,000,000 ppm) + Au (0.1-1,000,000 ppm) GRAVIMETRIC	GAu \$22 per sample FAAuAg \$26 per sample GAuAg \$30 per sample

CYANIDE

LEACH	30 gram cyanide leach 2 hour tumble Au (0.01-100ppm) Ag (0.01-300ppm) Cu (0.1-2000ppm)	CN?? \$11 + \$4 per element
BLEG	1 kg cyanide leach 24 hour tumble Au (0.0001-10ppm)	BLEG \$40 per sample

ICP

ICP-2AO12	12 element 2 acid digestion ICP-OES analysis	2AO12 \$9.10 per sample
ICP-2AO24	24 element 2 acid digestion ICP-OES analysis	2AO24 \$11.60 per sample
ICP-2AO36	36 element 2 acid digestion ICP-OES analysis	2AO36 \$13.80 per sample
ICP-2AM50	50 element 2 acid digestion ICP-OES+ICP-MS analysis	2AM50 \$21.00 per sample
ICP-2 ORE	2 acid Ore Grade analysis for overrange elements	2ORE \$7 + \$3 per element
ICP-5AO35	35 element 5 acid digestion ICP-OES analysis	5AO35 \$20.00 per sample
ICP-5AM48	43 element 5 acid digestion ICP-OES+ICP-MS analysis	5AM48 \$28.00 per sample
ICP-5 ORE	5 acid Ore Grade analysis for overrange elements	5ORE \$12 + \$3 per element

X-RAY

WHOLE ROCK	Li Borate fusion WD-XRF + LOI + C&S	WR \$50 per sample
XRD	Clay extraction and XRD quantification Quantative XRD scan SEM analysis (\$150 setup fee)	XRDC \$700 per sample XRDQ \$500 per sample SEM \$150 per hour



CARBON & SULFUR

Carbon (0.005-50%) and Sulfur (0.005-50%)	CS \$22 per sample
Carbon (Organic)(0.005-50%) and Sulfur (Sulfide)(0.005-50%) HCl Leach	CSL \$30 per sample
Carbon (Organic)(0.005-50%) and Sulfur (Sulfide)(0.005-50%) HCl Leach+Roast	CSLR \$38 per sample

MERCURY

Hg (0.001-2ppm) by DMA-80 Direct Mercury Analyzer	DMA \$15 per sample
Hg (0.005-10ppm) by D2A ICP-MS	D2AHG \$12 per sample

Other analytes and other techniques available from Special Projects Group
Contact Joshua Zimmerman Ph.D. at 775-356-0606



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FUSION *Sample is fused in a ceramic crucible with litharge, sodium carbonate, borax and flour.*
CUPELLATION *The 25-50 gram lead button is cupelled in a magnesite cupel at 900C for 60 minutes.*
PARTING *The silver bead is parted with nitric acid then hydrochloric acid.*
ANALYSIS *Gold, Palladium and Platinum may be determined by this technique.*
ICP-OES reading of digestion. Parted prills can be weighed and reported as gold.
LIMITATION *ICP readings typically have a +/- 3-5% variation.*
Gravimetric determinations for gold and silver are less accurate at low levels (<3 ppm) but more accurate (<1% variation) above 3 ppm than ICP.
Gravimetric reported gold results include any palladium, platinum and retained silver

METHOD	FA-Pb30	FA-GRAV	ICP-2AAg
DIGEST	FA-Pb30	FA-Pb30	D2A
WEIGHT	30g	30g	0.5g
FINISH	ICP-OES	Gravimetric	ICP-OES
UNITS	ppm	ppm	ppm
RANGE	LDL-UDL	LDL-UDL	LDL-UDL

	Au	Gold	0.003-10	0.05-1,000,000	x
	Ag	Silver	x	7-1,000,000	0.2-100
	Pd	Palladium	0.003-10	x	x
	Pt	Platinum	0.005-10	x	x

Overrange result will trigger an Gravimetric Fire Assay repeat
Results can be reported in client requested units



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DIGEST Sample is digested with HNO₃+HCl.
ANALYSIS Agilent 700/Agilent5110/Agilent7900/AJ-PQElite+
LIMITATION Partial digest with many resistant phases that are not digested.

METHOD	ICP-2A012	ICP-2A024	ICP-2A036	ICP-2AM50
DIGEST	D2A	D2A	D2A	D2A
WEIGHT	0.5g	0.5g	0.5g	0.5g
FINISH	ICP-OES	ICP-OES	ICP-OES	ICP-OES/MS
UNITS	ppm	ppm	ppm	ppm
RANGE	LDL-UDL	LDL-UDL	LDL-UDL	LDL-UDL
1 Ag	0.2-100	0.2-100	0.2-100	0.05-100
2 Al	x	x	100-200,000	100-200,000
3 As	2-10,000	2-10,000	2-10,000	0.1-10,000
4 B	x	x	x	10-10,000
5 Ba	x	x	5-2,000	5-2,000
6 Be	x	x	0.1-1,000	0.01-1,000
7 Bi	+	+	2-10,000	0.01-10,000
8 Ca	100-250,000	100-250,000	100-250,000	100-250,000
9 Cd	+	0.5-1,000	0.5-1,000	0.02-1,000
10 Ce	x	x	1-5,000	0.1-5,000
11 Co	x	x	1-10,000	0.1-10,000
12 Cr	x	1-10,000	1-10,000	0.1-10,000
13 Cs	x	x	x	0.1-1,000
14 Cu	1-10,000	1-10,000	1-10,000	0.1-10,000
15 Fe	100-300,000	100-300,000	100-300,000	100-300,000
16 Ga	x	x	10-10,000	0.02-10,000
17 Ge	x	x	x	0.01-100
18 Hf	x	x	x	0.01-1,000
19 Hg	0.5-500	0.5-500	0.5-500	0.005-10
20 In	x	x	x	0.01-1,000
21 K	x	x	100-100,000	100-100,000
22 La	x	10-10,000	10-10,000	0.01-10,000
23 Li	+	+	+	0.5-10,000
24 Mg	+	100-250,000	100-250,000	100-250,000
25 Mn	+	5-50,000	5-50,000	5-50,000
26 Mo	1-10,000	1-10,000	1-10,000	0.1-10,000
27 Na	x	x	100-100,000	100-100,000
28 Nb	x	x	x	0.02-1,000
29 Ni	+	1-10,000	1-10,000	0.1-10,000
30 P	+	10-10,000	10-10,000	10-10,000
31 Pb	3-10,000	3-10,000	3-10,000	3-10,000
32 Rb	x	x	x	1-10,000
33 Re	x	x	x	0.002-1,000
34 S	100-100,000	100-100,000	100-100,000	100-100,000
35 Sb	3-10,000	3-10,000	3-10,000	0.05-10,000
36 Sc	x	x	1-1,000	0.01-1,000
37 Se	+	5-5,000	5-5,000	0.2-5,000
38 Sn	x	x	x	0.1-10,000
39 Sr	x	x	1-10,000	1-10,000
40 Ta	x	x	x	0.02-1,000
41 Te	+	+	+	0.01-1,000
42 Th	x	10-10,000	10-10,000	0.1-10,000
43 Ti	x	x	10-100,000	10-100,000
44 Tl	x	5-1,000	5-1,000	0.002-1,000
45 U	8-10,000	8-10,000	8-10,000	0.1-10,000
46 V	+	1-10,000	1-10,000	1-10,000
47 W	x	3-10,000	3-10,000	0.1-10,000
48 Y	x	x	1-2,000	0.1-2,000
49 Zn	2-10,000	2-10,000	2-10,000	2-10,000
50 Zr	x	x	x	0.1-10,000

+ Element	
Bi	2-10,000
Cd	0.5-1,000
Li	0.5-10,000
Mg	100-250,000
Mn	5-50,000
Ni	1-10,000
P	10-10,000
Se	5-5,000
Te	10-1,000
V	1-10,000

Overrange will trigger OreGrade digest/analysis



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DIGEST Sample is digested with HNO₃, HF, HClO₄, HCl and H₃BO₃.
ANALYSIS Agilent 700/Agilent5110/Agilent7900/AJ-PQElite+
LIMITATION Near Total digest but resistant phases eg Corundum, Ilmenite, Rutile et al are not digested.

METHOD	ICP-5A035	ICP-5AM48			
DIGEST	D5A	D5A			
WEIGHT	0.5g	0.5g			
FINISH	ICP-OES	ICP-MS			
UNITS	ppm	ppm			
RANGE	LDL-UDL	LDL-UDL		+ 5AREE Suite	
1	Ag	0.5-100	0.05-100	Dy	0.1-1,000
2	Al	100-200,000	100-200,000	Er	0.1-1,000
3	As	2-10,000	0.1-10,000	Eu	0.1-1,000
4	B	x	x	Gd	0.1-1,000
5	Ba	5-5,000	5-5,000	Ho	0.1-1,000
6	Be	0.1-1,000	0.01-1,000	Lu	0.1-1,000
7	Bi	5-10,000	0.01-10,000	Nd	0.1-1,000
8	Ca	100-350,000	100-350,000	Pr	0.1-1,000
9	Cd	0.5-1,000	0.02-1,000	Sm	0.1-1,000
10	Ce	1-10,000	0.1-10,000	Tb	0.1-1,000
11	Co	1-10,000	0.1-10,000	Tm	0.1-1,000
12	Cr	1-10,000	0.1-10,000	Yb	0.1-1,000
13	Cs	x	0.1-1,000		
14	Cu	1-10,000	0.1-10,000		
15	Fe	100-500,000	100-500,000		
16	Ga	10-10,000	0.02-10,000		
17	Ge	x	0.01-100		
18	Hf	x	0.01-1,000		
19	Hg	x	x	* Add D2A Hg (0.2-1000ppm)	
20	In	x	0.01-1,000		
21	K	100-100,000	100-100,000		
22	La	10-10,000	0.01-10,000		
23	Li	x	0.2-10,000		
24	Mg	100-400,000	100-400,000		
25	Mn	5-50,000	5-50,000		
26	Mo	1-10,000	0.1-10,000		
27	Na	100-100,000	100-100,000		
28	Nb	x	0.02-10,000		
29	Ni	1-10,000	0.1-10,000		
30	P	10-10,000	10-10,000		
31	Pb	3-10,000	3-10,000		
32	Rb	x	1-10,000		
33	Re	x	0.002-1,000		
34	S	100-100,000	100-100,000		
35	Sb	2-10,000	0.05-10,000		
36	Sc	1-10,000	0.01-10,000		
37	Se	x	0.2-5,000		
38	Sn	x	0.1-10,000		
39	Sr	1-10,000	1-10,000		
40	Ta	x	0.02-10,000		
41	Te	x	0.01-1,000		
42	Th	20-10,000	0.1-10,000		
43	Ti	10-100,000	10-100,000		
44	Tl	10-1,000	0.002-1,000		
45	U	10-10,000	0.1-10,000		
46	V	1-10,000	1-10,000		
47	W	2-10,000	0.1-10,000		
48	Y	1-5,000	0.1-5,000		
49	Zn	2-10,000	2-10,000		
50	Zr	x	0.1-10,000		

Overrange result will trigger Ore Grade digest/analysis



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FUSION *Sample is fluxed with LiBorate/LiNO₃ flux in automatic fusion equipment
Sample is fused in a Pt/Au crucible at 1050C and poured into Pt/Au mold*

ANALYSIS *Zetium WD-XRF*

LIMITATION *High Sulfide (S>10%) samples may not oxidize and fuse quantitatively*

METHOD **XRF-LiB17**
 DIGEST **LiBorate**
 WEIGHT 0.5g
 FINISH Zetium WD-XRF
 UNITS %

RANGE LDL-UDL **+ Element**

1	Al ₂ O ₃	0.01-100	XRF	a	CeO ₂	0.01-20
2	BaO	0.01-60	XRF	b	Cl	0.01-20
3	CaO	0.01-80	XRF	c	CuO	0.01-10
4	CeO ₂		+ XRF	d	La ₂ O ₃	0.01-20
5	Cl		+ XRF	e	MoO ₃	0.01-10
6	Cr ₂ O ₃	0.01-10	XRF	f	NiO	0.01-10
7	CuO		+ XRF	g	SnO ₂	0.01-10
8	Fe ₂ O ₃	0.01-100	XRF	h	ThO ₂	0.01-10
9	K ₂ O	0.01-15	XRF	i	U ₃ O ₈	0.01-15
10	La ₂ O ₃		+ XRF	j	WO ₃	0.01-10
11	MgO	0.01-50	XRF	k	Y ₂ O ₃	0.01-10
12	MnO	0.01-39	XRF			
13	MoO ₃		+ XRF			
14	Na ₂ O	0.01-20	XRF			
15	NiO		+ XRF			
16	P ₂ O ₅	0.01-40	XRF			
17	SO ₃	0.01-30	XRF			
18	SiO ₂	0.01-100	XRF			
19	SnO ₂		+ XRF			
20	SrO	0.01-2	XRF			
21	ThO ₂		+ XRF			
22	TiO ₂	0.01-30	XRF			
23	U ₃ O ₈		+ XRF			
24	V ₂ O ₅	0.01-10	XRF			
25	WO ₃		+ XRF			
26	Y ₂ O ₃		+ XRF			
27	ZnO	0.01-10	XRF			
28	ZrO ₂	0.01-20	XRF			
29	LOI 1000C	0.01-50	Gravimetric			
30	C	0.01-20	ELTRA			



SCOPE OF ACCREDITATION

IAS Accreditation Number	TL-536
Company Name	American Assay Laboratories Inc.
Address	1500 Glendale Avenue Sparks, Nevada, 89431, USA
Contact Name	Dr. Joshua Robert Zimmerman, Quality Coordinator/Research Chemist
Telephone	+1 (775) 356-0606
Effective Date of Scope	November 28, 2016
Accreditation Standard	ISO/IEC 17025:2005

Environmental

ANP	EPA # 600/2-78-054 Acid neutralization potential
AGP	EPA # 600/2-78-054 Acid generation potential
Paste pH	EPA # 600/2-78-054 Paste pH
SEM	EPA # 600/r-02-070 Determination of minerals/ores by SEM analysis
XRD	EPA # 600/2-78-054 Determination of minerals/ores by X-ray diffraction

Chemical

Sample preparation	Basic sample preparation
Au	Fire assay
Multi element	1 – Acid digestion 2 – Acid digestion (aqua regia) 3 – Acid digestion 4 – Acid digestion Sodium peroxide fusion Cyanide leaching