

# CDN Resource Laboratories Ltd.

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## **REFERENCE MATERIAL: CDN-ME-2306**

Recommended values and the “Between Lab” Two Standard Deviations

Gold	2.553 gpt	± 0.237 gpt	30 g FA, AA or ICP Finish	Certified value
Silver	67 ppm	± 6 ppm	4 Acid digestion / ICP Finish	Certified value
Copper	0.302 %	± 0.012 %	4 Acid digestion / ICP Finish	Certified value
Lead	0.702 %	± 0.018 %	4 Acid digestion / ICP Finish	Certified value
Zinc	2.34 %	± 0.09 %	4 Acid digestion / ICP Finish	Certified value

**Note 1:** Standards with an RSD of near or less than 5% are certified; RSD's of between 5% and 15% are Provisional; RSD's over 15% are Indicated. Provisional and Indicated values cannot be used to monitor accuracy with a high degree of certainty.

**PREPARED BY:** CDN Resource Laboratories Ltd.  
**CERTIFIED BY:** Ali Alizadeh, MSc, MBA, P Geo  
**INDEPENDENT GEOCHEMIST:** Dr. Barry Smee., Ph.D., P. Geo.  
**DATE OF CERTIFICATION:** September 21<sup>st</sup>, 2023

### **ORIGIN OF REFERENCE MATERIAL:**

Standard CDN-ME-2306 was prepared from the ore provided by Hecla Mining's Greens Creek deposit. The Greens Creek deposit is a polymetallic, stratiform, massive sulfide deposit. The host rock consists of predominantly marine sedimentary, and mafic to ultramafic volcanic and plutonic rocks, which have been subjected to multiple periods of deformation. Mineralization occurs discontinuously along the contact between a structural hanging wall of quartz mica carbonate phyllites, and a structural footwall of graphitic and calcareous argillite. Ore lithologies fall into two broad groups: massive ores with over 50% sulfides and white ores with less than 50% sulfides. The massive ores are further subdivided as either base-metal or pyrite dominant. Massive ores vary greatly in precious-metal grade from uneconomic to bonanza Au (>.5 opt) and Ag (>100 opt). White ores are subdivided into three groups by the dominant gangue mineralogy: white carbonate, white siliceous, and white baritic ore. These ores tend to be base-metal poor and precious-metal rich. Major sulfide minerals are pyrite, sphalerite, galena, and tetrahedrite/tennantite.

### **METHOD OF PREPARATION:**

Reject ore material was dried, crushed, pulverized, and then passed through a 270-mesh screen. The +270 material was discarded. The -270 material was mixed for 5 days in a double-cone mixer. Splits were taken and sent to 15 commercial laboratories for round robin assaying.

### **Assay Procedures:**

**Au:** 30 gr. fire assay pre-concentration, AA or ICP finish.  
**Ag, Cu, Pb, Zn, Fe:** 4-acid digestion, AA or ICP finish.

### **Statistical Procedures:**

The final limits were calculated after first determining if all data was compatible within a spread normally expected for similar analytical methods done by reputable laboratories. Data from any one laboratory was removed from further calculations when the mean of all analyses from that laboratory failed a t test of the global means of the other laboratories. The means and standard deviations were calculated using all remaining data. Any analysis that fell outside of the mean  $\pm 2$  standard deviations was removed from the ensuing database. The mean and standard deviations were again calculated using the remaining data. This method is different from that used by Government agencies in that the actual “between-laboratory” standard deviation is used in the calculations. This produces upper and lower limits that reflect actual individual analyses rather than a grouped set of analyses. The limits can therefore be used to monitor accuracy from individual analyses, unlike the Confidence Limits published on other standards.

## Quality Assurance and Quality Control Procedures:

**Screening Test:** After completion of homogenization, three samples, 300g each of homogenized material was randomly collected and was re-screened by a testing sieve. Over size material of this standard and based on CDN's screening test was ~%1.0.

### Homogeneity Test:

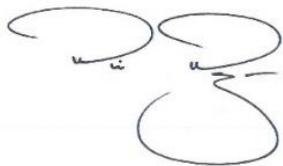
15 samples were selected selectively throughout the batch and were sent to an independent assay Laboratories for Homogeneity testing following directions of Annex B, Homogeneity and Stability of proficiency test items, ISO 13528:2015 Guidelines.

Assay results went through a statistical work-up by checking the mean, standard deviation, and %RSD. Based on performed statistical works outlined by ISO 13528; CDN-ME-2306 is statistically homogenized (Appendix III).

### LEGAL NOTICE:

This certificate and the reference material described in it have been prepared with due care and attention. However, CDN Resource Laboratories Ltd. nor Barry Smee accept any liability for any decisions or actions taken following the use of the reference material. Our liability is limited solely to the cost of the reference material.

Certified by



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Ali Alizadeh, MSc, MBA, P.Geo.

Geochemist



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Dr. Barry Smee, PhD, P. Geo.

**APPENDIX I:**

Whole rock analysis and 30 element ICP analysis (4-acid digestion) were also conducted on 3 samples.

**APPROXIMATE CHEMICAL COMPOSITION (by whole rock analysis):**

Analyte	Percent	Analyte	Percent
SiO <sub>2</sub>	50.8	Na <sub>2</sub> O	2.0
Al <sub>2</sub> O <sub>3</sub>	10.5	MgO	2.2
Fe <sub>2</sub> O <sub>3</sub>	13.7	K <sub>2</sub> O	1.6
CaO	4.5	TiO <sub>2</sub>	0.4
MnO	0.2	LOI	8.6
Total S	8.3	Total C	0.6

**Participating Laboratories:** (not in same order as table of assays)

Activation Labs, Ancaster, Ontario, Canada	Bureau Veritas, Perth, Australia
Activation Labs, Thunder Bay, Ontario, Canada	Bureau Veritas, Vancouver, BC, Canada
ALS, Brisbane, Australia	Certimin S.A., Lima, Peru
ALS, Perth, Australia	MS Analytical, Langley, BC, Canada
ALS Lima, Peru	SGS Lakefield, ON, Canada
ALS, Loughrea, Ireland	SGS, Vancouver, BC, Canada
ALS Reno, NV, USA	Swastika Laboratories, ON. Canada
ALS Canada, North Vancouver, BC, Canada	

**APPENDIX II: Results from round-robin assaying:**

Sample	Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	Lab 6	Lab 7	Lab 8	Lab 9	Lab 10	Lab 11	Lab 12	Lab 13	Lab 14	Lab 15
<b>Au (g/t) by Fire Assay, 30g sample size and Instrumental finish</b>															
<b>ME-2306</b>	2.89	2.58	2.52	2.62	2.51	2.42	2.72	2.91	2.51	2.44	2.346	2.539	2.614	2.45	2.56
	2.68	2.55	2.56	2.50	2.51	2.35	2.78	2.51	2.55	2.94	2.273	2.463	2.865	2.55	2.59
	2.83	2.59	2.55	2.79	2.69	2.55	2.55	2.58	2.58	2.71	2.676	2.476	2.867	2.58	2.36
	2.65	2.49	2.58	3.26	2.60	2.57	2.48	2.51	2.56	2.36	2.598	2.507	2.797	2.62	2.44
	2.49	2.48	2.54	2.63	2.61	2.46	2.53	2.81	2.81	2.41	2.276	2.481	2.677	2.56	2.47
	2.63	2.45	2.58	2.65	2.67	2.49	2.55	2.46	2.63	2.40	2.703	2.470	2.635	2.38	2.53
	2.55	2.78	2.57	2.63	2.60	2.40	2.46	2.71	2.54	2.63	2.389	2.529	2.882	2.31	2.57
	2.84	2.53	2.48	2.71	2.54	2.50	2.36	2.53	2.54	2.49	2.357	2.467	2.682	2.50	2.41
	2.70	2.75	2.51	2.49	2.43	2.49	2.50	2.55	2.56	2.63	2.842	2.524	2.782	2.60	2.47
	2.77	2.40	2.51	2.43	2.71	2.62	2.52	2.66	2.44	2.65	2.284	2.474	2.360	2.37	2.36
<b>Mean</b>	2.70	2.56	2.54	2.67	2.59	2.49	2.55	2.62	2.57	2.57	2.474	2.493	2.716	2.49	2.48
<b>Std. Devn.</b>	0.13	0.12	0.03	0.23	0.09	0.08	0.12	0.15	0.10	0.18	0.21	0.03	0.16	0.11	0.08
<b>% RSD</b>	4.80	4.80	1.34	8.73	3.46	3.29	4.80	5.60	3.76	7.02	8.49	1.16	5.88	4.36	3.42
<b>Ag (g/t) by 4 Acid digestion /Instrumental finish</b>															
<b>ME-2306</b>	67	72		71	70	66	65	70	66	71.5	66	71	64	67	61
	62	65		68	73	73	75	69	68	63.0	65	70	62	64	65
	63	65		68	64	65	67	61	65	65.0	70	68	62	68	66
	62	66		69	64	72	69	64	66	73.0	67	71	64	68	65
	61	66		74	69	71	68	64	68	63.5	67	69	63	69	60
	69	65		67	74	73	68	69	69	66.5	68	69	63	68	61
	65	67		67	65	68	73	64	70	79.5	65	70	68	67	62
	66	66		65	66	68	67	66	69	67.5	65	69	63	66	62
	68	64		81	64	68	67	65	69	73.5	66	69	64	71	61
	62	68		65	68	71	70	65	68	80.0	69	70	63	62	66
<b>Mean</b>	65	66		70	68	70	69	66	68	70.3	67	70	64	67	63
<b>Std. Devn.</b>	2.88	2.27		4.86	3.74	2.88	3.03	2.83	1.619	6.21	1.75	0.97	1.71	2.54	2.33
<b>% RSD</b>	4.46	3.42		6.99	5.53	4.14	4.40	4.31	2.388	8.84	2.62	1.39	2.69	3.79	3.71
<b>Cu (%) by 4 Acid digestion Instrumental finish</b>															
<b>ME-2306</b>	0.290	0.303		0.301	0.302	0.299	0.304	0.299	0.294	0.311	0.311	0.30	0.302	0.31	0.297
	0.297	0.299		0.304	0.309	0.296	0.302	0.296	0.298	0.313	0.315	0.31	0.301	0.30	0.290
	0.294	0.305		0.304	0.304	0.299	0.306	0.298	0.298	0.315	0.322	0.31	0.299	0.30	0.293
	0.295	0.305		0.302	0.297	0.301	0.311	0.297	0.298	0.305	0.317	0.30	0.297	0.31	0.292
	0.293	0.309		0.304	0.312	0.303	0.304	0.300	0.297	0.313	0.312	0.31	0.298	0.30	0.294
	0.298	0.311		0.301	0.308	0.302	0.303	0.298	0.299	0.305	0.308	0.31	0.300	0.30	0.297
	0.288	0.309		0.301	0.303	0.301	0.305	0.300	0.299	0.313	0.316	0.30	0.301	0.30	0.298
	0.294	0.304		0.301	0.310	0.299	0.302	0.298	0.299	0.313	0.311	0.31	0.306	0.30	0.292
	0.295	0.300		0.302	0.307	0.300	0.307	0.298	0.299	0.311	0.308	0.31	0.307	0.30	0.292
	0.293	0.295		0.305	0.301	0.301	0.303	0.294	0.297	0.313	0.309	0.31	0.297	0.31	0.294
<b>Mean</b>	0.294	0.304		0.303	0.305	0.300	0.305	0.298	0.298	0.311	0.313	0.31	0.301	0.30	0.294
<b>Std. Devn.</b>	0.003	0.005		0.002	0.005	0.002	0.003	0.002	0.002	0.003	0.005	0.005	0.003	0.005	0.003
<b>% RSD</b>	1.016	1.641		0.523	1.529	0.656	0.903	0.609	0.520	1.111	1.449	1.573	1.149	1.594	0.900

Pb (%) by 4 Acid digestion Instrumental finish															
ME-2306	0.692	0.705		0.706	0.694	0.699	0.709	0.699	0.692	0.708	0.73	0.71	0.70	0.64	0.680
	0.696	0.690		0.706	0.697	0.692	0.708	0.698	0.696	0.712	0.73	0.72	0.70	0.64	0.672
	0.693	0.699		0.713	0.696	0.696	0.708	0.700	0.694	0.703	0.76	0.70	0.70	0.67	0.668
	0.696	0.710		0.706	0.683	0.705	0.728	0.699	0.692	0.685	0.73	0.71	0.69	0.64	0.672
	0.684	0.712		0.707	0.706	0.708	0.712	0.703	0.695	0.700	0.73	0.72	0.70	0.61	0.669
	0.699	0.709		0.703	0.715	0.697	0.713	0.698	0.693	0.691	0.72	0.72	0.69	0.63	0.682
	0.690	0.702		0.704	0.691	0.708	0.711	0.702	0.694	0.698	0.74	0.71	0.70	0.64	0.674
	0.695	0.695		0.705	0.715	0.700	0.702	0.703	0.698	0.692	0.72	0.72	0.70	0.66	0.670
	0.703	0.692		0.712	0.698	0.703	0.707	0.696	0.698	0.686	0.71	0.71	0.71	0.66	0.674
	0.687	0.681		0.706	0.679	0.707	0.714	0.695	0.697	0.703	0.71	0.72	0.70	0.65	0.680
Mean	0.694	0.700		0.707	0.697	0.702	0.711	0.699	0.695	0.698	0.73	0.71	0.70	0.64	0.674
Std. Devn.	0.01	0.01		0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.00
% RSD	0.81	1.43		0.46	1.72	0.79	0.96	0.39	0.33	1.31	2.03	0.98	0.81	2.66	0.73
Zn (%) by 4 Acid digestion Instrumental finish															
ME-2306	2.31	2.35		2.37	2.29	2.31	2.34	2.31	2.27	2.27	2.43	2.41	2.31	2.32	2.39
	2.33	2.30		2.39	2.34	2.28	2.34	2.28	2.32	2.28	2.44	2.40	2.30	2.32	2.44
	2.31	2.33		2.40	2.34	2.32	2.36	2.31	2.28	2.27	2.50	2.40	2.32	2.30	2.35
	2.31	2.32		2.38	2.28	2.34	2.40	2.31	2.31	2.23	2.44	2.42	2.28	2.32	2.50
	2.28	2.36		2.39	2.36	2.35	2.33	2.33	2.29	2.31	2.42	2.40	2.31	2.32	2.38
	2.33	2.36		2.37	2.35	2.33	2.35	2.31	2.30	2.24	2.40	2.42	2.30	2.32	2.43
	2.30	2.36		2.37	2.30	2.35	2.35	2.33	2.32	2.28	2.45	2.42	2.31	2.31	2.39
	2.31	2.29		2.36	2.36	2.34	2.34	2.32	2.31	2.28	2.43	2.40	2.33	2.31	2.39
	2.33	2.30		2.38	2.34	2.29	2.37	2.32	2.32	2.26	2.41	2.42	2.34	2.30	2.44
	2.31	2.25		2.39	2.31	2.36	2.37	2.30	2.29	2.28	2.43	2.42	2.30	2.33	2.38
Mean	2.31	2.32		2.38	2.33	2.33	2.36	2.31	2.30	2.27	2.44	2.41	2.31	2.32	2.41
Std. Devn.	0.02	0.04		0.01	0.03	0.03	0.02	0.01	0.02	0.02	0.03	0.01	0.02	0.01	0.04
% RSD	0.67	1.60		0.52	1.27	1.15	0.88	0.64	0.78	1.00	1.12	0.41	0.74	0.42	1.80

**Notes:**

Pb results assayed by 4 Acid digestion with instrumental finish from Labs 14 and 15 were removed for failing the t test.

### APPENDIX III: QAQC

Table below illustrates percentages of over size (+275 mesh) material in CDN-ME-2306

Standard	Study Date	Total weight Screened (g)	Total weight Over size (g)	Percentage
ME-2306	CDN-ME-2306	20/7/2023	300	3.5
	CDN-ME-2306	20/7/2023	300	2.5
	CDN-ME-2306	20/7/2023	300	3.5

Table below shows homogeneity test results of CDN-ME-2306

ME-2306	Au Original	Au Repeat	Between Sample Variance Wt	Sample Avg. Xt	Stdev of Sample Avg	Within-Sample Std.
	2.573	2.493	0.080	2.533	0.007	0.006
	2.527	2.493	0.034	2.510	0.003	0.001
	2.433	2.475	0.042	2.454	0.000	0.002
	2.393	2.405	0.012	2.399	0.003	0.000
	2.391	2.305	0.086	2.348	0.011	0.007
	2.597	2.340	0.257	2.469	0.000	0.066
	2.529	2.551	0.022	2.540	0.008	0.000
	2.332	2.384	0.052	2.358	0.009	0.003
	2.263	2.446	0.183	2.355	0.009	0.033
	2.293	2.500	0.207	2.397	0.003	0.043
	2.433	2.328	0.105	2.381	0.005	0.011
	2.659	2.527	0.132	2.593	0.020	0.017
	2.365	2.486	0.121	2.426	0.001	0.015
	2.305	2.651	0.346	2.478	0.001	0.120
	2.522	2.530	0.008	2.526	0.006	0.000
Statistics			Gavg	SX	SS	
Mean	2.441	2.461	2.451	0.030	0.025	
SD	0.1212	0.0940	C	C SQRT		
RSD	4.965	3.819	0.0179	0.06		
Proof of Homogeneity	Based on Statistical procedures outlined in Annex B, ISO 13528:2015 guidelines, If “SS is < square root of C” Standard is considered homogeneous. ME-2306 is statistically homogenous					

## **APPENDIX IV: General Notes**

### **Intended Use**

This Certified Reference Material, fit for use as a control sample in routine assay laboratory quality control when inserted within runs of test samples and measured in parallel to test samples. This material can also be used for method development, use as independent calibration verification check standard or for validation of accuracy in a method validation exercise.

This CRM can also be used to assess inter-laboratory or instrument bias and establish within-laboratory precision and within-laboratory reproducibility. The certified concentrations and expanded uncertainty for this material are property values based on an inter-laboratory measurement campaign and reflect consensus results from the laboratories that took part in the exercise.

### **Handling**

Do not use if the seal is broken or there are any signs of contamination.

The material is packaged in either Tin Tie envelopes, foil envelopes or jars that must be shaken before use.

### **Storage information**

The material should be stored in a dry place, in such a way that it does not compromise the integrity of the CRM. The material should be stored in conditions which will ensure it does not absorb moisture.

Certificate is not valid if re-packaged by a third party.

### **Metrological Traceability**

The values quoted herein are based on the consensus values derived from statistical analysis of the data from an inter-laboratory measurement program. Traceability to SI units is via the standards used by the individual laboratories all of which are accredited to the ISO17025 general requirements for the competence of testing and calibration laboratories and who have maintained measurement traceability during the analytical process.

### **Period of Validity**

The certified values are valid for this product, while still sealed in its original packaging, until notification to the contrary. The stability of the material will be subject to continuous testing for every five the duration of the inventory. Should product stability become an issue, all customers will be notified and notification to that effect will be placed on the <http://www.cdnlabs.com/> website.

### **Minimum Sample Size**

Most of the laboratory's reporting used a 0.5g sample size for the ICP and a 30g sample size for the fire assay. Our certified gold values are based on 30 g Fire Assay determinations. For optimal results, we strongly recommend you assay our standards with similar methods using "at least" 30 g of material. Using a smaller sample weight may result in erratic values. These are the recommended minimum sample sizes for the use of this material.