A Review of Enzyme Leach Geochemical Responses, Sturgeon Lake Area, Ontario

By

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For

Geofine Exploration Consultants Ltd.

Terms of Review

Enzyme Leach geochemical data was received from Geofine Exploration Consultants Ltd. from a survey undertaken by Excalibur Exploration in the Sturgeon Lake area of Ontario. The database combines SGH and Enzyme Leach geochemical analyses for base metal massive sulphide-type mineralization. These surveys were intended to assess airborne electromagnetic and magnetic anomalies for their base and precious metal contents and in so doing focus exploration by differentiating “metal-rich” from “metal-poor” geophysical anomalies.

Sampling was undertaken on lines 32 through 40 however in areas where no suitable Enzyme Leach sample could be collected available sample media was collected for SGH analysis. This results in sampling gaps along the transects where no Enzyme Leach samples were available. Since Enzyme Leach and SGH measure two different forms of geochemical response, data from each survey cannot be directly compared. Areas of anomalous response can have, however both an Enzyme Leach and an SGH anomaly. Results from the SGH survey are compared and contrasted to those for Enzyme Leach.

Method of Review

Data was first examined visually for the presence of any obvious commodity element (Cu, Pb, Zn, Au, Ag) anomalous/elevated responses and then for responses related to pathfinder elements and associated elements typical of volcanogenic massive sulphide type mineralization. Since the data consists of samples from linear transects rather than from a gridded rectangular array, the presence or absence of Enzyme Leach responses is likely to be more easily recognized as an apical nature rather than the areally more extensive Halo or Combination-type anomalous response.

Where geochemical contrast was noted, data was plotted as single element or multi-element response bar charts along each transect.

Commodity element responses were not recognized for geochemical data collected from samples along line 33. The presence of large gaps where enzyme leach samples could not be collected on line 35 precluded the recognition of anomalous responses owing to a lack of data. Analytical data was not available for line 36 and no commodity element responses were noted from samples collected on line 37 although lesser responses for Br, I and V were noted and plotted.

Results are described below for individual sampling transects. Two-dimensional plots illustrating the variability of significant element response accompanies each transect.

RESULTS

Analytical Data Quality

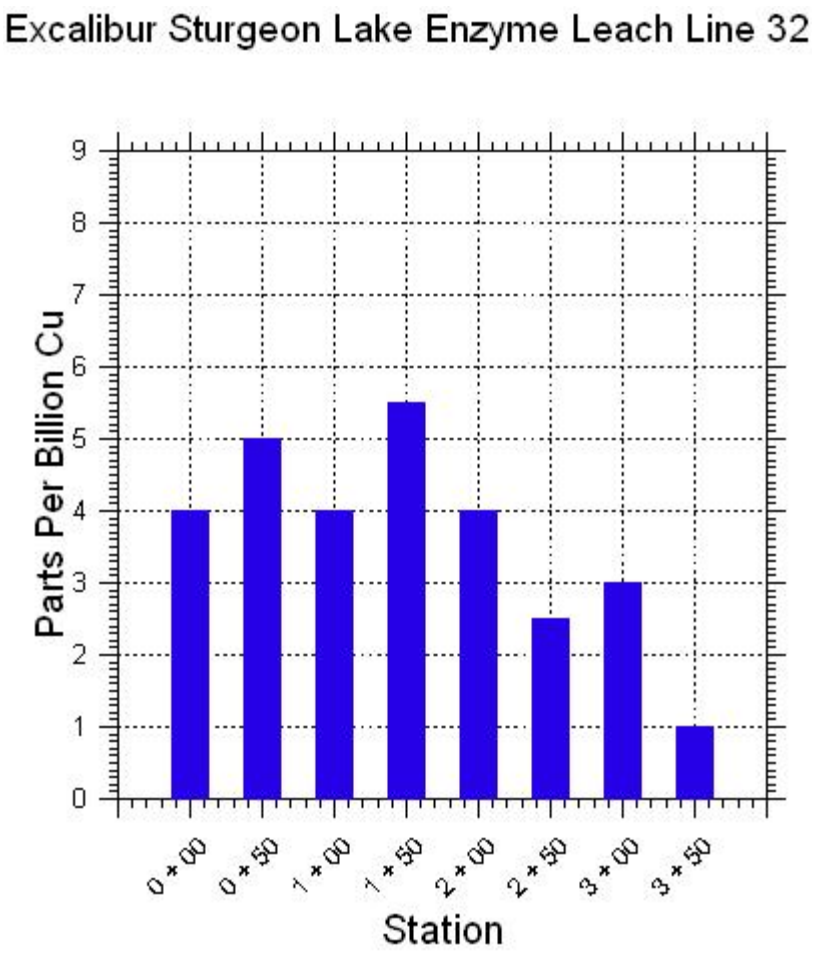
The accuracy and reproducibility of analytical duplicates for the important commodity and associated elements is summarized in Table form below and indicates excellent reproducibility for all elements at low concentration levels. There is some variability for Au in duplicate pair 36049.

There are no contaminants being introduced into the sample at the laboratory stage as indicated by the results for the analytical blank.

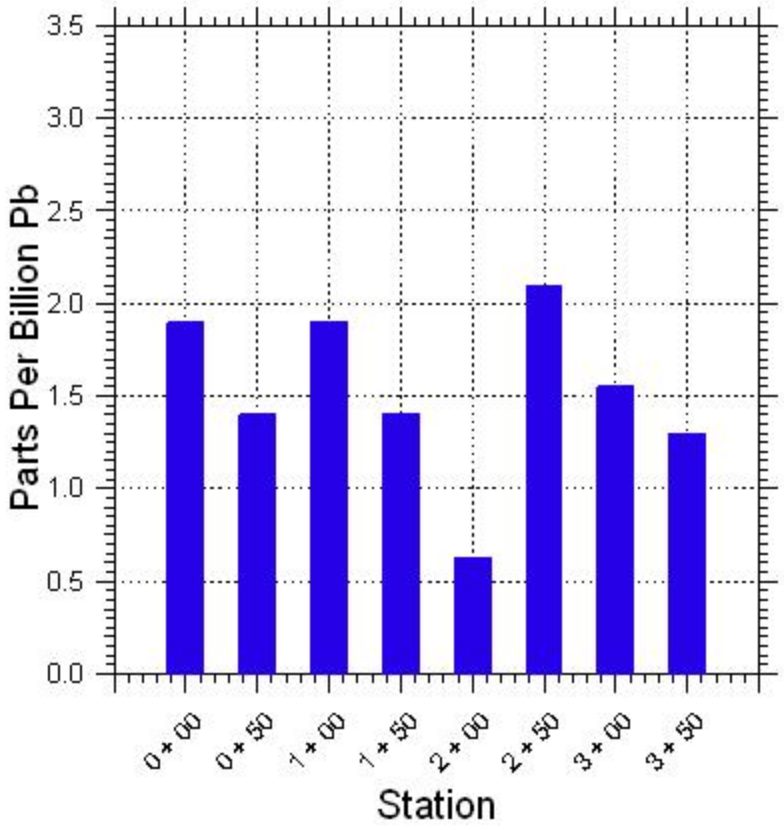
Analyte Symbol	Au	Co	Ni	Cu	Zn	Pb	Ag	La
Unit Symbol	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit	0.005	0.2	1	1	5	0.1	0.1	0.01
Analysis Method	ENZ-MS	ENZ-MS	ENZ-MS	ENZ-MS	ENZ-MS	ENZ-MS	ENZ-MS	ENZ-MS
36022 Orig	< 0.005	12	17	8	9	< 0.1	< 0.1	4.66
36022 Dup	< 0.005	13	18	9	10	< 0.1	< 0.1	4.61
36032 Orig	< 0.005	17	39	11	9	1.6	< 0.1	7.72
36032 Dup	< 0.005	17	39	11	8	1.2	< 0.1	7.36
36049 Orig	0.009	21	28	8	45	1.3	< 0.1	8.67
36049 Dup	0.006	22	25	7	47	2.2	< 0.1	8.95
Method Blank Method Blank	< 1000	< 1	< 1	< 0.1	< 0.1	< 1	< 0.1	< 0.1

Variability of Element Responses-Lines 32 through 40

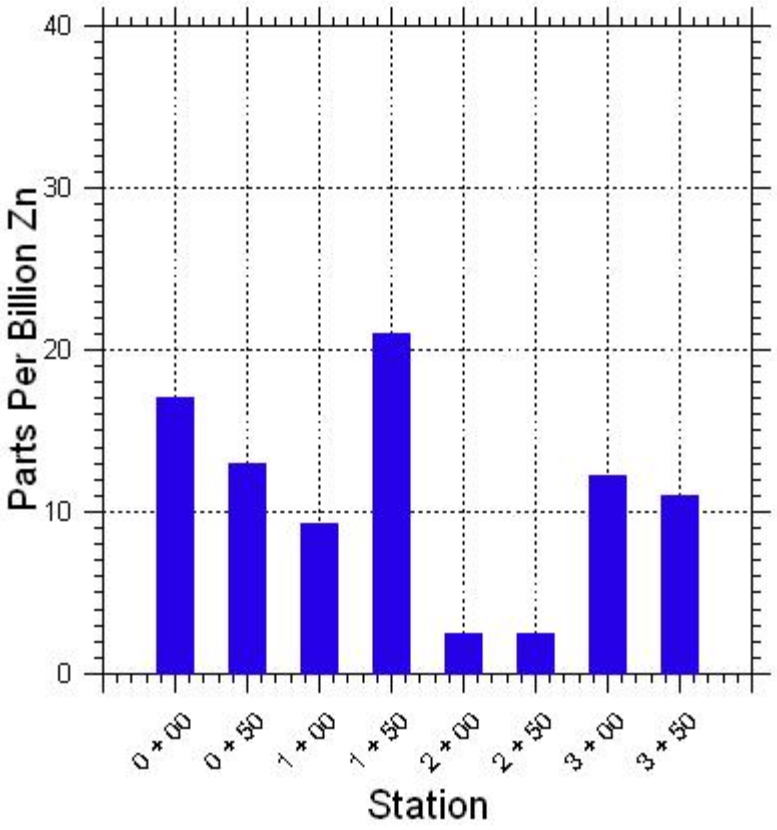
Line 32: Results from this sampling transect are characterized by a lack of focused base and precious metal responses including Cu, Pb, Zn, Au and Ag. There is a modest Co response between station 0+50 and 1+50 that is both adjacent to and overlapping with a V anomaly. The Co response is likely the signature of a mono-mineralic zone of pyrite mineralization or the signature of a mafic lithology (or both). There are no follow-up base and precious metal anomalies on this line.



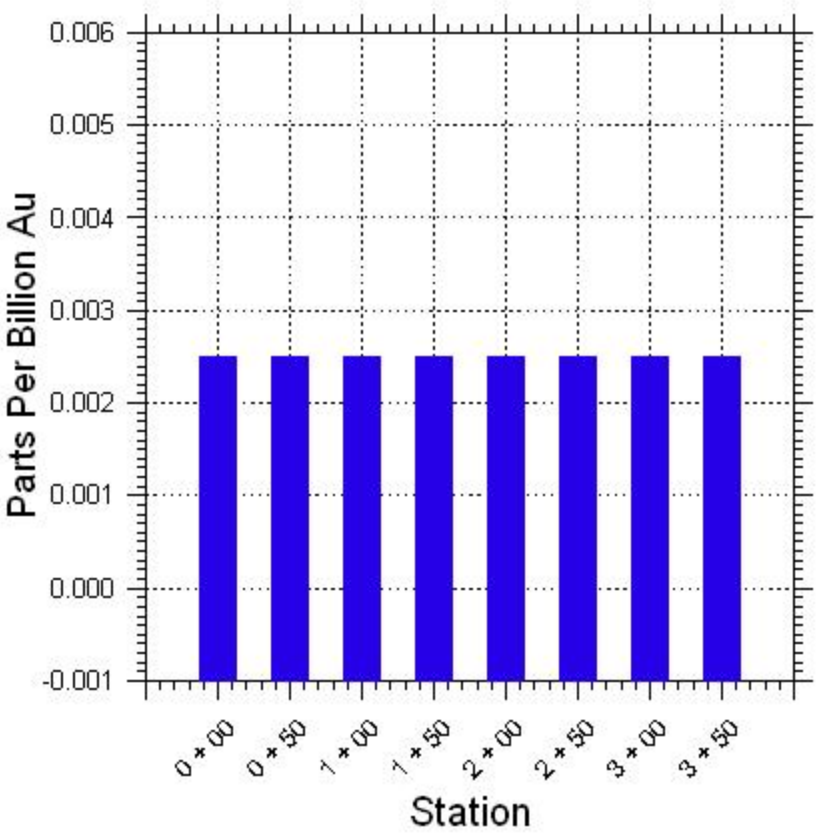
Excalibur Sturgeon Lake Enzyme Leach Line 32



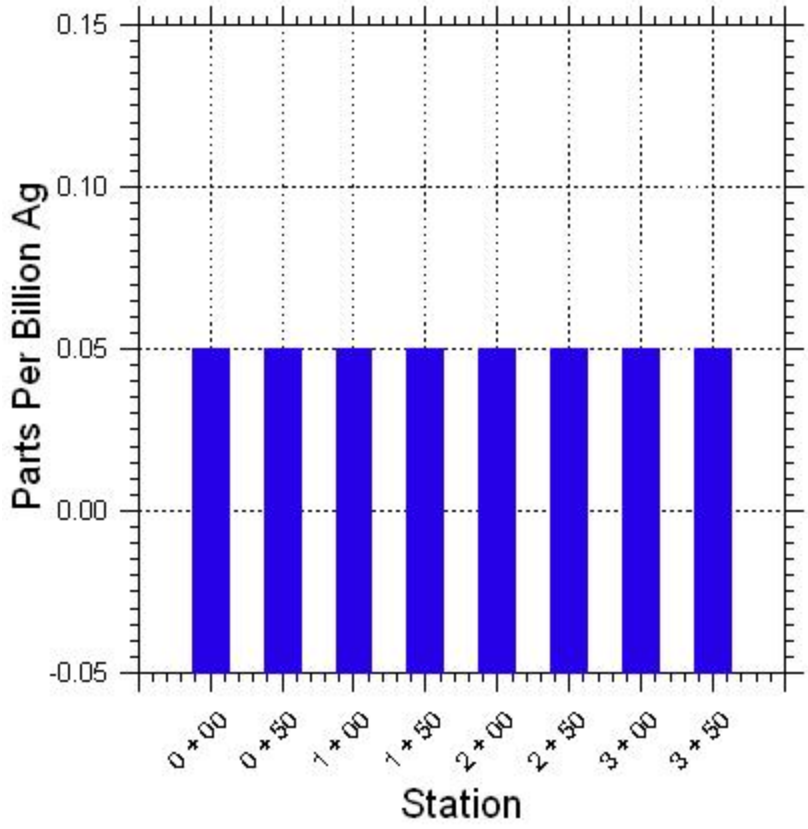
Excalibur Sturgeon Lake Enzyme Leach Line 32



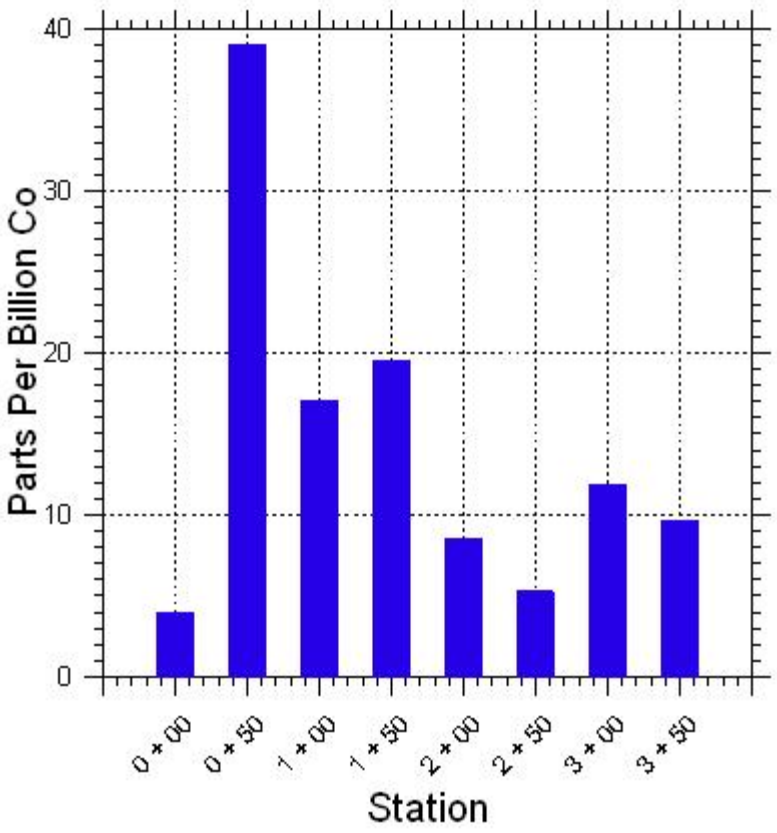
Excalibur Sturgeon Lake Enzyme Leach Line 32



Excalibur Sturgeon Lake Enzyme Leach Line 32

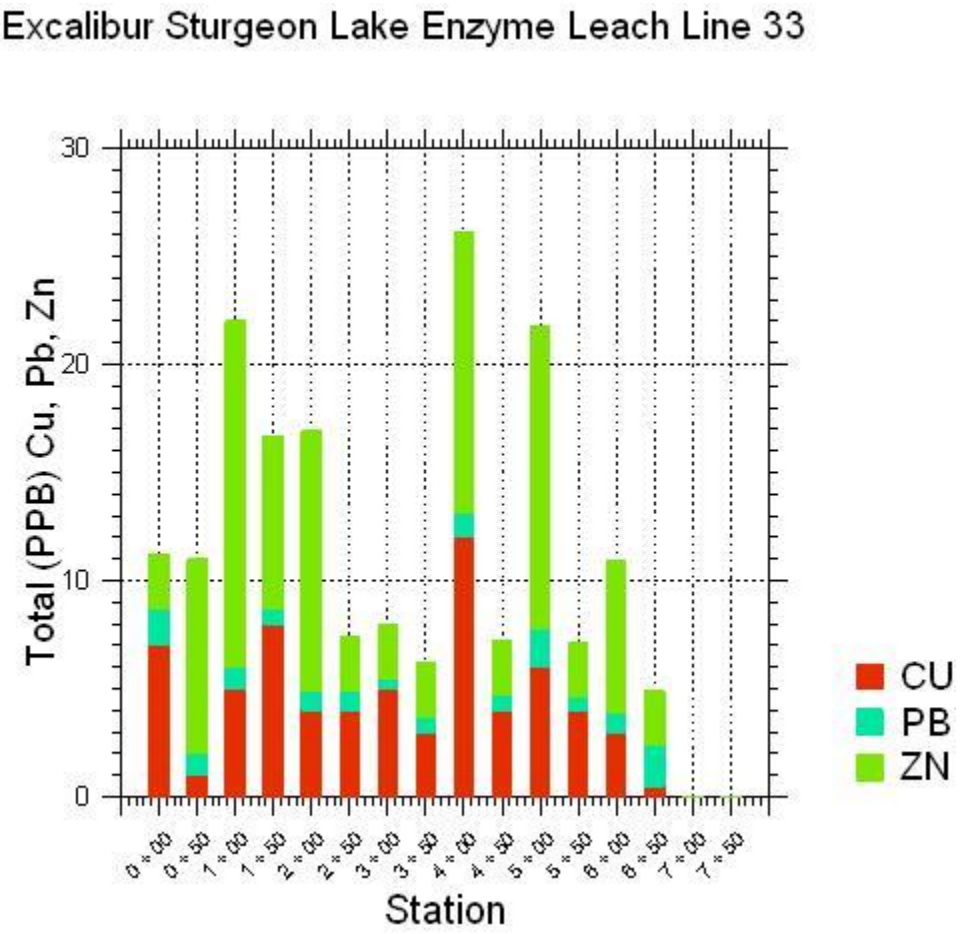


Excalibur Sturgeon Lake Enzyme Leach Line 32

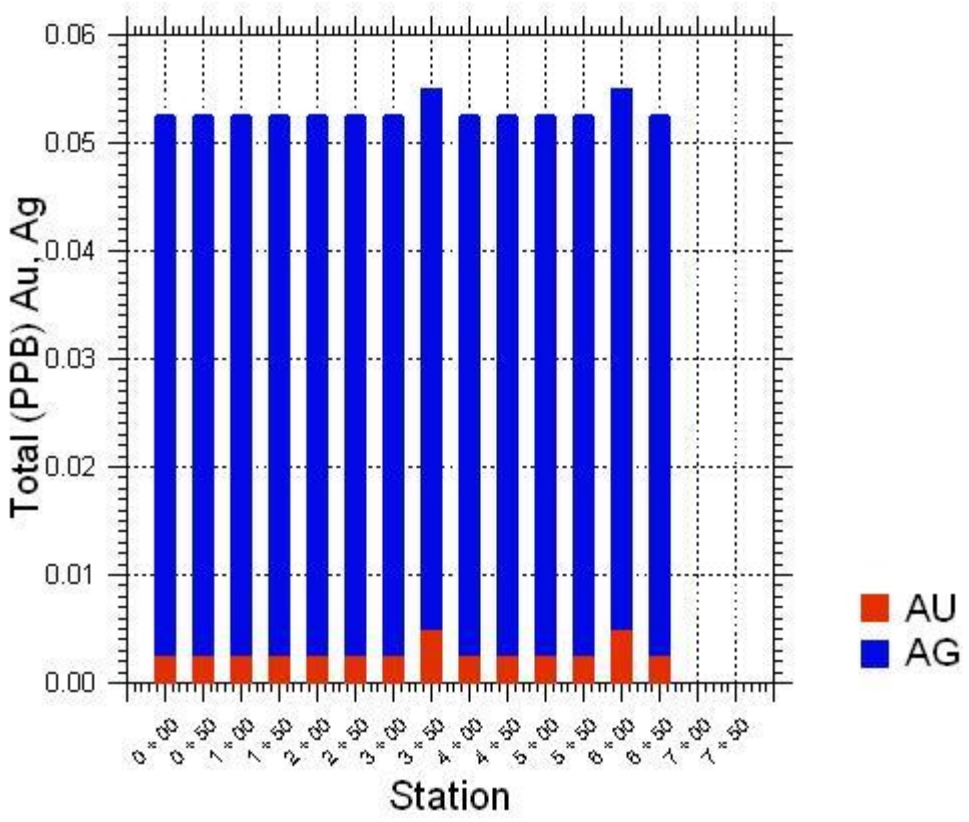


Line 33: Base metal response on this transect is low-contrast and non-definitive of a response to buried or blind base metal mineralization. There is also no pattern of response that might suggest a vector to mineralization.

Precious metal responses are essentially all at the lower limit of determination.

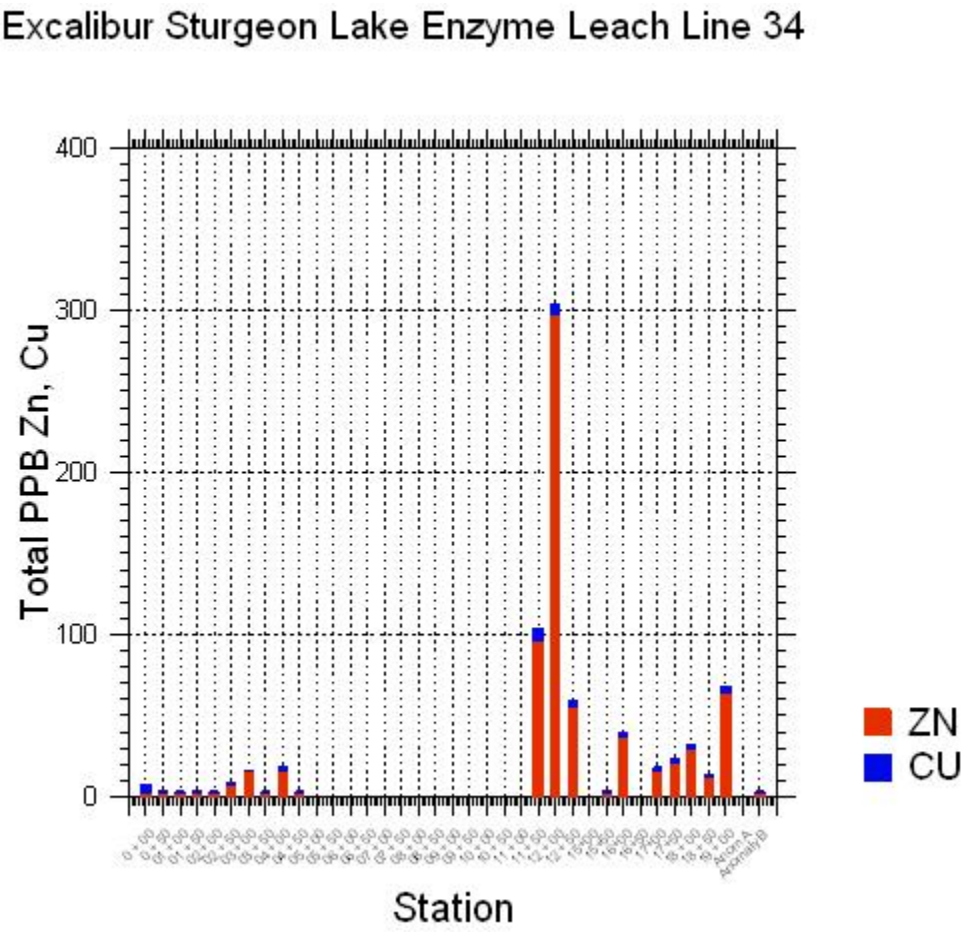


Excalibur Sturgeon Lake Enzyme Leach Line 33

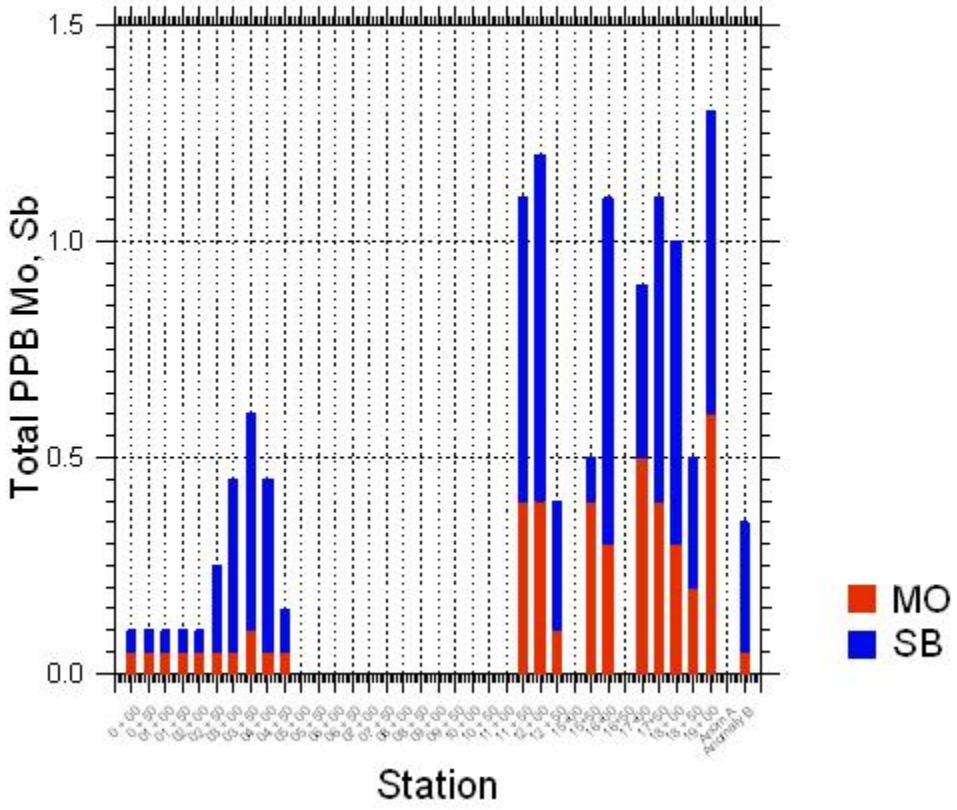


Line 34: A strong and focused base metal anomaly is present on this transect and has other associated element responses as well. The main anomalous response is Zn-rich, with lesser Cu occurring between stations 11+50 and 12+50. A lesser Zn-Cu response occurs between 2+00 and 4+00 on the same transect although this anomaly is very low-contrast. Both Zn-Cu anomalies are coincident with very low-contrast Mo-Sb-Tl anomalies and Ni-Co anomalies.

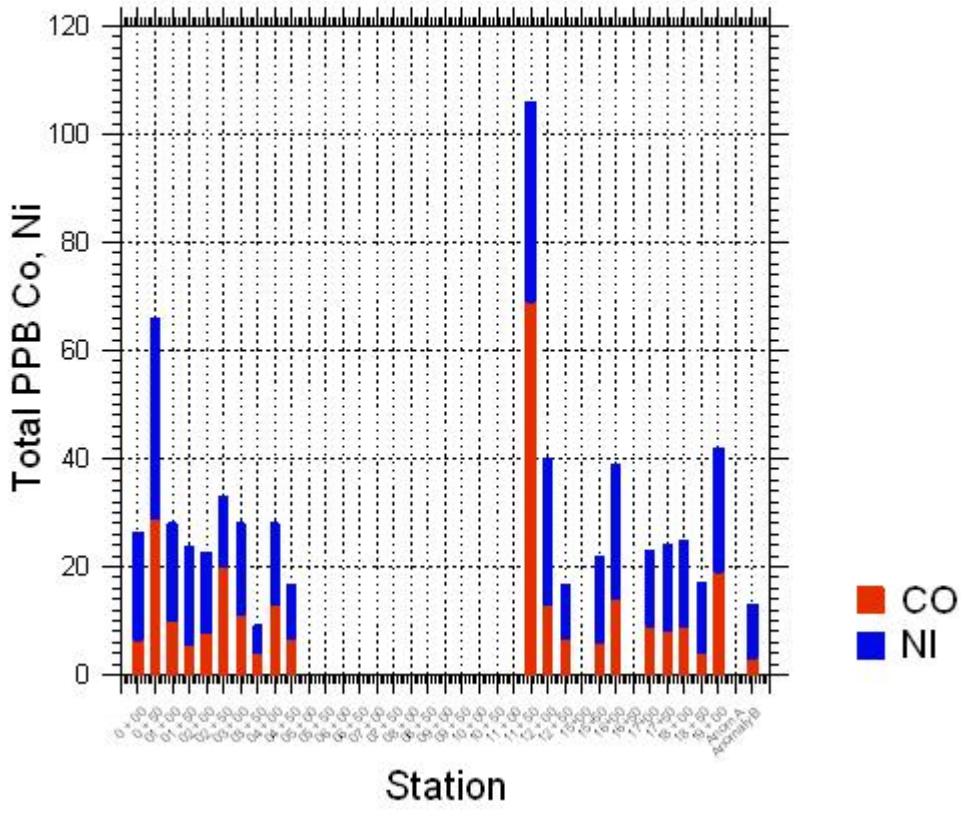
The coincidence between the Ni-Co anomalies and the base metal anomalies suggests the host rocks to mineralization are likely mafic in bulk chemical composition. The presence of a discrete Ni-Co anomaly between 0+00 and 1+50 without a base metal association would tend to support this interpretation.



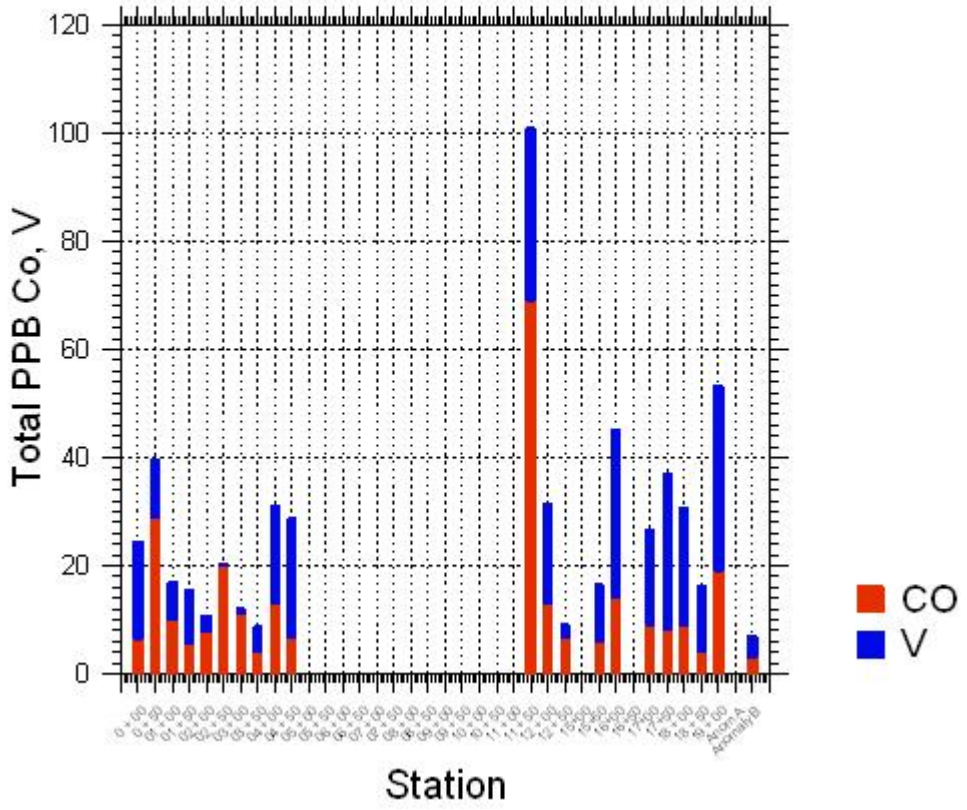
Excalibur Sturgeon Lake Enzyme Leach Line 34



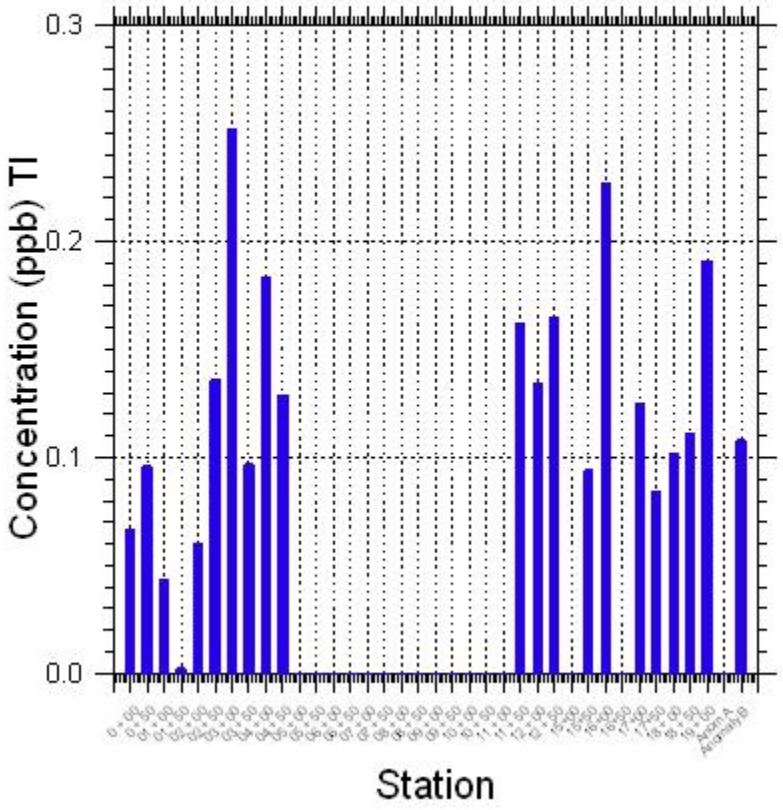
Excalibur Sturgeon Lake Enzyme Leach Line 34



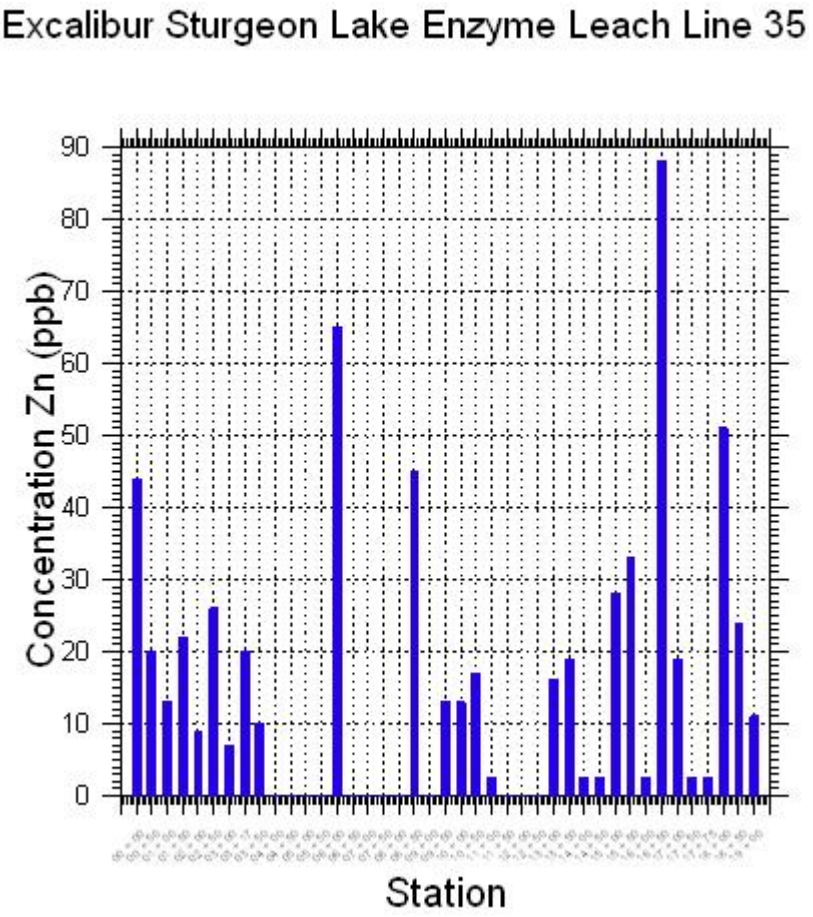
Excalibur Sturgeon Lake Enzyme Leach Line 34



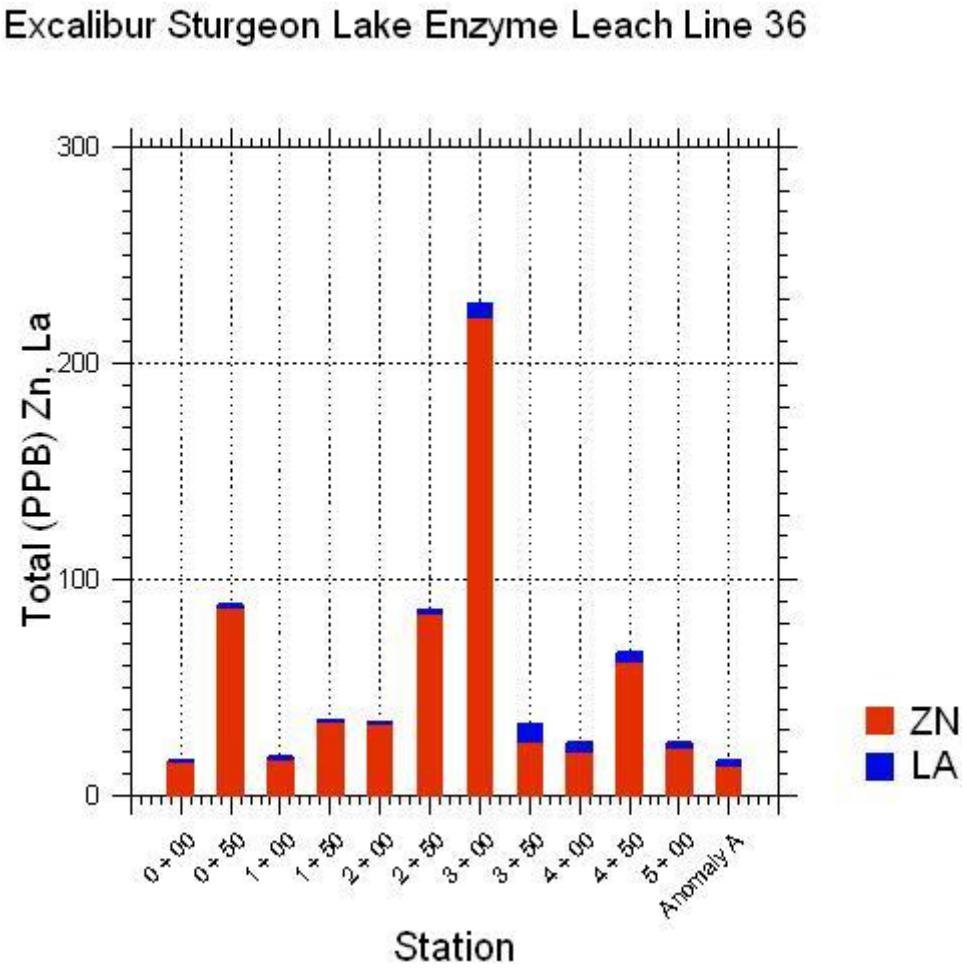
Excalibur Sturgeon Lake Enzyme Leach Line 34



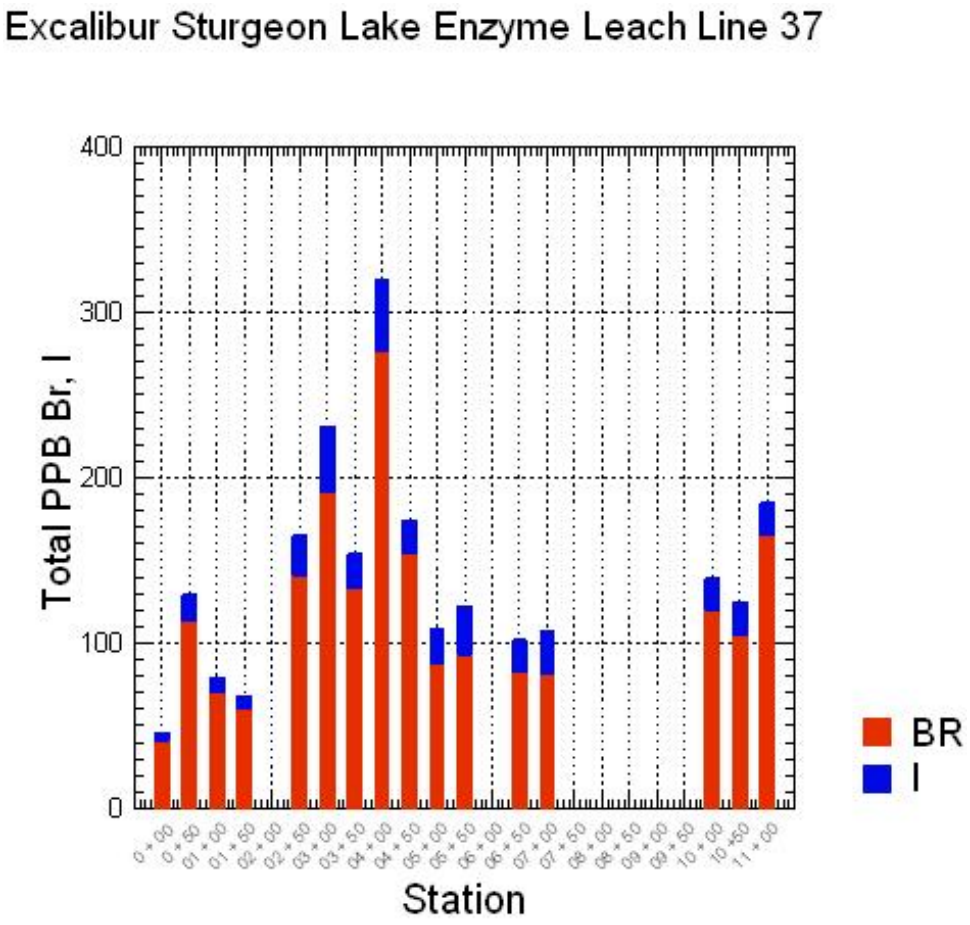
Line 35: All elements determined in the enzyme leach analysis of soil samples from line 35 are marked by low-contrast and erratic responses that are interpreted to be non-diagnostic of a signature related to base metal mineralization. The typical pattern of response is demonstrated by the results for Zn.



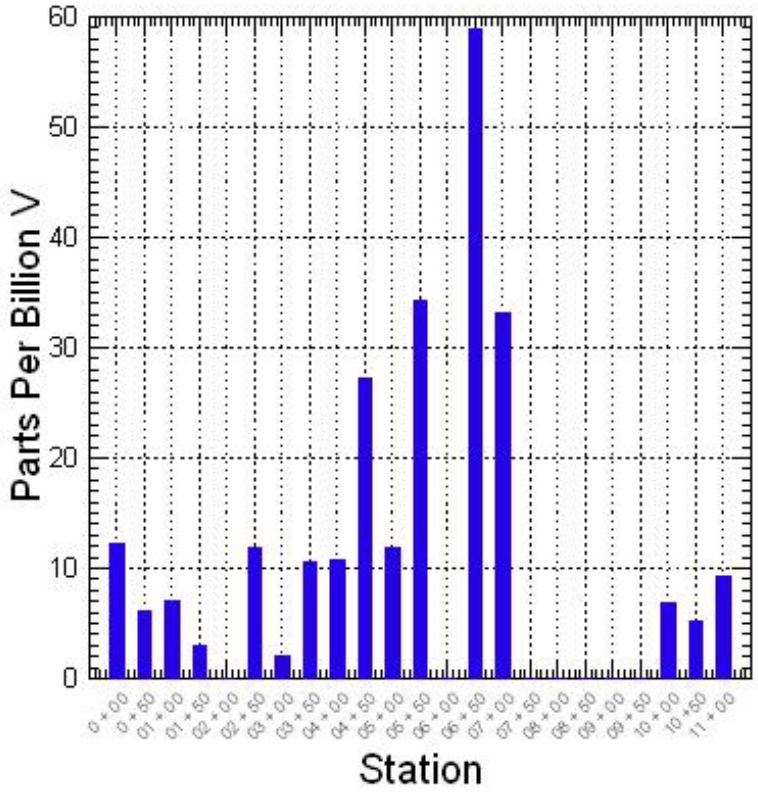
Line 36: There is a modest Zn +/- La (REE) response at station 3+00 on this transect. The anomaly is a one-sample response with a lesser contribution to the anomaly from the rare earth elements. La is presented with Zn to demonstrate this association. There are no other base and/or precious metals responding on the transect.



Line 37: A broad Br-I anomaly exists between 2+50 and 4+50 and an adjacent V response between 6+50 and 7+00. There are no significant base and/or precious metal anomalies on the transect. There are very low-contrast single sample responses for Cu, Pb and Zn at 6+50, 11+00 and 1+50, respectively. There is also a very low-contrast Au response that coincides with the Cu response at 6+50. All Ag responses are <LLD. It is possible the Pb single sample response is at the edge of an anomaly building to the east.



Excalibur Sturgeon Lake Enzyme Leach Line 37



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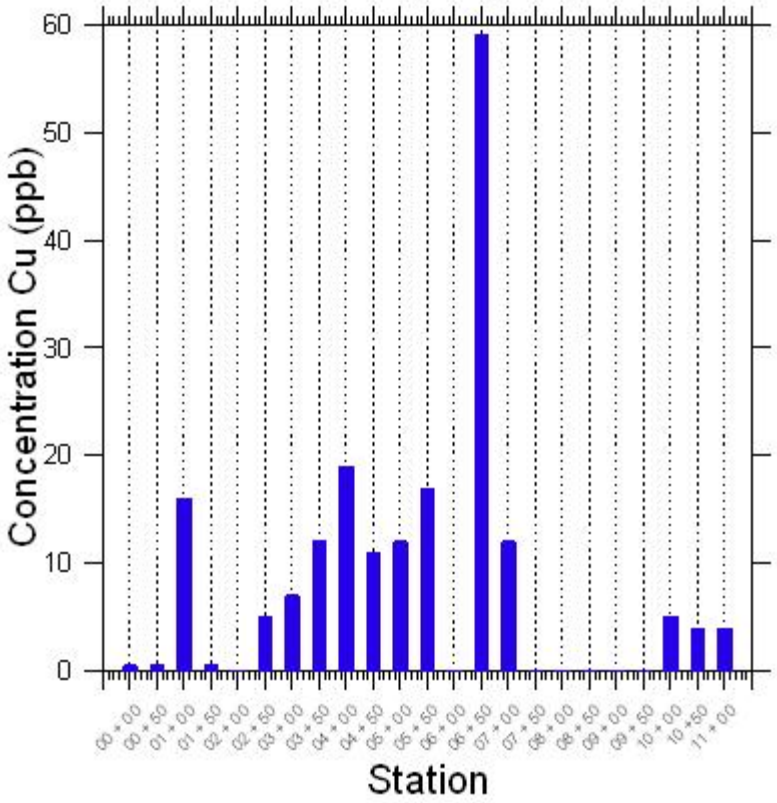

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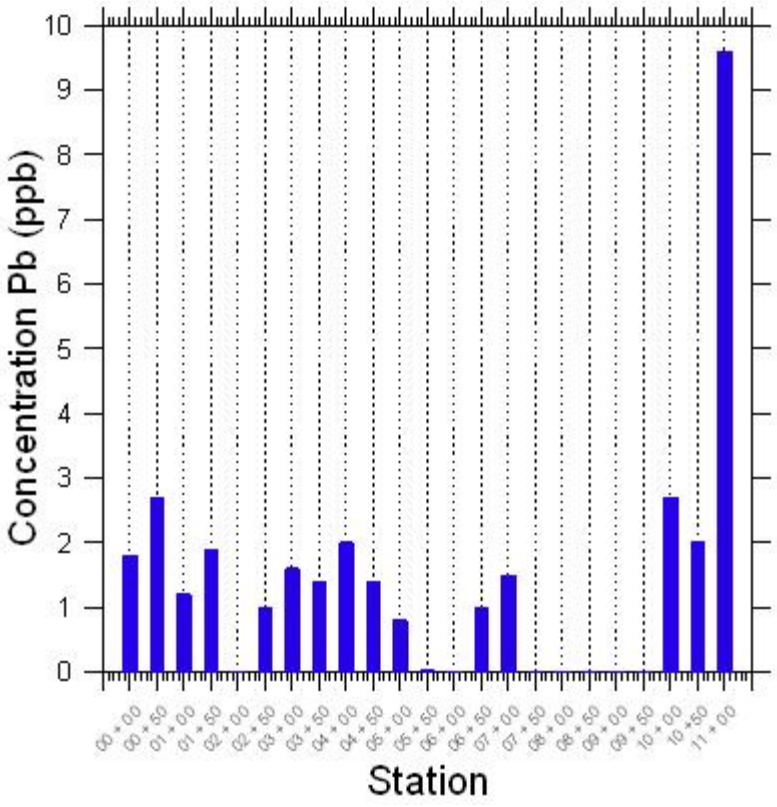

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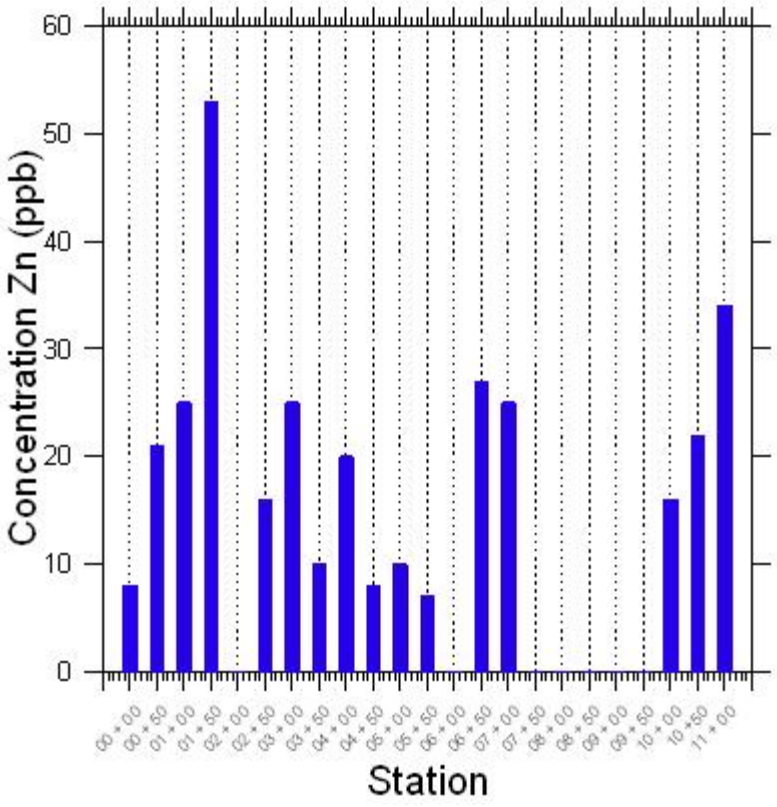

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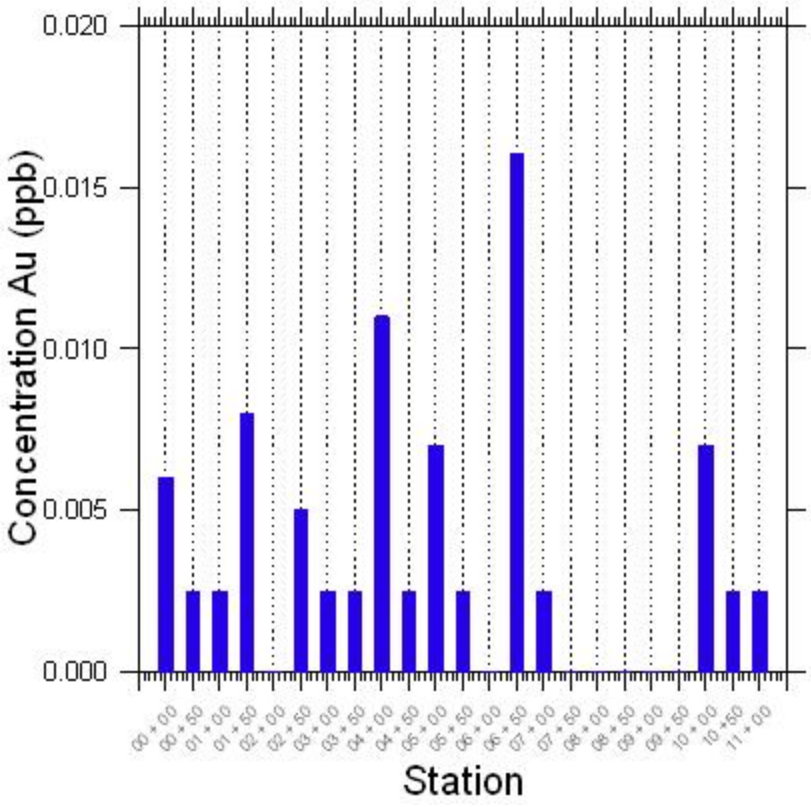
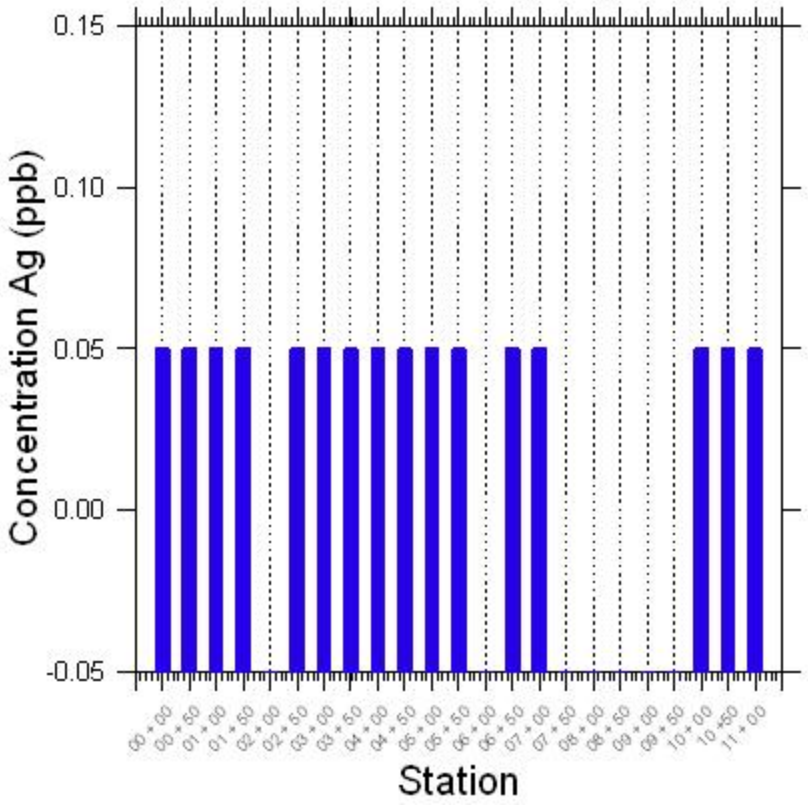
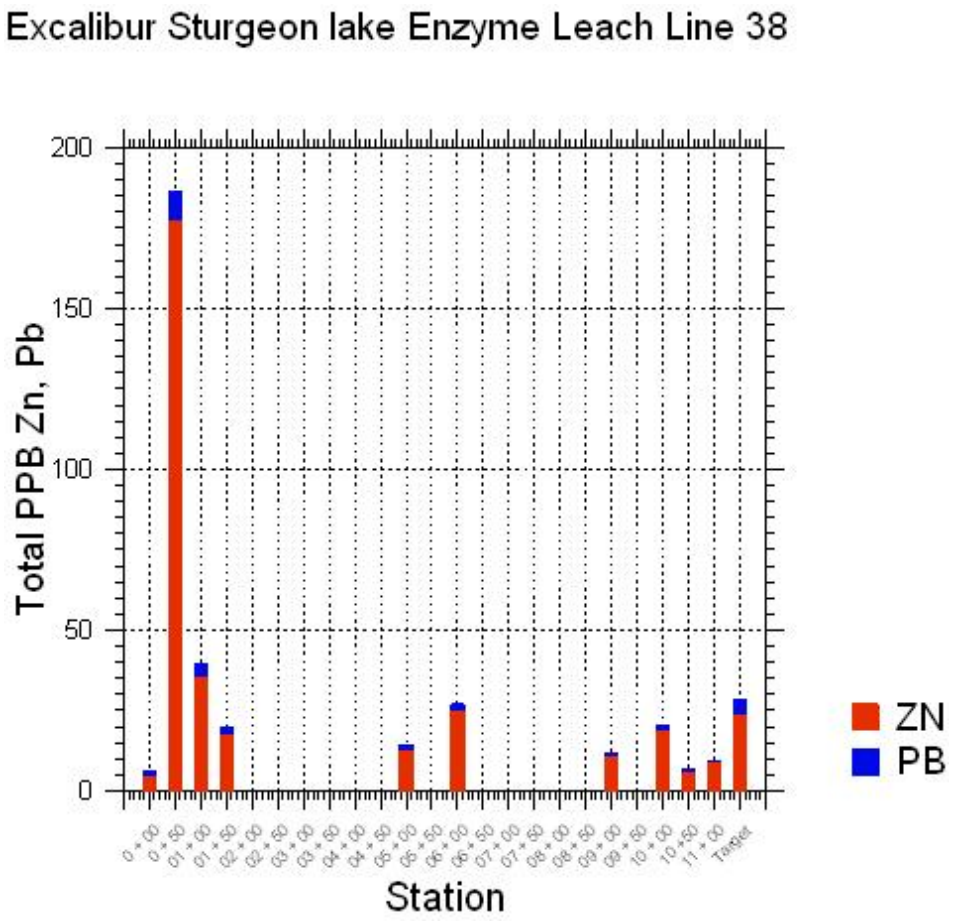


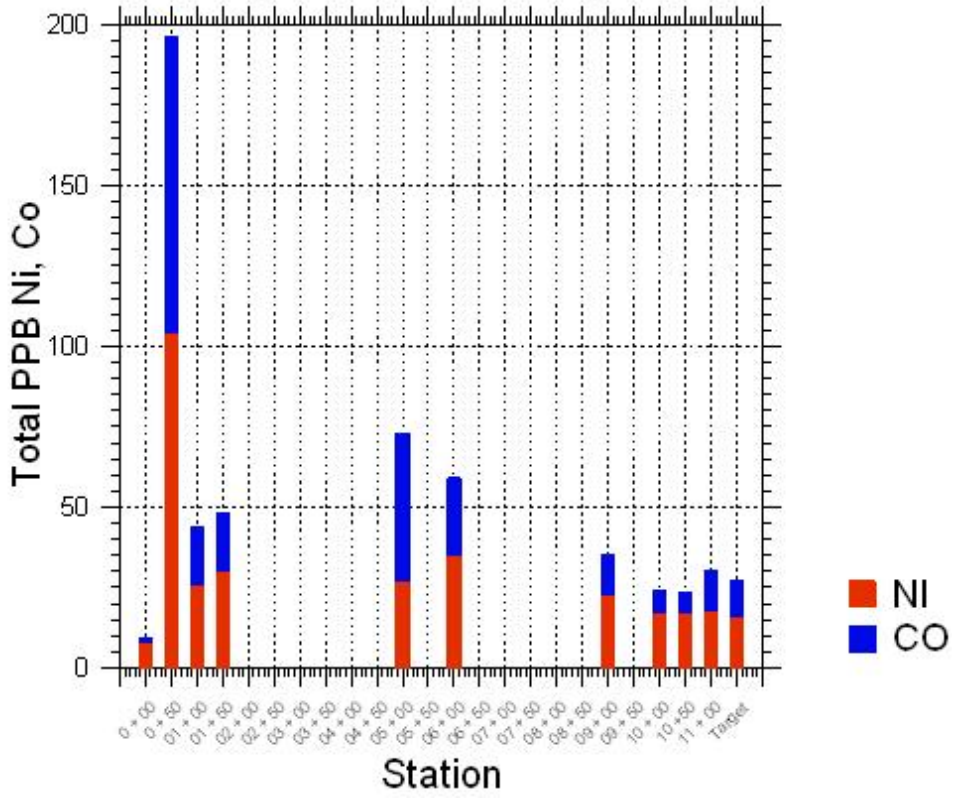
Excalibur Sturgeon Lake Enzyme Leach Line 37



Line 38: There is a single- or two-sample Zn+/-Pb anomaly present on this transect between 0+50 and 1+00. The response is essentially Zn-rich. Elsewhere on the transect low base metal responses are typical. A coincident Ni-Co response is present, suggesting the presence of a mafic lithology and associated pyrite mineralization.

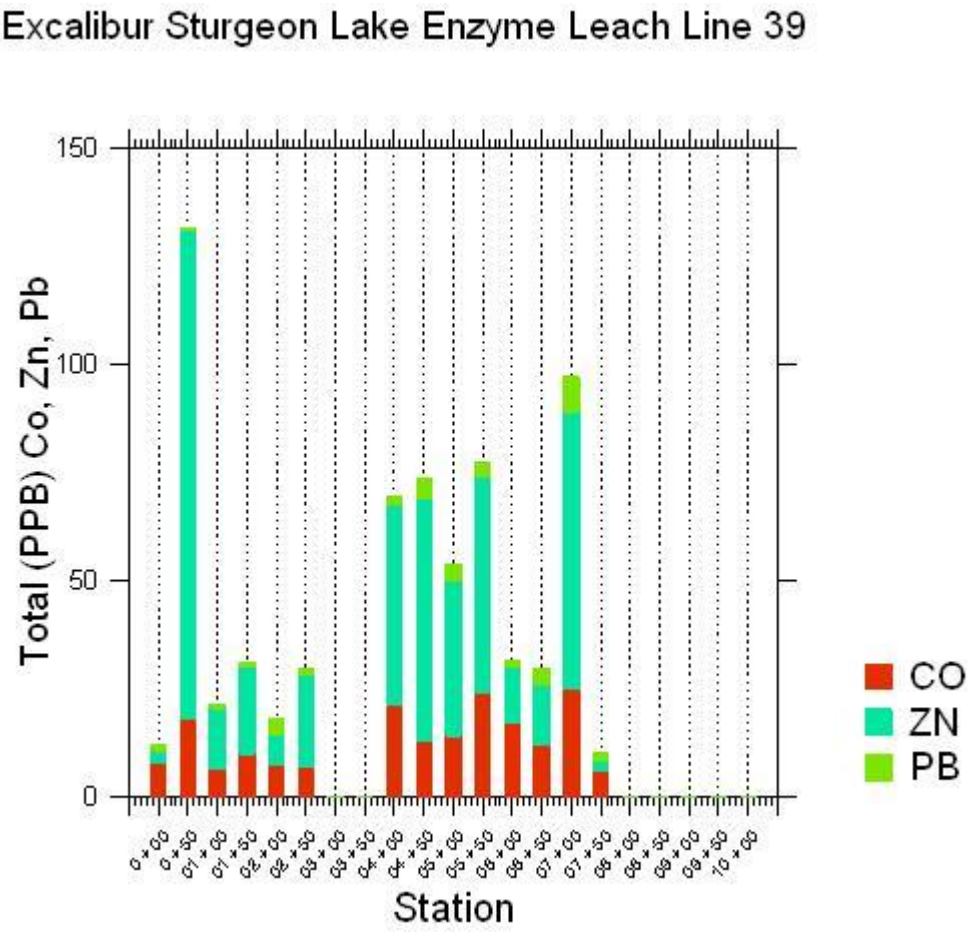


Excalibur Sturgeon Lake Enzyme Leach Line 38

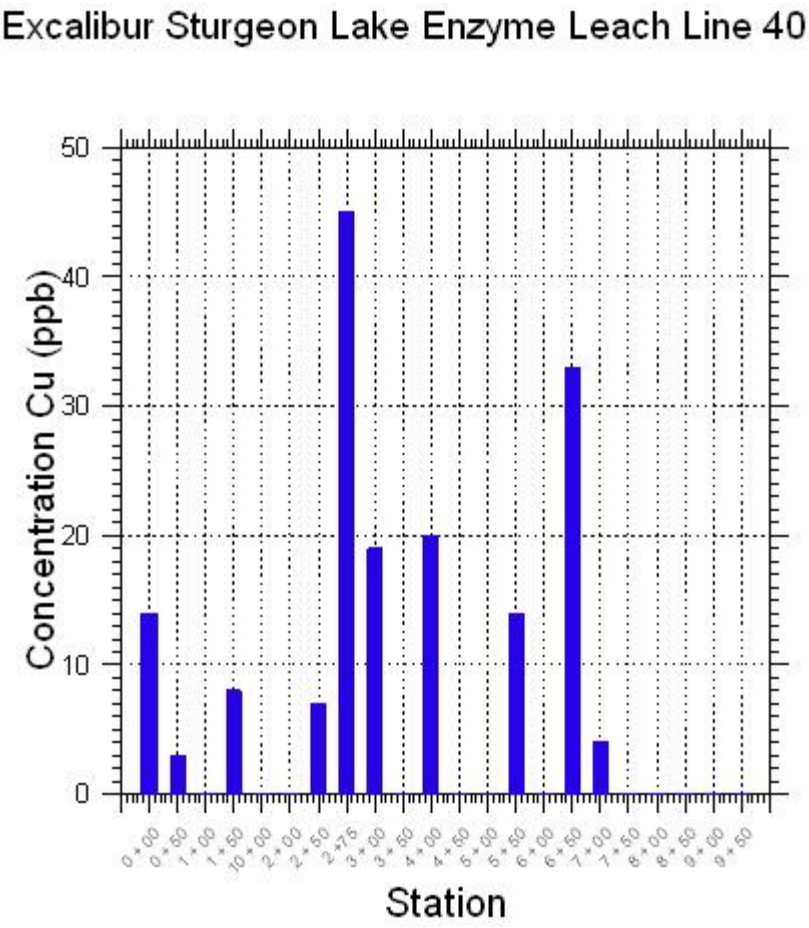


Line 39: Base metal responses from line 39 are primarily Zn-rich with a moderate-contrast Zn response between 4+00 and 5+50. There is some lesser Co associated with the Zn and this is likely the signature of pyrite mineralization associated with sphalerite.

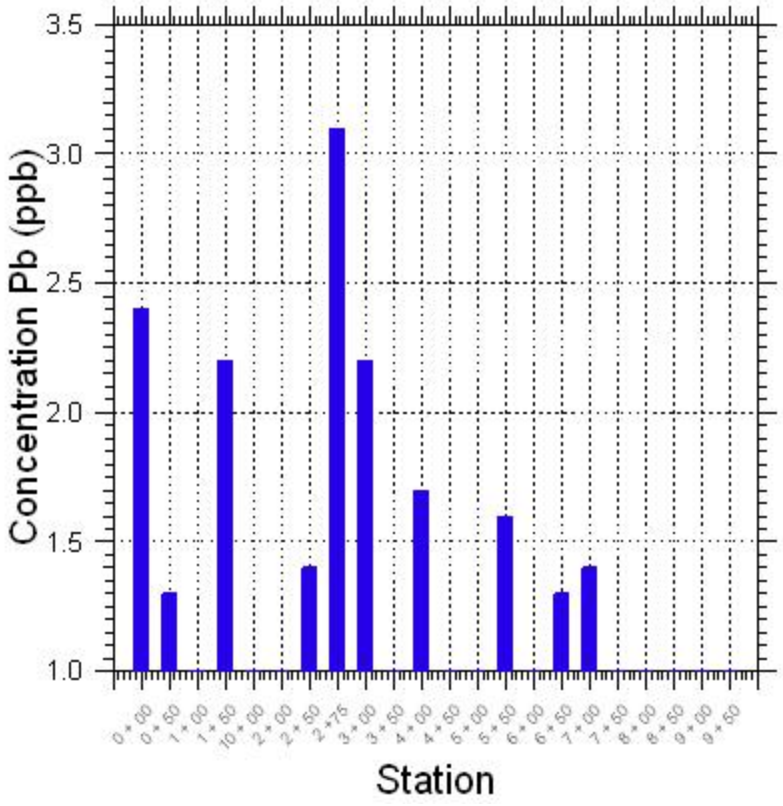
There are no precious metal responses associated with the line 39 soil samples.



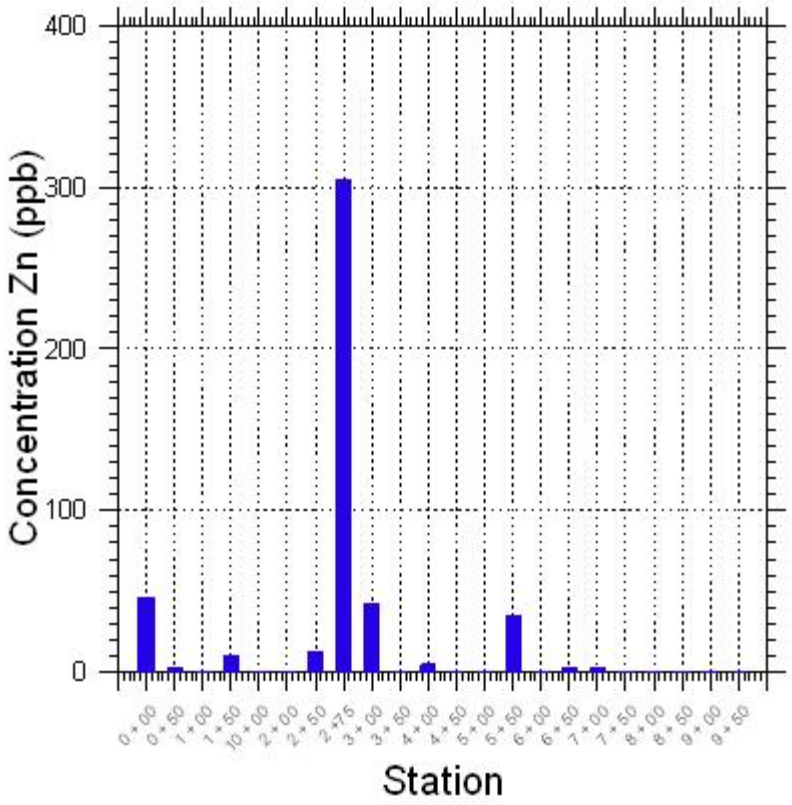
Line 40: A single sample coincident Cu-Pb-Zn-Mo-Sb response occurs at 2+75 but is not associated with additional elevated responses on the remainder of the line. There are also other elements with single sample responses and these include Co at 4+50 and As at 5+50. Of possible interest is a coincident Au-Tl-Br three sample anomaly between 2+50 and 3+00. The Au and Br responses are located at the western edge of a very broad Tl response.



Excalibur Sturgeon Lake Enzyme Leach Line 40



Excalibur Sturgeon Lake Enzyme Leach Line 40



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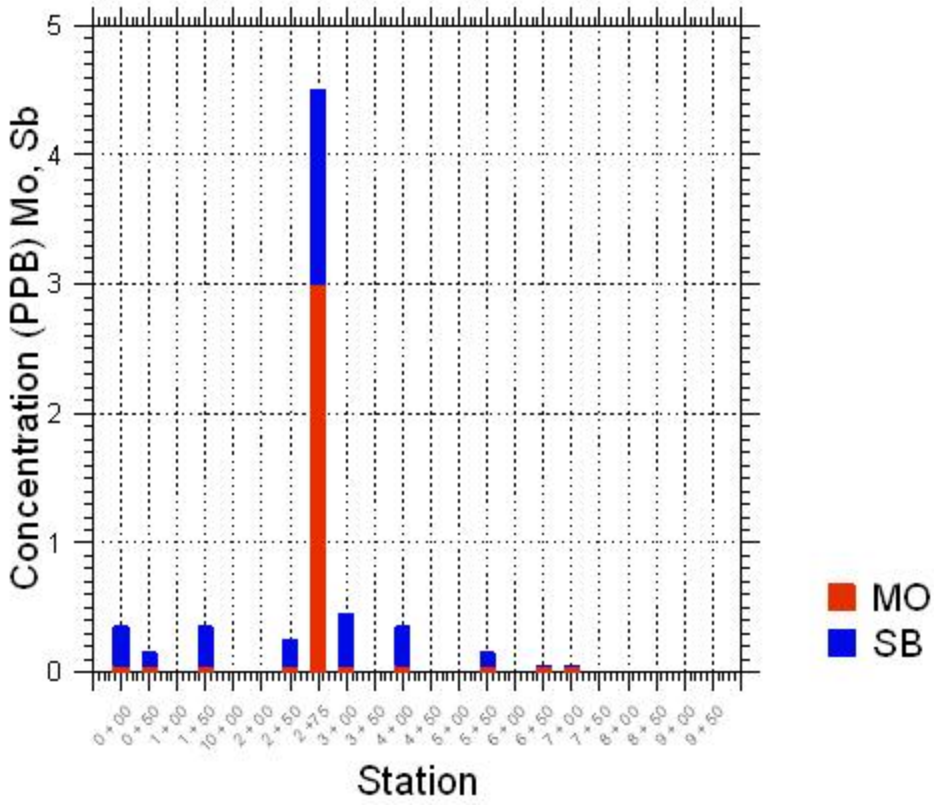

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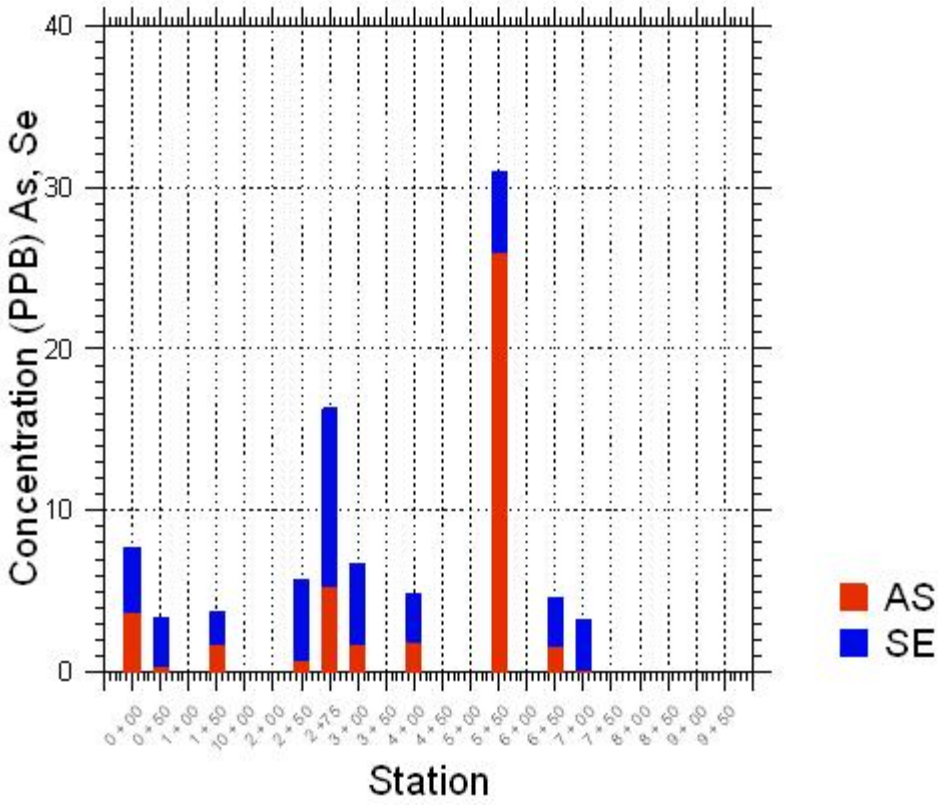
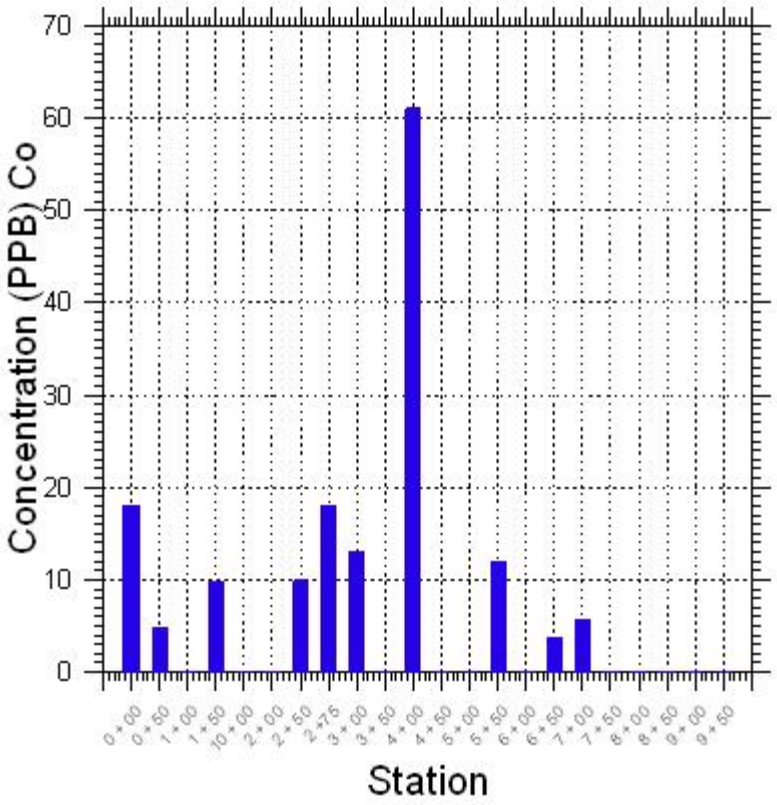
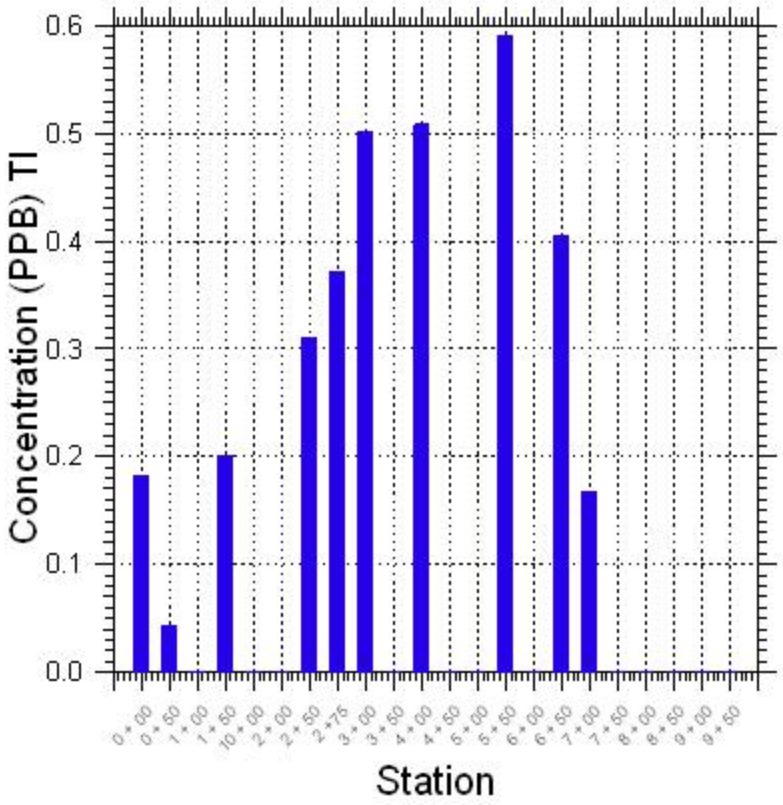


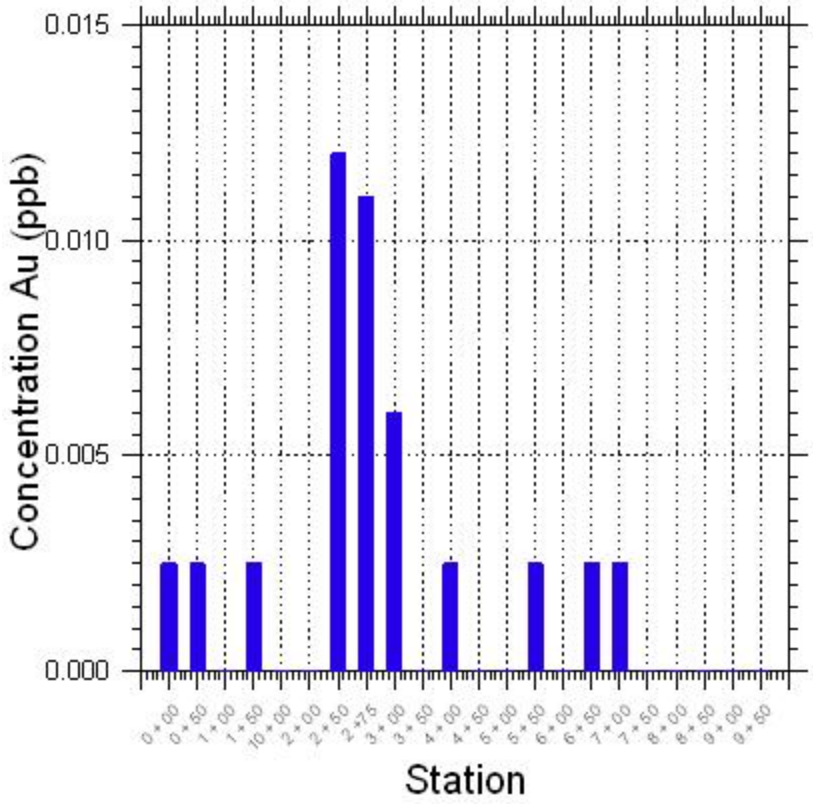
Excalibur Sturgeon Lake Enzyme Leach Line 40



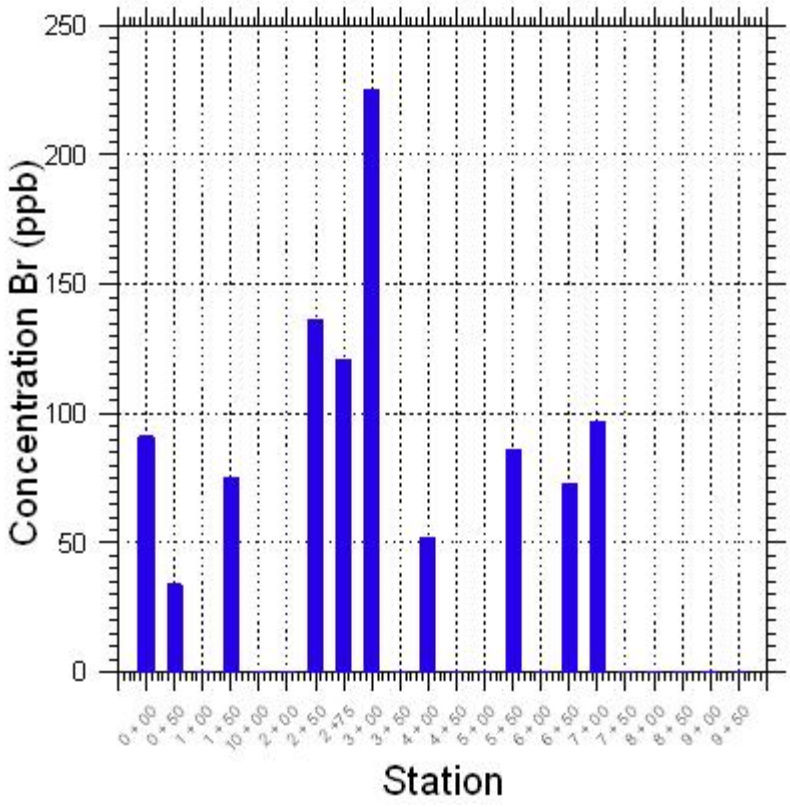
Excalibur Sturgeon Lake Enzyme Leach Line 40



Excalibur Sturgeon Lake Enzyme Leach Line 40



Excalibur Sturgeon Lake Enzyme Leach Line 40



OBSERVATIONS, CONCLUSIONS AND RECOMMENDATIONS

Enzyme Leach

The Enzyme Leach component of the combined Enzyme Leach and SGH geochemical survey in the Sturgeon Lake area has successfully documented the presence of base metal anomalies, albeit at very low contrasts and in many cases as single sample responses. The characteristics of these responses are summarized in Table form below.

Summary of anomalous responses in Enzyme Leach data, Sturgeon Lake area.

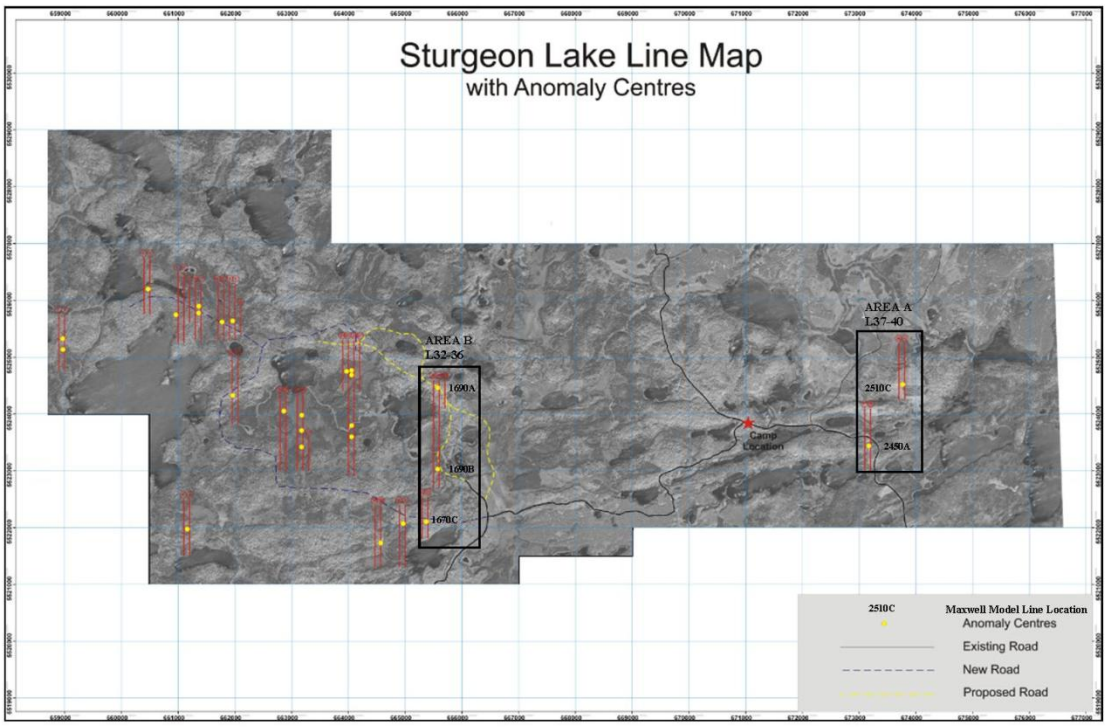
Line	Anomaly	No. of Samples	Location	
32	Co	3	0+50 to 1+50	
33	nil			
34	Zn+/- Cu, Mo, Sb, Co	3	11+50 to 12+50	
35	nil			
36	Zn+/- Cu, Mo, Sb, Co	1	3+00	
37	Cu, Au	1	6+50	
	Pb	1	11+00	
38	Zn, Pb, Ni, Co	2	0+50 to 1+50	
39	Zn, Co	4	4+00 to 5+50	
40	Cu, Pb, Zn, Mo, Sb	1	2+75	
	Co	1	4+50	
	As	1	5+50	
	Au, Tl, Br	3	2+50 to 3+00	

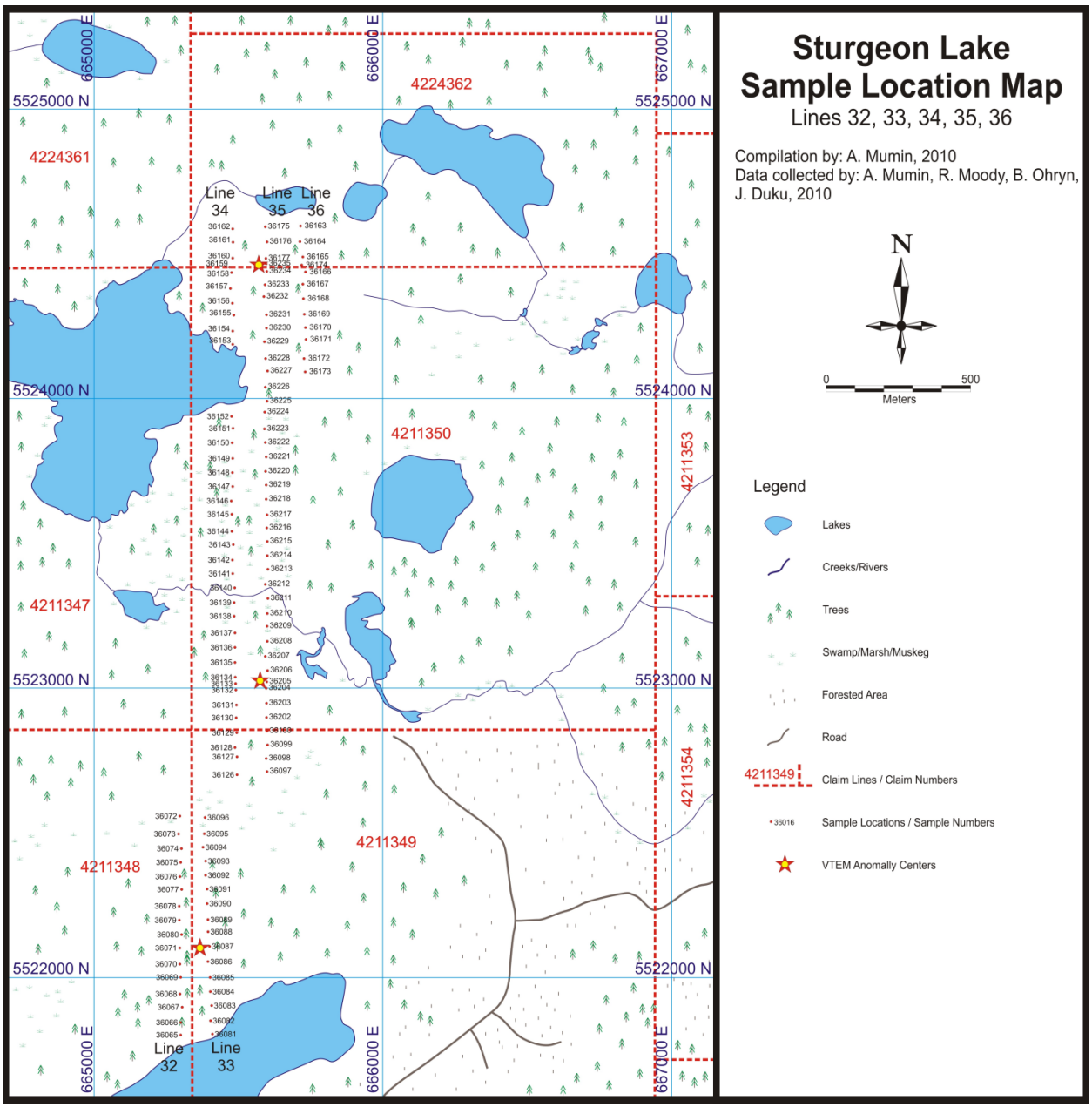
Many of these anomalies are one-sample responses and should not be considered as significant in terms of follow-up exploration. The line 34 anomaly is the priority response in the dataset. It consists of a three sample, 100 m elevated response for the suite Zn-Cu-Mo-Sb-Co suggesting a zone of sulphide mineralization with pyrite in association with mafic lithologies. The secondary anomaly in the survey is located on line 40 where a single sample Cu, Pb, Zn, Mo and Sb anomaly is encapsulated by a three sample Au-Tl-Br anomaly. This is also suggestive of a base metal mineralized signature with associated Au. The Enzyme Leach survey has returned two potential follow-up targets where ground geophysical surveys or diamond drill testing can be focused. Anomalous responses are not recognized on lines 33 and 35.

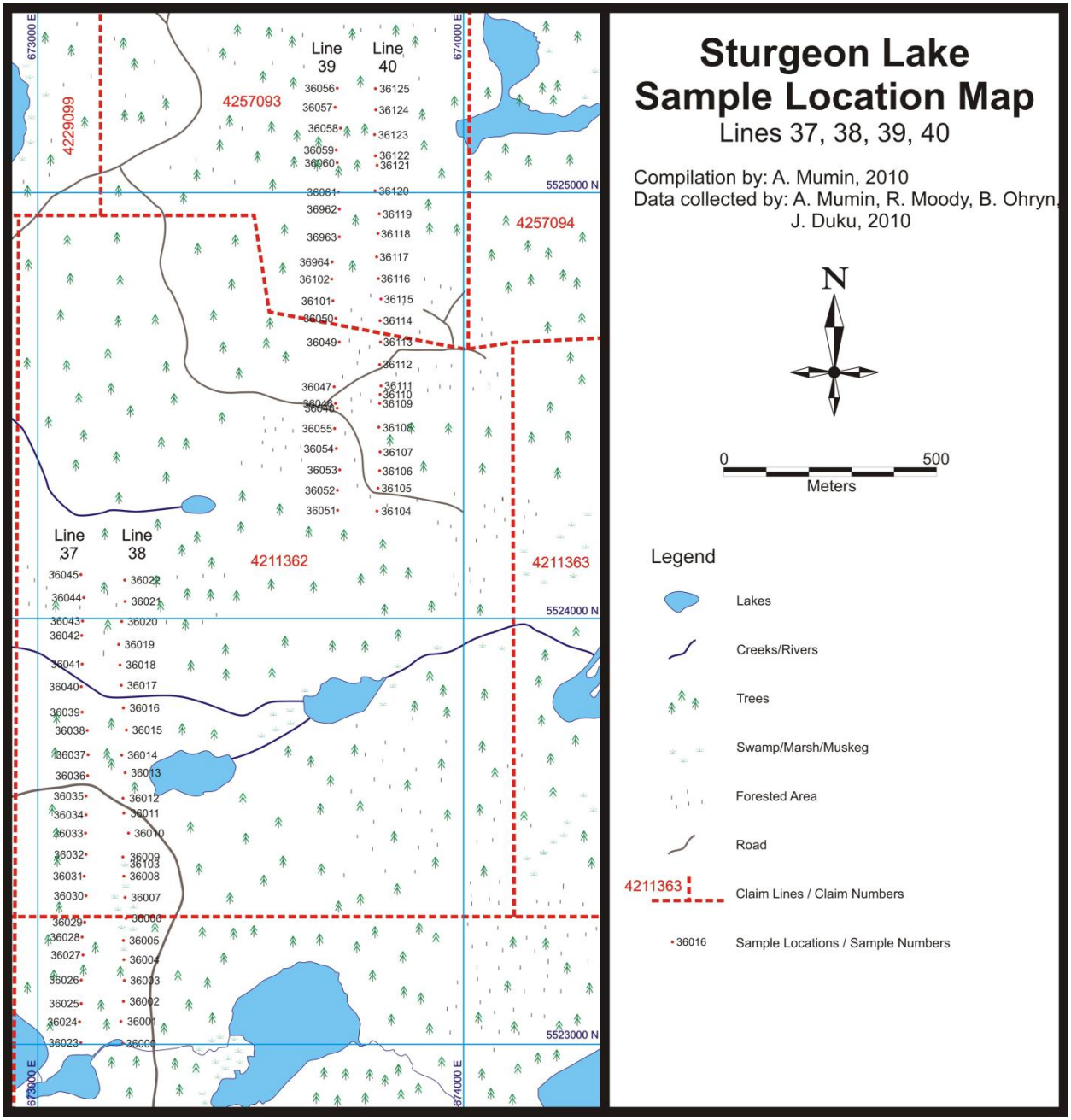
Enzyme Leach and VTEM Anomalies

Integration of a geochemical layer with geophysical survey results and a foundation of geology is an important approach to exploration in buried and otherwise covered terrain. The following figures document the locations of VTEM anomalies subsequent to Maxwell Plate modeling in and sample locations for the area of the Enzyme Leach survey.

FIGURE 3:
PROPERTY ROADS, PROPOSED TRAILS AND CAMP LOCATION, STURGEON LAKE PROPERTY
PATRICIA MINING DIVISION, NW ONTARIO




Sturgeon Lake
Sample Location Map
Lines 32, 33, 34, 35, 36
Compilation by: A. Mumin, 2010
Data collected by: A. Mumin, R. Moody, B. Ohryn, J. Duku, 2010
N
0
500
Meters
Legend
Lakes
Creeks/Rivers
Trees
Swamp/Marsh/Muskeg
Forested Area
Road
4211349
Claim Lines / Claim Numbers
36016
Sample Locations / Sample Numbers
VTEM Anomally Centers
665000 E
666000 E
667000 E
5525000 N
5524000 N
5523000 N
5522000 N
4224362
4224361
4211350
4211353
4211347
4211354
4211349
4211348
Line 34
Line 35
Line 36
Line 32
Line 33


Sturgeon Lake
Sample Location Map
Lines 37, 38, 39, 40
Compilation by: A. Mumin, 2010
Data collected by: A. Mumin, R. Moody, B. Ohryn, J. Duku, 2010
N
0
500
Meters
Legend
Lakes
Creeks/Rivers
Trees
Swamp/Marsh/Muskeg
Forested Area
Road
4211363
Claim Lines / Claim Numbers
36016
Sample Locations / Sample Numbers
673000 E
674000 E
5525000 N
5524000 N
5523000 N
4257093
4229099
4257094
4211362
4211363
Line 39
Line 40
Line 37
Line 38

Examination of the locations of VTEM anomaly centers and the locations of enzyme leach anomalies reveals very little correspondence exists between these two sets of data for the most part. VTEM anomalies on lines 32 and 33 have an association of Co-only in the enzyme leach data suggesting the VTEM anomaly in this area is “pyrite-only” without base and/or precious metals.

Soil Gas Hydrocarbon (SGH) Survey

The SGH survey has successfully delineated a Volcanogenic Massive Sulphide-related anomaly with a ranking of five out of a possible six on lines 37 and 38. A review of the enzyme leach data indicates that in the immediate area of the SGH anomaly there is a single sample Cu-Au enzyme leach anomaly on line 37. Single sample anomalies are usually accepted with some reticence as they are subject to reproducibility tests to determine whether this anomaly is real or spurious. Nevertheless, in this survey there appears to be some limited correspondence between enzyme leach and SGH, albeit from a single sample Cu-Au anomaly.

Multiple Survey Types

An important consideration is the survey expenditures related to undertaking two kinds of geochemical surveys (Enzyme Leach and SGH) when an appropriate enzyme leach sample could not be obtained. This increases expenditures considerably and these costs could be controlled with the expeditious use of an auger to acquire inorganic soil samples for enzyme leach analysis. Alternatively the entire survey area could be based on SGH analysis of organic material if this is the only sampling medium that is universally obtainable on the property. Again, the use of an auger could supply inorganic/particulate samples for SGH analysis. Particulate (soil) samples appear to produce the best SGH responses.

CONCLUSIONS

It is concluded that the Enzyme Leach survey has successfully detected two base metal anomalies (Lines 34 and 40) which are worthy of follow-up. The use of a standard grade of enzyme leach is fraught with difficulty since it has difficulty extracting particulate gold from the substrate and the use of ***enhanced*** Enzyme Leach is recommended for this reason.

There is limited correspondence between enzyme leach analyses and an SGH anomaly in the form of a single sample Cu-Au anomaly.

For the remainder of the geochemical program it is strongly recommended that only one type of survey be completed in terms of analysis. The expenditures would thus be controlled and interpretation may proceed on the basis of either Enzyme Leach or SGH.

In exploration terrains where deep organic cover is encountered it is advisable to attempt sample collection with a Dutch auger thereby acquiring inorganic soil samples that can then be analyzed by enhanced enzyme leach, Soil Gas Hydrocarbons or another partial/selective extraction.

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Lac du Bonnet, Manitoba

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