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LEAD CONCENTRATE ASSESSMENT OF

BROWNS ORE LEAD CONC (LC01) FOR

COMPASS RESOURCES

REPORT T0979-1
J R GLEN
MAY 2016

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CONTENTS

1. SUMMARY

A single intersection of Compass Resources Browns Ore was prepared and assessed for lead and cobalt/nickel recovery. A final locked cycle float consisting of a 90L rougher stage and three stages of cleaning generated some 11kg of final lead concentrate. This report details the assessments undertaken on this concentrate:

- Detailed Assay analyses
- Full Sizing
- Settling tests
- Pressure Filtration test
- TML test
- Self-Heating test

Analyses indicate a concentrate containing 68.7%Pb, 6.6%SiO2, 2.9%Zn, 1.9%Fe, 0.29%Co, 0.24%Ni, 0.13%Cu and 69PPMaG.

The concentrate has a p80 of 33um with 21% mass less than 5um.

The concentrate has rapid settling character with a final settled density of around 77% solids.

The IMO TML value is 14.7%H2O.

The concentrate has a pressure filtration (dewatering) rate of 12.2t/m2/hr.

The Self-Heating test results indicate that the lead concentrate is classified as low risk for self heating in Stage A, this is mainly due to the lack of presence of other sulphide minerals. The concentrate is classified within Risk Region 3 (Do Not Expose to a High Heat Source).

2. CONCENTRATE GENERATION

Some 65 bags of cut core were received for preparation and testing:

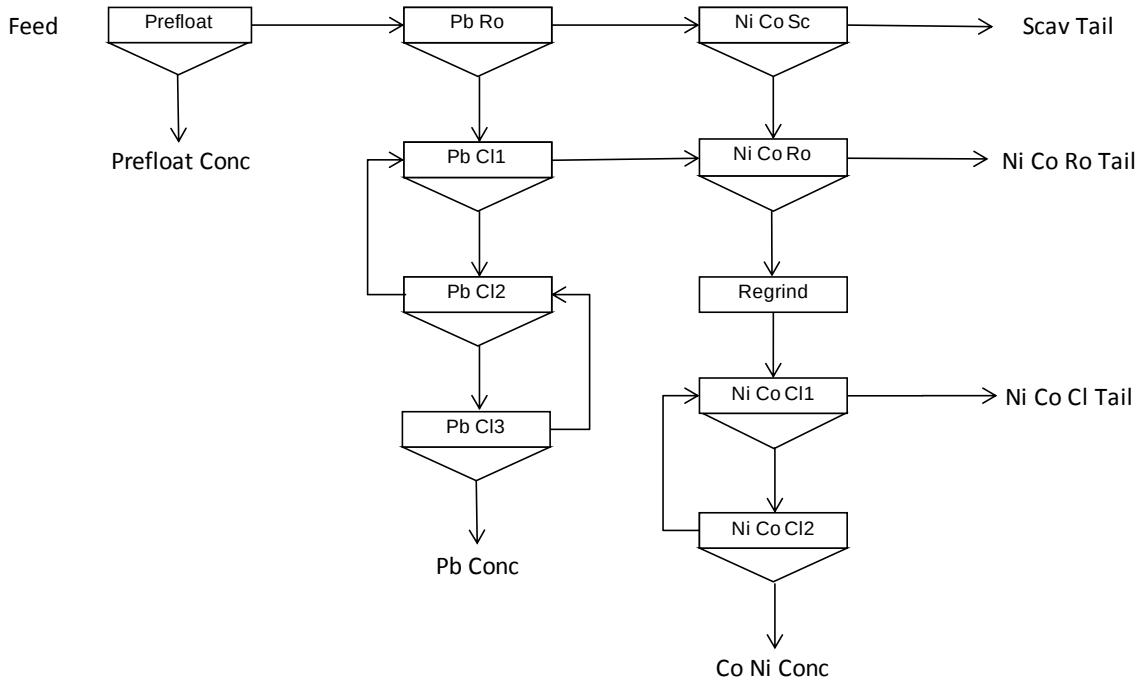
Holes	From (m)	To (m)	Mass (kg)
15BD06	94.0	158.0	262

A single composite was generated and tested for flotation response and optimisation. A single large scale locked cycle lead float test was performed. This test generated some 11kg of final lead flotation concentrate.

3. TESTWORK FLOWSHEET

The following diagram summarises the locked cycle flotation test performed to generate lead concentrate. This concentrate was used for characterisation testing.

DIAGRAM 1: LOCKED CYCLE FLOWSHEET



4. TESTS PERFORMED

Table 1 summarises the tests performed.

TABLE 1: LEAD CONCENTRATE TEST SUMMARY

TEST
Head Analyses
Full Sizing
Static Settling Tests
IMO TML Test
Pressure Filtration Test
Concentrate Self Heating Test

5. RESULTS

Table 2 details head icp assays (gold by fire) for the concentrate.

TABLE 2: CONCENTRATE ANALYSES

SiO2	%	6.64	Hf	ppm	2.60	Sc	ppm	2.00
Ag	ppm	68.5	In	ppm	0.63	Se	ppm	21.0
Al	%	1.05	K	%	0.56	Sn	ppm	1.00
As	ppm	200	La	ppm	9.80	Sr	ppm	3.50
Ba	ppm	40.0	Li	ppm	2.60	Ta	ppm	0.49
Be	ppm	0.51	Mg	%	0.11	Te	ppm	0.70
Bi	ppm	4.60	Mn	ppm	99.0	Th	ppm	8.51
Ca	%	0.03	Mo	ppm	27.9	Ti	%	0.13
Cd	ppm	66.8	Na	%	0.01	Tl	ppm	0.76
Ce	ppm	22.1	Nb	ppm	5.90	U	ppm	3.60
Co	ppm	2890	Ni	ppm	2390	V	ppm	29.0
Cr	ppm	29.0	P	ppm	110	W	ppm	1.40
Cs	ppm	0.45	Pb	%	68.68	Y	ppm	8.30
Cu	ppm	1270	Rb	ppm	14.3	Zr	ppm	103.5
Fe	%	1.93	Re	ppm	0.02	Zn	%	2.91
Ga	ppm	3.59	S	%	>10.0	Hg	ppm	0.06
Ge	ppm	0.15	Sb	ppm	8.09			

Table 3 indicates the sizing results.

TABLE 3: CONCENTRATE SIZING

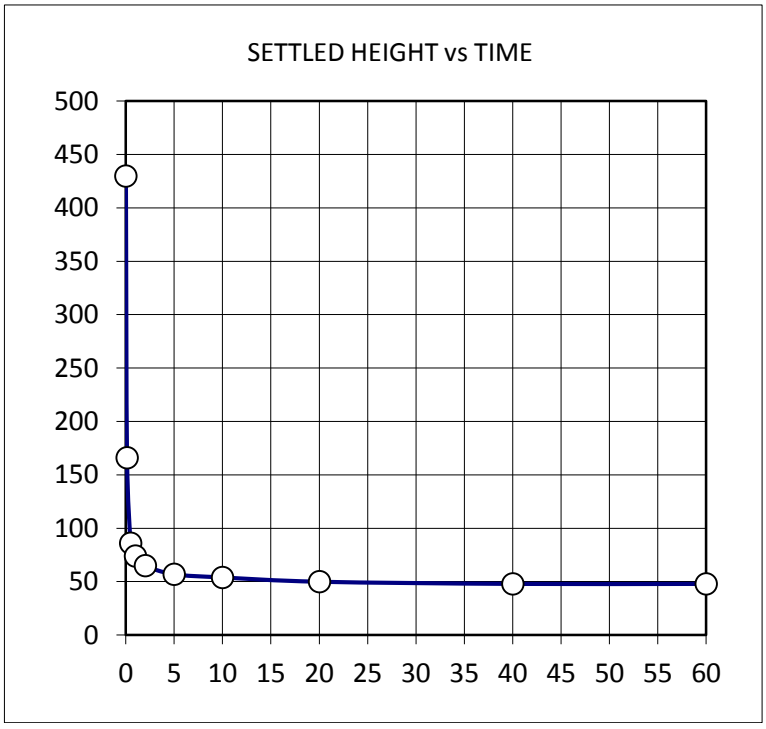
SAMPLE SIZED Comb Pb Conc		SIZE um	WEIGHTS g	(%)	% Pass	P80 um
		150	0.00	0.00	100.0	
		106	0.11	0.10	99.9	
		75	1.48	1.37	98.5	
		53	4.54	4.20	94.3	
		38	9.39	8.69	85.6	
CYCLOSIZER	CS1	21	19.67	18.21	67.4	33
FLOW 185	CS2	18	14.80	13.70	53.7	
TEMP 21	CS3	12	14.95	13.84	39.9	
SG 5.00	CS4	7	14.55	13.47	26.4	
TIME 20min	CS5	5	7.45	6.90	19.5	
	<CS5	CALC	21.08	19.51	0.0	
		TOTAL	108.02	100.0		

Settling test curves are detailed in Table 4 below.

TABLE 4: CONCENTRATE SETTLING TESTS

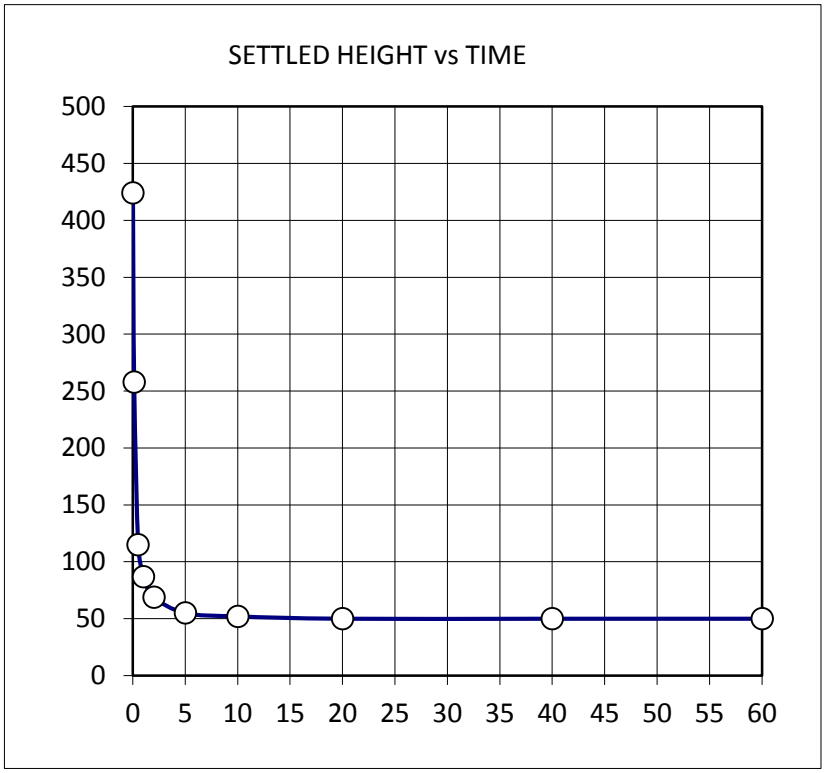
TEST NO	T41	SOLIDS	
CYL VOL ml	2000	LIQUOR	WATER
CYL HT mm	420	FLOC	M10
CYL DIAM mm	75	%W/W	1
SOLIDS SG	5.00	DOSE	5
SOLIDS gm	488	GPT	102

TIME	HEIGHT	CALC UNDERFLOW			
min	mm	VOL	%SOL	kg/m3	VOL%
0.0	430	2048	20.0	1.191	4.8
0.1	166	790	41.3	1.494	12.3
0.5	86	410	61.0	1.953	23.8
1.0	74	352	65.7	2.108	27.7
2.0	65	310	69.7	2.261	31.5
5.0	57	271	73.7	2.438	36.0
10.0	54	257	75.4	2.518	38.0
20.0	50	238	77.6	2.640	41.0
40.0	48	229	78.8	2.708	42.7
60.0	48	229	78.8	2.708	42.7



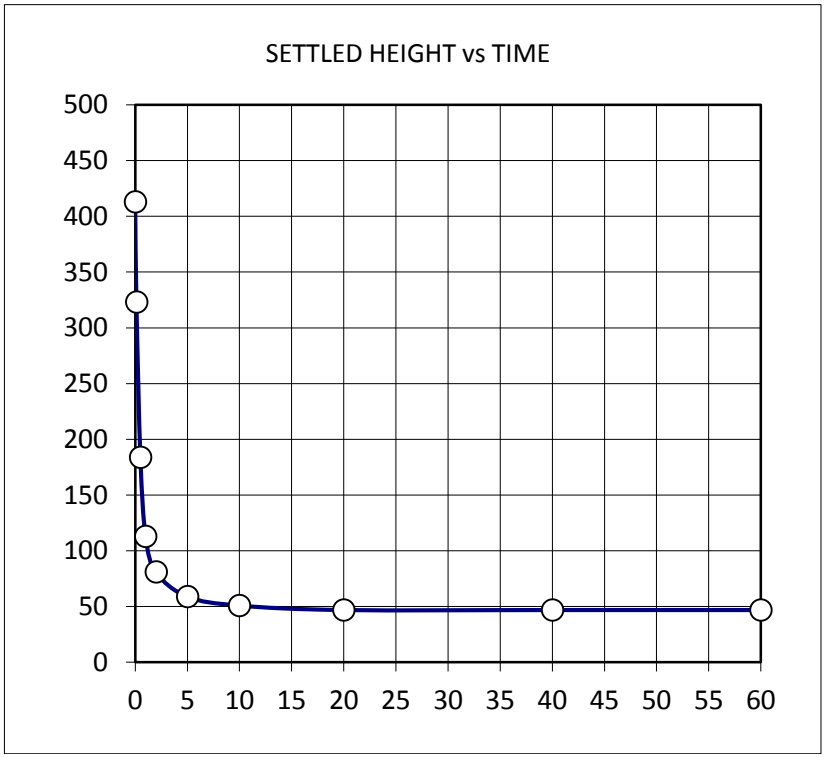
TEST NO	T42	SOLIDS	
CYL VOL ml	2000	LIQUOR	WATER
CYL HT mm	420	FLOC	M10
CYL DIAM mm	75	%W/W	1
SOLIDS SG	5.00	DOSE	2.5
SOLIDS gm	488	GPT	51

TIME	HEIGHT	CALC UNDERFLOW			
min	mm	VOL	%SOL	kg/m3	VOL%
0.0	424	2019	20.3	1.193	4.8
0.1	258	1229	30.1	1.318	7.9
0.5	115	548	52.0	1.713	17.8
1.0	87	414	60.6	1.942	23.6
2.0	69	329	67.9	2.188	29.7
5.0	55	262	74.8	2.491	37.3
10.0	52	248	76.5	2.577	39.4
20.0	50	238	77.6	2.640	41.0
40.0	50	238	77.6	2.640	41.0
60.0	50	238	77.6	2.640	41.0



TEST NO	T43	SOLIDS	
CYL VOL ml	2000	LIQUOR	WATER
CYL HT mm	412	FLOC	M10
CYL DIAM mm	75	%W/W	1
SOLIDS SG	5.00	DOSE	1
SOLIDS gm	488	GPT	20

TIME	HEIGHT	CALC UNDERFLOW			
min	mm	VOL	%SOL	kg/m3	VOL%
0.0	413	2005	20.4	1.195	4.9
0.1	323	1568	24.9	1.249	6.2
0.5	184	893	38.0	1.437	10.9
1.0	113	549	52.0	1.712	17.8
2.0	81	393	62.3	1.993	24.8
5.0	59	286	72.1	2.363	34.1
10.0	51	248	76.5	2.577	39.4
20.0	47	228	78.9	2.711	42.8
40.0	47	228	78.9	2.711	42.8
60.0	47	228	78.9	2.711	42.8



The TML test results are presented in Table 5 below.

TABLE 5: CONCENTRATE IMO TML TEST

SAMPLE DETAILS

SAMPLE RECEIVED	Lead Concentrate
DATE RECEIVED	150316
MATERIAL TYPE	LC01 Pb Con
DAMP MASS kg	3.6

MOISTURES

AS RECEIVED	9.05
TML (% H2O)	14.74

MOISTURE DATA

SAMPLE	TARE (g)	GFROSS WET (g)	GROSS DRY (g)	CALC MOISTURE (%)
AS RECEIVED	6.74	100.45	98.10	9.05
MAIN 1	6.98	100.65	90.96	16.56
MAIN 2	6.87	100.54	91.13	16.19
MAIN 3				
MAIN 4				
DIFFERENCE				-0.37

FLOW TABLE RESULTS

PRELIMINARY		MAIN	
H2O (ml)	F/NF	H2O (ml)	F/NF
0.0	NF	132.0	NF
12	NF	3.5	NF
24	NF	3.5	F
36	NF		
48	NF		
60	NF		
72	NF		
84	NF		
96	NF		
108	NF		
120	NF		
132	NF		
144	F		

TML DETERMINATION FLOWSHEET

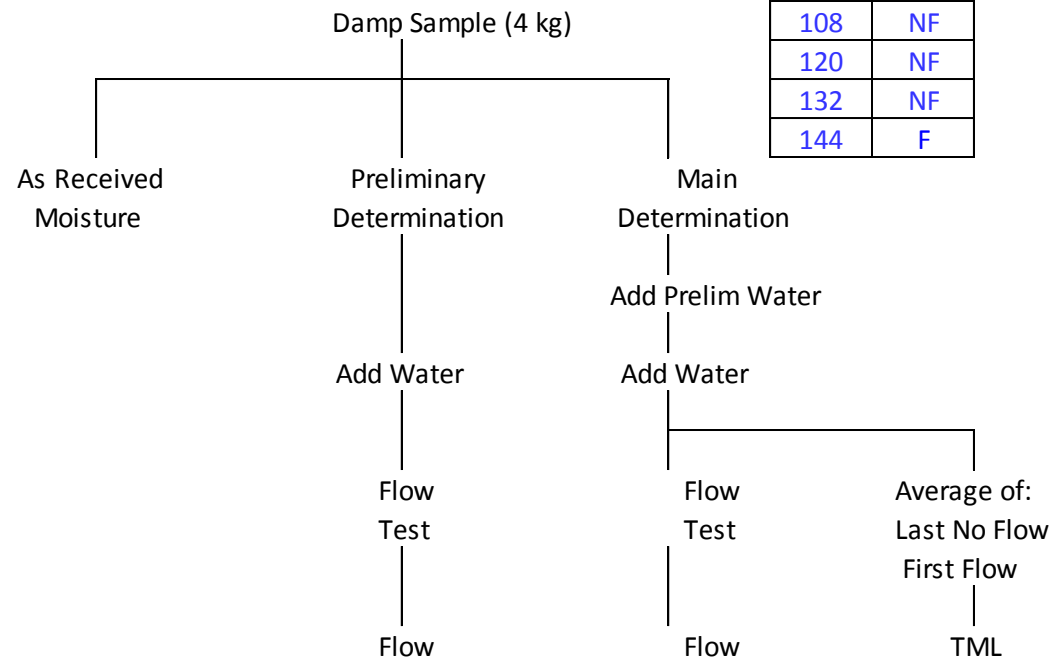


Table 6 details the pressure filtration results.

TABLE 6: CONCENTRATE PRESSURE FILTRATION TEST DATA

SAMPLE TESTED	LC01 Pb Conc
FLOC M10 (gpt)	50
START PULP (g)	18830
PULP VOL (ml)	3400
CLOTH TYPE	Industrial Cloth
CLOTH DIAM (mm)	264
CLOTH AREA (m2)	0.0547

FILTER DATA

FORM TIME (s)	15
DRY TIME (s)	60
AV PRESSURE (kPa)	450
RATE (kg/m2/h)	12170

CAKE

CAKE THK (mm)	180
TARE (g)	249.7
GROSS WET (g)	3355.2
GROSS DRY (g)	3023.6
MOISTURE (%)	10.68

The Self Heating test results are presented in Appendix 1.

A1 SELF HEATING REPORT - NESSETECH

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Technical Report

To: John Glen, Bonita Raimondo
Company: ALS Metallurgy, (TAS, Australia)
From: J.E. Nesset, F. Rosenblum
Date: May 13, 2016
Copy:

Subject: ***Self-Heating Tests –Pb Concentrate – Compass Resources: Browns Ore Project***

INTRODUCTION

A request was received from ALS Metallurgy (TAS, Australia) in March of this year (e-mail March 28, 2016; Bonita Raimondo) for a self-heating test on a Pb concentrate sample (combined) from locked-cycle testwork on Compass Resources Brows Ore Project. The sample was received shortly after, with testing completed by April 8th. Basic assay and size data for the sample were also provided by the Client. This Report represents the formal presentation of the test results for the sample as well as a discussion of the results, and thus completes the contracted work.

DISCLAIMER

These results are relevant to the sample received and processed only. Neither NesseTech nor FR Control holds any responsibility for how this information is used by ALS or, in turn, their owners, associates or clients.

NesseTech and FR Control may add the data from this test to their database and use in reporting to other clients and publications without naming the operation or laboratory specifically. By accepting and paying for this Report the Client has also accepted the terms of this arrangement.

SAMPLES RECEIVED

The following Table 1 lists the sample as received according to the description and naming supplied by ALS, as well as our internal numbering system. Two samples were received in sealed poly bags in a dry state, with instructions to test one and use the second as a spare. The sample was specifically identified as combined Pb concentrate from locked cycle test LC01 for Compass Resources' Browns Ore Project, having code number 979-337. The ALS project is T0979.

Table 1. Sample description and identification for the Browns Ore Project Pb Concentrate sample

Sample Description	*Details*	*Our Number*
Pb Combined Concentrate LC01 #979-337	Browns ore, Project T0979	2016-39

SAMPLE PREPARATION and TESTING

Sample weights received were ~0.5 kg each for the two samples (Table 2). Table 2 also lists the as-received moisture, in this case 0% (wt), and as-tested moisture, 6% (wt), the standard testing value. If required (not in this case), the sample was rolled to break up any visible, small lumps. The testing methodology was as described in the publication by Rosenblum, Nesset and Spira (CIM Bulletin, Nov/Dec 2001) for Stage A (70 deg C) and Stage B (140 deg C), each stage being run for approximately 50 hours. Due to the lower level of reactivity of this sample in Stage A, the Stage B testing time was reduced to 20 hours. The results are reported in terms of Self Heating Capacity (SHC, Joules/gram) for both Stage A and Stage B in the following section.

Table 2. As-received and adjusted test moisture level for the Browns Ore Project Pb Concentrate sample

Sample	*As-received Moisture, %*	*As-received Mass, grams*	*Test Moisture, %*
Pb Concentrate	dry	2 @~500 each	6

Assay (ICP) and particle size distribution data were also supplied by ALS for the sample and are presented in Table 3 and Figure 1. The main mineral is galena (79.3%), with SiO_2 as the main non-sulphide (6.6%). Sphalerite accounts for 4.3% of the total mass. These three minerals account for >90% of the concentrate as calculated from the assays provided. It was not possible to establish if the Ni and Fe occur as sulphides. Overall, this sample is considered

to be a very “clean” lead concentrate with few impurities, especially in terms of other sulphide minerals.

Table 3. Assay data (ICP) supplied by ALS for the Browns Ore Project Pb Concentrate sample. Minor elements not shown

Sample Description	*Ca*	*Cu*	*Fe*	*Mg*	*Ni*	*Pb*	*S*	*SiO2*	*Zn*	*Total*
Pb Concentrate	0.030	0.127	1.93	0.11	0.239	68.68	>10*	6.64	2.91	>92.72**

**galena contributes 10.63% S; sphalerite contributes 1.43% S (calculated)*
***assuming S from galena and sphalerite contribute 12.0%S to the total*

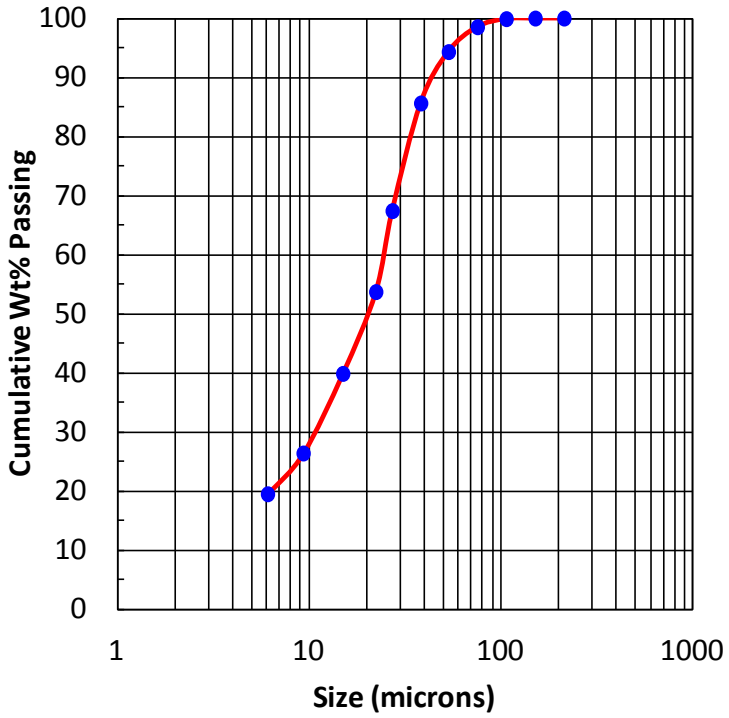

Figure 1. Particle size distribution of the Browns Ore Project Pb Concentrate sample as provided by ALS. The P_{80} is 35 microns

RESULTS

Table 4 lists the Self Heating Capacities (SHC, Joules/gram) for the Pb concentrate sample. The actual SHC thermogram test curve is included in the Appendix. The data of Table 4 are more usefully plotted on a log-log basis of Stage A versus Stage B values in order to assess the potential for self-heating to occur, the so-called *Risk Assessment Chart*. Figure 2 illustrates this relative to the five regions of varying risk and shows that the Browns Ore Pb concentrate sample has a negligible Stage A value of 0 J/g and a very moderate Stage B

value of 1.3 J/g, placing it within Risk Region 3 (*Do Not Expose to a High Heat Source*).

Table 4. Self heating capacities for the Browns Ore Project Pb Concentrate sample

Sample Description	*Test No*	*Stage A J/g*	*Stage B J/g*	*Risk Region*
Pb Concentrate	2016-39	0.0	1.3	3

For comparison purposes, the data for the Browns Ore sample of Pb concentrate was compared to lead concentrate data from other operations in our database; one each from the U.S., Australia and Mexico, and two from Canadian operations. The results are presented in Figure 3 and indicate that the tested Browns Ore Pb concentrate has similar low reactivity to the Mexico and Canada 2 samples. The Australia, Canada 1 and U.S. samples have a self-heating reactivity that is more typical of many lead concentrates.

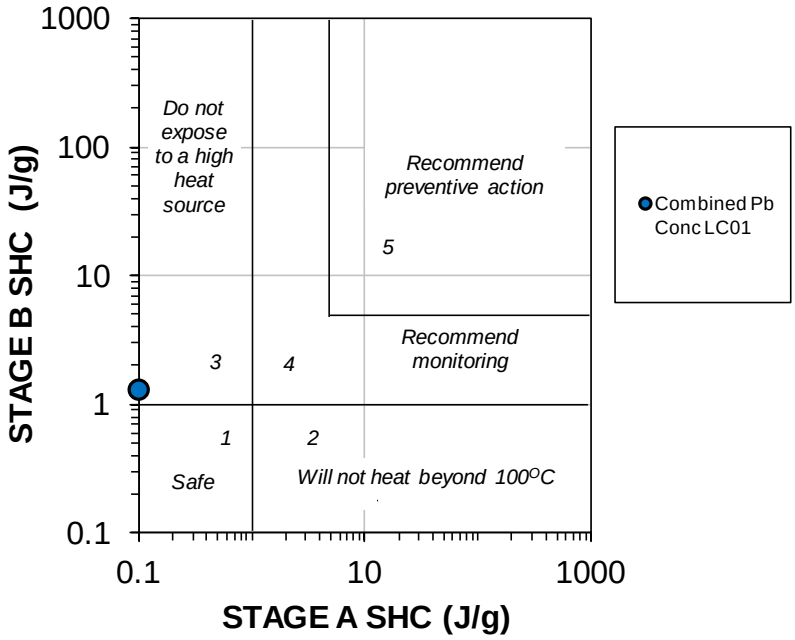

Figure 2. *Risk Assessment Chart*. Plot of Stage A versus Stage B SHC for the Browns Ore Project Pb Concentrate sample

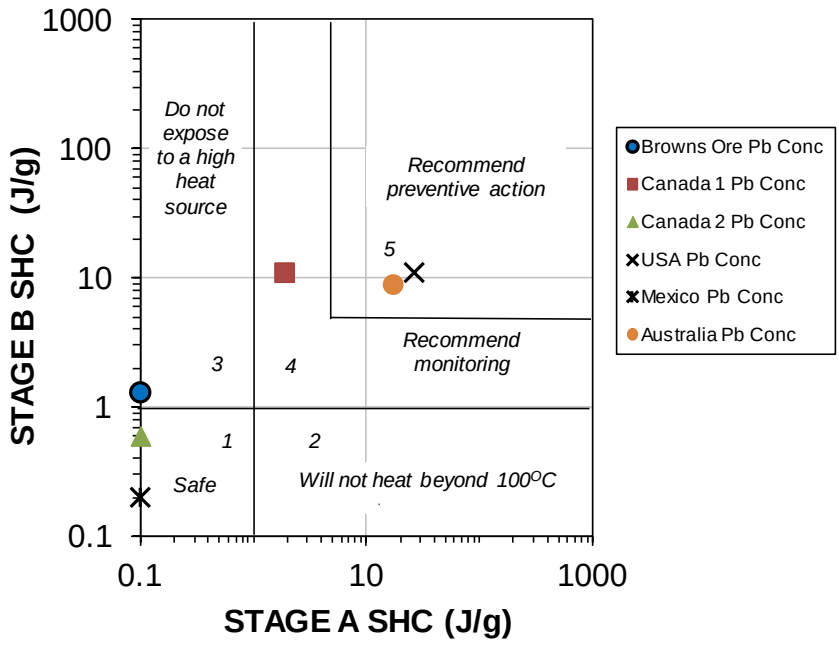

Figure 3. *Risk Assessment Chart*. Comparison of Stage A versus Stage B SHC for the Browns Ore Project Pb Concentrate sample with Pb concentrate samples from other operations

DISCUSSION of RESULTS

The tested Browns Ore Pb concentrate sample shows a low risk for self-heating. This is emphasized by the value of 0 J/g for Stage A heating which represents the mechanism (electrochemical in origin) by which a material will rise in temperature from ambient to reach Stage B heating (>100 deg C). Essentially, the results indicate that there is no mechanism for the sample material to self-heat above ambient temperature. The Stage B value of 1.3 J/g is indicative of the response of most finely ground sulphides to heat if an external heat source is applied. An example of this would be a spark from a welder's torch, or dust in very close proximity to a hot light bulb or an electrical spark. Even when the risk for self-heating is low, all finely ground sulphides are a fuel source having the potential to be ignited by a strong heat source.

Given the reported mineralogy showing ~80% galena and very little in the way of other sulphides, the absence of Stage A heating is not surprising. It is believed that Stage A heating is initiated by the electrochemical reaction between dissimilar sulphide minerals in the concentrate mixture. There needs to be a sufficient proportion of anodic and cathodic mineral sites for this to occur, and given the predominance of galena (typically where the anodic oxidation reaction occurs) and lack of potential cathodic minerals (e.g. pyrite or chalcopyrite) there

will be little heating. This is the case with all the lead concentrates that have tested as low Stage A risk shown in Figure 3. They are all “clean” galena concentrates in terms of other sulphide minerals. The lead concentrates shown in Figure 3 that exhibit high Stage A and B SHC values are all “dirty” lead concentrates that contain ample galena as well as significant amounts of cathodic sulphide minerals.

These results and comments relate to the sample supplied only, and (as noted) may vary if the mineralogical composition or other physical characteristics of the material changes. Since it is believed there is a strong electrochemical component to initiating (Stage A) self-heating behaviour, the relative quantities and types of the sulphides and other minerals present will significantly impact on the measured SHC values. The Client is advised to ensure himself that the sample tested here will be representative of the materials being, or to be, produced. The Client is also advised to read the reference article by Rosenblum, Nesset and Spira (2001) in order to more fully understand the risks and mitigation methods in general. In addition to the mineralogical basis, it needs to be emphasized that actual self-heating will depend on the history of weathering (oxidation), storage conditions, ambient temperature and relative humidity, in-transit time, and moisture content of the material as well as the specific surface area (m^2/g). Conditions of higher temperature (>30 ^oC) and high humidity (>70% RH), coupled with prolonged transport or storage times, are often the contributing factors that lead to problems due to self-heating.

CONCLUSIONS

The testing of the Browns Ore Pb concentrate sample, and analysis of resulting data, yields the following conclusions:

1. The sample exhibited a low risk for self-heating, particularly in Stage A, placing it within Risk Region 3 (*Do Not Expose to a High Heat Source*).
2. The Stage A SHC value of 0 J/g is not surprising given the high proportion of galena (~80%) in the concentrate coupled with very low amounts of any other, cathodic, sulphide minerals.

Respectfully Submitted,

Jan E. Nesset, P.Eng (Ont) PhD

Director
Nessetech Consulting Services Inc.

APPENDIX – Self Heating Thermogram for the Browns Ore Project Pb Concentrate sample.