2012 Waste Rock Management Plan

March 2013

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1 WASTE ROCK MANAGEMENT ACTIVITIES

1.1 INTRODUCTION

Proposed waste rock management practices were outlined in the Project Proposal submitted to Yukon Environmental and Socio-Economic Assessment Board (YESAB) on February 6, 2008 in Section 2.5.1, the Waste Rock Management Plan (Appendix D) of the Project Proposal and in the Waste Rock Metals and Acid Base Accounting Testing Plan submitted to Yukon Water Board and Government of Yukon, Mining Land Use Department, under Sections 24 and 25 of Water License QZ07-078. These guidelines have been successfully put into practice in managing waste rock from the Bellekeno Mine. This plan augments those presented in the Project Proposal and Water Use License QZ07-078 by reviewing the effectiveness of the current plan.

This Waste Rock Testing Plan Summary will fulfill the following objectives:

- Review the method and effectiveness in which waste rock is sampled and classified using field screening criteria;
- Review all waste rock management data collected to date from the Bellekeno Mine operation;
- Review the sampling schedule for both ICP and ABA analyses based on a per tonnage basis

1.2 METHODS

1.2.1 Bellekeno Underground Development 2012

Underground development at Bellekeno continued throughout the entire year in 2012, focusing mainly in the Southwest Zone of the mine and notable development in the upper 99 Zone above the 600 Level. The majority of development consisted of production mining of the Bellekeno ore body. The waste rock development in 2012 focused on establishing accesses to both the 870 level and the 960 level as well as minor amounts of stope re-accesses. The SW Main Ramp was extended down to the 931 level. A ventilation raise was driven between the 930 level and the 810 level to improve air quality and volume to the lower portions of the mine. There were no temporary or permanent closures or stability issues that occurred in 2012. Figure 1 shows an isometric view looking down to the North East direction of all new development for 2012 in red.

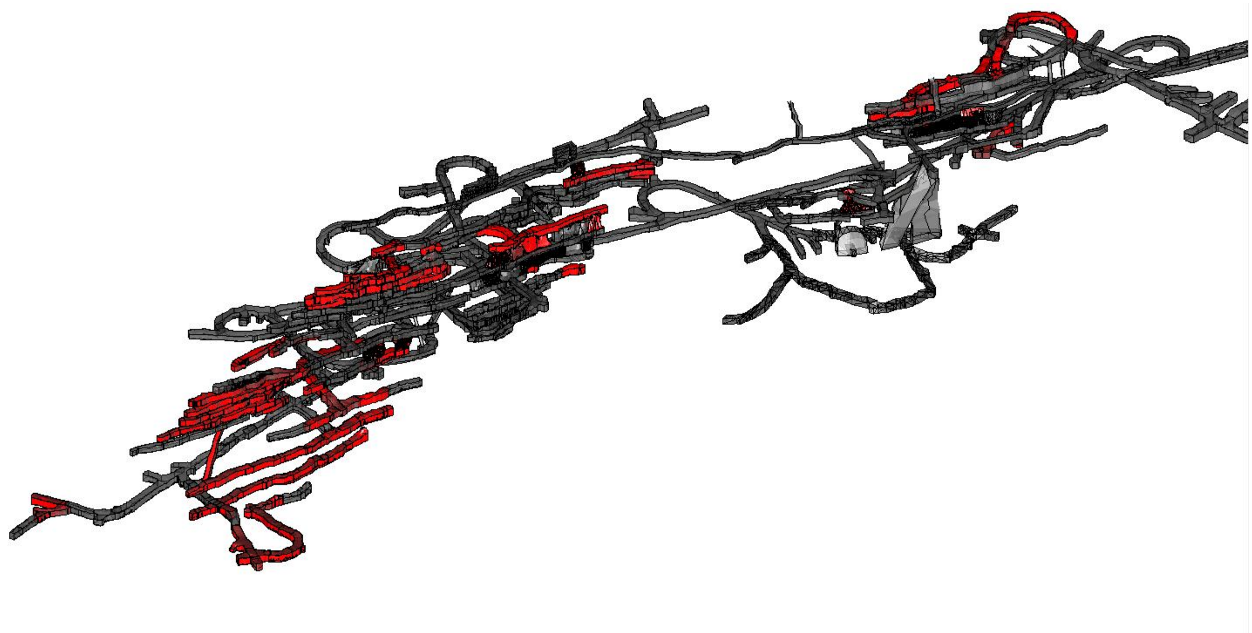


Figure 1 Isometric View showing new 2012 development in the Bellekeno Mine

Face sampling was conducted as outlined in Section 2.5.1 of the Project Proposal submitted to YESAB February 6, 2008. All face sampling was conducted by trained site geologists and sample preparation was done on site by a lab technician at the Keno District Mill assay laboratory. The laboratory is located at the Keno District Mill site. A total of 55 samples were analyzed using 44 element ICP-OES, with 19 of these samples having an additional suite of ABA analysis. A cover hole which was drilled at the bottom of the SW Main Ramp extending out towards future development was also drilled and sampled. This drillhole BKUD12-336 had 47 samples analyzed using ICP-OES and those samples were composited into 8 samples and sent out for additional ABA analysis.

1.3 RESULTS

The ARD/ML sampling program in 2012 was effective at recognizing material classified as P-AML rock. The field classification is based on essentially two independent variables, the CaCO3 vs. pyrite ratio as a proxy for acid base accounting and the quantity of various sulphides such as sphalerite and galena for metal leaching potential predictability. Geochemical results received from the 2012 sampling program have more consistent Pb and Zn levels to what was observed in the field compared to sampling in 2011. This is most likely due to improved procedures to limit contamination throughout the various procedural steps in the acquisition and preparation process.

1.3.1 $CaCO_3$ Prediction

Carbonate estimation at the field level has remained difficult in samples with low to moderate amounts of available carbonate for neutralization (<100kgCaCO3/tonne). Of the 27 samples run for ABA, there were 2 samples which showed zero reaction to the fizz test (fizz rating = 1) and zero samples which showed a vigorous reaction to HCl (fizz rating = 4). All other samples rated between 2 and 3. The variability of measured neutralizing potential between these samples is shown below in Figure 2. All samples with an NP>100 had a NP:MPA ratio >3 showing no potential for acid generation. There were 21 samples with a fizz rating of 2 and an average value of NP = 38.33. Of the 21 samples with a fizz rating of 2, 10 of these samples had an NP:MPA <3. There were 4 samples with a fizz rating of 3 and averaging a value of NP=107.25. All of these samples had an NP:MPA value <3.

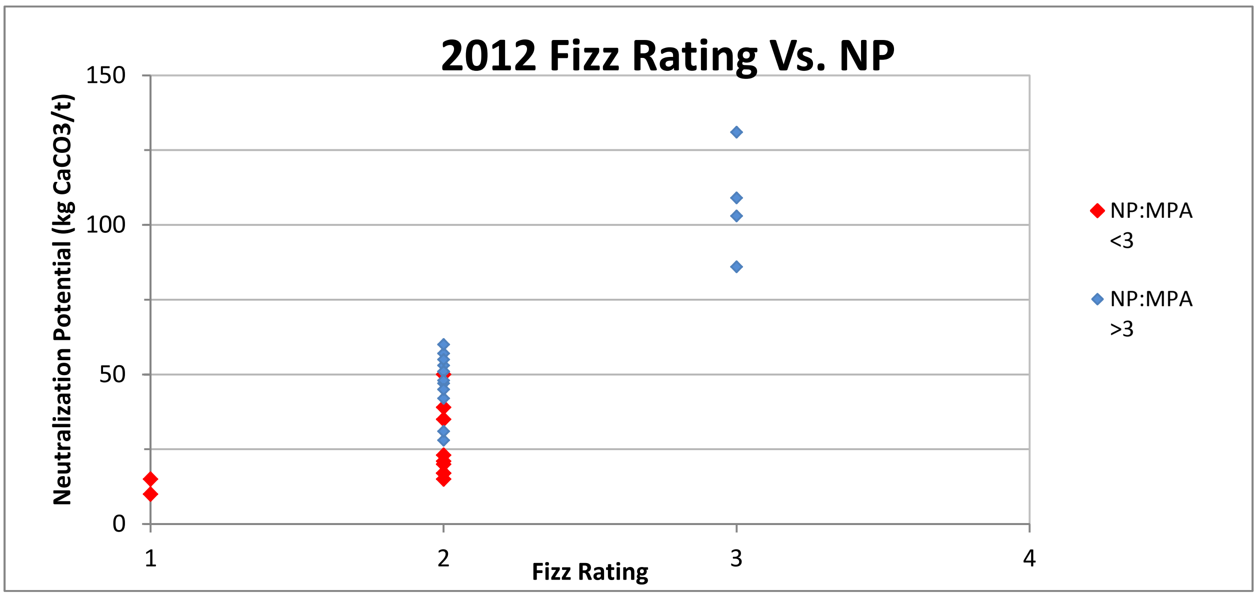


Figure 2 Distribution of Neutralization Potential in relation to Fizz Rating (2012)

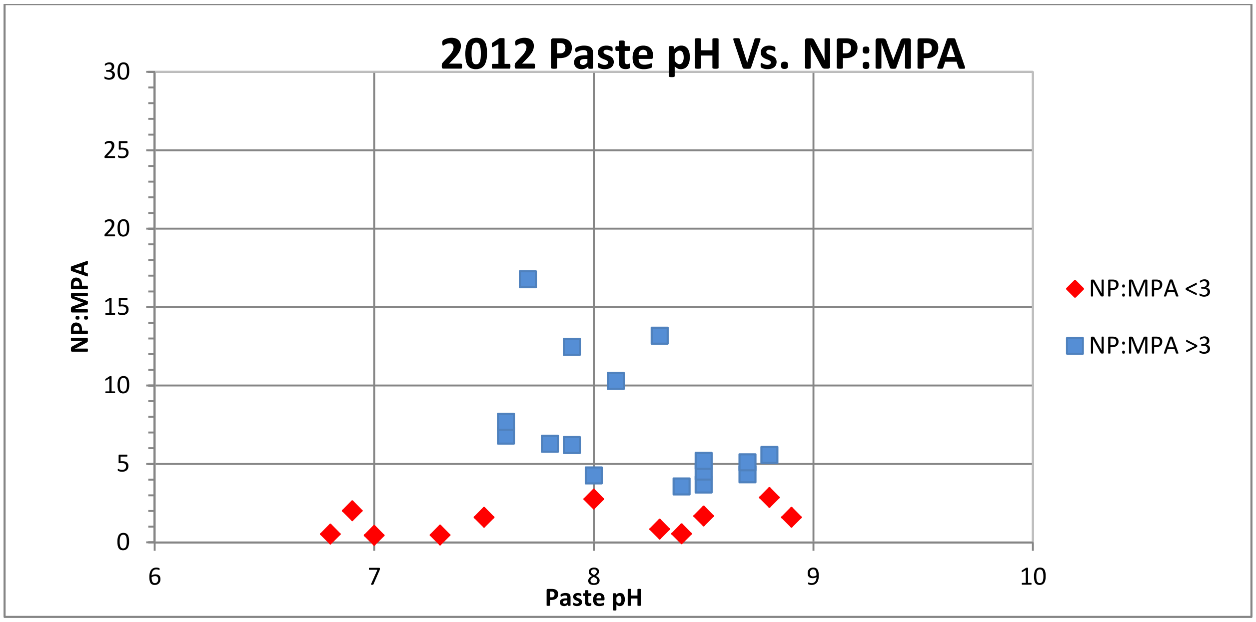


Figure 3 Distribution of Paste pH to NP:MPA ratio (2012)

The paste pH data from 2012 as shown in Figure 3 has no values < 6. The distribution of paste pH values in P-AML material is widespread between a pH of 6.8 to 8.9. All samples classified as Non-AML had a paste pH >7.5.

A compilation of all data collected to date shows that fizz rating criteria cannot be effectively used to determine whether a sample will have a high enough neutralization potential to effectively place a sample into the NP:MPA >3 category. Of 142 samples collected to date, only one sample has been assigned a fizz rating of 4 (Figure 4). This sample also had the highest recorded NP of all samples collected at 196 kgCaCO3/t. Based on a maximum S% of 1.5 which a sample can still be possibly considered as Non-AML, a sample would need a NP value >140 kgCaCO3/t to maintain a NP:MPA ratio of 3. This would put the sample in the uppermost 99th percentile of NP values recorded making this criteria alone inadequate to address NP on a day to day basis.

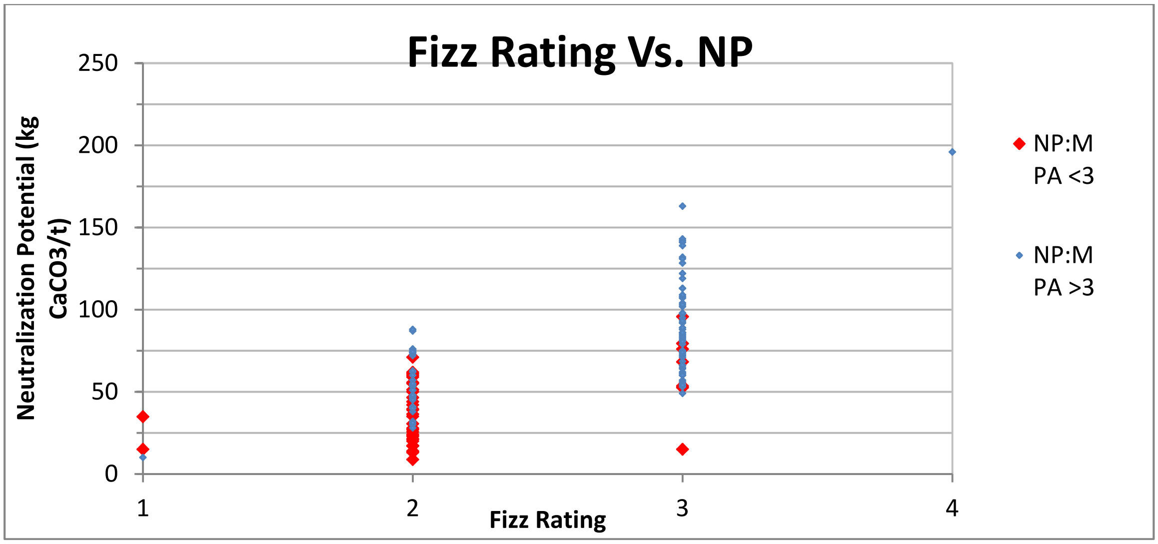


Figure 4 Fizz Rating Vs. NP (2008-2012)

A review of all data collected to date also shows that no paste pH value can be considered to be a lower threshold limit reflecting adequate neutralization potential based on the NP:MPA ratio as samples with a NP:MPA <3 are evenly distributed across the pH range of samples with a NP:MPA ratio >3 (Figure 5).

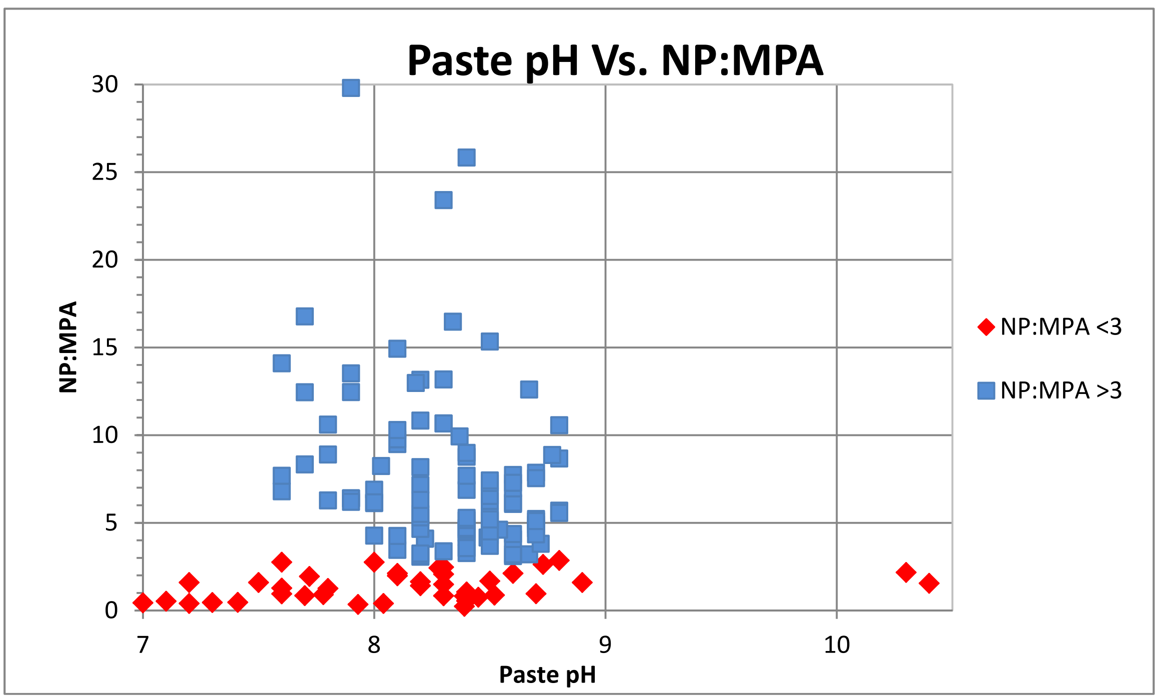


Figure 5 Paste pH Vs. NP:MPA (2008-2012)

1.3.2 Pyrite Prediction

The dominant form of sulphide encountered in the 2012 development was Pyrite, with the exception of development in the ore accesses which also contained significant amounts of Galena and Sphalerite due to the proximity of the mineralized 48 Vein. Lead and Zinc was a minor contributor of sulphides present for most samples taken, however there were a few significant exceptions to this. Sulphur values obtained from ICP analysis were plotted against a calculated value of Sulphur in the form of Pyrite (Figures 4). This calculation is based on Sulphur being present only in three forms; Pyrite, Galena, or Sphalerite. Using the Pb and Zn assays, the molar ratio of Sulphur for each of their respective minerals was subtracted from the total sulphur leaving the remaining Sulphur to represent the amount present in the form of Pyrite. Figure 6 shows that in the majority of samples Pb and Zn sulphides represent a minor portion of the total sulphides averaging 17% of the total sulphide component, but on an individual basis can comprise up to 49% of the total sulphide present.

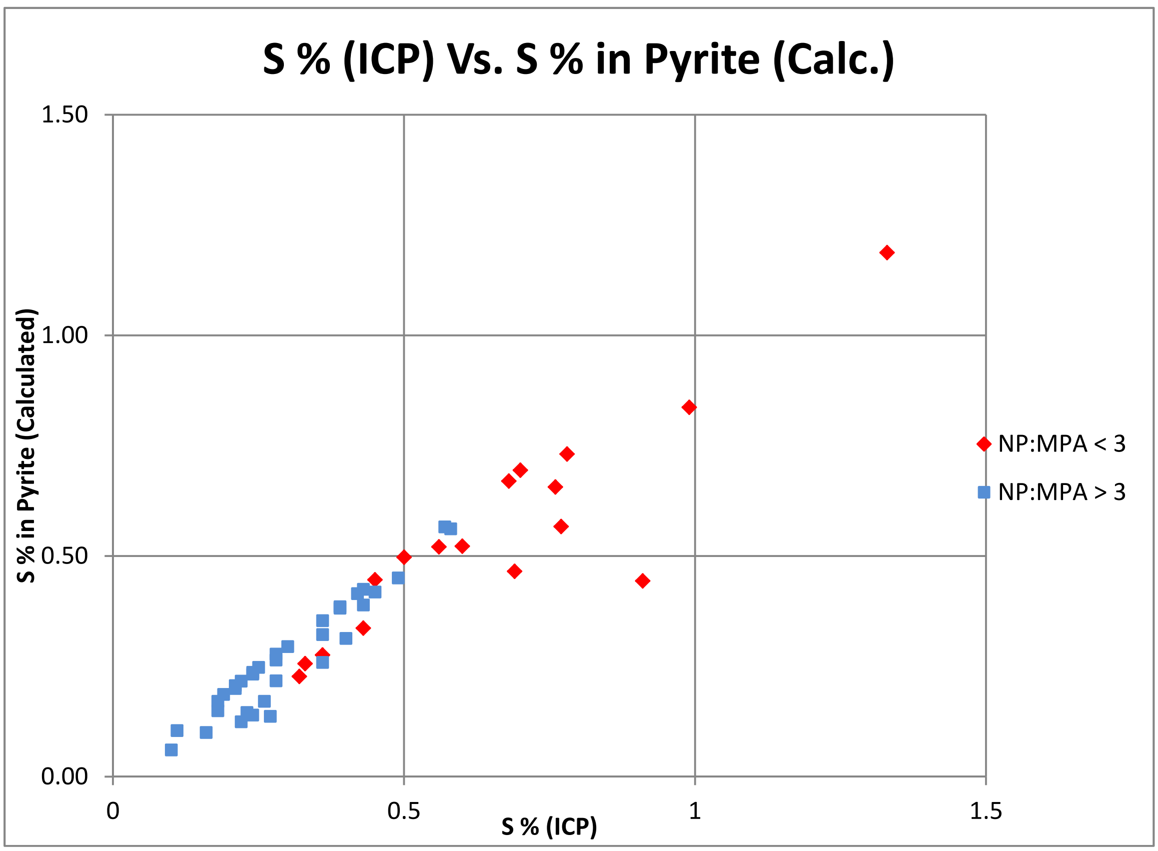


Figure 6 Correlation between S% (ICP) and ICP Geochemical Screening

ICP Geochemical screening for Pb and Zn showed two samples with potential for metal leaching (values >5000ppm). Both samples were identified in the field and designated as P-AML. Figure 7 shows both Pb and Zn values for all samples analyzed and which samples were field screened as P-AML. Identification of elevated Pb/Zn levels in 2012 was very effective.

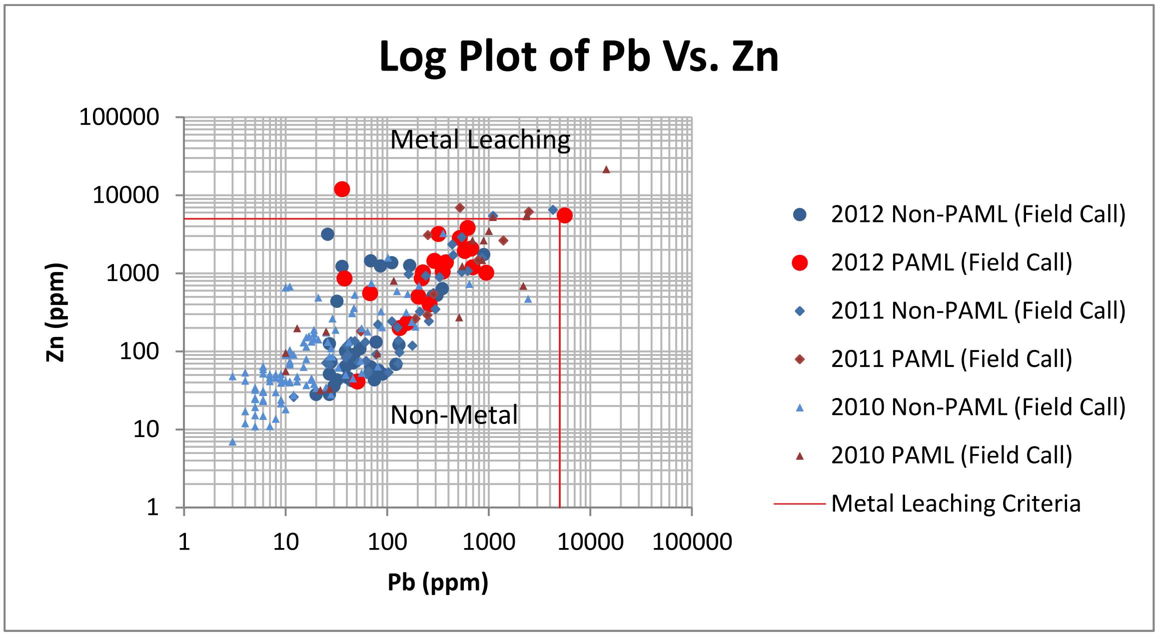


Figure 7 Log Plot of Pb Vs. Zn

A significant shift in Lead values occurred between 2011 and 2012. Both the mean and median values of samples decreased 24% and 49% respectively. Zinc values in samples collected in 2012 did not see a similar shift in mean and median values. The mean value of Zinc decreased slightly by 3% while Median values increased by 110%. Table 1 shows the number of samples within different grade bins, and the relative percentage of samples taken that year within each grade bin.

Table 1 Pb and Zn Distribution of Samples

2012 Pb ppm			2012 Zn ppm		
Bin(ppm)	*Frequency*	% of Samples	*Bin(ppm)*	*Frequency*	% of Samples
100	29	52.73%	100	18	32.73%
500	17	30.91%	500	8	14.55%
1000	8	14.55%	1000	8	14.55%
5000	0	0.00%	5000	19	34.55%
5000+	1	1.82%	5000+	2	3.64%
2011 Pb ppm			2011 Zn ppm		
Bin(ppm)	*Frequency*	% of Samples	*Bin(ppm)*	*Frequency*	% of Samples
100	16	34.78%	100	13	28.26%
500	20	43.48%	500	15	32.61%
1000	6	13.04%	1000	5	10.87%
5000	4	8.70%	5000	9	19.57%
5000+	0	0.00%	5000+	4	8.70%

The shift in the main modal distribution of both Lead and Zinc from the 100-500ppm bin to the 0-100ppm bin may suggest a decrease in contamination issues experienced in 2011. But the bimodal distribution of Zinc is still present and the increase in samples between 1000-5000ppm likely represents the increased proportion of development directly adjacent to the vein in the form of re-accesses.

1.3.3 Acid Base Accounting

Using the Modified ABA analysis with siderite correction, 27 different samples were analyzed. Of the 27 samples submitted, 19 samples were composite samples while the remaining 8 were from a cover drill hole. Seven of the composite samples had NP:MPA ratios below 3, five of which were field screened.

Figure 6 shows a log plot of all of the ABA data to date from the Bellekeno mine. The data shows the four quadrants of potentially acid generating material. All NP:MPA values between 0 and 1 represent material with a net acid producing potential, with the exception of Sulphur values <0.25% which are assumed to be too low to sustain acidic pH values over time. The lower left quadrant contains samples with Sulphur values of between 0.25% and 1.5%. The lower right quadrant contains samples with Sulphur values >1.5%. All samples taken to date indicate that Sulphur values >1.5% have a net acid producing potential with the exception of one sample from 2011. The upper two quadrants contain samples with an NP:MPA ratio between 1 and 3, and represent samples with a net neutralizing potential where the effective neutralization potential may not be adequate to sustain a drainage pH of 6.0 or higher over time. The upper left quadrant represents samples with a Sulphur level between 0.25% and 1.5%. There are 2 samples represented by the sample population with S>1.5% and a NP:MPA ratio >1. All samples that fall outside of these four quadrants represent NP:MPA values >3 and are unlikely to produce net acidity over time.

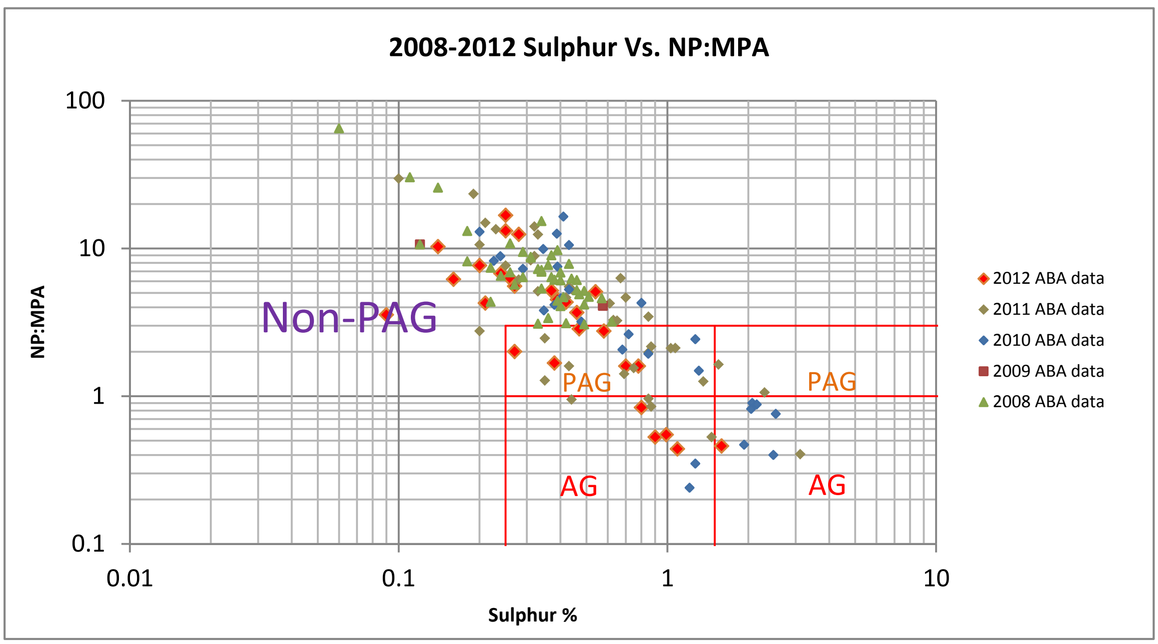


Figure 8 Log Plot of Sulphur% Vs. NP:MPA for all ABA data collected to date

Data collected from 2012 fit the distribution and range of data collected previously. The highest recorded S% with corresponding NP:MPA data was 1.59%. This sample was collected from a cover drill hole (BKUD12-336).

Sulphur% (ICP) shows a very good correlation to Sulphur% (Leco) with a correlation coefficient on 0.978 (Figure 7, Table 2). Given the close correlation between the two methods of measuring Sulphur, especially at levels less than 1% (typical of waste rock), using S% (ICP) as a proxy for Leco Sulphide would be a reasonable estimate of the Sulphur in a waste rock sample given that it is not visibly oxidized.

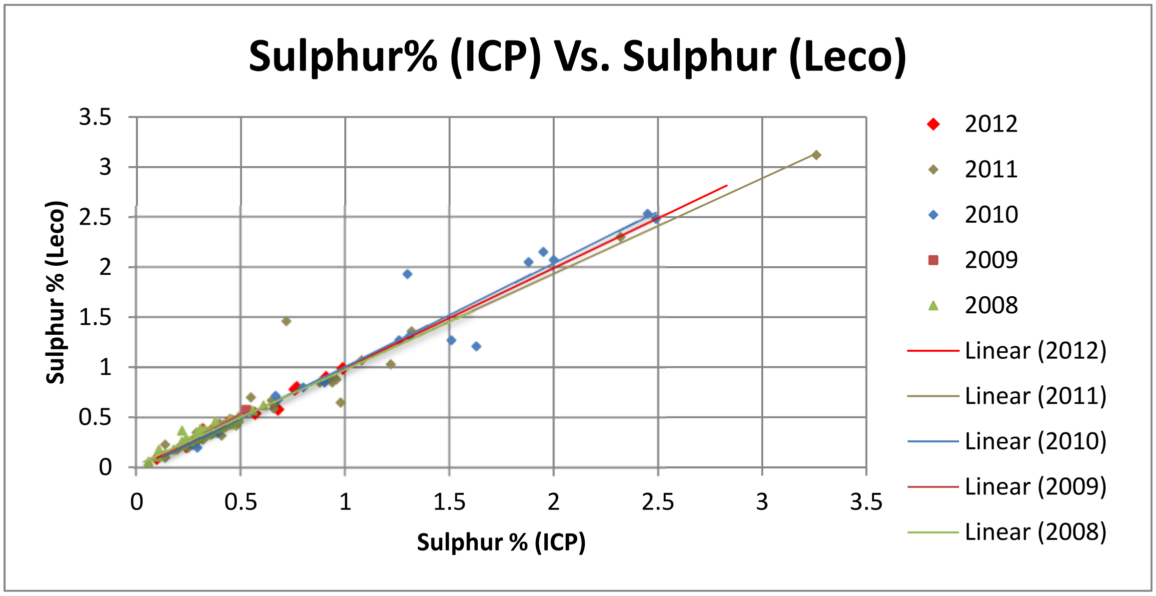


Figure 9 Sulphur% (ICP) Vs. Sulphur% (Leco)

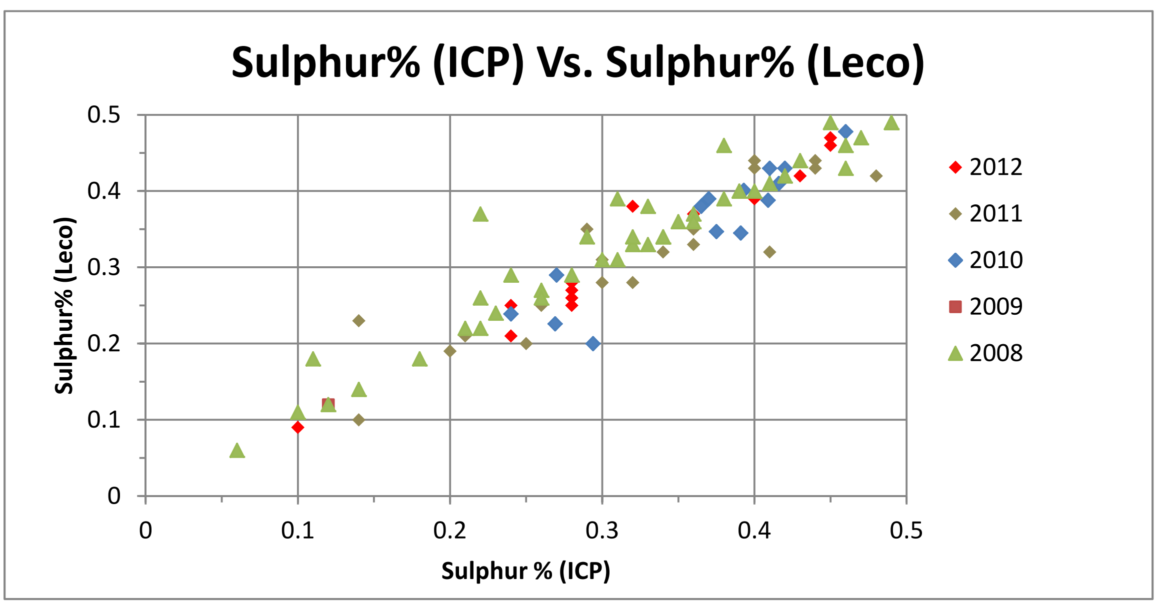


Figure 10 Low Level Sulphur Correlation

Table 2 S% (ICP) – S% Sulphide (Leco) Correlation

S% (ICP - S% (LECO)		
YEAR	Correlation Coefficient	# of Samples
2008	0.970	45
2009	1.000	2
2010	0.975	29
2011	0.970	38
2012	0.992	19
Total	*0.978*	*133*

Correlation between Calcium (ICP) and the Neutralization Potential show a consistent trend year to year. The correlation coefficient between Ca% (ICP) and NP for all data between 2008 and 2012 was 0.916. See Table 3 for the individual breakdown of each year. There appears to be a minimum NP value for any given amount of Calcium present which could be used to predict a conservative statistical NP value based off of Ca% (ICP) in the future where ABA analysis is not available or cost prohibitive. This may prove useful in conjunction with S% (ICP) in re-interpreting existing drill core data. From the data collected to date this formula would be as follows. However, use of this formula should be limited to sedimentary units within Bellekeno as the Greenstone units contain non-carbonate Calcium minerals which would predict an artificially high NP value. 15 of the 128 samples collected fall below the proposed NPCalc. representing an over estimation for 11% of samples based on measured NP.

Equation 1 Neutralization Potential from Ca% (ICP)

$$NP_{Calc.}=-1.375(Ca\%^{2})+28.38(Ca\%)$$

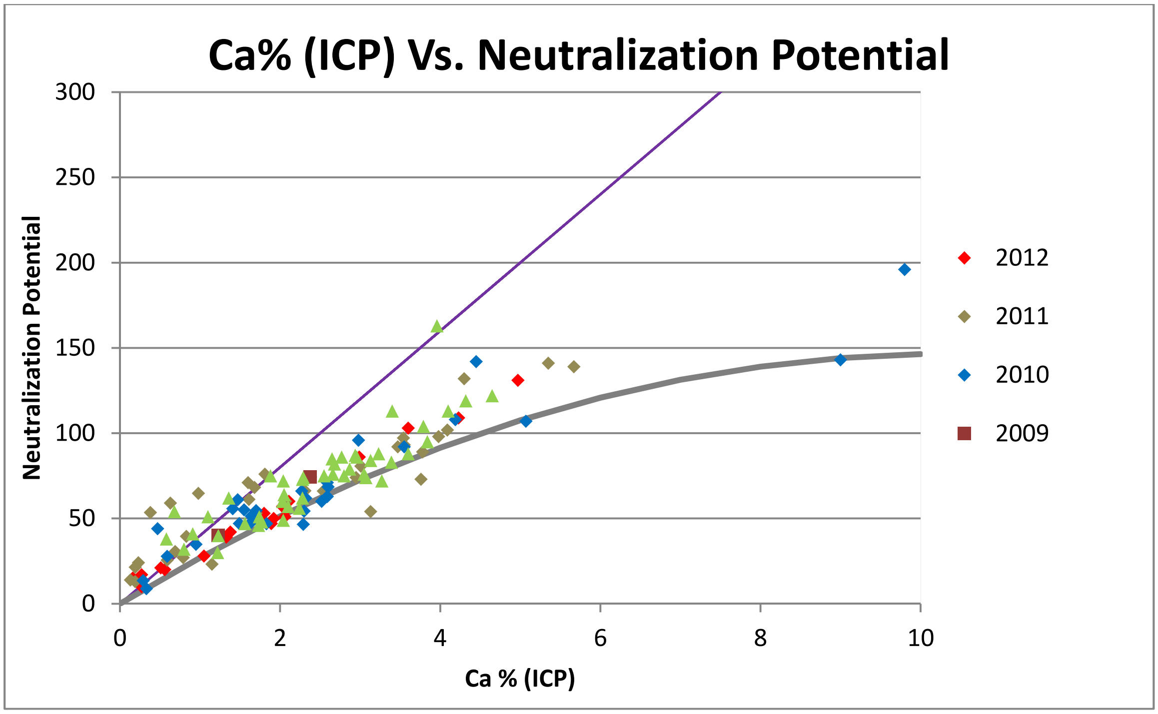


Figure 11 Ca% Vs. Neutralization Potential

Table 3 Ca% (ICP) - Neutralization Potential Correlation

Ca% - NP Correlation		
YEAR	Correlation Coefficient	# of Samples
2008	0.882	45
2009	1.000	2
2010	0.938	29
2011	0.917	33
2012	0.916	19
Total	*0.916*	*128*

1.3.4 Tonnages

Development in the Bellekeno Mine generated an estimated 25455 tonnes of excavated material, of which 22,185 tonnes has been sampled, classified, and verified by lab analysis in 2012. Table 4 shows a breakdown of the 25455 tonnes of material and its classification. The total Non-AML waste generated in all of 2012 which has been verified by lab analysis was an estimated 17343 tonnes, while the total verified P-AML waste generated in all of 2012 was an estimated 4842 tonnes.

Table 4 2012 Tonnage Summary

2012 Tonnage Summary		
Rock Classification	Tonnes	Percent
Non-AML Waste Rock (Field screened and un-verified)	3270	12.85%
Non-AML Waste Rock (Field screened and verified)	15432	60.62%
Non-AML Waste Rock (Mis-classified as P-AML)	1911	7.51%
Potentially-AML Waste Rock (Field screened and verified)	2420	9.51%
Potentially-AML Waste Rock (Mis-classified as Non-AML)	2422	9.51%
Total Verified Non-AML Waste Rock	***17343***	*68.13%*
Total Verified Potentially-AML Waste Rock	***4842***	*19.02%*
Total Excavated Rock	**25455**	100.00%

An estimated 2422 tonnes of material was misclassified in the field screening process as Non-AML but lab results from composite sampling determined this material to be P-AML. Based on haulage records, none of the mis-classified P-AML material appears to have dumped on surface and all of it was placed underground as backfill. (Table 5).

Table 5 2011 Waste Rock Storage Locations

2012 Category	Tonnes	Storage Location	Tonnes
Non-AML Waste Rock (excavated)	***20613***	Surface	5158
		BK PAG PAD	0
		U/G Storage	0
		U/G Backfill	15455
P-AML Waste Rock (excavated)	***4842***	Surface	0
		BK PAG PAD	0
		U/G Storage	0
		U/G Backfill	4842
Total	**25455**	**Total**	**25455**

This misclassified material is represented by 5 sample composites, 2 of which had ABA analysis and 3 with only ICP analysis. Prediction of the NP value for the two was calculated using the NP calculation shown (Equation 1), while prediction of an AP value was calculated by multiplying the ICP Sulphur assay by 31.25 (Table 4). The weighted average of the material misclassified has an estimated net neutralizing potential of 21.65 kgCaCO3/Tonne and an NP:MPA ratio of 2.35 (Table 6). This low potential for acid/metal leaching combined with the relatively low levels of sulphur (<1%) make this material very unlikely to ever become AML.

Table 6 Misclassified Rock Characteristics

Misclassified Waste Rock											
Sample	Tonnes	Classification (Geochemical)	AP	NNP	NP	NP:MPA	S % (total)	Ca % (ICP)	S % (ICP)	Pb % (ICP)	Zn % (ICP)
E815003	150	P-AML	17.5	15.3	32.8	1.87		0.71	0.56	69	552
E815007	358	P-AML	24.4	2.2	26.6	1.09		0.44	0.78	350	633
E815019	290	P-AML	13.4	7.4	20.8	1.55		0.19	0.43	684	1205
E815037	677	P-AML	18.1	32	50	2.76	0.58	1.92	0.68	131	121
E815045	947	P-AML	14.7	27	42	2.86	0.47	1.38	0.45	75	43
TOTAL	**2422**	**Weighted Average**	**17.10**	**21.65**	**38.84**	**2.35**	**0.35**	**1.21**	**0.57**	**203.85**	**322.67**

Values calculated using ICP data

The material misclassified was spatially located throughout the mine. There was 967 tonnes of this mis-classified material from the Southwest Main Ramp represented by 2 samples, E815019 and E815037. These two samples were also covered by a diamond drill cover hole which had addition ABA/ICP analysis done. The cover hole results confirm that 290 tonnes of this material was P-AML material however 677 of this mis-classified material was actually correctly classified. Sample E815045 was from the 960 ACC which met all geochemical criteria but ABA analysis on this sample came back below the NP:MPA >3.

1.4 DISCUSSION

The Bellekeno Mine Waste Rock Management Plan has been successfully implemented throughout 2012. With the addition of data collected from 2008-2011, a substantial amount of geochemical data has been compiled. This will help guide site geologists in determining the characteristics of rock to be excavated in the future and also in predicting amounts of P-AML material to be encountered in planned development. The data set from 2012 shows a shift in the modal distribution of Pb and Zn back to what would be expected for samples representing material from both development through sedimentary rocks with very low Pb/Zn levels outside of the area of influence around the vein and also access development directly adjacent to the vein. Improvements in the sample handling and preparation procedures are attributed to the reduction in contamination. Figure 5 and Table 1 show the shift in samples from <500ppm Pb and Zn in 2011 to <100ppm in 2012, as well as an increasing shift in values between 1000-5000ppm for both Pb and Zn.

While some sources of minor contamination are difficult to avoid, others have been addressed and mitigated. Sample preparation has improved with more thorough cleanings and batch preparing waste rock samples to avoid contamination from high grade production samples. Another source of contamination which was identified and addressed was cross contamination which was occurring in the drying oven. Changing sample bags from polyethylene to cloth also reduced the air born contamination as the previously used polyethylene bags had to be open to allow the sample to dry and the opening and closing of the drying oven door stirred up dust from concentrate samples which were also drying in the oven.

Waste rock disposal on surface has been decreasing year over year as demand for backfill increases and capital development decreases. In 2012 only 20% of all rock excavated was disposed of on surface. This is 1599 tonnes less than in 2011.None of the material classified as P-AML in both field screening and also geochemical results was deposited on surface. In following years the deficit of backfill will increase and it is likely that all material excavated will be used as backfill in conjunction with an increased amount of tailings.

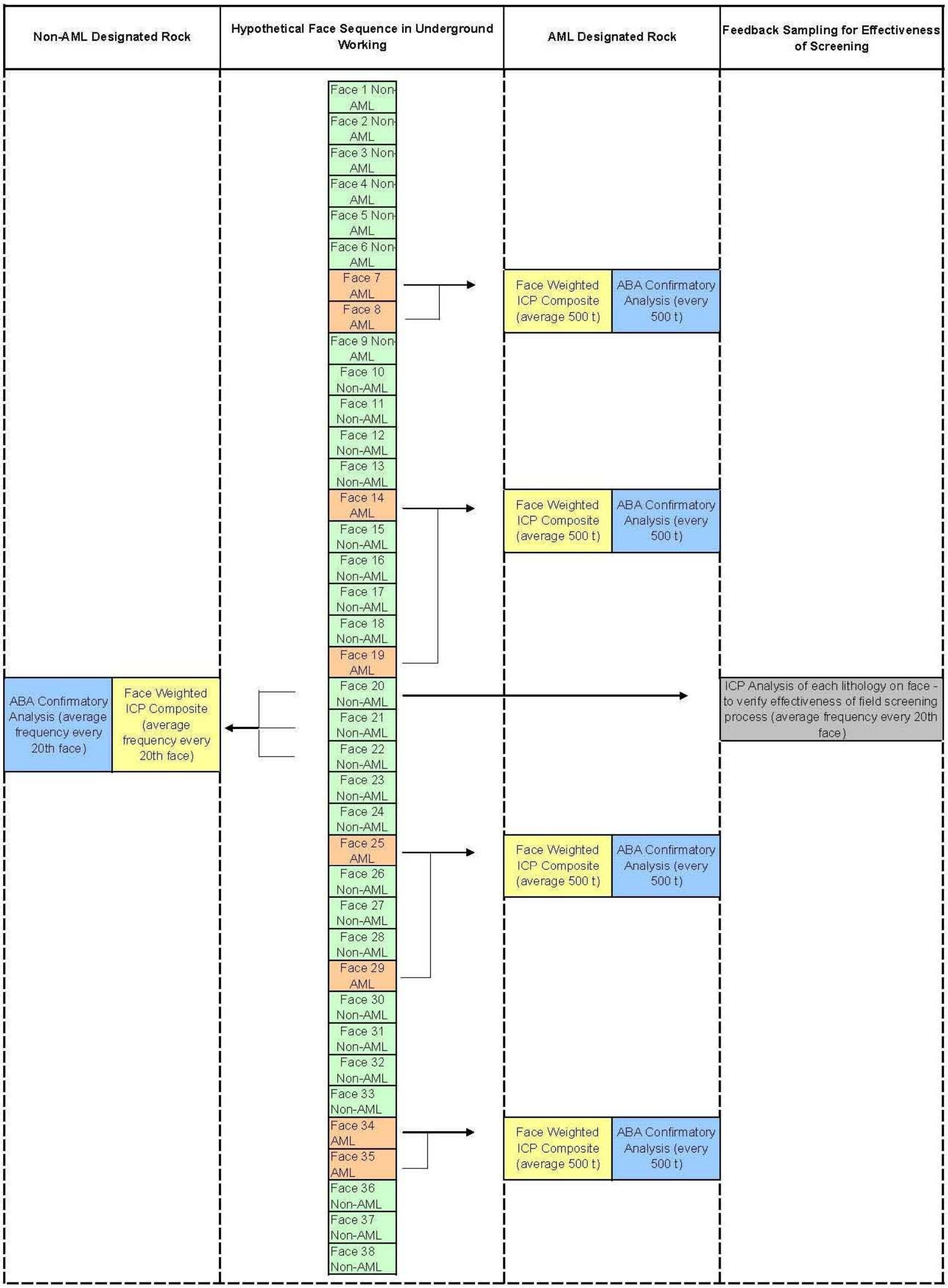
1.5 RECOMMENDATIONS

With the compilation of 5 years of underground geochemical data and underground exposure throughout all of the varying lithologies known in the Bellekeno mine, a 3D block model estimating the NP:MPA and Pb/Zn should be constructed and used to better refine zones of P-AML before encountering it in development.

The Waste Rock Management Plan within the Water License QZ07-078 does not address the level of characterization needed for waste rock which is to be used as underground backfill. As P-AML material is preferentially used as backfill material to limit the potential liability of surface storage, the Waste Rock Management Plan should be modified to include underground backfill as a storage location for both Non-AML rock and P-AML rock and whether or not material being used as backfill needs to be classified as it will be handled the same regardless of its classification.

The sample density and schedule should be revised to focus on sampling only material hauled to surface. It is recommended that the Bellekeno Waste Rock Sampling Schedule be reviewed and a new sampling plan focusing on areas which the possibility of encountering P-AML material is moderate to high.

Table 7 Current Bellekeno Waste Rock Hypothetical Sampling Schedule



APPENDIX A

2012 COMPOSITE SAMPLE ASSAYS

SAMPLE	Cert. #	Tonnes	Classification	Classification	Fizz	AP	NNP	NP	Paste pH	NP:MPA	S (total)	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th	Ti	Tl	U	V	W	Zn
NUMBER			Field	Geochem	Rating	kgCaCO3/t	kg CaCO3/t	kgCaCO3/t	pH	%	%	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
E815001	WH12154949	738	N-AML	N-AML	2.00	12.20	43	55.00	8.5	4.51	0.39	0.7	1.36	76	230	<0.5	2	2.08	5.8	5	263	9	1.63	<10	0.28	10	0.24	710	5	0.04	18	480	86	0.4	23	3	96	<20	0.09	<10	<10	31	<10	1240
E815002	WH12154949	260	N-AML	N-AML								4.2	0.85	24	200	<0.5	3	3.38	6.2	2	256	11	1.17	<10	0.29	10	0.37	1095	5	0.02	13	390	283	0.49	<5	2	56	<20	0.05	<10	<10	21	<10	511
E815003	WH12154949	150	N-AML	PAML								1.3	1.17	22	230	<0.5	4	0.71	6	2	335	17	0.89	<10	0.27	10	0.07	434	8	0.06	16	250	69	0.56	<5	2	59	<20	0.1	10	<10	29	<10	552
E815005	WH12154949	396	PAML	PAML	2.00	30.90	-14	17.00	8.4	0.55	0.99	5.2	1.69	1030	150	<0.5	2	0.27	25.6	5	421	38	4.48	<10	0.46	20	0.23	10600	8	0.05	18	400	672	0.99	8	3	21	<20	0.08	<10	<10	32	<10	2070
E815006	WH12154949	448	N-AML	N-AML								0.7	0.61	5	100	<0.5	<2	1.71	0.5	2	338	6	0.53	<10	0.11	10	0.06	130	8	0.02	8	200	47	0.24	<5	1	35	<20	0.05	<10	<10	12	<10	91
E815007	WH12154949	358	N-AML	PAML								2.2	2.14	28	280	0.7	2	0.44	7.3	3	368	12	2.67	<10	0.77	20	0.2	4810	7	0.04	19	780	350	0.78	<5	4	27	<20	0.1	<10	<10	59	<10	633
E815008	WH12154949	130	PAML	N-AML	1.00	2.80	7	10.00	8.4	3.56	0.09	0.8	0.26	7	10	<0.5	2	0.27	6.4	1	351	5	0.78	<10	0.1	10	0.03	1480	8	<0.01	7	140	68	0.1	<5	<1	4	<20	0.04	<10	<10	5	<10	557
E815010	WH12154949	879	N-AML	N-AML	2.00	13.10	44	57.00	8.7	4.34	0.42	0.8	1.43	8	270	<0.5	<2	2.03	0.6	3	256	14	1.11	<10	0.35	10	0.27	195	5	0.04	13	320	69	0.43	<5	3	68	<20	0.09	<10	<10	30	<10	63
E815011	WH12154949	955	N-AML	N-AML								0.8	0.94	5	180	<0.5	4	2.24	0.5	2	270	8	0.96	<10	0.23	10	0.26	147	4	0.03	12	390	90	0.39	<5	2	75	<20	0.07	<10	<10	20	<10	51
E815012	WH12154949	886	N-AML	N-AML								0.6	1.04	<5	190	<0.5	3	2.38	0.6	2	249	7	0.97	<10	0.24	10	0.27	170	5	0.03	12	370	82	0.42	<5	2	75	<20	0.07	<10	<10	22	<10	57
E815013	WH12154949	400	PAML	N-AML								0.8	1.45	6	270	<0.5	<2	1.7	1.9	4	290	10	1.28	<10	0.5	10	0.2	1490	5	0.04	14	470	157	0.58	<5	3	65	<20	0.1	<10	<10	30	<10	231
E815014	WH12154949	255	N-AML	N-AML	3.00	16.90	69	86.00	8.7	5.10	0.54	<0.5	1.85	8	360	0.5	<2	2.99	<0.5	3	258	10	1.19	<10	0.49	10	0.28	178	5	0.06	15	370	27	0.57	<5	4	131	<20	0.12	<10	<10	39	<10	51
E815018	WH12154949	280	N-AML	N-AML								3.1	0.32	<5	70	<0.5	<2	3.56	16.5	1	260	7	1.36	<10	0.11	<10	0.1	4180	6	0.01	7	270	895	0.27	<5	1	49	<20	0.03	<10	<10	8	<10	1735
E815019	WH12154949	290	N-AML	PAML								3.5	0.82	19	150	<0.5	<2	0.19	13.3	2	272	13	2.1	<10	0.3	10	0.1	5330	6	0.02	11	360	684	0.43	<5	2	17	<20	0.07	<10	<10	20	<10	1205
E815020	WH12154949	315	PAML	PAML	1.00	28.10	-13	15.00	6.8	0.53	0.90	29.3	0.75	103	90	<0.5	3	0.16	59.5	2	367	42	2.68	<10	0.28	10	0.09	5110	9	0.01	12	310	5610	0.91	29	2	10	<20	0.06	<10	<10	20	<10	5510
E815021	WH12154949	349	PAML	PAML	2.00	25.00	-4	21.00	8.3	0.84	0.80	4.1	0.99	3040	160	<0.5	2	0.51	34.9	6	288	22	2.52	<10	0.33	10	0.16	3870	5	0.02	13	340	520	0.77	9	2	20	<20	0.08	<10	<10	23	<10	2830
E814040	WH12154949	103	PAML	PAML								3.1	0.56	160	40	<0.5	2	0.12	39.4	1	367	37	3.31	<10	0.21	10	0.08	7140	9	0.01	9	300	319	0.69	<5	1	5	<20	0.05	<10	<10	15	<10	3190
E815022	WH12213631		PAML	PAML	2.00	8.40	9	17.00	6.9	2.01	0.27																																	
E815023	WH12213631		PAML	PAML	2.00	34.10	-19	15.00	7.0	0.44	1.09																																	
E815024	WH12213631		PAML	PAML	2.00	49.70	-27	23.00	7.3	0.46	1.59																																	
E815025	WH12213631		PAML	PAML	2.00	21.90	13	35.00	7.5	1.60	0.70																																	
E815026	WH12213631		PAML	N-AML	2.00	4.40	41	45.00	8.1	10.29	0.14																																	
E815027	WH12213631		N-AML	N-AML	2.00	6.30	42	48.00	7.6	7.68	0.20																																	
E815028	WH12213631		N-AML	N-AML	2.00	7.50	44	51.00	7.6	6.80	0.24																																	
E815029	WH12213631		N-AML	N-AML	2.00	5.00	26	31.00	7.9	6.20	0.16																																	
E815030	WH12213631	877	N-AML	N-AML								0.9	1.87	70	300	0.5	<2	2.19	5.3	6	230	8	1.48	<10	0.4	10	0.23	857	3	0.05	18	440	111	0.22	17	3	97	<20	0.12	<10	<10	39	<10	1365
E815031	WH12213631	735	N-AML	N-AML								<0.5	0.75	55	100	<0.5	<2	1.68	4.7	5	278	6	1.04	<10	0.15	10	0.17	866	5	0.03	14	260	36	0.23	7	2	66	<20	0.07	<10	<10	16	<10	1220
E815032	WH12213631	704	N-AML	N-AML	2.00	6.60	21	28.00	8.0	4.27	0.21	0.9	1.06	98	140	<0.5	<2	1.05	5.8	6	311	23	1.25	<10	0.22	10	0.16	932	7	0.03	18	300	69	0.24	11	2	47	<20	0.08	<10	<10	21	<10	1440
E815033	WH12213631	409	PAML	PAML	3.00	7.80	123	131.00	7.7	16.77	0.25	<0.5	1.53	349	200	<0.5	<2	4.97	33.9	28	271	10	3.34	<10	0.34	10	0.34	8590	5	0.04	69	690	36	0.28	19	3	147	<20	0.08	<10	<10	31	<10	####
E815034	WH12213631	837	N-AML	N-AML								0.6	0.52	9	110	<0.5	<2	3.26	1.2	2	261	5	0.74	<10	0.12	10	0.16	187	6	0.01	8	430	54	0.39	<5	1	62	<20	0.06	<10	<10	14	<10	108
E815035	WH12213631	338	PAML	N-AML	2.00	8.10	43	51.00	7.8	6.28	0.26	1.3	0.57	10	90	<0.5	<2	2.06	9.7	1	257	7	0.98	<10	0.17	10	0.18	991	3	0.01	9	410	219	0.28	<5	1	43	<20	0.05	<10	<10	14	<10	862
E815036	WH12213631	512	PAML	N-AML	3.00	8.80	100	109.00	7.9	12.46	0.28	0.8	0.78	14	110	<0.5	2	4.23	2.4	1	223	5	0.88	<10	0.17	10	0.23	471	2	0.02	8	500	133	0.28	<5	2	101	<20	0.06	<10	<10	16	<10	199
E815037	WH12213631	677	N-AML	PAML	2.00	18.10	32	50.00	8.0	2.76	0.58	1.5	1.93	15	330	0.6	<2	1.92	1.2	4	352	12	1.39	<10	0.47	10	0.35	284	8	0.06	17	540	131	0.68	<5	3	92	<20	0.14	<10	<10	39	<10	121
E815038	WH13002751	504	N-AML	N-AML								1.4	1.04	8	200	<0.5	<2	1.46	5.4	2	250	8	1.16	<10	0.38	10	0.2	2030	6	0.03	11	400	310	0.43	<5	2	45	<20	0.08	<10	<10	23	<10	522
E815039	WH13002751	944	N-AML	N-AML								<0.5	0.55	<5	90	<0.5	<2	2.38	0.5	1	292	5	0.55	<10	0.13	10	0.1	97	8	0.02	9	190	32	0.24	<5	1	42	<20	0.06	<10	<10	12	<10	43
E815040	WH13002751	789	N-AML	N-AML	2	8.4	39	47	8.8	5.57	0.27	<0.5	0.6	5	100	<0.5	<2	1.89	<0.5	1	266	5	0.57	<10	0.1	10	0.09	69	7	0.03	8	210	20	0.28	<5	1	38	<20	0.06	<10	<10	14	<10	28
E815041	WH13002751	876	N-AML	N-AML								<0.5	0.35	5	100	<0.5	<2	1.1	0.6	1	288	4	0.43	<10	0.08	<10	0.05	188	9	0.02	7	180	45	0.19	<5	1	19	<20	0.04	<10	<10	9	<10	42
E815042	WH13002751	475	PAML	PAML	2	11.9	8	20	8.5	1.68	0.38	2	0.54	16	120	<0.5	<2	0.56	14	1	286	7	1.53	<10	0.21	10	0.08	4370	8	0.01	8	220	695	0.32	<5	1	9	<20	0.06	<10	<10	13	<10	1195
E815043	WH13002751	409	PAML	N-AML	2	11.6	48	60	8.5	5.19	0.37	1.8	0.59	18	90	<0.5	<2	2.11	16.5	1	287	10	1.12	<10	0.22	10	0.14	2260	8	0.02	10	280	378	0.36	<5	1	27	<20	0.06	<10	<10	16	<10	1380
E815044	WH13002751	890	N-AML	N-AML								<0.5	0.94	7	190	<0.5	<2	1.27	<0.5	2	240	7	1	<10	0.23	10	0.25	115	7	0.03	14	380	30	0.5	<5	2	49	<20	0.08	<10	<10	22	<10	36
E815045	WH13002751	947	N-AML	PAML	2	14.7	27	42	8.8	2.86	0.47	0.9	0.83	5	180	<0.5	<2	1.38	0.5	2	266	6	0.98	<10	0.2	10	0.25	122	6	0.02	11	370	75	0.45	<5	2	45	<20	0.07	<10	<10	21	<10	43
E815046	WH13002751	880	N-AML	N-AML								0.5	0.66	5	120	<0.5	<2	1.85	0.7	2	260	5	0.73	<10	0.17	10	0.15	243	7	0.02	9	330	39	0.3	<5	1	39	<20	0.06	<10	<10	17	<10	64
E815047	WH13002751	507	N-AML	N-AML								<0.5	0.61	8	100	<0.5	<2	1.97	1.1	1	241	4	0.7	<10	0.21	10	0.19	626	7	0.01	8	370	78	0.21	<5	1	31	<20	0.06	<10	<10	13	<10	131
E815048	WH13002751	373	PAML	PAML	2	24.4	15	39	8.9	1.6	0.78	2	2.95	77	530	0.7	<2	1.33	15.1	4	243	17	1.65	10	1.16	20	0.18	2610	7	0.05	20	440	292	0.76	<5	6	60	<20	0.17	<10	<10	60	<10	1440
E815049	WH13002751	369	N-AML	N-AML								1	0.51	<5	90	<0.5	<2	3.06	15.2	1	257	12	1.07	<10	0.14	10	0.19	2020	7	0.02	10	460	167	0.26	<5	1	52	<20	0.05	<10	<10	15	<10	1255
E815050	WH13002751	895	N-AML	N-AML								<0.5	0.57	8	130	<0.5	<2	1.53	0.7	2	239	4	0.59	<10	0.19	10	0.13	103	5	0.02	10	230	28	0.11	<5	1	43	<20	0.06	<10	<10	13	<10	73
E816051	WH13002751	924	N-AML	N-AML	3	7.8	95	103	8.3	13.18	0.25	<0.5	1.78	10	310	0.5	<2	3.6	0.6	2	204	8	1.27	<10	0.47	10	0.31	213	5	0.07	14	350	39	0.24	<5	3	160	<20	0.11	<10	<10	33	<10	100
E815322	WH13002751	122	PAML	N-AML	2	14.4	39	53	8.5	3.69	0.46	1.6	0.67	14	110	<0.5	<2	1.8	5	2	256	5	1.91	<10	0.24	10	0.15	4340	7	0.02	8	470	262	0.45	<5	2	39	<20	0.05	<10	<10	16	<10	400

APPENDIX B

2012 LITHOLOGY VERIFICATION SAMPLE ASSAYS

SAMPLE	Cert. #	Tonnes	Classification	Classification	Fizz	AP	NNP	NP	Paste pH	NP:MPA	S (total)	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	In	K	La	Li
NUMBER			Field	Geochem	Rating	kgCaCO3/t	kg CaCO3/t	kgCaCO3/t	pH	%	%	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm
E814737	WH12154949	126	N-AML	N-AML								<0.5	0.58	34	130	<0.5	3	4.93	2.2		10	234		3	0.6	<10		0.14	10	
E813988	WH12154949	123	N-AML	N-AML								<0.5	3.7	8	670	1.1	<2	2.07	<0.5		5	232		14	1.8	10		1.02	20	
E813739	WH12154949	61	PAML	PAML								5.2	3.4	4450	310	1	3	0.53	50		9	278		43	5.23	10		1.16	20	
E814015	WH12154949	61	PAML	PAML								7.4	0.55	>10000	50	<0.5	9	0.26	24.9		16	312		30	3.7	<10		0.14	10	
E814466	WH13002751	70	PAML	N-AML								1.6	0.52	9	130	<0.5	<2	0.79	5.5		2	305		6	1	<10		0.16	10	
E814912	WH13002751	85	PAML	N-AML								<0.5	0.54	7	80	<0.5	<2	2.47	<0.5		1	248		4	0.7	<10		0.11	10	
E814916	WH13002751	117	N-AML	N-AML								2.1	0.71	6	110	<0.5	<2	1.73	0.7		1	322		7	0.85	<10		0.15	10	
E814923	WH13002751	65	N-AML	N-AML								<0.5	1.06	84	170	<0.5	<2	0.38	11.5		9	213		9	1.08	<10		0.28	10	
E814964	WH13002751	104	PAML	N-AML								<0.5	0.97	62	100	<0.5	<2	5	4.3		3	314		7	2.15	<10		0.3	10	
E815660	WH13002751	135	N-AML	N-AML								<0.5	0.48	5	90	<0.5	<2	2.15	<0.5		1	254		7	0.47	<10		0.09	10	
E815678	WH13002751	129	N-AML	N-AML								<0.5	2.02	9	360	0.5	<2	5.27	0.5		3	203		7	1.39	10		0.49	10	
E815689	WH13002751	86	N-AML	N-AML								0.5	0.29	6	10	<0.5	<2	0.45	0.6		2	320		6	0.76	<10		0.02	10	
E815775	WH13002751	84	PAML	N-AML								2.9	0.89	532	100	<0.5	<2	1.15	11.8		2	273		23	2.19	<10		0.35	10	
E815792	WH13002751	162	PAML	PAML								2.6	0.78	12	190	<0.5	<2	0.22	11.7		1	298		7	0.57	<10		0.3	10	
E815798	WH13002751	136	PAML	PAML								1.3	0.28	28	40	<0.5	<2	0.16	12.5		1	376		9	1.09	<10		0.12	<10	

SAMPLE	Mg	Mn	Mo	Na	Ni	P	Pb	Rb	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr
NUMBER	%	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
E814737	0.09	350	2	0.03	9	220	32		0.18	7	1			114			<20	0.05	<10	<10	14	100		437	
E813988	0.56	409	4	0.1	23	400	46		0.7	<5	7			101			<20	0.2	10	<10	72	<10		71	
E813739	0.36	10650	5	0.08	29	440	620		1.83	12	7			79			<20	0.15	<10	<10	70	<10		3820	
E814015	0.11	3340	2	<0.01	11	340	580		1.33	31	1			6			<20	0.05	<10	<10	15	<10		1935	
E814466	0.19	671	5	0.01	9	310	203		0.36	<5	1			18			<20	0.06	<10	<10	17	<10		503	
E814912	0.2	218	5	0.02	9	440	51		0.22	<5	1			64			<20	0.06	<10	<10	11	<10		41	
E814916	0.3	157	8	0.02	11	390	122		0.36	<5	1			51			<20	0.08	<10	<10	15	<10		68	
E814923	0.15	2030	5	0.03	20	230	26		0.14	8	2			24			<20	0.09	<10	<10	20	<10		3150	
E814964	0.34	2720	7	0.03	17	600	38		0.16	<5	2			138			<20	0.06	<10	<10	21	<10		858	
E815660	0.07	74	8	0.02	8	200	27		0.25	<5	1			38			<20	0.05	<10	<10	11	<10		28	
E815678	0.4	292	5	0.08	14	420	27		0.18	<5	4			222			<20	0.13	<10	<10	37	<10		125	
E815689	0.11	95	9	0.01	8	320	41		0.21	<5	1			8			<20	0.04	<10	<10	10	<10		46	
E815775	0.17	4950	7	0.02	12	540	352		0.6	<5	2			25			<20	0.06	<10	<10	18	<10		1050	
E815792	0.04	353	8	0.01	10	260	943		0.36	<5	2			8			<20	0.09	<10	<10	20	<10		1015	
E815798	0.03	2230	10	<0.01	9	130	225		0.33	<5	1			2			<20	0.04	<10	<10	8	<10		1025	