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Technical Memorandum

To:	Jamie Sturgess	**From:**	Mark A. Williamson
Company:	Rosemont Copper Company	**Date:**	October 10, 2008
Re:	Tailings Geochemistry	**Project #:**	121/08-320777-5.3
CC:	Kathy Arnold, Lance Newman (Rosemont Copper)		
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To date, four (4) samples of tailings material has been generated for the proposed Rosemont Copper Project. The approximate dates in which each tailings sample was generated are: May 2006, February 2007, June 2007, and July 2008. The rock composition for each tailings sample is provided in Table 1. All of the samples have been tested or are scheduled to be tested for acid-generating capacity, metals content, and/or metal release. Table 2 provides a detailed list of the completed and scheduled test work for each sample.

Table 1. Rock Composition for Tailings Samples

Sample Date	Rock Units
May 2006	Horquilla[1]
February 2007	Horquilla[1]
June 2007	Horquilla
July 2008	21.3% Earp 72.9% Horquilla 5.8% Escabrosa (Year 0 to 3 composite)

[1] Assumed rock samples processed for flotation were composed of Horquilla. Unable to confirm rock sample type.

Table 2. Tailings Test Protocols

Sample Date	Current Testing Status	ABA	NAG	Whole Rock	SPLP	MWMT	Kinetic
May 2006	Completed	X	X	X	X		
February 2007	Completed	X	X	X			X
June 2007	Completed	X	X	X	X	X	
July 2008	In Progress	X		X	X	X	X

The analytical results for the May 2006, February 2007, June 2007, and July 2008 tailings samples are presented in this memo. The ABA, Whole Rock, SPLP and MWMT analytical results for the July 2008 sample are complete. However, kinetic testing (humidity cell) data for this sample will not be received for several months due to the minimum 20 week duration of the test. In summary, all the tailings samples

tested to date show a net capacity to neutralize acidity and a very limited release of metals. The discussion below presents the results of:

- Acid-base accounting (ABA) and Net Acid Generating Test (NAG)
- Kinetic (Humidity Cell) testing
- Synthetic Precipitation Leaching Procedure (SPLP)
- Meteoric Water Mobility Testing (MWMT)
- Whole rock analysis

Acid-Base Accounting

The ratio of acid neutralization potential (NP) to acid potential (AP) and the net neutralizing capacity (NNP) of tailings meets Arizona Department of Environmental Quality (ADEQ) criteria as inert: the ratio of NP to AP is greater than 3 and the NNP is greater than +20 tons $CaCO_3$/kton rock. However, the ABA characterization of the tailings not only shows a lack of acid potential (AP) but a pronounced neutralizing potential (NP). Thus, with respect to the potential for acidic drainage, the tailings are not only inert but furthermore acid consuming.

The NAG pH is a measure of the net acid generating capacity of a sample. The value of the NAG test is typically associated with waste rock, where the NAG result can often be tied to NNP. Thus, NAG testing offers an on-the-ground technique for segregating waste rock during operations. With respect to tailings, NAG testing has limited value. The results obtained thus far, however, support the overall non-acid generating nature of the tailings. A summary of ABA testing results are provided in Table 3.

Table 3. Summary of ABA on tailings samples

Sample ID	AP	NP	NNP	NP/AP	NAG pH	Non-Extractable Sulfur (%)	Pyritic Sulfur (%)	Sulfate Sulfur (%)	Total Sulfur (%)
	tons $CaCO_3$/kton rock								
May 2006	1	426	425	426	NA	<0.01	0.01	0.04	0.05
February 2007	<0.3	332	332	2210	7.87	<0.01	<0.01	<0.01	<0.01
June 2007	<0.3	248	248	1650	8.25	<0.01	<0.01	0.04	0.04
July 2008	<0.3	304	304	2030	NA	<0.01	<0.01	<0.01	<0.01

Kinetic Testing

The results of a 35 week kinetic (humidity cell) test on the February 2007 tailings sample reinforces the ABA results. This sample did not produce acidic drainage and meets the ADEQ criteria as inert. The results of the humidity cell, for acid generation as well as metal (and other constituent) release, are consistent with that characterization. In addition to maintaining a neutral pH, the effluent from the humidity cell test also maintained a constant and elevated alkalinity value. A decreasing alkalinity value (despite a neutral pH) is a precursor to the onset of lower pH values. Thus, the February 2007 tailings sample showed no sign of acid onset. Humidity cell results for pH, sulfate, acidity, and alkalinity are illustrated in Figure 1. Results for metals are reported in Table 4. The tailings sample from July 2008 is currently in week 5 of the 20 week kinetic test. Data from weeks 0 through 4 show very similar humidity cell response compared to the February 2007 sample, although pH values for the July 2008 sample are higher as is the total dissolved solid load for the week zero sample.

Figure 1. Humidity cell results for February 2007 Tailings Sample

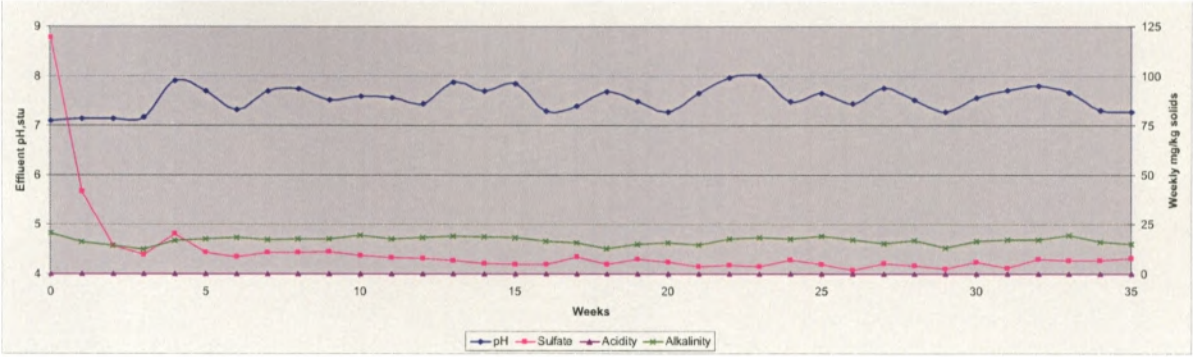

Figure 2. Humidity cell results for July 2008 Tailings Sample

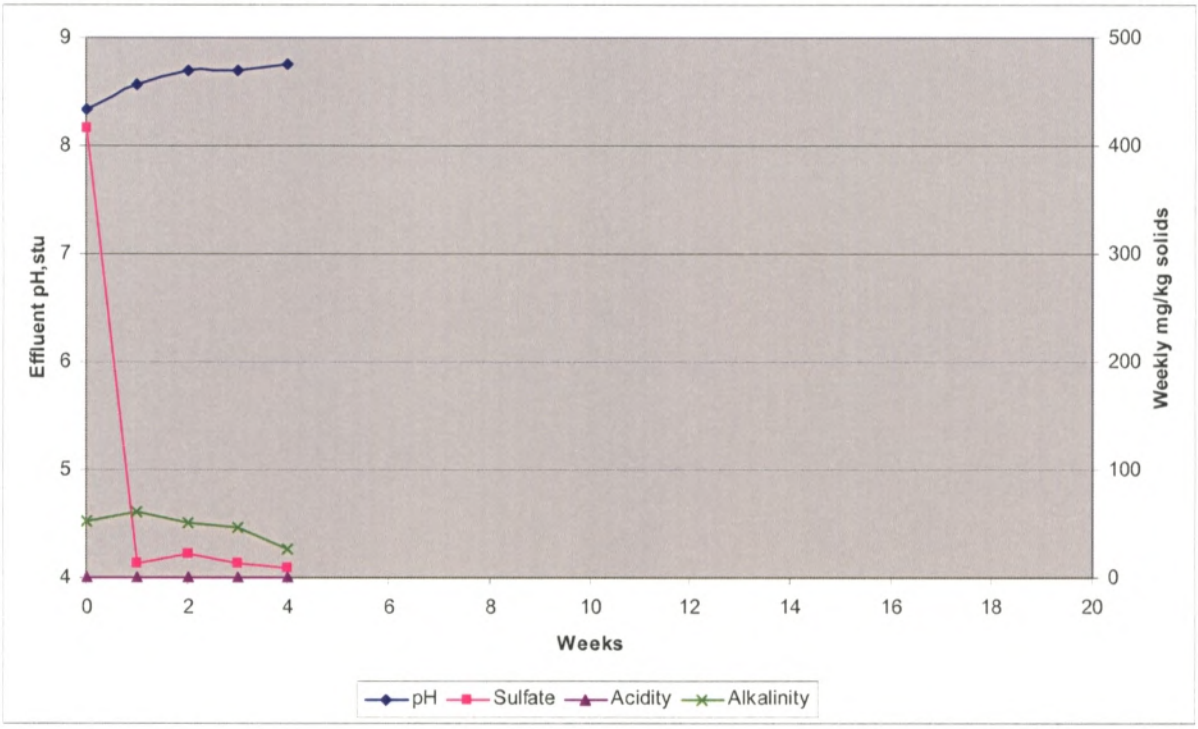

Table 4. Summary of Humidity Cell Metals.

Parameter	Kinetic Test (Humidity Cell) Metals mg/L					
Tailings Sample Date	February 2007					July 2008
Test Week	0	5	10	15	20	0
Aluminum	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Antimony	<0.006	0.0035	0.0057	0.0058	0.0056	0.009
Arsenic	<0.01	0.0071	0.0095	0.0087	0.0153	0.017
Barium	0.0409	0.0176	0.0113	0.0067	0.0094	0.017
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	26.9	22.8	14.4	10.7	11.8	335
Chloride	4.07	1.5	1.43	0.2	<0.2	15.2
Chromium	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	0.012
Fluoride	0.81	1.09	1.17	1.34	1.65	1.68
Iron	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Lead	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075	<0.0075
Magnesium	1.45	1.49	0.75	0.6	0.75	6.92
Manganese	0.005	0.017	0.005	<0.004	<0.004	0.045
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum						0.832
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	
Potassium	3.99	3.24	1.57	1.08	1.03	25.4
Selenium	<0.04	<0.04	<0.04	<0.04	<0.04	0.151
Silver	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium	15.6	10.3	2.7	6.32	7.58	106
Sulfate	74.3	50.5	14.4	13.7	15.3	1060
Thallium	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001
Uranium						<0.001
Zinc	0.0162	<0.01	<0.01	<0.01	<0.01	<0.01
TDS	162	137	83	99	112	NA

Whole Rock Analysis

Whole rock analysis determines the total concentration of selected chemical constituents in a sample and has been performed on every tailings sample to date. There are variations in the composition of each sample tested. However, such total analyses do not bear directly on potential impacts to water resources, as do analyses such as SPLP and MWMT. Table 5 reports available whole rock analyses for the tailings samples.

Synthetic Precipitation Leaching Procedure

The SPLP test is designed and utilized to gauge the potential release of chemical constituents from a solid that is exposed to meteoric precipitation (rain or snow melt). There are no specific regulatory criteria that dictate interpretation of SPLP results, but the results may be used as input to models that predict potential impacts to water resources (either ground or surface).

The tailings samples tested for SPLP to date show very limited release of any chemical parameter, including metals. This is expected due to the non-acidic nature of the tailings and the near-neutral pH conditions that are associated with its leaching (see humidity cell test results in Table 4). Most metals have limited solubility at neutral pH, although some chemical constituents, such as arsenic and selenium, are quite mobile under such pH conditions. However, even arsenic and selenium show a very limited release from the tailings. SPLP test results are reported in Table 5.

Meteoric Water Mobility Testing

The meteoric water mobility test (MWMT), also known as the meteoric water mobility procedure (MWMP), is quite similar to the SPLP. The MWMT is tailored more for mine waste whereas the SPLP was developed more for soil applications. The MWMT uses run-of-mine materials, without any crushing, thus emulating the range of material sizes that are expected to weather in the field. This grain size issue is more germane to waste rock than to the tailings results reported here. However, the MWMT is a suitable and largely expected test of mine materials.

Consistent with the SPLP results, MWMT results indicate a very limited release of metals. There are a few discrepancies, however, that may be related to the chemical quality of the water used to complete each of the tests. For example, the sulfate result for the MWMT was 285 mg/L compared to only 20 mg/L in the SPLP tests of the same tailings sample. The MWMT is performed using a water to rock ratio of 1:1 while the SPLP ratio is 20:1. The MWMT therefore yielded a value of 285 mg sulfate per kg of rock while the SPLP produced a value of 400 mg/kg. Similarly, sodium values ranged from 27.6 mg/kg to 40.4 for MWMT and SPLP, respectively. However, the differences are not significant and do not alter the fundamental conclusions. MWMT results obtained with this protocol are provided in Table 5.

Table 5. Summary of Geochemical Data for Rosemont Tailings Testing

Parameter	May 2006		February 2007		June 2007			July 2008		
	Whole Rock (mg/kg)	*SPLP (mg/L)*	*Whole Rock (mg/kg)*	*SPLP (mg/L)*	*Whole Rock (mg/kg)*	*SPLP (mg/L)*	*MWMT (mg/L)*	*Whole Rock (mg/kg)*	*SPLP (mg/L)*	*MWMT (mg/L)*
pH End							7.43			8.5
Alkalinity									8.3	11.5
Aluminum	12000		3910	0.08	6210	0.08	<0.08	5870	<0.08	<0.08
Antimony	<10		2		2.2	<0.02	<0.02	<2	<0.02	<0.02
Arsenic	5.5	<1	8.6	<0.003	8.2	<0.003	<0.003	22	<0.02	<0.003
Barium	20	<10	7.7	<0.0020	12.2	0.0032	0.0172	25.6	0.02	0.0229
Beryllium			0.36		0.58	<0.0020	<0.002	0.537	<0.002	<0.002
Cadmium	0.9	<0.5	1.51	<0.0020	0.97	<0.0020	<0.002	1.1	<0.002	<0.002
Calcium	150000		125000	8.8	146000	13	103	126000	15.6	150
Chloride	40		11.3	0.36	46	0.43	5.69	10.3	0.55	5.18
Chromium	14	<1	10.4	<0.0060	21	<0.0060	<0.006	17.7	<0.006	<0.006
Copper			2070	<0.010	1100	<0.010	<0.01	1120	<0.01	<0.01
Fluoride			8.72	1.25		1.29	1.02	2.35	0.85	1.11
Iron	18000		15300	<0.06	23600	<0.06	<0.06	21700	<0.06	<0.06
Lead	7	<1	10.4		13.6	<0.0075	<0.0075	20	<0.0075	<0.008
Magnesium	8400		4960	0.23	5410	0.17	0.65	8300	0.2	1.91
Manganese	2100		1520	<0.0040	2000	<0.0040	0.019	1670	<0.004	0.0172
Mercury	<0.100	<0.01	0.038	<0.0002	0.042	<0.0002	0.00033	1.77	0.0007	<0.0002
Molybdenum			90		46	0.075	0.46	13.8	0.06	0.463
Nickel			8.8	<1	5.5	<0.01	<0.01	11.2	<0.01	<0.01
NO_2+NO_3 as N				0.04			0.021			
Potassium	1000		786	0.62	977	0.86	8.33	1040	1.24	11.3
Selenium	<5	<0.5	<4	<0.50	<4	<0.04	<0.04	<4	<0.04	<0.04
Silver	0.8		2.41	<0.0050	0.87	<0.0050	<0.005	1.15	<0.005	<0.005
Sodium	<250		117	2.57	154	2.22	27.6	225	4.1	37.1
Sulfate	320		123	6.95	311	20	285	632	35	441
TDS				13		66	505			
Thallium			1.5		2	<0.015	<0.015	<1.5	<0.02	<0.015
Uranium								2.89	<0.002	<0.001
Zinc	85		271		118	<0.01	<0.01	108	<0.01	<0.01