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FILE: 4286 22TM-01

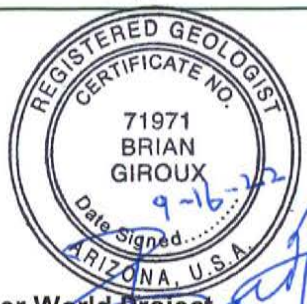
TECHNICAL MEMORANDUM

FINAL: July 15, 2022

TO: David Krizek, PE
Environmental Manager

FROM: Tyler Cluff, Will Taylor
Email: tcluff@piteau.com; wtaylor@piteau.com

RE: **Supplemental Geochemical Samples for Copper World Project**



Piteau Associates Engineering Ltd. (Piteau) has prepared this technical memorandum to summarize additional geochemical characterization and sampling of materials to be mined with the planned Satellite pits associated with the Rosemont Copper World Project (the Project). The objectives of this memorandum are:

1. Describe sample collection
2. Convey initial laboratory results
3. Provide guidance on how the initial leachate chemistry may modify source terms, chemical release functions (CRFs), that was used in geochemical models for the Project (Piteau, 2022).

Previous geochemical characterization programs appropriately emphasized rock materials found within the Rosemont Pit. The Rosemont Pit comprises ~83% of waste materials and contains nearly every geochemical rock unit anticipated throughout all of the Satellite pits. The focus of the supplemental geochemical characterization was to collect samples for underrepresented rock units found in the Satellite pits and to sample endmember materials with regard to potential acid-generation (PAG). Therefore, the sampling program focused on the following rock units:

- Granodiorite: This unit is frequently exposed in the Satellite pits.
- Qmp: This unit is exposed along pit walls.
- Glance: This unit is found primarily in the Broadtop Butte Pit.
- Alluvium: This unit resides below the TSF and as overburden.
- Limestone / Skarn: These units are found in Satellite pits and were selected to validate the existing geochemical dataset.

A total of 40 samples were collected between September 8, 2021 to September 9, 2021. Samples were selected from split cores from exploration borehole drilled in the Satellite pits. Alluvial samples were collected from overburden which was excavated from test pits. An approximate 7 kg to 11 kg sample was collected for geochemical analysis. Samples were submitted to McClelland Laboratories in Reno, Nevada for the following tests:

- Modified Sobek Acid-base Accounting (ABA)
- Non-acid Generating testing
- Whole Rock assay
- Meteoric Water Mobility Procedure (MWMP)
- Humidity Cell Test (on select samples)

Sample identification, rock type, pit location, and testing is summarized in Table 1.

Table 1 Satellite Pits geochemical sample summary

Sample ID	Rock Material	Area	Whole Rock Chemistry	ABA	NAG	MWMP	HCT
RNW-HB-071 (278.5-287)	Abrigo	Copper World	X	X	X	X	
RNW-HB-081 (61-71)	Abrigo	Peach-Elgin	X	X	X	X	
RNW-HB-156 (215-226)	Abrigo	Copper World	X	X	X	X	X
G&H2021-01	Alluvium	TSF	X	X		X	
G&H2021-07	Alluvium	TSF	X	X		X	
G&H2021-09	Alluvium	TSF	X	X		X	
G&H2021-10	Alluvium	TSF	X	X		X	
G&H2021-14	Alluvium	TSF	X	X		X	
G&H2021-15	Alluvium	TSF	X	X		X	
G&H2021-21	Alluvium	TSF	X	X		X	
G&H2021-25	Alluvium	TSF	X	X		X	
RNW-HB-088 (370-375)	Bolsa	Copper World	X	X	X	X	X
RNW-HB-084 (105-115)	Concha	Peach-Elgin	X	X	X	X	
RNW-HB-126 (41-48.5)	Concha	Heavy Weight	X	X	X	X	
RNW-HB-079 (239-249)	Epitaph	Peach-Elgin	X	X	X	X	
RNW-HB-077 (589-601.5)	Escabrosa	Peach-Elgin	X	X	X	X	
RNW-HB-084 (227.5-236.5)	Escabrosa	Peach-Elgin	X	X	X	X	
RNW-HB-069 (555-564)	Glance	Broadtop	X	X	X	X	
RNW-HB-143 (717-725)	Glance	Broadtop	X	X	X		X

Sample ID	Rock Material	Area	Whole Rock Chemistry	ABA	NAG	MWMP	HCT
RNW-HB-143 (816-826)	Glance	Broadtop	X	X	X	X	
RNW-HB-195 (588-597)	Glance	Broadtop	X	X	X		X
RNW-HB-213A (391-401)	Glance	Broadtop	X	X	X	X	
RNW-HB-213A (616-623)	Glance	Broadtop	X	X	X	X	
RNW-HB-003 (919-925.5)	Granodiorite	Copper World	X	X	X		X
RNW-HB-012 (250-262)	Granodiorite	Broadtop	X	X	X	X	
RNW-HB-012 (266-276.5)	Granodiorite	Broadtop	X	X	X	X	
RNW-HB-093 (729.5-739.5)	Granodiorite	Copper World	X	X	X	X	
RNW-HB-141 (529.5-535)	Granodiorite	Copper World	X	X	X		X
RNW-HB-161 (909-920)	Granodiorite	Broadtop	X	X	X	X	
RNW-HB-174 (201-217)	Granodiorite	Broadtop	X	X	X	X	
RNW-HB-086 (87-100)	Martin	Peach-Elgin	X	X	X	X	
RNW-HB-092 (258-264)	Qmp	Broadtop	X	X	X	X	
RNW-HB-107 (181-189)	Qmp	Heavy Weight	X	X	X		X
RNW-HB-122 (341-350)	Qmp	Broadtop	X	X	X	X	
RNW-HB-122 (350-354)	Qmp	Broadtop	X	X	X		X
RNW-HB-069 (683-692.5)	Scherrer	Broadtop	X	X	X	X	
RNW-HB-080 (757-762)	Scherrer	Rosemont / Broadtop	X	X	X	X	
RNW-HB-094 (1-10)	Scherrer	Broadtop	X	X	X	X	
RNW-HB-129 (552-560)	Scherrer	Broadtop	X	X	X	X	
RNW-HB-129 (623-633)	Scherrer	Broadtop	X	X	X	X	

ABA AND NAG TESTING SUMMARY

Each rock sample received ABA testing (Sobek et al, 1978) to compare the acid generating and acid neutralizing potential of the material as part of Phase I characterization (ADEQ, 1998). Acid generation is determined from the abundance of sulfide sulfur and carbonate acid neutralization capacity. The latter of these variables was measured in the specific ABA procedure adopted through consumption of carbonate by HCl addition and subsequent back-titration with NaOH to quantify the mass of carbonate consumed in the reaction.

Samples were also submitted for Net Acid Generation (NAG) testing to evaluate the potential of minerals to generate net-acidity on simultaneous oxidation of sulfides and consumption of protons through carbonate neutralization. The NAG procedure uses 250 ml of 15% v/v hydrogen peroxide (H_2O_2) solution in a reaction with 2.5 grams of pulverized sample. The pH of the resulting aliquot is measured. A pH below 4.5 s.u. indicates net acidity production. A pH above 4.5 s.u. suggests neutralization of the H_2O_2 solution by the sample. This procedure is useful because it provides an upper endmember assessment of acid-generation where sulfide oxidation is incomplete or minerals are sequestered.

ABA and NAG results for Satellite pit samples are present in Table 2. Key findings are summarized as follows:

- The additional samples complete data gaps for i) characterizing rocks with higher sulfide mineral content and ii) specific rock units which are more abundant in the Satellite pits (Granodiorite, Qmp, Glance, Scherrer, and Abrigo). The distributions of AP, NP, and NPR of the ABA dataset is shown against the surrogate values from the geologic block model (Figure 2). The distribution of samples encapsulates the range of AP, NP, and NPR values.
- Conventionally, ABA data are interpreted using two indices, net neutralization potential (NNP) and the neutralization potential ratio (NPR). The former of these variables is determined as NP minus AP. A PAG classification is assigned to materials yielding NNP values of less than -20 kg/T $CaCO_3$, while non-acid generating assignments are applied to samples yielding NNP values of greater than 20 kg/T $CaCO_3$. Interim values are typically interpreted as indicative of uncertain PAG potential. Within the suite of 40 supplementary samples subject to analysis, only 3 yield NNP values which signify PAG propensity. This is the case across a wide range of sulfide S abundances and reflects the substantial carbonate presence in most samples. A similar trend is evident from the NPR indices, which exceed a threshold of 3 conventionally applied to discriminate non-acid forming material in all but six samples, while only 3 samples yield NPR values of less than 1 (PAG).
- Although supplementary samples are biased towards higher sulfide content materials for the Project, the bulk rock mass is concluded to remain dominantly neutralizing (Figure 3 and Figure 4).
- NAG pH tests convey similar conclusions to those drawn from ABA data (Figure 5). Only three (3) samples produced a NAG pH of <4.5 s.u. Four (4) PAG of the uncertain samples as defined by ABA testing produced NAG pH values of above 7.0 s.u. These included rock units of Abrigo, Qmp, and Granodiorite.
- Intrusive rocks were confirmed to possess relatively high quantities of NP. Granodiorite and Qmp had a median NP value of 31 t $CaCO_3$ / kt.

From the ABA and NAG pH analysis, eight (8) samples were selected for humidity cell tests (HCT), the other 32 samples were submitted for MWMP testing. Results from these analyses are discussed in subsequent sections of this memo.

Table 2 Satellite Pits geochemical ABA summary

Sample ID	Rock Material	NP (t $CaCO_3$ / kt)	AP (t $CaCO_3$ / kt)	NPR	NNP (t $CaCO_3$ / kt)	Paste pH (s.u.)	NAG pH (s.u.)	Pyritic S(%)	Classification
RNW-HB-071 (278.5-287)	Abrigo	114	23.44	4.86	90.6	9.19	9.63	0.71	NAG
RNW-HB-081 (61-71)	Abrigo	183	1.88	97.6	181	9.07	9.3	0.05	NAG
RNW-HB-156 (215-226)	Abrigo	90.4	83.75	1.08	6.65	8.9	8.93	2.54	PAG
G&H2021-01	Alluvium	308	<0.30	1027	308	9.12		<0.01	NAG
G&H2021-07	Alluvium	215	<0.30	717	215	9.3		<0.01	NAG
G&H2021-09	Alluvium	24.8	0.31	79	24.5	9.3		<0.01	NAG
G&H2021-10	Alluvium	62.3	0.31	199	62.0	9.35		<0.01	NAG
G&H2021-14	Alluvium	11	<0.30	37	10.7	8.94		<0.01	PAG
G&H2021-15	Alluvium	12.4	<0.30	41	12.1	8.72		<0.01	PAG
G&H2021-21	Alluvium	13.5	<0.30	45	13.2	9.59		<0.01	PAG
G&H2021-25	Alluvium	13.6	<0.30	45	13.3	8.9		<0.01	PAG
RNW-HB-088 (370-375)	Bolsa	29.9	67.81	0.44	-37.9	9.28	2.71	2.11	AG
RNW-HB-084 (105-115)	Concha	172	15.94	10.8	156	8.86	9.15	0.48	NAG
RNW-HB-126 (41-48.5)	Concha	207	0.94	221	206	8.84	10.2	0.03	NAG
RNW-HB-079 (239-249)	Epitaph	162	17.81	9.09	144	9.24	9.03	0.52	NAG
RNW-HB-077 (589-601.5)	Escabrosa	752	1.88	401	750	8.67	9.1	0.04	NAG
RNW-HB-084 (227.5-236.5)	Escabrosa	264	15.00	17.6	249	8.65	8.98	0.45	NAG
RNW-HB-069 (555-564)	Glance	412	45.31	9.09	367	8.57	8.5	1.44	NAG
RNW-HB-143 (717-725)	Glance	54.1	124.38	0.43	-70.3	8.84	2.56	3.71	AG
RNW-HB-143 (816-826)	Glance	567	34.06	16.6	533	8.49	8.63	1.03	NAG
RNW-HB-195 (588-597)	Glance	274	65.63	4.18	208	8.74	9.11	1.96	NAG
RNW-HB-213A (391-401)	Glance	292	0.94	311	291	9.12	10.99	0.02	NAG
RNW-HB-213A (616-623)	Glance	112	6.88	16.3	105	8.99	10.95	0.2	NAG
RNW-HB-003 (919-925.5)	Granodiorite	20.9	130.00	0.16	-109	8.5	2.27	4	AG
RNW-HB-012 (250-262)	Granodiorite	18.6	0.31	59.5	18.29	8.96	7.8	0.01	PAG
RNW-HB-012 (266-276.5)	Granodiorite	26.6	<0.30	88.7	26.3	8.74	7.64	<0.01	NAG
RNW-HB-093 (729.5-739.5)	Granodiorite	31	12.19	2.54	18.8	9.96	8.06	0.37	PAG

Sample ID	Rock Material	NP (t $CaCO_3$ / kt)	AP (t $CaCO_3$ / kt)	NPR	NNP (t $CaCO_3$ / kt)	Paste pH (s.u.)	NAG pH (s.u.)	Pyritic S(%)	Classification
RNW-HB-141 (529.5-535)	Granodiorite	90	38.44	2.34	51.6	9.54	10.84	1.17	PAG
RNW-HB-161 (909-920)	Granodiorite	9.4	1.25	7.52	8.15	9.78	9.04	0.04	PAG
RNW-HB-174 (201-217)	Granodiorite	21.1	<0.30	70.3	20.8	9.54	9	<0.01	NAG
RNW-HB-086 (87-100)	Martin	385	34.38	11.2	351	8.77	8.65	1	NAG
RNW-HB-092 (258-264)	Qmp	116	14.06	8.25	102	9.02	11.1	0.41	NAG
RNW-HB-107 (181-189)	Qmp	50.9	9.69	5.25	41.2	10.24	10.9	0.29	NAG
RNW-HB-122 (341-350)	Qmp	78.8	<0.30	263	78.5	9.36	11.1	<0.01	NAG
RNW-HB-122 (350-354)	Qmp	89.9	45.94	1.96	43.9	8.31	8.96	1.34	PAG
RNW-HB-069 (683-692.5)	Scherrer	812	21.88	37.1	790	8.73	10.82	0.64	NAG
RNW-HB-080 (757-762)	Scherrer	297	74.38	3.99	223	8.57	8.5	2.24	NAG
RNW-HB-094 (1-10)	Scherrer	612	0.63	979	611	9.5	11.06	0.02	NAG
RNW-HB-129 (552-560)	Scherrer	144	43.75	3.29	100	8.71	8.67	1.26	NAG
RNW-HB-129 (623-633)	Scherrer	900	3.13	288	897	9.72	11.3	0.09	NAG

Highlighted samples represent AG material

MWMP DATA SUMMARY

Phase I leachate testing was completed using meteoric water mobility procedure (MWMP) tests. Leachate chemistries produced from these tests contribute to the chemical release functions (CRF) used in geochemical modeling. Given the single rinse nature of the tests, MWMP leachates represent first flush chemistry of geologic materials, weathered by products, and accumulated salts.

The MWMP is a leaching test used to evaluate the potential for dissolution and mobility of constituents from mine rock when exposed to meteoric water (ASTM, 2003). The MWMP applies deionized water (pH reduced to approximately 5.5 s.u.) to the solid rock phase at a 1:1 mass ratio in a single-pass column. The application occurs over a 24-hr period (but not longer than 48-hr), after which the leachate is filtered and analyzed.

Thirty-two (32) samples were submitted for MWMP testing. Resulting leachate chemistry is provided in Appendix A. Key results from MWMP tests are as follows:

- Leachate pH ranges from slightly acidic (5.78 s.u.) to circum-neutral (8.43 s.u.). Granodiorite samples tended to be slightly acidic.
- None of the MWMP sample leach constituents were above Arizona Water Quality Standards (AWQS).
- Leachates of intrusive rock types (Granodiorite and Qmp) are characteristically categorized as “Near Neutral, Low Metals”. They have low constituent concentrations, with total dissolved solids (TDS) ranging from <25 mg/l to 140 mg/l. Sulfate concentrations were <3 mg/l for all samples. No measurable iron, antimony, arsenic, cadmium, or lead was found in the samples.
- Leachates from limestone / skarn rock types generally were categorized as “Near Neutral, High Metals”, although total metal concentrations were mainly controlled by magnesium. TDS ranged from <25 mg/l to 160 mg/l, with sulfate concentrations ranging from <1.5 mg/l to 26 mg/l. No measurable antimony, cadmium, or lead was observed.
- Leachates from Glance were characterized as “Near Neutral, Low Metals”, and in general were similar in composition to intrusive and limestone / skarn rock types. No measurable iron, cadmium, or lead was found in the samples.
- Alluvial leachates exhibited higher overall concentrations of constituents, with TDS ranging from 86 mg/l to 410 mg/l. However, sulfate concentrations were relatively low, ranging from 8 mg/l to 23 mg/l. This material was characterized as “Near Neutral, High Metals”. Three (3) samples leached moderately higher concentrations of aluminum and iron, which exceeded 1 mg/l. One (1) sample contained salts, leaching higher concentrations of chloride and sodium. No measurable antimony, cadmium, or lead was found in the samples.

HCT DATA SUMMARY

Humidity cell tests were conducted on 8 samples, summarized in Table 3. HCT sample selection targeted PAG or AG rock materials that would be exposed in the Satellite pits. A secondary consideration was to assess mass loading rates for lesser characterized materials which would be present in the Satellite pits, such as Granodiorite, Qmp, and Glance units.

HCT testing has reached 9 weeks of completion (3/8/22-5/10/22) and is anticipated to run for at least 20 weeks for all samples. Several samples, including AG samples, are expected to continue until leachate chemistries reach an equilibrium or consume neutralization potential. HCT results through week 9 are presented in Figures 22 through 29. Tabulated HCT results are provided in Appendix B. Key results from HCT testing are as follows:

- Overall the samples have produced circum-neutral leachates with low to moderate concentrations of dissolved solids and few instances above AWQS.
- Only 1 sample has thus far produced mildly acid leachate (6.03 s.u.). RNW-HB-003 (919-925.5) is a mineralized Granodiorite with very low NPR (0.16) and a relatively high sulfur content (4%). Sulfate concentrations peaked in week 1 (51 mg/l) and have been trending lower to ~12 mg/l. Iron concentrations have generally been below detection limits with one anomalous measurement of 1.83 mg/l in week 5 (Figure 26). Attendant metal concentrations of antimony, arsenic, aluminum and copper have been low and below AWQS.
- The release of most major ions occurs during early flushing, weeks 0 - 2. Subsequent weeks show a slight decline in constituents such as sulfate, calcium, sodium, and chloride.
- Sulfate concentrations in RNW-HB-122 (350-354) (Qmp) have been relatively higher than other samples, ranging from 290 mg/l to 310 mg/l. This appears to be a result of sulfide oxidation because the molar release of calcium and magnesium is slightly less than sulfate, signifying neutralization by dissolution of carbonate minerals. Leachate pH has remained circum-neutral. There appears to be sufficient buffering capacity to neutralize sulfide oxidation, pending the extent of weathering on sulfide and carbonate minerals.
- Several samples are releasing calcium and magnesium at a higher molar ratio than sulfate, suggesting that mineral dissolution is a meaningful joint process with sulfide oxidation. This would be expected given the relatively low concentrations of sulfate in leachate solution.
- Thus far, only 5 exceedances to AWQS have been measured in HCTs. They are sporadic instances and not consistent among samples:
- pH: One sample is below pH 6.5 s.u. at RNW-HB-003 (919-925.5) (Granodiorite). Five samples have had one rinse with pH above 8.5 s.u.
- As: 0.063 mg/l to 0.088 mg/l at RNW-HB-195 (588-597) (Glance).

- Cd: 0.01 mg/l for a first flush sample of RNW-HB-122 (350-354) (Qmp). Subsequent rinses were below AWQS.
- Cu: 7.8 mg/l for a first flush sample of RNW-HB-122 (350-354) (Qmp). Subsequent rinses were below AWQS.
- U: 0.32 mg/l for a first flush sample of RNW-HB-107 (Qmp). Subsequent rinses were below AWQS.

Table 3: HCT sample summary

Sample ID	Lithology	Pit	Total Weeks	Min pH (s.u.)	Max SO4 (mg/l)	Week of max SO4	Max Fe (mg/l)	Week of max Fe	NPR	Classification
RNW-HB-156 (215-226)	Abrigo	Copper World	9	7.60	110	1	0.17	5	1.08	PAG
RNW-HB-088 (370-375)	Bolsa	Copper World	9	7.28	70	1	0.15	1	0.44	AG
RNW-HB-143 (717-725)	Glance	Broadtop	9	7.14	64	6	0.51	5	0.43	AG
RNW-HB-195 (588-597)	Glance	Broadtop	9	7.96	120	1	0.21	4	4.18	NAG
RNW-HB-003 (919-925.5)	Granodiorite	Copper World	9	6.03	51	1	1.83	5	0.16	AG
RNW-HB-141 (529.5-535)	Granodiorite	Copper World	9	7.83	30	2	0.13	5	2.34	PAG
RNW-HB-107 (181-189)	Qmp	Heavy Weight	9	8.01	21	1	0.33	3	5.25	NAG
RNW-HB-122 (350-354)	Qmp	Broadtop	9	6.84	367	7	0.32	5	1.96	PAG

COMPARISON OF GEOCHEMICAL MODEL SOURCE TERMS TO SUPPLEMENTAL RESULTS

Geochemical modeling (Piteau, 2022) utilized chemical release functions (CRFs) to simulate the release of constituents from rock materials. CRFs were assigned to each geochemical unit from HCT, MWMP, and SPLP tests taken from samples derived from the Rosemont pit. Some geochemical units lacked samples to develop CRFs. Where this occurred a proxy sample was selected from a geochemically similar unit or a conservative sample was used. The Satellite pits geochemical characterization program collected samples that fill these missing data gaps and provide geologic specific leachate data to develop CRFs.

The objective of this analysis was to compare the first flush (week 0) CRFs used in geochemical modeling (Piteau, 2022) with the first flush data from the Satellite pits characterization program presented here in and evaluate whether the CRFs overestimated mass loading. A comparison of substitute CRFs and leachate tests is provided for pertinent geochemical units. The comparison applies the maximum leachate concentration from the first 4 weeks of HCT testing and the MWMP results against week 0 CRFs. Results and implications for geochemical units are discussed as follows:

- Abrigo < 1.2: Andesite sample substituted (Table 4). HCT leachates for this geochemical unit are circum-neutral and produces lower mass loading than the proxy CRF used in Piteau (2022). Major ions such as sulfate and calcium are approximately an order of magnitude lower. Minor ions and attendant metals are generally lower.
- Glance < 1.2: Andesite sample substituted (Table 5). Again, HCT leachates for this geochemical unit are circum-neutral and produces lower mass loading than the proxy CRF used in Piteau (2022). Major ions such as sulfate and calcium are approximately an order of magnitude lower. Minor ions and attendant metals are generally lower. Specific metals such as Cu, Be, Mn, Cd, Zn are 1 to 2 orders of magnitude lower.
- Glance 1.2-3.0: Epitaph sample substituted (Table 6). HCT leachates for this geochemical unit are a mixture of higher and lower mass loading than the proxy CRF. Most major ions such as SO_4, Ca, Cl, Na, K are lower by approximately an order of magnitude. However, several minor ions and attendant metals are higher in the HCT leachate (Sb, As, Fe, Se). There are also several ions which are shared non-detects (Be, Cr, Cu, Pb, Hg, etc). Although the overall mass contributed by this geochemical unit is lower, a greater mass is generated for some minor ions.
- Glance > 3.0: Epitaph sample substituted (Table 7). MWMP leachates for this geochemical unit generally produce lower mass loading than the proxy CRF. Major ion concentrations are lower (SO_4, Ca, Cl, Na, K). Likewise minor ions concentrations are equal to or lower than the CRF. Of these, lower concentrations of As, F, and Pb are the most important, as they are AWQS regulated.
- Granodiorite < 1.2: Qmp sample substituted (Table 8). The HCT leachate for acid-generating Granodiorite is comparable to the CRF used in Piteau (2022). HCT concentrations are slightly lower in several constituents. However, if the HCT becomes

acid-generating, concentrations for metals are expected to increase. The effect on mass loading is uncertain.

- Granodiorite 1.2-3.0: Qmp sample substituted (Table 9). HCT and MWMP leachates for this geochemical unit are a mixture of higher and lower mass loading than the proxy CRF. Overall mass loading is slightly lower, mainly from lower major ions (i.e. TDS). Alkalinity and pH from leachates are lower than the CRF. Non-detects between leachates and the CRF are similar.
- Granodiorite >3.0: Qmp sample substituted (Table 10). MWMP leachates for this geochemical unit generally produce lower mass loading than the proxy CRF. Leachates have more non-detects measurements than the CRF (i.e. F, As, Fe).
- Scherrer 1.2-3.0: Epitaph sample substituted (Table 11). MWMP leachates for this geochemical unit have lower major ion concentrations (Ca, SO_4, Alkalinity, Na, TDS). Mass loading of minor ions has mixed results, with some slightly higher elements (Al, Mo) and other lower elements (As).
- Scherrer >3.0: Epitaph sample substituted (Table 12). MWMP leachates for this geochemical unit also have lower major ion concentrations (Ca, SO_4, Alkalinity, TDS). Several minor ions were also lower, with fluoride being the most applicable to predicted concentration.

Satellite pit samples have also expanded the quantity and range of Qmp samples to provide a more robust characterization. A comparison of Qmp CRFs and leachate tests for pertinent geochemical units are as follows:

- Qmp 1.2-3.0: Additional HCT (Table 13). HCT leachate produced generally higher concentrations of major and minor ions than the CRF. The most important of which were higher SO_4 concentrations, which are consistently being released by this sample.
- Qmp >3.0: Additional HCT and MWMP (Table 14). MWMP leachates produced generally lower major ion concentrations than the CRF. Several minor ions were released at lower concentrations including Al, As, and F. A similar number of non-detect ions were observed.

Overall, the additional geochemical testing indicates that mass loading rates will be lower than those of the than proxy CRFs for the majority of geochemical units represented in Piteau (2022). In particular, the Granodiorite >3.0 and Qmp >3.0 are important geochemical units because they comprise much of the material in the Copper World, Heavy Weight and Peach-Elgin pits. Preliminary results from the initial weeks of kinetic testing suggest, however, that the current CRF's applied in modelling are conservative.

Table 4: Abrigo <1.2 Geochemical unit comparison

Parameter	Units	AWQS	Abrigo: <1.2	RNW-HB-156 (215-226)
Source			CRF	HCT
pH[1]	s.u.	----	3.34	7.6
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	0.1	12.37
Aluminum	mg/L	----	71.4	0.04
Antimony	mg/L	0.006	0.0002	0.0029
Arsenic	mg/L	0.05	0.004	0.0025
Barium	mg/L	2	0.03	0.07
Beryllium	mg/l	0.004	0.029	<0.001
Boron	mg/l	----	0.00	0.04
Cadmium	mg/L	0.005	0.3770	<0.001
Calcium	mg/L	----	526.0	28
Chloride	mg/L	----	7.0	1.7
Chromium	mg/L	0.1	0.04	<0.005
Copper	mg/L	----	53.10	<0.04
Fluoride	mg/L	4.0	6.38	0.8
Iron	mg/L	-	1.090	0.171
Lead	mg/L	0.05	0.0342	<0.0025
Magnesium	mg/L	----	187.0	5.2
Manganese	mg/L	----	31.10	0.014
Mercury	mg/L	0.002	0.000	<0.00045
Molybdenum	mg/L	----	0.01	0.095
Nickel	mg/L	0.1	0.734	<0.03
Nitrogen, Total as N	mg/L	10	0.1	<0.21
Potassium	mg/L	----	9.8	2.5
Selenium	mg/L	0.05	0.1300	0.0052
Silver	mg/L	----	0.017	<0.005
Sodium	mg/L	----	10.3	6.3
Sulfate	mg/L	----	2500	110
Thallium	mg/L	0.002	0.0001	0.0005
TDS	mg/L	----	3426	180
Uranium	mg/L	----	0.0002	<0.005
Zinc	mg/L	----	21.50	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 5: Glance <1.2 Geochemical unit comparison

Parameter	Units	AWQS	Glance: <1.2	RNW-HB-143 (717-725)
Source			CRF	HCT
pH[1]	s.u.	----	3.34	7.14
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	0.1	7.63
Aluminum	mg/L	----	71.4	0.025
Antimony	mg/L	0.006	0.0002	<0.0025
Arsenic	mg/L	0.05	0.004	0.0026
Barium	mg/L	2	0.03	0.096
Beryllium	mg/l	0.004	0.029	<0.001
Boron	mg/l	----	0.00	0.03
Cadmium	mg/L	0.005	0.3770	<0.001
Calcium	mg/L	----	526.0	22.4
Chloride	mg/L	----	7.0	2.9
Chromium	mg/L	0.1	0.04	<0.005
Copper	mg/L	----	53.10	<0.04
Fluoride	mg/L	4.0	6.38	0.33
Iron	mg/L	-	1.090	0.51
Lead	mg/L	0.05	0.0342	<0.0025
Magnesium	mg/L	----	187.0	5.81
Manganese	mg/L	----	31.10	0.036
Mercury	mg/L	0.002	0.000	<0.00045
Molybdenum	mg/L	----	0.01	0.017
Nickel	mg/L	0.1	0.734	<0.03
Nitrogen, Total as N	mg/L	10	0.1	<0.21
Potassium	mg/L	----	9.8	0.5
Selenium	mg/L	0.05	0.1300	0.023
Silver	mg/L	----	0.017	<0.005
Sodium	mg/L	----	10.3	4.5
Sulfate	mg/L	----	2500	64.354
Thallium	mg/L	0.002	0.0001	0.0005
TDS	mg/L	----	3426	120
Uranium	mg/L	----	0.0002	<0.005
Zinc	mg/L	----	21.50	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 6: Glance 1.2- 3.0: Geochemical unit comparison

Parameter	Units	AWQS	Glance: 1.2-3.0	RNW-HB-195 (588-597)
Source			CRF	HCT
pH[1]	s.u.	----	7.70	7.96
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	236	17.52
Aluminum	mg/L	----	0.004	1.3
Antimony	mg/L	0.006	0.0002	0.0059
Arsenic	mg/L	0.05	0.003	0.088
Barium	mg/L	2	0.05	0.15
Beryllium	mg/l	0.004	0.000	<0.001
Boron	mg/l	----	0.00	0.04
Cadmium	mg/L	0.005	0.0001	<0.001
Calcium	mg/L	----	456.9	33
Chloride	mg/L	----	11.8	0.6
Chromium	mg/L	0.1	0.00	<0.005
Copper	mg/L	----	0.01	<0.04
Fluoride	mg/L	4.0	0.37	0.98
Iron	mg/L	-	0.003	0.211
Lead	mg/L	0.05	0.0004	<0.0025
Magnesium	mg/L	----	23.7	13
Manganese	mg/L	----	0.02	0.018
Mercury	mg/L	0.002	0.000	<0.00045
Molybdenum	mg/L	----	0.00	0.07
Nickel	mg/L	0.1	0.001	<0.03
Nitrogen, Total as N	mg/L	10	0.1	<0.21
Potassium	mg/L	----	13.1	2.1
Selenium	mg/L	0.05	0.0003	0.019
Silver	mg/L	----	0.000	<0.005
Sodium	mg/L	----	18.4	5.2
Sulfate	mg/L	----	862	120
Thallium	mg/L	0.002	0.0001	0.0005
TDS	mg/L	----	1621	210
Uranium	mg/L	----	0.0002	0.0065
Zinc	mg/L	----	0.00	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 7: Glance >3.0: Geochemical unit comparison

Parameter	Units	AWQS	Glance: >3.0	RNW-HB-069 (555-564)	RNW-HB-143 (816-826)	RNW-HB-213A (391-401)	RNW-HB-213A (616-623)
Source			CRF	MWMP	MWMP	MWMP	MWMP
pH[1]	s.u.	----	8.01	7.75	7.13	7.25	6.97
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	113	33	11	17	12
Aluminum	mg/L	----	0.004	<0.05	<0.05	0.016	<0.05
Antimony	mg/L	0.006	0.0002	0.0041	<0.0025	<0.0025	<0.0025
Arsenic	mg/L	0.05	0.007	0.0082	0.0031	<0.005	<0.005
Barium	mg/L	2	0.00	<0.02	<0.02	<0.02	<0.02
Beryllium	mg/l	0.004	0.000	<0.001	<0.001	<0.001	<0.001
Boron	mg/l	----	0.00	<0.1	<0.1	<0.1	<0.1
Cadmium	mg/L	0.005	0.0001	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L	----	35.7	16	4.3	5.9	4.7
Chloride	mg/L	----	3.5	2.1	<1	<1	<1
Chromium	mg/L	0.1	0.00	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	----	0.00	<0.04	0.006	0.01	<0.04
Fluoride	mg/L	4.0	0.75	<0.3	<0.3	<0.3	<0.3
Iron	mg/L	-	0.003	<0.1	<0.1	<0.1	<0.1
Lead	mg/L	0.05	0.0211	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	mg/L	----	2.0	2.1	0.34	0.52	0.08
Manganese	mg/L	----	0.02	<0.01	0.018	0.012	0.011
Mercury	mg/L	0.002	0.000	<0.00045	<0.00045	<0.00045	<0.00045
Molybdenum	mg/L	----	0.06	0.74	0.042	<0.02	<0.02
Nickel	mg/L	0.1	0.001	<0.03	<0.03	<0.03	<0.03
Nitrogen, Total as N	mg/L	10	0.1	<0.15	<0.15	<0.15	<0.15
Potassium	mg/L	----	1.0	2.4	<1	0.3	<1
Selenium	mg/L	0.05	0.0003	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	----	0.000	<0.005	<0.005	<0.005	<0.005
Sodium	mg/L	----	5.8	4	<1.5	<1.5	<1.5
Sulfate	mg/L	----	9	15	1.4	<1.5	0.6
Thallium	mg/L	0.002	0.0001	<0.001	0.0003	0.0002	0.0003
TDS	mg/L	----	171	91	29	<25	57
Uranium	mg/L	----	0.0002	0.018	<0.005	<0.005	<0.005
Zinc	mg/L	----	0.00	<0.02	<0.02	<0.02	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 8: Granodiorite <1.2: Geochemical unit comparison

Parameter	Units	AWQS	Granodiorite: <1.2	RNW-HB-003 (919-925.5)
Source			CRF	HCT
pH[1]	s.u.	----	5.53	6.03
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	2.8	4.22
Aluminum	mg/L	----	0.7	0.095
Antimony	mg/L	0.006	0.0002	<0.0025
Arsenic	mg/L	0.05	0.000	0.002
Barium	mg/L	2	0.01	0.11
Beryllium	mg/l	0.004	0.003	<0.001
Boron	mg/l	----	0.00	0.03
Cadmium	mg/L	0.005	0.0092	<0.001
Calcium	mg/L	----	19.5	16
Chloride	mg/L	----	1.4	2.6
Chromium	mg/L	0.1	0.01	<0.005
Copper	mg/L	----	0.67	<0.04
Fluoride	mg/L	4.0	0.64	0.71
Iron	mg/L	-	0.117	1.83
Lead	mg/L	0.05	0.0133	<0.0025
Magnesium	mg/L	----	3.5	2.7
Manganese	mg/L	----	0.12	0.025
Mercury	mg/L	0.002	0.000	<0.00045
Molybdenum	mg/L	----	0.00	0.003
Nickel	mg/L	0.1	0.027	<0.03
Nitrogen, Total as N	mg/L	10	0.1	<0.21
Potassium	mg/L	----	1.3	5.4
Selenium	mg/L	0.05	0.0003	0.0015
Silver	mg/L	----	0.004	<0.005
Sodium	mg/L	----	5.2	5.2
Sulfate	mg/L	----	53	51
Thallium	mg/L	0.002	0.0001	0.0005
TDS	mg/L	----	89	90
Uranium	mg/L	----	0.0002	<0.005
Zinc	mg/L	----	0.16	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 9: Granodiorite 1.2-3.0: Geochemical unit comparison

Parameter	Units	AWQS	Granodiorite: 1.2-3.0	RNW-HB-093 (729.5-739.5)	RNW-HB-141 (529.5-535)
Source			CRF	MWMP	HCT
pH[1]	s.u.	----	7.41	5.78	7.83
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	69.6	2.2	12.81
Aluminum	mg/L	----	0.501	<0.05	0.056
Antimony	mg/L	0.006	0.0002	<0.0025	<0.0025
Arsenic	mg/L	0.05	0.011	<0.005	0.0022
Barium	mg/L	2	0.022	<0.02	0.12
Beryllium	mg/l	0.004	0.00	<0.001	<0.001
Boron	mg/l	----	0.000	<0.1	0.03
Cadmium	mg/L	0.005	0.0001	<0.001	<0.001
Calcium	mg/L	----	10.1	0.65	11
Chloride	mg/L	----	2.83	<1	2.1
Chromium	mg/L	0.1	0.00	<0.005	<0.005
Copper	mg/L	----	0.04	<0.04	0.006
Fluoride	mg/L	4.0	0.731	<0.3	0.5
Iron	mg/L	-	0.090	<0.1	0.132
Lead	mg/L	0.05	0.0004	<0.0025	<0.0025
Magnesium	mg/L	----	1.199	0.06	1.5
Manganese	mg/L	----	0.00	0.003	0.01
Mercury	mg/L	0.002	0.000	<0.00045	<0.00045
Molybdenum	mg/L	----	0.00	<0.02	0.081
Nickel	mg/L	0.1	0.001	<0.03	<0.03
Nitrogen, Total as N	mg/L	10	0.050	<0.15	<0.21
Potassium	mg/L	----	5.2	<0.02	3
Selenium	mg/L	0.05	0.0003	0.0016	0.0021
Silver	mg/L	----	0.000	<0.005	<0.005
Sodium	mg/L	----	15	<1.5	6.5
Sulfate	mg/L	----	7	<1.5	30
Thallium	mg/L	0.002	0.0001	<0.001	0.0005
TDS	mg/L	----	112	46	68
Uranium	mg/L	----	0.0002	<0.005	0.0062
Zinc	mg/L	----	0.00	<0.02	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 10: Granodiorite >3.0: Geochemical unit comparison

Parameter	Units	AWQS	Granodiorite: >3.0	RNW-HB-012 (250-262)	RNW-HB-012 (266-276.5)	RNW-HB-161 (909-920)	RNW-HB-174 (201-217)
Source			CRF	MWMP	MWMP	MWMP	MWMP
pH[1]	s.u.	----	7.41	6.48	6.57	6.49	6.91
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	69.6	2.5	2.5	3.7	9.1
Aluminum	mg/L	----	0.501	<0.05	0.13	<0.05	<0.05
Antimony	mg/L	0.006	0.0002	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	mg/L	0.05	0.011	<0.005	<0.005	<0.005	<0.005
Barium	mg/L	2	0.022	<0.02	<0.02	<0.02	<0.02
Beryllium	mg/l	0.004	0.00	<0.001	<0.001	<0.001	<0.001
Boron	mg/l	----	0.000	<0.1	<0.1	<0.1	<0.1
Cadmium	mg/L	0.005	0.0001	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L	----	10.1	0.73	1	1.1	2.8
Chloride	mg/L	----	2.83	<1	<1	<1	0.5
Chromium	mg/L	0.1	0.00	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	----	0.04	<0.04	<0.04	0.008	0.018
Fluoride	mg/L	4.0	0.731	<0.3	<0.3	<0.3	<0.3
Iron	mg/L	-	0.090	<0.1	<0.1	<0.1	<0.1
Lead	mg/L	0.05	0.0004	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	mg/L	----	1.199	<0.5	<0.5	0.07	0.5
Manganese	mg/L	----	0.00	<0.01	<0.01	0.008	0.013
Mercury	mg/L	0.002	0.000	<0.00045	<0.00045	<0.00045	<0.00045
Molybdenum	mg/L	----	0.00	<0.02	<0.02	<0.02	0.004
Nickel	mg/L	0.1	0.001	<0.03	<0.03	<0.03	<0.03
Nitrogen, Total as N	mg/L	10	0.050	<0.15	<0.15	<0.15	<0.15
Potassium	mg/L	----	5.2	<1	<1	<1	0.8
Selenium	mg/L	0.05	0.0003	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	----	0.000	<0.005	<0.005	<0.005	<0.005
Sodium	mg/L	----	15	<1.5	<1.5	<1.5	0.7
Sulfate	mg/L	----	7	<1.5	<1.5	<1.5	1
Thallium	mg/L	0.002	0.0001	<0.001	<0.001	0.0002	0.0003
TDS	mg/L	----	112	71	53	<25	25
Uranium	mg/L	----	0.0002	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	----	0.00	<0.02	<0.02	0.009	0.004

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 11: Scherrer 1.2-3.0: Geochemical unit comparison

Parameter	Units	AWQS	Scherrer: 1.2.-3.0	RNW-HB-080 (757-762)	RNW-HB-129 (552-560)
Source			CRF	MWMP	MWMP
pH[1]	s.u.	----	7.70	7.47	7.61
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	235	25	37
Aluminum	mg/L	----	0.004	0.049	0.029
Antimony	mg/L	0.006	0.0002	<0.0025	<0.0025
Arsenic	mg/L	0.05	0.003	<0.005	<0.005
Barium	mg/L	2	0.05	0.005	<0.02
Beryllium	mg/l	0.004	0.000	<0.001	<0.001
Boron	mg/l	----	0.00	<0.1	0.03
Cadmium	mg/L	0.005	0.0001	<0.001	<0.001
Calcium	mg/L	----	456.9	14	12
Chloride	mg/L	----	11.8	0.5	1.1
Chromium	mg/L	0.1	0.00	<0.005	<0.005
Copper	mg/L	----	0.01	0.009	0.009
Fluoride	mg/L	4.0	0.37	0.24	0.53
Iron	mg/L	-	0.003	<0.1	<0.1
Lead	mg/L	0.05	0.0004	<0.0025	<0.0025
Magnesium	mg/L	----	23.7	1.4	0.76
Manganese	mg/L	----	0.02	0.008	<0.01
Mercury	mg/L	0.002	0.000	<0.00045	<0.00045
Molybdenum	mg/L	----	0.00	0.49	0.013
Nickel	mg/L	0.1	0.001	<0.03	<0.03
Nitrogen, Total as N	mg/L	10	0.1	0.06	0.13
Potassium	mg/L	----	13.1	1.4	<0.02
Selenium	mg/L	0.05	0.0003	0.0023	0.0022
Silver	mg/L	----	0.000	<0.005	<0.005
Sodium	mg/L	----	18.4	2.9	6.6
Sulfate	mg/L	----	862	20	4.2
Thallium	mg/L	0.002	0.0001	<0.001	<0.001
TDS	mg/L	----	1392	91	180
Uranium	mg/L	----	0.0002	0.016	<0.005
Zinc	mg/L	----	0.00	<0.02	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 12: Scherrer >3.0: Geochemical unit comparison

Parameter	Units	AWQS	Scherrer: >3.0	RNW-HB-069 (683-692.5)	RNW-HB-094 (1-10)	RNW-HB-129 (623-633)
Source			CRF	MWMP	MWMP	MWMP
pH[1]	s.u.	----	9.47	7.51	7.27	7.35
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	112.1	13	28	16
Aluminum	mg/L	----	0.004	<0.05	0.047	<0.05
Antimony	mg/L	0.006	0.0002	<0.0025	<0.0025	<0.0025
Arsenic	mg/L	0.05	0.002	<0.005	<0.005	<0.005
Barium	mg/L	2	0.027	<0.02	0.006	<0.02
Beryllium	mg/l	0.004	0.00	<0.001	<0.001	<0.001
Boron	mg/l	----	0.000	<0.1	0.03	0.02
Cadmium	mg/L	0.005	0.0001	<0.001	<0.001	<0.001
Calcium	mg/L	----	33.4	12	7.9	9.5
Chloride	mg/L	----	1.58	<1	1.2	<1
Chromium	mg/L	0.1	0.00	<0.005	<0.005	<0.005
Copper	mg/L	----	0.00	<0.04	0.017	0.007
Fluoride	mg/L	4.0	2.751	<0.3	<0.3	<0.3
Iron	mg/L	-	0.003	<0.1	<0.1	<0.1
Lead	mg/L	0.05	0.0004	<0.0025	<0.0025	<0.0025
Magnesium	mg/L	----	6.793	<0.5	0.98	0.96
Manganese	mg/L	----	0.00	0.012	0.003	0.006
Mercury	mg/L	0.002	0.000	<0.00045	<0.00045	<0.00045
Molybdenum	mg/L	----	0.0	0.13	0.004	0.32
Nickel	mg/L	0.1	0.001	<0.03	<0.03	<0.03
Nitrogen, Total as N	mg/L	10	0.050	<0.15	0.06	<0.15
Potassium	mg/L	----	7	<1	<0.02	0.3
Selenium	mg/L	0.05	0.0003	0.0062	0.0019	<0.005
Silver	mg/L	----	0.00	<0.005	<0.005	<0.005
Sodium	mg/L	----	10	<1.5	4.4	0.6
Sulfate	mg/L	----	52	16	4.3	9.1
Thallium	mg/L	0.002	0.0001	<0.001	<0.001	0.0006
TDS	mg/L	----	226	95	46	32
Uranium	mg/L	----	0.0002	<0.005	<0.005	<0.005
Zinc	mg/L	----	0.00	<0.02	<0.02	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 13: Qmp 1.2-3.0: Geochemical unit comparison

Parameter	Units	AWQS	Qmp: 1.2.-3.0	RNW-HB-122 (350-354)
Source			CRF	HCT
pH[1]	s.u.	----	7.41	6.84
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	69.6	8.71
Aluminum	mg/L	----	0.501	0.035
Antimony	mg/L	0.006	0.0002	0.0053
Arsenic	mg/L	0.05	0.011	0.0015
Barium	mg/L	2	0.022	0.062
Beryllium	mg/l	0.004	0.00	<0.001
Boron	mg/l	----	0.000	0.05
Cadmium	mg/L	0.005	0.0001	0.01
Calcium	mg/L	----	10.1	91
Chloride	mg/L	----	2.83	6.7
Chromium	mg/L	0.1	0.00	<0.005
Copper	mg/L	----	0.04	7.8
Fluoride	mg/L	4.0	0.731	0.86
Iron	mg/L	-	0.090	0.321
Lead	mg/L	0.05	0.0004	<0.0025
Magnesium	mg/L	----	1.199	29
Manganese	mg/L	----	0.00	0.21
Mercury	mg/L	0.002	0.000	<0.00045
Molybdenum	mg/L	----	0.00	0.004
Nickel	mg/L	0.1	0.001	<0.03
Nitrogen, Total as N	mg/L	10	0.050	<0.21
Potassium	mg/L	----	5.2	5.4
Selenium	mg/L	0.05	0.0003	0.019
Silver	mg/L	----	0.000	<0.005
Sodium	mg/L	----	15	16
Sulfate	mg/L	----	7	367
Thallium	mg/L	0.002	0.0001	0.0006
TDS	mg/L	----	112	534
Uranium	mg/L	----	0.0002	0.0061
Zinc	mg/L	----	0.00	0.28

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

Table 14: Qmp >3.0: Geochemical unit comparison

Parameter	Units	AWQS	Qmp: >3.0	RNW-HB-092 (258-264)	RNW-HB-107 (181-189)	RNW-HB-122 (341-350)
Source			CRF	MWMP	HCT	MWMP
pH[1]	s.u.	----	7.41	6.86	8.01	7.27
Alkalinity, Total[1]	mg/L as $CaCO_3$	----	69.6	15	13.9	18
Aluminum	mg/L	----	0.501	<0.05	0.065	0.041
Antimony	mg/L	0.006	0.0002	<0.0025	<0.0025	<0.0025
Arsenic	mg/L	0.05	0.011	<0.005	0.0024	<0.005
Barium	mg/L	2	0.022	<0.02	0.12	<0.02
Beryllium	mg/l	0.004	0.00	<0.001	<0.001	<0.001
Boron	mg/l	----	0.000	<0.1	0.05	0.02
Cadmium	mg/L	0.005	0.0001	<0.001	<0.001	<0.001
Calcium	mg/L	----	10.1	5.3	11.2	5.7
Chloride	mg/L	----	2.83	0.3	2.4	4
Chromium	mg/L	0.1	0.00	<0.005	<0.005	<0.005
Copper	mg/L	----	0.04	<0.04	<0.04	0.012
Fluoride	mg/L	4.0	0.731	0.1	0.2	0.12
Iron	mg/L	-	0.090	<0.1	0.33	<0.1
Lead	mg/L	0.05	0.0004	<0.0025	<0.0025	<0.0025
Magnesium	mg/L	----	1.199	0.68	2.5	1.2
Manganese	mg/L	----	0.00	0.008	0.01	0.013
Mercury	mg/L	0.002	0.000	<0.00045	<0.00045	<0.00045
Molybdenum	mg/L	----	0.00	<0.02	0.013	0.005
Nickel	mg/L	0.1	0.001	<0.03	<0.03	<0.03
Nitrogen, Total as N	mg/L	10	0.050	<0.15	<0.21	<0.15
Potassium	mg/L	----	5.2	<0.02	1.6	<0.02
Selenium	mg/L	0.05	0.0003	0.0018	0.0019	0.0022
Silver	mg/L	----	0.000	<0.005	<0.005	<0.005
Sodium	mg/L	----	15	0.8	5.4	3.3
Sulfate	mg/L	----	7	1.4	21	2.8
Thallium	mg/L	0.002	0.0001	<0.001	0.0005	<0.001
TDS	mg/L	----	112	51	58	140
Uranium	mg/L	----	0.0002	<0.005	0.032	<0.005
Zinc	mg/L	----	0.00	<0.02	<0.02	<0.02

Highlighted green cells indicate value less than Week 0 CRF
Maximum value from HCT sample used in comparison
[1]Indicates minimum value from HCT used

REFERENCES

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LIMITATIONS

This investigation has been conducted using a standard of care consistent with that expected of scientific and engineering professionals undertaking similar work under similar conditions in Nevada. No warranty is expressed or implied.

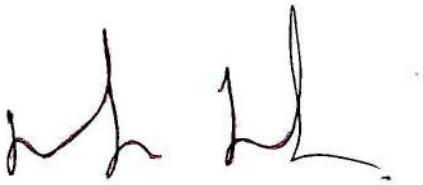
This memorandum is prepared for the sole use of Rosemont Copper Company. Any use, interpretation, or reliance on this information by any third party, is at the sole risk of that party, and Piteau Associates accepts no liability for such unauthorized use.

Respectfully submitted,

PITEAU ASSOCIATES USA LTD.

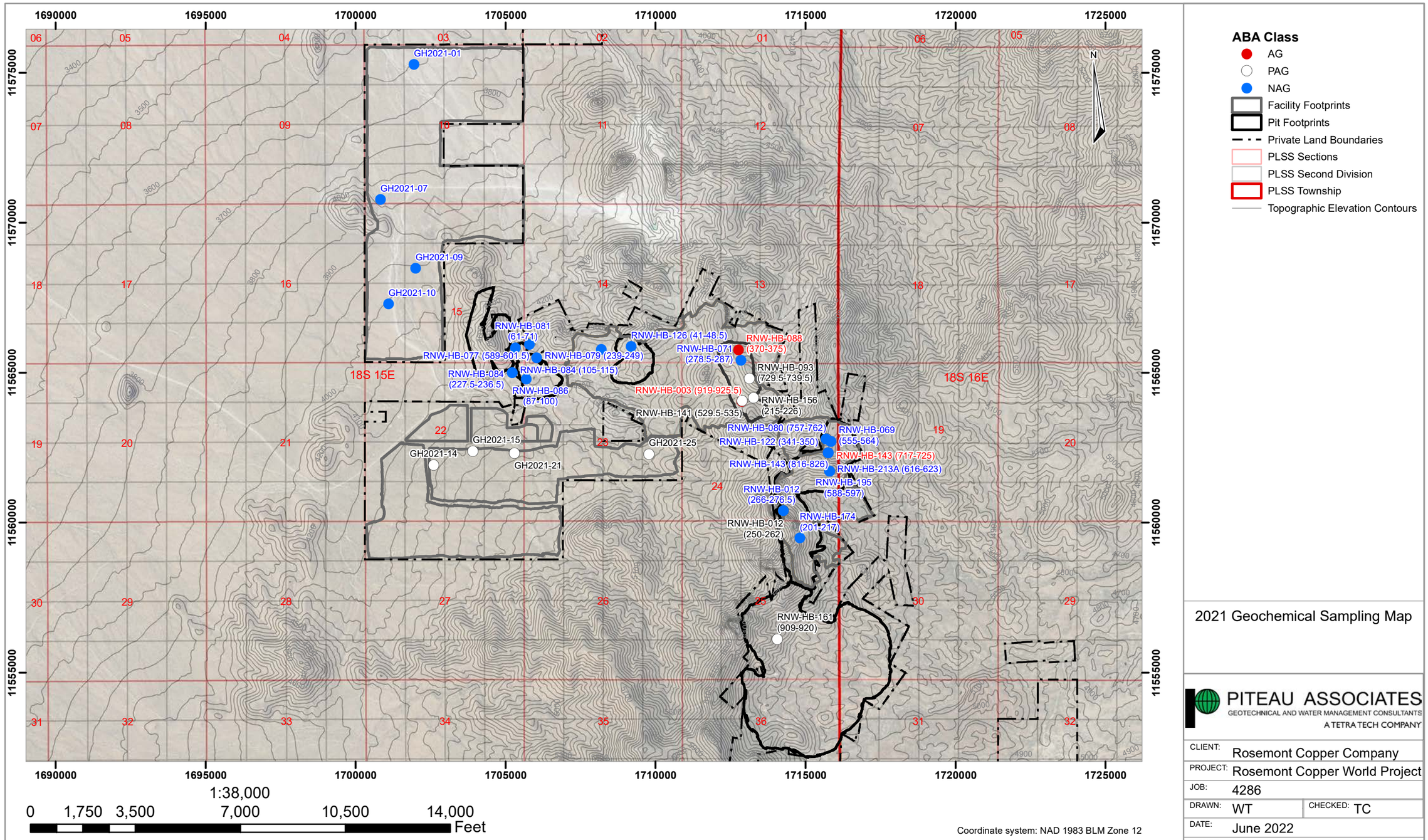
Tyler Cluff, PG
Senior Hydrogeologist / Geochemist

Reviewed by:



Martin Williams, PhD
Chief Advisor Geochemistry

FIGURES



2021 Geochemical Sampling Map

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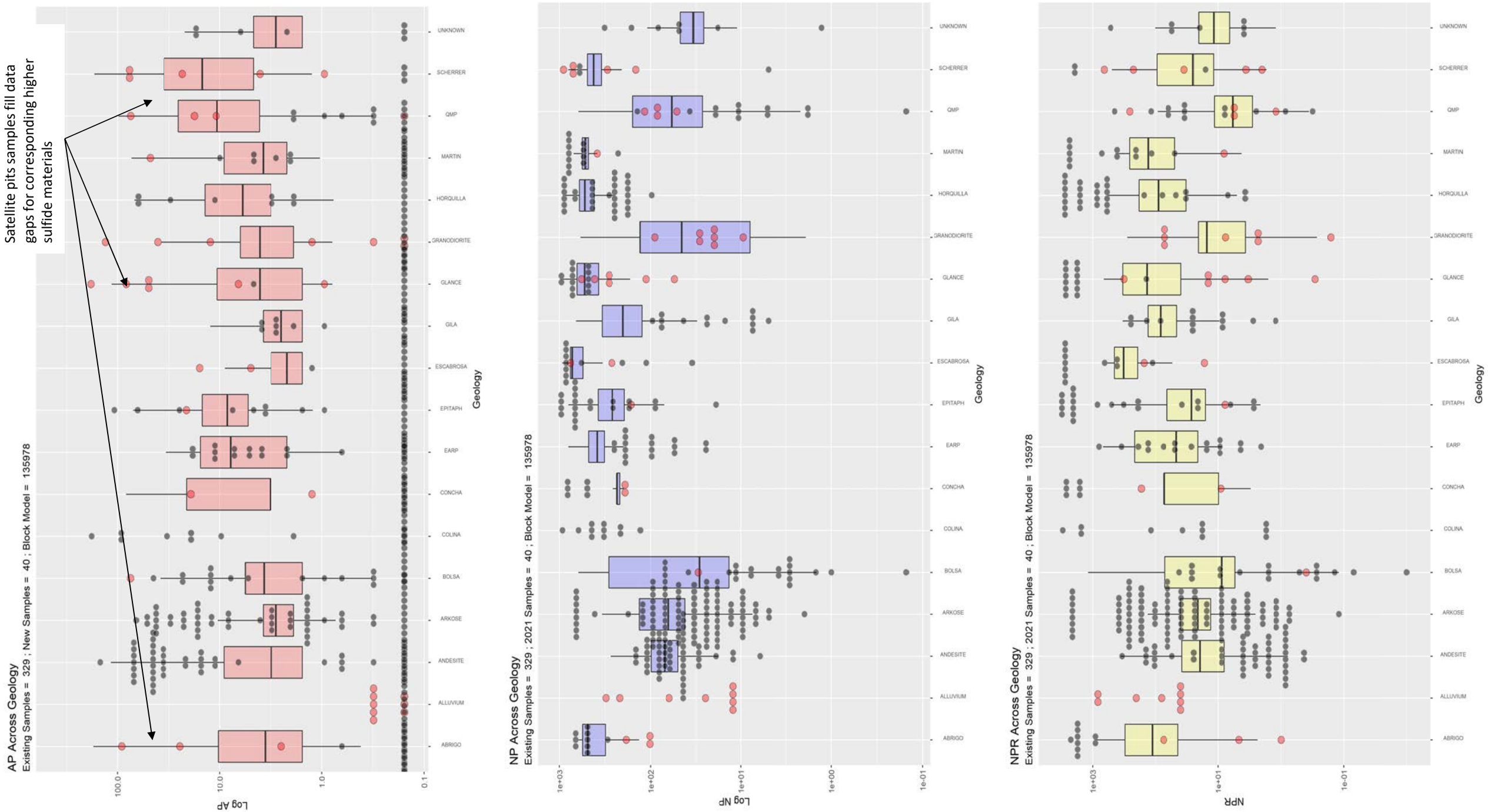
A TETRA TECH COMPANY

CLIENT:	Rosemont Copper Company		
PROJECT:	Rosemont Copper World Project		
JOB:	4286		
DRAWN:	WT	CHECKED:	TC
DATE:	June 2022		
FIGURE:	1		



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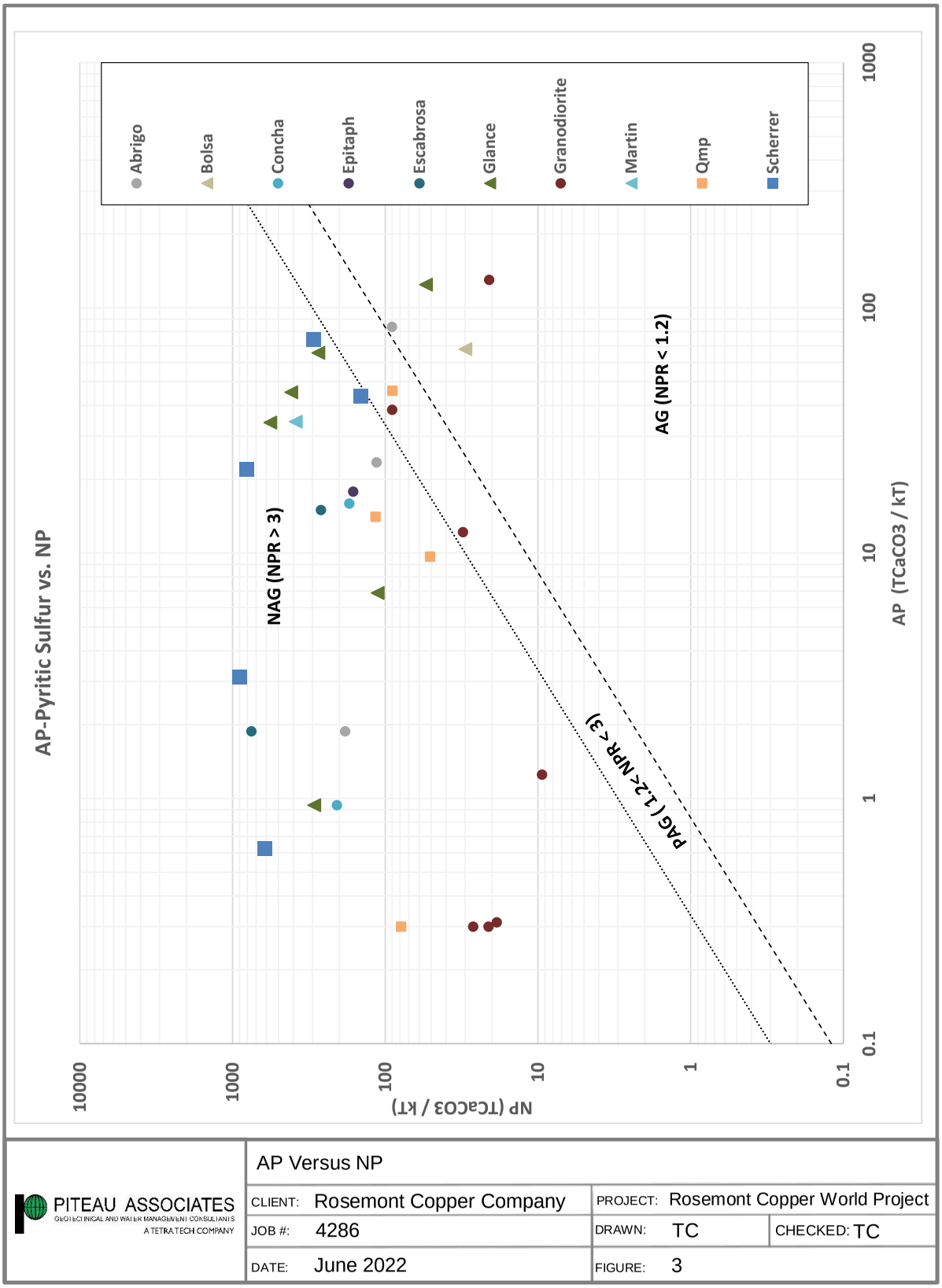
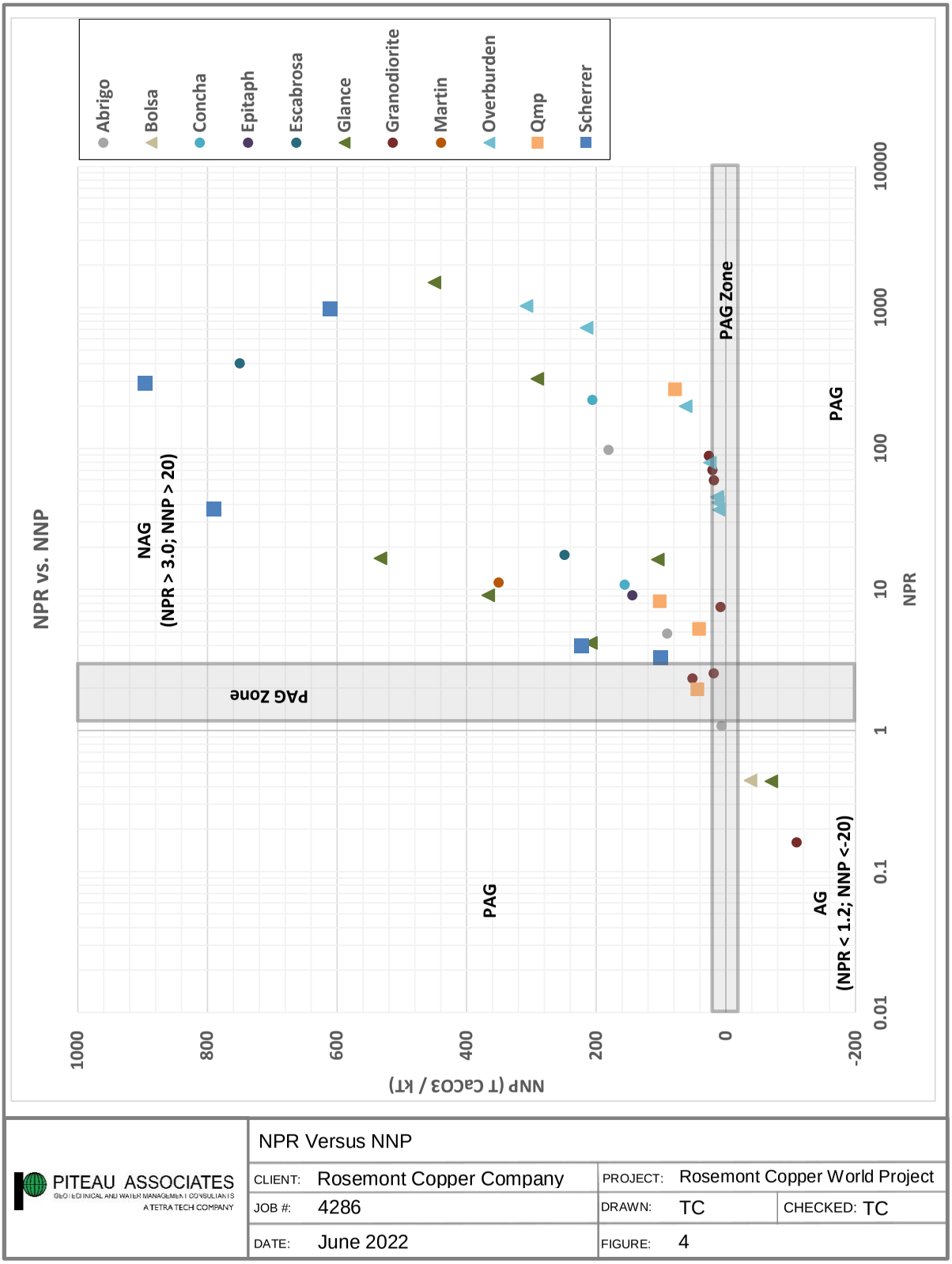
Sample Data Versus Geologic Units			
CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
JOB 4286		DRAWN: TC	CHECKE TC
DATE: June, 2022		FIGURE: 2	

H:\Project\4286\2021 RP21 APP\03_Deliverables\01_Memos\4286 TM22-01\Figures\Excel\[Figure 2 ABA Coverage



PITEAU ASSOCIATES GEOTECHNICAL AND WATER MANAGEMENT CONSULTANTS A TETRA TECH COMPANY	AP Versus NP			
	CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
	JOB #: 4286		DRAWN: TC	CHECKED: TC
	DATE: June 2022		FIGURE: 3	



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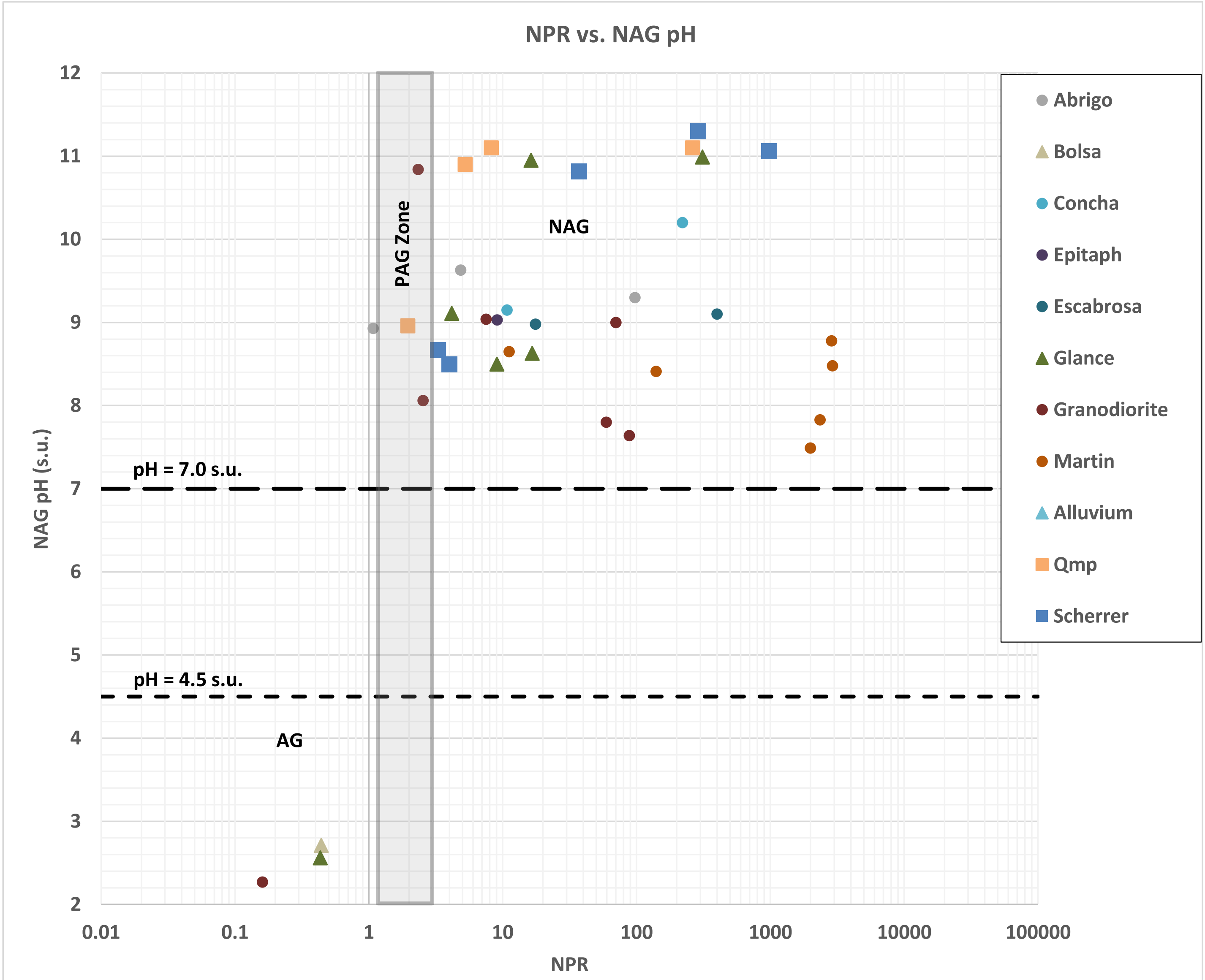
NPR Versus NNP

CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB #:	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	4



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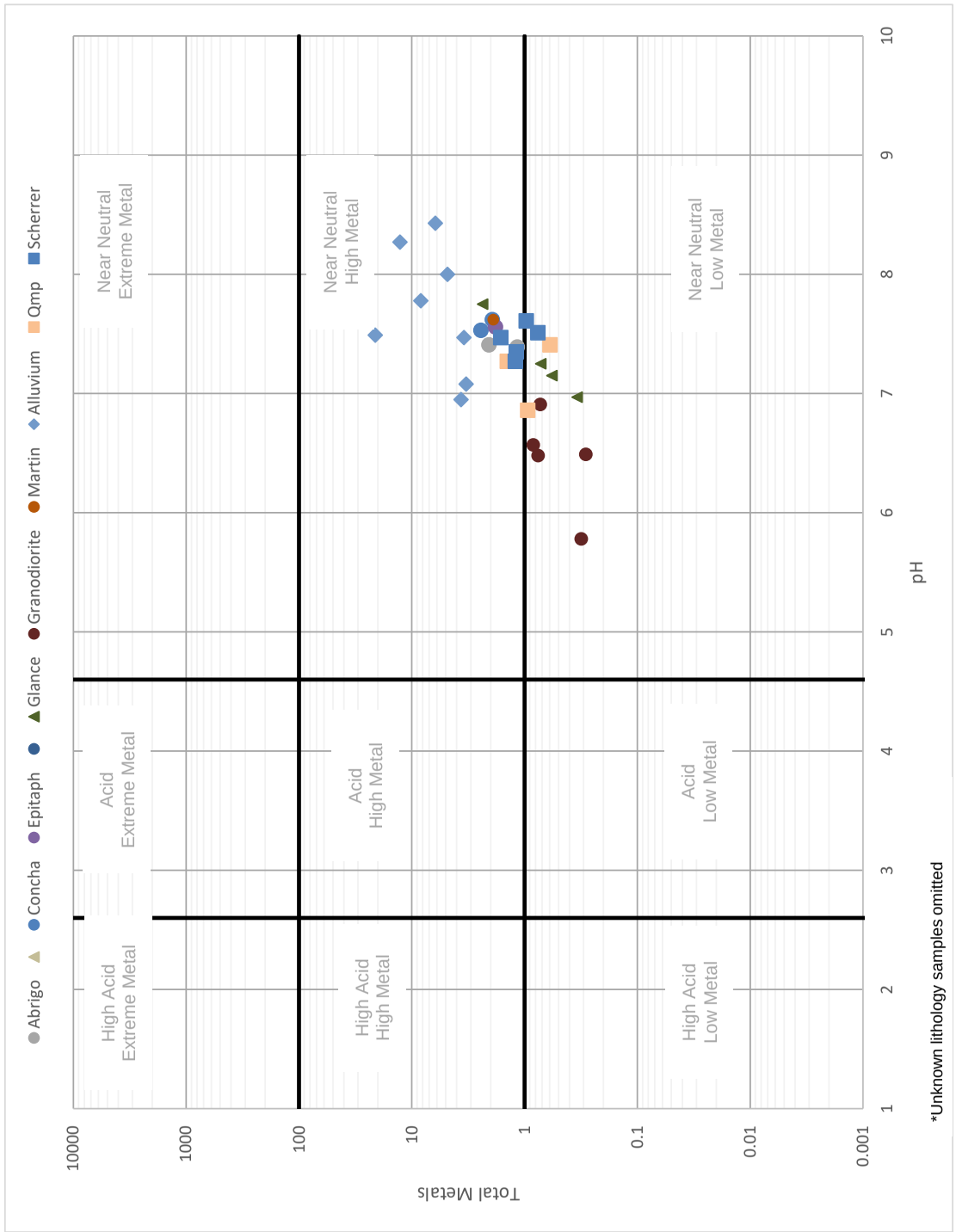
NPR Versus NAG pH

CLIENT: Rosemont Copper Company
PROJECT: Rosemont Copper World Project
JOB #: 4286
DRAWN: TC
CHECKED: TC
DATE: June 2022
FIGURE: 5



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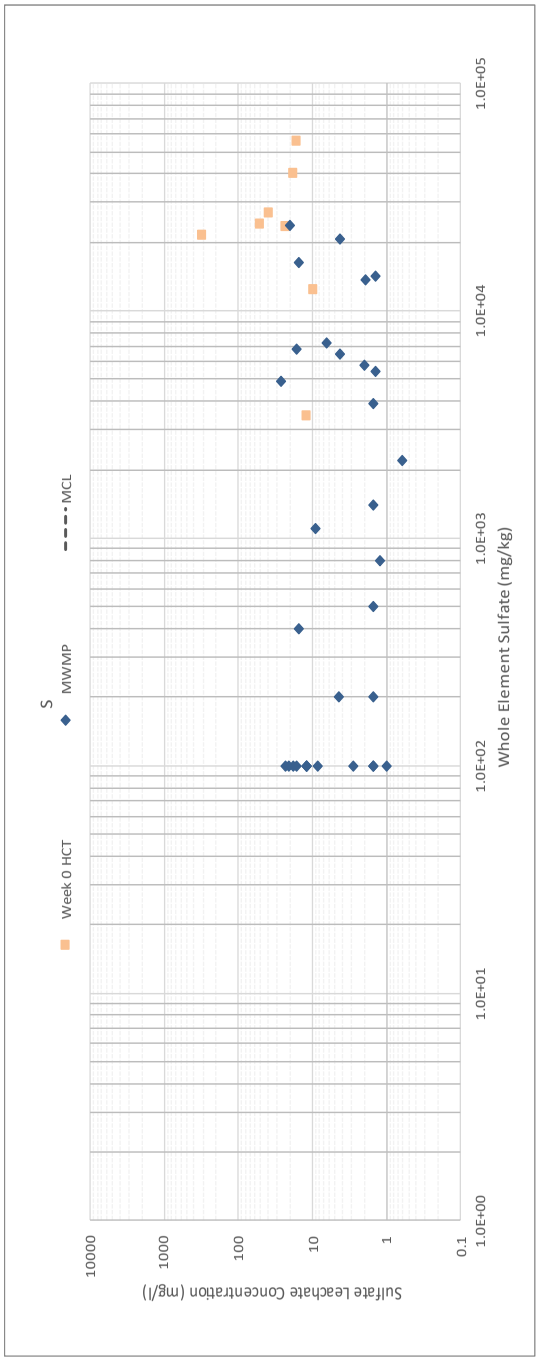
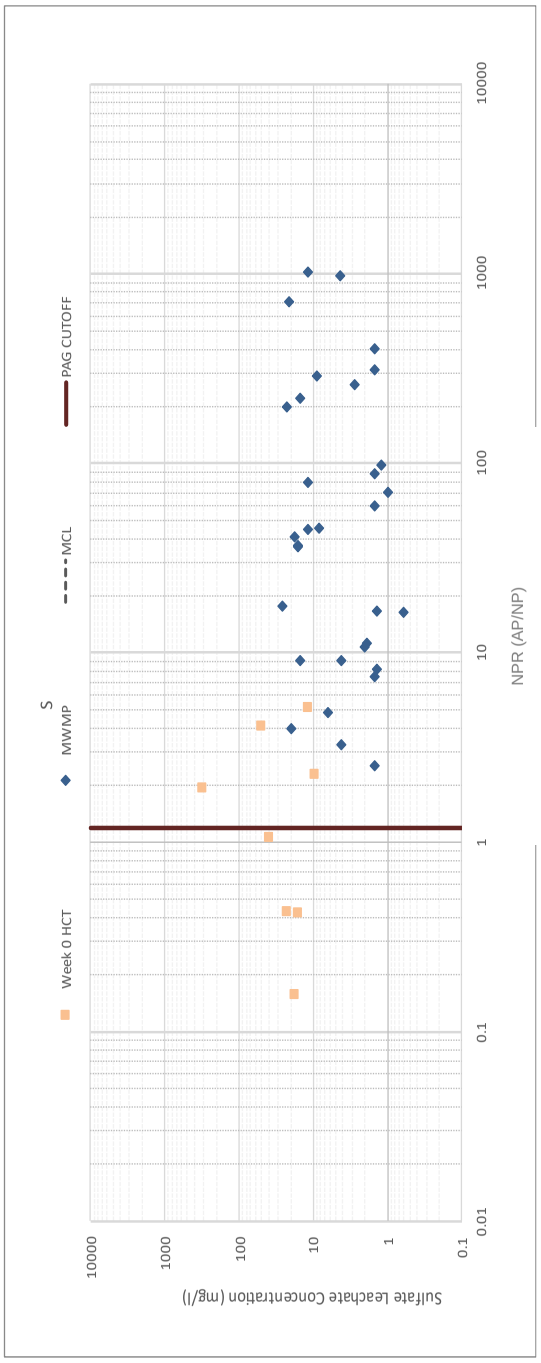
MWMP pH vs. Total Metals

CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
JOB #: 4286		DRAWN: TC	CHECKED: TC
DATE: June 2022		FIGURE: 6	





PITEAU ASSOCIATES GEOTECHNICAL AND WATER MANAGEMENT CONSULTANTS A TETRA TECH COMPANY	MWMP and Week 0 HCT : Sulfate		
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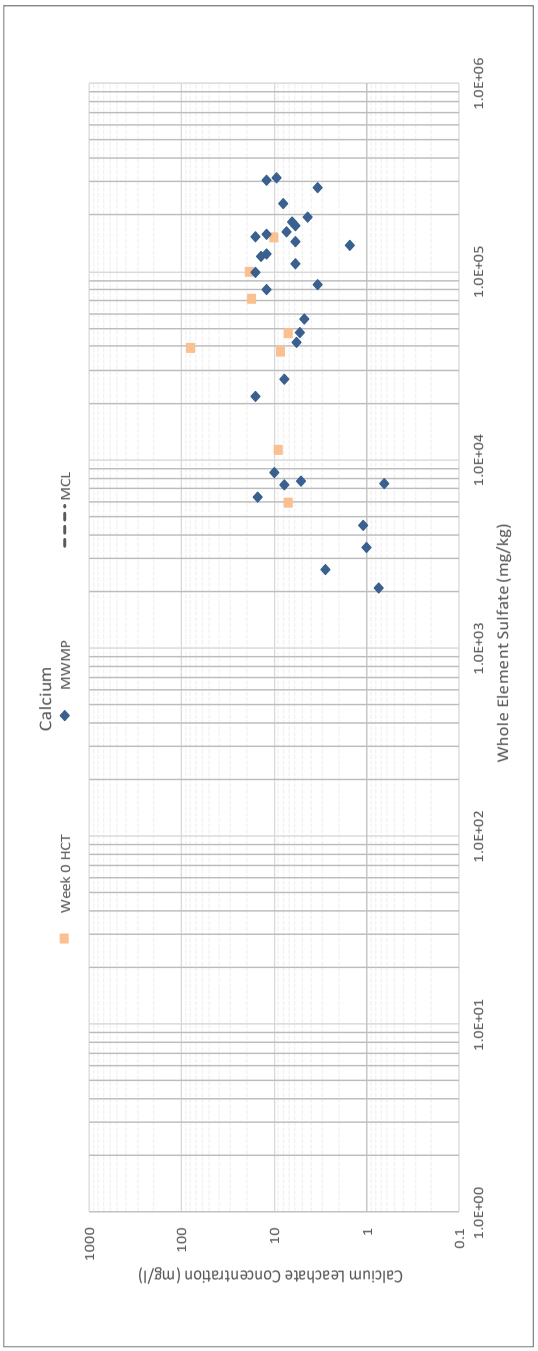
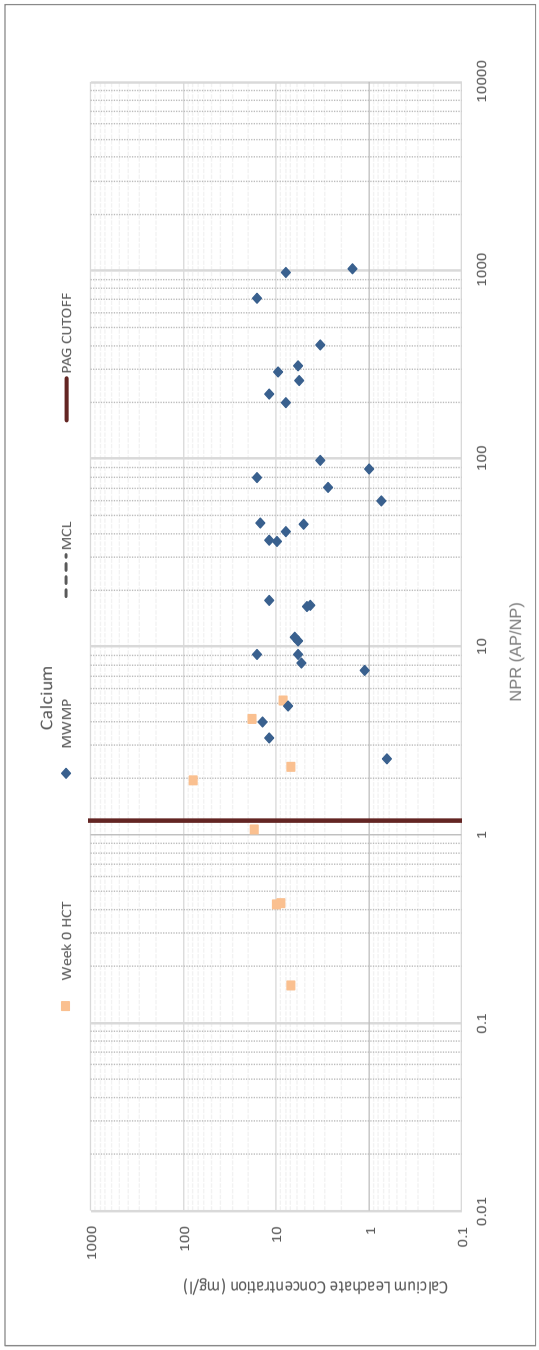
	DATE: June 2022	FIGURE: 7	





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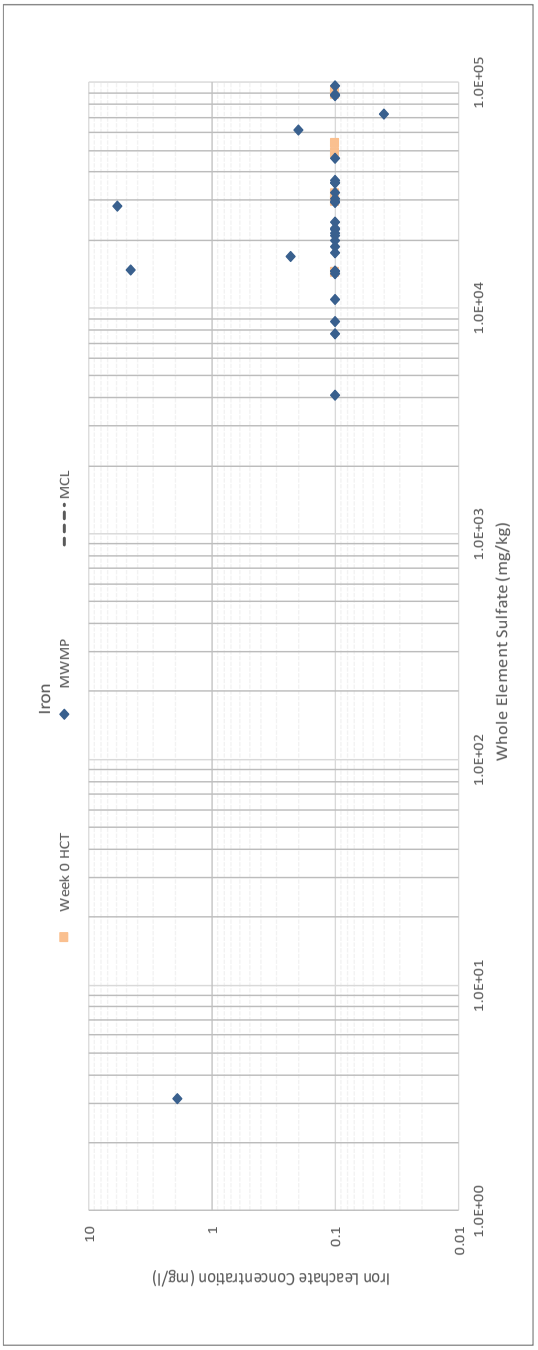
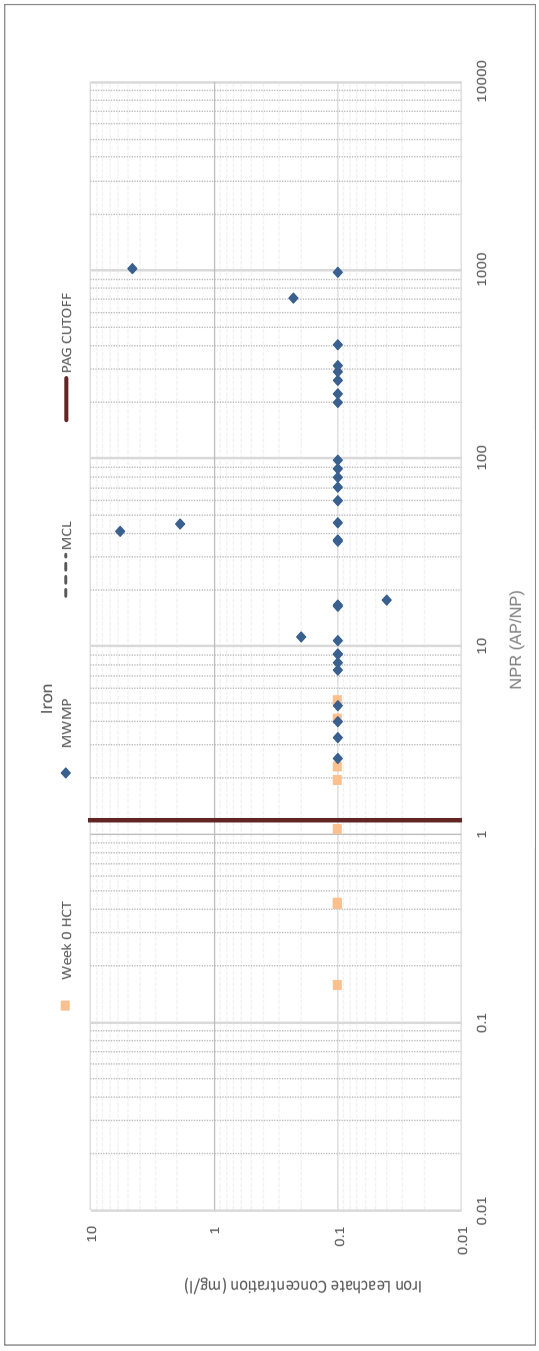
MWMP and Week 0 HCT : Calcium

CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
JOB #: 4286		DRAWN: TC	CHECKED:TC
DATE: June 2022		FIGURE: 8	





PITEAU ASSOCIATES GEOTECHNICAL AND WATER MANAGEMENT CONSULTANTS A TETRA TECH COMPANY	MWMP and Week 0 HCT : Iron		
	CLIENT: Rosemont Copper Company	PROJECT: Rosemont Copper World Project	
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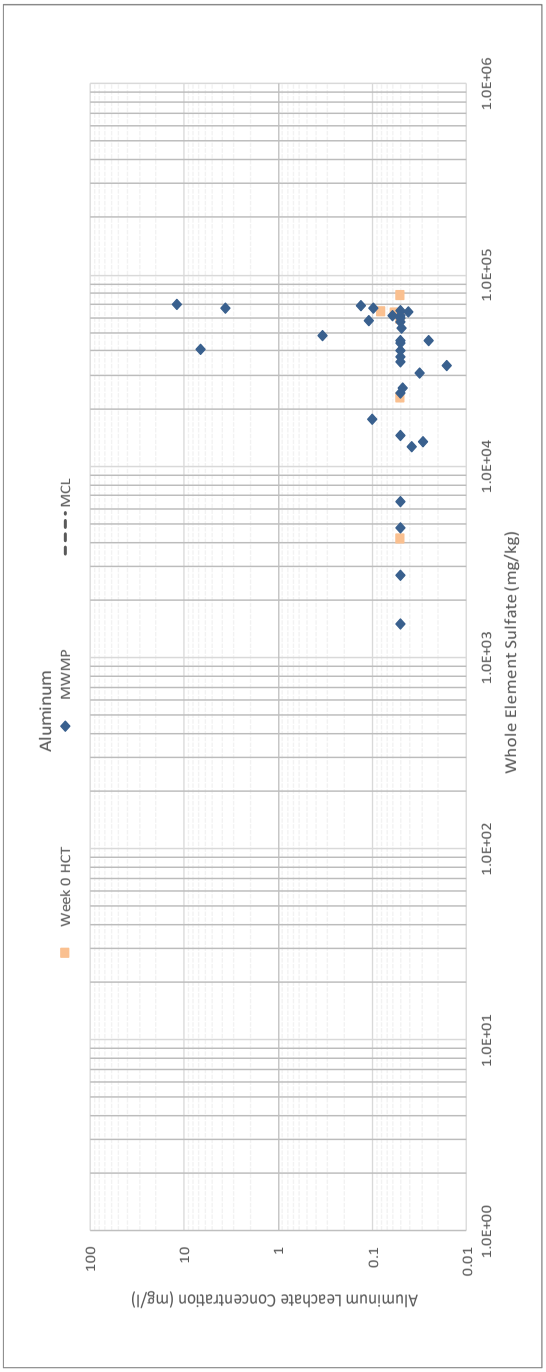
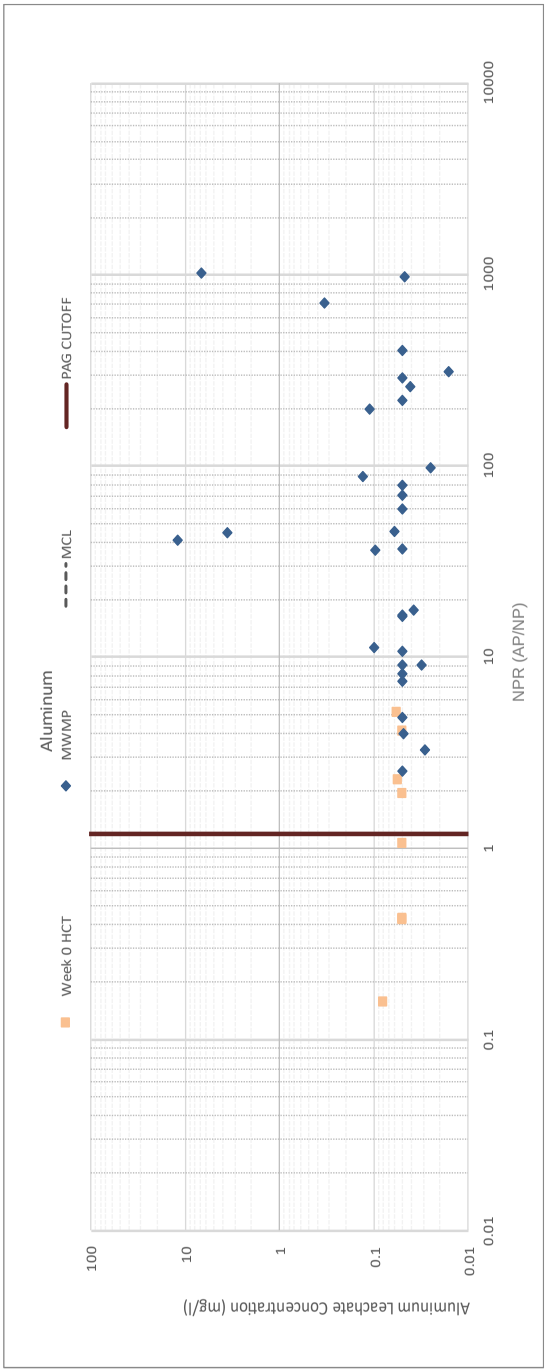
	DATE: June 2022	FIGURE: 9	





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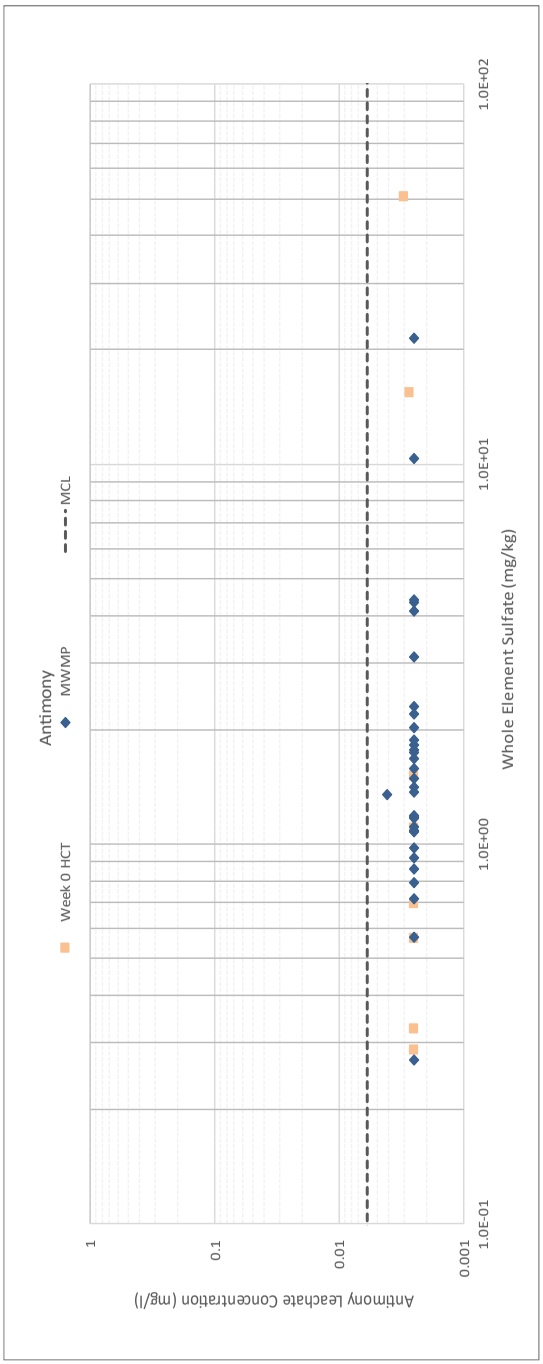
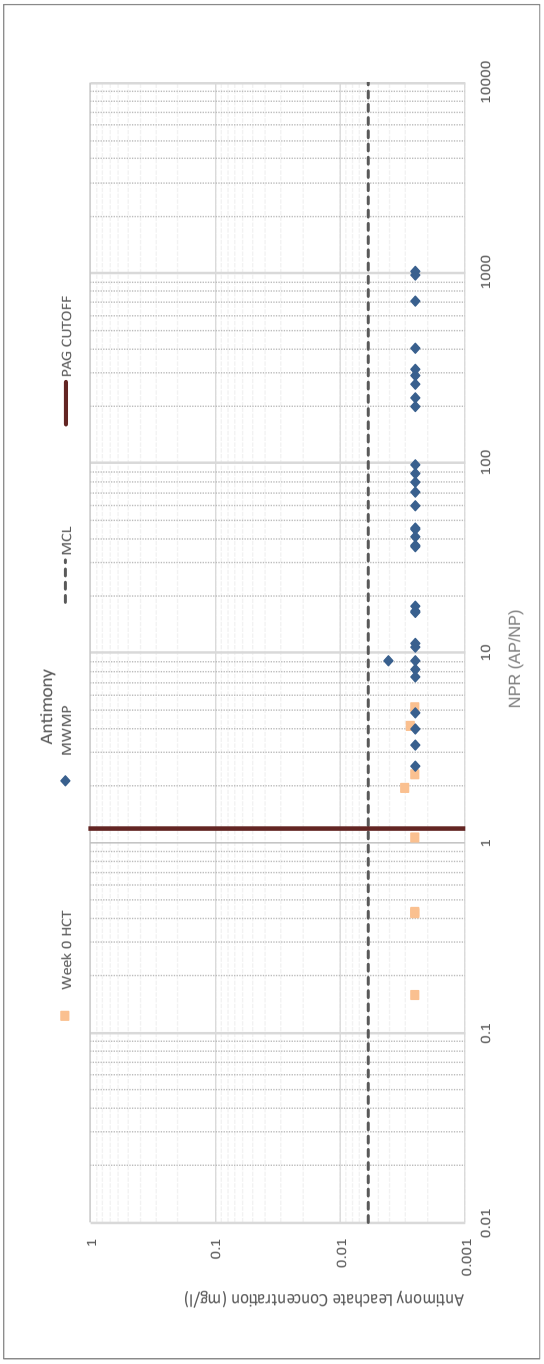
MWMP and Week 0 HCT : Aluminum

CLIENT:	Rosemont Copper Company	PROJECT: Rosemont Copper World Project	
JOB #:	4286	DRAWN: TC	CHECKED:TC
DATE:	June 2022	FIGURE: 10	





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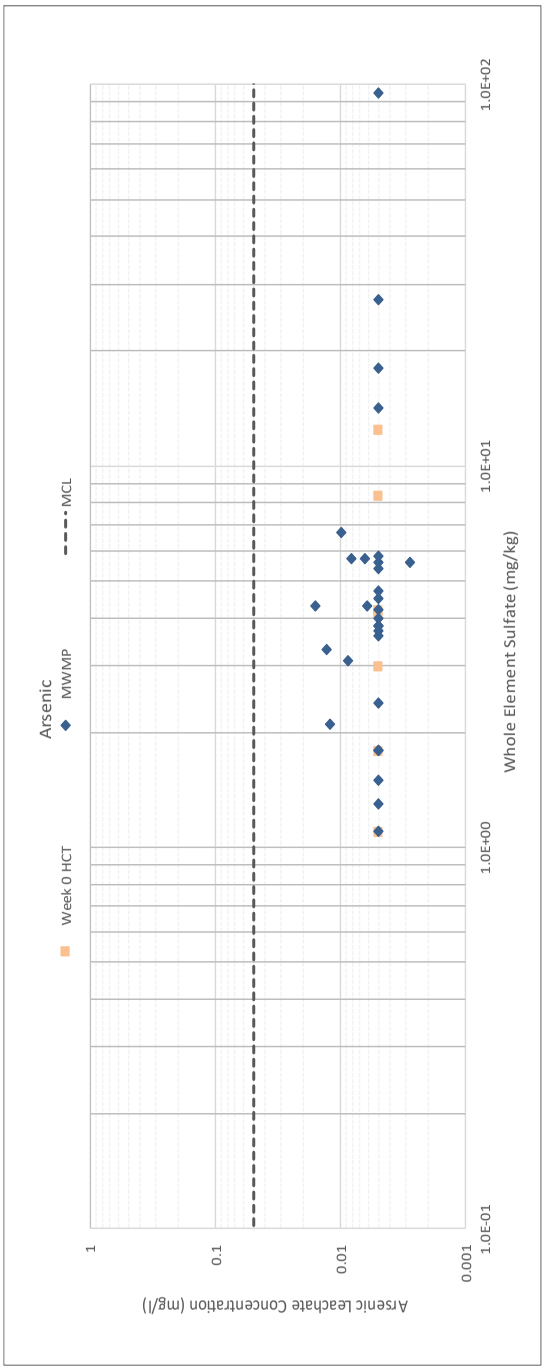
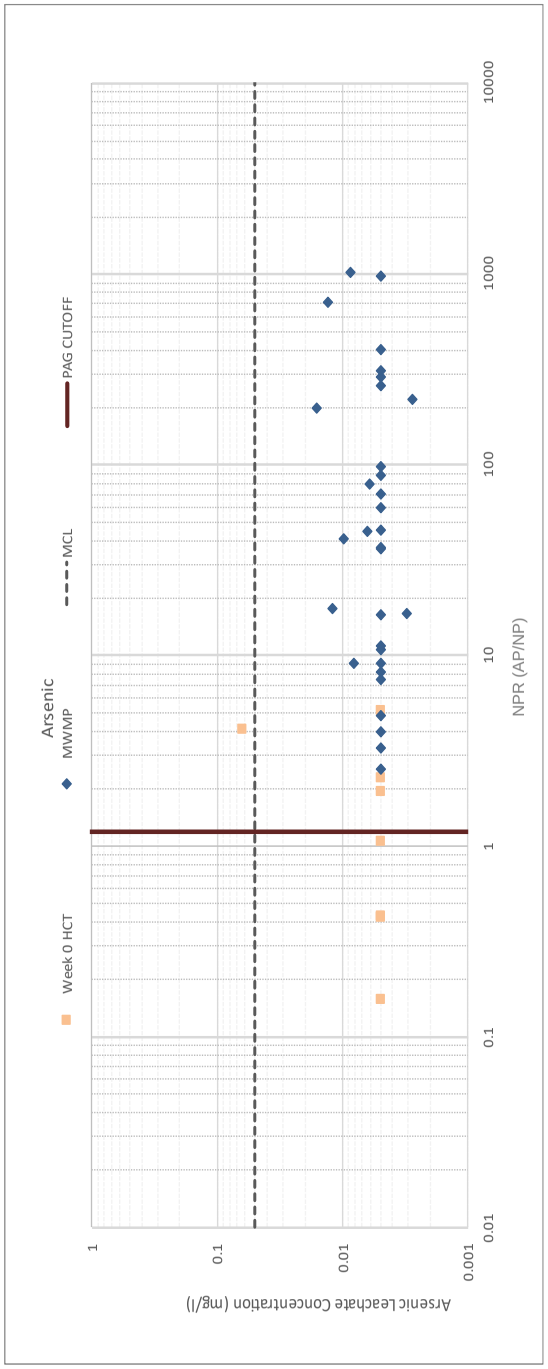
MWMP and Week 0 HCT : Antimony

CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB #:	4286	DRAWN: TC	CHECKED:TC
DATE:	June 2022	FIGURE:	11





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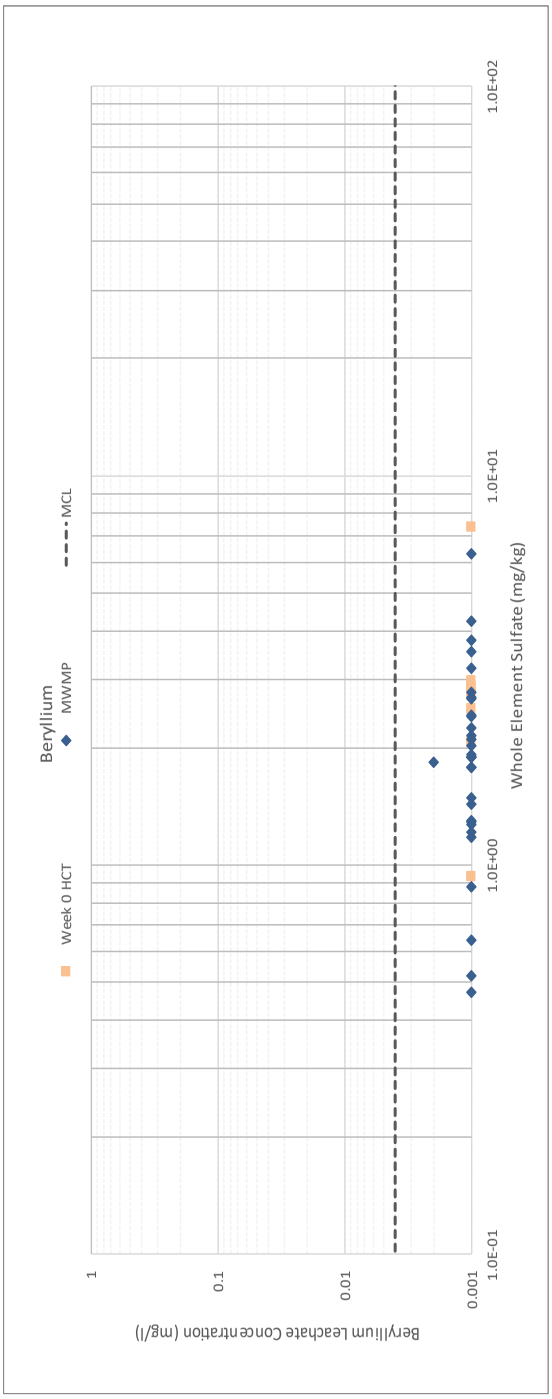
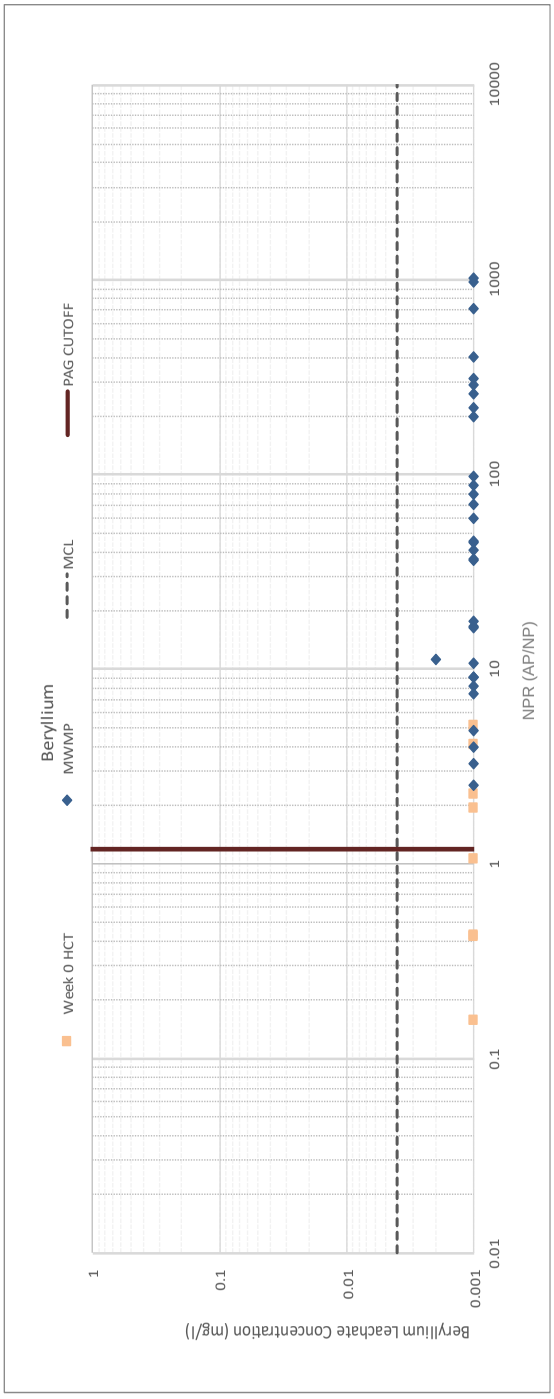
MWMP and Week 0 HCT : Arsenic

CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project		
JOB #:	4286	DRAWN:	TC	CHECKED:	TC
DATE:	June 2022	FIGURE:	12		





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MWMP and Week 0 HCT : Beryllium

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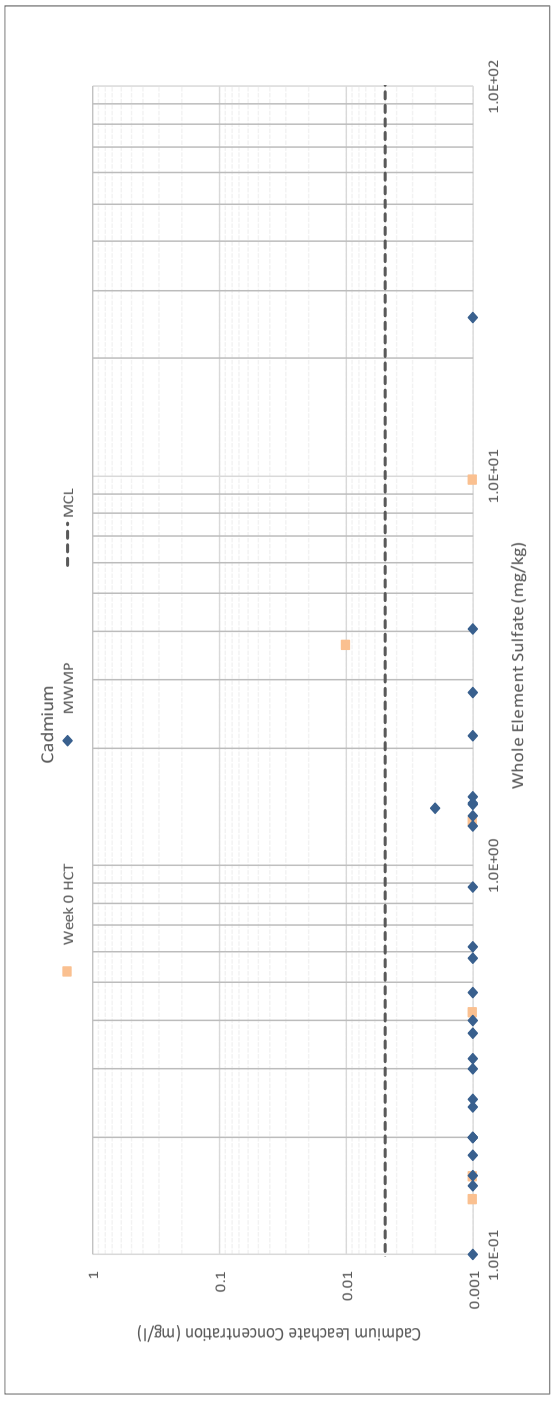
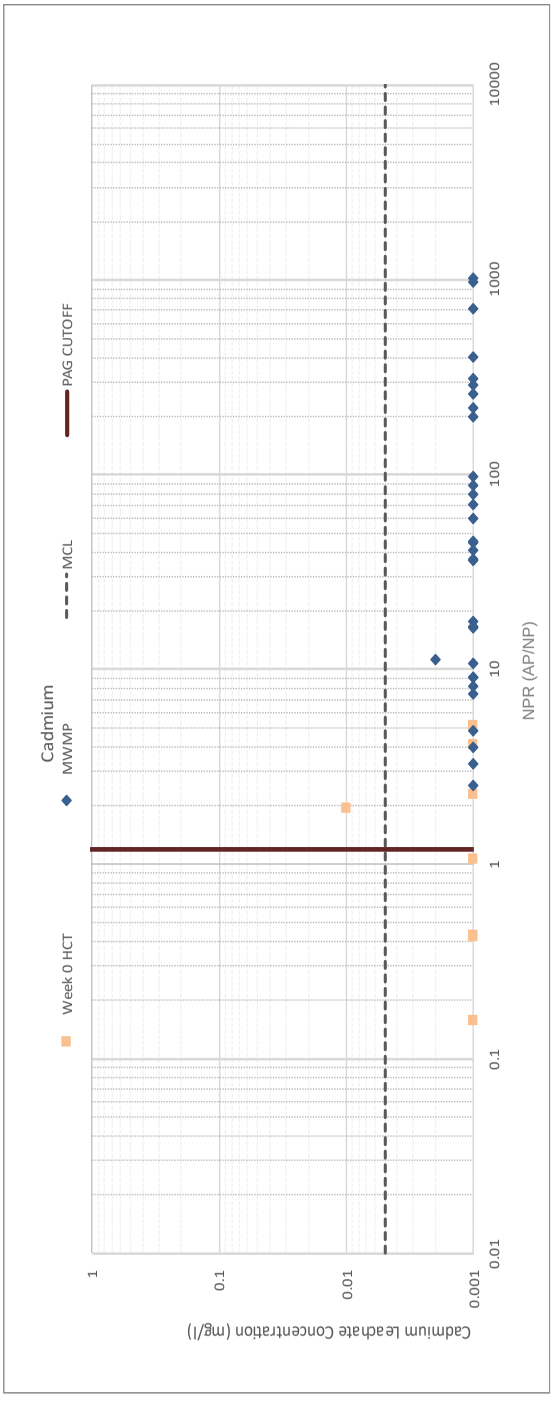
DATE: June 2022		FIGURE: 13	





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MWMP and Week 0 HCT : Cadmium

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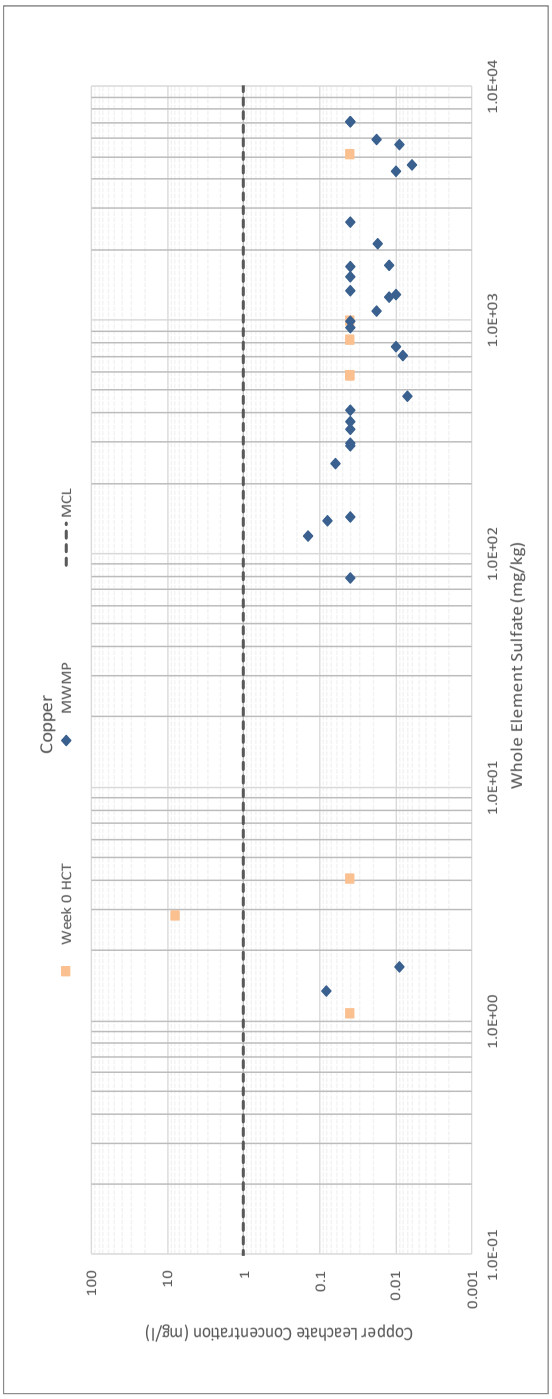
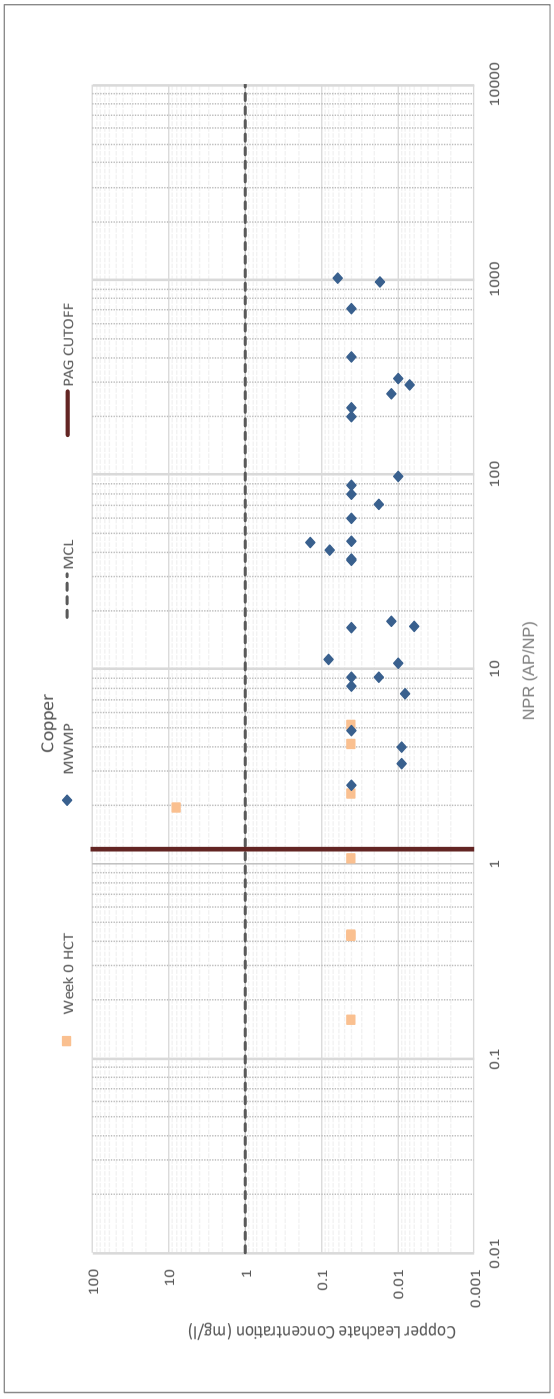
JOB #: 4286		DRAWN: TC	CHECKED: TC
DATE: June 2022		FIGURE: 14	





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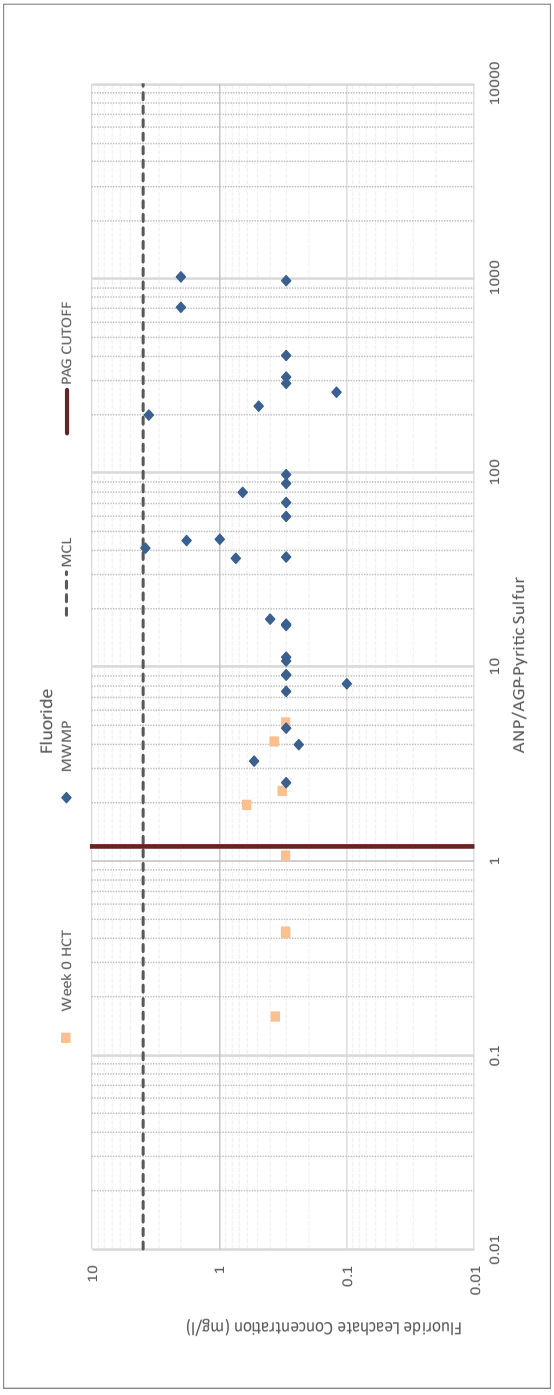
MWMP and Week 0 HCT : Copper

CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB #:	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	15



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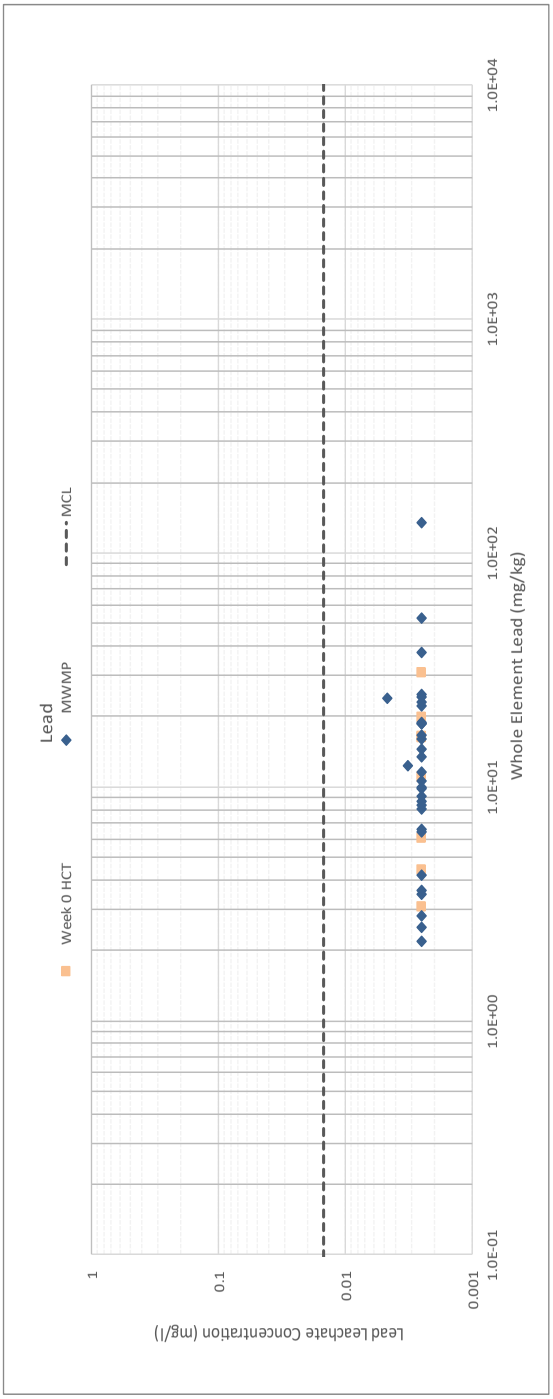
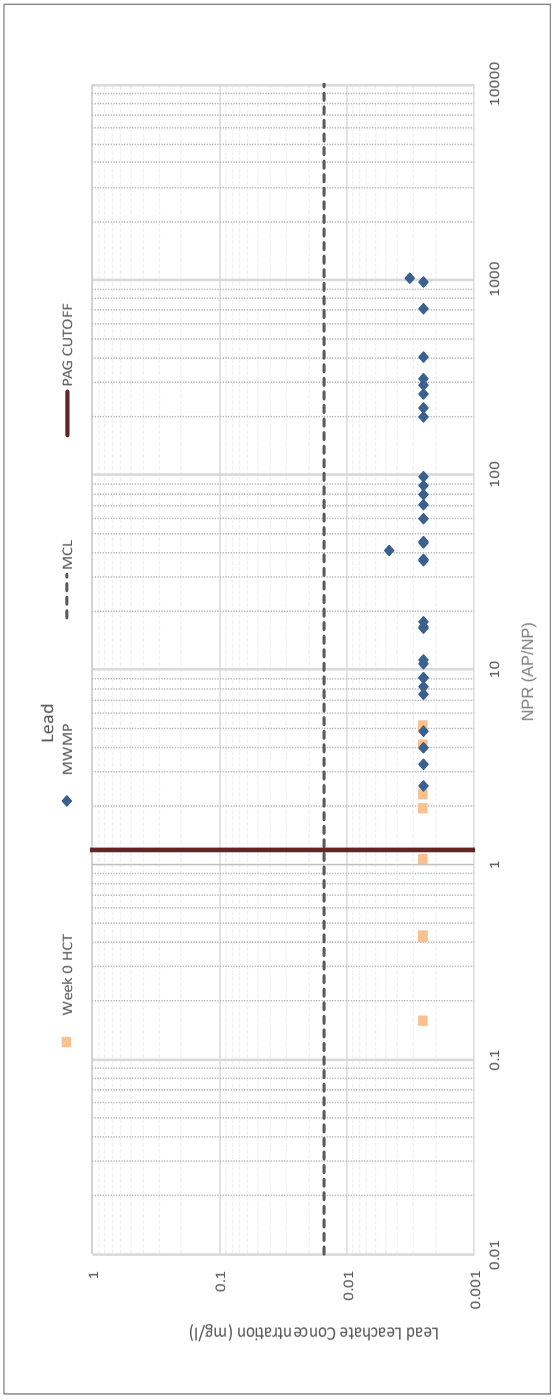
MWMP and Week 0 HCT : Fluoride

CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
JOB #: 4286		DRAWN: TC	CHECKED: TC
DATE: June 2022		FIGURE: 16	





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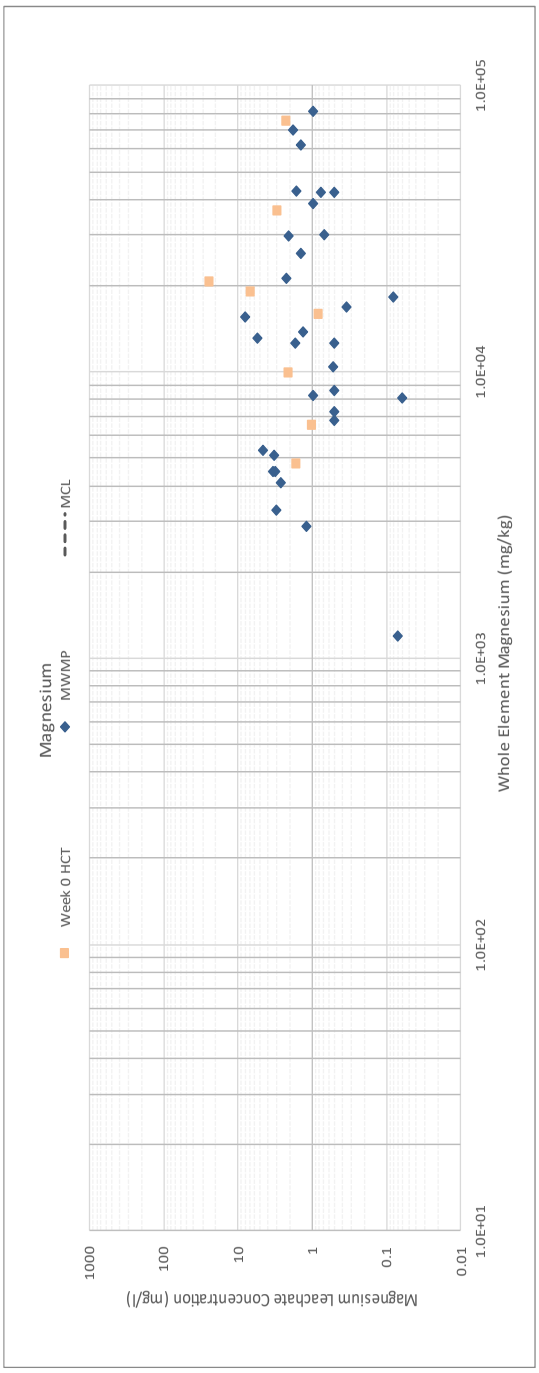
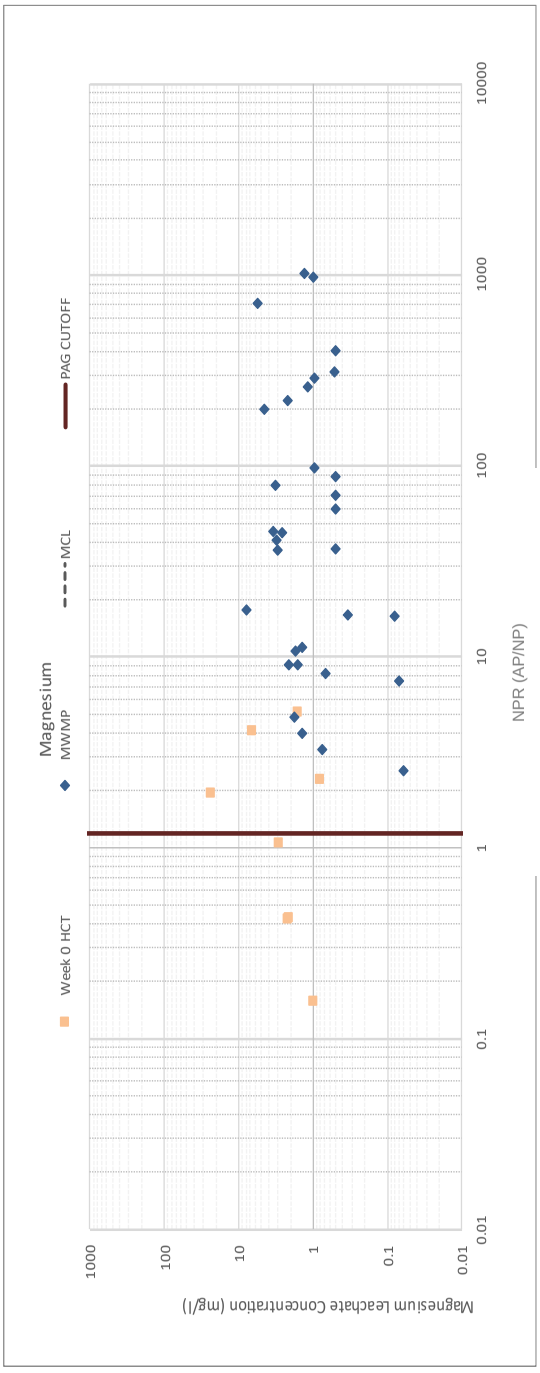
MWMP and Week 0 HCT : Lead

CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
JOB #: 4286		DRAWN: TC	CHECKED: TC
DATE: June 2022		FIGURE: 17	





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MWMP and Week 0 HCT : Magnesium

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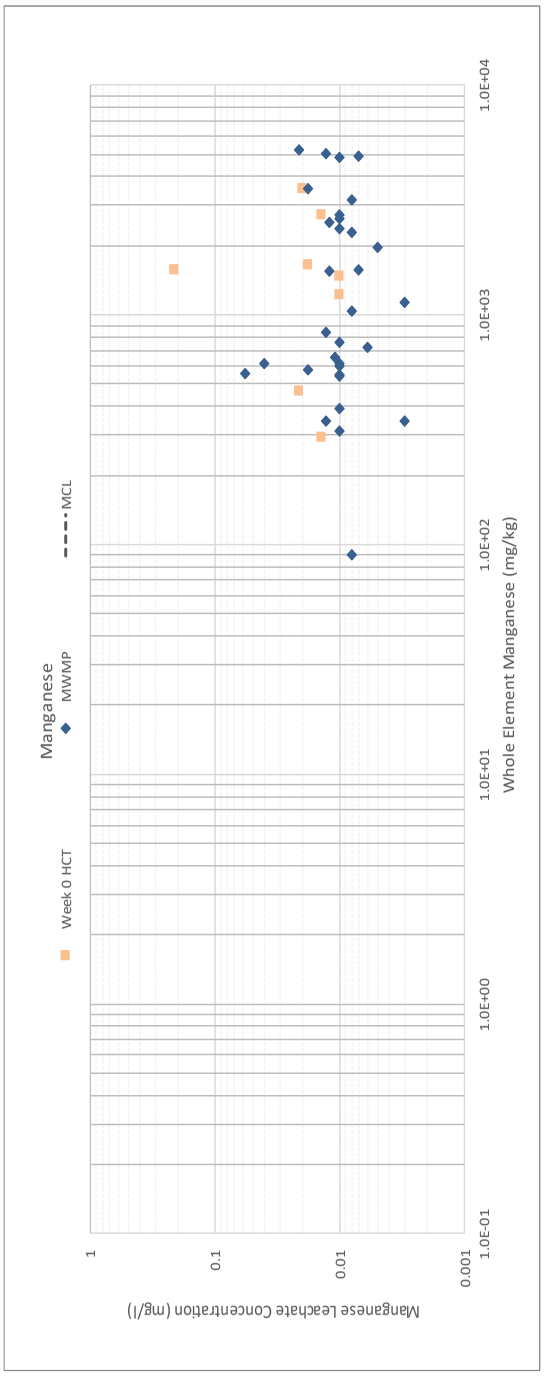
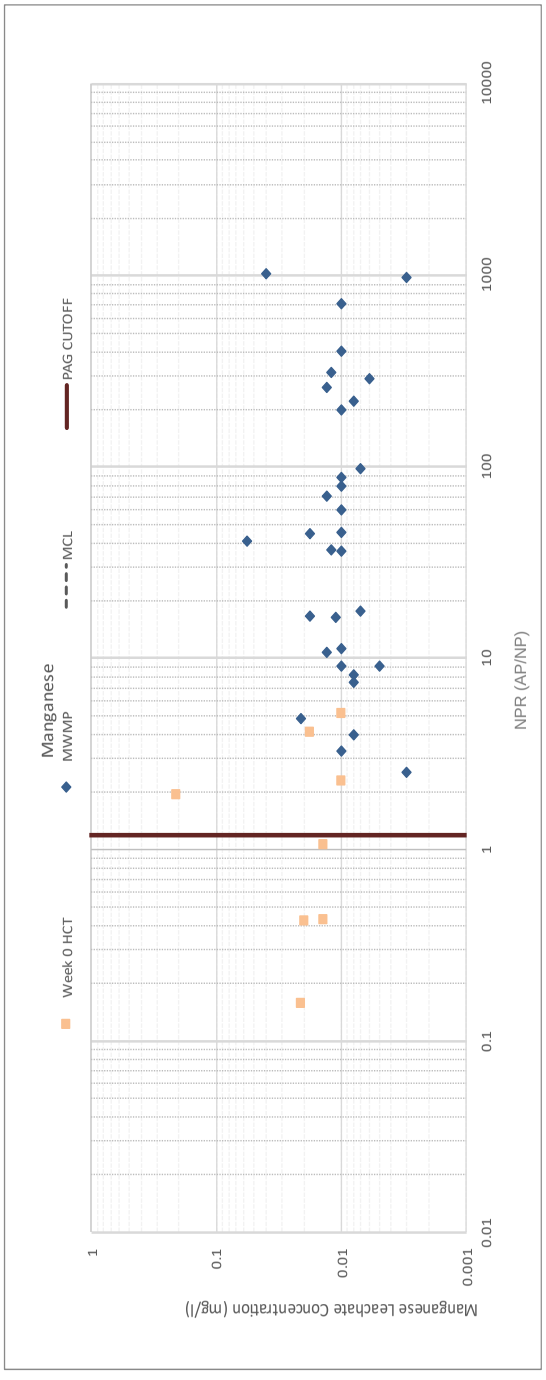
DATE:	June 2022	FIGURE:	18





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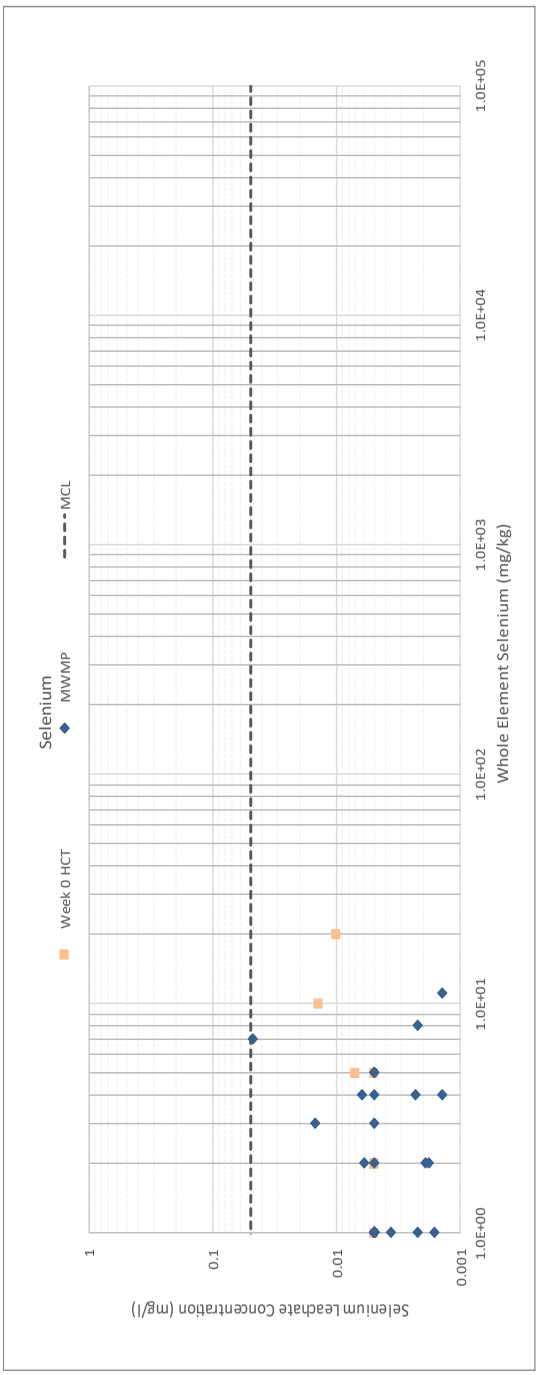
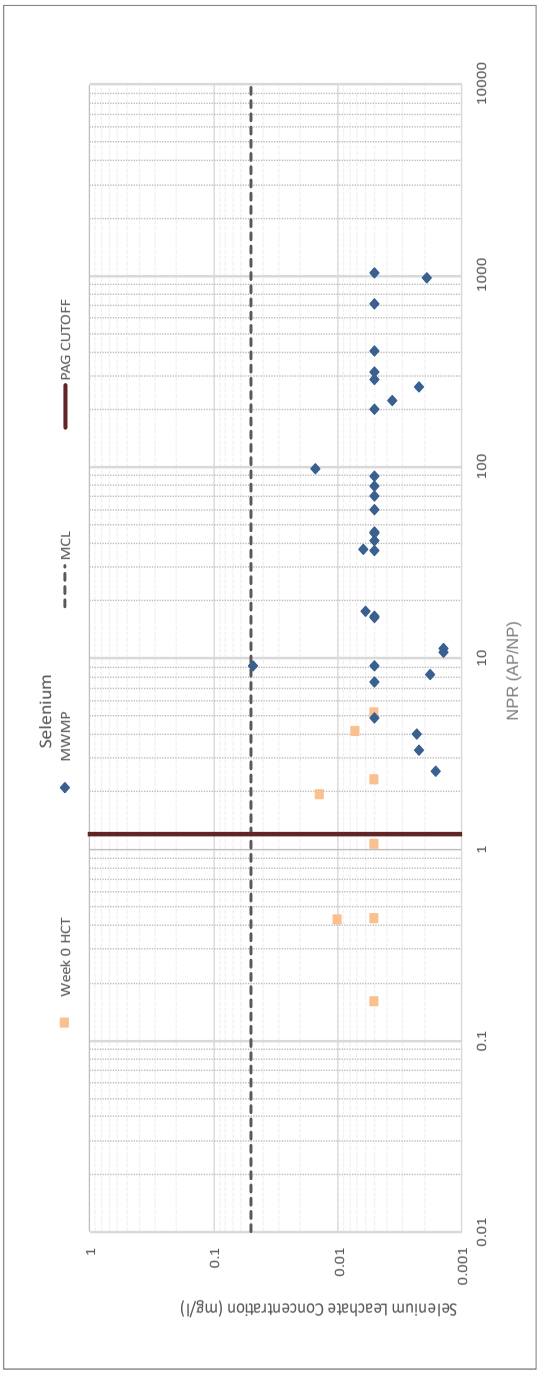
MWMP and Week 0 HCT Results: Manganese

CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB #:	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	19





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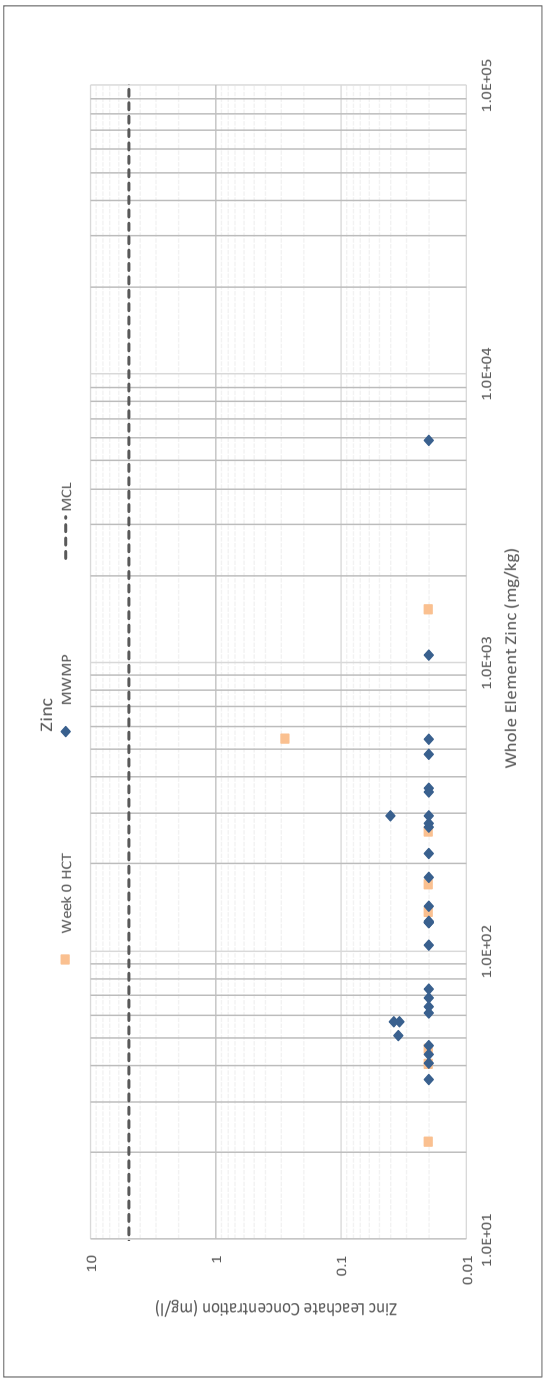
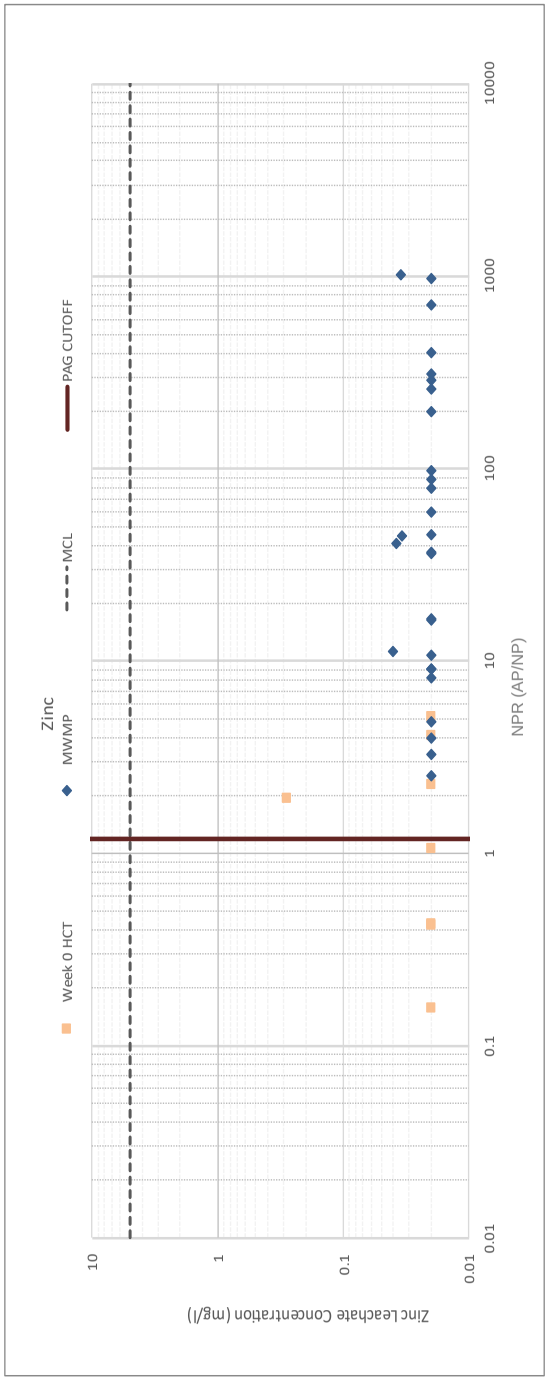
MWMP and Week 0 HCT Results: Selenium

CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
JOB #: 4286		DRAWN: TC	CHECKED: TC
DATE: June 2022		FIGURE: 20	





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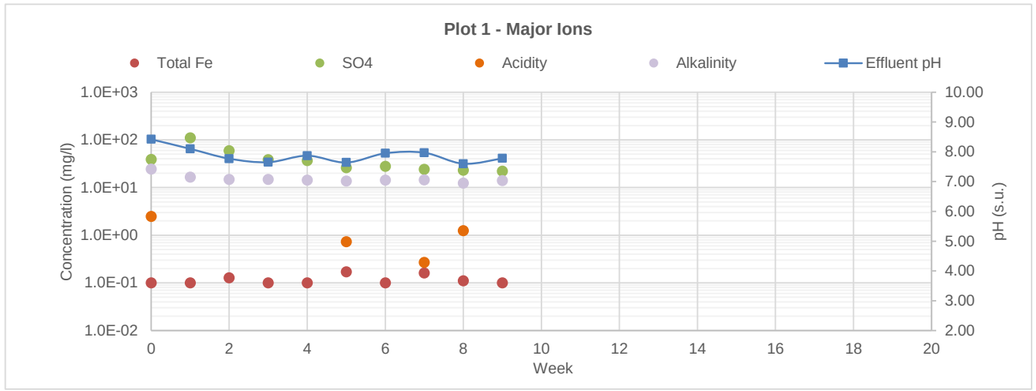
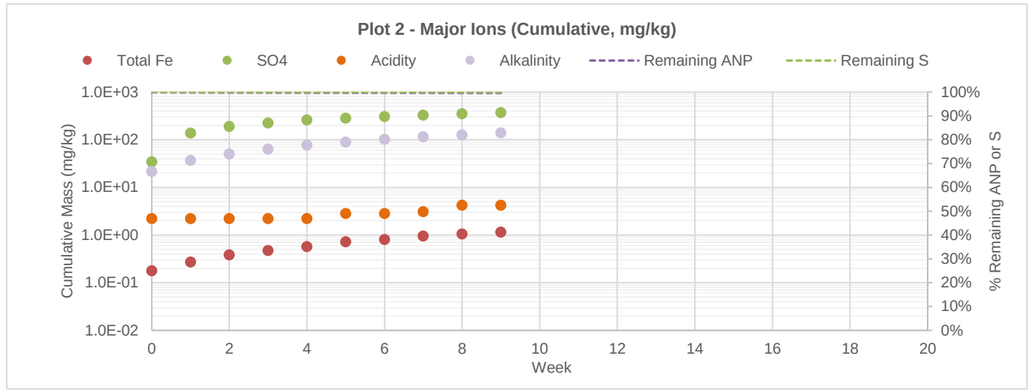
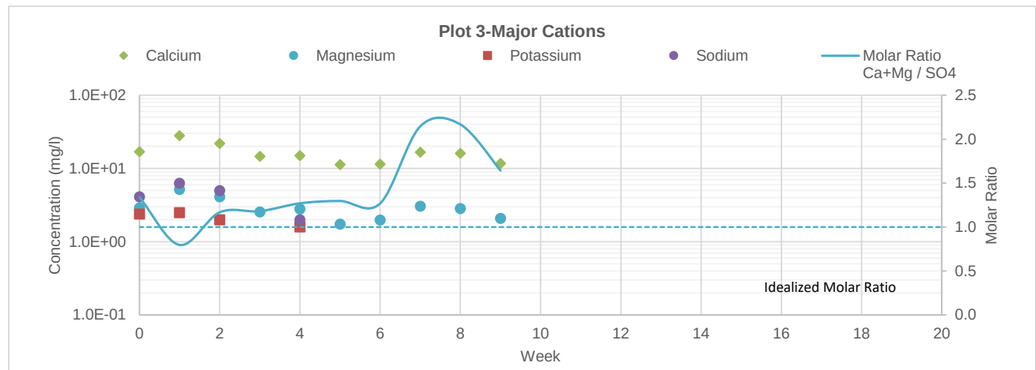
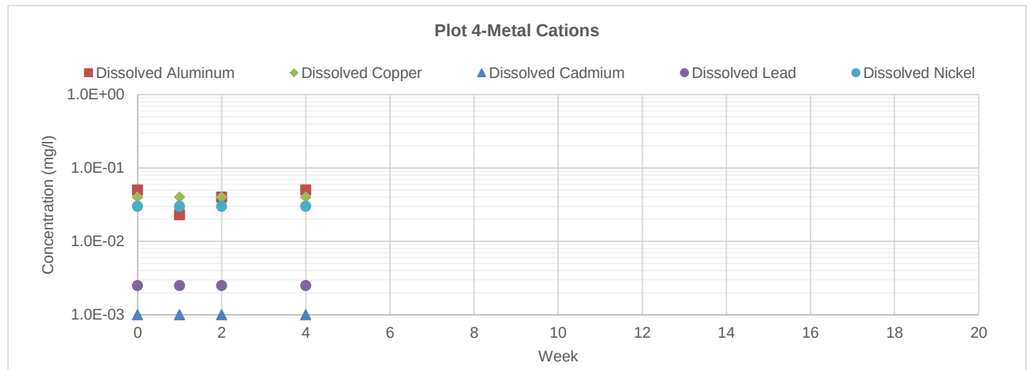
MWMP and Week 0 HCT Results: Zinc

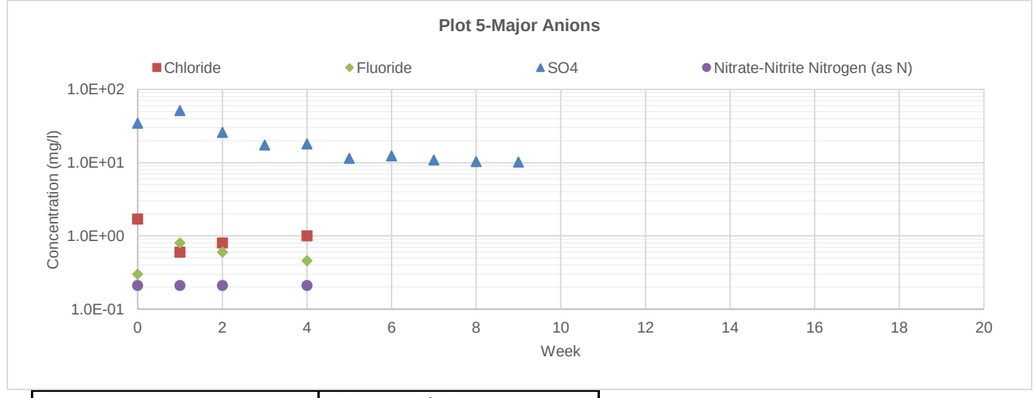
CLIENT: Rosemont Copper Company		PROJECT: Rosemont Copper World Project	
JOB #: 4286		DRAWN: TC	CHECKED: TC
DATE: June 2022		FIGURE: 21	

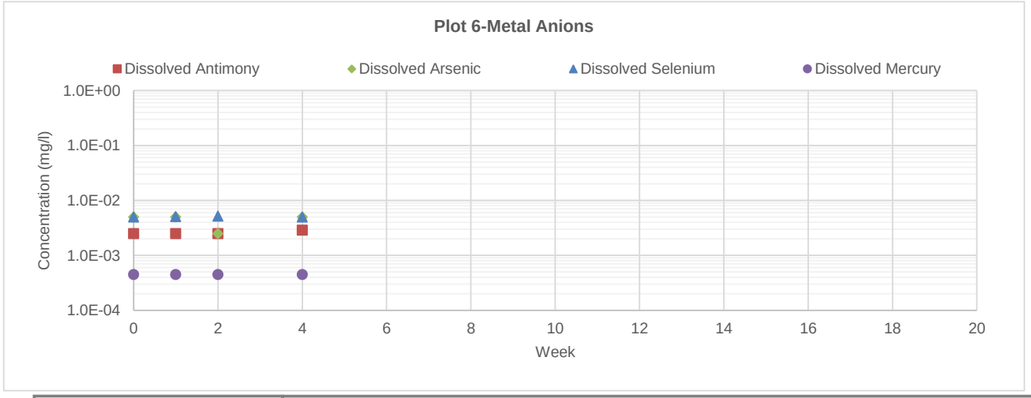












Name:	RNW-HB-156 (215-226)	Unit:	Abrigo
ANP:	90.40		
AGP:	83.75		
ANP/AGP:	1.08		
S% (Pyr):	2.54%		

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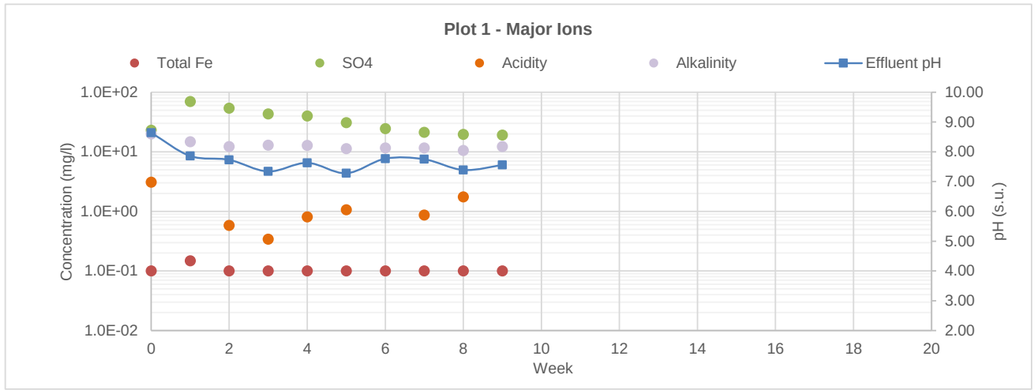
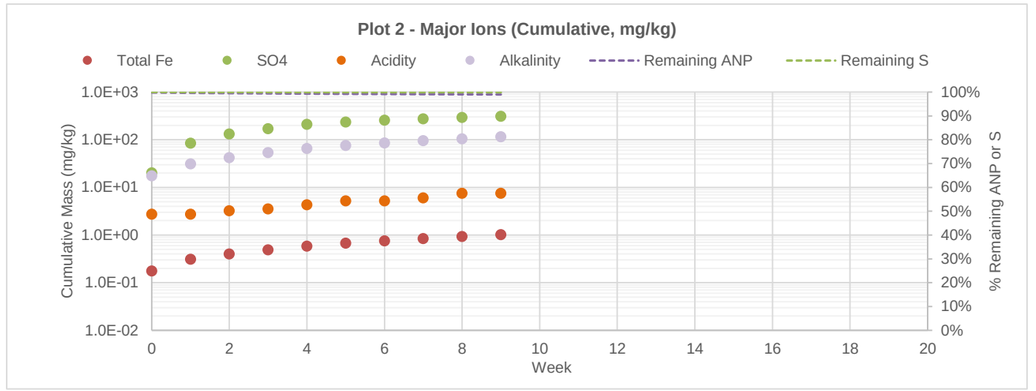
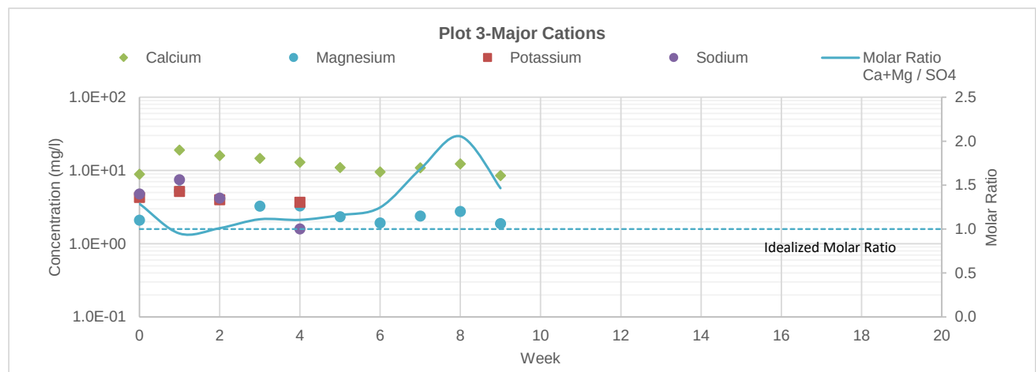
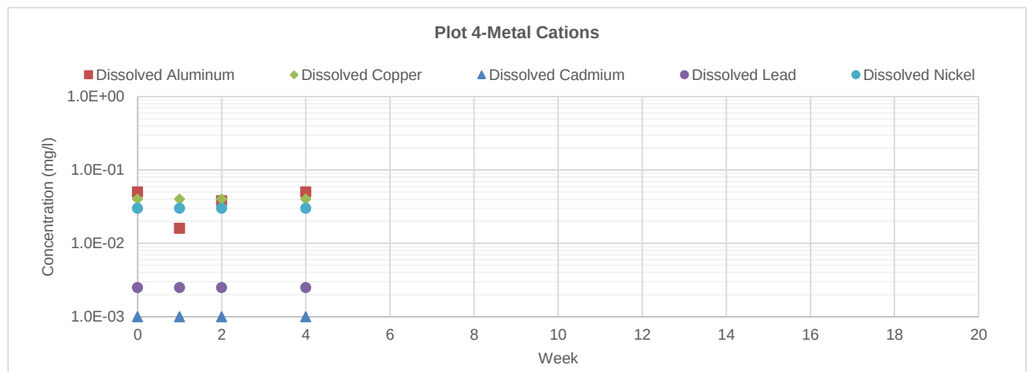
RNW-HB-156 (215-226)

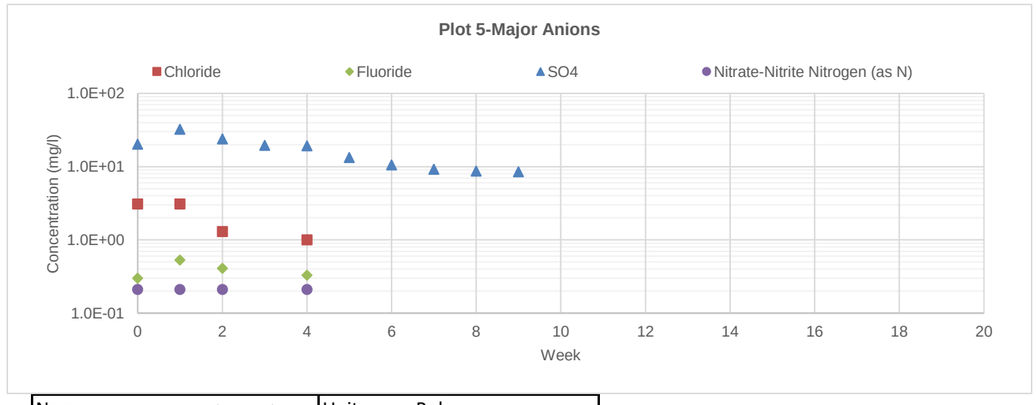
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	22

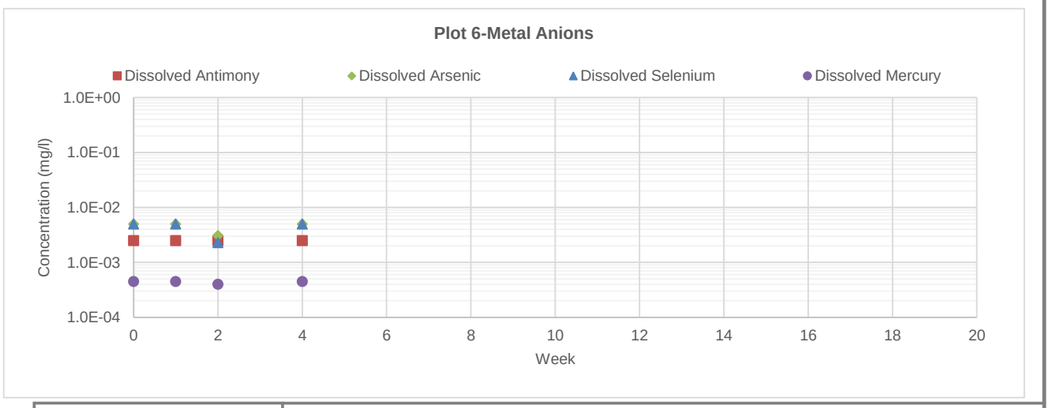












Name:	RNW-HB-088 (370-375)	Unit:	Bolsa
ANP:	29.90		
AGP:	67.81		
ANP/AGP:	0.44		
S% (Pyr):	2.11%		

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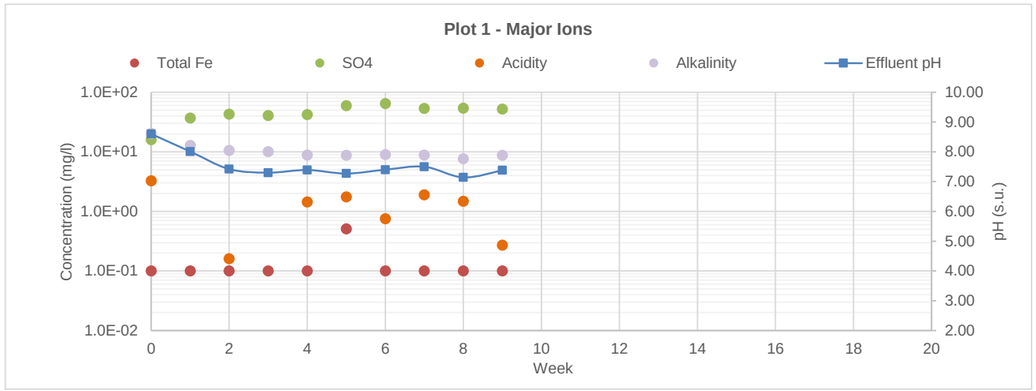
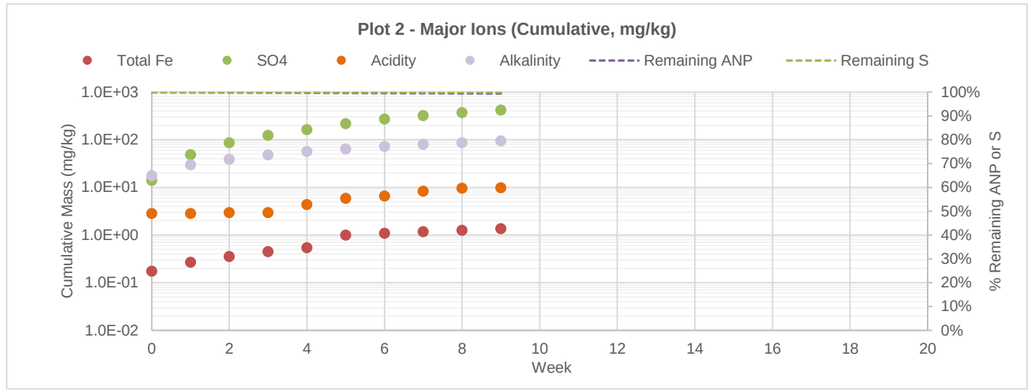
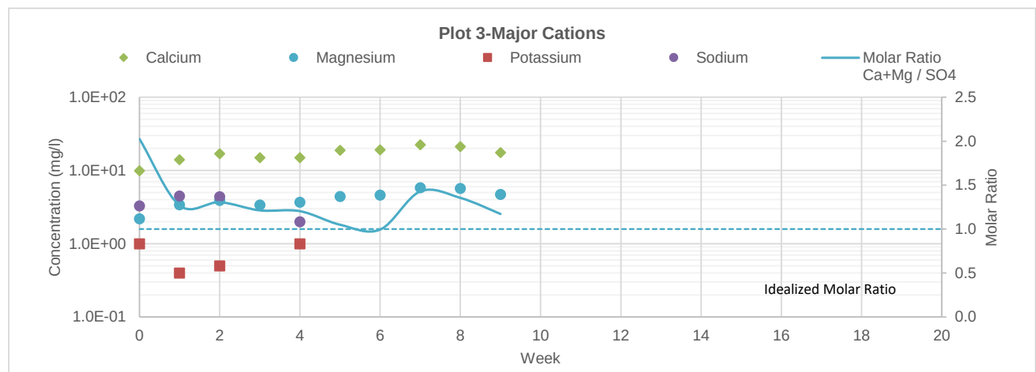
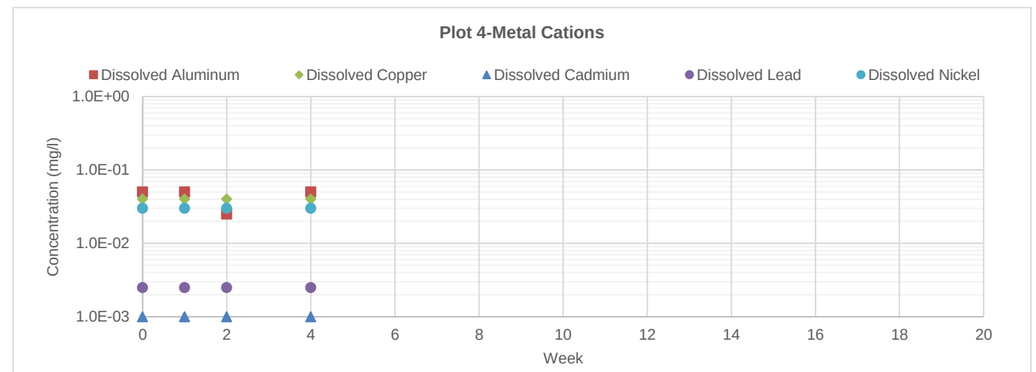
RNW-HB-088 (370-375)

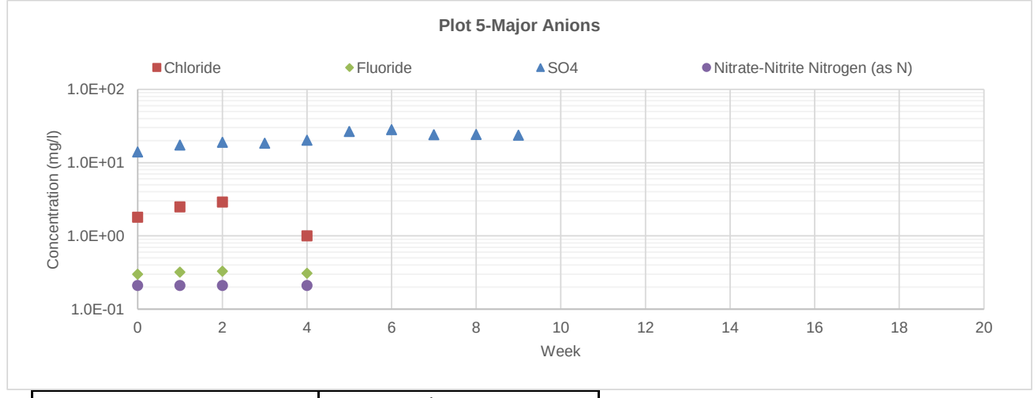
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	23

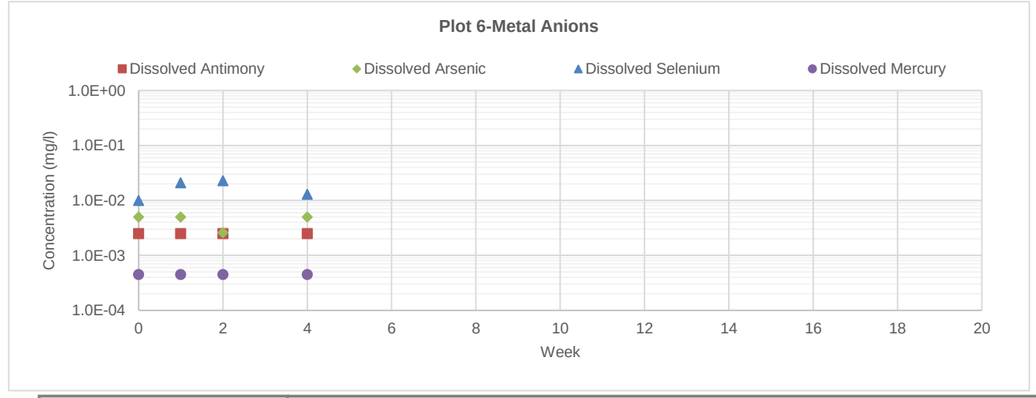












Name:	RNW-HB-143 (717-725)	Unit:	Glance
ANP:	54.10		
AGP:	124.38		
ANP/AGP:	0.43		
S% (Pyr):	3.71%		

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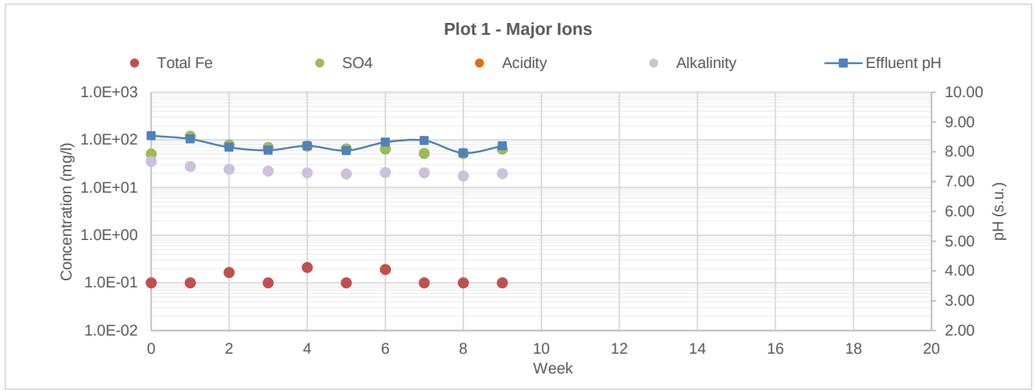
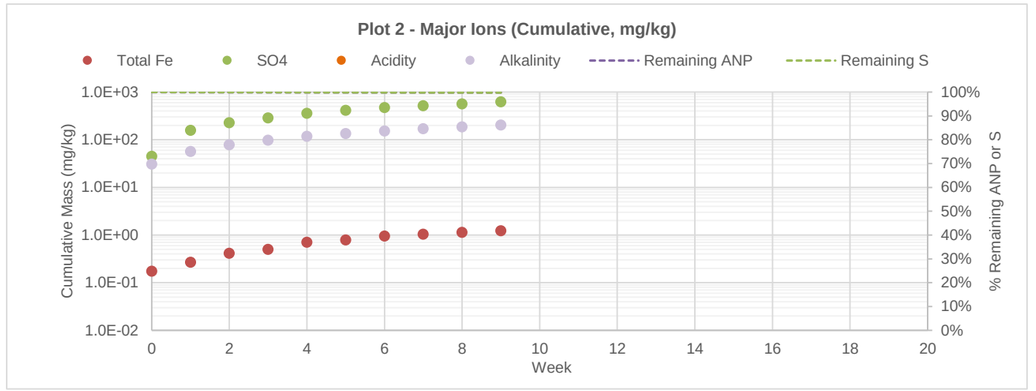
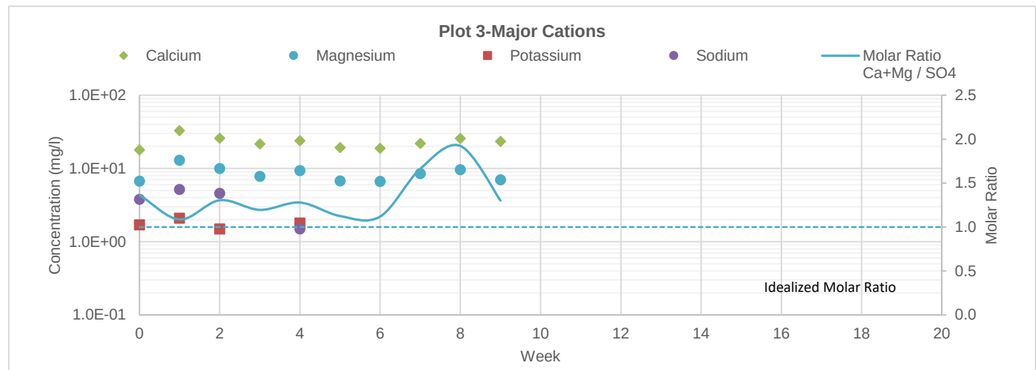
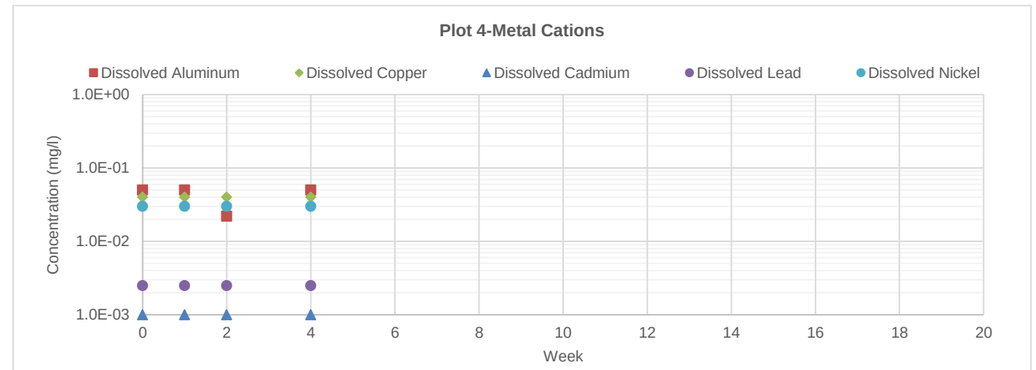
RNW-HB-143 (717-725)

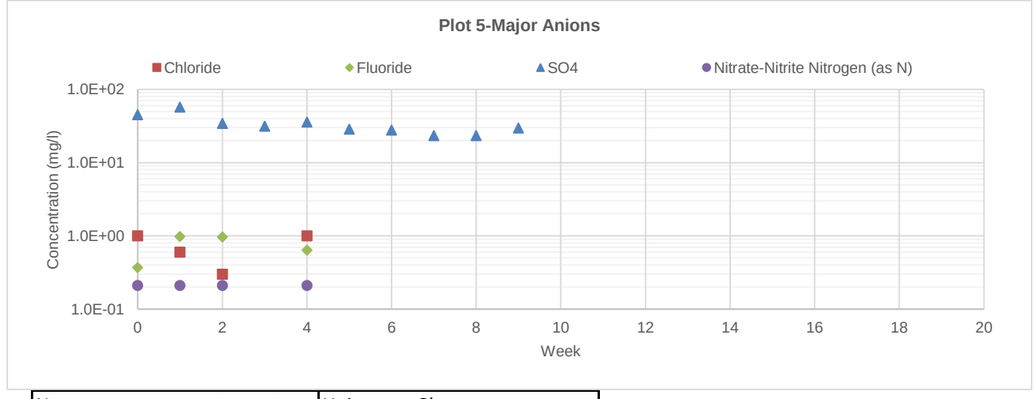
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	24

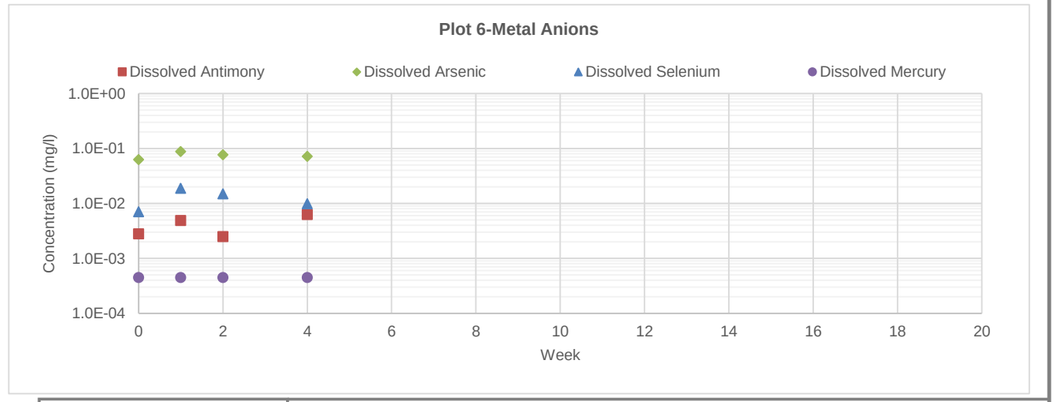












Name:	RNW-HB-195 (588-597)	Unit:	Glance
ANP:	274.00		
AGP:	65.63		
ANP/AGP:	4.17		
S% (Pyr):	1.96%		

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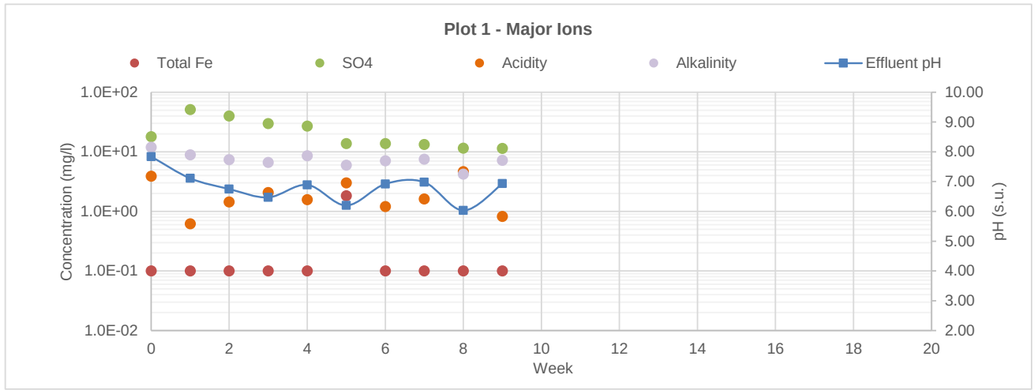
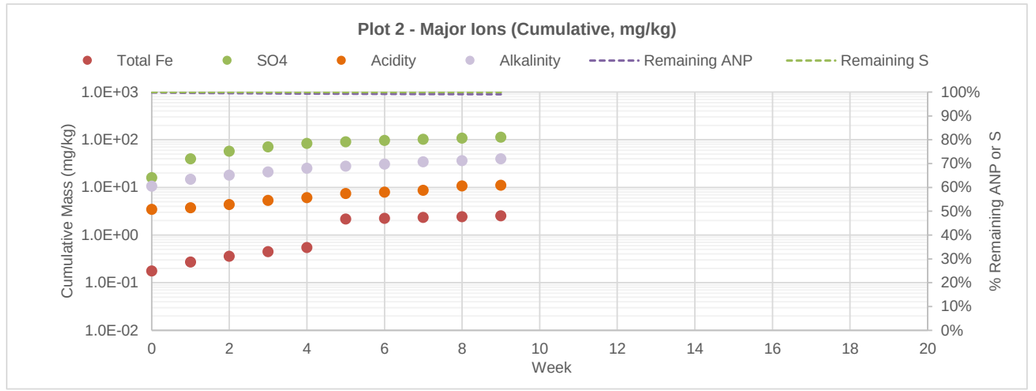
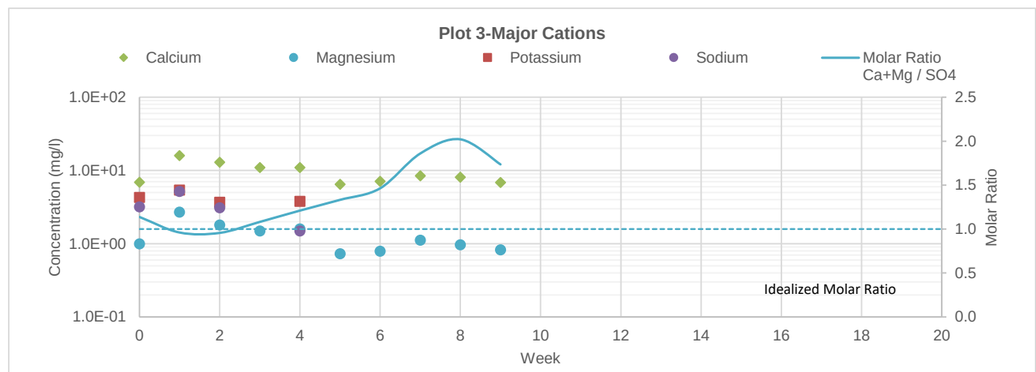
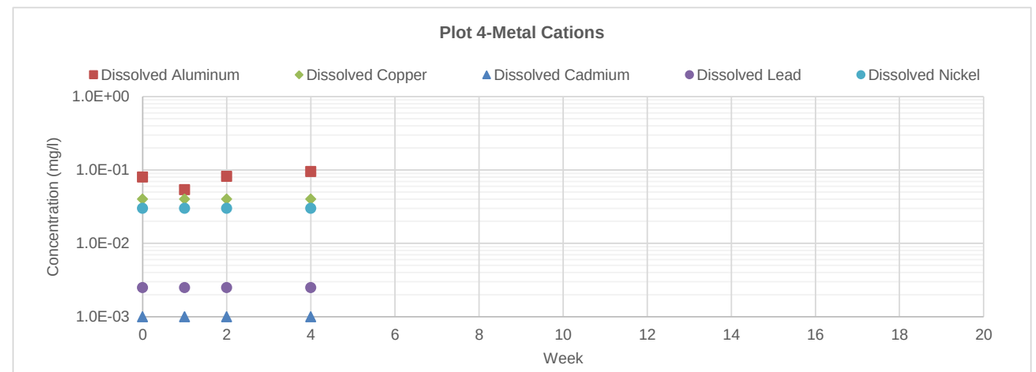
RNW-HB-195 (588-597)

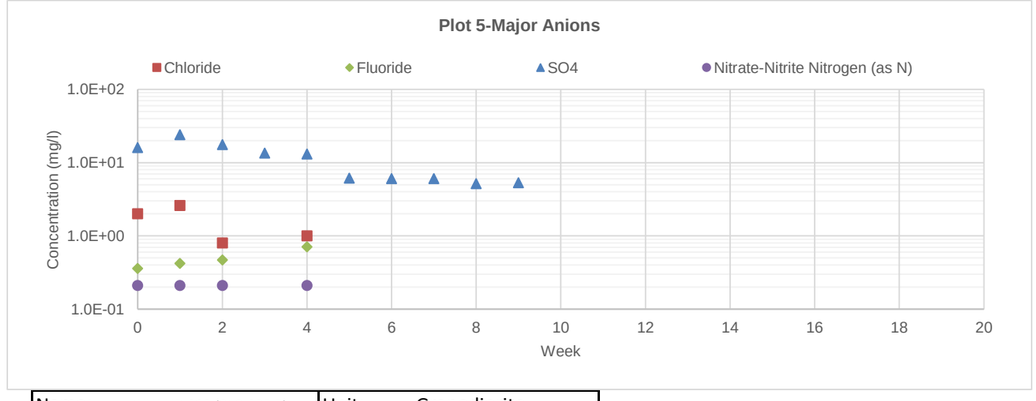
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	25

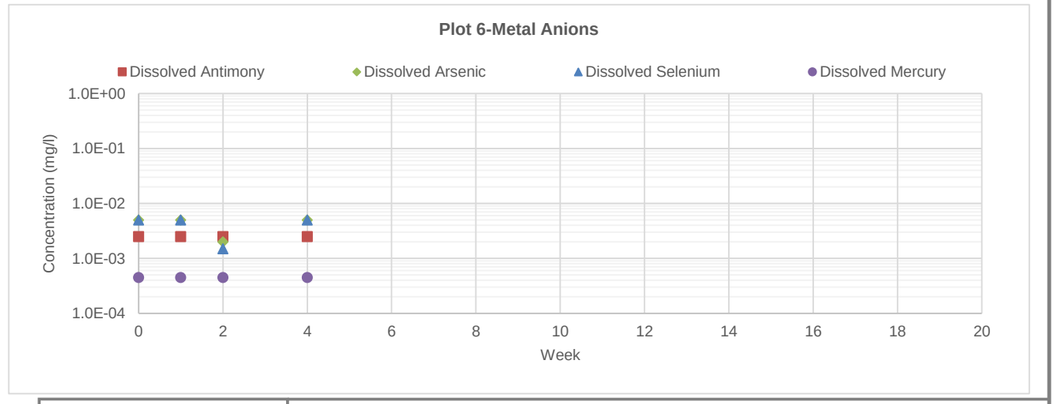












Name:	RNW-HB-003 (919-925.5)	Unit:	Granodiorite
ANP:	20.90		
AGP:	130.00		
ANP/AGP:	0.16		
S% (Pyr):	4.00%		

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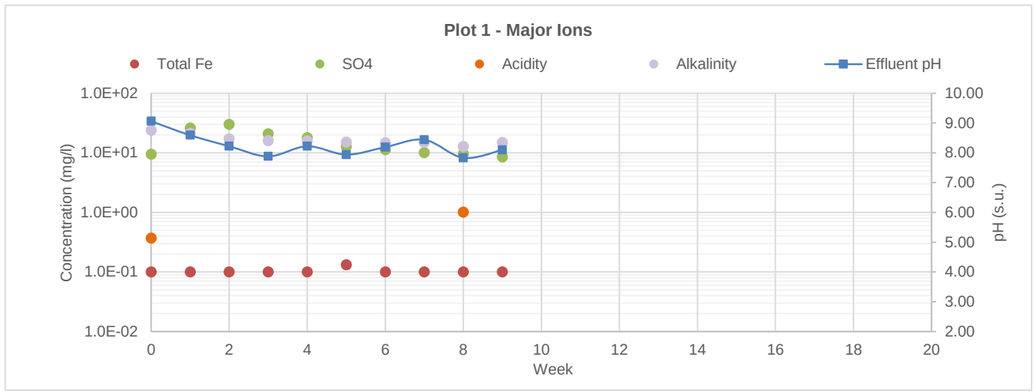
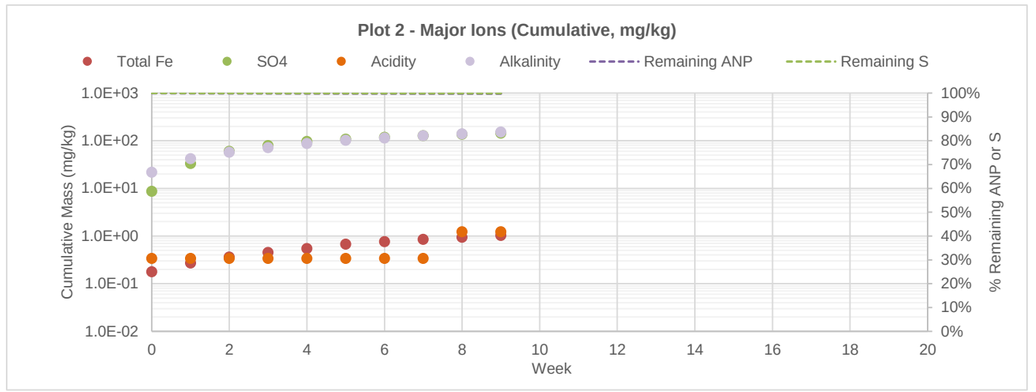
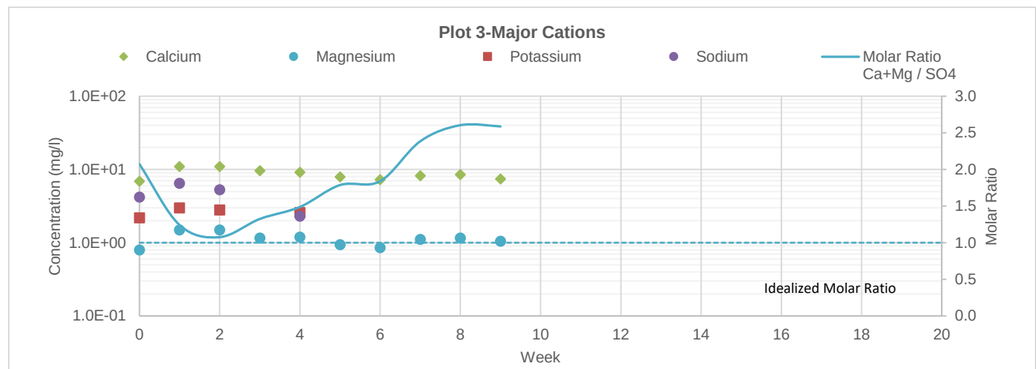
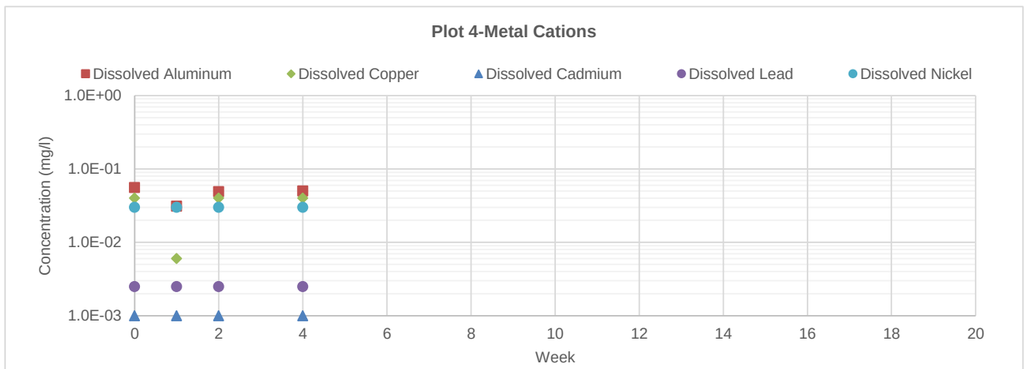
RNW-HB-003 (919-925.5)

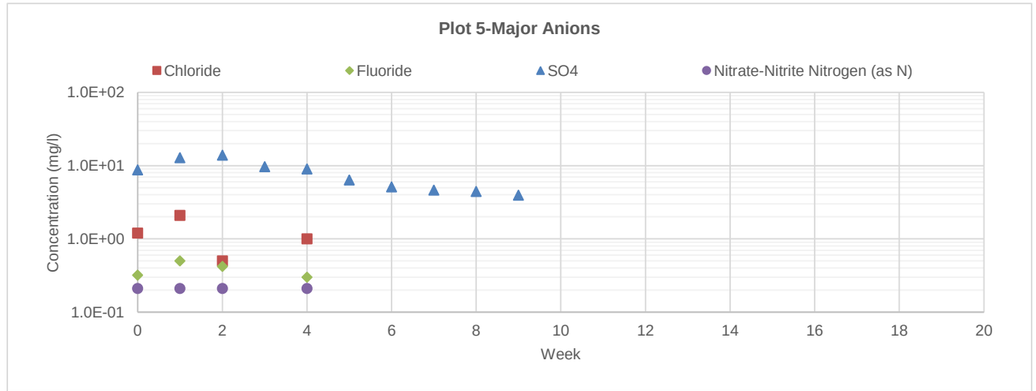
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	26

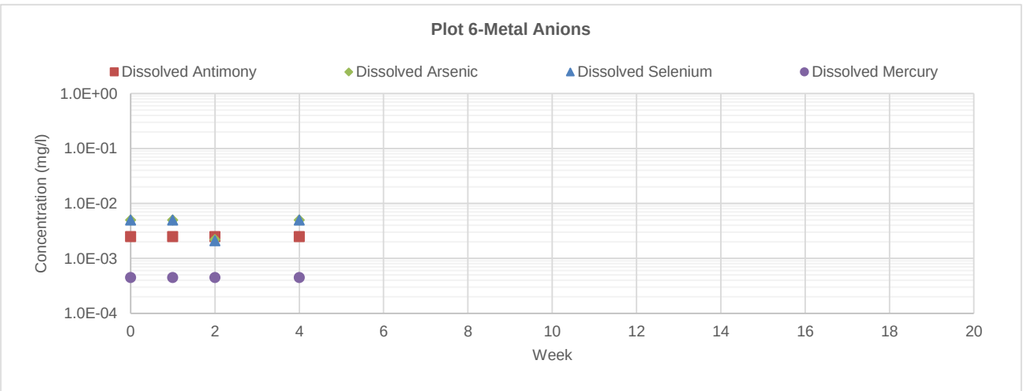












Name:	RNW-HB-141 (529.5-535)	Unit:	Granodiorite
ANP:	90.00		
AGP:	38.44		
ANP/AGP:	2.34		
S% (Pyr):	1.17%		

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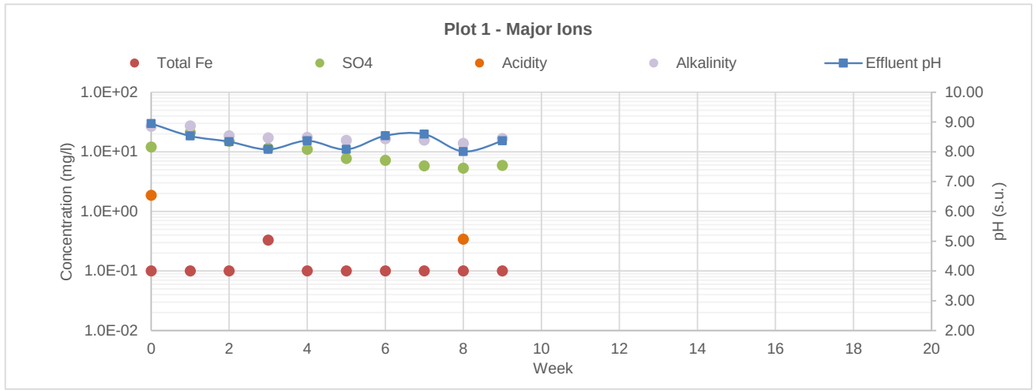
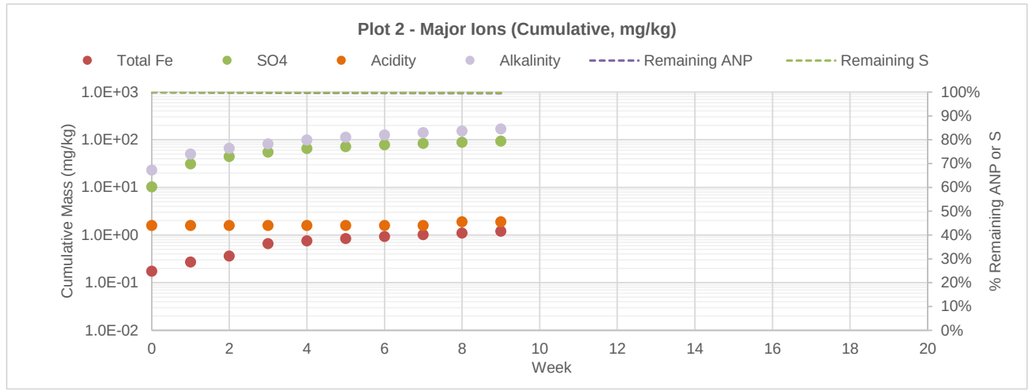
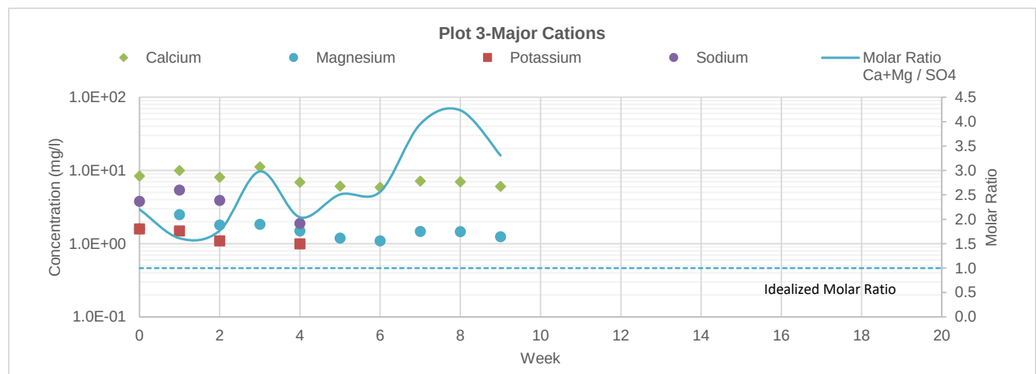
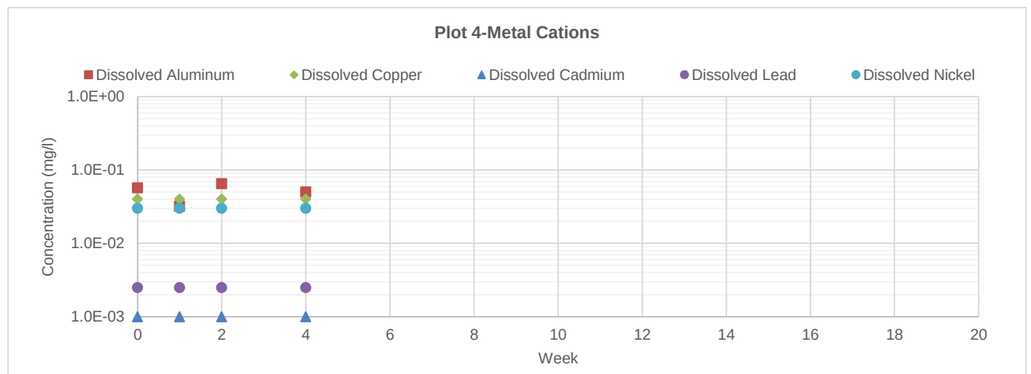
RNW-HB-141 (529.5-535)

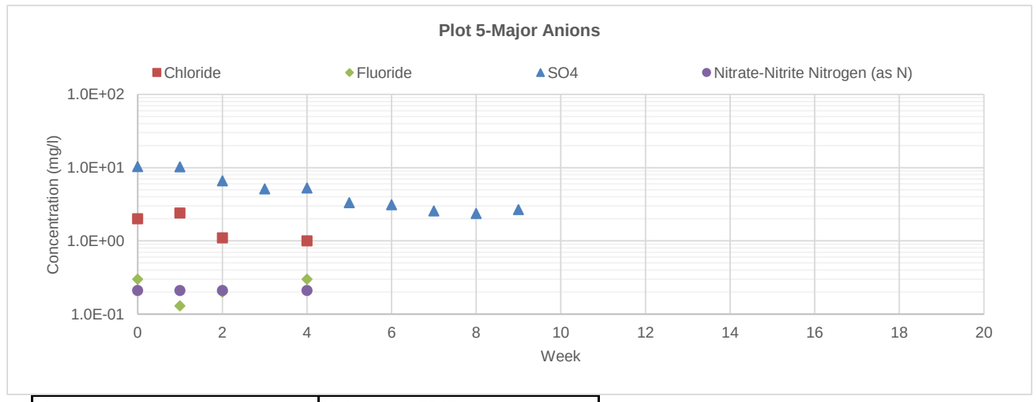
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	27

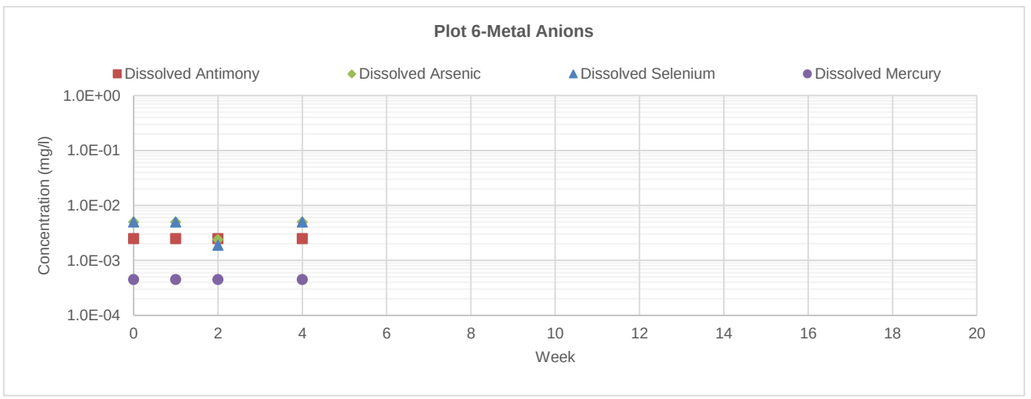












Name:	RNW-HB-107 (181-189)	Unit:	QMP
ANP:	50.90		
AGP:	9.69		
ANP/AGP:	5.25		
S% (Pyr):	0.29%		

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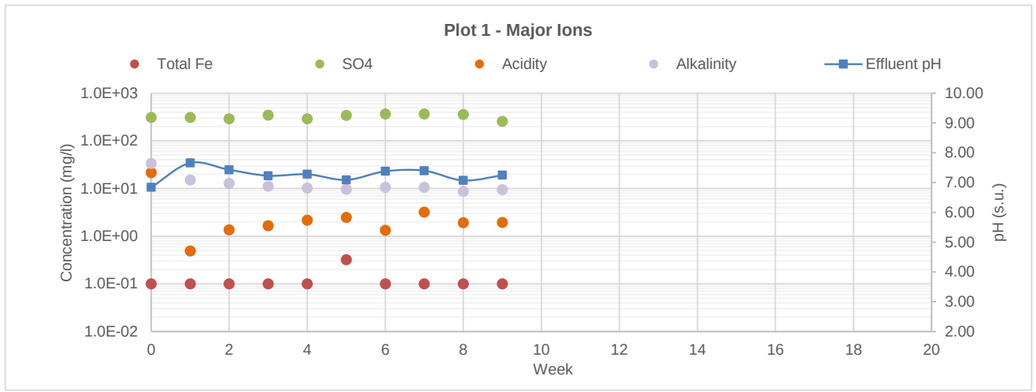
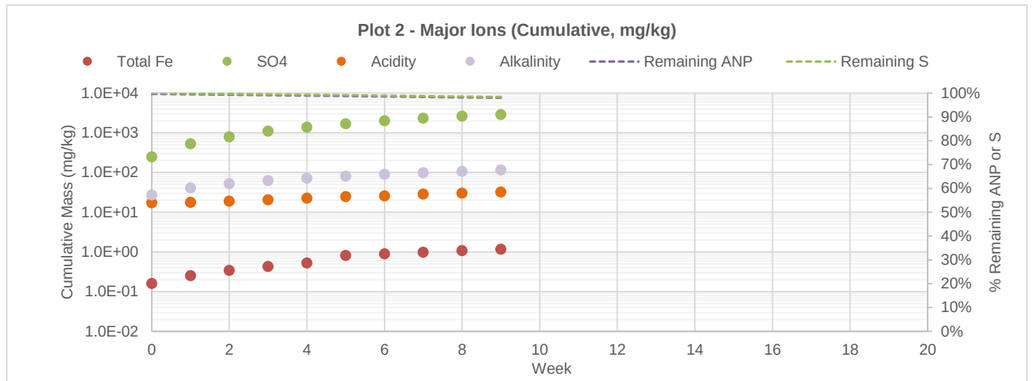
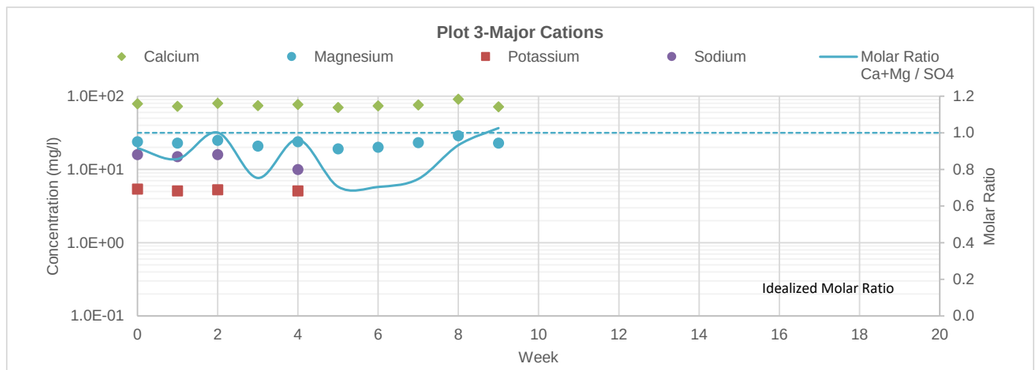
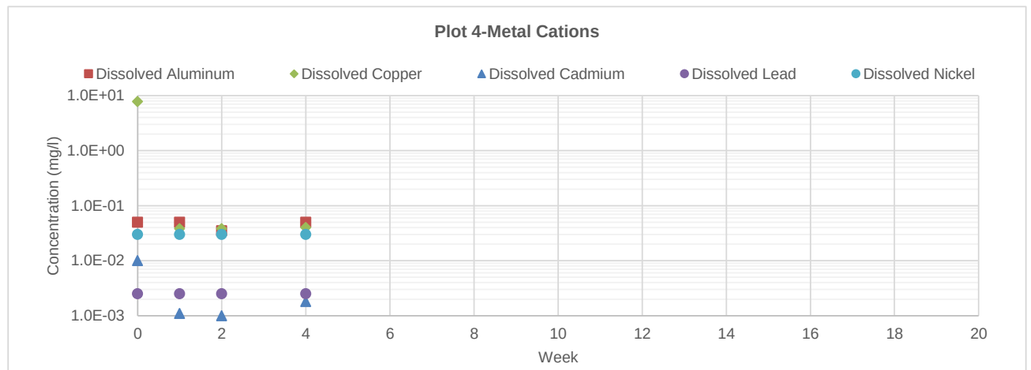
RNW-HB-107 (181-189)

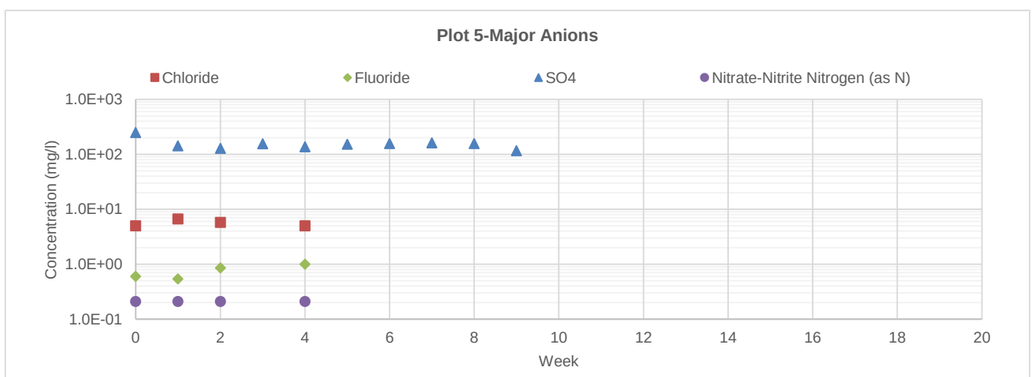
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	28

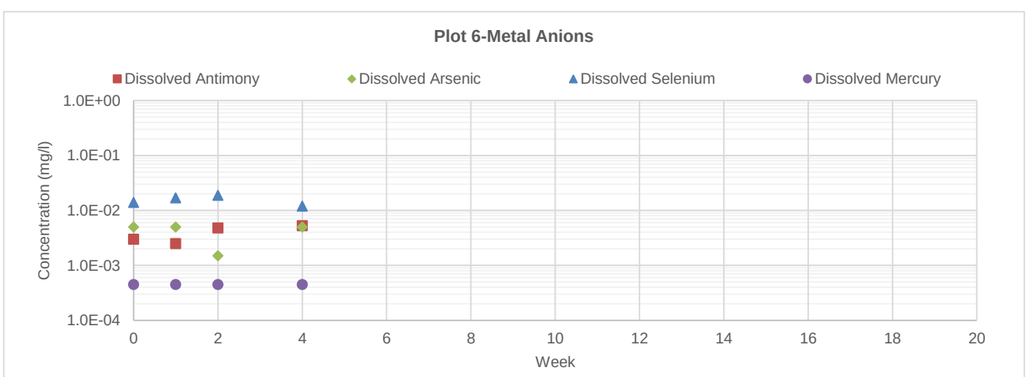












Name:	RNW-HB-122 (350-354)	Unit:	QMP
ANP:	89.90		
AGP:	45.94		
ANP/AGP:	1.96		
S% (Pyr):	1.34%		

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RNW-HB-122 (350-354)			
CLIENT:	Rosemont Copper Company	PROJECT:	Rosemont Copper World Project
JOB	4286	DRAWN: TC	CHECKED: TC
DATE:	June 2022	FIGURE:	29

APPENDIX A
Tabulated MWMP Data

Appendix A
MWMP Testing Results

Sample ID		AWQS Standard	RNW-HB-071 (278.5-287)	RNW-HB-081 (61-71)	GH2021-01	GH2021-07	GH2021-09	GH2021-10	GH2021-14	GH2021-15	GH2021-21
	Units										
Formation	-		Abrigo	Abrigo	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
pH	s.u.	6.5-8.5	7.41	7.39	8.27	8.43	7.47	8.00	7.08	7.49	7.78
Total Alkalinity	mg/L	-	15.0	15.0	57.0	140.0	46.0	90.0	31.0	79.0	31.0
Aluminum	mg/L	-	<0.05	0.025	6.7	0.34	<0.05	0.11	0.097	12	3.6
Antimony	mg/L	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	mg/L	0.05	<0.005	<0.005	0.0087	0.013	0.0061	0.016	<0.005	0.0099	0.01
Barium	mg/L	2	<0.02	<0.02	0.1	0.078	<0.02	<0.02	<0.02	<0.02	<0.02
Beryllium	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L	-	7.4	3.4	1.5	16	16	7.8	9.9	7.8	5.1
Chloride	mg/L	250	2.2	<1	14	120	1.9	3.7	2.6	14	4.5
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	1	<0.04	0.01	0.061	0.04	<0.04	<0.04	<0.04	0.078	0.14
Fluoride	mg/L	4	<0.3	<0.3	2	2	0.66	3.6	0.74	3.8	1.8
Iron	mg/L	-	<0.1	<0.1	4.6	0.23	<0.1	<0.1	<0.1	5.8	1.9
Lead	mg/L	0.015	<0.0025	<0.0025	0.0032	<0.0025	<0.0025	<0.0025	<0.0025	0.0047	<0.0025
Mercury	mg/L	0.002	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	0.00068	<0.00045
Magnesium	mg/L	-	1.8	0.96	1.3	5.5	3.2	4.5	3	3.1	2.6
Manganese	mg/L	-	0.021	0.007	0.04	<0.01	<0.01	<0.01	<0.01	0.057	0.018
Molybdenum	mg/L	-	0.063	0.003	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/L	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Nitrate (as N)	mg/L	10	<0.15	<0.15	0.49	2.5	1.3	0.35	1.2	1.7	0.85
Potassium	mg/L	-	<1	0.8	1.4	<1	2.5	1.3	1.4	2	2.2
Selenium	mg/L	0.05	<0.005	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium	mg/L	-	1.6	0.9	36	120	4	38	7.6	47	16
Sulfate	mg/L	-	6.4	1.2	12	21	12	23	16	18	12
Thallium	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	<0.001
Total Dissolved Solids	mg/L	500	43	73	270	410	110	200	86	280	150
Zinc	mg/L	5	<0.02	<0.02	0.035	<0.02	<0.02	<0.02	<0.02	0.038	0.034
Total Metals	mg/L	-	2.073	1.164	12.7824	6.19	3.4631	4.833	3.309	21.1221	8.3353
Ficklin Metals (Cu, Co, Cd, Pb, Ni, Zn)	mg/L	-	0.104	0.074	0.140	0.104	0.104	0.104	0.104	0.162	0.218

Highlighted cells exceed AWQS

Appendix A
MWMP Testing Results

Sample ID		AWQS Standard	GH2021-25	RNW-HB-126 (41-48.5)	RNW-HB-084 (105-115)	RNW-HB-079 (239-249)	RNW-HB-077 (589-601.5)	RNW-HB-084 (227.5-236.5)	RNW-HB-069 (555-564)	RNW-HB-143 (816-826)	RNW-HB-213A (391-401)
	Units										
Formation	-		Alluvium	Concha	Concha	Epitaph	Escabrosa	Escabrosa	Glance	Glance	Glance
pH	s.u.	6.5-8.5	6.95	7.53	7.62	7.56	7.23	8.01	7.75	7.15	7.25
Total Alkalinity	mg/L	-	60.0	33.0	21.0	22.0	7.6	66.0	33.0	11.0	17.0
Aluminum	mg/L	-	0.06	<0.05	<0.05	0.031	<0.05	0.038	<0.05	<0.05	0.016
Antimony	mg/L	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0041	<0.0025	<0.0025
Arsenic	mg/L	0.05	0.005	0.0028	<0.005	<0.005	<0.005	0.012	0.0082	0.0031	<0.005
Barium	mg/L	2	<0.02	0.022	<0.02	<0.02	<0.02	0.008	<0.02	<0.02	<0.02
Beryllium	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L	-	15	12	5.8	5.9	3.4	12	16	4.3	5.9
Chloride	mg/L	250	<1	1.3	<1	0.7	<1	2.0	2.1	<1	<1
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	1	<0.04	<0.04	0.01	0.018	<0.04	0.012	<0.04	0.006	0.01
Fluoride	mg/L	4	1	0.49	<0.3	<0.3	<0.3	0.4	<0.3	<0.3	<0.3
Iron	mg/L	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.04	<0.1	<0.1	<0.1
Lead	mg/L	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Mercury	mg/L	0.002	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
Magnesium	mg/L	-	3.4	2.2	1.7	1.6	<0.5	8	2.1	0.34	0.52
Manganese	mg/L	-	<0.01	0.008	0.013	0.005	<0.01	0.007	<0.01	0.018	0.012
Molybdenum	mg/L	-	<0.02	0.01	0.012	0.048	<0.02	0.490	0.74	0.042	<0.02
Nickel	mg/L	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Nitrate (as N)	mg/L	10	1.4	0.06	<0.15	<0.15	<0.15	0.06	<0.15	<0.15	<0.15
Potassium	mg/L	-	1.2	<0.02	<1	1	<1	1.5	2.4	<1	0.3
Selenium	mg/L	0.05	<0.005	0.0036	0.0014	0.048	<0.005	0.006	<0.005	<0.005	<0.005
Silver	mg/L	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium	mg/L	-	13	5.9	<1.5	2.4	<1.5	14	4	<1.5	<1.5
Sulfate	mg/L	-	8.4	15	2	4.2	<1.5	26	15	1.4	<1.5
Thallium	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0003	0.0002
Total Dissolved Solids	mg/L	500	130	82	64	32	<25	160	91	29	<25
Zinc	mg/L	5	<0.02	0.004	<0.02	<0.02	<0.02	0.004	<0.02	<0.02	<0.02
Total Metals	mg/L	-	3.672	2.4418	1.935	1.816	0.762	8.15	2.3668	0.5741	0.72
Ficklin Metals (Cu, Co, Cd, Pb, Ni, Zn)	mg/L	-	0.104	0.088	0.074	0.082	0.104	0.060	0.104	0.070	0.074

Highlighted cells exceed AWQS

Sample ID		AWQS Standard	RNW-HB-213A (616-623)	RNW-HB-012 (250-262)	RNW-HB-012 (266-276.5)	RNW-HB-161 (909-920)	RNW-HB-174 (201-217)	RNW-HB-093 (729.5-739.5)	RNW-HB-086 (87-100)	RNW-HB-092 (258-264)	RNW-HB-122 (341-350)
	Units										
Formation	-		Glance	Granodiorite	Granodiorite	Granodiorite	Granodiorite	Granodiorite	Martin	Qmp	Qmp
pH	s.u.	6.5-8.5	6.97	**6.48**	6.57	**6.49**	6.91	**5.78**	7.62	6.86	7.27
Total Alkalinity	mg/L	-	12.0	2.5	2.5	3.7	9.1	2.2	18.0	15.0	18.0
Aluminum	mg/L	-	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.1	<0.05	0.041
Antimony	mg/L	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	mg/L	2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.04	<0.02	<0.02
Beryllium	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001
Calcium	mg/L	-	4.7	0.73	1	1.1	2.8	0.65	6.3	5.3	5.7
Chloride	mg/L	250	<1	<1	<1	<1	0.5	<1	<1	0.3	4
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005
Copper	mg/L	1	<0.04	<0.04	<0.04	0.008	0.018	<0.04	<0.08	<0.04	0.012
Fluoride	mg/L	4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.1	0.12
Iron	mg/L	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1
Lead	mg/L	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Mercury	mg/L	0.002	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
Magnesium	mg/L	-	0.08	<0.5	<0.5	0.07	0.5	0.06	1.4	0.68	1.2
Manganese	mg/L	-	0.011	<0.01	<0.01	0.008	0.013	0.003	0.01	0.008	0.013
Molybdenum	mg/L	-	<0.02	<0.02	<0.02	<0.02	0.004	<0.02	0.036	<0.02	0.005
Nickel	mg/L	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.06	<0.03	<0.03
Nitrate (as N)	mg/L	10	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Potassium	mg/L	-	<1	<1	<1	<1	0.8	<0.02	0.9	<0.02	<0.02
Selenium	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	0.0016	0.0014	0.0018	0.0022
Silver	mg/L	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005
Sodium	mg/L	-	<1.5	<1.5	<1.5	<1.5	0.7	<1.5	<3	0.8	3.3
Sulfate	mg/L	-	0.6	<1.5	<1.5	<1.5	1	<1.5	1.9	1.4	2.8
Thallium	mg/L	0.002	0.0003	<0.001	<0.001	0.0002	0.0003	<0.001	<0.001	<0.001	<0.001
Total Dissolved Solids	mg/L	500	57	71	53	<25	25	46	47	51	140
Zinc	mg/L	5	<0.02	<0.02	<0.02	0.009	0.004	<0.02	<0.04	<0.02	<0.02
Total Metals	mg/L	-	0.343	0.762	0.842	0.287	0.727	0.315	1.904	0.94	1.428
Ficklin Metals (Cu, Co, Cd, Pb, Ni, Zn)	mg/L	-	0.104	0.104	0.104	0.061	0.066	0.104	0.205	0.104	0.076

Highlighted cells exceed AWQS

Sample ID		AWQS Standard	RNW-HB-069 (683-692.5)	RNW-HB-094 (1-10)	RNW-HB-129 (552-560)	RNW-HB-129 (623-633)	RNW-HB-080 (757-762)
	Units						
Formation	-		Scherrer	Scherrer	Scherrer	Scherrer	Scherrer
pH	s.u.	6.5-8.5	7.51	7.27	7.61	7.35	7.47
Total Alkalinity	mg/L	-	13.0	28.0	37.0	16.0	25.0
Aluminum	mg/L	-	<0.05	0.047	0.029	<0.05	0.049
Antimony	mg/L	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	mg/L	0.05	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	mg/L	2	<0.02	0.006	<0.02	<0.02	0.005
Beryllium	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L	-	12	7.9	12	9.5	14
Chloride	mg/L	250	<1	1.2	1.1	<1	0.5
Chromium	mg/L	-	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	1	<0.04	0.017	0.009	0.007	0.009
Fluoride	mg/L	4	<0.3	<0.3	0.53	<0.3	0.24
Iron	mg/L	-	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	mg/L	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Mercury	mg/L	0.002	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
Magnesium	mg/L	-	<0.5	0.98	0.76	0.96	1.4
Manganese	mg/L	-	0.012	0.003	<0.01	0.006	0.008
Molybdenum	mg/L	-	0.13	0.004	0.013	0.32	0.49
Nickel	mg/L	-	<0.03	<0.03	<0.03	<0.03	<0.03
Nitrate (as N)	mg/L	10	<0.15	0.06	0.13	<0.15	0.06
Potassium	mg/L	-	<1	<0.02	<0.02	0.3	1.4
Selenium	mg/L	0.05	0.0062	0.0019	0.0022	<0.005	0.0023
Silver	mg/L	0.1	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium	mg/L	-	<1.5	4.4	6.6	0.6	2.9
Sulfate	mg/L	-	16.0	4.3	4.2	9.1	20
Thallium	mg/L	0.002	<0.001	<0.001	<0.001	0.0006	<0.001
Total Dissolved Solids	mg/L	500	95	46	180	32	91
Zinc	mg/L	5	<0.02	<0.02	<0.02	<0.02	<0.02
Total Metals	mg/L	-	0.764	1.209	0.97	1.185	1.628
Ficklin Metals (Cu, Co, Cd, Pb, Ni, Zn)	mg/L	-	0.104	0.081	0.073	0.071	0.073

Highlighted cells exceed AWQS

APPENDIX B
Tabulated HCT Data

Appendix B
HCT Testing Results

Sample ID		AWQS Standard	RNW-HB-003 (919-925.5)	RNW-HB-003 (919-925.5)	RNW-HB-003 (919-925.5)	RNW-HB-003 (919-925.5)	RNW-HB-088 (370-375)	RNW-HB-088 (370-375)	RNW-HB-088 (370-375)	RNW-HB-088 (370-375)
Week	Units		0	1	2	4	0	1	2	4
Formation	-		Granodiorite	Granodiorite	Granodiorite	Granodiorite	Bolsa	Bolsa	Bolsa	Bolsa
pH	s.u.	6.5-8.5	7.84	7.11	6.75	6.89	**8.64**	7.86	7.73	7.63
Total Alkalinity	mg/L	-	12.0	8.9	7.4	8.6	19.9	14.8	12.3	12.8
Aluminum	mg/L	-	0.08	0.054	0.082	0.095	-0.05	0.016	0.038	-0.05
Antimony	mg/L	0.006	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025
Arsenic	mg/L	0.05	-0.005	-0.005	0.002	-0.005	-0.005	-0.005	0.0031	-0.005
Barium	mg/L	2	0.11	0.032	0.06	-0.02	0.13	0.14	0.071	-0.02
Beryllium	mg/L	0.004	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Cadmium	mg/L	0.005	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Calcium	mg/L	-	6.9	16	13	11	8.9	19	16	13
Chloride	mg/L	250	2	2.6	0.8	-1	3.1	3.1	1.3	-1
Chromium	mg/L	-	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Copper	mg/L	1	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Fluoride	mg/L	4	0.36	0.42	0.47	0.71	-0.3	0.53	0.41	0.33
Iron	mg/L	-	-0.1	0.16	0.2	-0.1	-0.1	0.148	-0.1	-0.1
Lead	mg/L	0.015	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025
Mercury	mg/L	0.002	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	0.0004	-0.00045
Magnesium	mg/L	-	1	2.7	1.8	1.6	2.1	5.3	4.1	3.3
Manganese	mg/L	-	0.021	0.025	0.016	0.021	0.014	0.029	0.023	0.021
Molybdenum	mg/L	-	-0.02	0.003	-0.02	-0.02	0.08	0.22	0.15	0.16
Nickel	mg/L	-	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nitrate (as N)	mg/L	10	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15
Potassium	mg/L	-	4.3	5.4	3.7	3.8	4.3	5.2	4	3.7
Selenium	mg/L	0.05	-0.005	-0.005	0.0015	-0.005	-0.005	-0.005	0.0023	-0.005
Silver	mg/L	0.1	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Sodium	mg/L	-	3.2	5.2	3.7	-1.5	4.8	7.5	4.2	1.6
Sulfate	mg/L	-	18	51	40	27	23	70	54	40
Thallium	mg/L	0.002	-0.001	-0.001	0.0005	-0.001	-0.001	-0.001	0.0005	-0.001
Total Dissolved Solids	mg/L	500	38	130	58	33	78	160	86	82
Uranium	mg/L	0.030	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Zinc	mg/L	5	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Highlighted cells exceed AWQS										

Appendix B
HCT Testing Results

Sample ID		AWQS Standard	RNW-HB-107 (181-189)	RNW-HB-107 (181-189)	RNW-HB-107 (181-189)	RNW-HB-107 (181-189)	RNW-HB-122 (350-354)	RNW-HB-122 (350-354)	RNW-HB-122 (350-354)	RNW-HB-122 (350-354)
Week	Units		0	1	2	4	0	1	2	4
Formation	-		Qmp	Qmp	Qmp	Qmp	Qmp	Qmp	Qmp	Qmp
pH	s.u.	6.5-8.5	**8.95**	**8.53**	8.34	8.37	6.84	7.66	7.43	7.28
Total Alkalinity	mg/L	-	26.8	27.3	18.5	17.4	33.8	15.2	12.9	10.3
Aluminum	mg/L	-	0.057	0.032	0.065	-0.05	-0.05	-0.05	0.035	-0.05
Antimony	mg/L	0.006	-0.0025	-0.0025	-0.0025	-0.0025	0.003	-0.0025	0.0048	0.0053
Arsenic	mg/L	0.05	-0.01	-0.005	0.0024	-0.005	-0.01	-0.005	0.0015	-0.005
Barium	mg/L	2	0.12	0.063	0.081	-0.02	0.051	0.062	0.053	-0.02
Beryllium	mg/L	0.004	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Cadmium	mg/L	0.005	-0.001	-0.001	-0.001	-0.001	**0.01**	0.0011	0.001	0.0018
Calcium	mg/L	-	8.4	10	8.1	6.9	79	73	80	77
Chloride	mg/L	250	2	2.4	1.1	-1	5	6.7	5.8	-5
Chromium	mg/L	-	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Copper	mg/L	1	-0.04	-0.04	-0.04	-0.04	**7.8**	0.038	0.038	-0.04
Fluoride	mg/L	4	-0.3	0.13	0.2	-0.3	-0.6	0.5	0.86	-1
Iron	mg/L	-	-0.1	-0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Lead	mg/L	0.015	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025
Mercury	mg/L	0.002	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045
Magnesium	mg/L	-	1.6	2.5	1.8	1.5	24	23	25	24
Manganese	mg/L	-	-0.01	0.01	0.007	-0.01	0.21	0.11	0.11	0.16
Molybdenum	mg/L	-	-0.02	0.013	0.006	-0.02	-0.02	0.004	-0.020	-0.02
Nickel	mg/L	-	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nitrate (as N)	mg/L	10	-0.15	-0.15	-0.15	-0.15	-0.06	-0.06	-0.3	-0.3
Potassium	mg/L	-	1.6	1.5	1.1	-1	5.4	5.1	5.3	5.1
Selenium	mg/L	0.05	-0.005	-0.005	0.0019	-0.005	0.014	0.017	0.019	0.012
Silver	mg/L	0.1	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Sodium	mg/L	-	3.8	5.4	3.9	1.9	16	15	16	10
Sulfate	mg/L	-	12	21	15	11	310	310	290	290
Thallium	mg/L	0.002	-0.001	-0.001	0.0005	-0.001	-0.001	-0.001	0.0006	-0.001
Total Dissolved Solids	mg/L	500	47	56	45	38	460	480	470	460
Uranium	mg/L	0.030	-0.005	**0.032**	0.012	0.019	0.006	-0.005	-0.005	-0.005
Zinc	mg/L	5	-0.02	-0.02	-0.02	-0.02	0.28	-0.02	0.007	0.024
Highlighted cells exceed AWQS										

Appendix B
HCT Testing Results

Sample ID		AWQS Standard	RNW-HB-141 (529.5-535)	RNW-HB-141 (529.5-535)	RNW-HB-141 (529.5-535)	RNW-HB-141 (529.5-535)	RNW-HB-143 (717-725)	RNW-HB-143 (717-725)	RNW-HB-143 (717-725)	RNW-HB-143 (717-725)
Week	Units		0	1	2	4	0	1	2	4
Formation	-		Granodiorite	Granodiorite	Granodiorite	Granodiorite	Glance	Glance	Glance	Glance
pH	s.u.	6.5-8.5	**9.06**	**8.59**	8.22	8.22	**8.60**	8.01	7.42	7.39
Total Alkalinity	mg/L	-	23.9	21.3	17.2	15.8	20.2	12.9	10.6	8.8
Aluminum	mg/L	-	0.056	0.031	0.049	-0.05	-0.05	-0.05	0.025	-0.05
Antimony	mg/L	0.006	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025
Arsenic	mg/L	0.05	-0.005	-0.005	0.0022	-0.005	-0.005	-0.005	0.0026	-0.005
Barium	mg/L	2	0.12	0.043	0.071	-0.02	0.096	0.075	0.056	-0.02
Beryllium	mg/L	0.004	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Cadmium	mg/L	0.005	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Calcium	mg/L	-	6.9	11	11	9.2	9.9	14	17	15
Chloride	mg/L	250	1.2	2.1	0.5	-1	1.8	2.5	2.9	-1
Chromium	mg/L	-	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Copper	mg/L	1	-0.04	0.006	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Fluoride	mg/L	4	0.32	0.5	0.42	0.3	-0.3	0.32	0.33	0.31
Iron	mg/L	-	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Lead	mg/L	0.015	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025
Mercury	mg/L	0.002	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045
Magnesium	mg/L	-	0.8	1.5	1.5	1.2	2.2	3.4	3.9	3.7
Manganese	mg/L	-	-0.01	0.010	0.008	-0.01	0.02	0.03	0.029	0.036
Molybdenum	mg/L	-	0.039	0.081	0.050	0.028	-0.02	0.017	0.012	-0.02
Nickel	mg/L	-	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nitrate (as N)	mg/L	10	-0.15	-0.15	-0.15	-0.15	-0.06	-0.06	0.019	-0.06
Potassium	mg/L	-	2.2	3	2.8	2.6	-1	0.4	0.5	-1
Selenium	mg/L	0.05	-0.005	-0.005	0.0021	-0.005	0.01	0.021	0.023	0.013
Silver	mg/L	0.1	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Sodium	mg/L	-	4.2	6.5	5.3	2.3	3.3	4.5	4.4	2
Sulfate	mg/L	-	9.5	26	30	18	16	37	43	42
Thallium	mg/L	0.002	-0.001	-0.001	0.0005	-0.001	-0.001	-0.001	0.0005	-0.001
Total Dissolved Solids	mg/L	500	33	91	65	53	46	120	100	78
Uranium	mg/L	0.030	-0.005	-0.005	-0.005	0.006	-0.005	-0.005	-0.005	-0.005
Zinc	mg/L	5	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Highlighted cells exceed AWQS										

Appendix B
HCT Testing Results

Sample ID		AWQS Standard	RNW-HB-156 (215-226)	RNW-HB-156 (215-226)	RNW-HB-156 (215-226)	RNW-HB-156 (215-226)	RNW-HB-195 (588-597)	RNW-HB-195 (588-597)	RNW-HB-195 (588-597)	RNW-HB-195 (588-597)
Week	Units		0	1	2	4	0	1	2	4
Formation	-		Abrigo	Abrigo	Abrigo	Abrigo	Glance	Glance	Glance	Glance
pH	s.u.	6.5-8.5	8.42	8.1	7.77	7.87	**8.54**	8.43	8.15	8.20
Total Alkalinity	mg/L	-	24.3	16.5	14.9	14.4	35.0	27.6	24.2	20.4
Aluminum	mg/L	-	-0.05	0.023	0.04	-0.05	-0.05	0.023	0.032	1.3
Antimony	mg/L	0.006	-0.0025	-0.0025	-0.0025	0.0029	0.0027	0.0049	0.0043	0.0059
Arsenic	mg/L	0.05	-0.005	-0.005	0.0025	-0.005	**0.063**	**0.088**	**0.077**	**0.072**
Barium	mg/L	2	0.06	0.063	0.07	-0.02	0.09	0.058	0.15	-0.02
Beryllium	mg/L	0.004	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Cadmium	mg/L	0.005	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Calcium	mg/L	-	17	28	22	15	18	33	26	24
Chloride	mg/L	250	1.7	0.6	0.8	-1	-1	0.6	0.3	-1
Chromium	mg/L	-	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Copper	mg/L	1	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Fluoride	mg/L	4	-0.3	0.8	0.6	0.46	0.37	0.98	0.97	0.64
Iron	mg/L	-	-0.1	-0.1	0.128	-0.1	-0.1	-0.1	0.165	0.211
Lead	mg/L	0.015	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025	-0.0025
Mercury	mg/L	0.002	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045	-0.00045
Magnesium	mg/L	-	2.9	5.2	4.1	2.8	6.7	13	10	9.4
Manganese	mg/L	-	0.014	0.014	0.01	0.01	0.018	0.017	0.013	0.015
Molybdenum	mg/L	-	0.043	0.095	0.082	0.051	0.07	0.062	0.039	0.041
Nickel	mg/L	-	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nitrate (as N)	mg/L	10	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15
Potassium	mg/L	-	2.4	2.5	2	1.6	1.7	2.1	1.5	1.8
Selenium	mg/L	0.05	-0.005	0.0051	0.0052	-0.005	0.0071	0.019	0.015	0.0099
Silver	mg/L	0.1	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Sodium	mg/L	-	4.1	6.3	5	2	3.8	5.2	4.6	1.5
Sulfate	mg/L	-	39	110	59	37.0	51	120	78	74
Thallium	mg/L	0.002	-0.001	-0.001	0.0005	-0.001	-0.001	-0.001	0.0005	-0.001
Total Dissolved Solids	mg/L	500	90	180	120	69	100	210	150	120
Uranium	mg/L	0.030	-0.005	-0.005	-0.005	-0.005	0.006	0.006	-0.005	0.007
Zinc	mg/L	5	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Highlighted cells exceed AWQS										