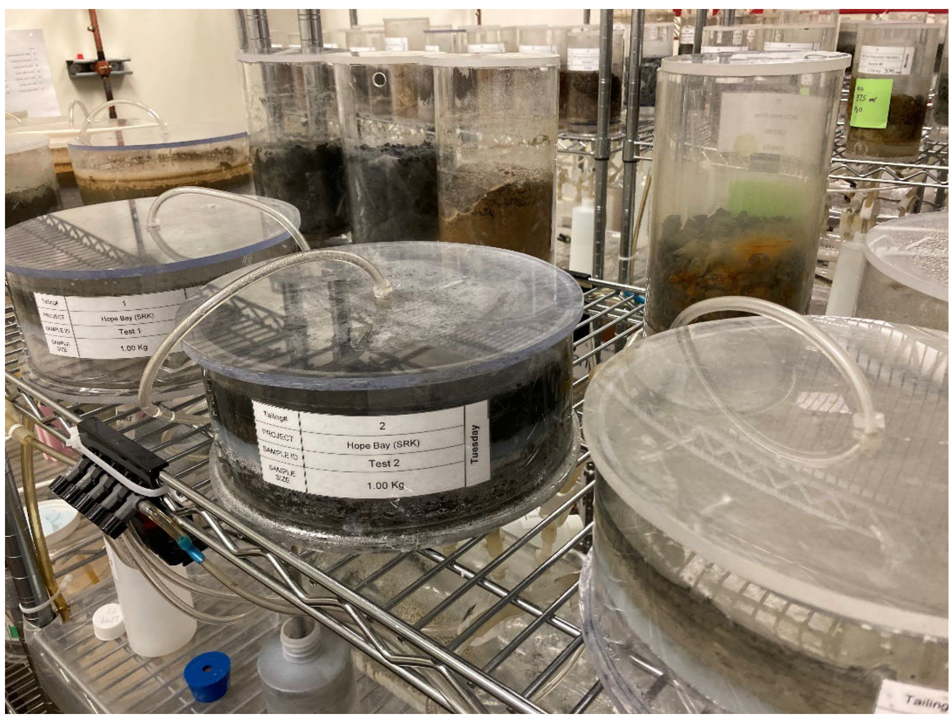
FINAL

Geochemical Characterization of Naartok West Metallurgical Tailings, Hope Bay Project

Hope Bay Madrid ML/ARD Characterization, Hope Bay, Canada

Agnico Eagle Mines Ltd.



SRK Consulting (Canada) Inc. ▪ CAPR002672 ▪ January 2024

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Naartok West Humidity Cells, Hope Bay 2023

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Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

ABA	Acid Base Accounting
AP	Acid potential
CMR	Carbonate molar ratio
CNO	Cyanate
COPC	Constituent of potential concern
DL	Detection limit
DOC	Dissolved organic carbon
EC	Electrical conductivity
HCT	Humidity cell test
ICP-MS	Inductively coupled plasma mass spectrometry
ML/ARD	Metal leaching and acid rock drainage
Non-PAG	Non-potentially acid generating
NP	Neutralization potential
ORP	Oxidation-reduction potential
PAG	Potentially Acid Generating
QAQC	Quality Assurance/Quality Control
QXRD	Quantitative X-Ray Diffraction
RPD	Relative percent difference
SCN	Thiocyanate
SFE	Shake flask extraction
TIA	Tailings Impoundment Area
TIC	Total inorganic carbon
TIMA-X	TESCAN Integrated Mineral Analyzer

1 Introduction

Agnico Eagle Mines Ltd. (Agnico) is re-evaluating the project description for the Madrid North mine, which is geologically defined as four ore zones: Naartok West, Naartok East, Suluk, and Rand. Agnico is currently considering changes to the metallurgical process, which would result in changes to the Doris milling process and waste management for tailings. Currently, the Hope Bay Project manages tailings as the following two streams: flotation tailings and detoxified tailings. Agnico is evaluating tailings disposal as one combined stream that would be generated by the alternate case metallurgical scenario.

Agnico retained SRK Consulting (Canada) Inc. (SRK) to complete an assessment of the ML/ARD potential of three Naartok West metallurgical tailings streams (combined detoxified tailings, sulphide concentrate tailings and flotation tailings) produced using a new metallurgical flow sheet referred to herein as the “Alternative Case”. The purpose of the ML/ARD assessment is to support a future Water Licence amendment for Madrid North and to support Agnico’s engineering and waste management options analysis currently in progress. This report presents the findings of the ML/ARD assessment of the combined detoxified, sulphide concentrate, and flotation tailings for Naartok West. This report is part of Task 961 of PO OL-1294273.

2 Updated Metallurgical Process

Agnico is currently assessing two metallurgical scenarios referred to as the Base Case and the Alternative Case (Appendices A and B, respectively).

The Base Case is the current process used at the Doris mill that produces a flotation tailings slurry and detoxified tailings. Detoxified tailings are sulphide ore that is leached with cyanide then detoxified. The slurry is discharged to the Doris TIA and detoxified tailings are placed as backfill in underground stopes at Doris Mine. All metallurgical and mill tailings the have been previously geochemically characterized were produced using the Base Case metallurgical flow sheet (e.g., SRK 2015 and SRK 2017d).

The Alternative Case has the same flotation process as the Base Case but differs in that there is a regrind of the sulphide concentrate before it is recombined with the flotation tailings. The combined detoxified tailings are composed of 12% sulphide concentrate tailings and 88% flotation tailings.

3 Methods

3.1 Sample Set

Three metallurgical tailings samples (combined detoxified tailings, sulphide concentrate tailings and flotation tailings) were produced using the Alternative Case flow sheet at SGS Canada Inc. (SGS) in Burnaby, BC under the direction of Agnico (Paul Grady). All tailings streams generated for the geochemical test work program were leached with cyanide and then detoxified before geochemical testing. For each sample, 2 kg of solids and ~20 L of slurry composed of ~30% solids were generated for geochemical characterization. SRK relied on Agnico and SGS to produce samples that were representative of the metallurgical process. SGS was responsible for the internal transfer of samples from the metallurgical department to their ML/ARD group for geochemical characterization.

3.2 ML/ARD Test Work Program

3.2.1 Sample Preparation

Sample preparation and geochemical analyses were conducted at the SGS ML/ARD department in Burnaby, BC under the instruction of SRK. The slurry tailing samples was blended and divided into eleven subsamples for the aging tests. For all other tests, solids were dried at room temperature. Lab IDs and the corresponding tailings types are summarized in Table 3-1.

Table 3-1: Naartok West Metallurgical Tailings Sample IDs

Lab ID	Tailings Type
Test 1	Combined Detoxified Tailings
Test 2	Sulphide Concentrate Tailings
Test 3	Flotation Tailings

Sources:https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

3.2.2 Mineralogy

Bulk mineralogy was determined by semi-QXRD using Rietveld refinement. High-definition modal mineralogy was also determined by TIMA-X analysis. TIMA-X determined both the modal abundances and sulphur deportment.

3.2.3 Humidity Cell Tests

HCTs were operated using the MEND method to evaluate the kinetic behaviour and resultant leachate chemistry. A summary of the analyte list and analytical frequency is provided in Table 3-2. The list of analytes was defined by SRK and Agnico. This report includes data up to 30 cycles of HCT operation, however the HCTs were initiated at different times. Accordingly, data are available for 20 to 30 cycles of HCT operation, depending on the sample and parameter.

After 40 weeks of operation, SRK will review the data and based on the objectives of the tests, recommend if the tests should continue or be considered complete.

Table 3-2: HCT Analytes and Analytical Frequency

Parameters	Typical Frequency
pH, EC, SO_4, Alkalinity, Acidity	Weekly
ICP-MS (trace elements), Total CN, WAD CN, SCN, CNO, TOC, Hardness, NO_2, NO_3, NH_3	Weeks 1-12, 16, 20, 24, 28, etc.

Sources:https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

3.2.4 ABA and Metals

ABA included paste pH, modified NP (MEND 1991), fizz test, total sulphur and total carbon by LECO furnace, sulphate sulphur by HCl leach followed by ICP-MS analysis, TIC by coulometry and trace element content by aqua regia digestion followed by ICP-MS analysis.

3.2.5 Shake Flask Extraction Tests

SFE tests were conducted to assess the potential for increased metal mobility under saline conditions. SFE tests were conducted using two different lixiviants (deionized and saline water) and following the MEND (2009) method. In summary, 250 g of sample was combined with 750 mL of lixiviant and agitated on a rotary extractor for 24 hours. The saline solution was produced by the lab using the major ion composition of groundwater intercepted by the Doris Mine underground at monitoring station TL-12a (Table 3-3, SRK 2023b). Doris mine water rather than Madrid groundwater was selected because major ion data from Madrid (Suluk) were incomplete and no other groundwater data from Madrid are available.

SFE leachates were analyzed for pH, EC, ORP, alkalinity, sulphate, chloride, fluoride, bromide, and dissolved metals by ICP-MS including mercury.

Table 3-3: Saline Lixiviant Recipe for SFE Tests (all units mg/L)

Ca	Cl	Mg	Na	Sulphate
3100	21000	1200	9000	1900

Sources:https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

3.2.6 Aging Tests

Oxic and anoxic aging tests for each tailings samples were initiated in May 2023. The oxic tests are complete and all data have been received. Anoxic tests are still in progress with data from 3 aliquots included in this report.

Each ~20 L slurry sample was blended and divided into ten ~1.7 L subsamples and one ~3 L subsample for the oxic aging test (n=5), anoxic aging test (n=5) and supernatant chemistry (n=1).

The initial supernatant represents leachate from the slurry mixture before aging, and therefore represents process water at time zero.

Each of the five subsamples for the oxic aging tests were placed in separate 2 L beakers and covered with a parafilm. The beakers were placed in a window and exposed to natural light. Leachates from the subsamples were sampled at the intervals presented in Table 3-4.

Each of the five subsamples for anoxic aging tests were placed in separate 2 L airtight containers with stoppers. The containers were placed in a glovebox that was purged with nitrogen gas to create oxygen depleted conditions. The glovebox was purged continuously for two hours during the setup of anoxic tests, flushed weekly and also during sample collection from an aliquot. After each round of purging, a Tedlar bag filled with nitrogen was attached to the container stopper to prevent oxygen ingress. The containers were kept in a dark room to prevent light exposure. The supernatant from the subsamples were sampled at the intervals presented in Table 3-4.

Samples were analyzed for the parameters outlined in Table 3-5.

Table 3-4: Aging Test Oxic and Anoxic Aliquot Analysis Schedule

Aliquot No.	Oxic Testing (Months)	Anoxic Testing (Months)
Supernatant	0	0
1	0.5	1
2	1	2
3	2	4
4	3	6
5	4	8

Sources:https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

Table 3-5: Aging Test Analytes

Parameters	Unfiltered Leachate	Filtered Leachate
pH, EC, TDS, ORP	x	x
Total Suspended Solids	x	
Alkalinity, Acidity, SO4, Cl, F, Br		x
NO3, NO2, Total Ammonia, PO4		x
Total CN, WAD CN, Free CN, SCN, CNO		x
DOC, Hardness		x
Thiosalts (as S2O3), Thiosulphate		x
Metals (ICP-MS) + Hg (CVAA)	x	x

Sources:https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

Notes: Unfiltered leachate was analyzed for total metals, while filtered leachate was analyzed for dissolved metals.

3.3 Data Interpretation

ABA data calculations are summarized as follows:

1. Sulphide sulphur was calculated as the difference between total sulphur and sulphate sulphur.
2. Organic carbon was calculated as the difference between total carbon and TIC.
3. Effective TIC, referred to as $TIC_{(Ca+Mg)}$ was calculated to account for the potential overestimation of neutralization potential from TIC due to the presence of NP-neutral iron carbonates as follows:

$$TIC(_{Ca+Mg}) = TIC*0.87$$

The factor of 0.87 was determined using the following information:

- The stoichiometric proportion of calcium-plus-magnesium content in ferroan dolomite from Naartok West metallurgical tailings, $Ca_{(Mg0.72Fe0.28)}CO_3$ (SRK 2017d).
- ABA and mineralogy data from Naartok West metallurgical tailings which indicated the presence of iron carbonate minerals (Section 4).

The ARD potential of samples were classified using the following criteria:

- NP/AP greater than 3 is classified as non-PAG.
- NP/AP ratio between 1 and 3 is classified as uncertain.
- NP/AP less than 1 is classified as PAG.

The same criteria were used for ratios of TIC/AP and $TIC_{(Ca+Mg)}$/AP.

Trace elements were compared to ten times crustal abundances for basalt (Price, 1997) to provide an indication of metals enrichment.

HCT stable release rates are based on review of sulphate release rates whereby stability is defined as relatively constant sulphate loading rates. Stable release rates for all parameters is calculated by averaging the release rates over the period of sulphate stability.

3.4 Data Quality Assurance and Quality Control

Data QAQC was conducted by SRK on all results received from SGS. A summary of QAQC performed according to test is presented in Table 3-6.

Iron concentrations in the saline SFE blank and combined detoxified tailings sample were high, indicating contamination (Table 4-5). Iron could not be re-analyzed because there was an insufficient amount of sample remaining at the laboratory. SFE iron concentrations for Test 1 (combined detoxified tailings) are presented for completeness but have been excluded from data interpretations.

QAQC is conducted on ongoing HCTs and aging tests as results are received. Anomalous values (data peaks greater than 10 times detection limit) for total cyanide, aluminum, and iron in HCTs are currently being reviewed by SGS.

All other data passed QC checks and were deemed by SRK as acceptable.

Table 3-6: Summary of QAQC Results, Naartok West Tailings

QC Test	n	SRK QC Criteria	Results
		paste pH	
Pulp Duplicate	(n=2)	For any samples, +/- 0.5 difference pH unit	All passed
		Total C and TIC	
Lab Blank	(n=1) for TIC and (n=0) for Total C	<5X detection limit (DL)	All passed
Carbon balance (Total C > TIC)	(n=3)	For samples > 10X the detection limit (DL), Total Carbon should be greater than Total Inorganic Carbon, if not the % difference should be within +/-20%	All passed
Pulp Duplicate	(n=3) for TIC and (n=2) for Total C	For samples > 10X the detection limit (DL), % RPD within +/-20%	All passed
Standard Reference Material	(n=3) for TIC and (n=3) for Total C	Within specified tolerance ranges.	All passed
		Total S & Total Sulphate	
Lab Blank	(n=1) for Total S and (n=1) for Total Sulphate	<5X detection limit (DL)	All passed
Sulphur balance (total S > sulphate S)	(n=3)	For samples > 10X the detection limit (DL), Total Sulphur should be greater than Total Sulphate, if not the % difference should be within +/-20%	All passed
Pulp Duplicate	(n=2) for Total S and (n=3) for SO4	For samples > 10X the detection limit (DL), % RPD within +/-20%	All passed. Test 1 failed SRK criteria but passed overall as values are within specified tolerance ranges, as per the lab's QC guide.
Standard Reference Material	(n=3) for Total S and (n=2) for SO4	Within specified tolerance ranges.	All passed
		Modified NP and Terminal pH	
NP consistent with paste pH	(n=3)	Negative NP has paste pH <= 5	All passed
Pulp Duplicate	(n=2) for NP and (n=1) for terminal pH	% RPD better than +/-15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/-5kg/t for NP<10 kg/t. Fizz test rating is the same.	All passed
Terminal pH	(n=3)	within pH 1.5-2	All passed
Standard Reference Material	(n=1) for NP	Within specified tolerance ranges.	Passed
		Modified NP and TIC	

QC Test	n	SRK QC Criteria	Results
Comparison between Modified NP and TIC	(n=3)	Check for trends/correlation	TIC higher than NP for all samples
		Total S-Leco and S-ICP	
Comparison between Total S-Leco and S-ICP	(n=3)	For samples >10X detection limit (DL), % RPD within +/-20%	All passed
		Metals - Aqua Regia Digestion with ICP-OES/MS Finish	
Lab Blank	(n=3)	<5X detection limit (DL)	All passed
Pulp Duplicate	(n=3)	For samples >10X detection limit (DL), % RPD within +/- 20%, ok 10% of metal scan failing.	All passed
Standard Reference Material	(n=6)	<10X DL, Within specified tolerance ranges.	All passed
		Whole Rock Analysis - XRF	
Lab Blank	(n=2)	<5X detection limit (DL)	All passed
Pulp Duplicate	(n=2)	For samples >10X detection limit (DL), % RPD within +/- 20%, ok 10% of metal scan failing.	All passed
Standard Reference Material	(n=3)	<10X DL, Within specified tolerance ranges.	All passed
		MEND Shake Flask Extraction	
Lab Blank	(n=1)	<5X Detection Limit; pH should be within 5-6 pH units	Passed.
Ion Balance	(n=3)	If EC>100uS/cm, Ion balance should be within +/-10%	All passed
		Shake Flask Extraction Saline Water	
Lab Blank	(n=1)	<5X Detection Limit; pH should be within 5-6 pH units	Iron failed due to concentration >10X DL (4.9 mg/L)
Ion Balance	(n=3)	If EC>100uS/cm, Ion balance should be within +/-10%	All passed
Metals Check	(n=3)	Check for anomalous values	Test 1: iron concentration was anomalously high (5.2 mg/L) and failed. Refer to comments for lab blank. All other parameters and samples passed. Insufficient sample was available for re-run of results. Iron data excluded from data interpretations.

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/!020_Project_Data/040_Lab/SGS/[CAPR002672_HB_Madrid_Naartok W T_Compiled Summary QAQC Results_mlt.xlsx]

Notes: Yellow highlighted values are QA/QC failures, values were not used in interpretation of results.

4 Results

4.1 Mineralogy

Sulphur mineralogy is provided in Table 4-1 and carbonate mineralogy is provided in Table 4-2. Complete mineralogy results are presented in Appendix C

Total sulphur content indicated by TIMA-X was 1.0 wt% for flotation tailings, 2.7 wt% for combined detoxified tailings and 24 wt% for sulphide concentrate tailings. Pyrite (FeS_2) was the dominant sulphide for all tailings samples and was the only sulphide mineral indicated by QXRD. Other sulphide minerals identified included lesser chalcopyrite ($CuFeS_2$), arsenic sulphides (identified by SGS as primarily gersdorffite, (Fe,Co,Ni)AsS), and sphalerite ((Zn,Fe)S), and minor galena (PbS), molybdenite (MoS_2), and pyrrhotite ($Fe_{(1-x)}S$). Chalcocite (Cu_2S), cobaltite (CoAsS), and covellite (CuS) were also present in sulphide concentrate tailings. The primary sulphate mineral was gypsum ($CaSO_4 \cdot 2H_2O$) (<0.6 wt% for combined detoxified tailings and flotation tailings and 2.1 wt% for sulphide concentrate tailings) with lesser barite (BaSO4) and aluminum-silicate-calcium sulphates. Pyrite was the dominant sulphur mineral for sulphide concentrate tailings and combined detoxified tailings whereas gypsum content was greater than pyrite for flotation tailings (0.54 and 0.095 wt%, respectively).

Total sulphur content indicated by TIMA-X sulphur deportment analysis was 0.31 %S for flotation tailings, 1.1 %S for combined detoxified tailings and 11 %S for sulphide concentrate tailings. Pyrite was the dominant sulphide for all tailings types, and lesser and minor sulphides were as described in modal abundance results. The primary sulphate mineral was gypsum for all tailings types (0.21, 0.13, and 0.87 %S, respectively), and gypsum content also exceeded pyrite content in flotation tailings.

Carbonate mineral content indicated that all tailings samples were dominated by iron carbonates including ankerite (19 to 26 wt%) and ferroan dolomite (~10 wt%). Other carbonate minerals include magnesite (<5.0 wt%), and minor calcite (<0.07 wt%). TIMA-X also quantified trace amounts (<0.0009 wt%) of unspecified carbonate minerals.

The sulphide mineralogy suggests risk of neutral pH leaching for arsenic, cobalt, and nickel from gersdorffite and cobaltite (SRK 2017d and 2018), copper from chalcopyrite, covellite, and chalcocite, zinc, and cadmium from sphalerite and potentially molybdenum from molybdenite.

Table 4-1: Sulphur Mineralogy (wt%), Naartok West Tailings

Tailings Type	Pyrite		Chalcopyrite	As-Sulphides[1]	Sphalerite	Pyrrhotite	Molybdenite	Galena	Covellite	Cobaltite	Chalcocite	Gypsum	Barite	Al Si Ca Sulphates[2]	Other
	FeS_2		$CuFeS_2$	NiAsS	(Zn,Fe)S	$Fe_{(1-x)}S$	MoS_2	PbS	CuS	CoAsS	Cu_2S	$CaSO_4 \cdot 2H_2O$	$BaSO_4$		
	QXRD	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X	TIMA-X
Flotation Tailings	0.11	0.095	0.0029	0.0048	0.0075	0.00085	0.00032	0.00085	bd	bd	bd	0.54	0.1	0.11	0.16
Sulphide Concentrate Tailings	17	19	0.31	0.16	0.11	0.029	0.022	0.0044	0.0015	0.00073	0.00065	2.1	0.19	0.31	0.97
Combined Detoxified Tailings	2.2	1.8	0.031	0.017	0.019	0.0025	0.00021	0.0054	bd	bd	bd	0.34	0.11	0.06	0.24

Sources : https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

Notes: bd = below detection limit

[1] Primarily gersdorffite as communicated by SGS mineralogists.

[2] Indicated by SGS as i) fine-grained, intermixed gypsum and silicates and/or ii) A thin layer of gypsum on silicates.

Table 4-2: Carbonate Mineralogy (wt%), Naartok West Tailings

Tailings Type	Ankerite		Dolomite[1]		Magnesite		Calcite		Other Carbonates[2]
	$CaFe(CO_3)_2$		$CaMg(CO_3)_2$		$MgCO_3$		$CaCO_3$		
	QXRD	TIMA-X	QXRD	TIMA-X	QXRD	TIMA-X	QXRD	TIMA-X	TIMA-X
Flotation Tailings	26	20	10	9.0	3.8	2.6	bd	0.032	bd
Sulphide Concentrate Tailings	19	16	9.4	7.0	2.5	1.8	<1	0.069	0.00084
Combined Detoxified Tailings	25	21	10	8.6	3.2	2.9	bd	0.025	0.00075

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

Notes: bd = below detection limit

[1] Reported as dolomite, but previously identified as ferroan dolomite (SRK, 2016)

[2] Trace carbonates not identified by mineralogical analysis.

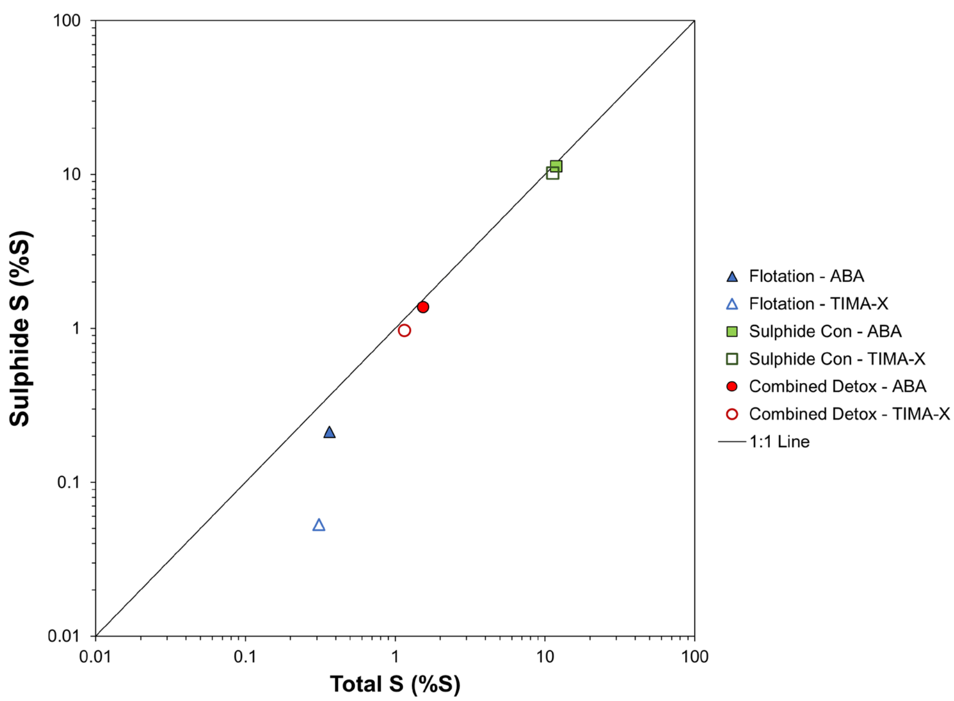
4.2 Acid Base Accounting

A summary of ABA data for Naartok West tailings are presented in Table 4-3. The complete ABA dataset is presented in Appendix D.

Values of paste pH ranged from 8.5 to 8.8 for all samples. Total carbon content ranged from 4.2 to 4.7 %C. Organic carbon content was highest in sulphide concentrate tailings (1.1 %C), which was higher than combined detoxified tailings (0.65 %C) and flotation tailings (0.35 %C).

Consistent with mineralogical analyses, total sulphur content was highest in sulphide concentrate tailings (12 %S), followed by combined detoxified tailings (1.5 %S) and flotation tailings (0.36%S). ABA data indicated that sulphide content was roughly equivalent to total sulphur for all tailings (Figure 4-1). The relationship between total sulphur and sulphide sulphur was consistent with mineralogical analysis except that TIMA-X indicated that for flotation tailings, sulphate minerals were the primary sulphur mineral.

Figure 4-1: Comparison of Total Sulphur and Sulphide Sulphur, Naartok West Tailings



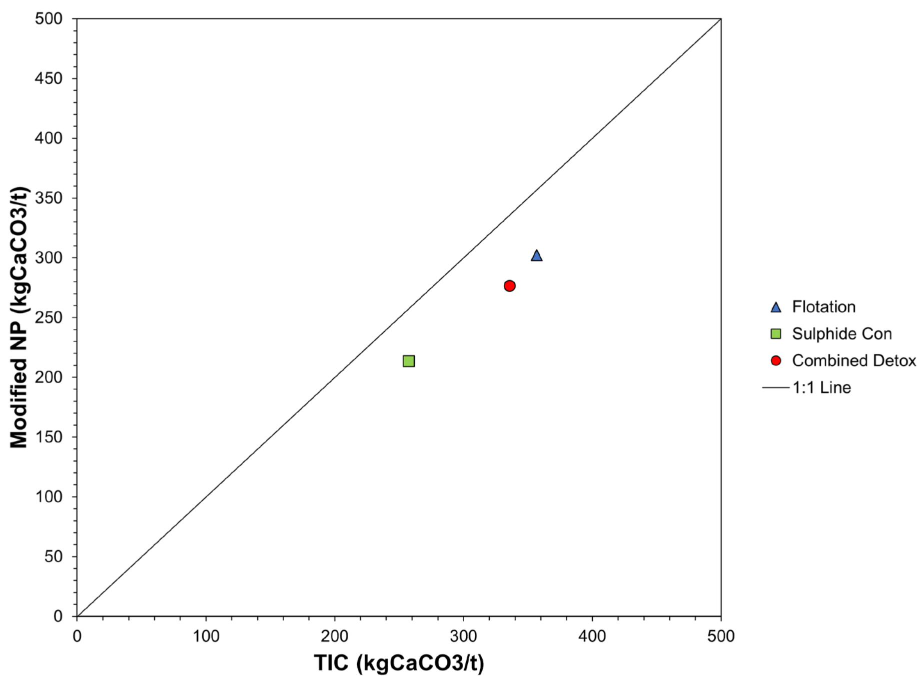
Sources:

https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/3. Compiled Static Data/[Compiled_Naartok_W_MetTailings_Static_Data_CAPR002672_KWJ_Rev01.xlsx]

Modified NP ranged from 210 to 300 kg$CaCO_3$/t whereas TIC ranged from 260 to 360 kg$CaCO_3$/t. As shown in Figure 4-2, values of TIC are higher than NP suggesting the presence of iron and/or manganese carbonates. This is consistent with mineralogy that indicates the presence of iron carbonates (Sections 3.3 and 4.1). Iron and manganese carbonates are net neutral because iron and/or manganese produced from carbonate dissolution generates acidity through hydrolysis. $TIC_{(Ca+Mg)}$ content ranged from 220 to 310 kgCaCO3/t and was at near parity with Modified NP (Figure 4-3).

The sulphide concentrate tailings sample was classified as PAG based on values of NP/AP, TIC/AP, and $TIC_{(Ca+Mg)}$/AP whereas other samples were classified as non-PAG.

Figure 4-2: Comparison of TIC and NP, Naartok West Tailings



Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/3. Compiled Static Data/[Compiled_Naartok_W_MetTailings_Static_Data_CAPR002672_KWJ_Rev01.xlsx]

Figure 4-3: Comparison of $TIC_{(Ca+Mg)}$ and NP, Naartok West Tailings

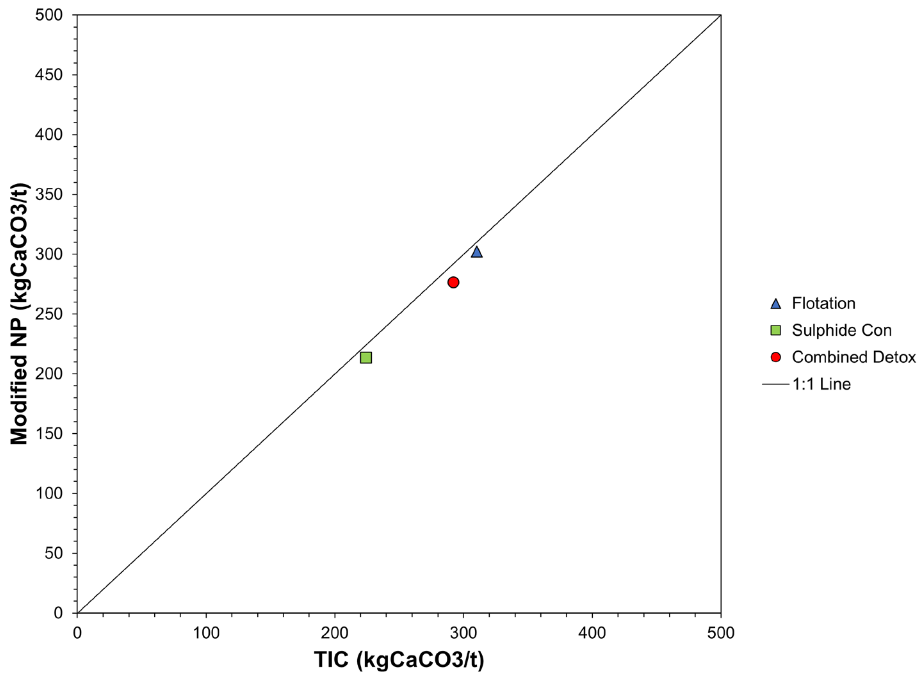


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Table 4-3: Acid-Base Accounting Results, Naartok West Tailings

Tailings Type	Paste pH	Total C	TIC	TOC[1]	Total S	Sulphate S	Sulphide S[1]	AP	Fizz Test	TIC[1]	TIC($_{Ca+Mg}$)	Mod NP	TIC/AP	TIC($_{Ca+Mg}$)/AP	NP/AP	ARD Classification
		%C	%C	%C	%S	%S	%S	kg $CaCO_3$/t		kg$CaCO_3$/t	kg$CaCO_3$/t	kg$CaCO_3$/t				
Flotation Tailings	8.8	4.6	4.3	0.35	0.36	0.15	0.21	6.7	Slight	360	310	300	54	47	45	non-PAG
Sulphide Concentrate Tailings	8.5	4.2	3.1	1.1	12	0.56	11	350	Slight	260	220	210	0.73	0.63	0.6	PAG
Combined Detoxified Tailings	8.6	4.7	4.0	0.65	1.5	0.16	1.4	43	Slight	340	290	280	7.8	6.8	6.4	non-PAG

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

Notes:

[1] Calculated. Refer to Section 3.3.

4.3 Trace Element Content

Trace element content is summarized in Table 4-4, with complete results provided in Appendix E.

Arsenic and sulphur were elevated compared to the screening criteria for all tailings types. Arsenic was greater than 100 times the screening criteria for combined detoxified tailings and flotation tailings and greater than 1,000 times higher for sulphide concentrate tailings. Bismuth was greater than 10 times the screening criteria for combined detoxified tailings and sulphide concentrate tailings . Sulphide concentrate tailings were also elevated in antimony and copper (10 times), and selenium (100 times). All other elements were below the screening criteria indicating no appreciable enrichment.

Table 4-4: Selected Trace Element Data, Naartok West Tailings

Tailings Type	Sb	As	Bi	Cd	Co	Cu	Fe	Pb	Mo	Mn	Ni	Se	Ag	S	W	Zn
	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
Flotation Tailings	0.46	**250**	*0.02*	0.18	27	110	4.8	2.9	6.0	1300	260	*1.0*	0.03	**0.39**	2.1	78
Sulphide Concentrate Tailings	**3.4**	**2500**	**0.49**	1.7	210	**1300**	14	32	5.8	1000	1200	**6.0**	0.81	**5.0**	1.6	820
Combined Detoxified Tailings	0.85	**510**	**0.09**	0.4	46	230	6.0	9.8	6.9	1300	340	*1.0*	0.15	**1.6**	1.9	160
10x Crustal Abundance for Basalt (Price, 1997)	*2.0*	*20*	*0.07*	*2.2*	*480*	*870*	*87*	*60*	*15*	*15000*	*1300*	*0.5*	*1.1*	*0.3*	*7.0*	*1100*

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/020_Tables/[NaartokWest_Characterization_Tables_CAPR002672_KWJ_Rev01.xlsm]

Notes: Red bolded values are ten times greater than Price (1997); Blue italics are values less than laboratory detection limit. Detection limit shown.

4.4 SFE Tests

Select SFE test results are summarized in Table 4-5. For clarity, the test types are referred to as water SFE (for water lixiviant) and saline SFE. Complete laboratory results are presented in Appendix F.

pH values were higher for water SFE tests compared to saline SFE tests (8.1 and 7.8 respectively for combined detoxified tailings and sulphide concentrate tailings, and 8.2 and 7.9 respectively for flotation tailings).

For water SFE tests, major cations were characterized by calcium (310 to 600 mg/L) and sodium (160 to 400 mg/L) whereas major anions varied by tailings type. For flotation tailings and combined detoxified tailings, anions were dominantly sulphate (1,200 and 1,100 mg/L, respectively) and alkalinity (50 and 45 mg$CaCO_3$/L, respectively) whereas for sulphide concentrate tailings sulphate and chloride were dominant (2,600 and 120 mg/L, respectively). Major ions for saline SFE tests represented the saline lixiviant (Table 3-3) except for sulphate. Water and saline SFE sulphate leachate concentrations for sulphide concentrate tailings samples (2,600 mg/L) were higher than sulphate concentrations in the lixiviant blank (1,900 mg/L).

Sulphate and trace metal concentrations were generally highest in sulphide concentrate tailings and lowest in flotation tailings. An assessment of metal mobility under saline conditions is summarized as follows:

- Concentrations were higher for saline SFE tests by approximately 100 times for cadmium for all tailings types.
- Concentrations were higher for saline SFE tests by approximately 10 times for copper, manganese, nickel, silver, and zinc for all tailings types.
- Concentrations were higher for saline SFE tests by 2 to 3 times for cobalt for all tailings types.
- Concentrations were roughly equivalent for saline and water SFE tests for antimony, arsenic, molybdenum, selenium, and uranium (all tailings types).
- Concentrations were equivalent and below their respective detection limits for saline and water SFE tests for nitrite (sulphide concentrate and combined detoxified tailings), nitrate (flotation and combined detoxified tailings), and mercury (flotation tailings).

Table 4-5: Select Shake Flask Extraction Results, Naartok West Tailings

Parameter	Flotation Tailings		Sulphide Concentrate Tailings		Combined Detoxified Tailings	
	DI Water	Saline	DI Water	Saline	DI Water	Saline
pH	8.2	7.9	8.1	7.8	8.1	7.8
Conductivity	2400	58000	4000	58000	2500	57000
Sulphate	1200	2400	2600	2600	1100	2100
Alkalinity	50	70	70	78	45	56
Chloride	5	24000	120	25000	27	24000
Fluoride	0.12	0.06	0.18	0.19	0.1	0.1
Nitrite (as N)	0.07	*3*	*0.03*	*3*	*0.03*	*3*
Nitrate (as N)	*0.06*	*6*	0.07	*6*	*0.06*	*6*
Total Ammonia (N)	2.5	0.7	5	1.9	0.8	0.8
Aluminum Al	0.065	0.03	0.023	0.02	0.043	0.02
Antimony Sb	0.015	0.013	0.054	0.048	0.018	0.017
Arsenic As	2.6	1.7	3.8	2.1	1.7	1.2
Cadmium Cd	0.000019	0.00071	0.00019	0.022	0.000041	0.005
Calcium Ca	310	2700	600	2700	410	2700
Cobalt Co	0.082	0.11	0.21	0.36	0.055	0.15
Copper Cu	0.003	0.026	0.029	0.2	0.0044	0.06
Iron Fe	0.094	0.1	0.03	*0.07*	0.03	**5.2**
Magnesium Mg	8.5	1200	10	1300	9.3	1300
Manganese Mn	0.018	0.22	0.058	0.43	0.029	0.33
Mercury Hg	*0.00001*	*0.01*	0.00018	0.000045	0.00005	*0.01*
Molybdenum Mo	0.0025	0.0037	0.0087	0.013	0.0031	0.0061
Nickel Ni	0.0098	0.097	0.29	1.8	0.039	0.56
Potassium K	7.5	120	5.7	120	7.1	120
Selenium Se	0.002	0.0033	0.01	0.011	0.0023	0.0052
Silver Ag	*0.00005*	0.0023	0.00044	0.0027	0.0002	0.0029
Sodium Na	230	8800	400	9400	160	9000
Uranium U	0.00063	0.0011	0.0007	0.0011	0.00048	0.00098
Zinc Zn	*0.002*	0.03	0.028	0.42	0.002	0.08

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/3. Compiled Static Data/[Compiled_Naartok_W_MetTailings_Static_Data_CAPR002672_KWJ_Rev01.xlsx]

Notes: Blue italicized values are less than detection limit, with detection limit shown. Red bolded values indicate QA/QC failures (Section 3.4). Saline lixiviant contained calcium, chloride, magnesium, sodium, and sulphate (Table 3.3). Units for parameters are all mg/L except pH, conductivity (us/cm), alkalinity (mgCaCO$_3$/L), and nitrate, nitrite, and total ammonia (mgN/L).

4.5 Humidity Cell Tests

The geochemical characteristics of the HCT samples are discussed in Sections 4.1 to 4.4. A summary of HCT leachate concentrations and stable loadings rates are presented in Table 4-6 and Table 4-7 Current laboratory data are provided in Appendix G and time series plots for all parameters are presented in Appendix H.

4.5.1 ARD Potential

For combined detoxified tailings and flotation tailings, pH has been relatively stable with values ranging between 7.6 and 8.3, and 7.9 and 8.4, respectively. For sulphide concentrate tailings, pH has oscillated between 7.4 and 8.0 and has been relatively stable at pH ~7.8 since cycle 12.

Sulphate loading trends were characterized by a large flush during the initial weeks of operation (1,400 to 2,500 mg/kg/week), which is typical of HC tests flushing oxidation products that can accumulate prior to operation (Figure 4-4). Rates for all tailings types gradually decreased and then stabilized over time. Sulphate loading rates, which can indicate sulphide oxidation in the HC tests are summarized in Table 4-8 according to initial (presented as maximum) and stable rates. The anomalously high initial loadings and CMR values <0.8 suggests the flushing of sulphate minerals that mineralogy indicated was primarily gypsum (Section 4.1). Initial sulphate loading rates were higher than average rates (350 to 550 mg/kg/week), which are higher than current stable rates (23 to 120 mg/kg/week).

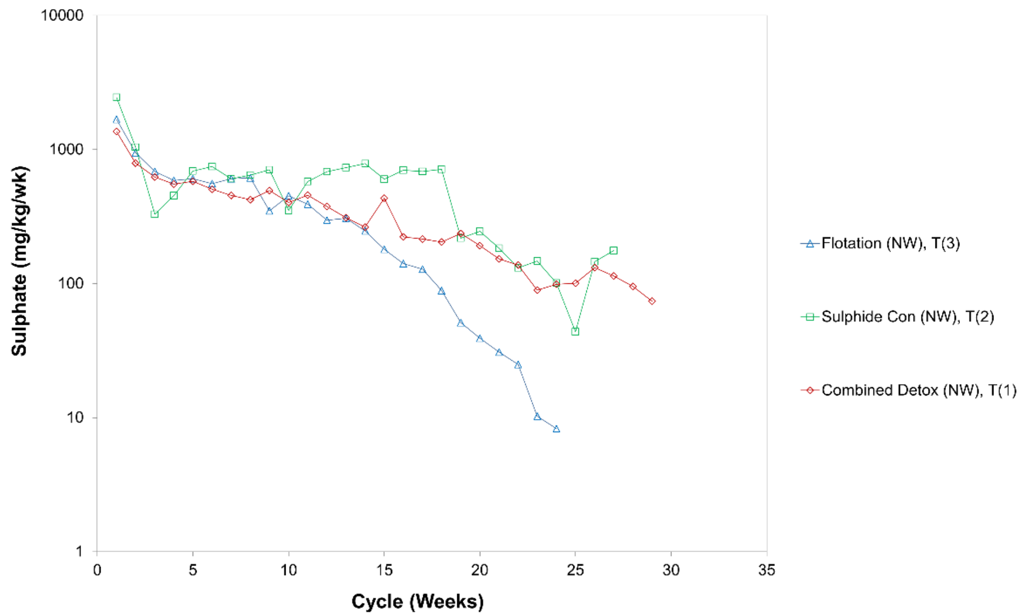
Total alkalinity levels were generally higher in combined detoxified tailings and flotation tailings compared to sulphide concentrate tailings (Figure 4-6). For combined detoxified and flotation tailings, total alkalinity increased over time and varied between 48 and 130 mg$CaCO_3$/L with mean concentrations of ~80 mg$CaCO_3$/L. Sulphide concentrate tailings had a large initial flush of total alkalinity (87 mgCaCO3/L), followed by oscillation between 34 and 91 mg$CaCO_3$/L and stability after 18 weeks (~30 mg$CaCO_3$/L).

ARD potential was assessed using the following two factors:

- Comparison of depletion times for sulphide with NP and TIC; and
- Comparison of the CMR with acid base accounting data.

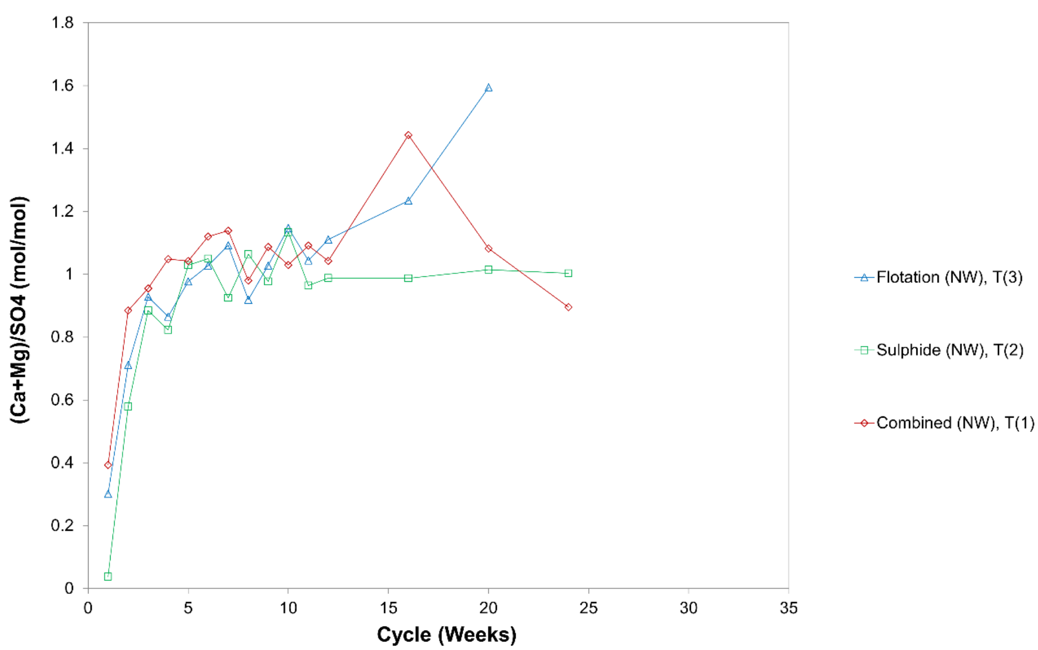
Combined detoxified and flotation tailings are predicted to be neutral due to NP and TIC depletion times exceeding sulphide depletion times and NP/AP and TIC/AP values exceeding CMR values (Table 4-8). Sulphide concentrate tailings were predicted to likely be acidic due to sulphide depletion times exceeding NP and TIC depletion times and CMR values exceeding NP/AP and TIC/AP values

Figure 4-4: Sulphate Loadings (mg/kg/week) for Naartok West Tailings HCTs



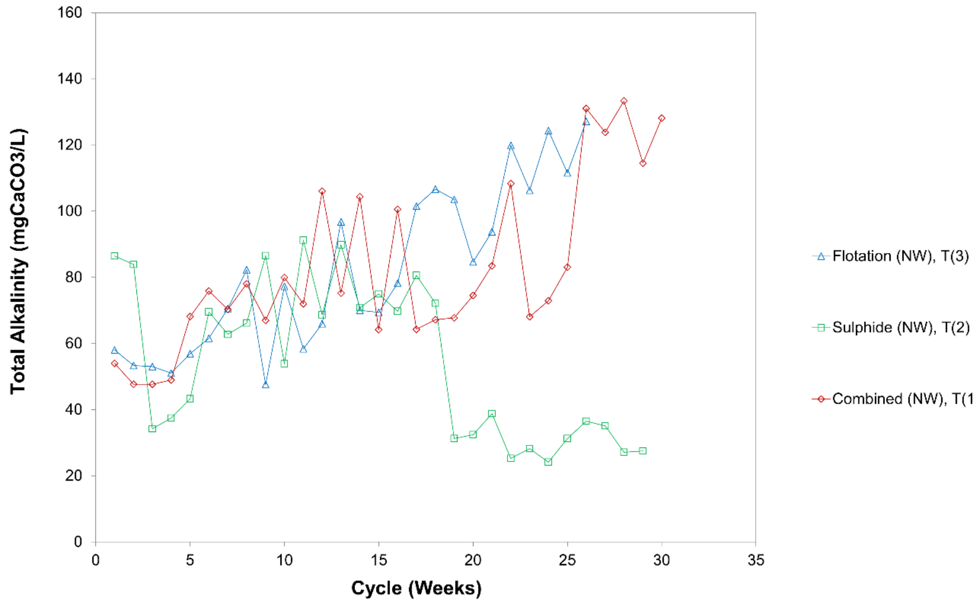
Sources:https://srk.sharepoint.com/sites/NACAPR002672/Internal/600MetallurgicalTailings/2.HCFiles/[HB_Madrid_Conc_Charts_HCT_CAPR002672_mlt_rev00.xlsm

Figure 4-5: Carbonate Molar Ratios for Naartok West Tailings HCTs



Sources:https://srk.sharepoint.com/sites/NACAPR002672/Internal/600MetallurgicalTailings/2.HCFiles/[HB_Madrid_Conc_Charts_HCT_CAPR002672_mlt_rev00.xlsm

Figure 4-6: Total Alkalinity (mgCaCO$_3$/L) for Naartok West Tailings HCTs



Sources:https://srk.sharepoint.com/sites/NACAPR002672/Internal/600MetallurgicalTailings/2.HCFiles/[HB_Madrid_Conc_Charts_HCT_CAPR002672_mlt_rev00.xlsm

Table 4-6: Median and Maximum Concentrations and Stable Rates for General Parameters, Major Ions, Cyanide and Cyanide Destruct Species, Naartok West Tailings

	Tailings Type	Total Alkalinity	Sulphate	TOC	Ca	Mg	Na	Total CN	WAD CN	CNO	SCN	Ammonia (As N)	Nitrate (as N)	Nitrite (as N)	Hardness (CaCO3)
Median[1]	Flotation	78	690	3.0	430	21	4.2	0.06	*0.01*	*1.0*	*2.0*	*0.1*	*0.6*	*0.3*	1200
	Sulphide Concentrate	54	1400	14	520	25	13	0.01	*0.01*	3.0	38	1.2	*0.6*	*0.3*	1400
	Combined Detoxified	75	580	4.0	390	30	2.9	*0.01*	*0.01*	*1.0*	*2.0*	0.2	*0.6*	*0.3*	1100
Maximum[1]	Flotation	130	3700	14	560	39	980	0.58	*0.01*	17	*2.0*	1.7	*0.6*	*0.3*	1500
	Sulphide Concentrate	91	5700	38	680	77	2400	0.18	0.1	27	77	5.3	*0.6*	*0.3*	1800
	Combined Detoxified	130	3100	16	540	63	790	0.12	*0.01*	3.0	18	1.6	*0.6*	*0.3*	1400
Stable Rates[2]	Flotation	48	23	0.28	46	35	0.88	0.28	0.018	1.8	0.18	0.18	1.1	0.53	260
	Sulphide Concentrate	13	120	0.0053	34	13	0.35	0.0053	0.0053	0.53	0.27	0.27	0.32	0.16	140
	Combined Detoxified	48	100	0.016	35	24	0.38	0.016	0.0078	0.78	0.078	0.078	0.47	0.23	180

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/2. HC Files/[HB_Madrid_Outcomes_HCT_CAPR002672_rev00.xlsx]

Notes: Blue italicized values are less than detection limit, with detection limit shown.

[1] Median and maximum concentrations are in units mgCaCO$_3$/L (total alkalinity), mg/L (sulphate, calcium, magnesium, sodium, total cyanide, WAD cyanide, CNO, SCN, hardness), % (TOC), and mgN/L (ammonia, nitrate, nitrite).

[2] Stable rates for all parameters are in units mg/kg/week.

Table 4-7: Median and Maximum Concentrations and Stable Rates for Selected Trace Metals, Naartok West Tailings

	Tailings Type	Al	Sb	As	Cd	Co	Cr	Cu	Fe	Pb	Mn	Mo	Ni	P	Se	Ag	U	Zn
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Median[1]	Flotation	0.042	0.0094	0.47	0.000024	0.034	0.00021	0.0021	0.03	0.00009	0.082	0.0029	0.022	0.005	0.00051	0.00005	0.00057	0.003
	Sulphide Concentrate	0.011	0.022	0.25	0.00054	0.3	0.00009	0.028	0.007	0.00009	0.24	0.005	1.1	0.004	0.0066	0.00005	0.00059	0.16
	Combined Detoxified	0.017	0.0087	0.11	0.0001	0.053	0.00011	0.0029	0.008	0.00009	0.13	0.0031	0.2	0.004	0.0032	0.00005	0.00035	0.018
Maximum[1]	Flotation	0.067	0.023	3.7	0.000072	0.33	0.0029	0.011	0.22	0.00044	0.15	0.014	0.041	0.01	0.0059	0.00007	0.0013	0.032
	Sulphide Concentrate	0.036	0.064	4.9	0.00099	0.4	0.0008	0.13	0.16	0.0009	0.95	0.046	2.2	0.03	0.025	0.0029	0.0014	0.5
	Combined Detoxified	0.061	0.026	1.9	0.00039	0.25	0.00091	0.0099	0.11	0.0009	0.32	0.023	0.29	0.03	0.0089	0.0022	0.00088	0.031
Stable Rates[2]	Flotation	0.12	0.0049	0.23	0.000012	0.0083	0.00032	0.0023	0.1	0.00016	0.064	0.011	0.006	0.0053	0.00037	0.000088	0.000035	0.0035
	Sulphide Concentrate	0.0021	0.00059	0.0084	0.000041	0.019	0.000043	0.00048	0.0037	0.000048	0.13	0.00027	0.067	0.0016	0.00095	0.000027	0.0000032	0.0075
	Combined Detoxified	0.014	0.0016	0.026	0.00002	0.008	0.000062	0.00055	0.0062	0.00038	0.038	0.0072	0.012	0.0023	0.0009	0.000039	0.000026	0.0023

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/2. HC Files/[HB_Madrid_Outcomes_HCT_CAPR002672_rev00.xlsx]

Notes:

[1] Median and maximum concentrations are in units mg/L.

[2] Stable rates for all parameters are in units mg/kg/week.

Table 4-8: Summary of Stable Rates and ARD Classification, Naartok West Tailings

Tailings Type	NP/AP (ABA)	TIC/AP (ABA)	Stable CMR	NP Depletion Time (years)	TIC Depletion Time (years)	Sulphide Depletion Time (years)	ABA Classification	Kinetic Prediction		Initial Rate	Average Rate	Stable Rates									
								Neutral	Acidic	Sulphate	Sulphate	Sulphate	Sb	As	Co	Cu	Mn	Mo	Ni	Se	Zn
										mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk	mg/kg/wk
Flotation	45	54	11	22	26	5.5	non-PAG	likely		1700	380	23	0.0049	0.23	0.0083	0.0023	0.064	0.011	0.006	0.00037	0.0035
Sulphide Concentrate	0.6	0.73	1.1	29	35	58	PAG		possible	2500	550	120	0.00059	0.0084	0.019	0.00048	0.13	0.00027	0.067	0.00095	0.0075
Combined Detoxified	6.4	7.8	1.8	28	34	8.1	non-PAG	likely		1400	350	100	0.0016	0.026	0.008	0.00055	0.038	0.0072	0.012	0.0009	0.0023

Sources: https://srk.sharepoint.com/sites/NACAPR002672/Deliverables/Naartok West Met Tailings Characterization Memo/2. HC Files/[HB_Madrid_Outcomes_HCT_CAPR002672_rev00.xlsx]

Notes: CMR values and depletion times are based on stable rates. NP/AP and TIC/AP ratios are based on ABA data.

4.5.2 Milling Reagents and Cyanide Destruct Products

Table 4-6 presents the median and maximum concentrations and stable loading rates for sodium, total and WAD cyanide, and cyanide destruct products (CNO, SCN, ammonia, nitrate, and nitrite). Time series for cyanide species and destruct products are presented in Appendix H.

For all tailings samples, there was an initial flush of sodium and total cyanide ranging from 790 to 2,400 mg/L and 0.11 to 0.58 mg/L, respectively followed by a decrease in concentration to <100 mg/L and <0.2 mg/L, respectively.

Concentrations were below or near the level of detection limit for all tailings samples for WAD cyanide (0.01 mg/L), nitrate (0.6 mg/L) and nitrite (0.3 mg/L). CNO, SCN, and ammonia concentrations were highest for sulphide concentrate tailings. There was an initial flush of CNO, SCN and ammonia for all tailings types followed by a decrease to analytical detection except for SCN and ammonia in sulphide concentrate tailings, where concentrations have oscillated between 2.5 and 77 mg/L, and 0.7 and 1.8 mg/L, respectively.

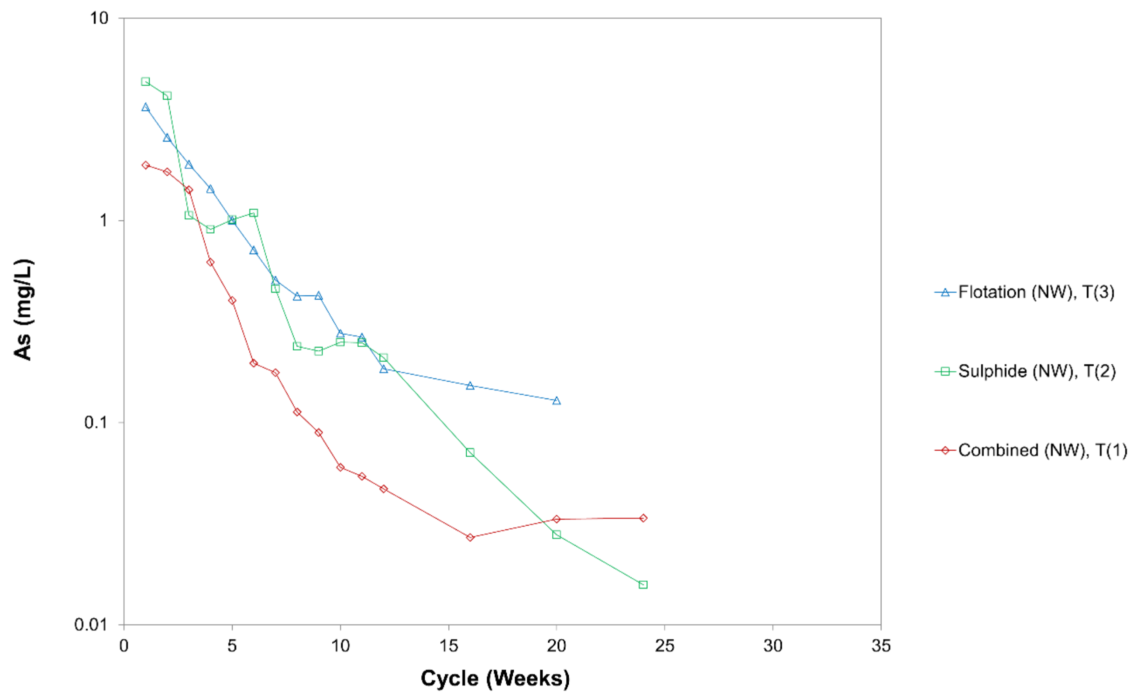
4.5.3 Trace Elements

HCT trace element concentrations were assessed in the context of oxidation of sulphide minerals (Section 4.1) and elevated solid-phase content (Section 4.3). Table 4-7 summarizes median and maximum trace element concentrations and stable loadings rates. A time series for arsenic is presented in Figure 4-7, whereas other time series for selected parameters are presented in Figure 4-8 and Figure 4-9. Leachate trace metal concentrations are summarized as follows:

- Arsenic concentrations were initially high (1.9 to 4.9 mg/L) and have decreased over time (Figure 4-7). Arsenic concentrations were highest for flotation tailings followed by sulphide tailings, which were higher than combined detoxified tailings. After 24 cycles (period of stable rates), arsenic concentrations for sulphide detoxified tailings were roughly equivalent to combined detoxified tailings (~0.02 mg/L) whereas concentrations were higher for flotation tailings (0.13 mg/L). The lower arsenic concentrations in the sulphide and combined detoxified tailings are likely due to arsenic adsorption to iron (oxy)hydroxides, as observed in leachate from detoxified (sulphide) tailings placed as backfill in the Doris underground mine (SRK 2023a).
- Antimony had an initial flush for all tailings types (0.023 to 0.064 mg/L) followed by oscillation between 0.015 and 0.044 mg/L for sulphide concentrate tailings. Concentrations stabilized to <0.01 mg/L for all tailings types as of 20 cycles.
- Selenium had a large initial flush (0.0059 to 0.025 mg/L) then decreased and stabilized at ~0.005 mg/L for sulphide concentrate tailings, ~0.001 mg/L for combined detoxified tailings, and ~0.0002 mg/L for flotation tailings.
- Molybdenum levels decreased in sulphide concentrate tailings and increased in flotation and combined detoxified tailings following the initial flush (0.014 to 0.046 mg/L).

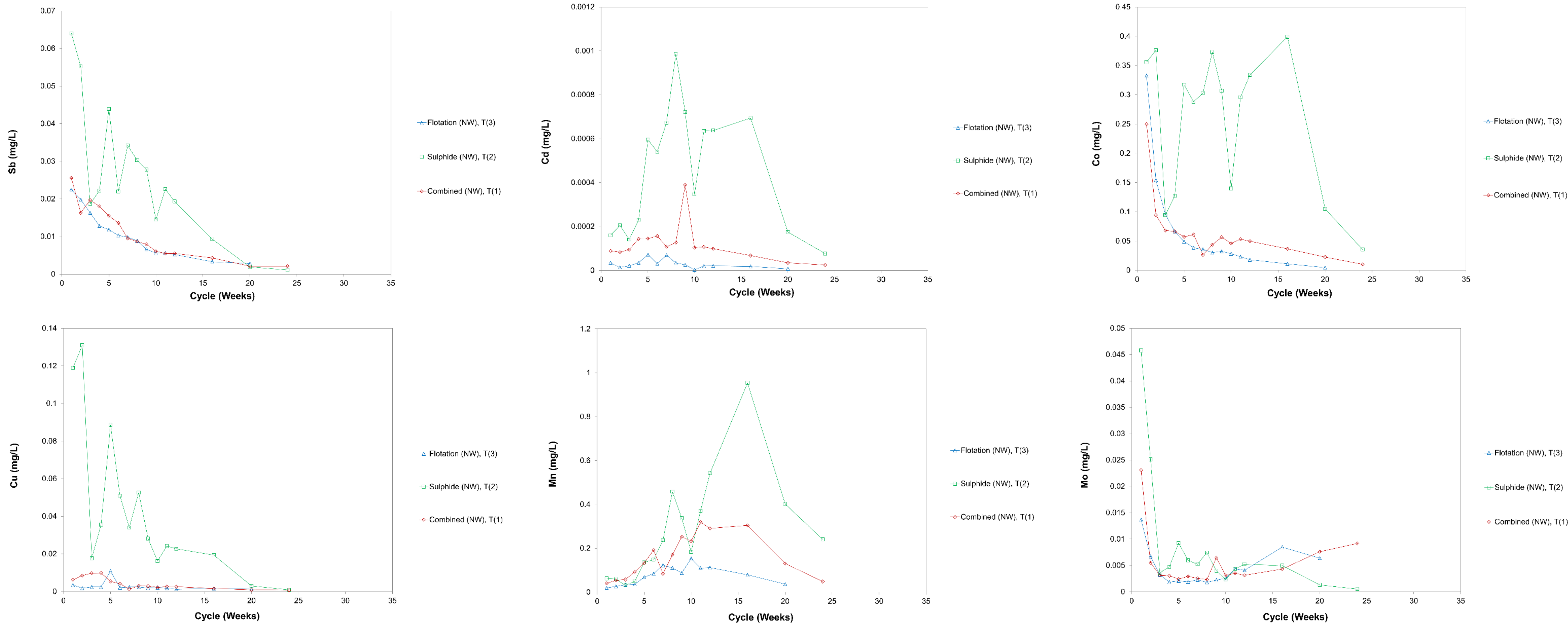
- Cobalt had a large initial flush for all tailings types (0.25 to 0.36 mg/L), then stabilized at <0.05 mg/L for combined detoxified and flotation tailings and oscillated between 0.035 mg/L and 0.40 mg/L for sulphide concentrate tailings.
- Copper had a large initial flush (0.12 mg/L), oscillated between 0.016 mg/L and 0.089 mg/L, then stabilized to <0.02 mg/L for sulphide concentrate tailings. Copper was stable through all cycles thus far for flotation and combined detoxified tailings.
- Cadmium, nickel, and zinc had low initial release rates for all tailings types, followed by an increase then decrease for sulphide concentrate tailings. These parameters were generally stable through all cycles thus far for flotation and combined detoxified tailings.
- Manganese had initially low concentrations and increased until 10, 11, and 16 cycles for flotation, combined detoxified, and sulphide concentrate tailings, respectively. Concentrations decreased afterwards to <0.05 mg/L for flotation and combined detoxified tailings, and 0.24 mg/L for sulphide concentrate tailings.

Figure 4-7: Arsenic HCT Concentrations, Naartok West Tailings



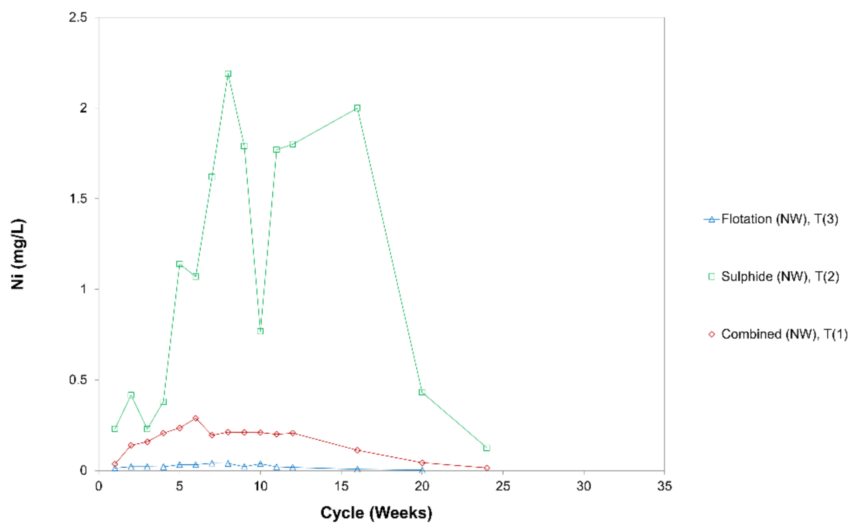
Sources:https://srk.sharepoint.com/sites/NACAPR002672/Internal/600MetallurgicalTailings/2.HCFiles/[HB_Madrid_Conc_Charts_HCT_CAPR002672_mlt_rev00.xlsm

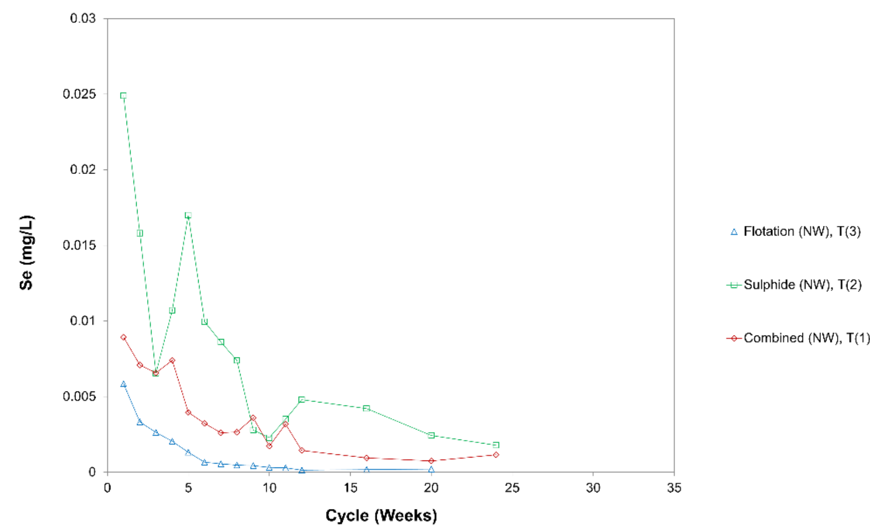
Figure 4-8: Concentration Charts of Select Naartok West Humidity Cell Metals – Antimony, Cadmium, Cobalt, Copper, Manganese, and Molybdenum

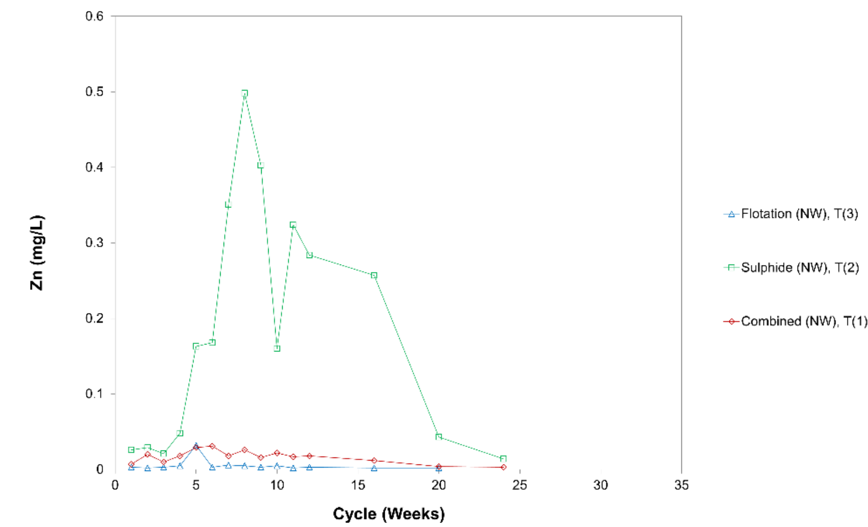


Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600MetallurgicalTailings/2.HCFiles/[HB_Madrid_Conc_Charts_HCT_CAPR002672_mlt_rev00.xlsm

Figure 4-9: Concentration Charts of Select Naartok West Humidity Cell Metals – Nickel, Selenium, and Zinc







Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600MetallurgicalTailings/2.HCFiles/[HB_Madrid_Conc_Charts_HCT_CAPR002672_mlt_rev00.xlsm

4.6 Aging Tests

Current data from the oxic and anoxic aging tests are presented in Appendix I, and time series concentration charts are presented in Appendix J. Concentration plots for select parameters are presented in Figure 4-10 to Figure 4-14.

The pH for process water and aliquots from all oxic and anoxic tests ranged from 8.2 to 8.8.

Cations were characterized by sodium and calcium whereas anions were dominantly sulphate and alkalinity. Major ion concentrations and trends are summarized as follows:

- Concentrations and trends between oxic and anoxic tests were roughly equivalent.
- Sodium concentrations were highest for sulphide concentrate tailings, followed by combined detoxified tailings which were higher than flotation tailings (ranges of 3,900 to 4,100, 1,700 to 1,900 mg/L, and 220 to 2,400 mg/L, respectively). Sodium increased for the first month and stabilized afterwards for flotation tailings and was stable for the duration of both tests for sulphide concentrate and combined detoxified tailings.
- Calcium was highest for sulphide concentrate tailings and lower for combined detoxified and flotation tailings, which were roughly equivalent (ranges of 310 to 520 mg/L, 72 to 350 mg/L, and 10 to 370 mg/L, respectively). Calcium increased with oxic and anoxic aging for flotation tailings and was generally stable for sulphide concentrate and combined detoxified tailings, except the oxic test for combined detoxified tailings, where it increased.
- Sulphate concentrations were highest for sulphide concentrate tailings (6,900 to 10,000 mg/L) compared to flotation tailings (4,600 to 6,700 mg/L), which was roughly equivalent to combined detoxified tailings (4,200 to 5,800 mg/L). Sulphate concentrations were relatively stable with oxic and anoxic aging for all tailings types (Figure 4-10).
- Alkalinity levels were highest for sulphide concentrate tailings and lower for combined detoxified and flotation tailings, which were roughly equivalent (190 to 920 mg/L, 140 to 260 mg/L, and 140 to 240 mg/L, respectively). Alkalinity decreased with oxic and anoxic aging for sulphide concentrate tailings, while combined detoxified and flotation tailings were stable with aging. Oxic and anoxic tests had similar alkalinity concentrations and trends.

Cyanide species and cyanide degradation products are summarized as follows:

- Thiosulphate levels were generally highest in sulphide concentrate tailings and lower and roughly equivalent in flotation and combined detoxified tailings. Thiosulphate decreased with oxic and anoxic aging for all tailings types. For oxic tests, all tailings had equivalent concentrations up to 1 month of testing, but sulphide concentrate and flotation tailings had higher concentrations than combined detoxified tailings afterwards. For anoxic tests, all tailings had equivalent concentrations up to 1 month of testing but combined detoxified and flotation tailings had lower concentrations than sulphide concentrate tailings afterwards. Oxic and anoxic tests had similar thiosulphate concentrations.

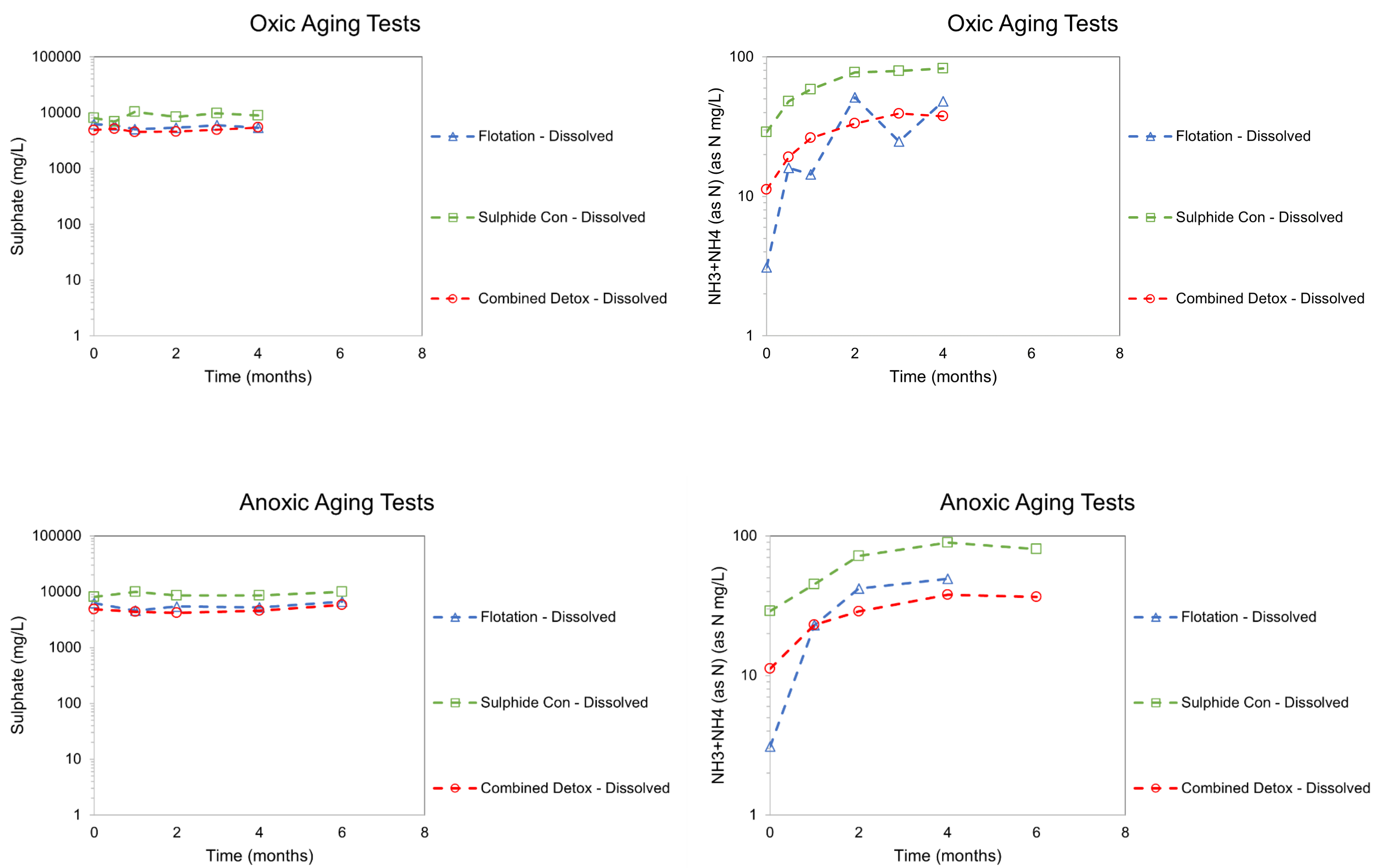
- Cyanide is a reagent additive that is part of the milling process and species analyzed included total, WAD, and free cyanide. Flotation tailings had the highest total cyanide concentrations, sulphide concentrate tailings had lower total cyanide and combined detoxified tailings had the lowest total cyanide. Total cyanide decreased with oxic aging for all tailings types after high initial concentrations. Conversely, concentrations with anoxic aging were stable for sulphide concentrate and combined detoxified tailings and decreased for flotation tailings. Total cyanide levels were roughly equivalent for oxic and anoxic tests (~0.1 to 5 mg/L).
- WAD cyanide was highest and roughly equivalent in sulphide concentrate and combined detoxified tailings and lowest in flotation tailings. With oxic aging, WAD cyanide in sulphide concentrate and combined detoxified tailings decreased to analytical detection (0.01 mg/L) after 0.5 months, and in flotation tailings, concentrations were initially at analytical detection, increased briefly, then returned to analytical detection. With anoxic aging, concentrations were stable for sulphide concentrate and combined detoxified tailings and increased for flotation tailings. Concentrations were generally higher in anoxic tests (~0.05 mg/L) than oxic tests (~0.02 mg/L).
- Free cyanide was roughly equivalent for all tailings types in the oxic test but was highest and roughly equivalent in sulphide concentrate and combined detoxified tailings in the anoxic test. Free cyanide decreased for sulphide concentrate and combined detoxified tailings and was stable for flotation tailings with oxic aging. With anoxic aging, concentrations were stable for sulphide concentrate and combined detoxified tailings and increased for flotation tailings. Concentrations were similar between oxic and anoxic tests (0.005 to 0.1 mg/L).
- Cyanide degradation products included CNO, SCN, and total ammonia. CNO and SCN were highest in sulphide concentrate tailings, lower in combined detoxified tailings, and lowest in flotation tailings for oxic and anoxic tests. With oxic and anoxic aging, CNO concentrations decreased for all tailings types, however, concentrations in flotation tailings decreased faster with anoxic aging compared to oxic aging. SCN concentrations were generally stable with both oxic and anoxic aging. CNO (10 to ~700 mg/L) and SCN (10 to 200 mg/L) concentrations were similar between oxic and anoxic tests.
- Total ammonia was highest in sulphide concentrate tailings, and lowest and roughly equivalent in flotation and combined detoxified tailings. Total ammonia concentrations increased with oxic and anoxic aging for all tailings types and concentrations increased at a faster rate with oxic aging compared to anoxic aging. Total ammonia concentrations were roughly equivalent in oxic and anoxic tests (3 to ~90 mg/L).

Based on trends observed with oxic and anoxic aging, trace elements are grouped into the following: Group 1 (antimony, molybdenum, selenium), Group 2 (arsenic, cobalt, copper), Group 3 (cadmium, manganese, nickel), and Group 4 (zinc). Trace element concentrations and trends for these groups are summarized below.

- Antimony, molybdenum, and selenium concentrations were highest in sulphide concentrate tailings (~0.1, ~0.075, and ~0.015 mg/L, respectively) and lower and roughly equivalent in flotation and combined detoxified tailings (~0.05, ~0.035, and ~0.007 mg/L respectively). For each sample, concentrations were roughly equivalent for oxic and anoxic tests.
- Arsenic was highest and roughly equivalent in flotation and sulphide concentrate tailings (4.5 to 21 mg/L), and lowest in combined detoxified tailings (2.4 to 11 mg/L) for the oxic test. For the anoxic test, arsenic for flotation tailings (15 to 18 mg/L, excluding the low initial concentration) was higher than sulphide concentrate tailings, which were roughly equivalent to combined detoxified tailings (5.3 to 21 mg/L).
- Cobalt was highest in sulphide concentrate tailings (1.0 to 2.7 mg/L) compared to flotation tailings (0.63 to 1.1 mg/L), and combined detoxified tailings (0.49 to 1.1 mg/L) for both oxic and anoxic tests.
- Copper was highest and roughly equivalent in sulphide concentrate and combined detoxified tailings (0.13 to 1.4 mg/L) and lowest in flotation tailings (0.041 to 0.40 mg/L) for both oxic and anoxic tests.
- Arsenic, cobalt and copper exhibited decreasing trends in the oxic and anoxic aging tests for all tailings types except for flotation tailings, which exhibited stable concentrations in the anoxic test. The rate of change was greater in the oxic tests.
- Cadmium was highest and roughly equivalent for sulphide concentrate and combined detoxified tailings (0.00003 to 0.0038 mg/L) and lowest for flotation tailings (0.000003 to 0.00004 mg/L). Cadmium concentrations were roughly equivalent between the oxic and anoxic tests.
- Dissolved manganese and nickel concentrations were highest in sulphide concentrate tailings (0.046 to 0.11 mg/L and 0.12 to 0.26 mg/L, respectively), lower in combined detoxified tailings (0.01 to 0.062 mg/L and 0.0096 to 0.033 mg/L, respectively), and lowest in flotation tailings (0.0025 to 0.075 mg/L and 0.0042 to 0.033 mg/L), respectively). Manganese and nickel concentrations were roughly equivalent between the oxic and anoxic tests.
- Zinc concentrations for oxic and anoxic tests were stable for sulphide concentrate tailings (~0.05 mg/L) and flotation tailings (~0.02 mg/L) whereas concentrations for combined detoxified tailings oscillated between 0.007 and 0.19 mg/L.

Overall, the anoxic storage scenario resulted in similar pH, major ions, and trace element concentrations compared to the oxic storage scenario. Cyanide degradation was higher in oxic tests as indicated by bigger changes in concentrations with time compared to the anoxic aging tests, specifically decreasing trends of cyanide species and increasing trends in total ammonia.

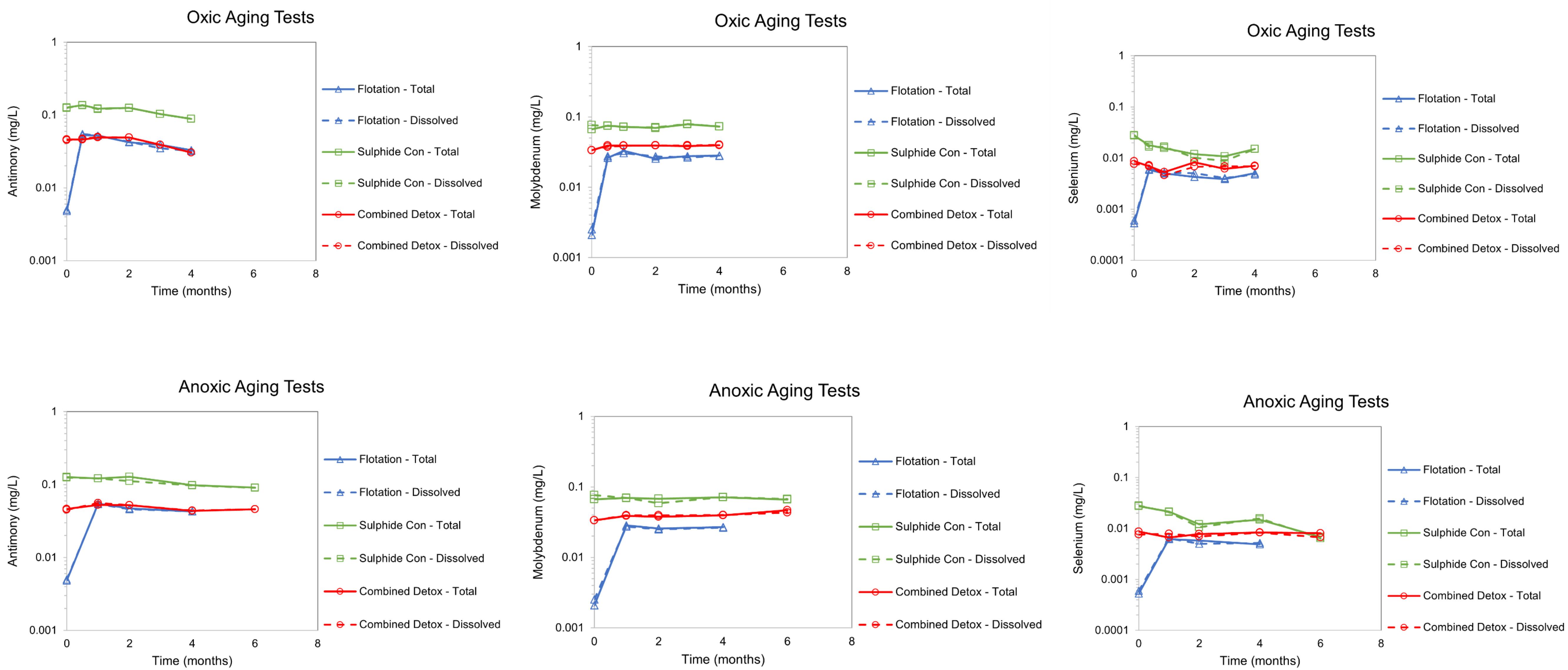
Figure 4-10: Concentration Charts of Sulphate, Total Ammonia, Oxic and Anoxic Aging Tests



Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/4. Aging Tests/[Aging_Tests_Data_NaartokW_CAPR002672_KWJ_Rev02.xlsx]

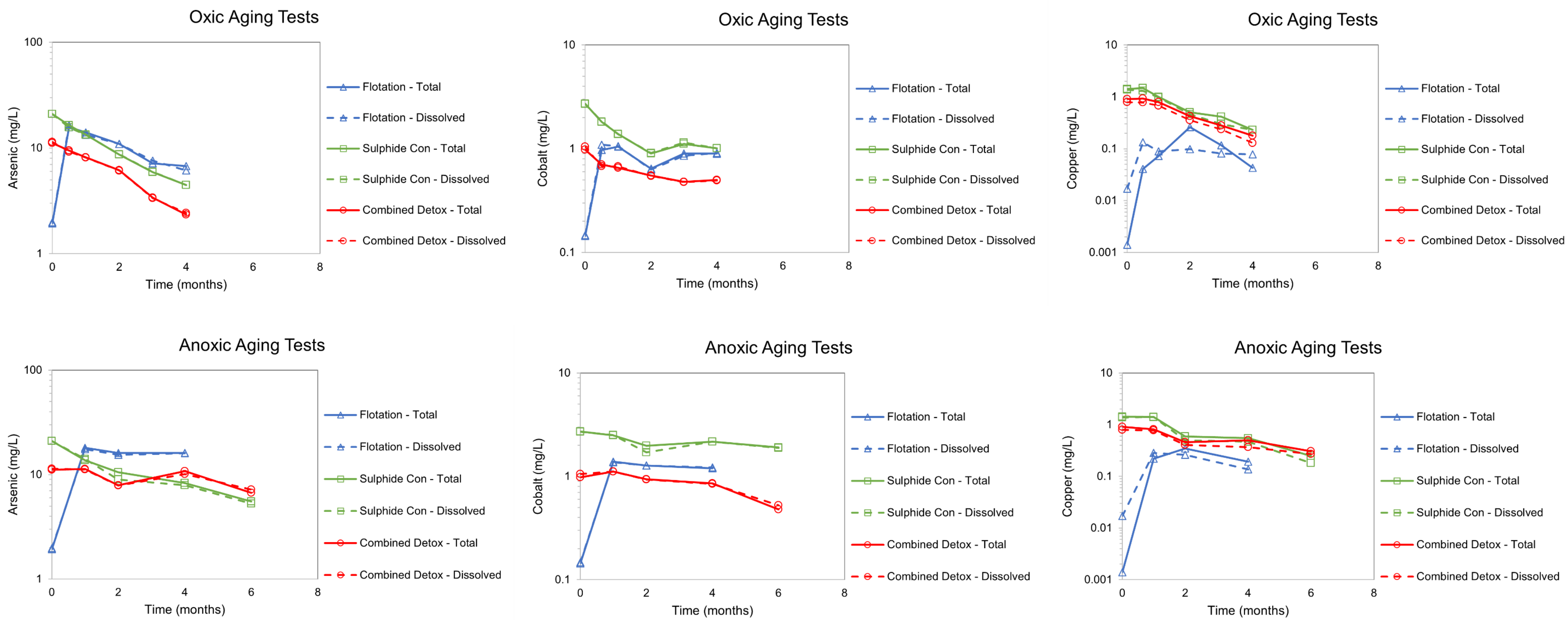
Notes: For sulphate and total ammonia, total = unfiltered aging tests, dissolved = filtered aging tests.

Figure 4-11: Concentration Charts of Group 1 (Antimony, Molybdenum, and Selenium), Oxic and Anoxic Aging Tests



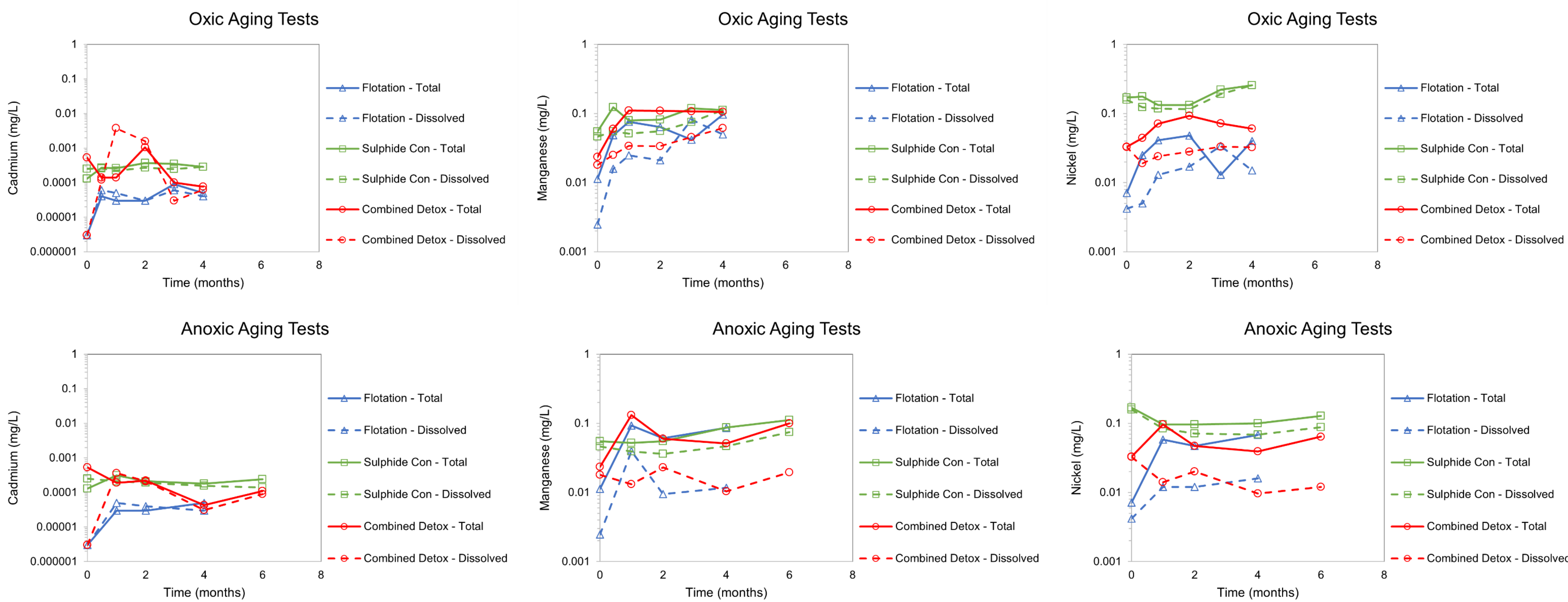
Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/4. Aging Tests/[Aging_Tests_Data_NaartokW_CAPR002672_KWJ_Rev02.xlsx]

Figure 4-12: Concentration Charts of Group 2 (Arsenic, Cobalt, and Copper), Oxic and Anoxic Aging Tests



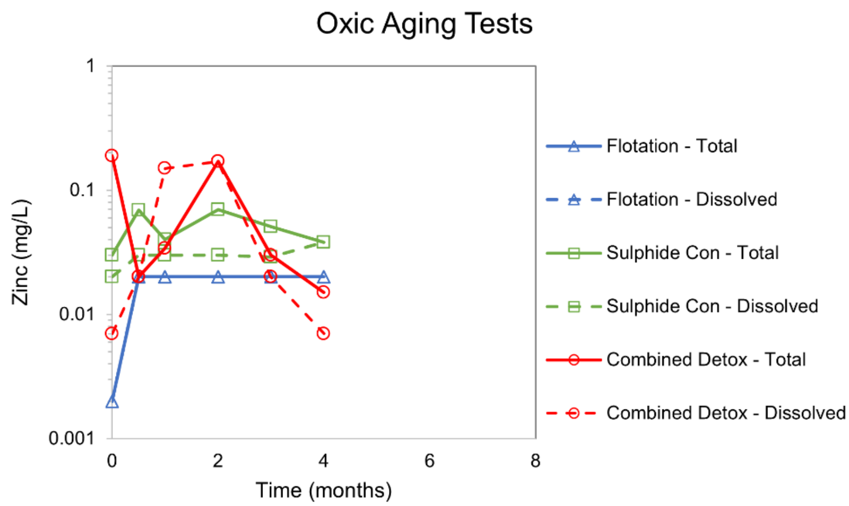
Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/4. Aging Tests/[Aging_Tests_Data_NaartokW_CAPR002672_KWJ_Rev02.xlsx]

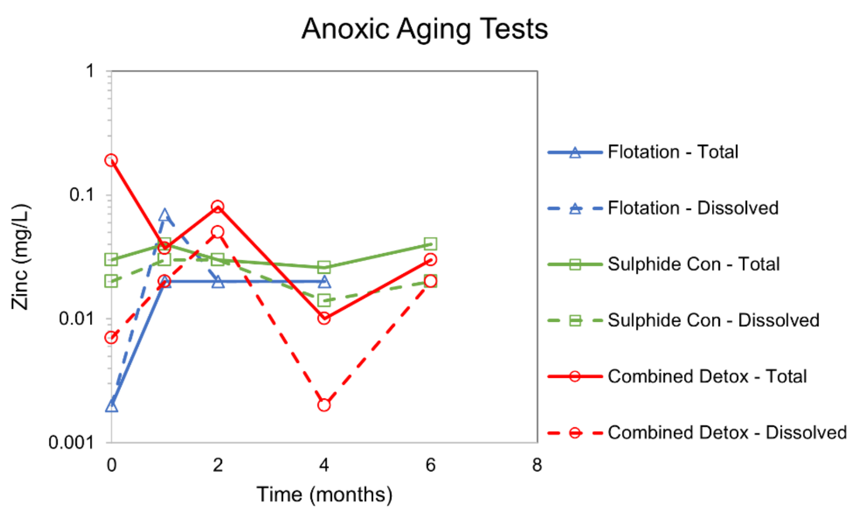
Figure 4-13: Concentration Charts of Group 3 (Cadmium, Manganese, and Nickel), Oxic and Anoxic Aging Tests



Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/4. Aging Tests/[Aging_Tests_Data_NaartokW_CAPR002672_KWJ_Rev02.xlsx]

Figure 4-14: Concentration Charts of Group 4 (Zinc), Oxic and Anoxic Aging Tests





Sources: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/4. Aging Tests/[Aging_Tests_Data_NaartokW_CAPR002672_KWJ_Rev02.xlsx]

5 Discussion

The Alternate Base Case metallurgical scenario generates one tailings stream, referred to as combined detoxified tailings. SRK understands management options for combined detoxified tailings include placement underground as backfill and/or on surface at the Doris TIA. Using the Naartok West metallurgical tailings, this section assesses geochemical implications of producing, and managing, one combined tailings stream compared to the existing waste management plan whereby flotation tailings are placed in the Doris TIA and cyanide detoxified tailings underground as backfill.

Combined detoxified tailings are classified as non-PAG and would result in a material change whereby acidic drainage from detoxified tailings placed in the underground would no longer be produced. There would be no change to ARD potential for the Doris TIA.

To assess changes in metal leaching potential, screen for contaminants of potential concern (COPCs) and ultimately identify potential impacts to site-wide water quality, SRK compared stable HCT rates for the Naartok West combined detoxified tailings to the Naartok West flotation and sulphide concentrate tailings samples (Section 4.5) and 2017 source term input data for the Doris TIA and underground mines that was used as inputs to the site-wide water and load balance for the Phase 2 Hope Bay environmental assessment (SRK 2017c, Appendix K). SRK (2017c) concluded that arsenic from the Doris TIA at closure was a risk to water quality.

Table 5-1 summarizes the results of the comparisons with Naartok West combined detoxified tailings by identifying source term parameters with rates at least 2 times higher than the comparative data set. Table 5-1 suggests the following for placement of Naartok West combined detoxified tailings on surface disposal, e.g., Doris TIA:

- Most COPCs were flagged by comparison to source term inputs rates, including sulphate (>25 times), antimony, cadmium, cobalt (>100 times), copper, lead (>15 times), lithium, manganese (7 times), mercury (5 times), molybdenum (>7 times), nickel (>30 times), selenium (>7 times), silver (>6 times), thallium, uranium and zinc. Source term inputs rates were derived using the most conservative (highest) rates available at the time of derivation by assuming that Madrid North flotation tailings would be present on surface of the Doris TIA at closure.
- Arsenic leaching rates for combined detoxified tailings was the same order of magnitude as the source terms.
- Metal leaching rates from Naartok West tailings samples are higher than the previous metallurgical tailings sample set.

Table 5-1 suggests the following for placement of Naartok West combined detoxified tailings as backfill in the stopes of the underground mine:

- COPCs identified included antimony, arsenic, barium, boron, cadmium, lead, lithium, mercury, molybdenum, silver, thallium, uranium, vanadium and zinc. Notably, neutral pH leaching rates from the Naartok West combined detoxified tailings are higher than acidic rates for antimony, arsenic, mercury, molybdenum and silver.

- Previous HCTs containing metallurgical tailings indicated that metal leaching rates from cyanide detoxified tailings were higher than flotation tailings (SRK 2017d). Leaching rates for Naartok West combined tailings are typically lower than Naartok West sulphide concentrate tailings [1] (Section 4.5), however they are notably higher than the detoxified tailings source term inputs. The higher leaching rates may be due to the Naartok West ore sample being higher grade, higher leaching potential of Naartok West ore [2], or possibly increased leaching potential due to cyanidation of the flotation tailings.

The identification of COPCs indicates higher load rates from by the screening method does not indicate that water quality limits will be exceeded. For a more fulsome assessment of potential impacts to water quality, SRK recommends that the SRK (2017c) tailings source terms be updated using the Naartok West data, and input into the SRK (2017b) site-wide water and load balance model (WLBM) to assess potential for impacts to water quality during operations and closure. SRK also recommends continuation of the Naartok West tailings HCTs until metal rates have stabilized.

[1] Metallurgical equivalent to detoxified tailings generated by the base case and Doris mill metallurgical flow sheet.
[2] Madrid North metallurgical tailings was a composite sample from different ore zones.

Table 5-1: Contaminants of Potential Concern for Naartok West Combined Detoxified Tailings

Disposal Location	Data Source	Data Set	SO4	Sb	As	Ba	B	Cd	Ca	Co	Cu	Pb	Li	Mg	Mn	Hg	Mo	Ni	Se	Ag	Tl	U	V	Zn
Doris TIA	Tailings (Section 4.5)	Flotation	x									x						x	x					
	Source term inputs[1]	Base Case	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
		Upper Case	x	x				x	x	x		x	x	x	x	x	x	x	x	x	x	x		x
Underground mine	Tailings (Section 4.5)	Sulphide Concentrate		x	x	x	x					x	x				x				x	x	x	
	Source term inputs[1]	Doris neutral pH[2]		x	x							x				x	x			x				
		Madrid North neutral pH		x	x	x		x				x				x	x			x				x
		Acidic[3]		x	x											x	x			x				

Source: https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/2. HC Files/[HB_Madrid_Outcomes_HCT_CAPR002672_rev00.xlsx]

Notes: Parameters denoted by x have HCT stable rates at least 2 times higher than the comparative data set.

[1] SRK (2017c)

[2] Data set for Doris underground mine source term inputs included Madrid North tailings data

[3] Source term input only included acidic tailings

6 Summary and Recommendations

6.1 Summary of ML/ARD

SRK executed a geochemical characterization program on flotation tailings, sulphide tailings and combined detoxified tailings from Naartok West that were generated using AEM's Alternative Case Metallurgical Flow Sheet. The purpose of the geochemical characterization program was to generate data for permitting and also provide recommendations on tailings waste management.

Mineralogy data are summarized as follows:

- Pyrite was the dominant sulphide mineral. Other sulphides included chalcopyrite, pyrrhotite, sphalerite, galena, molybdenite, and gersdorffite. Sulphide content as indicated by TIMA-X was 0.095, 1.8 and 19 %S for flotation, combined detoxified, sulphide concentrate tailings, respectively.
- Sulphate mineralogy included gypsum, barite, and aluminum-silicate-calcium sulphates. Gypsum was the dominant sulphate mineral. Sulphate content, as indicated by TIMA-X, was roughly equivalent to ABA for sulphide concentrate and combined detoxified tailings but not flotation tailings. Accordingly, SRK recommends quantifying total sulphate by ABA methods.
- Iron carbonates (ankerite and ferroan dolomite) were the dominant carbonate minerals with lesser magnesite and calcite present.

ABA data are summarized as follows:

- Paste pH ranged from 8.5 to 8.8 for all tailings.
- Total sulphur content was higher in sulphide concentrate tailings (12 %S) compared to combined detoxified and flotation tailings (1.5 and 0.36 %S, respectively).
- TIC was higher than modified NP, suggesting the presence of iron carbonates, which is consistent with mineralogy. Effective TIC content, defined as TIC content attributable to calcium-and-magnesium carbonates was at near parity with modified NP.
- ARD classifications were related to tailings type with combined detoxified and flotation tailings classified as non-PAG and sulphide concentrate tailings as PAG.

Trace element data are summarized as follows:

- Arsenic content was elevated compared to the screening content for all tailings types and was highest in sulphide concentrate tailings (2,500 ppm) and lowest in flotation tailings (250 ppm).
- Other constituents with elevated content compared to the screening criteria included antimony, bismuth, copper and selenium.

The purpose of the saline and water shake flask tests as to assess the potential for increased metal mobility under saline conditions. Results are summarized as follows:

- Metals with higher concentrations in saline SFE tests included cadmium, cobalt, copper, manganese, nickel, silver, and zinc.
- Metals that were roughly equivalent between saline and water tests included antimony, arsenic, molybdenum, selenium, and uranium.

HCT data up until 30 cycles were summarized as follows:

- Leachate pH has ranged from 7.4 and 8.4.
- Flotation tailings and combined detoxified tailings are projected to remain neutral whereas sulphide tailings are predicted to be likely acidic.
- Sulphate stable rates were highest for sulphide concentrate tailings (120 mg/kg/week), followed by combined detoxified tailings (100 mg/kg/week), which was higher than flotation tailings (23 mg/kg/week).
- Milling reagent concentrations in HCTs, including sodium, cyanide species and degradation products, nitrate, and nitrate, generally had an initial flush followed by stabilization or oscillation. WAD cyanide, nitrate, and nitrite levels were mostly at the detection limit.
- Stable release rates for combined detoxified tailings were 5 to 10 times lower than flotation tailings for arsenic and copper and initial rates were higher for manganese and nickel. Molybdenum rates are currently showing an increasing trend in the HCT for combined detoxified tailings only.

Aging tests were summarized as follows:

- Cyanide species mostly decreased over the duration of the oxic aging tests, indicating degradation of residual cyanide. Cyanide species were generally stable with anoxic aging.
- For cyanide destruct products, CNO decreased with oxic and anoxic aging, SCN was generally stable with oxic and anoxic aging, and total ammonia increased with oxic and anoxic aging. Total ammonia increased faster in oxic tests compared to anoxic tests.
- Concentrations for combined detoxified tailings were roughly equivalent to flotation tailings except for cadmium and zinc, which had periodic increasing spikes.

6.2 Implications for Tailings Management and Recommendations

The Alternate Base Case metallurgical scenario generates one tailings stream, referred to as combined detoxified tailings. SRK understands management options for combined detoxified tailings include placement underground as backfill and/or on surface at the Doris TIA.

To assess changes in metal leaching potential, screen for contaminants of potential concern and ultimately identify potential impacts to site-wide water quality, SRK compared stable HCT rates for the Naartok West combined detoxified tailings to the Naartok West flotation and sulphide concentrate tailings samples (Section 4.5) and data inputs used to derive the Doris TIA and Doris and Madrid underground mine source terms. These source terms were used as inputs to the site-wide water and load balance for the Phase 2 Hope Bay environmental assessment (SRK 2017c, Appendix K). SRK (2017c) concluded that arsenic from the Doris TIA at closure was a risk to water quality.

A number of COPCs were identified for Naartok West combined detoxified tailings:

- For placement on surface: sulphate, antimony, cadmium, cobalt, copper, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, uranium and zinc.
- For placement underground as backfill: antimony, arsenic, barium, boron, cadmium, lead, lithium, mercury, molybdenum, silver, thallium, uranium, vanadium and zinc. Notably, neutral pH leaching rates from the Naartok West combined detoxified tailings were higher than acidic rates for antimony, arsenic, mercury, molybdenum and silver.
- Previous HCTs containing metallurgical tailings indicated that metal leaching rates from cyanide detoxified tailings were higher than flotation tailings (SRK 2017d). Leaching rates for Naartok West combined tailings are notably higher than the detoxified tailings source term inputs. The higher leching rates may be due to the Naartok West ore sample being higher grade, higher leaching potential of Naartok West ore compared to the Madrid North ore composite previously tested, or possibly increased leaching potential due to cyanidation of the flotation tailings.

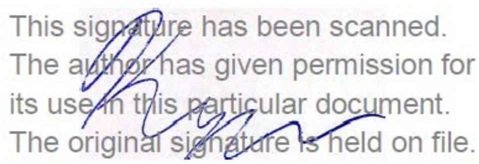
The identification of COPCs by the screening exercise does not indicate that water quality limits at Doris and Madrid will be exceeded. To assess potential for impacts to water quality during operations and closure, SRK recommends the following:

- Update SRK (2017c) tailings and process water source terms using Naartok West HCT and aging test data.
- Re-run SRK (2017b) site-wide water and load balance model (WLBM) to assess potential for impacts to water quality during operations and closure. Updated source terms are to be run as sensitivities to the WLBM.

SRK also recommends continuation of the Naartok West tailings HCTs until metal leaching rates have stabilized.

Closure

This report, Geochemical Characterization of Naartok West Metallurgical Tailings, Hope Bay Project, was prepared by



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Principal Consultant (Geochemistry)

All data used as source material plus the text, tables, figures, and Appendixes of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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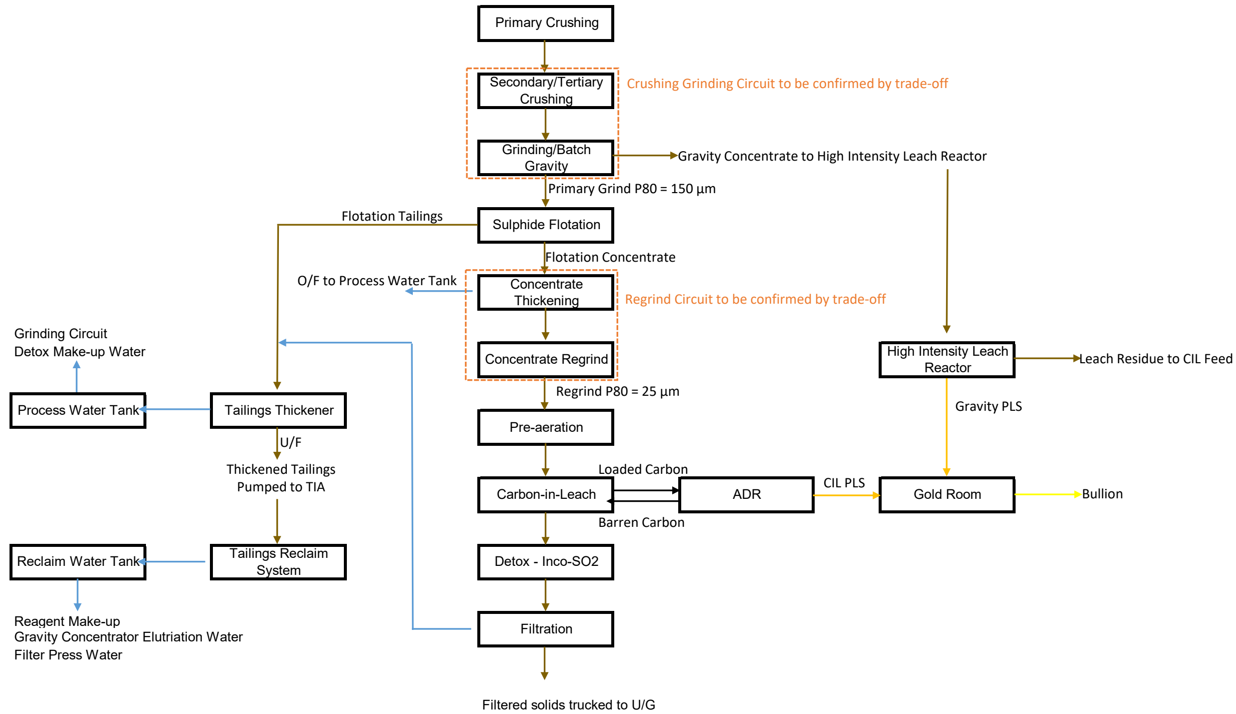
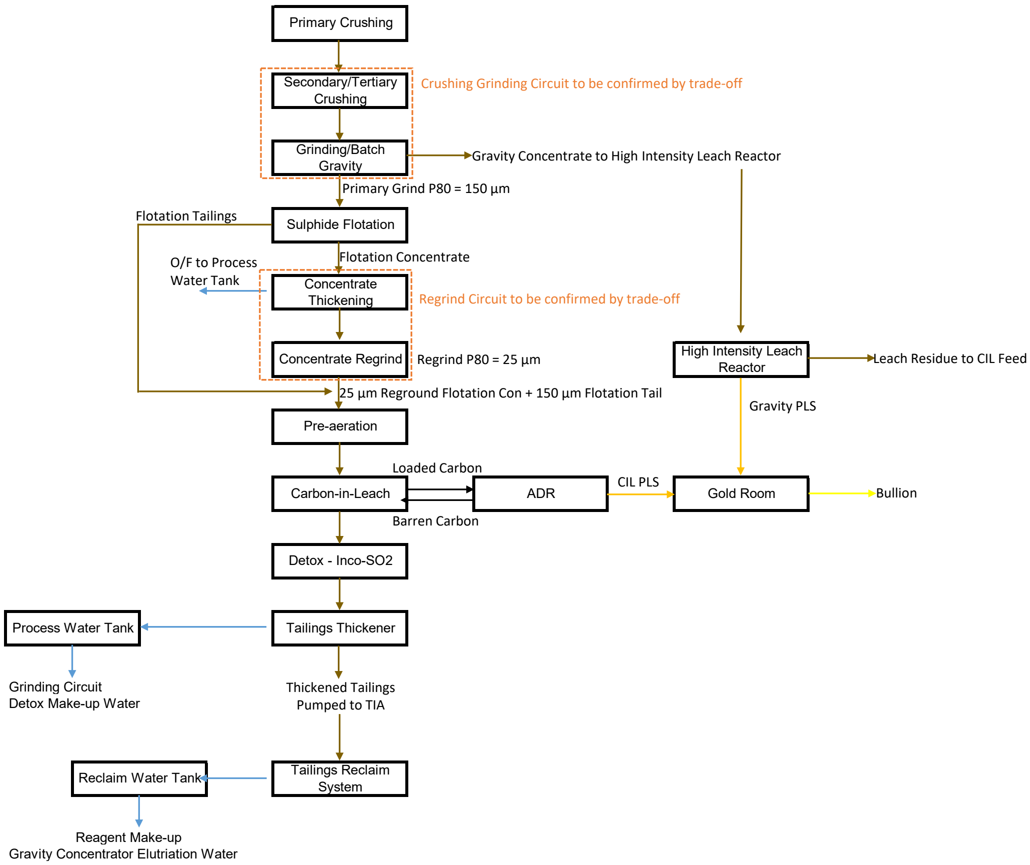
Appendix A Base Case Metallurgical Scenario

Basecase - Concentrate leach, 25 micron regrind



Appendix B Alternative Case Metallurgical Scenario

Alternative Case - Concentrate leach, 25 micron regrind + tailings leach



Appendix C Complete Mineralogy Results

Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

Mineral/Compound	Test 1 MAY7014-01 (wt %)	Test 2 JUN7000-01 (wt %)	Test 3 JUN7012-01 (wt %)
Quartz	32.0	18.3	33.2
Pyrite	2.2	17.0	0.1
Albite	10.2	17.7	11.5
Orthoclase	0.1	0.3	0.2
Muscovite	13.1	13.5	11.3
Chlorite	2.2	1.7	2.7
Rutile	1.3	0.2	0.8
Magnesite	3.2	2.5	3.8
Ankerite	25.2	19.2	25.8
Calcite	-	0.3	-
Dolomite	10.5	9.4	10.5
TOTAL	100	100	100

Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

Mineral/Compound	Formula
Quartz	SiO_2
Pyrite	FeS_2
Albite	$NaAlSi_3O_8$
Orthoclase	$KAlSi_3O_8$
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$
Rutile	TiO_2
Magnesite	$MgCO_3$

Ankerite	$CaFe(CO_3)_2$
Calcite	$CaCO_3$
Dolomite	$CaMg(CO_3)_2$

SGS Canada Inc.
2244 Hope Bay
CUSTOM MIN
MI7014-MAY23

High Definition Mineralogical Analysis using TIMA (TESCAN Integrated Mineral Analyzer)

Modals

Survey		CUSTOM MIN / MI7014-MAY23		
Project		2244 Hope Bay		
Sample		Test 1	Test 2	Test 3
Fraction		As Received	As Received	As Received
Mass % of Size Fraction [%]		100.0	100.0	100.0
Median Particle Size (µm)		79	10	64
		Sample	Sample	Sample
Mineral Mass (%)	Pyrite	1.84	19.4	0.09
	Chalcopyrite	0.03	0.31	0.00
	Pyrrhotite	0.00	0.03	0.00
	Sphalerite	0.02	0.11	0.01
	Galena	0.01	0.00	0.00
	Molybdenite	0.00	0.02	0.00
	Tetrahedrite	0.00	0.00	0.00
	As-Sulphides	0.02	0.16	0.00
	Chalcocite	0.00	0.00	0.00
	Covellite	0.00	0.00	0.00
	Cobaltite	0.00	0.00	0.00
	Quartz	35.7	17.2	39.6
	Plagioclase	11.7	16.5	10.5
	K-Feldspar	0.49	0.20	0.42
	Micas/Illite	9.01	10.1	8.97
	Chlorites	3.12	3.48	3.44
	Clays	0.33	0.64	0.53
	Amphibole	0.56	0.16	0.46
	Other Silicates	0.89	0.44	0.74
	Apatite	0.23	0.26	0.21
	Iron Oxide	1.55	0.79	1.40
	Rutile	0.93	1.69	1.10
	Other Oxides	0.13	0.17	0.13
	Ankerite	21.2	16.0	19.9
	Calcite	0.02	0.07	0.03
	Dolomite	8.59	6.95	8.96
	Magnesite	2.86	1.81	2.60
	Other Carbonates	0.00	0.00	0.00
	Gypsum	0.34	2.13	0.54
	Other Sulphates	0.17	0.50	0.21
	Other	0.24	0.97	0.16
	Total	100.0	100.0	100.0
Mean Grain Size (µm)	Pyrite	10	9	8
	Chalcopyrite	7	8	5
	Pyrrhotite	5	5	5
	Sphalerite	7	5	7
	Galena	6	9	6
	Molybdenite	4	4	4
	Tetrahedrite	6	5	0
	As-Sulphides	6	7	8
	Chalcocite	0	6	0
	Covellite	0	9	0
	Cobaltite	0	6	0
	Quartz	17	6	16
	Plagioclase	12	6	10
	K-Feldspar	7	6	7
	Micas/Illite	10	6	8
	Chlorites	9	6	9
	Clays	7	4	6
	Amphibole	6	5	6
	Other Silicates	6	5	6
	Apatite	11	6	9
	Iron Oxide	8	6	8
	Rutile	6	5	6
	Other Oxides	7	6	6
	Ankerite	11	6	10
	Calcite	5	5	6
	Dolomite	9	5	8
	Magnesite	10	5	9
	Other Carbonates	8	9	0
	Gypsum	6	5	5
	Other Sulphates	5	5	5
	Other	4	4	5

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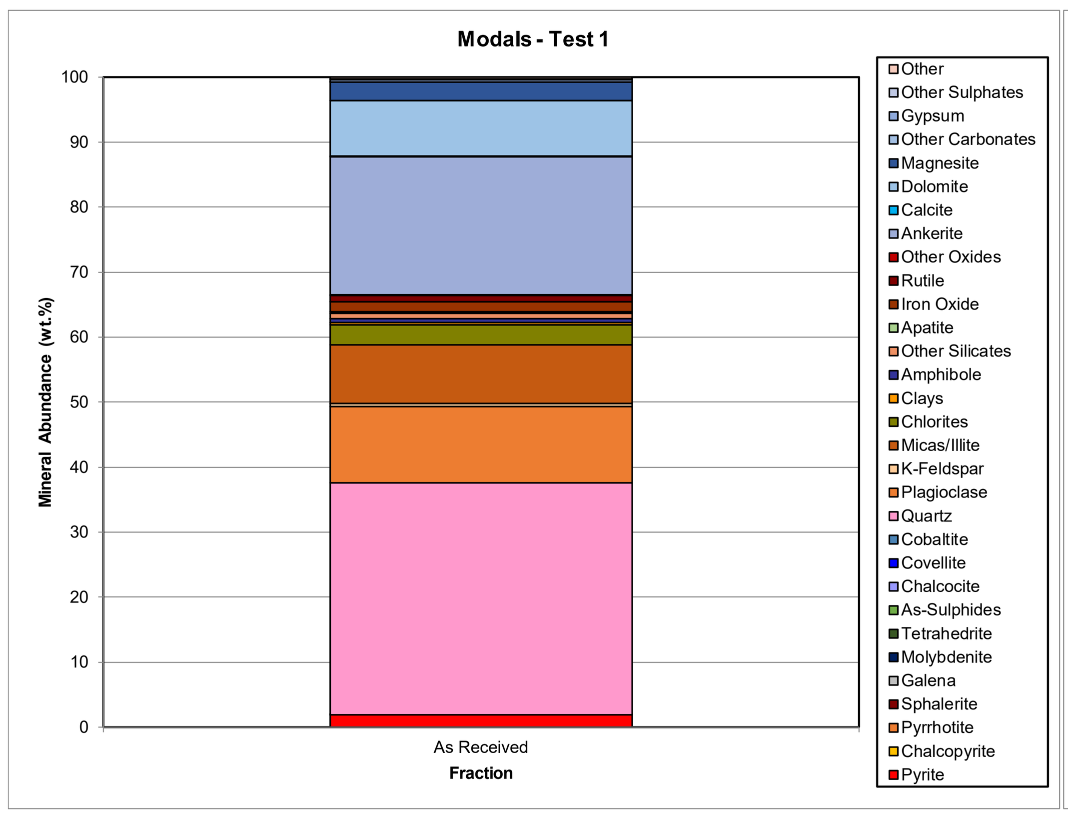
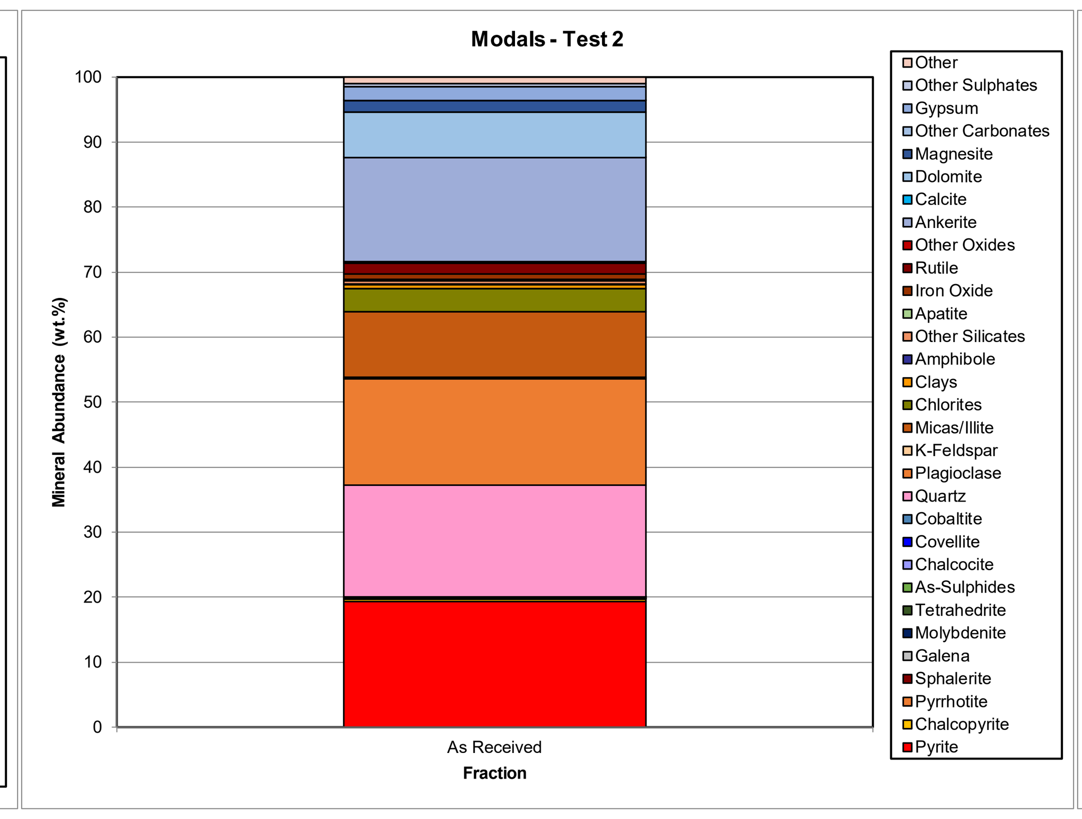
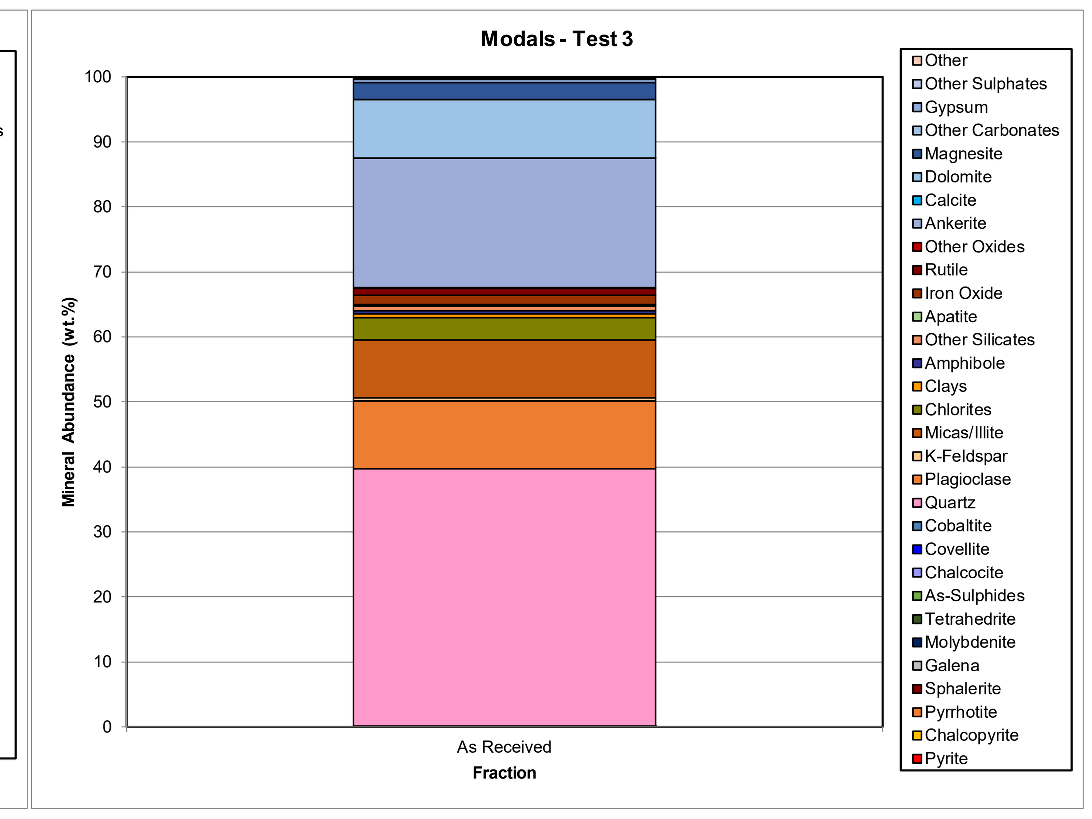
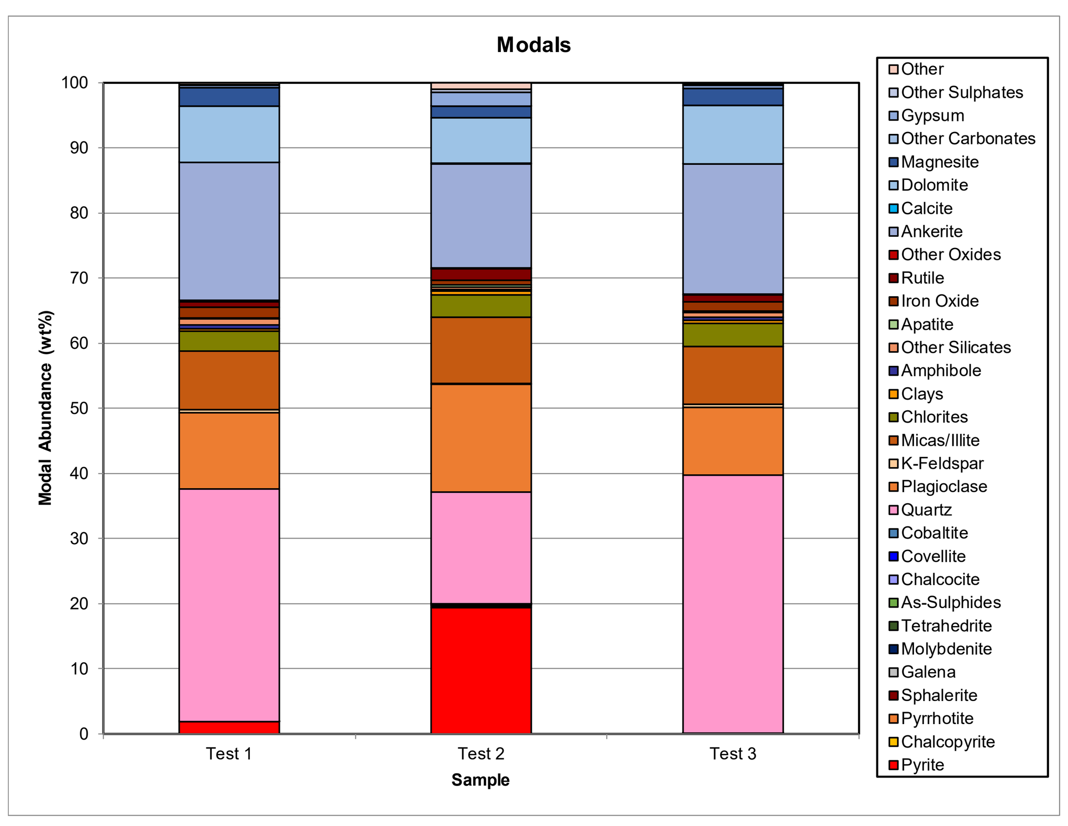
MI7014-MAY23
High Definition Mineralogical Analysis using TIMA (TESCAN Integrated Mineral Analyzer)









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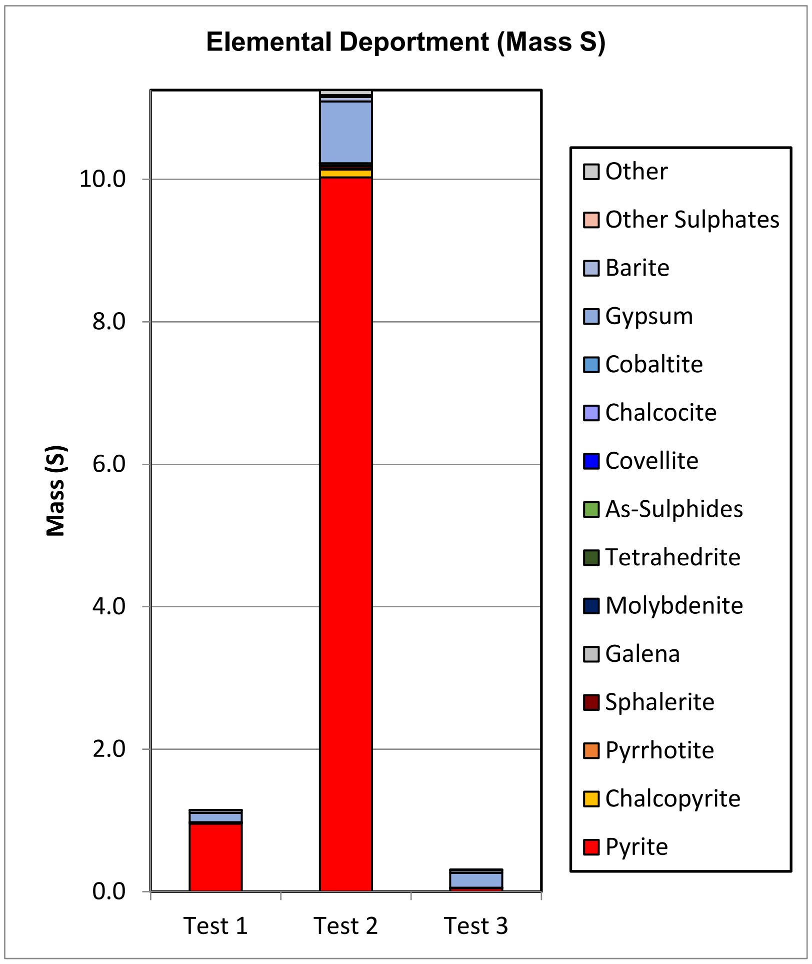
MI7014-MAY23

High Definition Mineralogical Analysis using TIMA (TESCAN Integrated Mineral Analyzer)

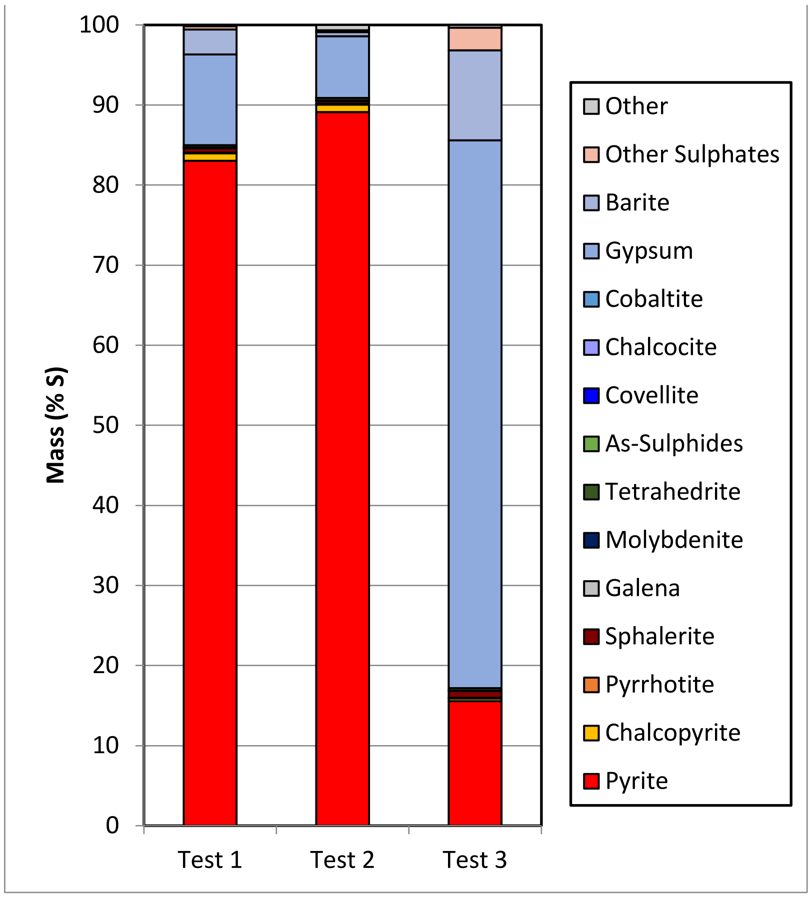
S Deportment - Absolute



Modal - S Dept / Dataset	Test 1	Test 2	Test 3
Pyrite	0.95	10.0	0.05
Chalcopyrite	0.01	0.11	0.00
Pyrrhotite	0.00	0.01	0.00
Sphalerite	0.01	0.04	0.00
Galena	0.00	0.00	0.00
Molybdenite	0.00	0.01	0.00
Tetrahedrite	0.00	0.00	0.00
As-Sulphides	0.00	0.03	0.00
Covellite	0.00	0.00	0.00
Chalcocite	0.00	0.00	0.00
Cobaltite	0.00	0.00	0.00
Gypsum	0.13	0.87	0.21
Barite	0.04	0.06	0.03
Other Sulphates	0.00	0.03	0.01
Other	0.00	0.07	0.00
Total	1.15	11.3	0.31

S Deportment - Normalized

Elemental Deportment (Mass % S)



Modal / Sample	Test 1	Test 2	Test 3
Pyrite	83.1	89.1	15.5
Chalcopyrite	0.93	0.94	0.33
Pyrrhotite	0.08	0.10	0.10
Sphalerite	0.56	0.35	0.83
Galena	0.06	0.01	0.04
Molybdenite	0.01	0.08	0.04
Tetrahedrite	0.01	0.00	0.00
As-Sulphides	0.28	0.27	0.30
Covellite	0.00	0.00	0.00
Chalcocite	0.00	0.00	0.00
Cobaltite	0.00	0.00	0.00
Gypsum	11.3	7.69	68.4
Barite	3.10	0.54	11.2
Other Sulphates	0.44	0.23	2.85
Other	0.15	0.65	0.32
Total	100.0	100.0	100.0

Appendix D Complete Acid Base Accounting Results

SGS proposal: 19736-PR1
SGS project #: 2244

Work order date: 11-May-23
Report date: 4-Jul-23

Version: Final

ABA Report

Test	S(T)	S(SO4)	S(S-2)	Insoluble S	AP
Units	%	%	%	%	kg CaCO3/t
Method Code	CSA06V	CSA07V	CSA08C1	Calc.	Calc.
LOD	0.005	0.01	0.01	#N/A	#N/A
Sample ID					
Test 1	1.537	0.16	1.3	0.077	40.6
Test 2	11.878	0.56	10.55	0.768	329.7
Test 3	0.363	0.15	0.08	0.133	2.5
Duplicates					
Test 2		0.54	10.52		
Test 3	0.355	0.15	0.07		
Test 1	1.541	0.12	1.38		

Test	S(T)	S(SO4)	S(S-2)	Insoluble S	AP
QA/QC					
Blank	<0.005	<0.01	<0.01		
Certified standards					
RTS-3a		1.00			
GGC-07	0.512				
OREAS 278			0.69		
RTS-3a		0.95			
OREAS 278			0.67		
GS-314-2	2.628				
GGC-07	0.525				

SGS proposal: 19736-PR1
SGS project #: 2244

Work order date: 11-May-23
Report date: 4-Jul-23

Version: Final

ABA Report

Test	C(T)	TIC	CaCO3 NP	CO3 NPR	Modified Sobek terminal pH	Modified NP	Net Modified NP	Bulk NPR	Fizz Test	Paste pH
Units	%	%	kg CaCO3/t			kg CaCO3/t	kg CaCO3/t			
Method Code	CSA06V	CSB02V	Calc.	Calc.		Modified	Calc.	Calc.	Sobek	Sobek
LOD	0.005	0.01				0.5				0.2
Sample ID										
Test 1	4.681	4.03	335.8	8.27	1.71	276.4	235.8	6.80	Slight	8.64
Test 2	4.152	3.09	257.5	0.78	1.54	213.4	-116.3	0.65	Slight	8.53
Test 3	4.631	4.28	356.7	142.67	1.55	302.1	299.6	120.84	Slight	8.76
Duplicates										
Test 2		3.03			1.38	210.9			Slight	8.58
Test 1	4.663	4.13			1.75	275.7			Slight	8.63
Test 3	4.641	4.30								

Test	C(T)	TIC	CaCO3 NP	CO3 NPR	Modified Sobek terminal pH	Modified NP	Net Modified NP	Bulk NPR	Fizz Test	Paste pH
QA/QC										
Blank	<0.005	<0.01								
Certified standards										
NBM-1						43.3			Slight	
GGC-07	0.552									
TIC-L1		0.12								
TIC-L1		0.13								
GS-314-2	5.053									
GGC-07	0.557									
TIC-L1		0.13								

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Appendix E Complete Trace Metal Results

SGS

SGS proposal: 19736-PR1
SGS project #: 2244

Work order date: 11-May-23
Report date: 8-Jun-23

Version: Final

Metals - Aqua Regia Digestion with ICP-OES/MS Finish

Test	Al	Ba	Ca	Cr	Cu	Fe	K	Li	Mg	Mn	Na	Ni	P	S	Sr	Ti	V
Units	%	ppm	%	ppm	ppm	%	%	ppm	%	ppm	%	ppm	%	%	ppm	%	ppm
Method Code	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20	ICP21B20
Lower detection	0.01	5	0.01	1	0.5	0.01	0.01	1	0.01	2	0.01	1	0.01	0.01	0.5	0.01	1
Upper detection	15	10000	15	10000	10000	15	15	10000	15	10000	15	10000	15	5	10000	15	10000
Sample ID																	
Test 1	0.60	27	6.95	246	225	5.97	0.07	11	3.23	1279	0.08	344	0.04	1.59	120	<0.01	37
Test 2	0.53	16	5.93	187	1294	13.63	0.05	12	2.48	1029	0.15	1177	0.04	>5.00	99.3	<0.01	28
Test 3	0.62	15	7.13	230	113	4.84	0.08	10	3.41	1287	0.09	256	0.04	0.39	119	<0.01	37
Duplicates																	
Test 1	0.61	28	6.96	245	228	5.97	0.07	11	3.23	1276	0.08	343	0.04	1.6	121	<0.01	37
Test 2	0.53	16	5.86	183	1290	13.71	0.05	12	2.45	1008	0.14	1174	0.04	>5.00	97.8	<0.01	28
Test 3	0.62	15	7.18	231	114	4.88	0.07	10	3.45	1298	0.09	256	0.04	0.39	120	<0.01	36
QA/QC																	
Blank	<0.01	<5	<0.01	<1	1	<0.01	<0.01	2	<0.01	<2	<0.01	<1	<0.01	<0.01	<0.5	<0.01	<1
Blank	<0.01	<5	<0.01	<1	<0.5	<0.01	<0.01	<1	<0.01	<2	<0.01	<1	<0.01	<0.01	<0.5	<0.01	<1
Blank	<0.01	<5	<0.01	<1	1	<0.01	<0.01	2	<0.01	<2	0.01	<1	<0.01	<0.01	<0.5	<0.01	<1
Certified standards																	
OREAS 151b	2.48	71	1.43	28	1850	3.49	0.42	8	1.51	290	0.15	14	0.06	0.72	38.5	0.08	145
OREAS 261	1.35	170	1.21	51	66	3.88	0.3	23	0.70	477	0.07	76	0.04	0.11	17.6	<0.01	22
OREAS 263	1.30	161	1	46	82	3.44	0.29	19	0.57	465	0.08	68	0.04	0.12	15.6	<0.01	21
OREAS 209	1.19	68	1.49	40	72	5.74	0.06	6	2.27	1327	0.19	107	0.15	0.87	63	0.13	41
OREAS 263	1.30	171	1.05	48	84	3.67	0.3	21	0.60	485	0.08	71	0.04	0.12	16.2	<0.01	22
OREAS 151b	2.380	67.00	1.36	27	1760.0	3.31	0.41	7	1.43	278.0	0.16	14.0	0.1	0.72	36.5	0.08	145

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Test	Zn	Zr	Ag	As	Be	Bi	Cd	Ce	Co	Cs	Ga	Ge	Hf	Hg	In	La	Lu
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Method Code	ICP21B20	ICP21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20
Lower detection	1	0.5	0.01	1	0.1	0.02	0.01	0.05	0.1	0.05	0.1	0.1	0.05	0.01	0.02	0.1	0.01
Upper detection	10000	10000	100	10000	100	10000	10000	1000	10000	1000	10000	10000	500	100	500	10000	1000
Sample ID																	
Test 1	156	4.3	0.15	511	0.2	0.1	0.4	7.31	45.5	0.13	2.0	0.1	0.16	0.0	0.07	2.7	0.05
Test 2	819	11.4	0.81	2459	0.2	0.5	1.74	7.48	205	0.09	2.0	0.2	0.35	0.1	0.20	2.9	0.05
Test 3	78	4.6	0.03	251	0.2	<0.02	0.18	10.02	26.5	0.18	2.2	0.2	0.15	0.0	0.05	3.8	0.05
Duplicates																	
Test 1	154	4.6	0.15	522	0.2	0.09	0.42	7.54	46.4	0.13	2.1	0.1	0.16	0.04	0.07	2.8	0.05
Test 2	815	11.6	0.80	2577	0.2	0.5	1.79	7.65	213	0.09	2.1	0.2	0.36	0.1	0.20	3	0.05
Test 3	72	4.6	0.03	246	0.2	<0.02	0.16	10.22	26.3	0.18	2.2	0.2	0.14	0.0	0.05	3.8	0.05
QA/QC																	
Blank	<1	<0.5	<0.01	<1	<0.1	<0.02	<0.01	<0.05	<0.1	<0.05	<0.1	<0.1	<0.05	<0.01	<0.02	<0.1	<0.01
Blank	<1	<0.5	<0.01	<1	<0.1	<0.02	<0.01	<0.05	<0.1	<0.05	<0.1	0.1	<0.05	<0.01	<0.02	<0.1	<0.01
Blank	<1	<0.5	<0.01	<1	<0.1	<0.02	<0.01	<0.05	<0.1	<0.05	<0.1	<0.1	<0.05	<0.01	<0.02	<0.1	<0.01
Certified standards																	
OREAS 151b	248	2.9	0.52	29	0.2	0.4	0.57	15.17	11.6	1.21	8.4	0.1	0.12	0.0	0.07	6.6	0.13
OREAS 261	135	16.1	0.18	16	1	0.6	0.27	54.35	31.6	3.01	4.7	0.1	0.45	0.1	0.03	26	0.15
OREAS 263	117	12.5	0.30	29	1	0.6	0.26	53.43	30.8	3.36	4.5	0.2	0.39	0.2	0.03	27.6	0.15
OREAS 209	69	26.6	0.26	1060	0.3	0.1	0.07	26.49	30	0.99	4.2	0.2	0.67	<0.01	0.02	13.4	0.13
OREAS 263	126	13.2	0.30	31	0.9	0.6	0.28	51.89	28.6	2.82	4.3	<0.1	0.43	0.2	0.03	25.2	0.14
OREAS 151b	235	2.300	0.55	32	0.2	0.4	0.62	15.55	11	1.24	8.5	<0.1	0.1	0.0	0.08	6.7	0.12

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Test	Mo	Nb	Pb	Rb	Sb	Sc	Se	Sn	Ta	Tb	Te	Th	Tl	U	W	Y	Yb
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Method Code	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20	ICM21B20
Lower detection	0.05	0.05	0.2	0.2	0.05	0.1	1	0.3	0.05	0.02	0.05	0.1	0.02	0.05	0.1	0.05	0.1
Upper detection	10000	1000	10000	10000	10000	10000	1000	1000	10000	10000	1000	10000	10000	10000	10000	10000	100
Sample ID																	
Test 1	6.94	0.09	9.8	2.2	0.9	11.7	<1	0.4	<0.05	0.2	0.19	0.6	0.05	0.09	1.9	4.74	0.3
Test 2	5.77	0.33	32	1	3.4	9.4	6	0.7	<0.05	0.2	1.27	1.0	0.15	0.13	1.6	3.67	0.3
Test 3	6.04	0.17	2.9	3.4	0.5	13.8	<1	<0.3	<0.05	0.2	0.07	0.6	<0.02	0.08	2.1	4.76	0.4
Duplicates																	
Test 1	7.03	0.1	10.5	2.3	0.9	11.8	<1	0.4	<0.05	0.22	0.18	0.6	0.05	0.09	2.1	4.79	0.4
Test 2	5.88	0.29	34.3	1.1	3.4	9.6	6	0.7	<0.05	0.2	1.33	0.9	0.16	0.14	1.6	3.69	0.3
Test 3	6.05	0.10	3.1	3.3	0.4	13.9	<1	<0.3	<0.05	0.2	0.06	0.6	<0.02	0.08	3.4	4.70	0.4
QA/QC																	
Blank	<0.05	0.06	<0.2	<0.2	<0.05	<0.1	<1	<0.3	<0.05	<0.02	<0.05	<0.1	0.03	<0.05	<0.1	<0.05	<0.1
Blank	<0.05	<0.05	<0.2	<0.2	<0.05	<0.1	<1	<0.3	<0.05	<0.02	<0.05	<0.1	<0.02	<0.05	<0.1	<0.05	<0.1
Blank	<0.05	<0.05	<0.2	<0.2	<0.05	<0.1	<1	<0.3	<0.05	<0.02	<0.05	<0.1	<0.02	<0.05	<0.1	<0.05	<0.1
Certified standards																	
OREAS 151b	56	0.30	42.8	19.7	0.6	9.2	3	1.1	<0.05	0.3	0.09	2.6	0.16	0.64	0.6	10.92	0.9
OREAS 261	0.52	0.11	34.4	19.5	2.3	3.2	<1	0.5	<0.05	0.5	0.10	11.9	0.32	1.46	0.1	12.34	1
OREAS 263	0.62	0.07	32.9	22.6	7.5	3.5	<1	0.6	<0.05	0.5	0.21	11.6	0.56	1.25	0.2	11.93	1
OREAS 209	2.06	1.28	3.3	4.5	1.2	4.4	1	0.9	<0.05	0.5	0.06	1.9	0.04	0.43	0.4	12.97	0.9
OREAS 263	0.55	<0.05	34.5	19.7	7.3	2.9	<1	0.6	<0.05	0.5	0.21	11.7	0.58	1.44	0.2	12.05	1
OREAS 151b	57.090	0.19	43	21.1	0.5	9.1	3	1.2	<0.05	0.4	0.09	2.6	0.1	0.67	0.6	11.10	0.9

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Appendix F Complete Shake Flask Extraction Results

SGS proposal: 19736-PR1 | Work order date: 11-May-23
SGS project #: 2244 | Report date: 24-Aug-23

Version: Final

Shake Flask Extraction Report

Leachate Analysis

Sample ID			**Test 1**	**Test 2**	**Test 3**	**Blank**
Parameter	**Method**	**Units**				
Volume Nanopure Water		mL	750	750	750	750
Sample Weight		g	250	250	250	-
pH	meter		8.11	8.1	8.23	5.75
Redox	meter	mV	177.19	179.44	180	479.83
Conductivity	meter	uS/cm	2451.5	4047.3	2397	0.9
Acidity (to pH 4.5)	titration	mg CaCO3/L	0	0	0	0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	1.77	2.84	1.1	1.36
Alkalinity	titration	mg CaCO3/L	44.8	69.62	49.7	0.45
Bromide		mg/L	< 0.3	< 0.3	< 0.3	< 0.3
Chloride		mg/L	27	120	5	< 1
Fluoride		mg/L	0.1	0.18	0.12	< 0.06
Nitrite (as N)		as N mg/L	< 0.03	< 0.03	0.07	< 0.03
Nitrate (as N)		as N mg/L	0.06	0.07	< 0.06	< 0.06
Ammonia+Ammonium (N)		as N mg/L	0.8	5	2.5	< 0.1
Sulphate	IC	mg/L	1129	2593.2	1195.8	<0.1
Ion Balance						
Major Anions	Calc	meq/L	25.19	58.81	26.06	
Major Cations	Calc	meq/L	28.68	49.26	27.04	
Difference	Calc	meq/L	-3.49	9.55	-0.98	
Balance (%)	Calc	%	-6.5%	8.8%	-1.8%	
Dissolved Metals						
Hardness CaCO3		mg/L	1050	1550	806	< 0.05
Aluminum Al	ICP-MS	mg/L	0.043	0.023	0.065	< 0.001
Antimony Sb	ICP-MS	mg/L	0.0178	0.0539	0.0146	< 0.0009
Arsenic As	ICP-MS	mg/L	1.68	3.84	2.59	< 0.0002
Barium Ba	ICP-MS	mg/L	0.0496	0.0522	0.0253	< 0.00008
Beryllium Be	ICP-MS	mg/L	< 0.000007	0.000007	< 0.000007	< 0.000007
Bismuth Bi	ICP-MS	mg/L	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Boron B	ICP-MS	mg/L	0.043	0.032	0.034	< 0.002
Cadmium Cd	ICP-MS	mg/L	0.000041	0.000187	0.000019	< 0.000003
Calcium Ca	ICP-MS	mg/L	406	604	309	< 0.01
Chromium Cr	ICP-MS	mg/L	0.00384	0.00168	0.00235	< 0.00008
Cobalt Co	ICP-MS	mg/L	0.0547	0.214	0.0817	< 0.000004
Copper Cu	ICP-MS	mg/L	0.0044	0.0291	0.003	< 0.0002
Iron Fe	ICP-MS	mg/L	0.03	0.03	0.094	< 0.007
Lead Pb	ICP-MS	mg/L	0.0001	< 0.00009	< 0.00009	< 0.00009
Lithium Li	ICP-MS	mg/L	0.0059	0.0061	0.0043	< 0.0001
Magnesium Mg	ICP-MS	mg/L	9.34	10.1	8.5	< 0.001
Manganese Mn	ICP-MS	mg/L	0.0292	0.0583	0.0175	0.00002
Mercury Hg	ICP-MS	mg/L	0.00005	0.00018	< 0.00001	< 0.00001
Molybdenum Mo	ICP-MS	mg/L	0.00313	0.00869	0.00254	< 0.00004
Nickel Ni	ICP-MS	mg/L	0.0388	0.29	0.0098	< 0.0001
Phosphorus P	ICP-MS	mg/L	< 0.003	0.004	< 0.003	< 0.003
Potassium K	ICP-MS	mg/L	7.06	5.65	7.54	< 0.009
Selenium Se	ICP-MS	mg/L	0.00232	0.00999	0.00198	< 0.00004
Silicon Si	ICP-MS	mg/L	3.56	4.31	3.63	< 0.02
Silver Ag	ICP-MS	mg/L	0.0002	0.00044	< 0.00005	< 0.00005
Sodium Na	ICP-MS	mg/L	164	395	233	0.06
Strontium Sr	ICP-MS	mg/L	0.295	0.382	0.228	< 0.00008
Sulphur (S)	ICP-MS	mg/L	553	1030	451	< 1
Thallium Tl	ICP-MS	mg/L	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Tin Sn	ICP-MS	mg/L	< 0.00006	< 0.00006	0.00008	< 0.00006
Titanium Ti	ICP-MS	mg/L	0.00005	0.00005	< 0.00007	< 0.00005
Uranium U	ICP-MS	mg/L	0.000481	0.000699	0.000634	< 0.000002
Vanadium V	ICP-MS	mg/L	0.00227	0.00229	0.00506	< 0.00001
Zinc Zn	ICP-MS	mg/L	0.002	0.028	< 0.002	< 0.002
Zirconium Zr	ICP-MS	mg/L	< 0.002	< 0.002	< 0.002	< 0.002

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SGS proposal: 19736-PR1
SGS project #: 2244

Work order date: 11-May-23
Report date: 8-Sep-23

Version: Final

Shake Flask Extraction Report

Leachate Analysis

Sample ID			Test 1 Saline Water	Test 2 Saline Water	Test 3 Saline Water	Blank Saline Water
Parameter	**Method**	**Units**				
Volume Nanopure Water		mL	750	750	750	750
Sample Weight		g	250	250	250	-
pH	meter		7.78	7.77	7.92	7.19
Redox	meter	mV	298.74	196.71	257	351.21
Conductivity	meter	uS/cm	57343.8	57951.1	57677	57123.6
Acidity (to pH 4.5)	titration	mg CaCO3/L	0	0	0.0	0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	11.97	16.38	10.7	8.03
Alkalinity	titration	mg CaCO3/L	56.45	78.1	70.0	14.6
Bromide		mg/L	< 30	< 30	< 30	< 30
Chloride		mg/L	24000	25000	24000	24000
Fluoride		mg/L	0.1	0.19	0.06	< 0.06
Nitrite (as N)		as N mg/L	< 3	< 3	< 3	< 3
Nitrate (as N)		as N mg/L	< 6	< 6	< 6	< 6
Ammonia+Ammonium (N)		as N mg/L	0.8	1.9	0.7	0.1
Sulphate	IC	mg/L	2130	2642	2371	1876
Ion Balance						
Major Anions	Calc	meq/L	721.57	760.84	726.86	715.43
Major Cations	Calc	meq/L	634.17	654.49	622.72	627.98
Difference	Calc	meq/L	87.39	106.35	104.13	87.45
Balance (%)	Calc	%	6.4%	7.5%	7.7%	6.5%
Dissolved Metals						
Hardness CaCO3		mg/L	11900	12000	11800	11800
Aluminum Al	ICP-MS	mg/L	0.02	0.02	0.03	0.02
Antimony Sb	ICP-MS	mg/L	0.017	0.048	0.013	< 0.009
Arsenic As	ICP-MS	mg/L	1.21	2.06	1.66	0.002
Barium Ba	ICP-MS	mg/L	0.359	0.359	0.335	0.0093
Beryllium Be	ICP-MS	mg/L	0.00019	0.00016	0.00014	0.00023
Bismuth Bi	ICP-MS	mg/L	0.0003	0.0003	0.0002	0.0008
Boron B	ICP-MS	mg/L	0.96	0.96	0.92	0.99
Cadmium Cd	ICP-MS	mg/L	0.00495	0.0221	0.00071	0.00009
Calcium Ca	ICP-MS	mg/L	2700	2700	2730	2660
Chromium Cr	ICP-MS	mg/L	0.0249	0.0048	0.0118	0.007
Cobalt Co	ICP-MS	mg/L	0.146	0.357	0.113	0.0006
Copper Cu	ICP-MS	mg/L	0.06	0.195	0.026	0.006
Iron Fe	ICP-MS	mg/L	5.23	< 0.07	0.1	4.91
Lead Pb	ICP-MS	mg/L	< 0.0009	< 0.0009	< 0.0009	0.0015
Lithium Li	ICP-MS	mg/L	1.24	1.31	1.24	1.27
Magnesium Mg	ICP-MS	mg/L	1260	1270	1210	1250
Manganese Mn	ICP-MS	mg/L	0.333	0.432	0.218	0.033
Mercury Hg	CVAAS	µg/L	< 0.01	0.045	< 0.01	< 0.01
Molybdenum Mo	ICP-MS	mg/L	0.0061	0.0129	0.0037	0.0014
Nickel Ni	ICP-MS	mg/L	0.555	1.79	0.097	0.01
Phosphorus P	ICP-MS	mg/L	0.07	0.08	0.03	0.04
Potassium K	ICP-MS	mg/L	119	116	120	114
Selenium Se	ICP-MS	mg/L	0.0052	0.0112	0.0033	0.0023
Silicon Si	ICP-MS	mg/L	3.7	4.1	3.7	1.6
Silver Ag	ICP-MS	mg/L	0.0029	0.0027	0.0023	< 0.0005
Sodium Na	ICP-MS	mg/L	8990	9440	8790	8920
Strontium Sr	ICP-MS	mg/L	46.8	43.4	46.6	50.3
Sulphur (S)	ICP-MS	mg/L	1020	1190	1050	804
Thallium Tl	ICP-MS	mg/L	0.00016	0.0001	0.00008	0.0002
Tin Sn	ICP-MS	mg/L	0.0009	< 0.0006	< 0.0006	0.001
Titanium Ti	ICP-MS	mg/L	< 0.0007	< 0.0007	< 0.0007	< 0.0007
Uranium U	ICP-MS	mg/L	0.00098	0.00111	0.00109	0.00011
Vanadium V	ICP-MS	mg/L	0.0023	0.002	0.0036	0.0009
Zinc Zn	ICP-MS	mg/L	0.08	0.42	0.03	< 0.02
Zirconium Zr	ICP-MS	mg/L	< 0.02	< 0.02	< 0.02	< 0.02

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Appendix G Current Humidity Cell Results

SGS project #: 2244

Humidity Cell Test Report

Version: Draft

T 1

Sample = Test 1

Leachate Analysis

Date	Cycle No.	Volume ml Input	Volume ml Output	pH	Cond. µmhos/cm	Acidity (pH 4.5) $mgCaCO_3/L$	Acidity (pH 8.3) $mgCaCO_3/L$	Total Alkalinity $mgCaCO_3/L$	Sulphate mg/L	TOC	Total CN mg/L	WAD CN mg/L	CNO mg/L	SCN mg/L	Ammonia As N mg/L	Nitrate as N mg/L	Nitrite as N mg/L	Hardness $CaCO_3$ mg/L	Al mg/L	Sb mg/L
30-May-23	1	800	435	7.87	5628	#N/A	3.5	54.0	3134	5	0.12	-0.01	3.0	18	1.6	-0.6	-0.3	1290	0.029	0.0256
6-Jun-23	2	500	510	7.83	2836	#N/A	3.6	47.7	1550	16	0.02	-0.01	1.8	9.8	0.6	-0.6	-0.3	165	0.030	0.0163
13-Jun-23	3	500	455	7.80	2472	#N/A	3.8	47.7	1371	12	0.01	-0.01	1.3	6.3	0.4	-0.6	-0.3	1370	0.020	0.0197
20-Jun-23	4	500	425	7.62	2475	#N/A	5.1	49.0	1300	9	0.01	-0.01	1.5	6.2	0.3	-0.6	-0.3	1420	0.017	0.018
27-Jun-23	5	500	480	7.84	2261	#N/A	4.9	68.1	1209	7	-0.01	-0.01	-1	3.4	0.3	-0.6	-0.3	1310	0.016	0.0155
4-Jul-23	6	500	450	8.02	2105	#N/A	3.5	75.8	1125	4	-0.01	-0.01	3.0	-2	0.3	-0.6	-0.3	1310	0.017	0.0136
11-Jul-23	7	500	495	7.91	1842	#N/A	4.0	70.3	918	4	-0.01	-0.01	-1	-2	0.2	-0.6	-0.3	1090	0.015	0.0095
18-Jul-23	8	500	490	7.96	1768	#N/A	3.9	78.0	863	3	-0.01	-0.01	-1	-2	0.2	-0.6	-0.3	881	0.012	0.0087
25-Jul-23	9	600	455	8.06	2090	#N/A	2.8	67.0	1089	4	-0.01	-0.01	2.6	-2	0.2	-0.6	-0.3	1230	0.061	0.0079
1-Aug-23	10	500	500	7.97	1572	#N/A	4.0	80.0	805	2	-0.01	-0.01	-1	-2	0.1	-0.6	-0.3	864	0.015	0.0061
8-Aug-23	11	500	450	8.04	1826	#N/A	3.1	72.0	1014	3	-0.01	-0.01	-1	-2	0.1	-0.6	-0.3	1150	0.017	0.0055
15-Aug-23	12	500	490	8.14	1561	#N/A	2.8	106.1	766	3	-0.01	-0.01	-1	-2	0.1	-0.6	-0.3	832	0.011	0.0055
22-Aug-23	13	500	380	8.07	1667	#N/A	2.7	75.3	817											
29-Aug-23	14	500	480	8.12	1252	#N/A	2.7	104.4	551											
5-Sep-23	15	500	470	8.01	1654	#N/A	2.6	64.2	924											
12-Sep-23	16	500	450	7.84	1222	#N/A	3.8	100.5	496	3	-0.01	-0.01	-1	-2	-0.1	-0.6	-0.3	747	0.011	0.0043
19-Sep-23	17	500	385	7.99	1241	#N/A	2.7	64.3	558											
26-Sep-23	18	500	415	7.98	1178	#N/A	2.6	67.2	493											
3-Oct-23	19	500	405	8.02	1186	#N/A	2.6	67.8	584											
10-Oct-23	20	500	430	8.00	977	#N/A	2.6	74.5	446	2	0.01	-0.01	-1	-2	-0.1	-0.6	-0.3	502	0.018	0.0021
17-Oct-23	21	500	400	8.09	917	#N/A	2.3	83.5	382											
24-Oct-23	22	500	465	8.18	789	#N/A	1.6	108.4	295											
31-Oct-23	23	500	440	8.04	654	#N/A	1.9	68.1	203											
7-Nov-23	24	500	390	8.10	673	#N/A	1.7	72.9	253	2	0.02	-0.01	-1	-2	-0.1	-0.6	-0.3	236	0.018	0.0021
14-Nov-23	25	500	400	8.15	725	#N/A	1.6	83.1	251											
21-Nov-23	26	500	450	8.23	755	#N/A	1.5	131.1	292											
28-Nov-23	27	500	425	8.27	634	#N/A	1.1	123.8	268											
5-Dec-23	28	500	495	8.31	623	#N/A	#N/A	133.4	192											
12-Dec-23	29	500	450	8.27	552	#N/A	1.3	114.5	164											
19-Dec-23	30	500	500	8.29	589	#N/A	1.0	128.1												

SGS

Humidity Cell Test Report

T 1

Sample = Test 1

Leachate Analysis

Date	Cycle No.	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
30-May-23	1	1.88	0.0527	-0.000007	0.00001	0.140	0.000089	466	0.00091	0.250	0.0063	0.041	0.00019	0.0075	29.4	0.0405	0.01	0.0231	0.0357	0.020	23.5	0.00893
6-Jun-23	2	1.74	0.0424	-0.00007	-0.0001	0.070	0.000083	537	-0.0008	0.0945	0.0085	0.108	-0.0009	0.0073	21.4	0.0541	0.29	0.00551	0.140	-0.03	11.4	0.00709
13-Jun-23	3	1.42	0.0381	-0.000007	-0.00001	0.054	0.000095	523	0.00032	0.0681	0.0098	0.008	-0.00009	0.0072	14.2	0.0579	0.31	0.00314	0.159	-0.003	5.42	0.00656
20-Jun-23	4	0.622	0.0305	-0.000007	-0.00001	0.037	0.000144	543	0.00027	0.0665	0.0099	0.009	-0.00009	0.007	15.7	0.0931	0.29	0.00304	0.207	-0.003	4.48	0.0074
27-Jun-23	5	0.403	0.0257	-0.000007	-0.00001	0.056	0.000145	491	0.00015	0.0571	0.0054	-0.007	0.00009	0.0078	21.3	0.133	0.05	0.00241	0.235	-0.003	3.56	0.00396
4-Jul-23	6	0.197	0.0246	-0.000007	-0.00001	0.046	0.000157	474	0.00012	0.0611	0.0042	-0.007	-0.00009	0.0082	31.6	0.192	-0.01	0.00292	0.289	0.004	3.24	0.00323
11-Jul-23	7	0.177	0.0187	-0.000007	-0.00001	0.036	0.000108	387	0.00011	0.0264	0.0013	-0.007	-0.00009	0.0056	29.9	0.0841	-0.01	0.00256	0.195	0.004	2.53	0.00261
18-Jul-23	8	0.113	0.0174	-0.000007	-0.00001	0.025	0.000127	307	0.00009	0.0438	0.0030	0.014	0.00026	0.0046	27.9	0.171	-0.01	0.00233	0.212	-0.003	1.70	0.00265
25-Jul-23	9	0.0893	0.0203	0.000012	0.00004	0.036	0.000390	404	0.00011	0.0567	0.0029	0.010	0.00014	0.0083	54.6	0.253	-0.01	0.00646	0.210	0.008	2.03	0.00360
1-Aug-23	10	0.0601	0.0160	-0.000007	0.00004	0.028	0.000104	290	-0.00008	0.0458	0.0022	-0.007	-0.00009	0.0055	33.9	0.232	-0.01	0.00310	0.210	0.005	1.74	0.00172
8-Aug-23	11	0.0543	0.0173	-0.000007	-0.00001	0.026	0.000107	359	0.00010	0.0533	0.0026	0.008	-0.00009	0.0064	62.5	0.319	-0.01	0.00352	0.200	0.006	1.91	0.00318
15-Aug-23	12	0.0471	0.0156	-0.000007	-0.00001	0.028	0.000099	266	-0.00008	0.0496	0.0026	-0.007	-0.00009	0.0054	40.9	0.291	-0.01	0.00314	0.207	0.005	1.77	0.00144
22-Aug-23	13																					
29-Aug-23	14																					
5-Sep-23	15																					
12-Sep-23	16	0.0271	0.0147	-0.000007	-0.00001	0.020	0.000068	201	-0.00008	0.0367	0.0016	-0.007	-0.00009	0.0046	59.3	0.305	-0.01	0.00431	0.113	-0.003	1.20	0.00095
19-Sep-23	17																					
26-Sep-23	18																					
3-Oct-23	19																					
10-Oct-23	20	0.0334	0.0113	0.000008	-0.00001	0.017	0.000035	113	-0.00008	0.0226	0.001	-0.007	-0.00009	0.0039	53.6	0.131	-0.01	0.0076	0.0434	0.015	1.1	0.00075
17-Oct-23	21																					
24-Oct-23	22																					
31-Oct-23	23																					
7-Nov-23	24	0.0338	0.00667	-0.000007	-0.00001	0.014	0.000025	44.8	-0.00008	0.0102	0.0007	0.008	0.00049	0.0024	30.2	0.0485	-0.01	0.00917	0.0155	0.003	0.593	0.00115
14-Nov-23	25																					
21-Nov-23	26																					
28-Nov-23	27																					
5-Dec-23	28																					
12-Dec-23	29																					
19-Dec-23	30																					

SGS

Humidity Cell Test Report

T 1

Sample = Test 1

Leachate Analysis

Date	Cycle	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr		Calculated Values				Notes
	No.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SGS File #	Major Anions	Major Cations	Diff meq/L	Diff (%)	
30-May-23	1	4.71	0.00045	785	0.515	1190	0.000014	0.0118	0.00011	0.000880	0.00267	0.007	-0.002	CA14049-JUN23	66.69	60.67	-6.03	-4.7%	
6-Jun-23	2	5.09	0.00090	143	0.423	728	-0.00005	0.0122	-0.0005	0.000763	0.00228	-0.02	-0.02	CA15538-JUN23	33.39	35.23	1.84	2.7%	Ca is being rechecked √
13-Jun-23	3	5.06	0.00140	30.0	0.428	623	0.000005	0.0198	0.00008	0.000672	0.00160	0.010	-0.002	CA15217-JUN23	29.59	28.84	-0.75	-1.3%	
20-Jun-23	4	5.59	0.00216	14.5	0.476	506	-0.000005	0.0197	0.0001	0.000739	0.00098	0.018	-0.002	CA15714-JUN23	28.14	29.22	1.08	1.9%	
27-Jun-23	5	5.18	0.00060	7.86	0.382	434	-0.000005	0.0236	0.00008	0.000596	0.00079	0.029	-0.002	CA15319-JUN23	26.52	26.77	0.25	0.5%	
4-Jul-23	6	5.43	-0.00005	5.12	0.325	402	-0.000005	0.0206	0.00017	0.000474	0.00055	0.031	-0.002	CA15118-JUL23	24.93	26.63	1.71	3.3%	SO_4 rechecked √, will request for icp ms recheck √
11-Jul-23	7	4.82	-0.00005	3.39	0.266	361	0.000006	0.0244	-0.00007	0.000350	0.00046	0.018	-0.002	CA15492-JUL23	20.41	22.04	1.63	3.8%	
18-Jul-23	8	3.19	-0.00005	2.06	0.242	279	-0.000005	0.0177	0.00008	0.000331	0.00027	0.026	-0.002	CA15665-JUL23	19.42	17.80	-1.62	-4.3%	
25-Jul-23	9	3.66	-0.00005	2.86	0.324	435	0.000010	0.0171	0.00012	0.000379	0.00021	0.016	-0.002	CA15868-JUL23	23.99	24.89	0.90	1.8%	
1-Aug-23	10	4.10	-0.00005	1.68	0.206	273	0.000014	0.0144	-0.00007	0.000274	0.00019	0.022	-0.002	A15453-AUG23 Revis	18.25	17.42	-0.83	-2.3%	rechecks requested √
8-Aug-23	11	4.07	-0.00005	1.99	0.250	353	-0.000005	0.0142	0.00008	0.000239	0.00017	0.017	-0.002	CA15541-AUG23	22.44	23.24	0.80	1.7%	
15-Aug-23	12	4.06	-0.00005	1.59	0.200	246	-0.000005	0.0178	-0.00007	0.000193	0.00018	0.018	-0.002	CA14763-AUG23	17.96	16.80	-1.16	-3.3%	
22-Aug-23	13																		
29-Aug-23	14																		
5-Sep-23	15																		
12-Sep-23	16	3.80	-0.00005	1.17	0.180	210	-0.000005	0.0154	-0.00007	0.000093	0.00010	0.012	-0.002	CA15535-SEP23	12.22	15.01	2.79	10.3%	
19-Sep-23	17																		
26-Sep-23	18																		
3-Oct-23	19																		
10-Oct-23	20	3.08	-0.00005	0.88	0.108	151	-0.000005	0.0133	-0.00007	0.00005	0.00011	0.004	-0.002	CA15305-OCT23	10.66	10.13	-0.53	-2.6%	
17-Oct-23	21																		
24-Oct-23	22																		
31-Oct-23	23																		
7-Nov-23	24	2.11	-0.00005	0.49	0.0533	57	0.000015	0.0122	-0.00007	0.000033	0.00007	0.003	-0.002	CA15450-NOV23	6.61	4.76	-1.84	-16.2%	rechecks requested
14-Nov-23	25																		
21-Nov-23	26																		
28-Nov-23	27																		
5-Dec-23	28																		
12-Dec-23	29																		
19-Dec-23	30																		

SGS project #: 2244

Humidity Cell Test Report

Version: Draft

T 2

Sample = Test 2

Leachate Analysis

Date	Cycle No.	Volume ml Input	Volume ml Output	pH	Cond. μmhos/cm	Acidity (pH 4.5) $mgCaCO_3/L$	Acidity (pH 8.3) $mgCaCO_3/L$	Total Alkalinity $mgCaCO_3/L$	Sulphate mg/L	TOC	Total CN mg/L	WAD CN mg/L	CNO mg/L	SCN mg/L	Ammonia As N mg/L	Nitrate as N mg/L	Nitrite as N mg/L	Hardness $CaCO_3$ mg/L	Al mg/L	Sb mg/L
6-Jun-23	1	750	430	7.65	10949	#N/A	7.4	86.5	5713	38	0.11	-0.1	27	56	5.3	-0.6	-0.3	226	0.030	0.0640
13-Jun-23	2	500	455	7.95	4197	#N/A	4.7	83.9	2292	32	0.06	-0.01	9.8	77	2.8	-0.6	-0.3	1380	0.018	0.0552
20-Jun-23	3	500	475	7.64	1540	#N/A	2.9	34.2	694	10	0.02	-0.01	2.8	29	0.7	-0.6	-0.3	641	0.017	0.0187
27-Jun-23	4	500	470	7.40	1785	#N/A	4.7	37.4	965	15	0.02	-0.01	4.1	42	1.0	-0.6	-0.3	828	0.014	0.0222
4-Jul-23	5	500	420	7.41	2946	#N/A	6.6	43.3	1646	29	0.03	-0.01	5.0	73	1.7	-0.6	-0.3	1760	0.014	0.0439
11-Jul-23	6	500	490	7.78	2749	#N/A	6.1	69.5	1526	23	0.02	-0.01	3.0	63	1.5	-0.6	-0.3	1670	0.011	0.0220
18-Jul-23	7	500	430	7.69	2717	#N/A	6.2	62.8	1411	19	0.01	-0.01	3.8	49	1.3	-0.6	-0.3	1360	0.007	0.0342
25-Jul-23	8	600	435	7.87	2798	#N/A	5.2	66.2	1481	18	0.01	-0.01	4.3	51	1.4	-0.6	-0.3	1640	0.036	0.0303
1-Aug-23	9	500	505	7.96	2509	#N/A	5.8	86.5	1401	11	0.18	0.01	-1	28	1.1	-0.6	-0.3	1430	0.006	0.0278
8-Aug-23	10	500	445	7.81	1578	#N/A	3.9	53.9	789	7	0.01	-0.01	-1	19	0.7	-0.6	-0.3	933	0.014	0.0145
15-Aug-23	11	500	410	8.01	2446	#N/A	4.9	91.3	1410	12	0.01	-0.01	1.1	31	1.2	-0.6	-0.3	1420	0.007	0.0226
22-Aug-23	12	500	450	7.96	2652	#N/A	4.4	68.7	1517	14	0.01	-0.01	3.1	38	1.1	-0.6	-0.3	1560	0.008	0.0193
29-Aug-23	13	500	480	7.97	2530	#N/A	5.3	89.8	1528											
5-Sep-23	14	500	475	7.93	2802	#N/A	4.6	70.8	1654											
12-Sep-23	15	500	440	7.94	2337	#N/A	5.6	75.0	1366											
19-Sep-23	16	500	420	7.94	2756	#N/A	5.0	69.7	1673	12	-0.01	-0.01	1.8	30	1.8	-0.6	-0.3	1720	0.006	0.0093
26-Sep-23	17	500	395	7.90	2751	#N/A	5.8	80.6	1738											
3-Oct-23	18	500	380	7.89	2818	#N/A	5.6	72.2	1874											
10-Oct-23	19	500	375	7.67	1112	#N/A	2.8	31.3	582											
17-Oct-23	20	500	495	7.67	1017	#N/A	2.9	32.4	495	2	-0.01	-0.01	-1	3.2	0.7	-0.6	-0.3	524	0.007	0.0019
24-Oct-23	21	500	415	7.61	977	#N/A	3.4	38.8	443											
31-Oct-23	22	500	440	7.67	681	#N/A	2.0	25.3	298											
7-Nov-23	23	500	380	7.69	792	#N/A	2.3	28.2	388											
14-Nov-23	24	500	400	7.68	578	#N/A	1.8	24.1	252	2	-0.01	-0.01	-1	2.5	0.5	-0.6	-0.3	263	0.004	0.0011
21-Nov-23	25	500	455	7.87	246	#N/A	1.7	31.3	96											
28-Nov-23	26	500	425	7.81	791	#N/A	2.2	36.5	343											
5-Dec-23	27	500	460	7.83	866	#N/A	2.1	35.1	384											
12-Dec-23	28	500	485	7.73	848	#N/A	2.4	27.1												
19-Dec-23	29	500	480	7.75	845	#N/A	2.1	27.5												

Humidity Cell Test Report
T 2
Sample = Test 2
Leachate Analysis

Date	Cycle No.	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
6-Jun-23	1	4.85	0.0571	-0.00007	-0.0001	0.193	0.000160	28.0	-0.0008	0.356	0.119	-0.07	-0.0009	0.0068	37.9	0.0624	0.03	0.0458	0.230	-0.03	26.4	0.0249
13-Jun-23	2	4.14	0.0342	-0.000007	-0.00001	0.081	0.000205	517	-0.00008	0.376	0.131	0.008	0.00019	0.0070	22.5	0.0595	0.25	0.0251	0.416	-0.003	8.54	0.0158
20-Jun-23	3	1.06	0.012	-0.000007	-0.00001	0.018	0.000141	248	0.00014	0.0944	0.0177	0.007	0.00078	0.002	5.07	0.0309	0.01	0.00362	0.229	-0.003	2.15	0.00655
27-Jun-23	4	0.904	0.0162	-0.000007	-0.00001	0.037	0.000230	319	0.00011	0.127	0.0355	-0.007	0.00009	0.0035	7.67	0.0499	0.20	0.00473	0.381	-0.003	2.67	0.0107
4-Jul-23	5	1.01	0.0329	-0.000007	-0.00001	0.057	0.000595	677	0.00010	0.317	0.0886	0.021	-0.00009	0.0071	18.1	0.136	0.15	0.00925	1.14	0.009	5.44	0.0170
11-Jul-23	6	1.09	0.0292	-0.000007	-0.00001	0.056	0.000541	641	-0.00008	0.288	0.0510	-0.007	-0.00009	0.0065	16.9	0.148	0.15	0.00595	1.07	0.006	4.29	0.00996
18-Jul-23	7	0.460	0.0285	-0.000007	-0.00001	0.031	0.000673	515	0.00050	0.303	0.0340	0.162	-0.00009	0.0051	18.1	0.237	0.03	0.00522	1.62	-0.003	2.72	0.00861
25-Jul-23	8	0.239	0.0268	0.000013	-0.00001	0.045	0.000986	593	0.00028	0.373	0.0526	0.008	0.00056	0.0094	39.3	0.458	-0.01	0.00747	2.19	0.007	3.34	0.00739
1-Aug-23	9	0.226	0.0247	-0.000007	-0.00001	0.033	0.000721	530	0.00009	0.307	0.0282	-0.007	-0.00009	0.0056	25.1	0.338	-0.01	0.00399	1.79	0.003	2.74	0.00279
8-Aug-23	10	0.250	0.0137	-0.000007	-0.00001	0.019	0.000347	345	0.00014	0.140	0.0162	-0.007	-0.00009	0.0030	17.3	0.184	-0.01	0.00230	0.768	0.006	1.80	0.00228
15-Aug-23	11	0.249	0.0213	-0.000007	-0.00001	0.031	0.000635	511	-0.00008	0.296	0.0242	-0.007	-0.00009	0.0047	34.3	0.371	-0.01	0.00436	1.77	0.007	2.54	0.00351
22-Aug-23	12	0.210	0.0234	-0.000007	-0.00001	0.022	0.000637	553	-0.00008	0.334	0.0227	-0.007	-0.00009	0.0057	44.0	0.542	-0.01	0.00523	1.80	0.004	2.39	0.00480
29-Aug-23	13																					
5-Sep-23	14																					
12-Sep-23	15																					
19-Sep-23	16	0.0712	0.0231	-0.000007	-0.00001	0.018	0.000694	562	-0.00008	0.399	0.0194	-0.007	0.00051	0.0060	77.3	0.954	-0.01	0.00497	2.00	-0.003	2.67	0.00421
26-Sep-23	17																					
3-Oct-23	18																					
10-Oct-23	19																					
17-Oct-23	20	0.0279	0.00643	0.000013	-0.00001	0.007	0.000175	157	-0.00008	0.105	0.0030	-0.007	-0.00009	0.0018	31.9	0.402	-0.01	0.00130	0.432	0.010	1.01	0.00243
24-Oct-23	21																					
31-Oct-23	22																					
7-Nov-23	23																					
14-Nov-23	24	0.0158	0.00321	-0.000007	-0.00001	0.005	0.000077	63.8	-0.00008	0.035308	0.0009	-0.007	-0.00009	0.0009	25.3	0.241	-0.01	0.00050	0.126	-0.003	0.532	0.00178
21-Nov-23	25																					
28-Nov-23	26																					
5-Dec-23	27																					
12-Dec-23	28																					
19-Dec-23	29																					

SGS

Humidity Cell Test Report

T 2

Sample = Test 2

Leachate Analysis

Date	Cycle No.	Si mg/L	Ag mg/L	Na mg/L	Sr mg/L	S mg/L	Tl mg/L	Sn mg/L	Ti mg/L	U mg/L	V mg/L	Zn mg/L	Zr mg/L	SGS File #	Calculated Values Major Anions	Major Cations	Diff meq/L	Diff (%)	Notes
6-Jun-23	1	4.64	0.00294	2440	0.474	2800	-0.00005	0.00968	-0.0005	0.00135	0.00396	0.026	-0.02	CA15538-JUN23	122.29	111.95	-10.34	-4.4%	
13-Jun-23	2	6.68	0.00189	411	0.448	1040	-0.000005	0.0100	-0.00007	0.00127	0.00272	0.029	-0.002	CA15217-JUN23	50.93	46.18	-4.75	-4.9%	
20-Jun-23	3	2.6	0.00055	52.4	0.175	259	-0.000005	0.0053	-0.00007	0.00036	0.00098	0.021	-0.002	CA15714-JUN23	15.65	15.24	-0.40	-1.3%	
27-Jun-23	4	2.87	0.00109	50.2	0.261	355	-0.000005	0.00787	-0.00007	0.000450	0.00085	0.048	-0.002	CA15319-JUN23	21.61	18.95	-2.66	-6.6%	
4-Jul-23	5	8.43	0.00234	67.5	0.535	728	0.000006	0.0308	0.00012	0.000773	0.00114	0.163	-0.002	CA15118-JUL23	36.47	38.60	2.13	2.8%	SO_4 is rechecked √; will request icp ms recheck √
11-Jul-23	6	8.10	0.00105	30.0	0.553	648	-0.000005	0.0230	0.00010	0.000763	0.00113	0.168	-0.002	CA15492-JUL23	34.28	35.03	0.76	1.1%	
18-Jul-23	7	4.49	0.00019	12.6	0.636	503	-0.000005	0.0165	0.00042	0.000748	0.00046	0.351	-0.002	CA15665-JUL23	31.52	28.03	-3.49	-5.9%	
25-Jul-23	8	5.79	-0.00005	12.7	0.727	617	-0.000005	0.0193	0.00010	0.000816	0.00033	0.498	-0.002	CA15868-JUL23	33.10	33.73	0.63	0.9%	
1-Aug-23	9	6.82	-0.00005	5.98	0.463	472	-0.000005	0.0148	0.00008	0.000710	0.00036	0.403	-0.002	A15453-AUG23 Revis	31.32	29.05	-2.27	-3.8%	rechecks requested √
8-Aug-23	10	4.50	-0.00005	3.37	0.244	299	-0.000005	0.00711	0.00009	0.000337	0.00033	0.160	-0.002	CA15541-AUG23	17.76	18.95	1.19	3.3%	
15-Aug-23	11	6.76	-0.00005	4.70	0.420	465	-0.000005	0.0148	0.00010	0.000593	0.00039	0.324	-0.002	CA14763-AUG23	31.70	28.80	-2.89	-4.8%	
22-Aug-23	12	5.45	-0.00005	4.70	0.487	564	-0.000005	0.0155	-0.00007	0.000485	0.00031	0.284	-0.002	CA15753-AUG23	33.64	31.69	-1.95	-3.0%	
29-Aug-23	13																		
5-Sep-23	14																		
12-Sep-23	15																		
19-Sep-23	16	4.68	-0.00005	3.17	0.451	548	-0.000005	0.0115	-0.00007	0.000301	0.00013	0.257	-0.002	CA15119-SEP23	36.74	34.89	-1.86	-2.6%	
26-Sep-23	17																		
3-Oct-23	18																		
10-Oct-23	19																		
17-Oct-23	20	1.45	-0.00005	1.11	0.142	172	-0.000005	0.00266	-0.00007	0.000038	0.00005	0.043	-0.002	CA15300-OCT23	10.93	10.63	-0.30	-1.4%	
24-Oct-23	21																		
31-Oct-23	22																		
7-Nov-23	23																		
14-Nov-23	24	0.89	-0.00005	0.66	0.0754	85	-0.000005	0.00173	-0.00007	0.000006	0.00002	0.014	-0.002	CA15276-NOV23	5.69	5.36	-0.32	-2.9%	
21-Nov-23	25																		
28-Nov-23	26																		
5-Dec-23	27																		
12-Dec-23	28																		
19-Dec-23	29																		

SGS project #: 2244

Humidity Cell Test Report

Version: Draft

T 3

Sample = Test 3

Leachate Analysis

Date	Cycle No.	Volume ml Input	Volume ml Output	pH	Cond. µmhos/cm	Acidity (pH 4.5) $mgCaCO_3/L$	Acidity (pH 8.3) $mgCaCO_3/L$	Total Alkalinity $mgCaCO_3/L$	Sulphate mg/L	TOC	Total CN mg/L	WAD CN mg/L	CNO mg/L	SCN mg/L	Ammonia As N mg/L	Nitrate as N mg/L	Nitrite as N mg/L	Hardness $CaCO_3$ mg/L	Al mg/L	Sb mg/L
27-Jun-23	1	750	455	8.07	6361	#N/A	2.3	58.0	3698	14	0.58	-0.01	17	-2	1.7	-0.6	-0.3	1160	0.044	0.0225
4-Jul-23	2	500	490	7.92	3454	#N/A	2.9	53.3	1935	10	0.25	0.01	3.9	-2	0.6	-0.6	-0.3	1430	0.044	0.0198
11-Jul-23	3	500	450	7.94	2680	#N/A	3.1	53.0	1526	7	0.16	-0.01	1.5	-2	0.3	-0.6	-0.3	1480	0.036	0.0163
18-Jul-23	4	500	460	7.92	2363	#N/A	3.0	51.1	1277	5	0.11	-0.01	1.2	-2	0.2	-0.6	-0.3	1150	0.034	0.0128
25-Jul-23	5	500	460	7.97	2357	#N/A	3.2	56.9	1316	3	0.06	-0.01	-1	-2	-0.1	-0.6	-0.3	1340	0.040	0.0118
1-Aug-23	6	500	470	7.94	2201	#N/A	4.5	61.6	1184	3	0.05	-0.01	-1	-2	-0.1	-0.6	-0.3	1270	0.025	0.0103
8-Aug-23	7	500	485	7.98	2182	#N/A	3.8	70.6	1250	3	0.04	-0.01	-1	-2	-0.1	-0.6	-0.3	1420	0.030	0.0098
15-Aug-23	8	500	500	8.05	2075	#N/A	3.5	82.3	1229	3	0.03	-0.01	-1	-2	-0.1	-0.6	-0.3	1180	0.024	0.0089
22-Aug-23	9	500	390	7.94	1738	#N/A	2.7	47.6	896	2	0.06	-0.01	-1	-2	-0.1	-0.6	-0.3	960	0.048	0.0066
29-Aug-23	10	500	470	8.06	1860	#N/A	3.1	77.3	960	2	0.03	-0.01	-1	-2	-0.1	-0.6	-0.3	1150	0.031	0.0056
5-Sep-23	11	500	460	8.01	1546	#N/A	2.6	58.4	850	3	0.06	-0.01	-1	-2	-0.1	-0.6	-0.3	924	0.050	0.0056
12-Sep-23	12	500	415	8.03	1409	#N/A	4.3	66.0	716	2	0.06	-0.01	-1	-2	-0.1	-0.6	-0.3	830	0.045	0.0052
19-Sep-23	13	500	460	8.11	1360	#N/A	3.1	96.8	667											
26-Sep-23	14	500	415	8.09	1146	#N/A	2.1	70.0	595											
3-Oct-23	15	500	395	8.10	1018	#N/A	2.3	69.4	456											
10-Oct-23	16	500	450	8.14	805	#N/A	2.2	78.2	313	2	0.15	0.01	-1	-2	-0.1	-0.6	-0.3	403	0.062	0.0033
17-Oct-23	17	500	485	8.17	762	#N/A	2.3	101.5	264											
24-Oct-23	18	500	485	8.13	623	#N/A	2.4	106.7	183											
31-Oct-23	19	500	445	8.21	483	#N/A	1.4	103.5	115											
7-Nov-23	20	500	440	8.21	378	#N/A	1.3	84.7	89	2	0.16	-0.01	-1	-2	-0.1	-0.6	-0.3	148	0.067	0.0028
14-Nov-23	21	500	405	8.27	365	#N/A	1.1	93.8	76											
21-Nov-23	22	500	430	8.20	371	#N/A	1.6	119.9	58											
28-Nov-23	23	500	445	8.30	275	#N/A	#N/A	106.3	23											
5-Dec-23	24	500	460	8.37	295	#N/A	#N/A	124.4	18											
12-Dec-23	25	500	445	8.36	260	#N/A	#N/A	111.6												
19-Dec-23	26	500	440	8.40	282	#N/A	#N/A	127.1												

SGS

Humidity Cell Test Report

T 3

Sample = Test 3

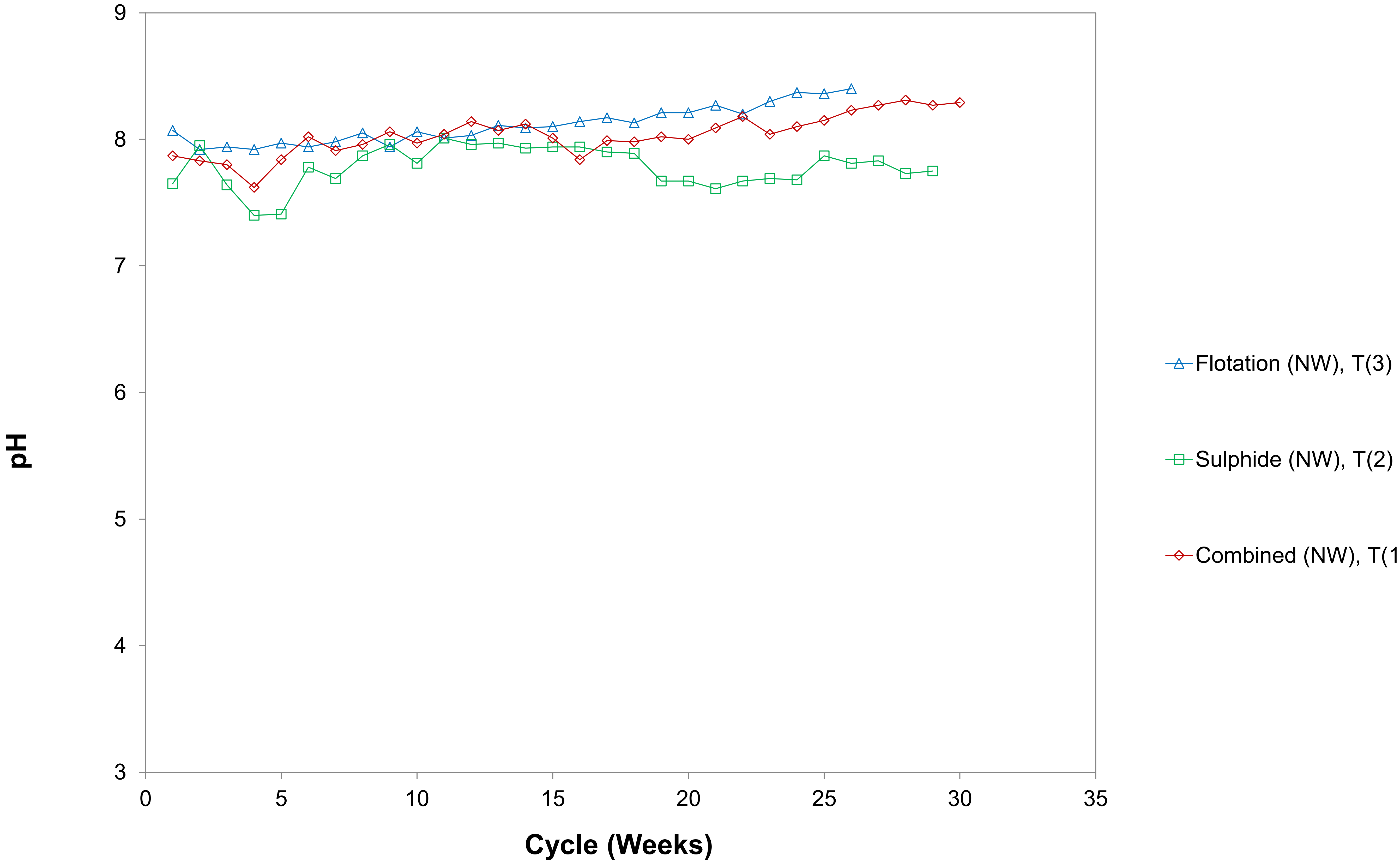
Leachate Analysis

Date	Cycle No.	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
27-Jun-23	1	3.65	0.0333	-0.000007	-0.00001	0.197	0.000035	434	0.00285	0.333	0.0035	0.222	0.00044	0.0069	18.8	0.0199	-0.01	0.0137	0.0136	0.010	23.8	0.00585
4-Jul-23	2	2.58	0.0335	-0.000007	-0.00001	0.095	0.000014	539	0.00037	0.154	0.0018	0.089	-0.00009	0.0062	21.4	0.0260	-0.01	0.00670	0.0219	0.005	15.2	0.00333
11-Jul-23	3	1.90	0.0271	-0.000007	-0.00001	0.085	0.000021	558	0.00016	0.0960	0.0025	0.064	-0.00009	0.0059	20.2	0.0344	-0.01	0.00323	0.0221	0.008	8.69	0.00263
18-Jul-23	4	1.44	0.0221	-0.000007	-0.00001	0.045	0.000035	439	0.00067	0.0662	0.0024	0.048	0.00017	0.0044	13.5	0.0360	-0.01	0.00184	0.0214	-0.003	4.27	0.00205
25-Jul-23	5	1.00	0.0194	-0.000007	-0.00001	0.064	0.000072	508	0.00049	0.0490	0.0108	0.029	-0.00009	0.0076	17.6	0.0684	-0.01	0.00209	0.0326	0.006	3.58	0.00132
1-Aug-23	6	0.716	0.0190	-0.000007	-0.00001	0.048	0.000030	476	0.00015	0.0386	0.0021	0.018	-0.00009	0.0062	19.4	0.0850	-0.01	0.00189	0.0329	0.003	3.00	0.00066
8-Aug-23	7	0.507	0.0180	-0.000007	-0.00001	0.050	0.000070	528	0.00040	0.0358	0.0024	0.025	-0.00009	0.0066	25.4	0.123	-0.01	0.00228	0.0409	0.007	2.81	0.00055
15-Aug-23	8	0.423	0.0154	-0.000007	-0.00001	0.045	0.000034	432	-0.00008	0.0302	0.0024	0.014	-0.00009	0.0057	23.9	0.111	-0.01	0.00178	0.0402	0.005	2.36	0.00047
22-Aug-23	9	0.427	0.0112	-0.000007	-0.00001	0.027	0.000026	350	0.00020	0.0325	0.0019	0.031	-0.00009	0.0045	20.9	0.0879	-0.01	0.00222	0.0223	0.006	1.78	0.00043
29-Aug-23	10	0.277	0.0146	-0.000007	-0.00001	0.035	-0.000003	406	-0.00008	0.0283	0.0021	0.022	0.00018	0.0064	32.6	0.154	-0.01	0.00256	0.0383	-0.003	2.22	0.00031
5-Sep-23	11	0.265	0.0103	-0.000007	-0.00001	0.034	0.000020	312	0.00022	0.0233	0.0017	0.025	-0.00009	0.0062	35.5	0.110	-0.01	0.00438	0.0212	-0.003	1.73	0.00029
12-Sep-23	12	0.185	0.00910	-0.000007	-0.00001	0.027	0.000021	270	-0.00008	0.0180	0.0012	0.022	0.00015	0.0045	37.6	0.112	-0.01	0.00407	0.0183	-0.003	1.37	0.00013
19-Sep-23	13																					
26-Sep-23	14																					
3-Oct-23	15																					
10-Oct-23	16	0.153	0.00561	0.000008	-0.00001	0.025	0.000018	96.8	0.00027	0.011	0.0016	0.061	-0.00009	0.0036	39.1	0.0791	-0.01	0.00847	0.0084	0.009	1.13	0.00017
17-Oct-23	17																					
24-Oct-23	18																					
31-Oct-23	19																					
7-Nov-23	20	0.129	0.00219	-0.000007	-0.00001	0.016	0.000007	26.1	0.00018	0.00470	0.0013	0.057	-0.00009	0.0019	20.1	0.0365	-0.01	0.00639	0.0034	0.003	0.627	0.00021
14-Nov-23	21																					
21-Nov-23	22																					
28-Nov-23	23																					
5-Dec-23	24																					
12-Dec-23	25																					
19-Dec-23	26																					

Humidity Cell Test Report
T 3
Sample = Test 3
Leachate Analysis

Date	Cycle No.	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr	SGS File #	Calculated Values				Notes
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		Major Anions	Major Cations	Diff meq/L	Diff (%)	
27-Jun-23	1	3.79	0.00006	980	0.467	1170	-0.000005	0.00655	0.00013	0.00128	0.00645	0.003	-0.002	CA15319-JUN23	78.53	66.79	-11.74	-8.1%	
4-Jul-23	2	5.86	0.00007	316	0.444	703	-0.000005	0.0124	0.00010	0.000913	0.00487	-0.002	-0.002	CA15118-JUL23	41.38	42.99	1.60	1.9%	SO_4 is being rechecked √
11-Jul-23	3	5.72	-0.00005	105	0.446	587	-0.000005	0.0175	0.00011	0.000761	0.00358	0.003	-0.002	CA15492-JUL23	32.80	34.44	1.65	2.4%	
18-Jul-23	4	3.27	0.00005	28.2	0.476	398	-0.000005	0.0119	0.00008	0.000746	0.00247	0.005	-0.002	CA15665-JUL23	27.56	24.46	-3.10	-6.0%	
25-Jul-23	5	4.40	-0.00005	13.3	0.411	494	-0.000005	0.0149	0.00007	0.000753	0.00210	0.032	-0.002	CA15868-JUL23	28.43	27.54	-0.89	-1.6%	
1-Aug-23	6	5.42	-0.00005	6.77	0.338	410	-0.000005	0.0157	-0.00007	0.000669	0.00175	0.003	-0.002	A15453-AUG23 Revis	25.78	25.77	0.00	0.0%	rechecks requested √
8-Aug-23	7	5.94	-0.00005	5.19	0.314	442	-0.000005	0.0173	0.00009	0.000630	0.00161	0.006	-0.002	CA15541-AUG23	27.33	28.78	1.45	2.6%	
15-Aug-23	8	4.65	-0.00005	3.11	0.265	367	-0.000005	0.0158	0.00009	0.000503	0.00140	0.005	-0.002	CA14763-AUG23	27.13	23.76	-3.37	-6.6%	
22-Aug-23	9	3.43	-0.00005	2.38	0.194	340	-0.000005	0.0131	-0.00007	0.000345	0.00130	0.003	-0.002	CA15753-AUG23	19.50	19.37	-0.13	-0.3%	
29-Aug-23	10	5.45	-0.00005	2.54	0.220	366	-0.000005	0.0164	0.00015	0.000412	0.00101	0.005	-0.002	CA19754-AUG23	21.42	23.14	1.72	3.9%	
5-Sep-23	11	4.66	-0.00005	2.07	0.163	305	-0.000005	0.0181	0.00008	0.000242	0.00100	0.002	-0.002	CA15480-SEP23	18.75	18.66	-0.10	-0.3%	
12-Sep-23	12	3.93	-0.00005	1.60	0.129	245	-0.000005	0.0170	-0.00007	0.000199	0.00076	0.003	-0.002	CA15535-SEP23	16.12	16.70	0.58	1.8%	
19-Sep-23	13																		
26-Sep-23	14																		
3-Oct-23	15																		
10-Oct-23	16	3.72	-0.00005	1.03	0.0566	111	0.000009	0.014	-0.00007	0.000068	0.00071	-0.002	-0.002	CA15305-OCT23	7.97	8.14	0.17	1.1%	
17-Oct-23	17																		
24-Oct-23	18																		
31-Oct-23	19																		
7-Nov-23	20	2.56	-0.00005	0.50	0.0233	27	-0.000005	0.0121	-0.00007	0.000020	0.00058	-0.002	-0.002	CA15450-NOV23	3.43	3.01	-0.42	-6.5%	
14-Nov-23	21																		
21-Nov-23	22																		
28-Nov-23	23																		
5-Dec-23	24																		
12-Dec-23	25																		
19-Dec-23	26																		

Appendix H Humidity Cell Time Series Concentration Charts



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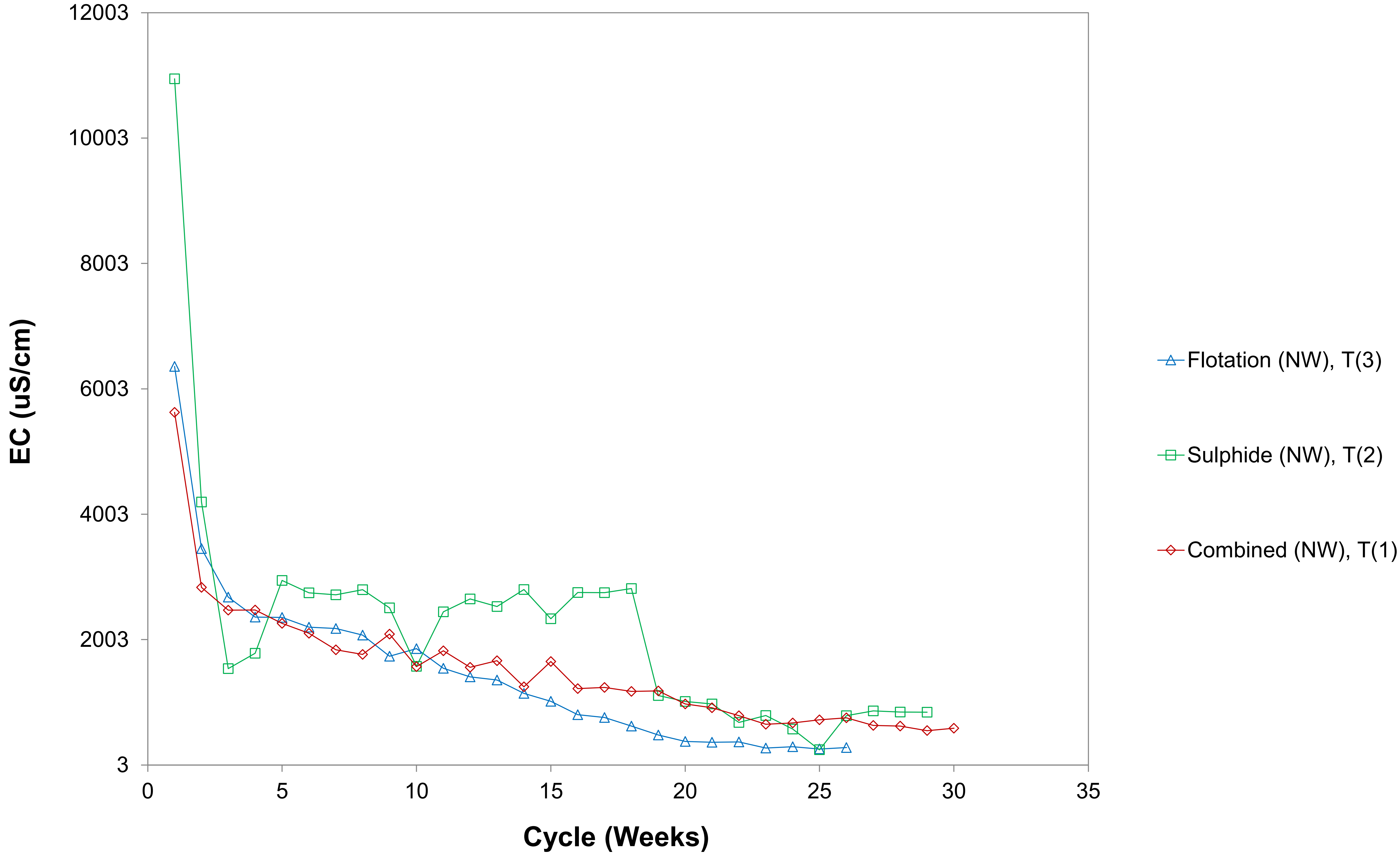

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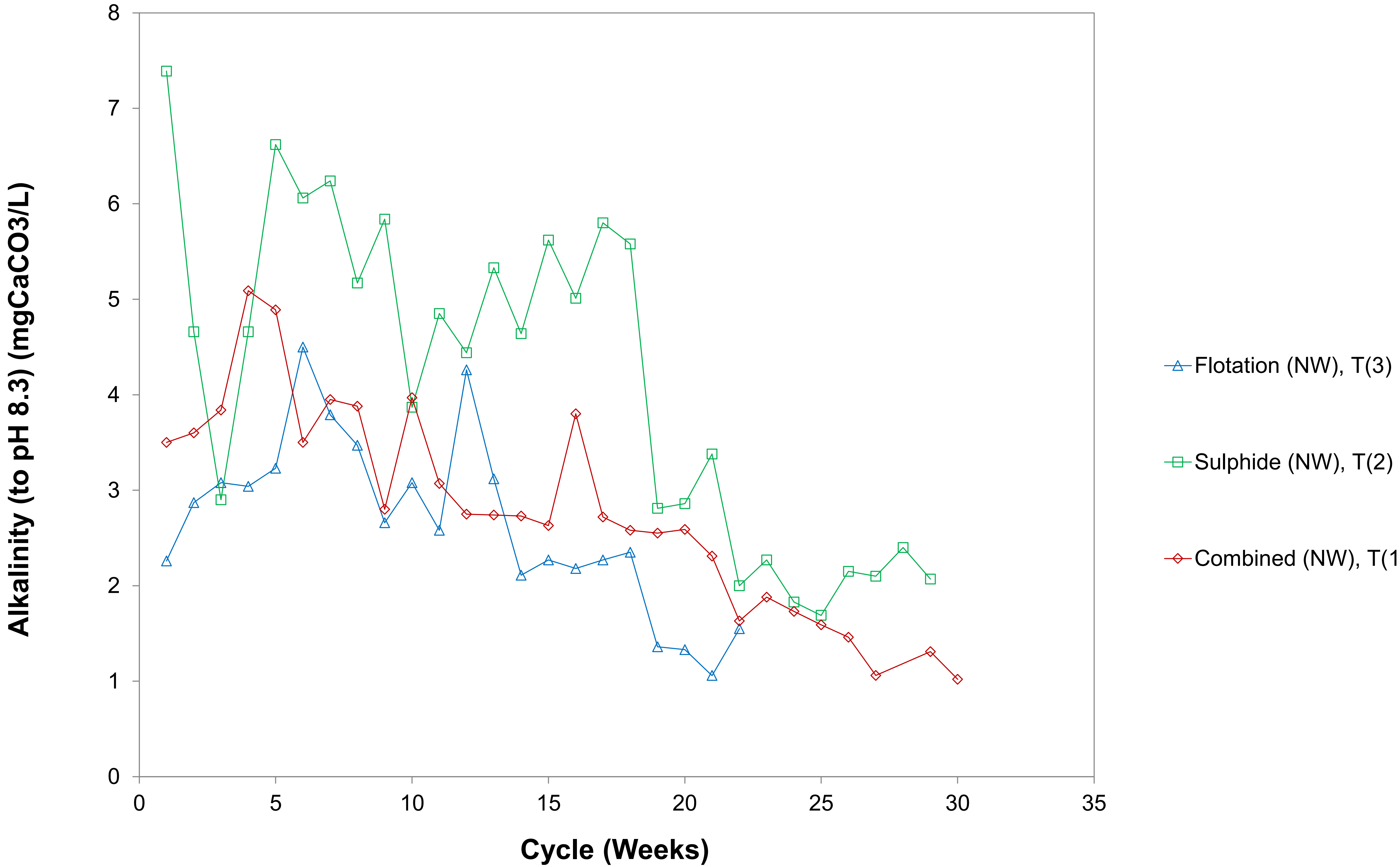

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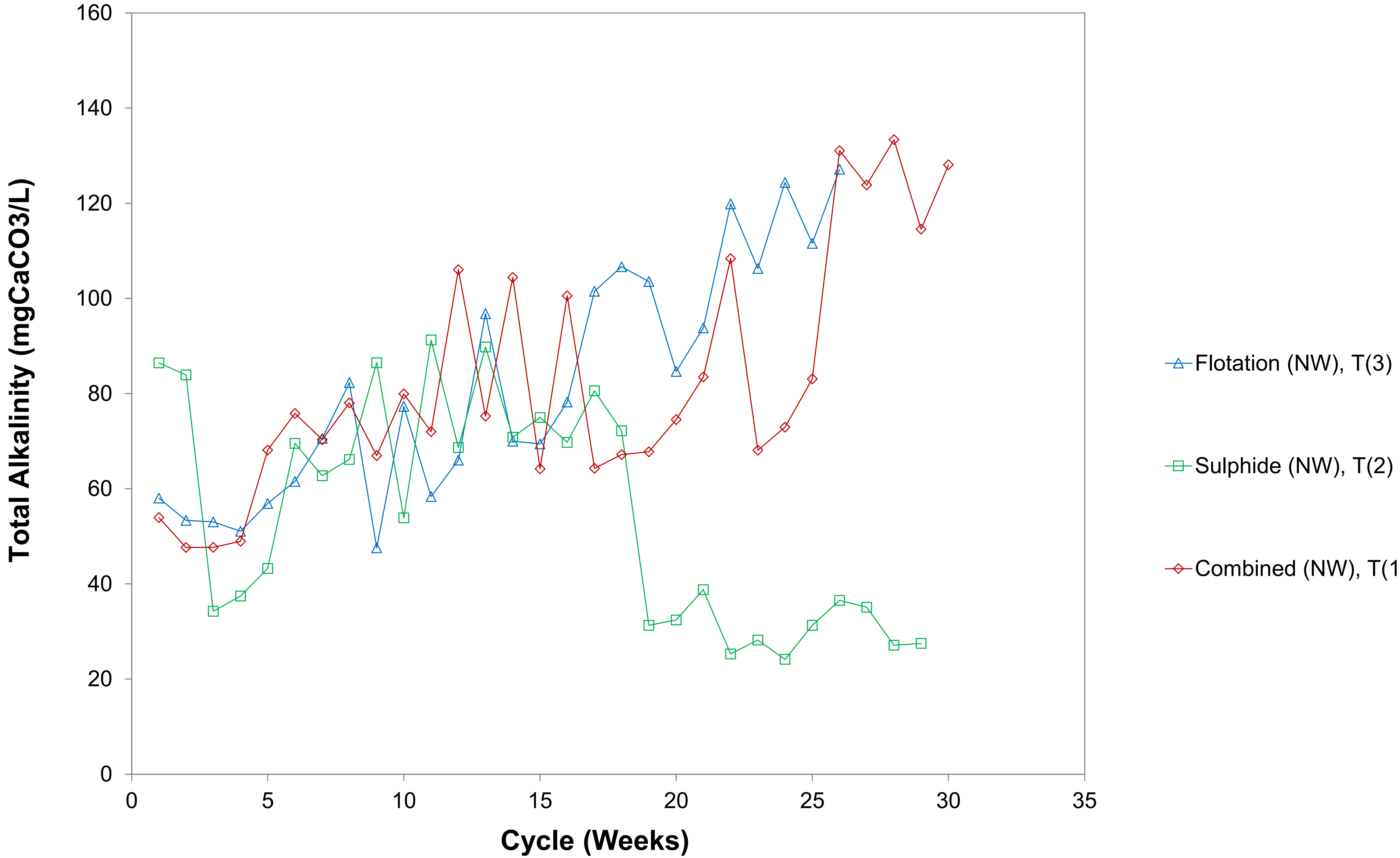

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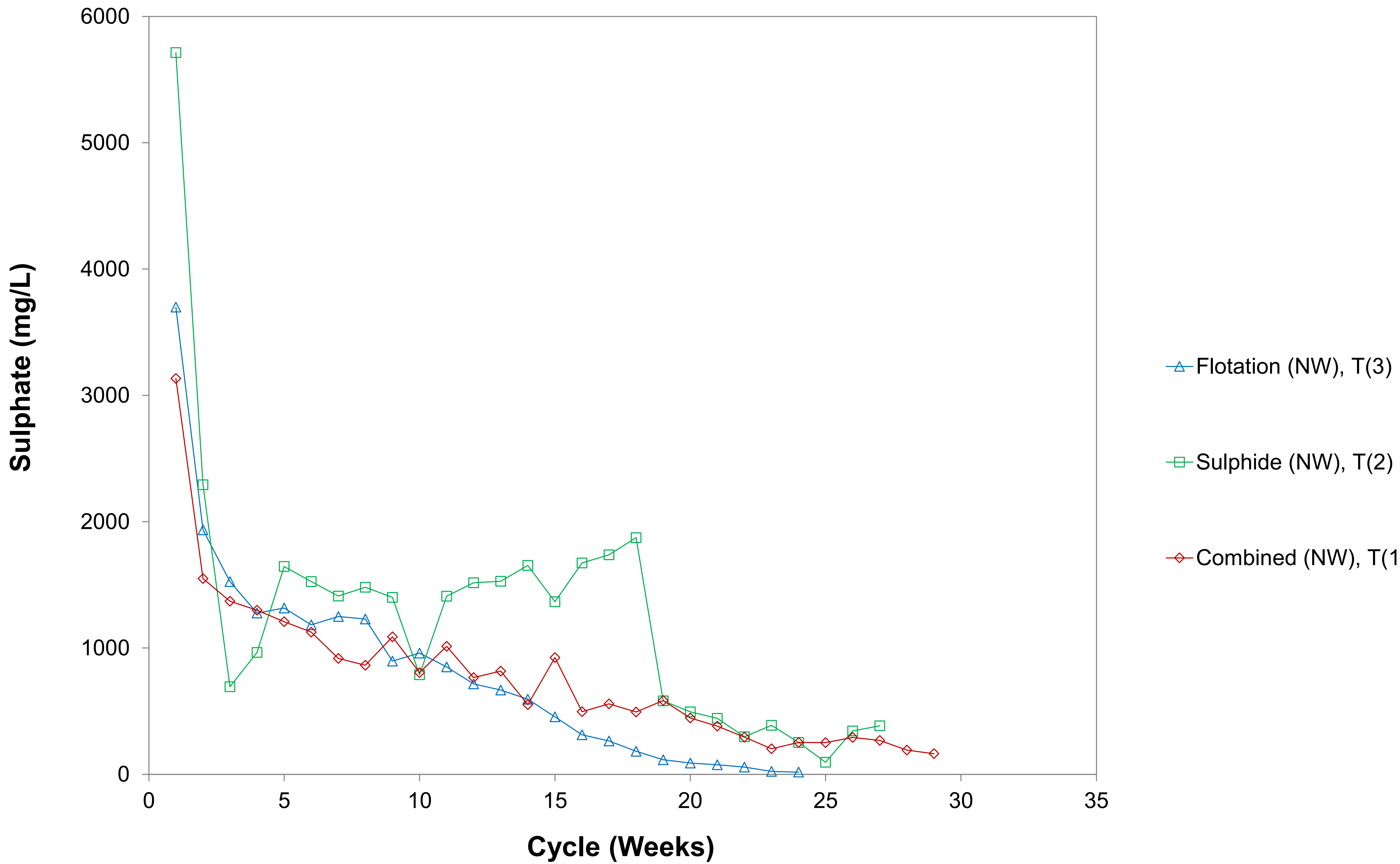

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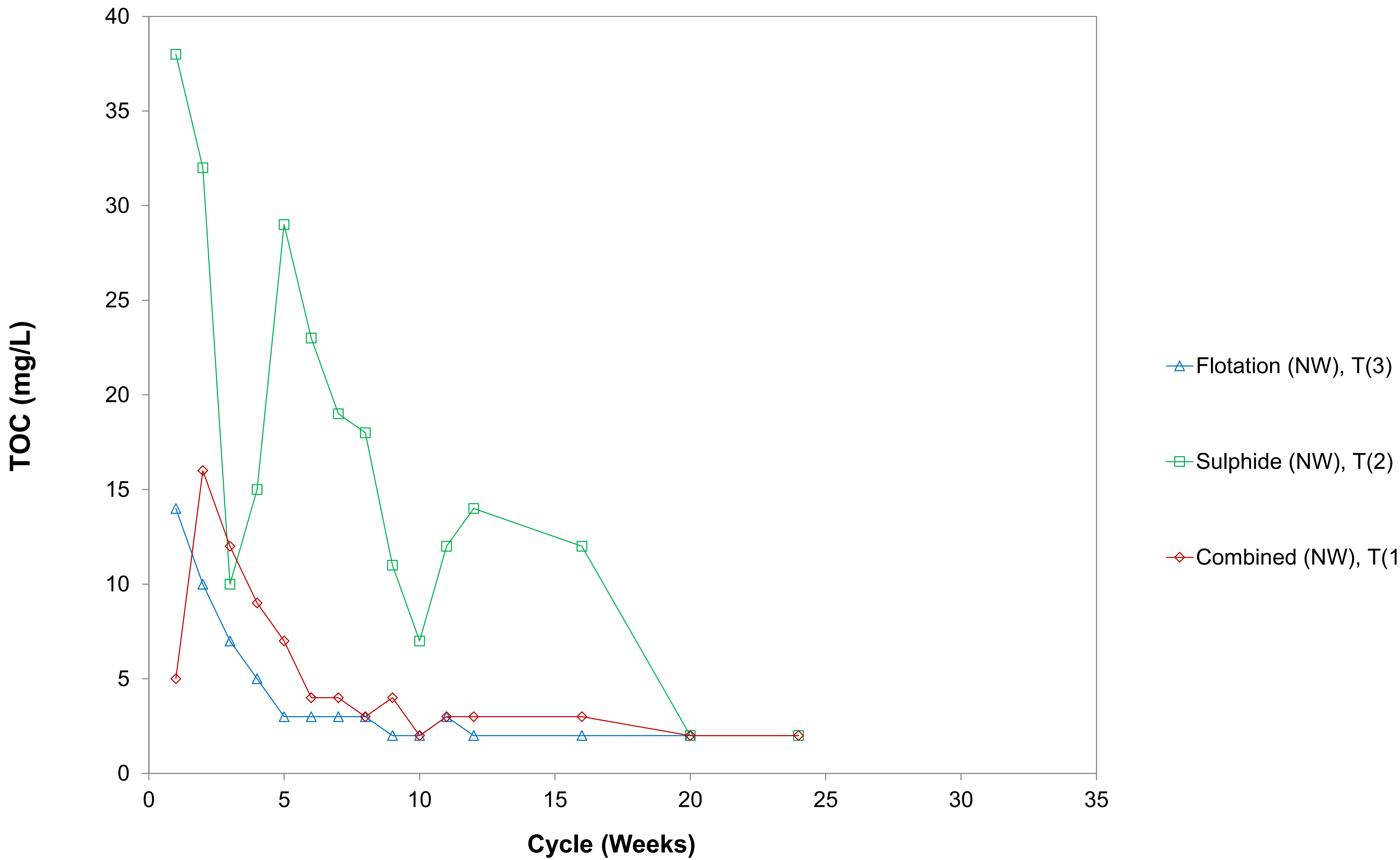

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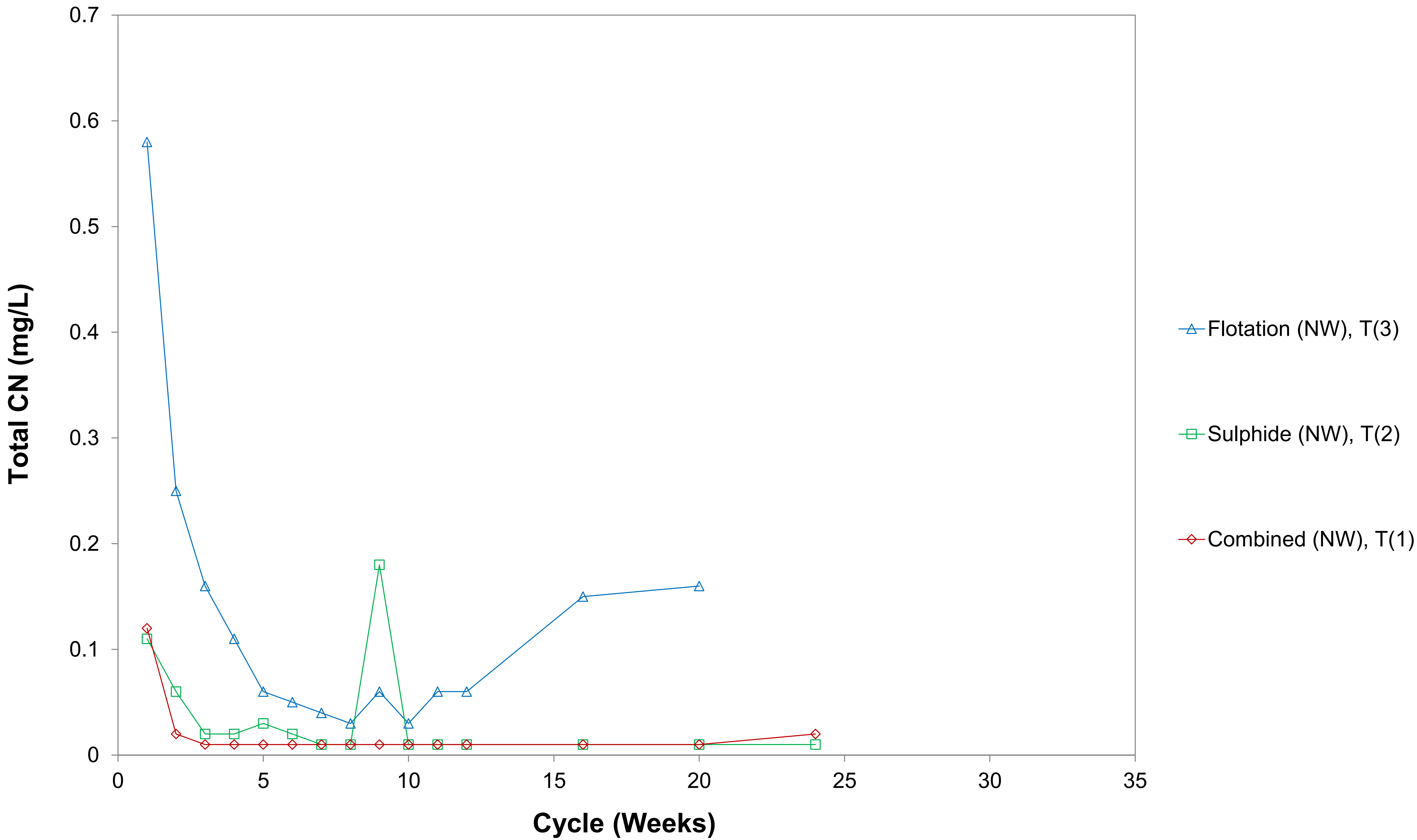

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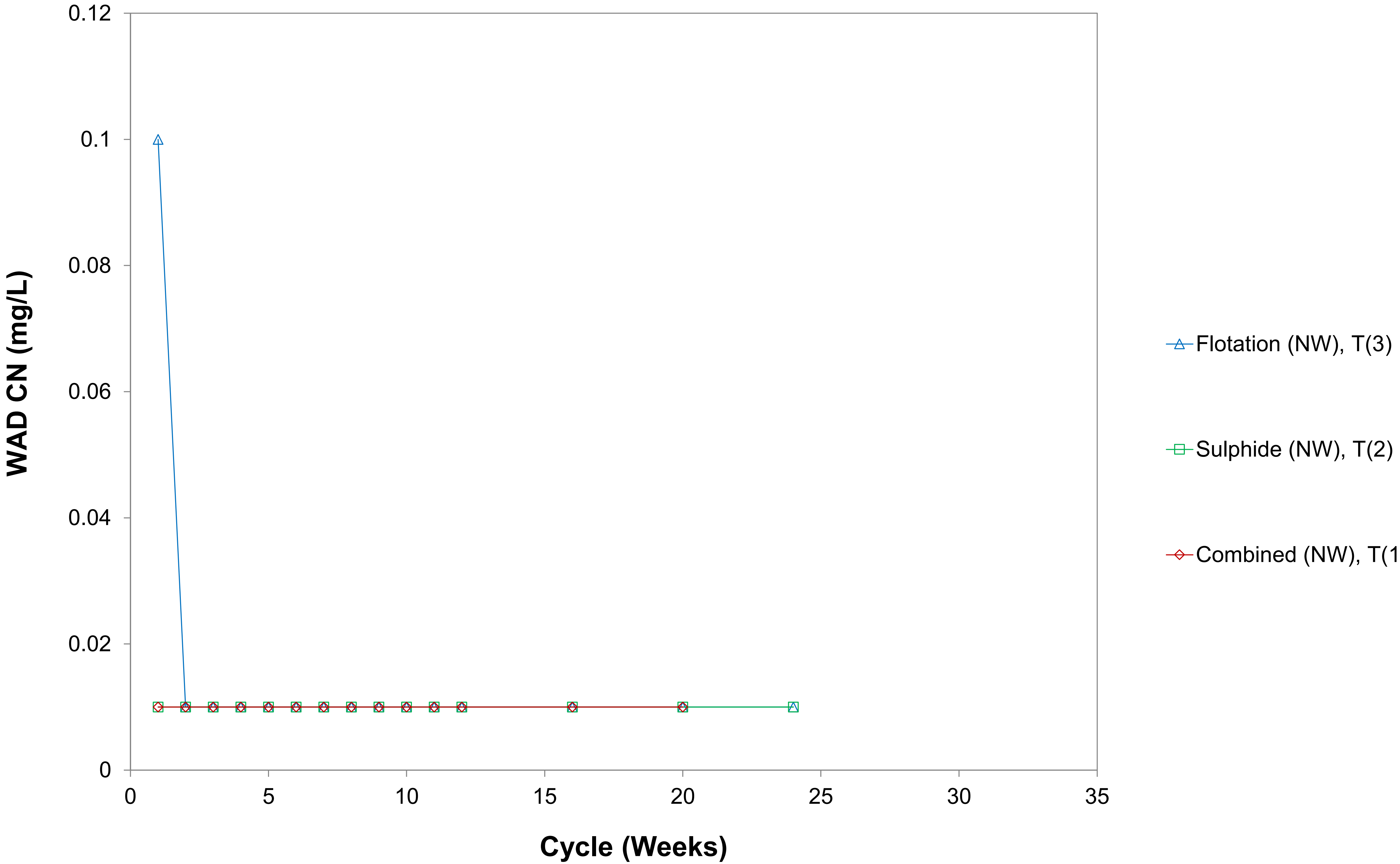

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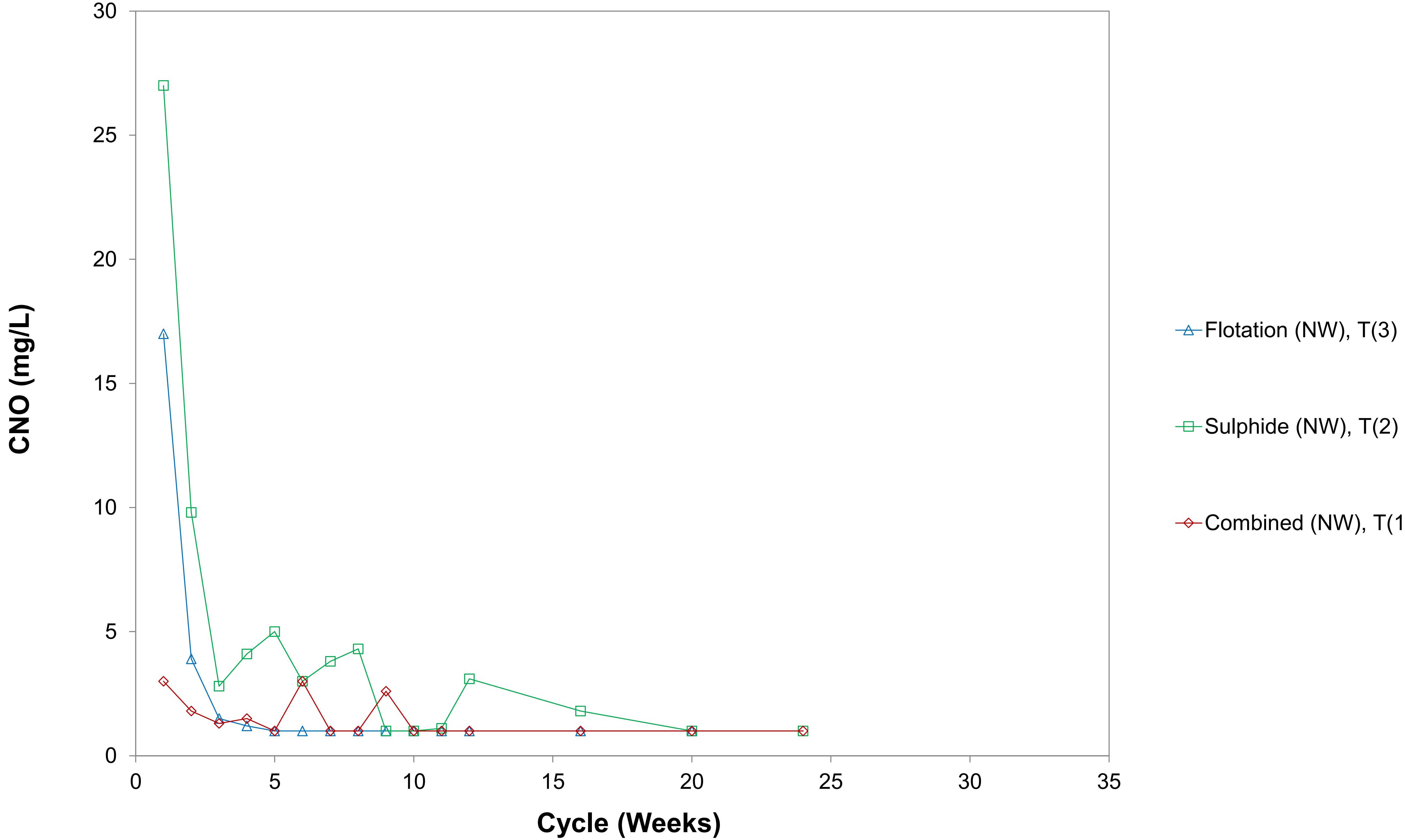

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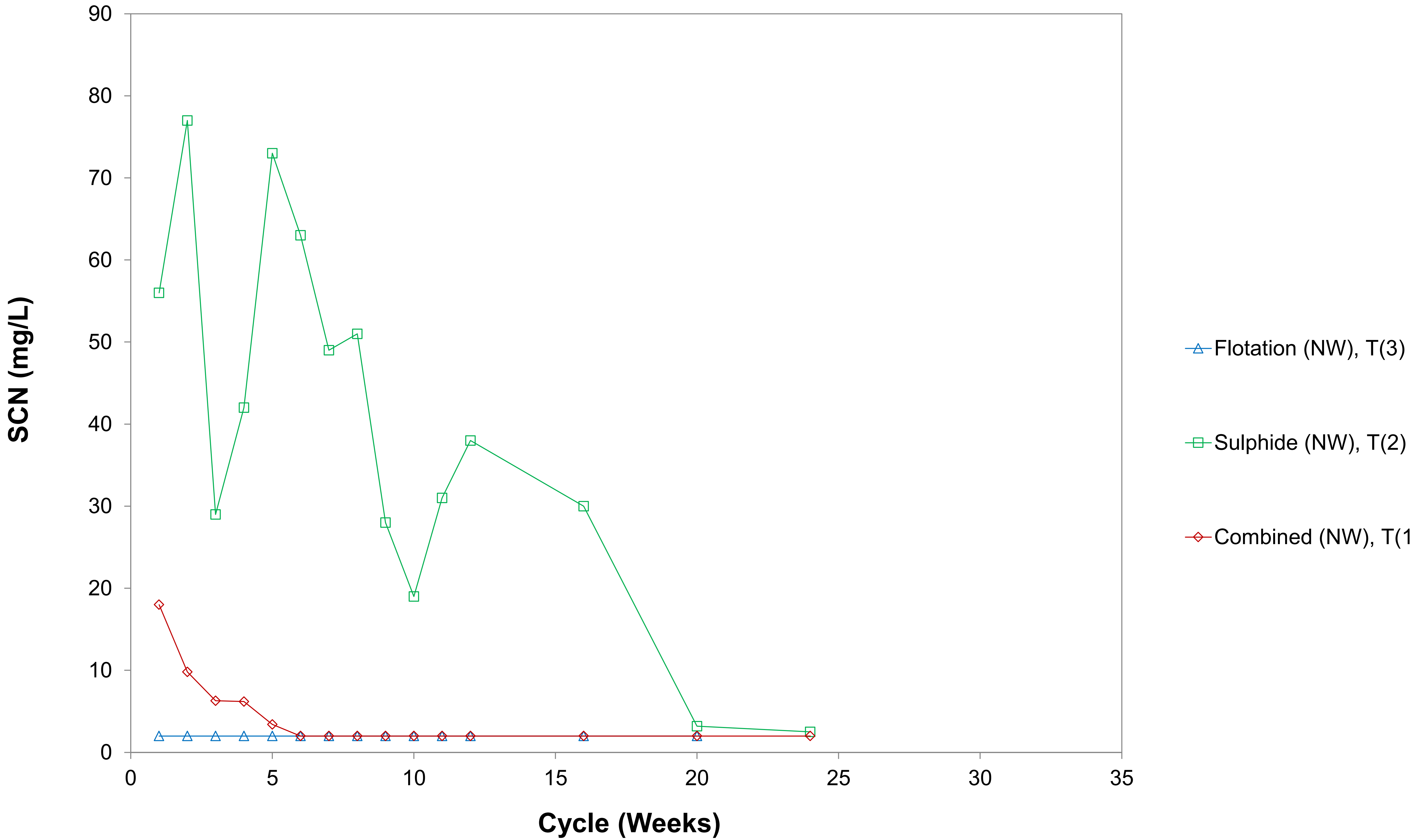

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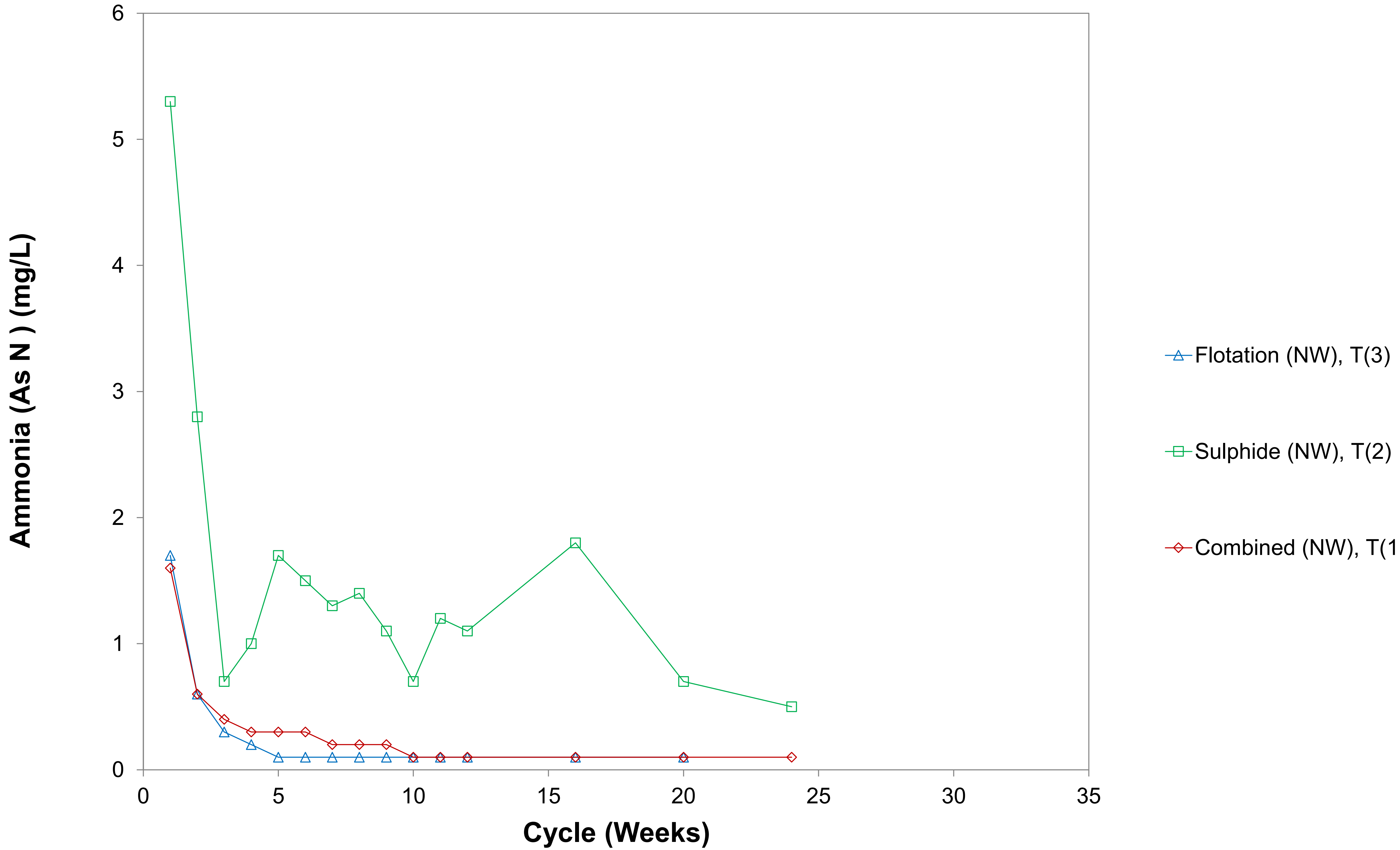

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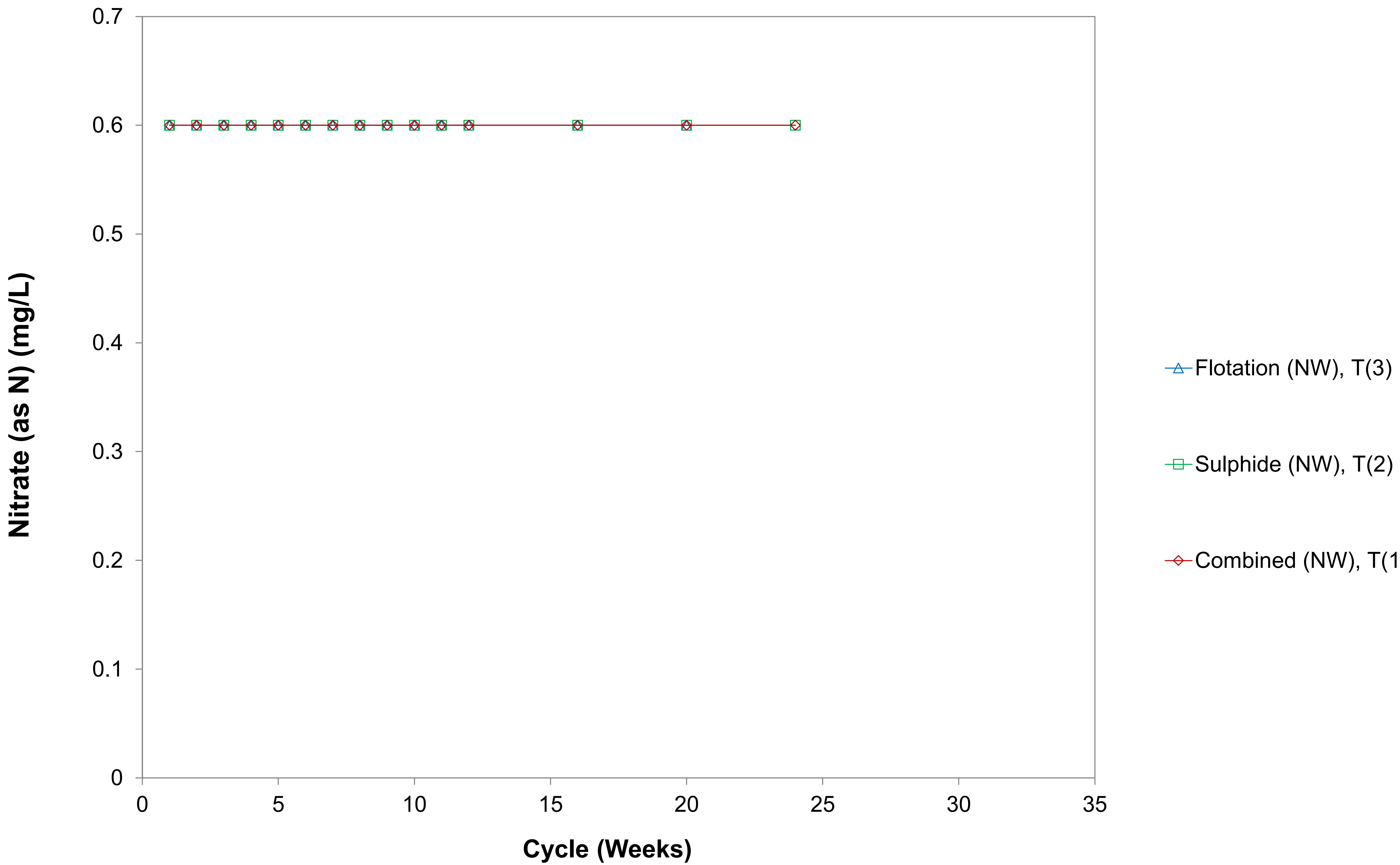

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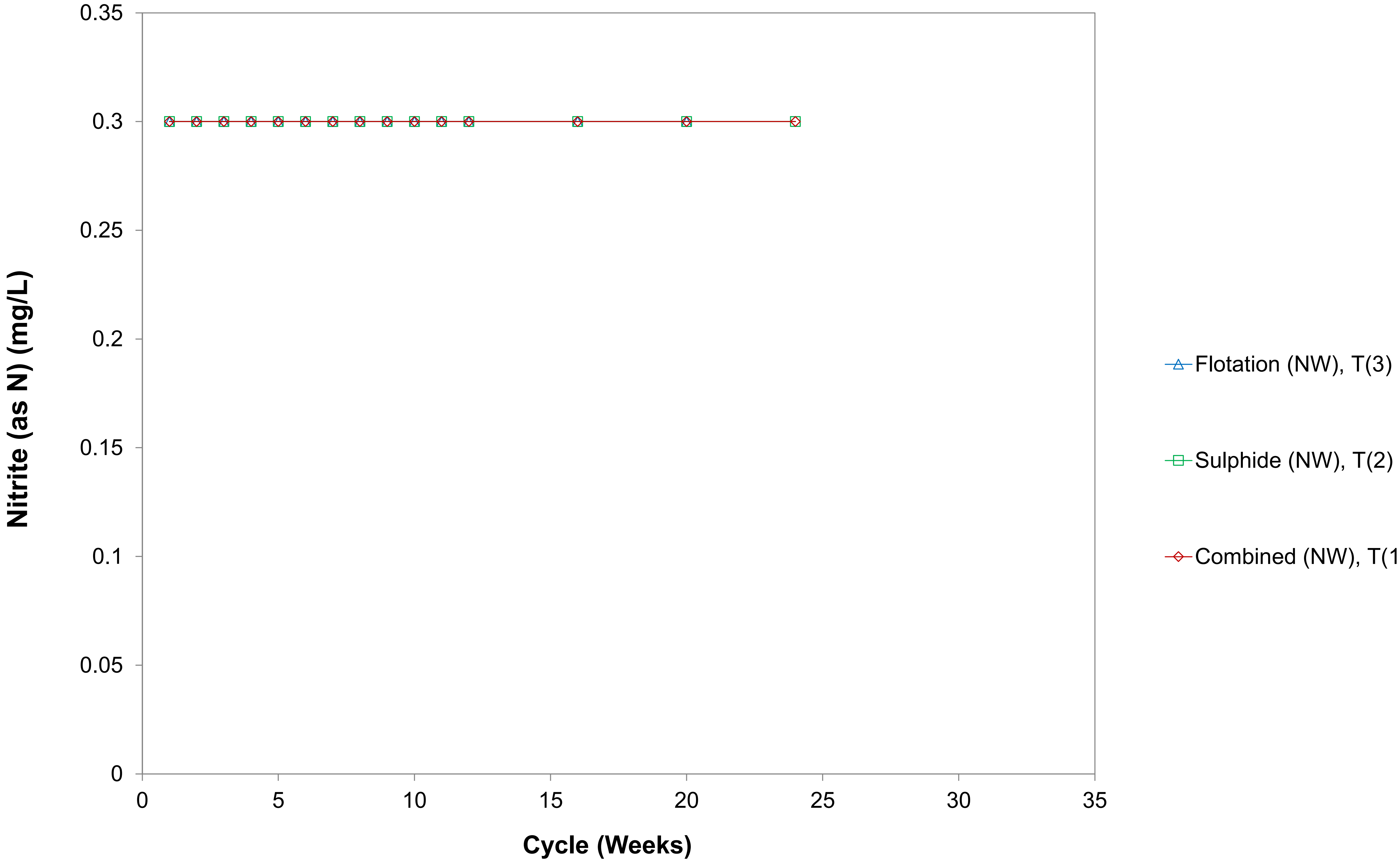

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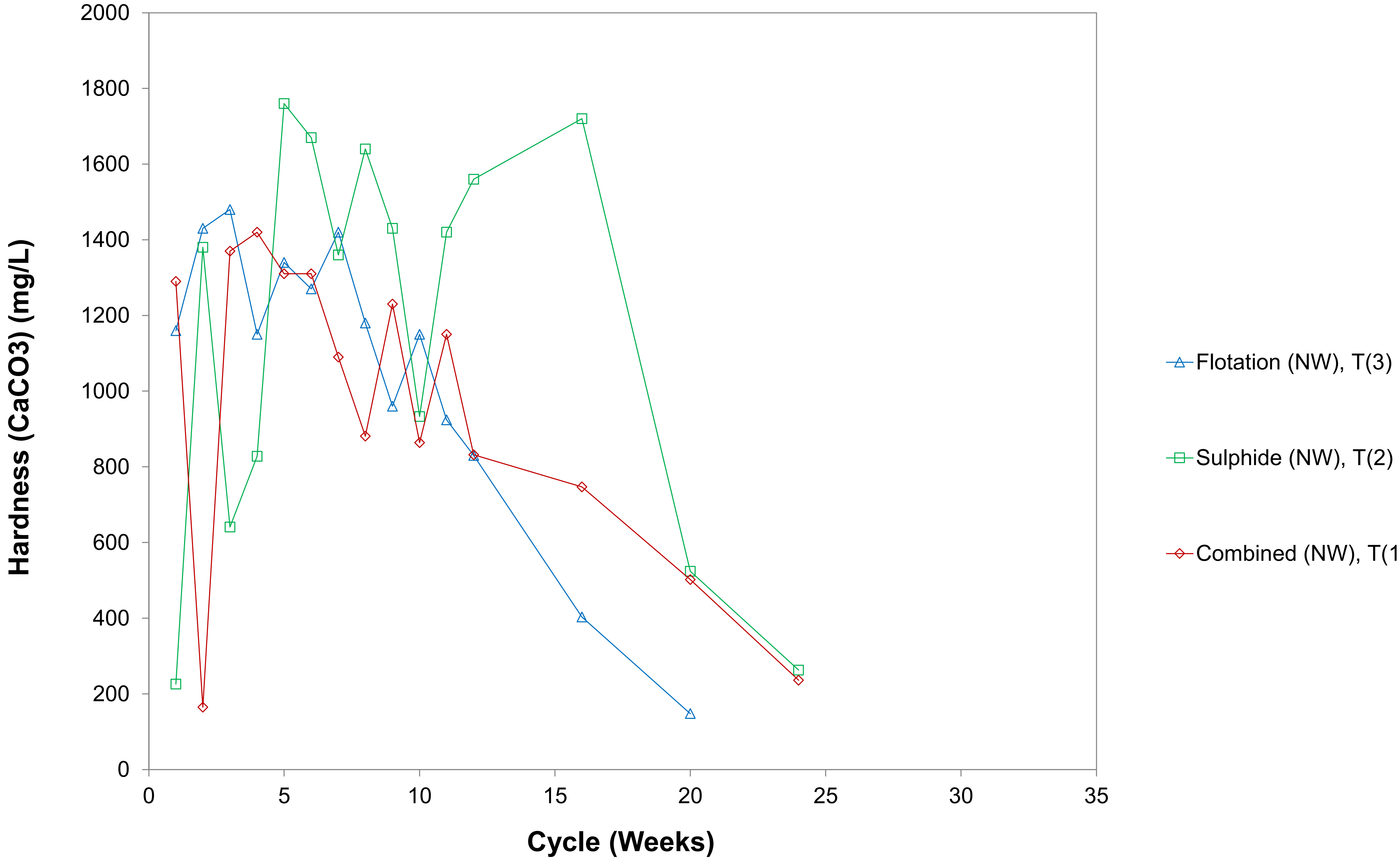

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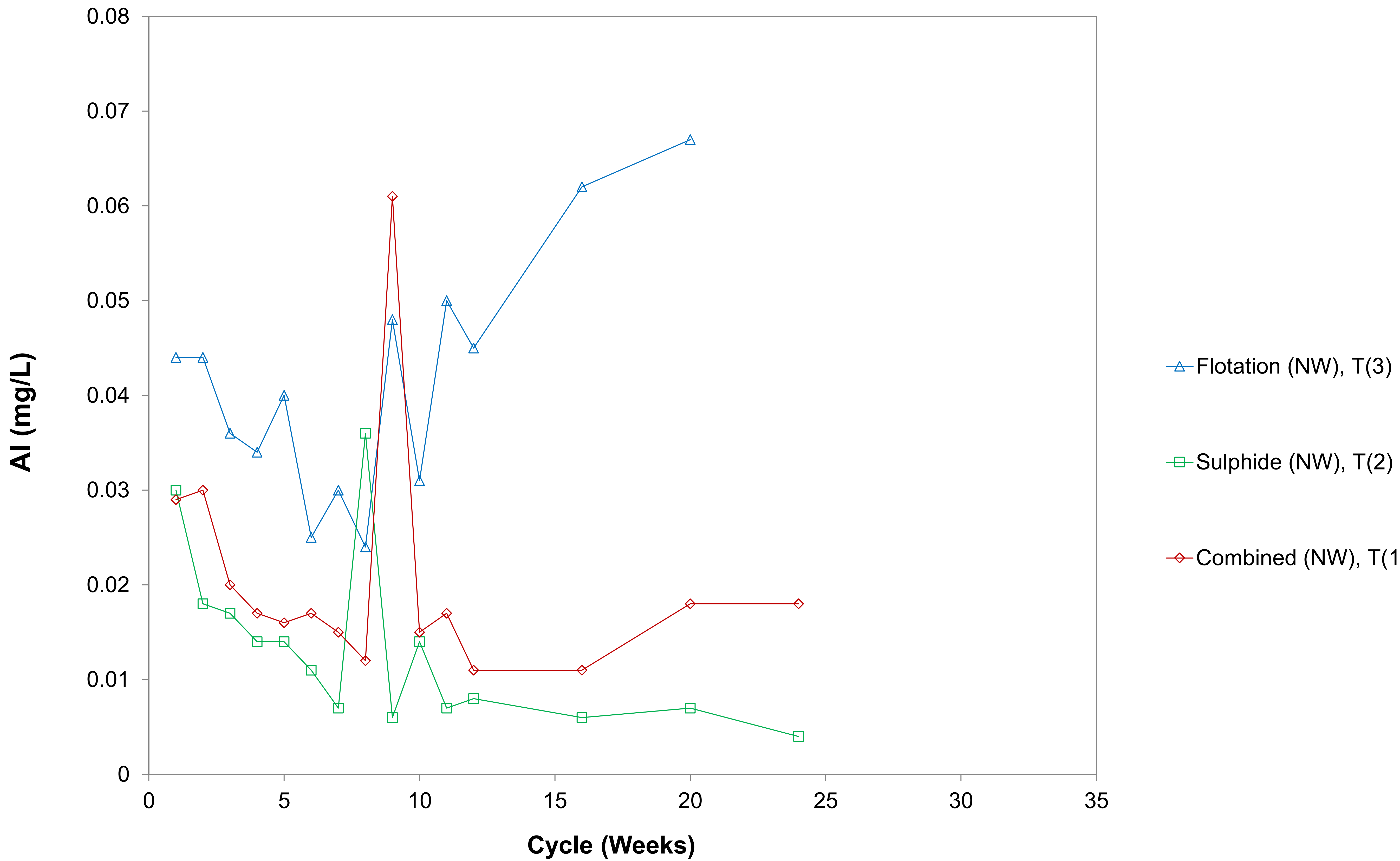

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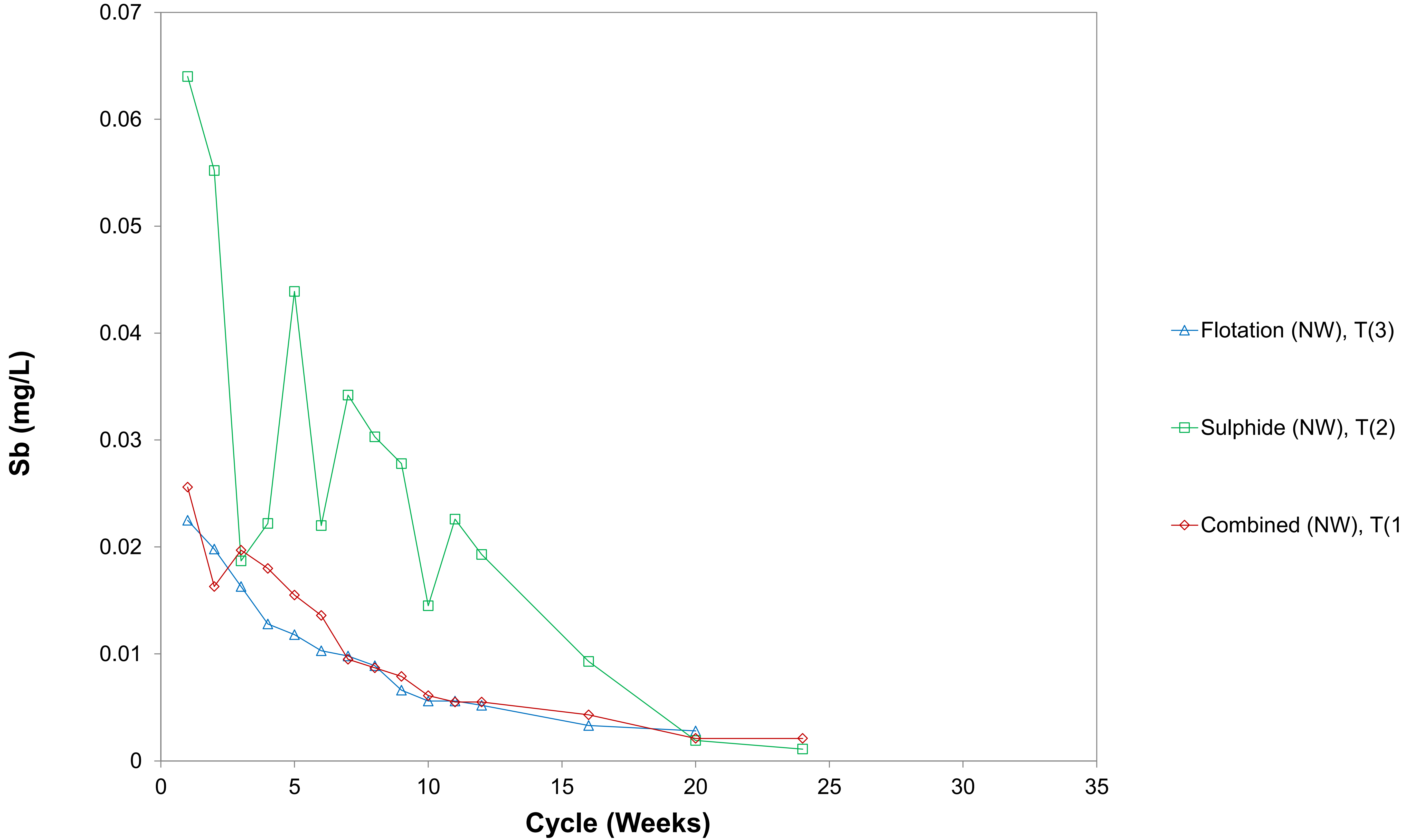

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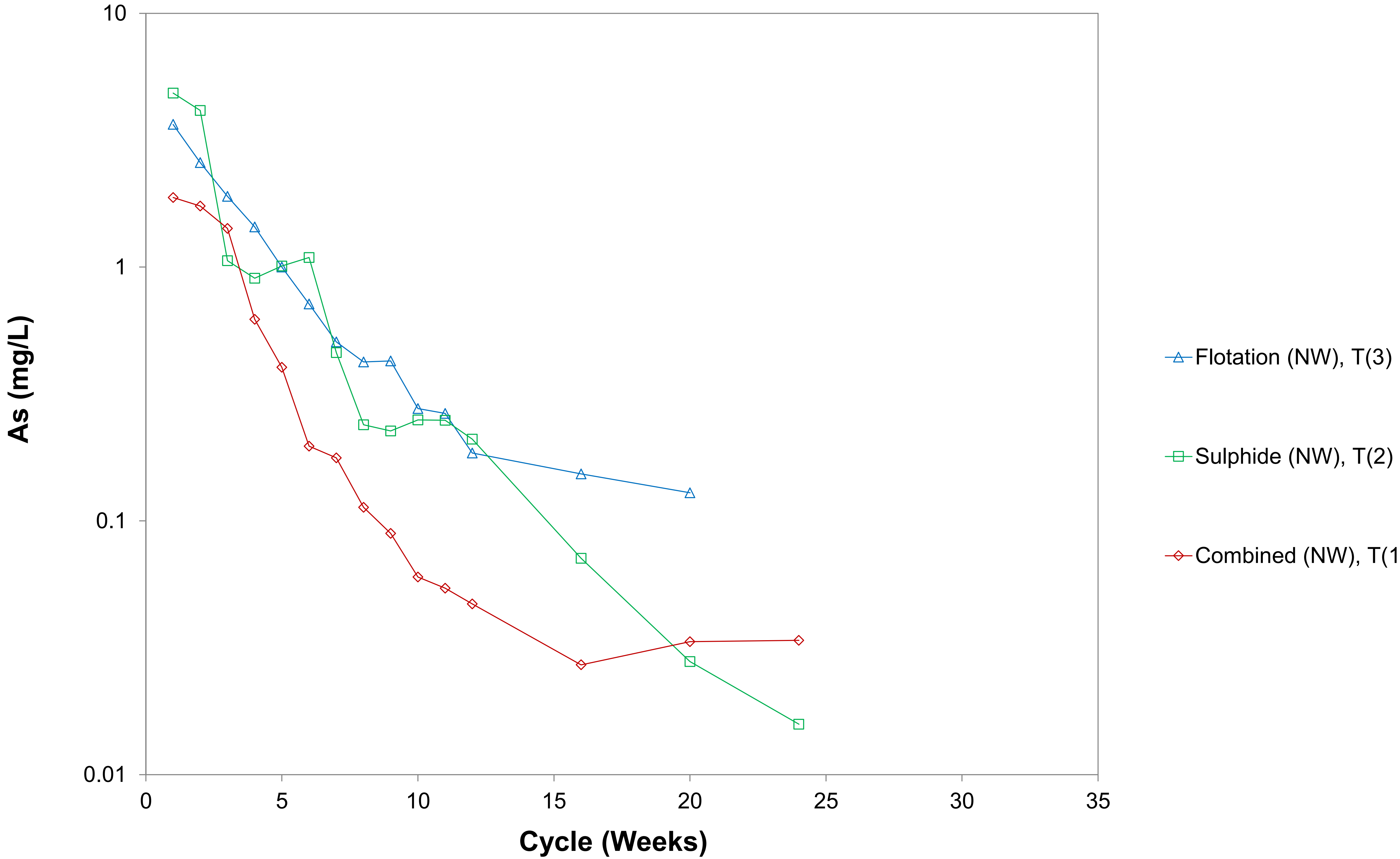

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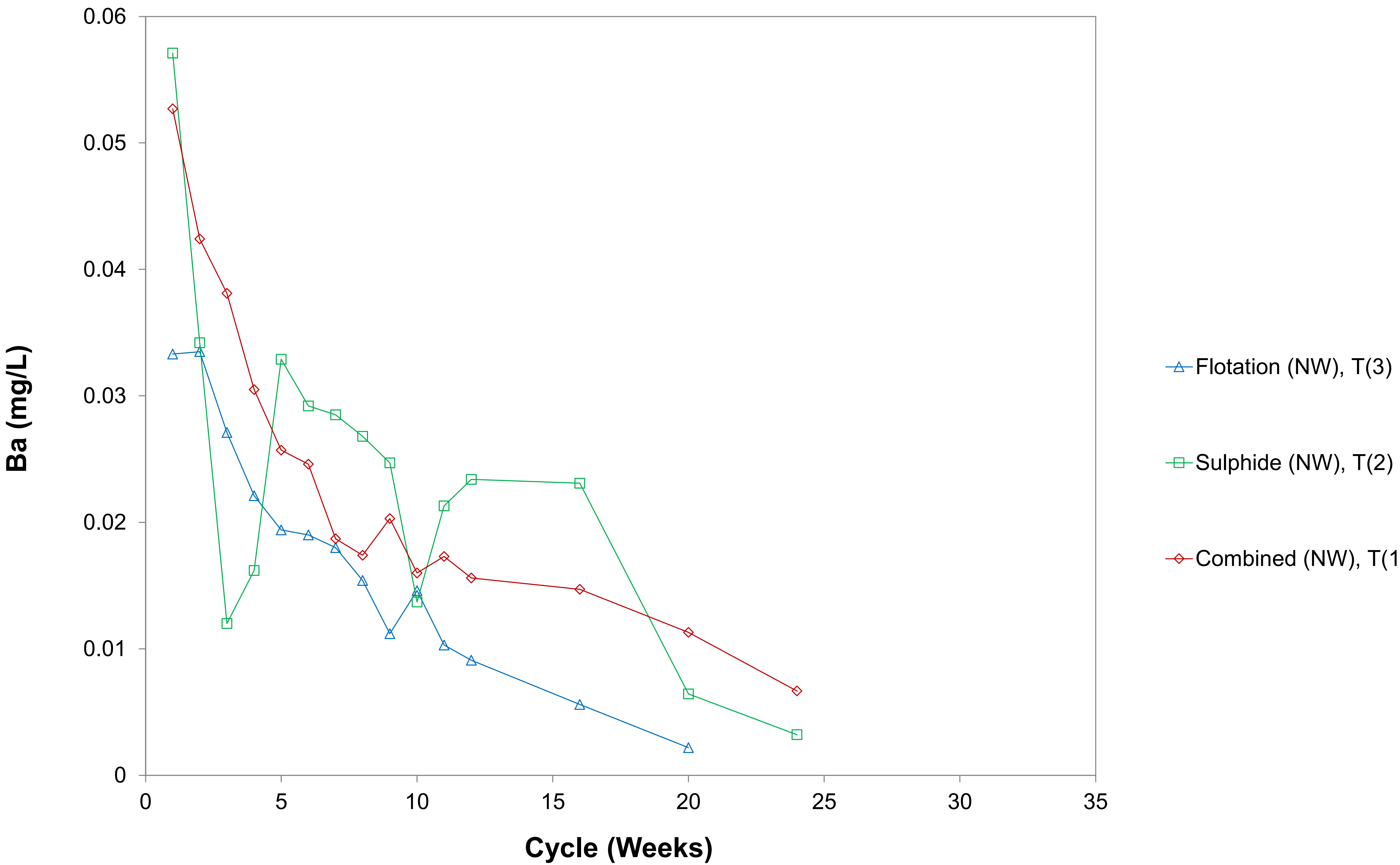

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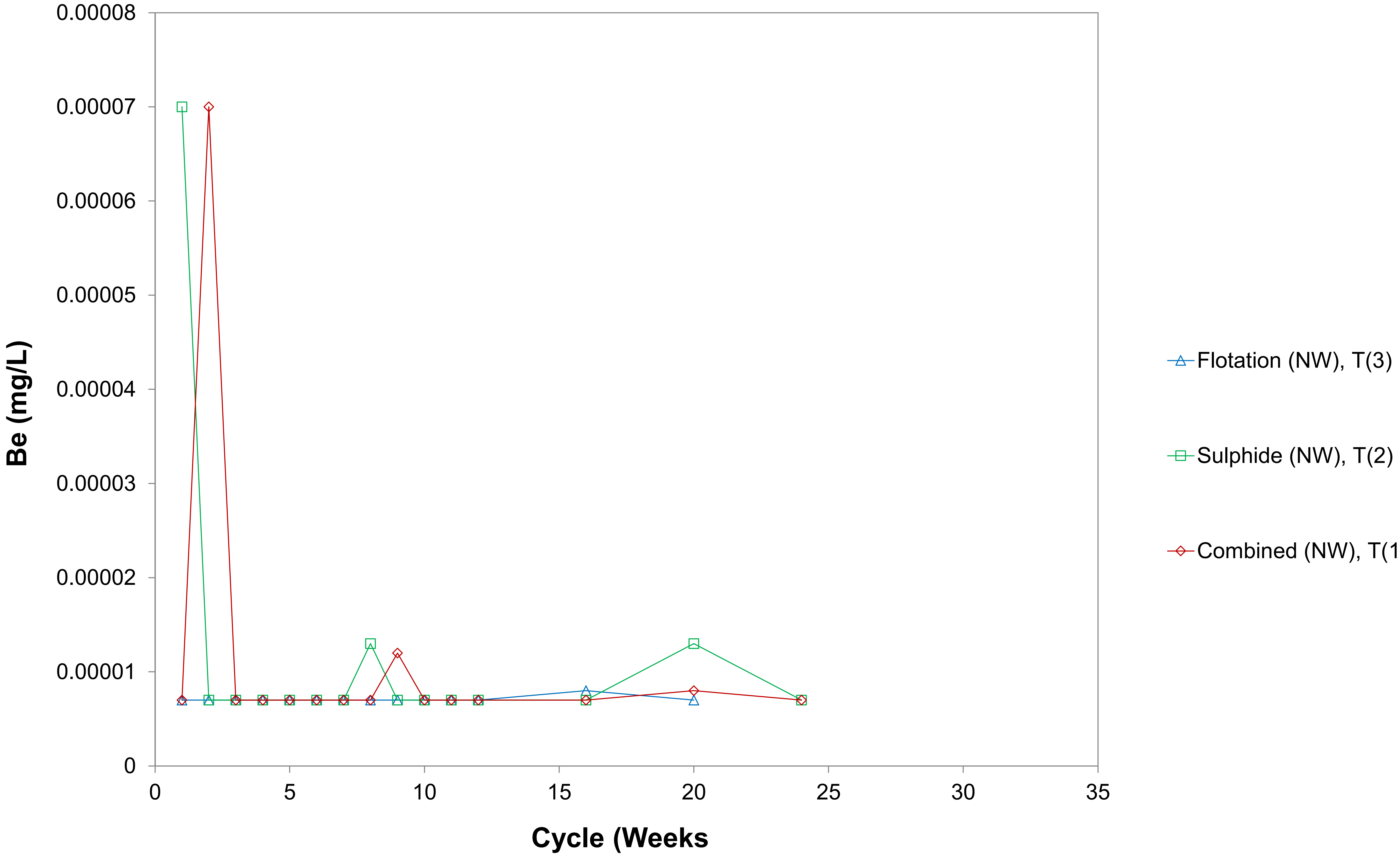

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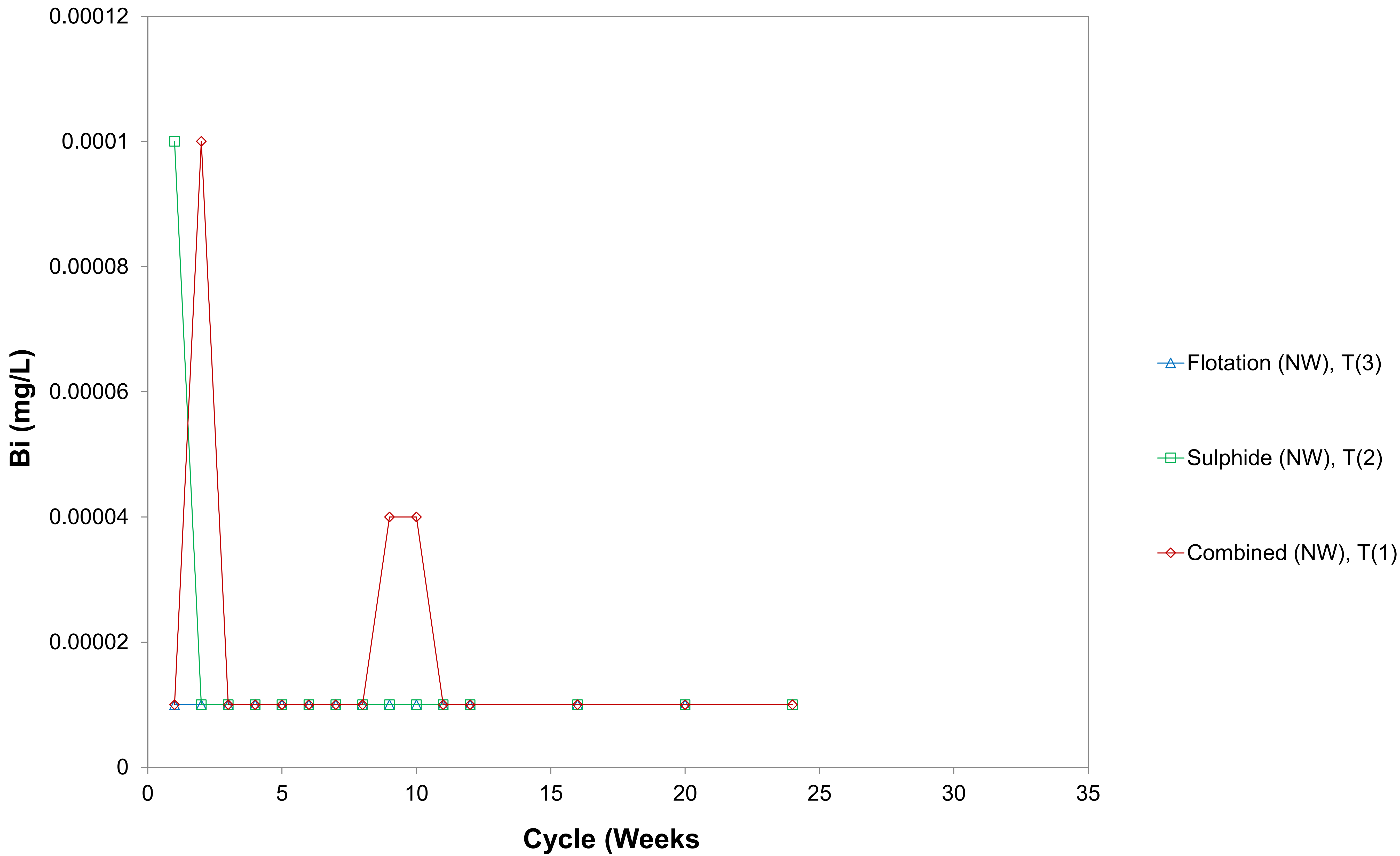

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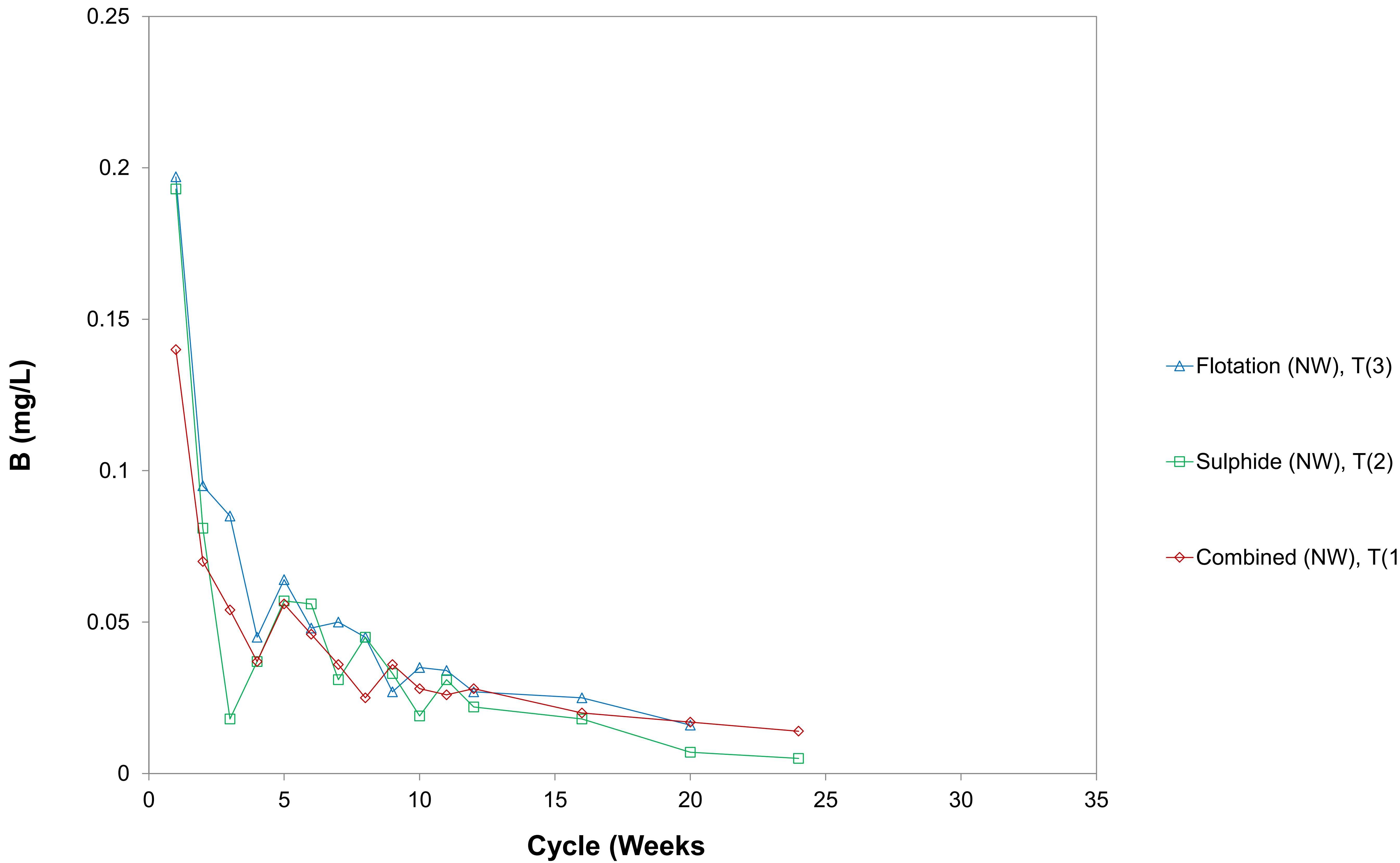

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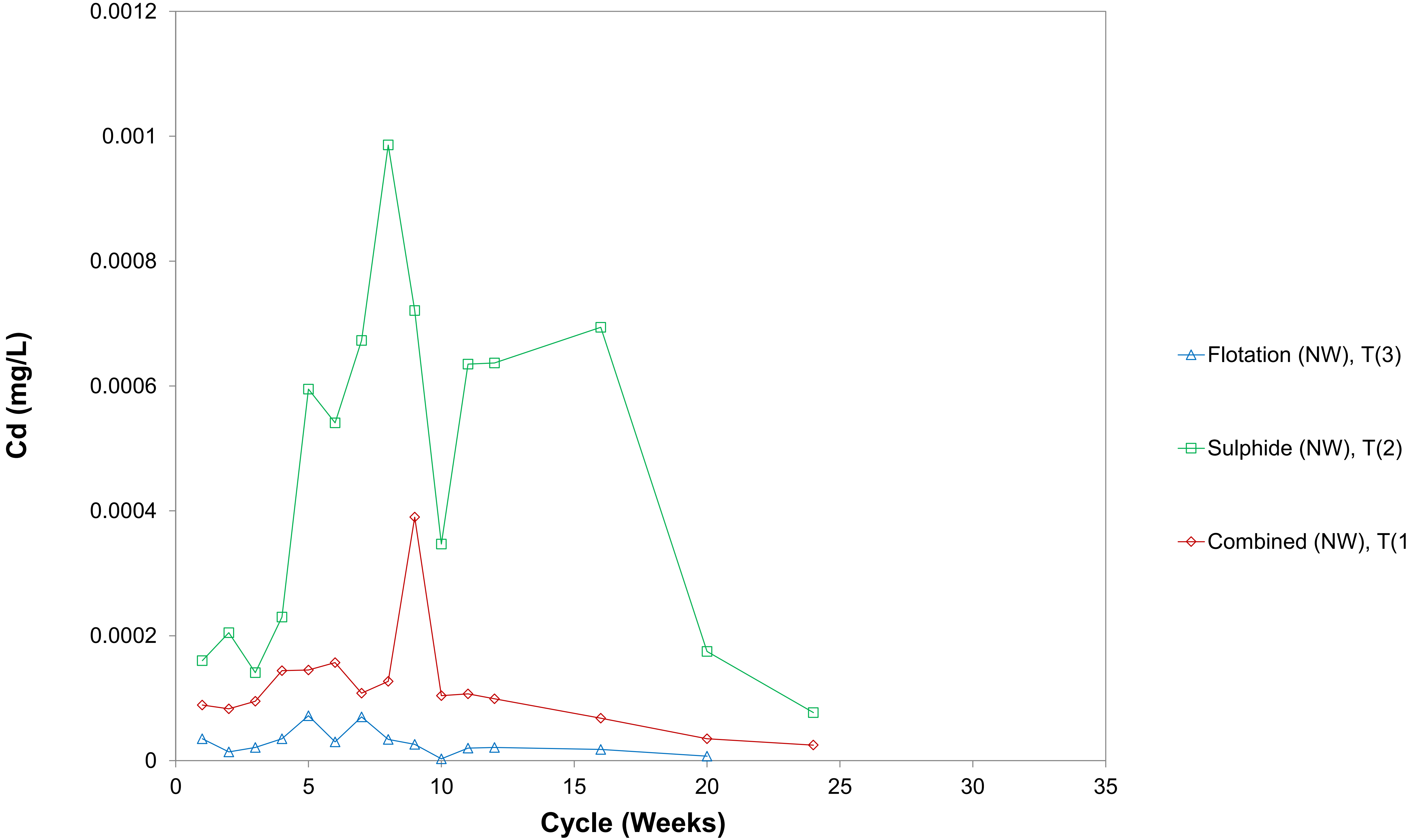

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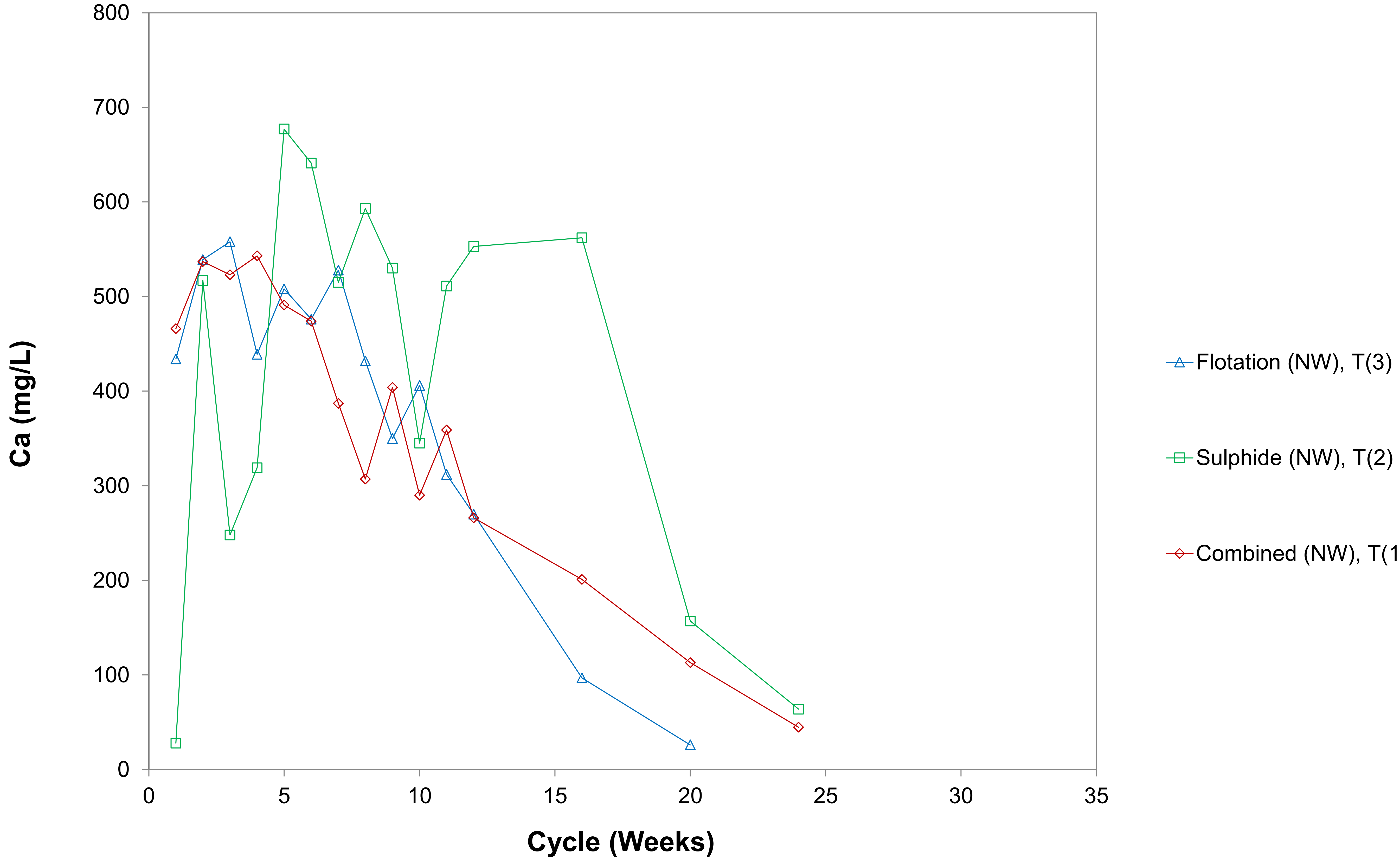

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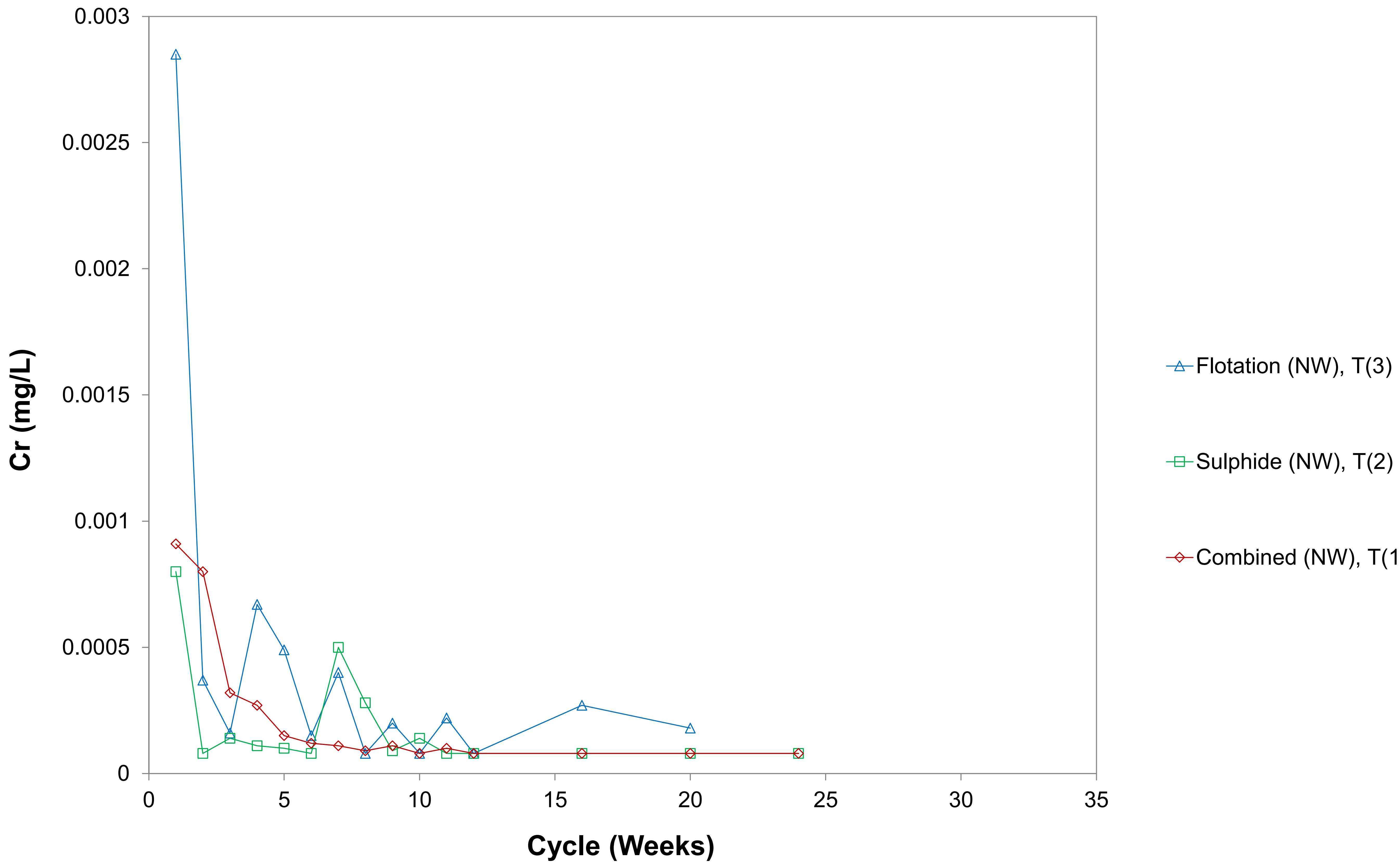

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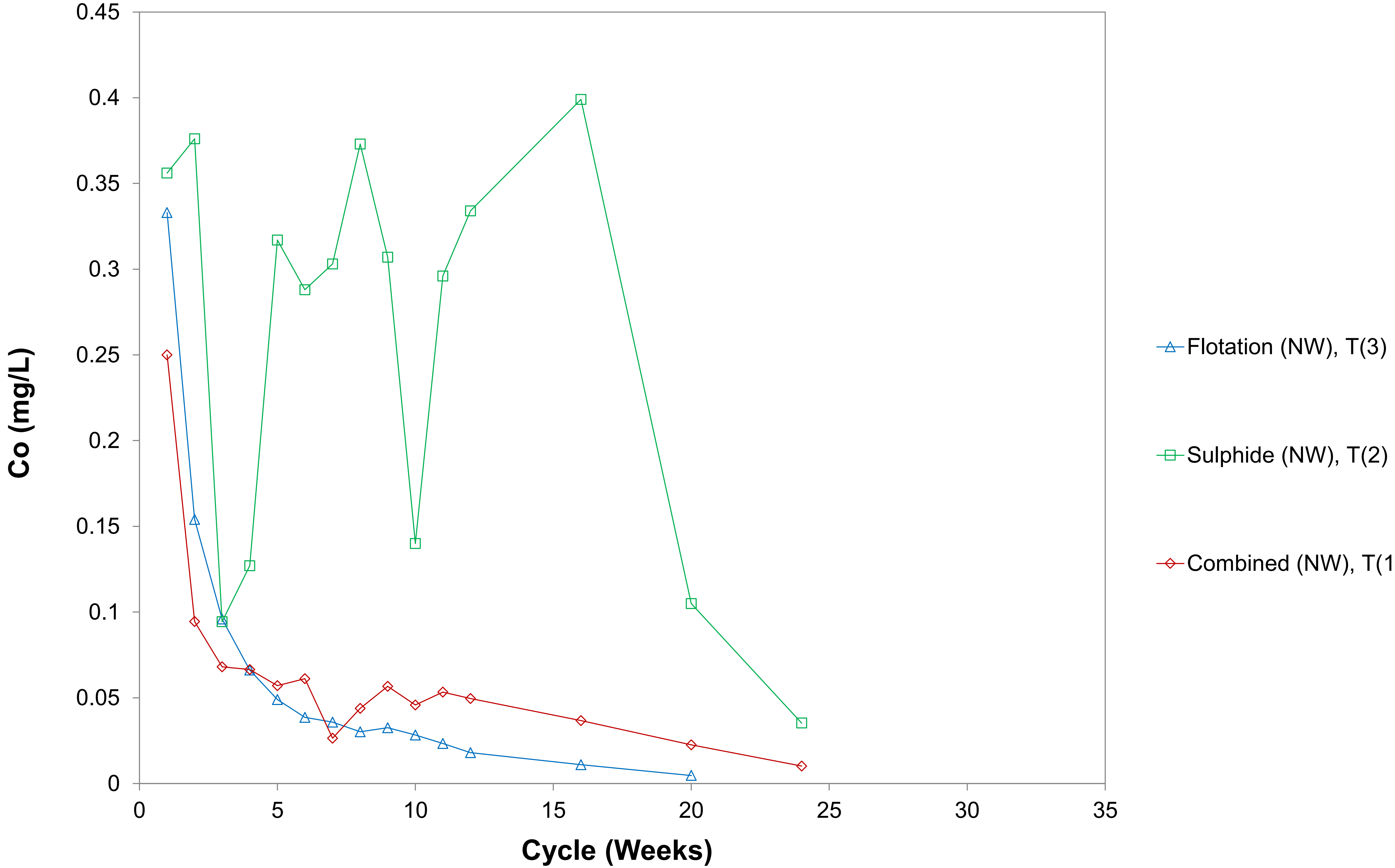

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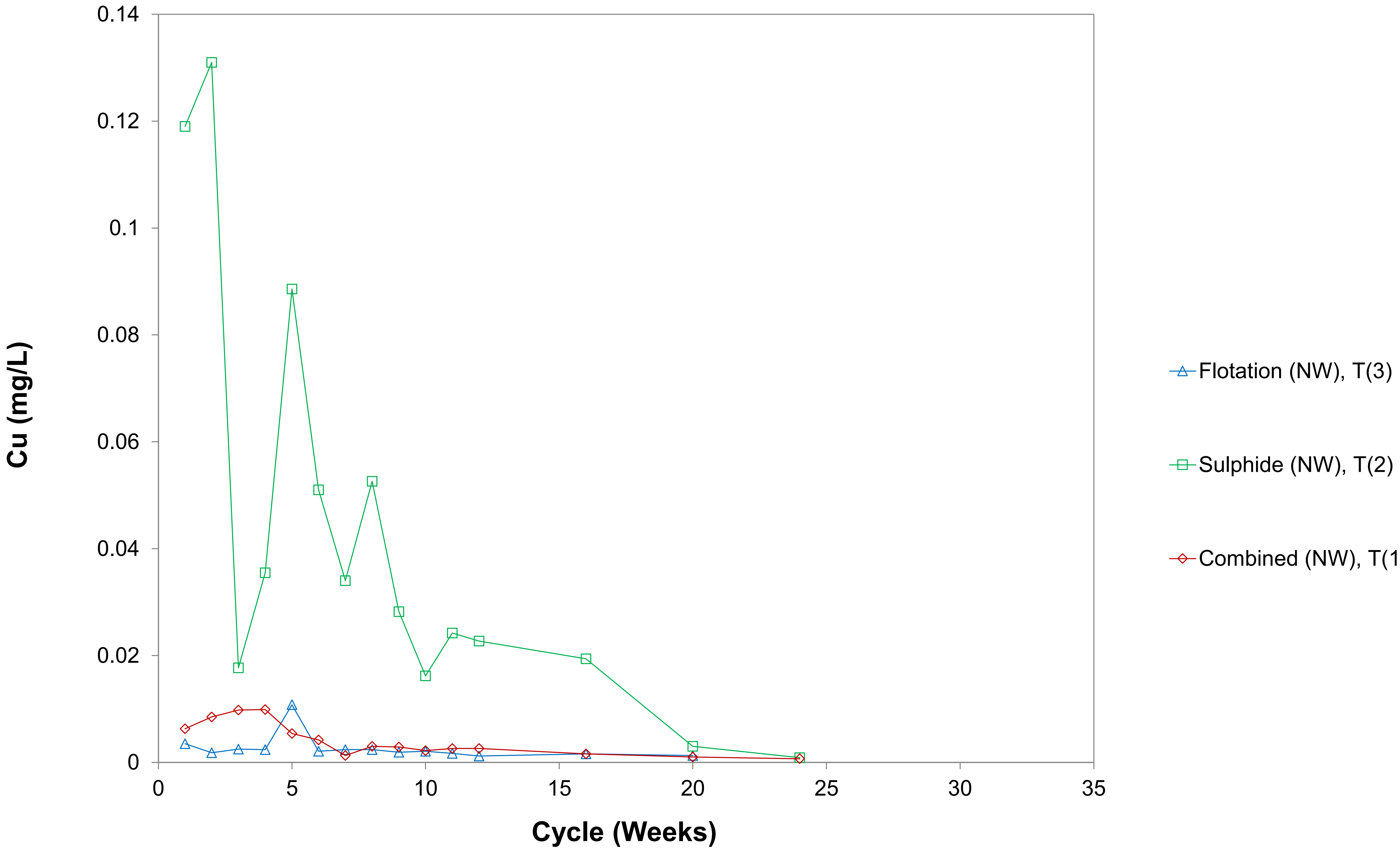

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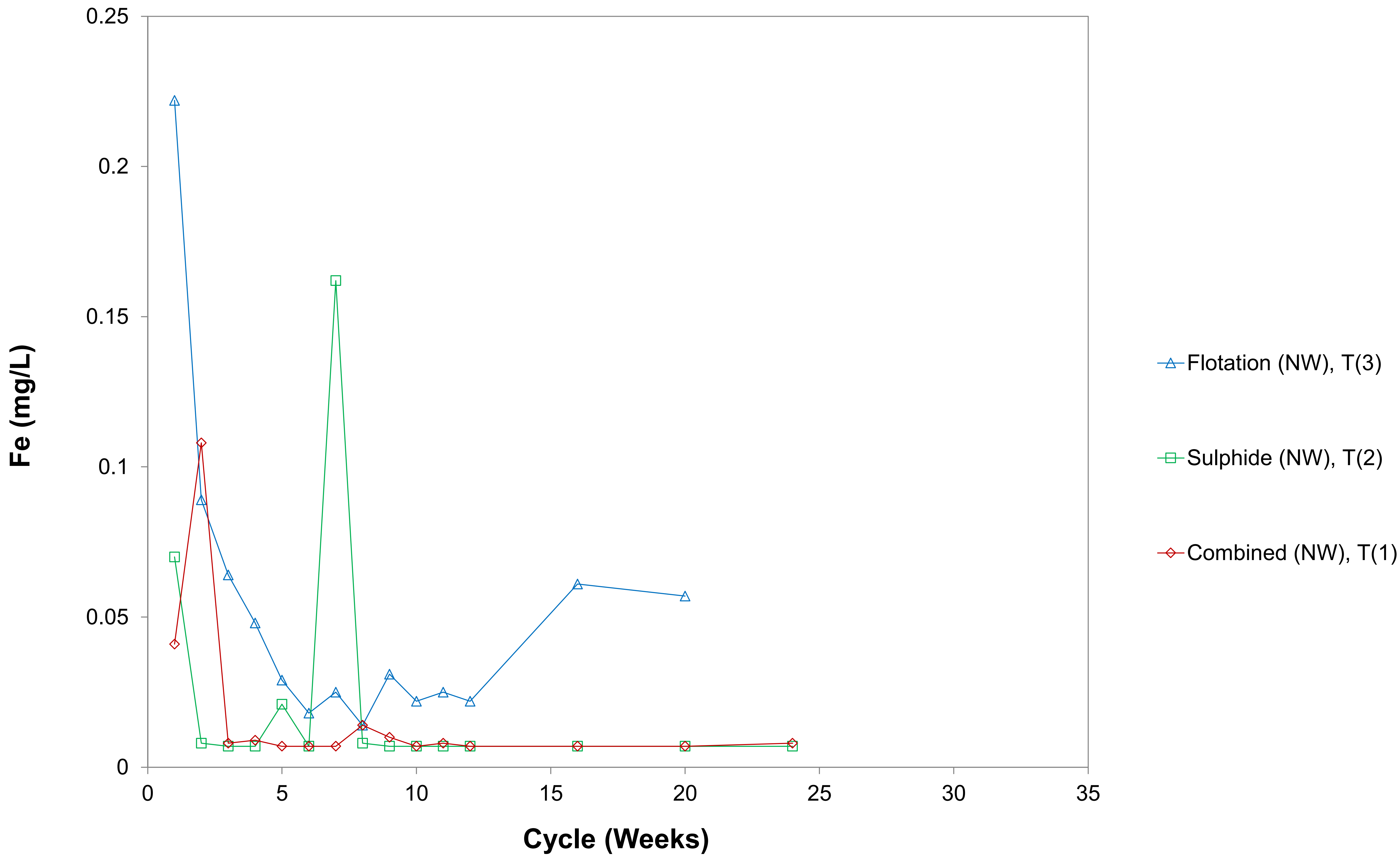

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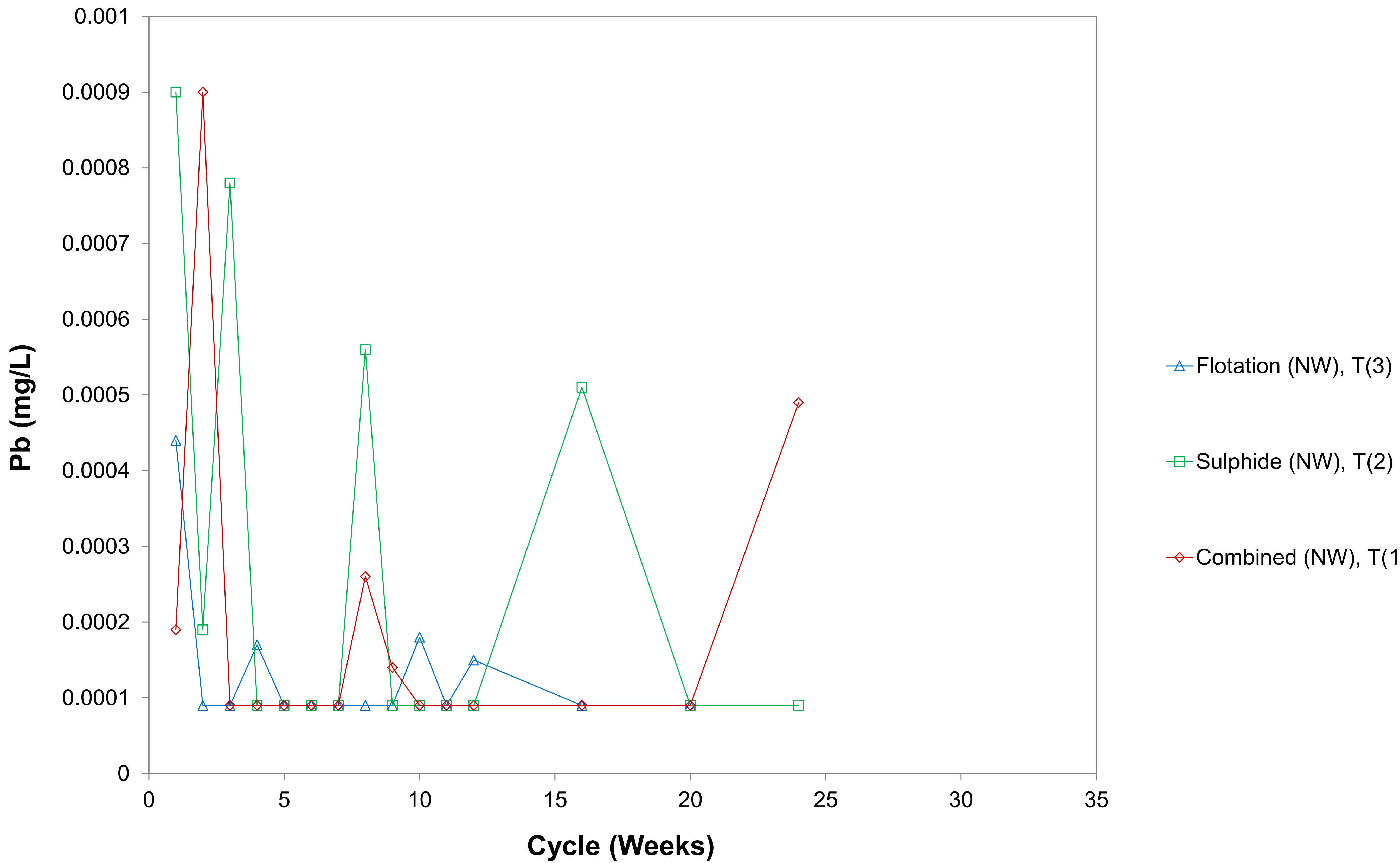

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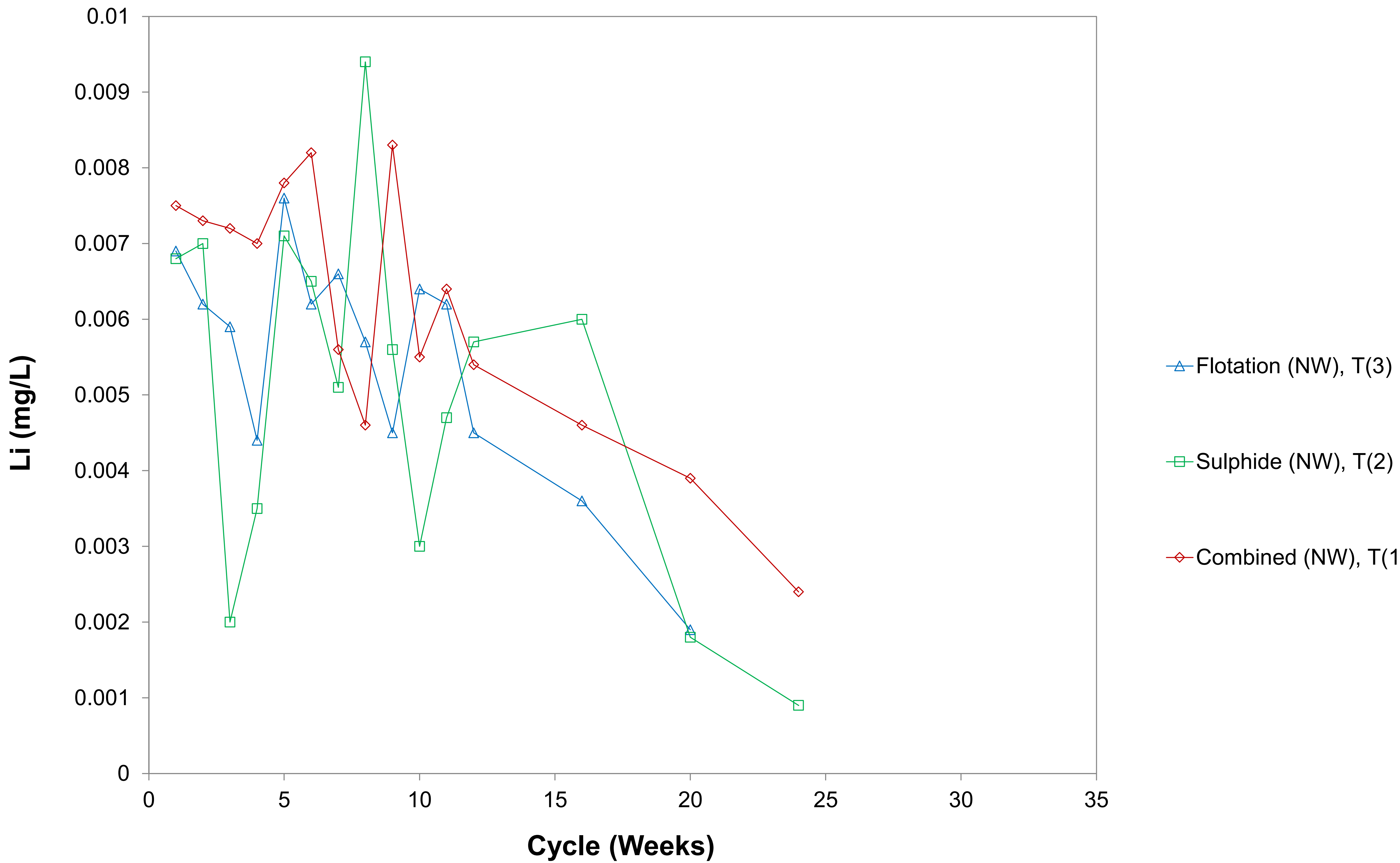

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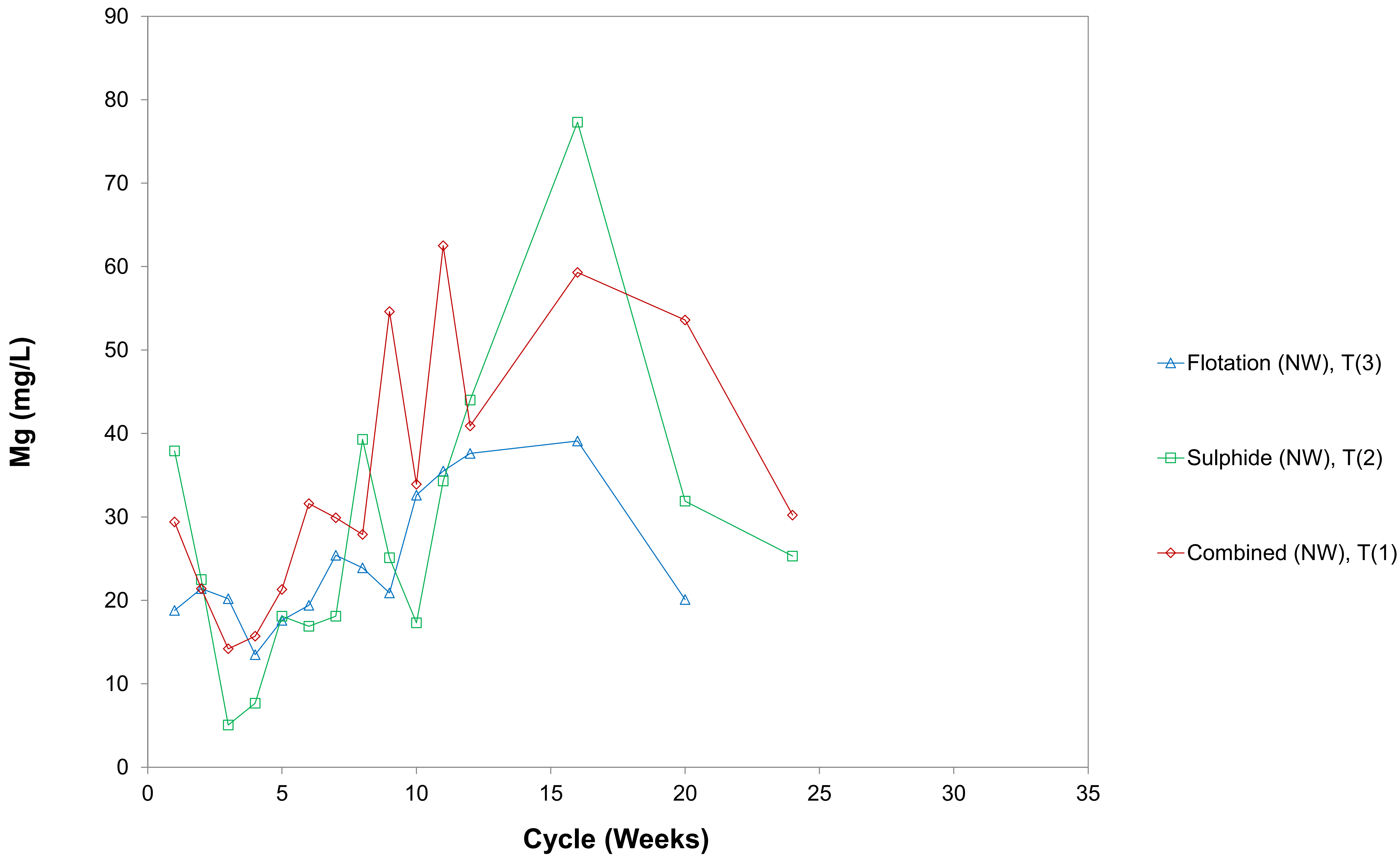

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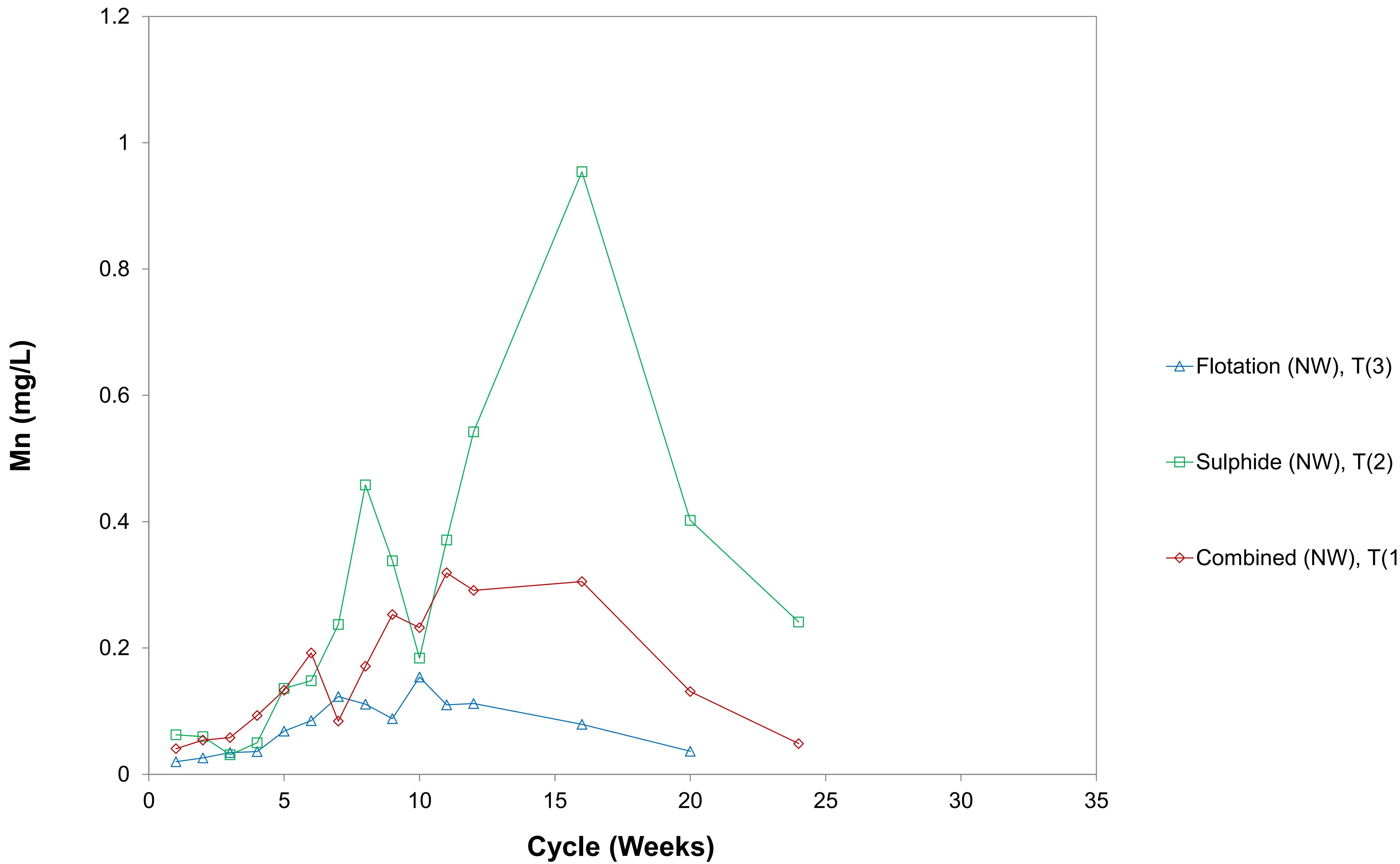

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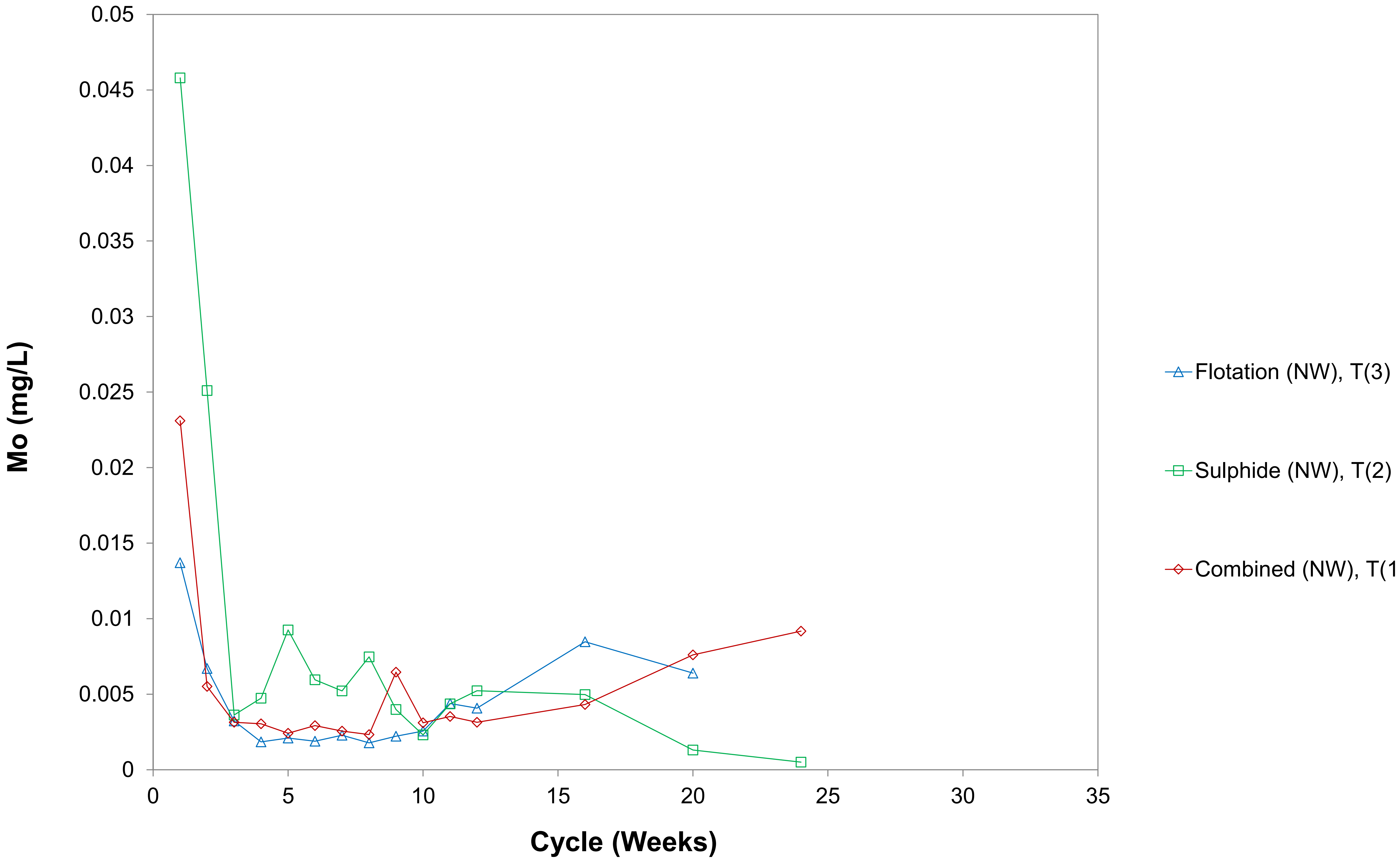

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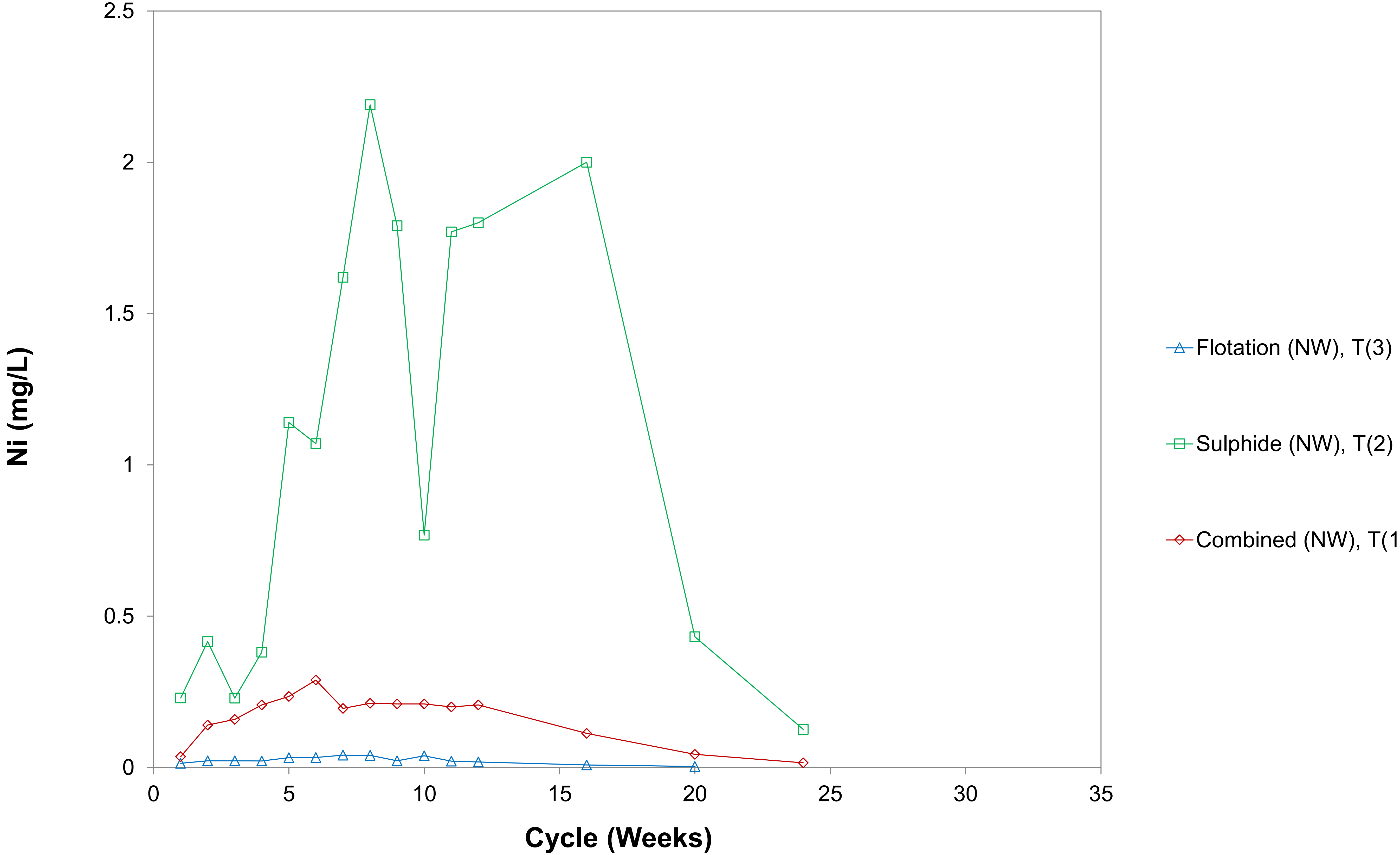

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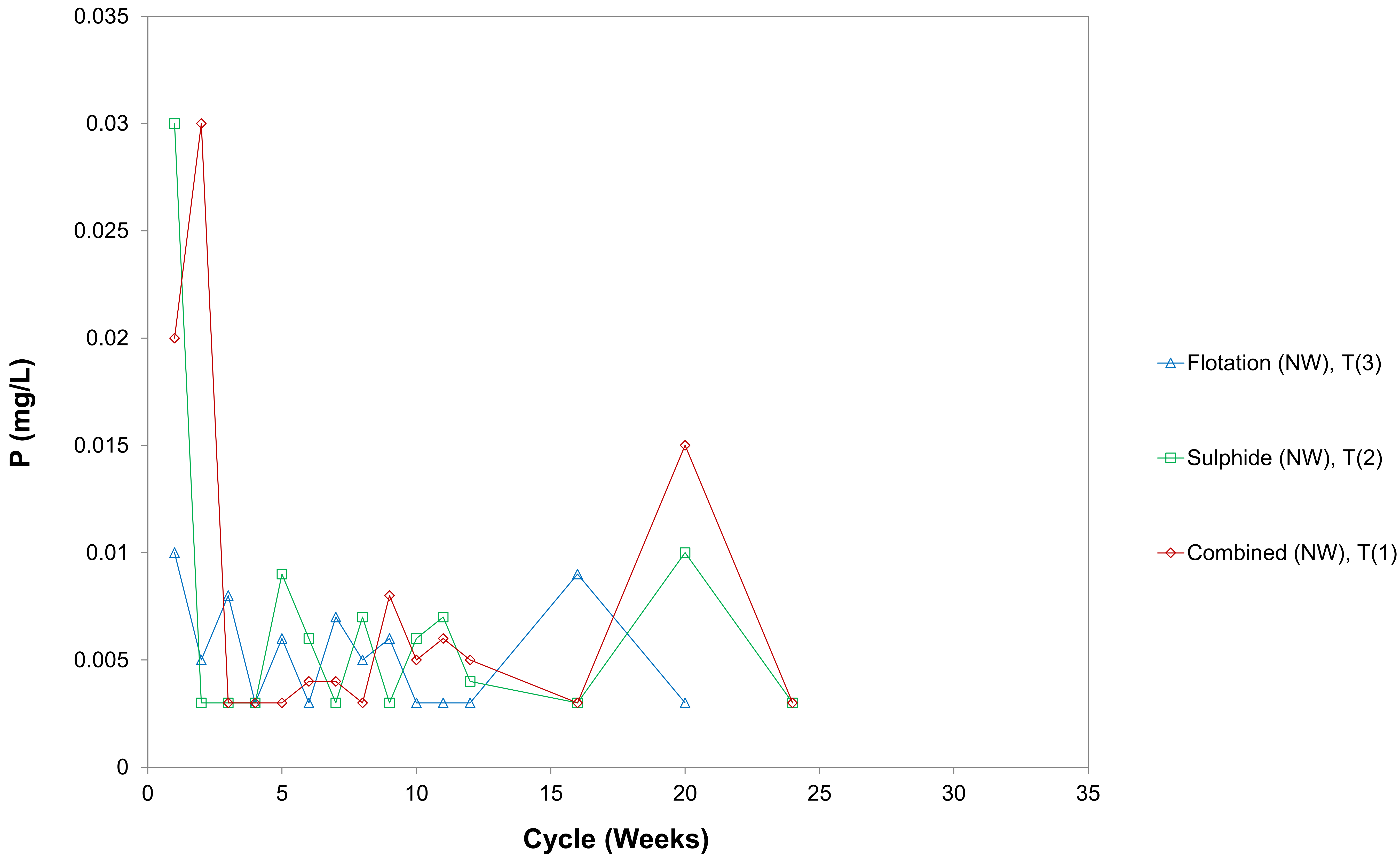

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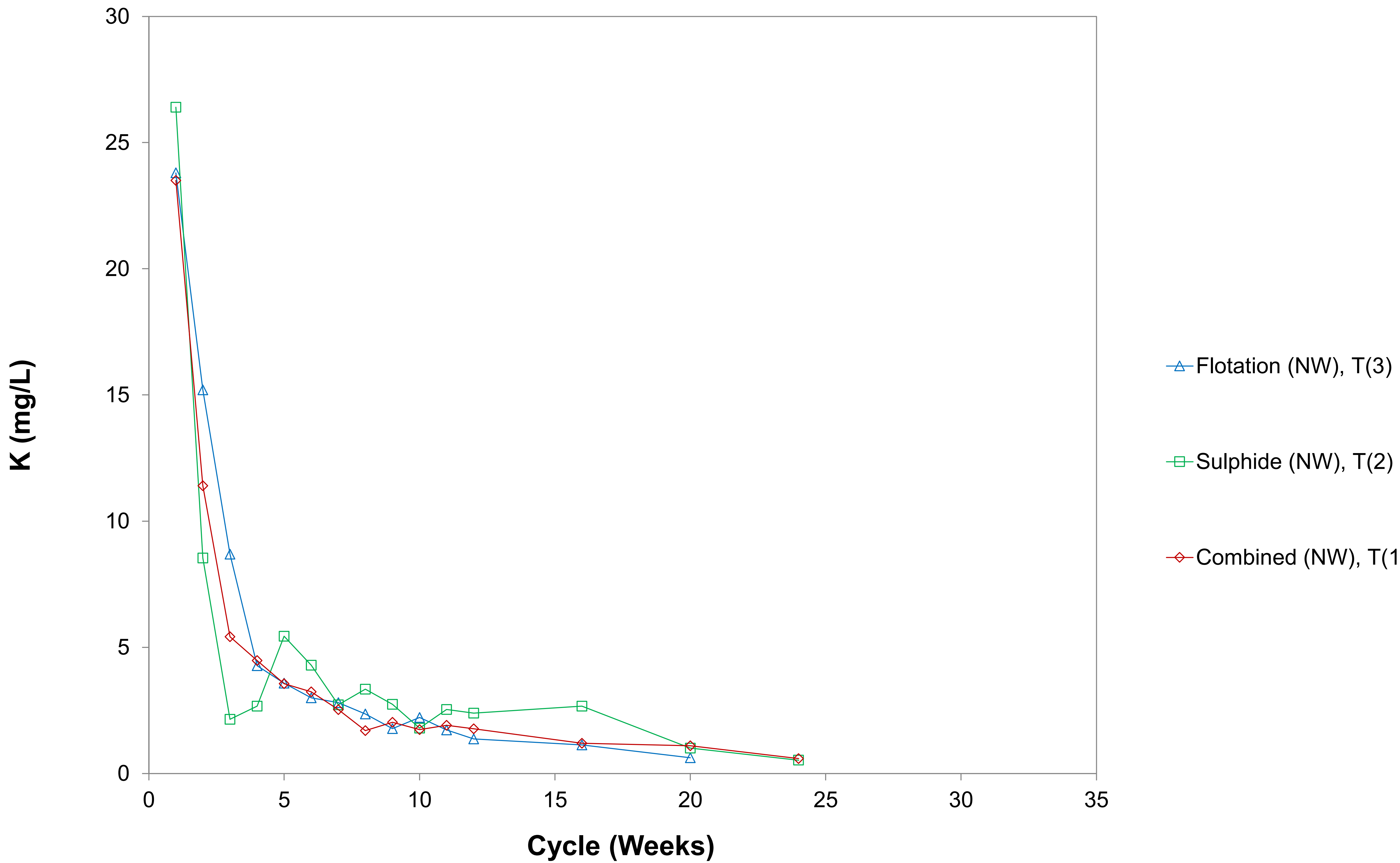

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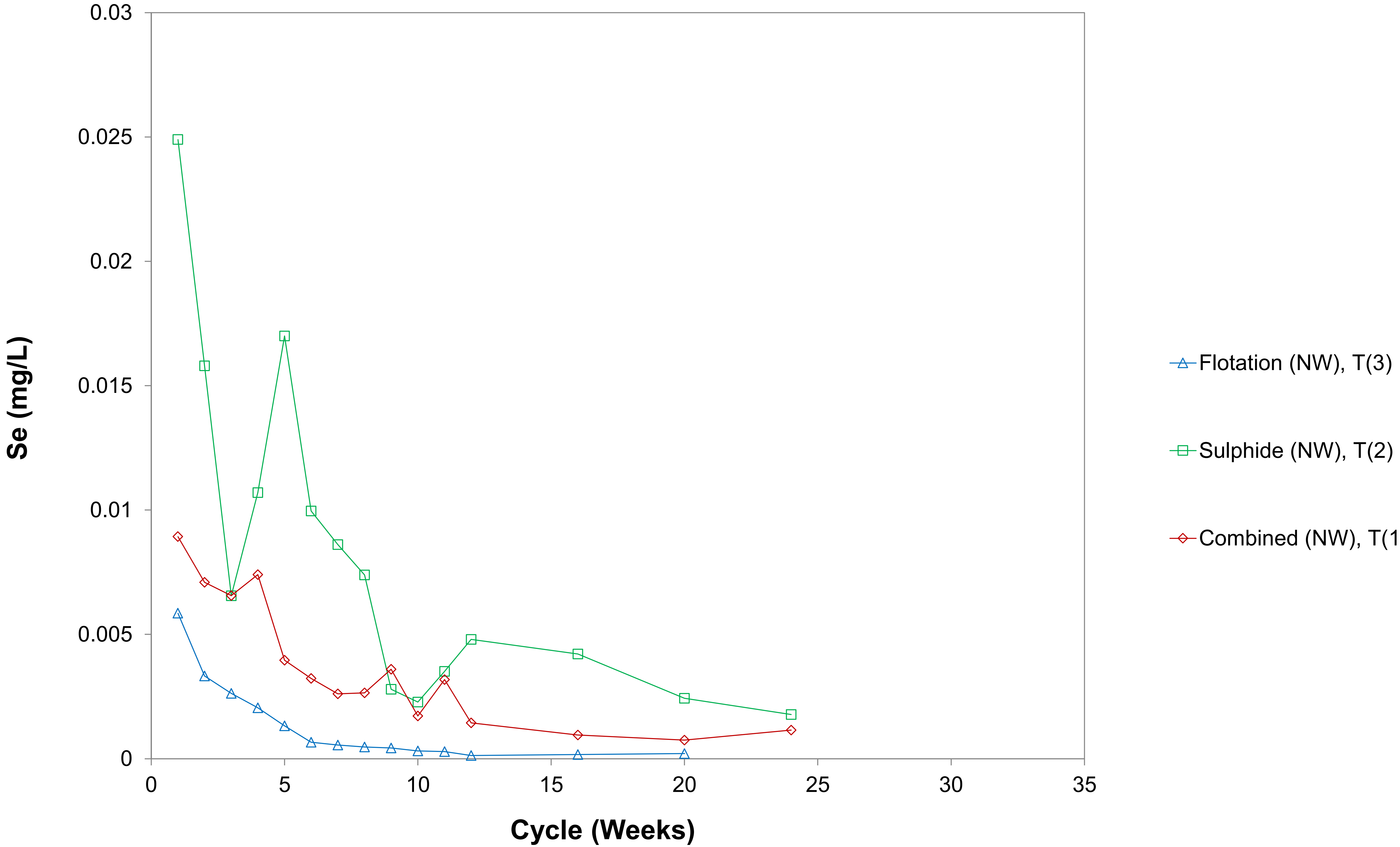

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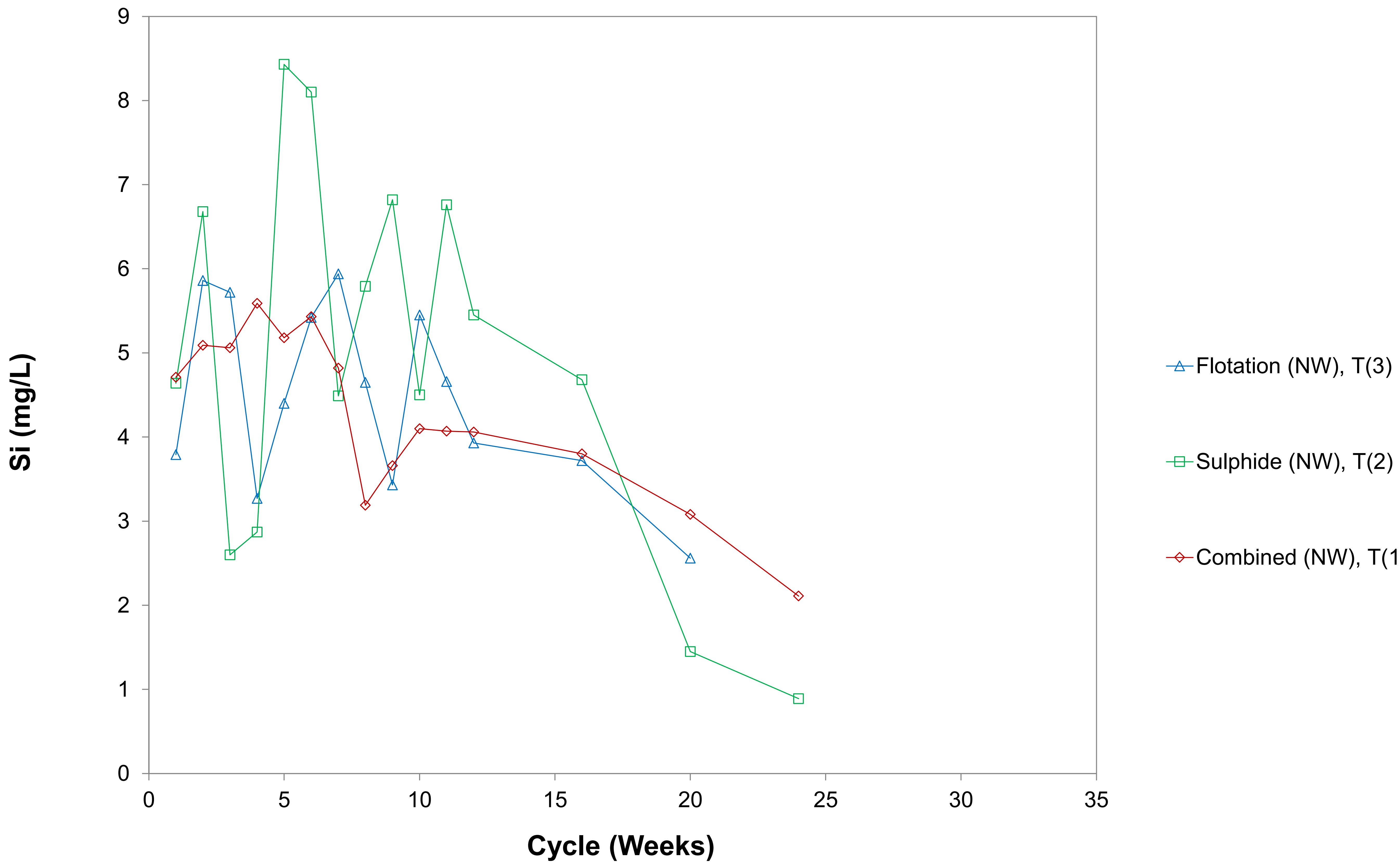

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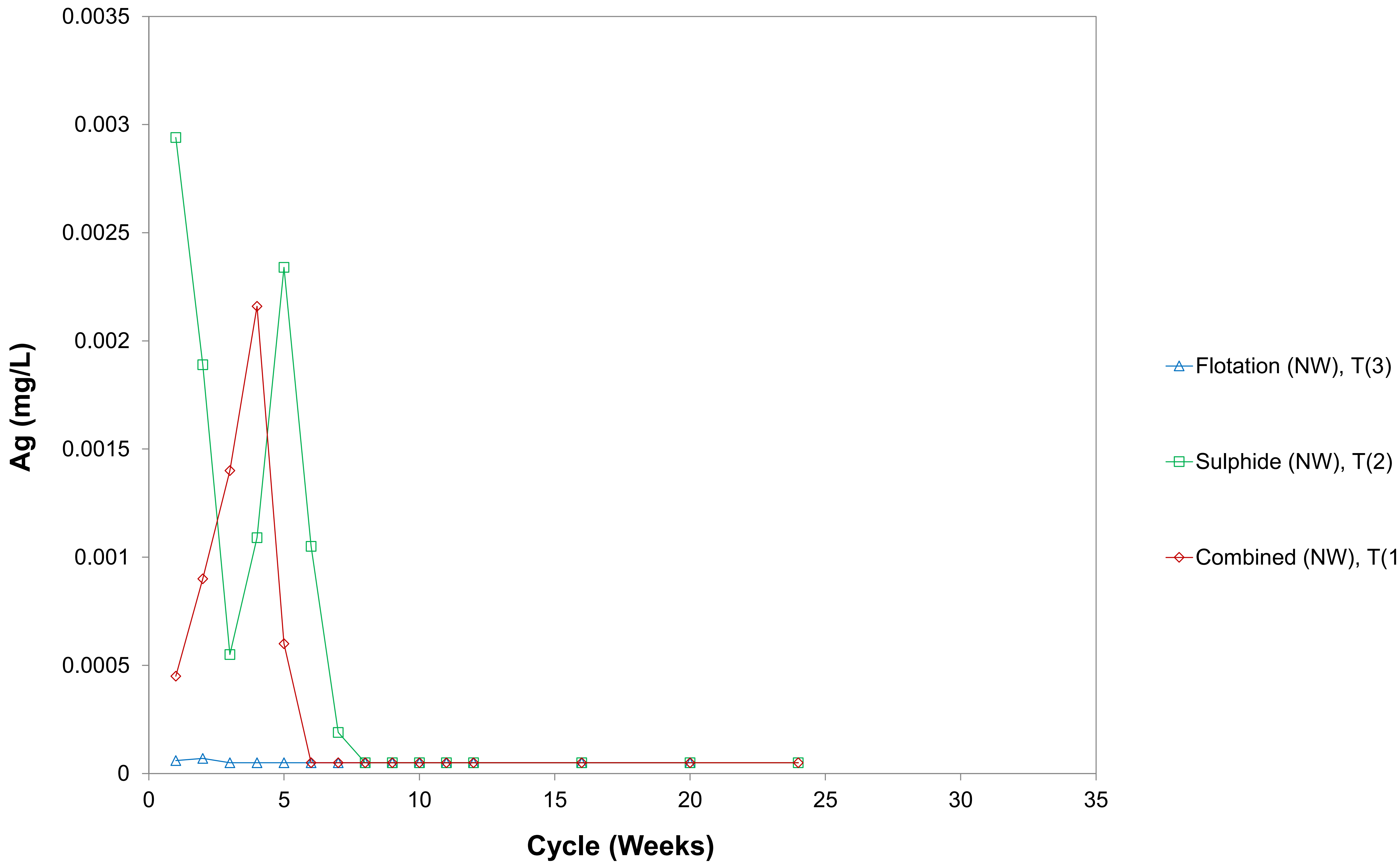

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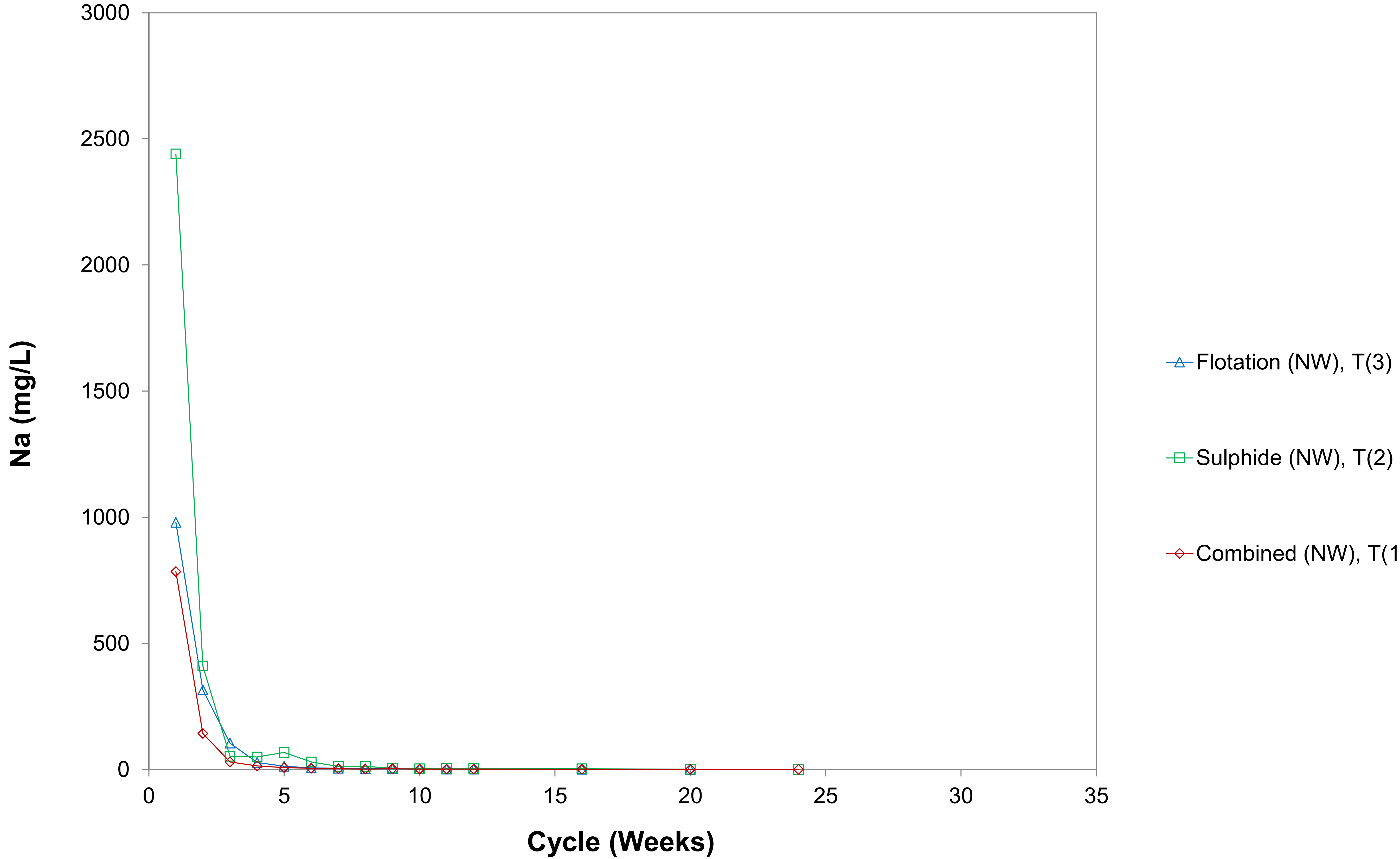

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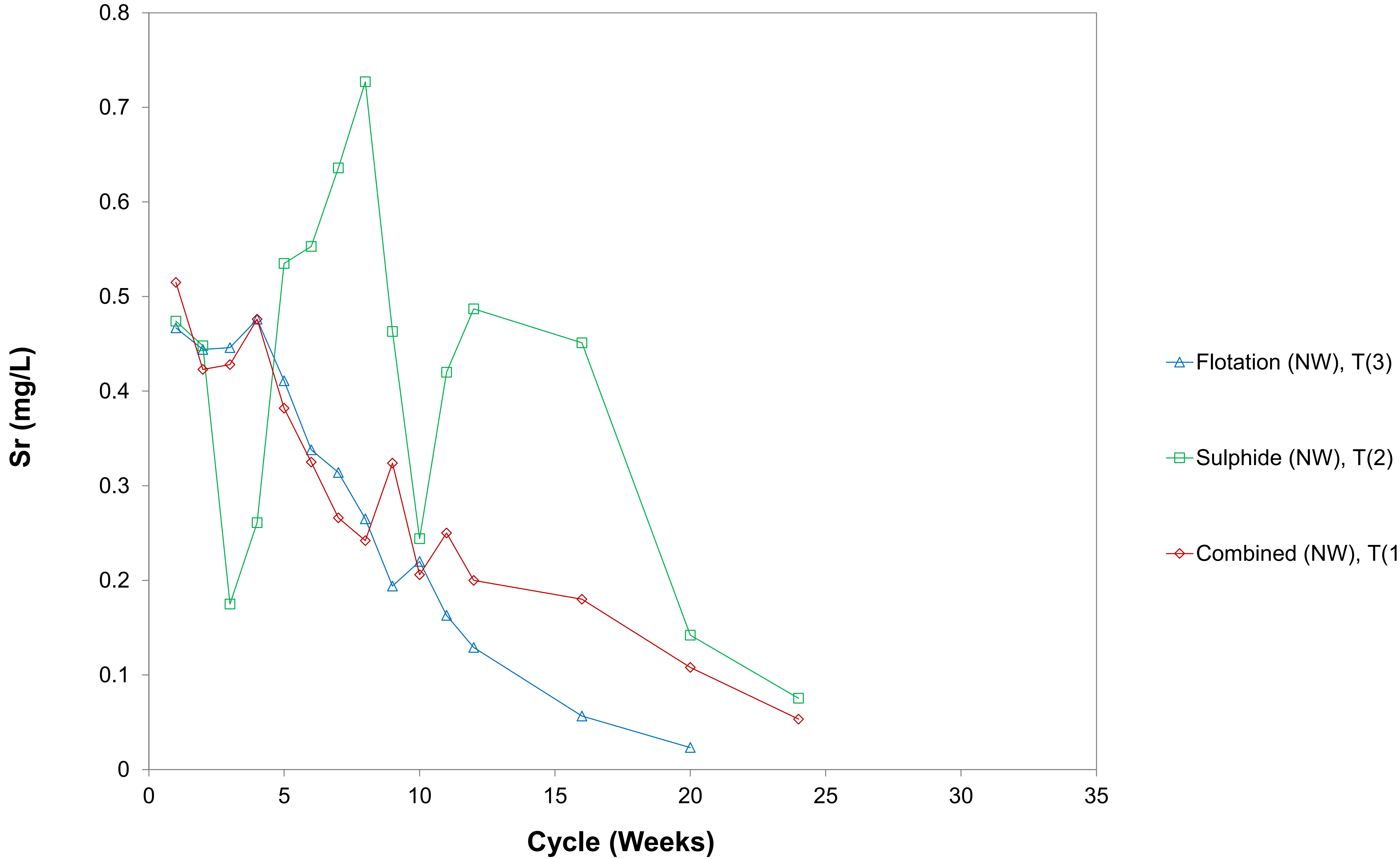

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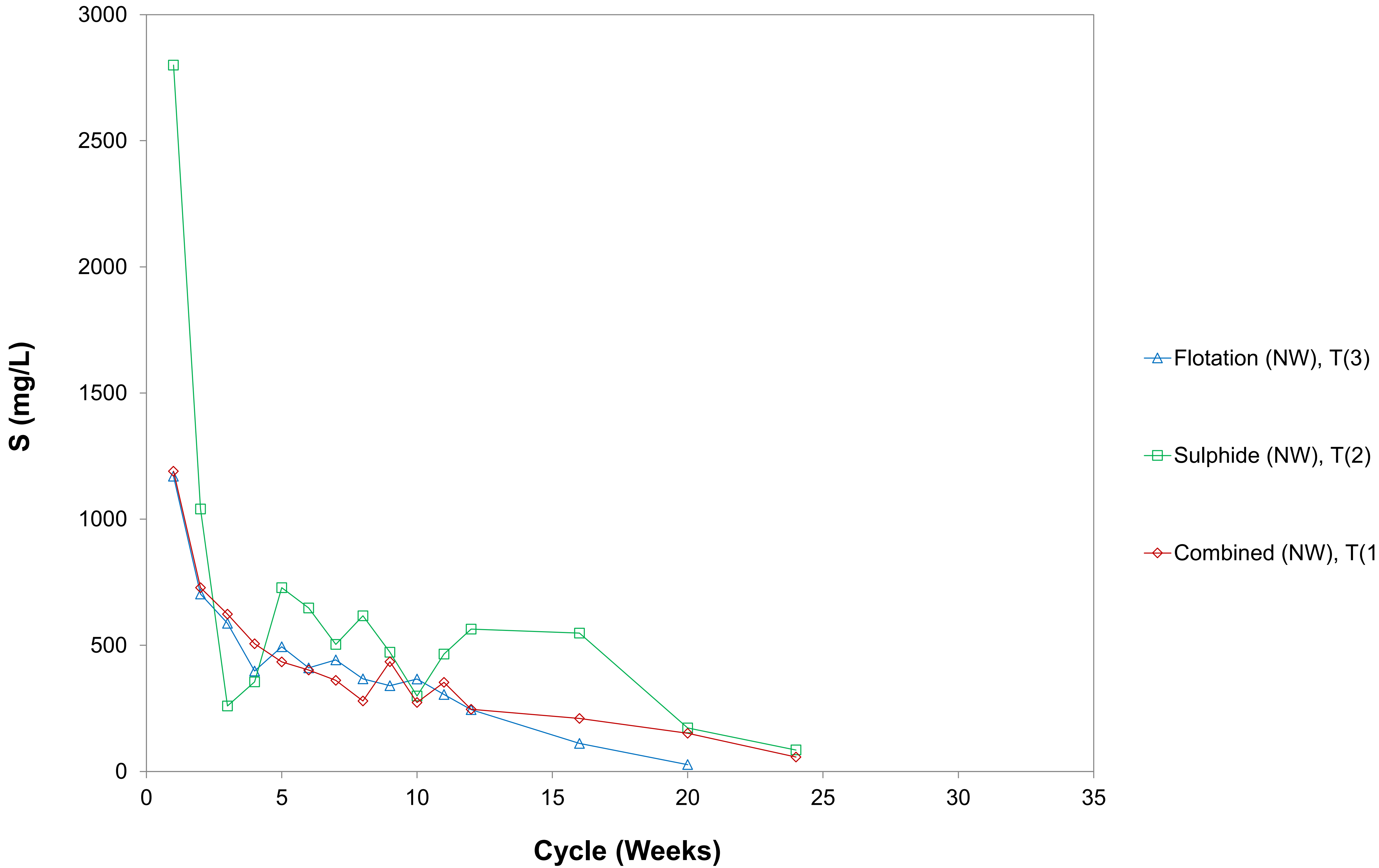

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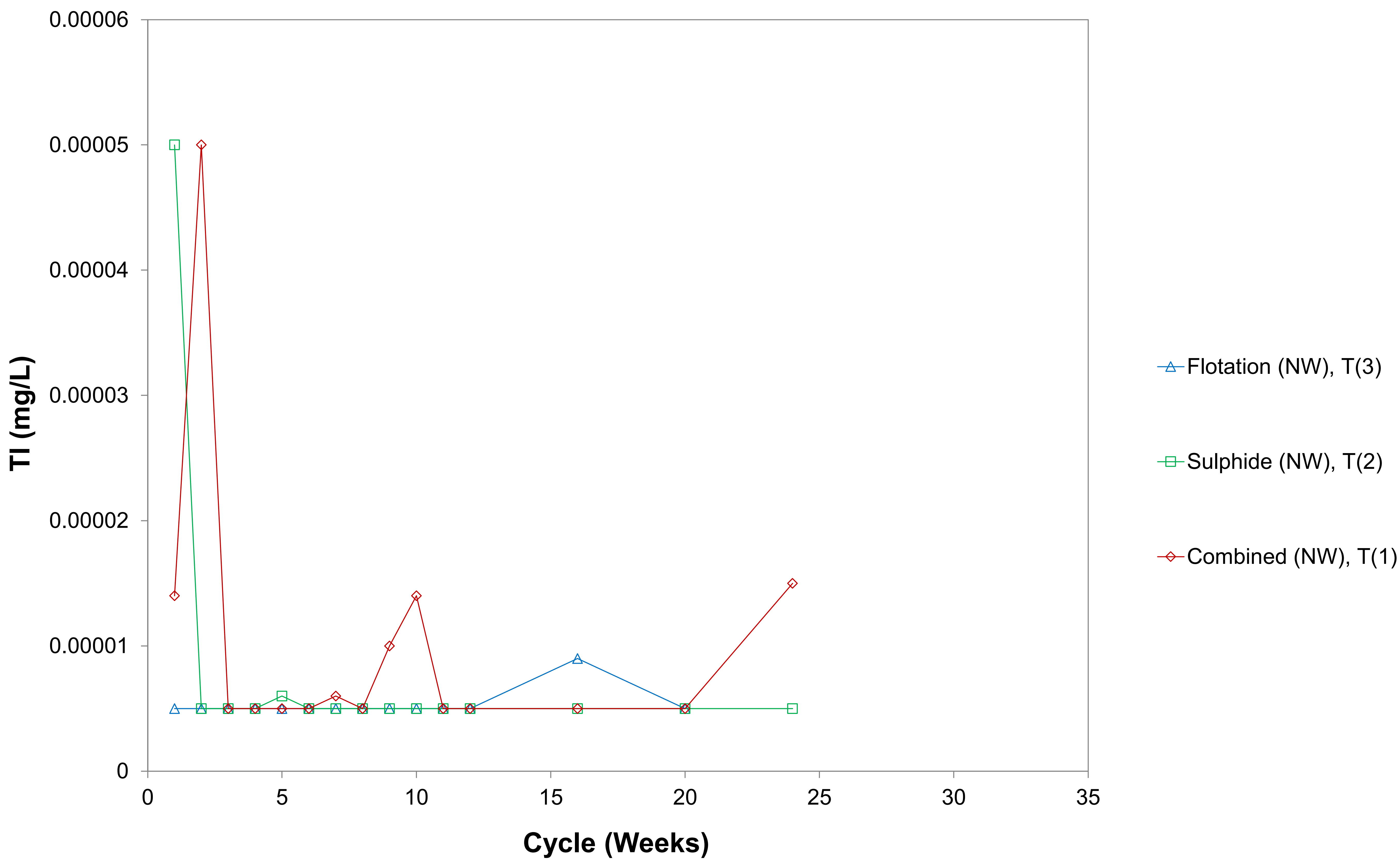

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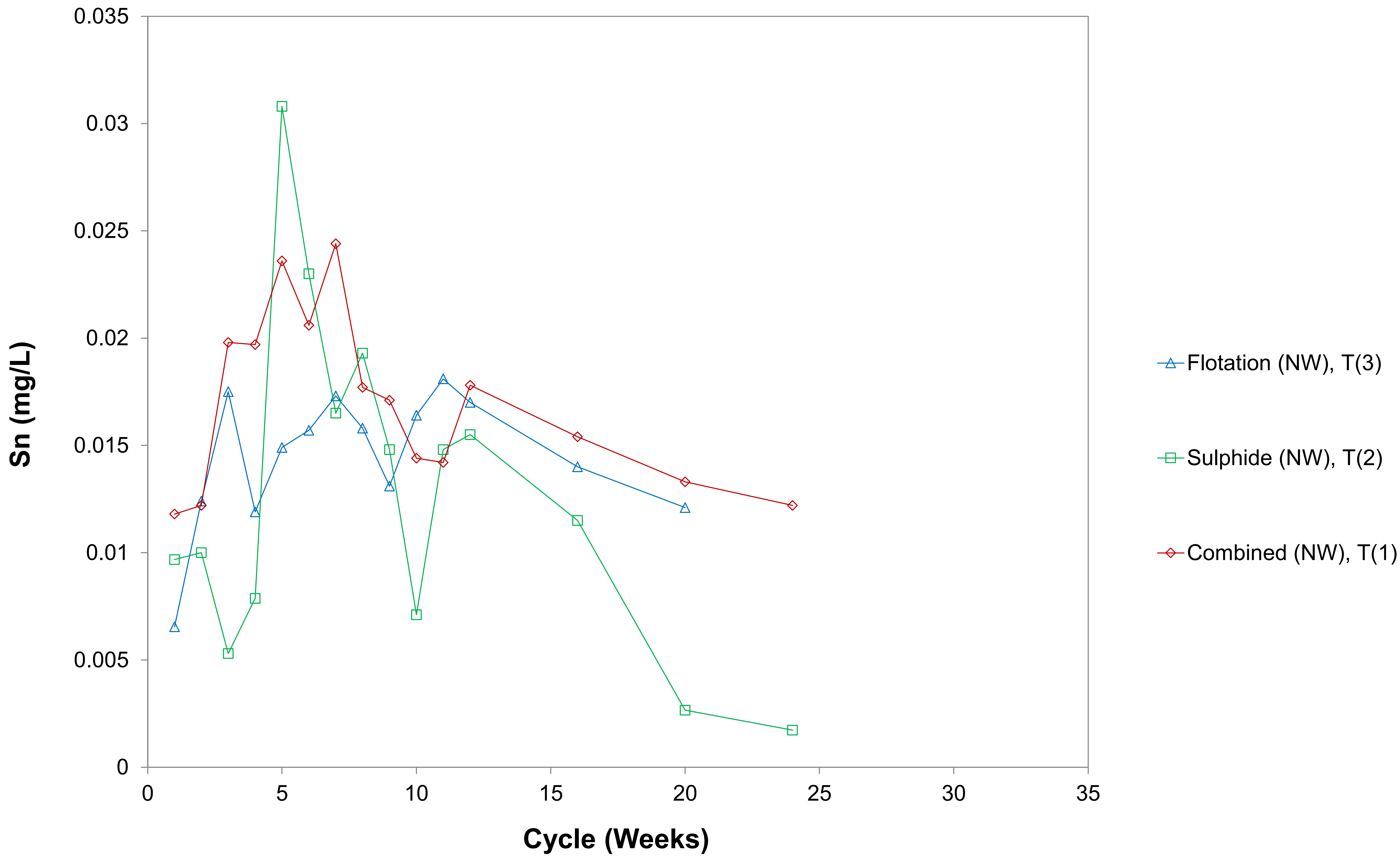

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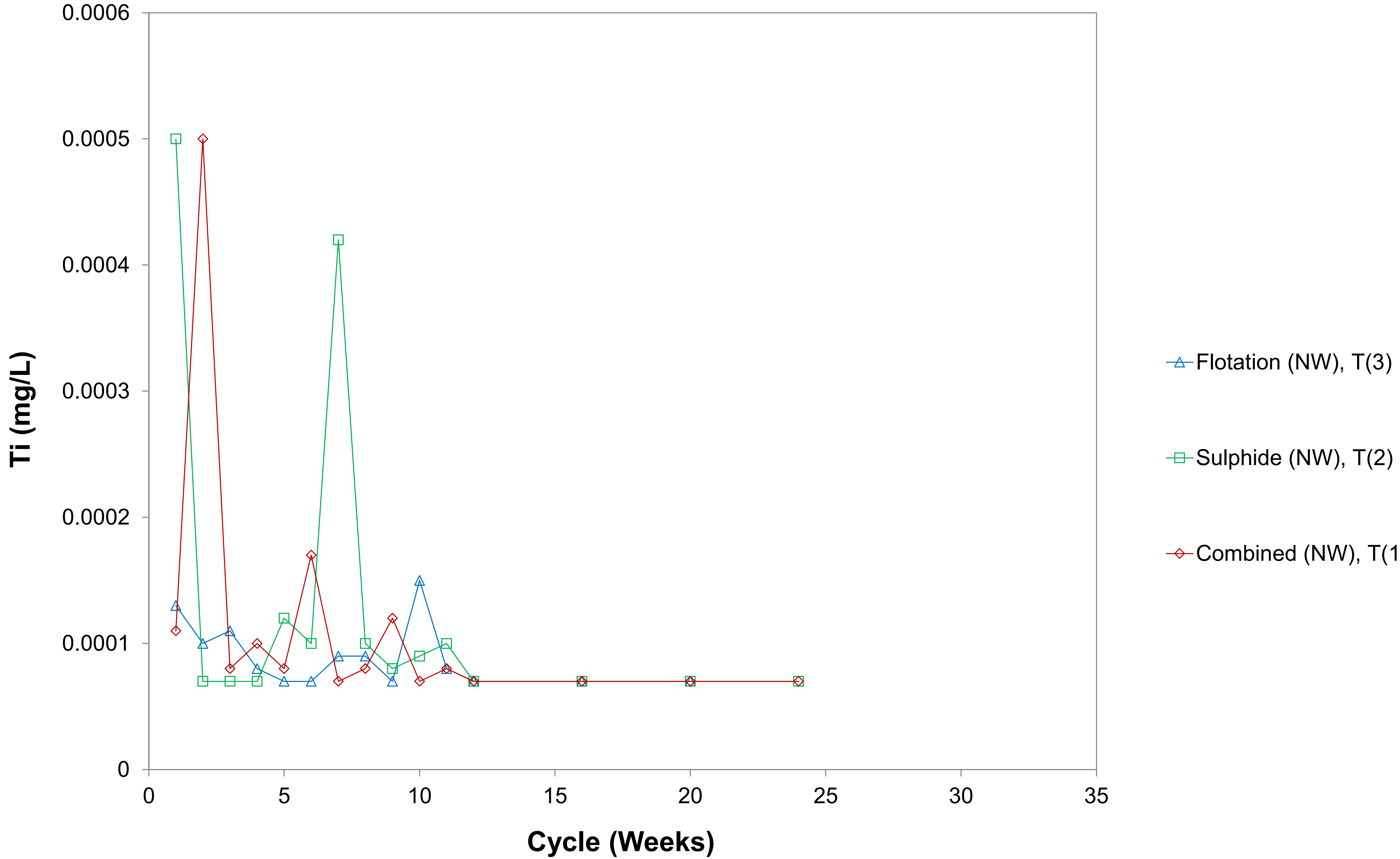

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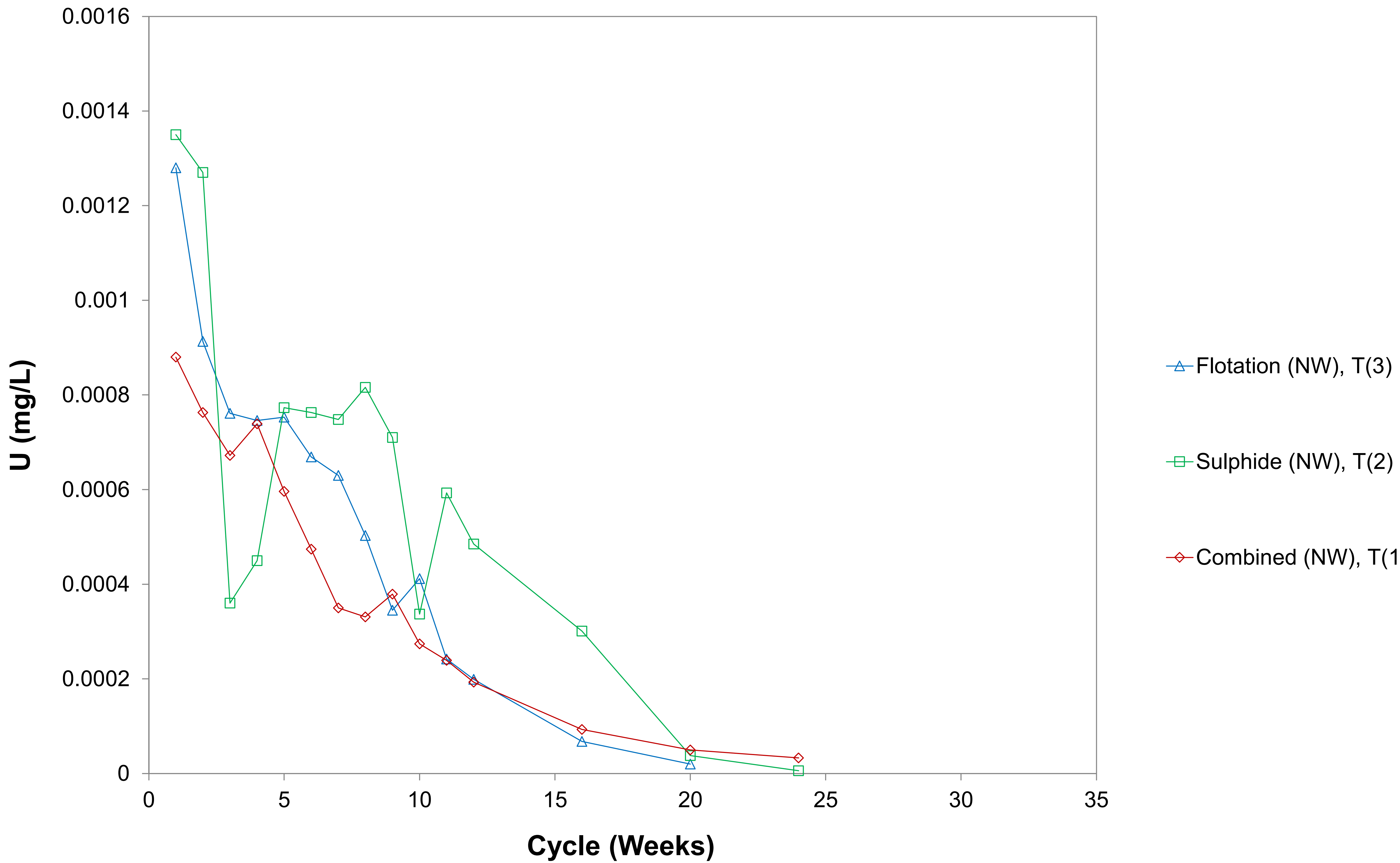

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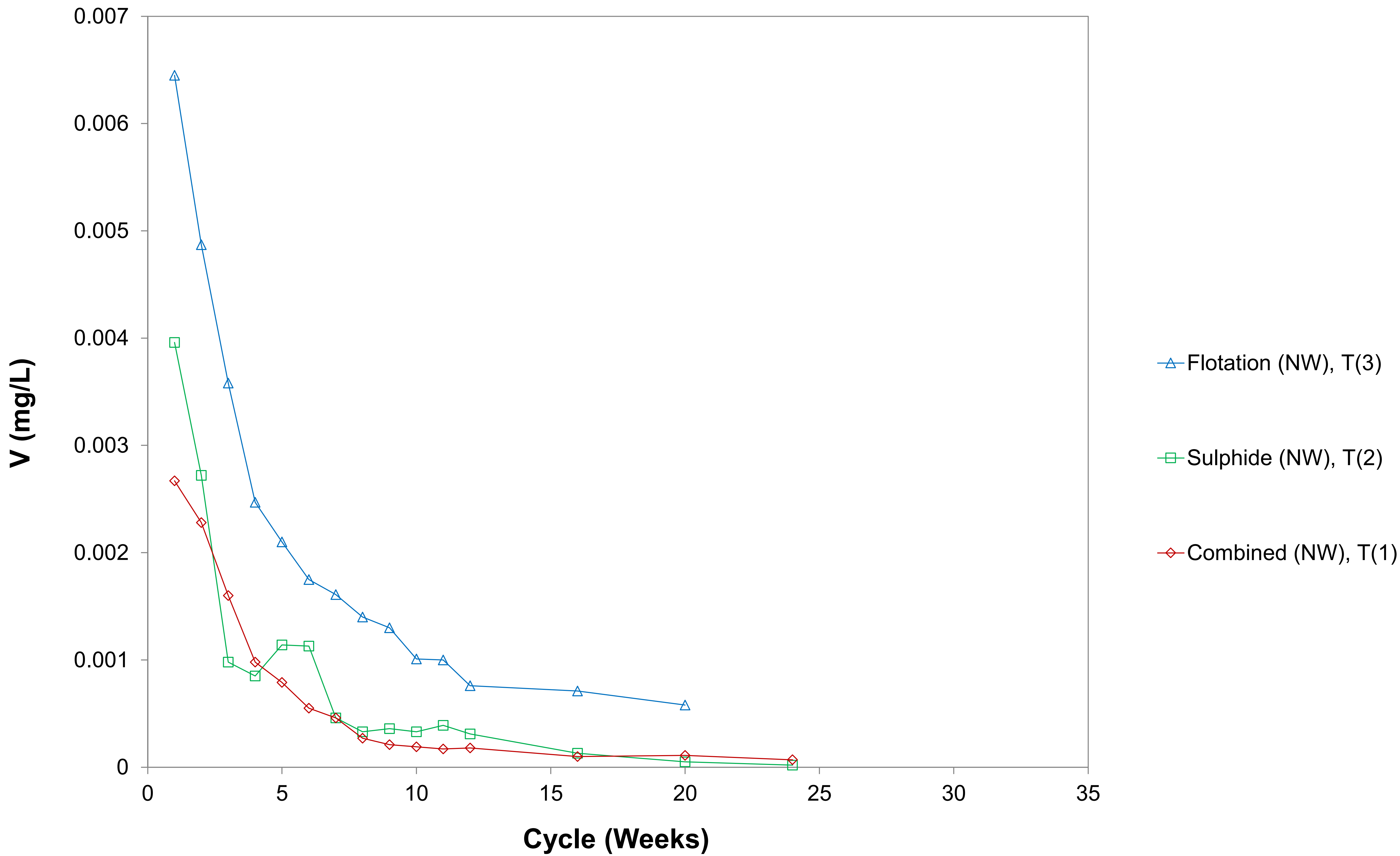

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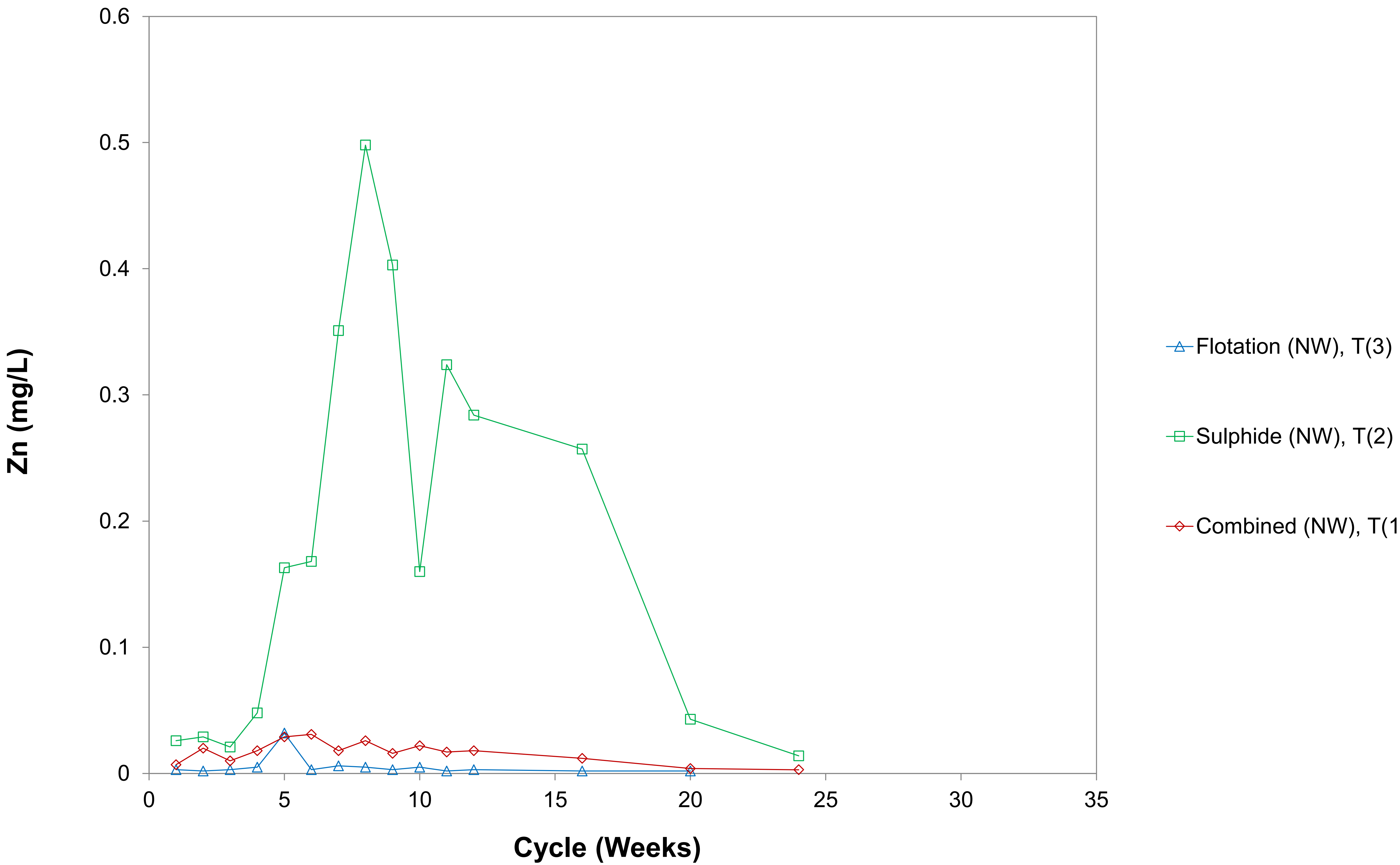

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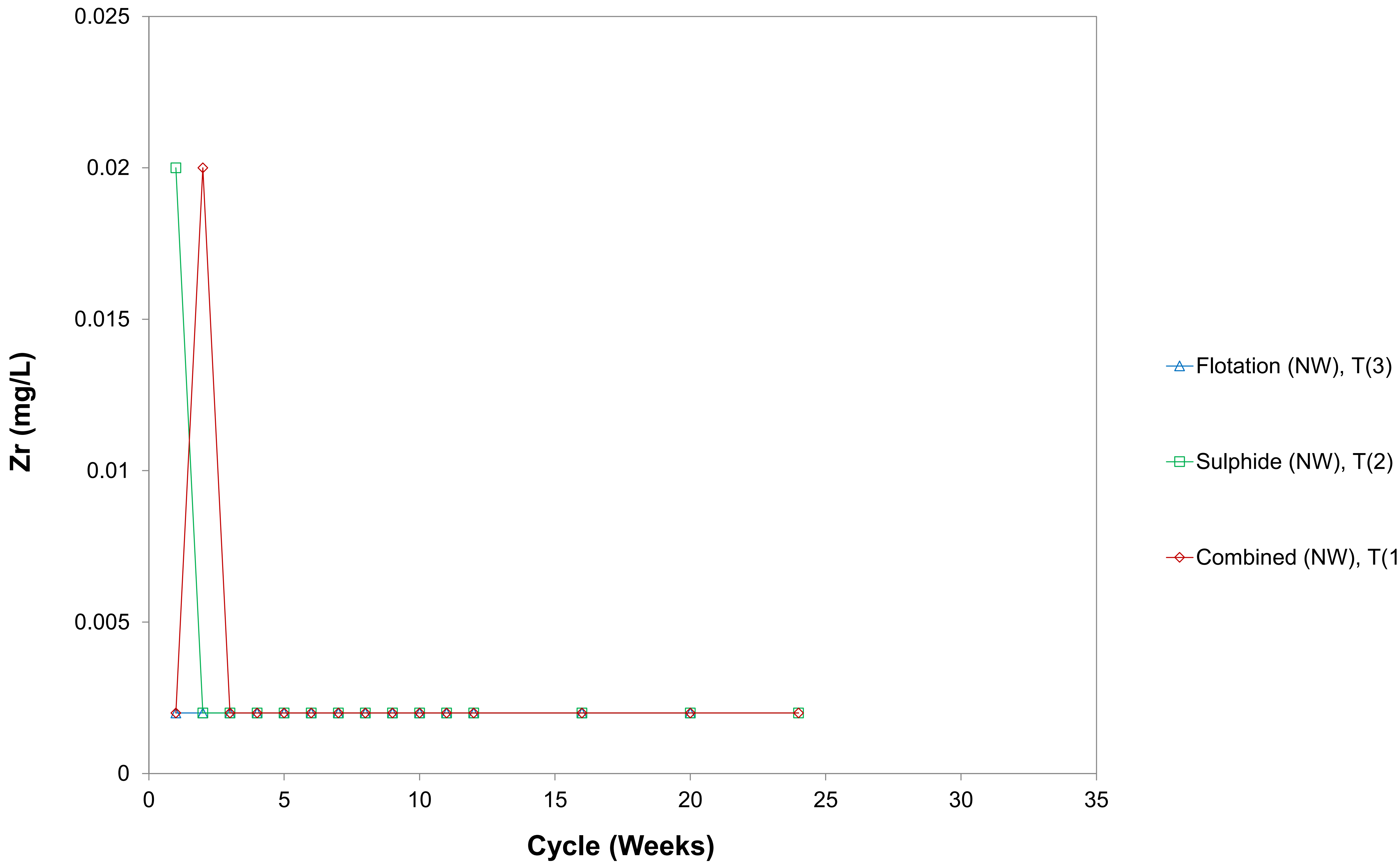

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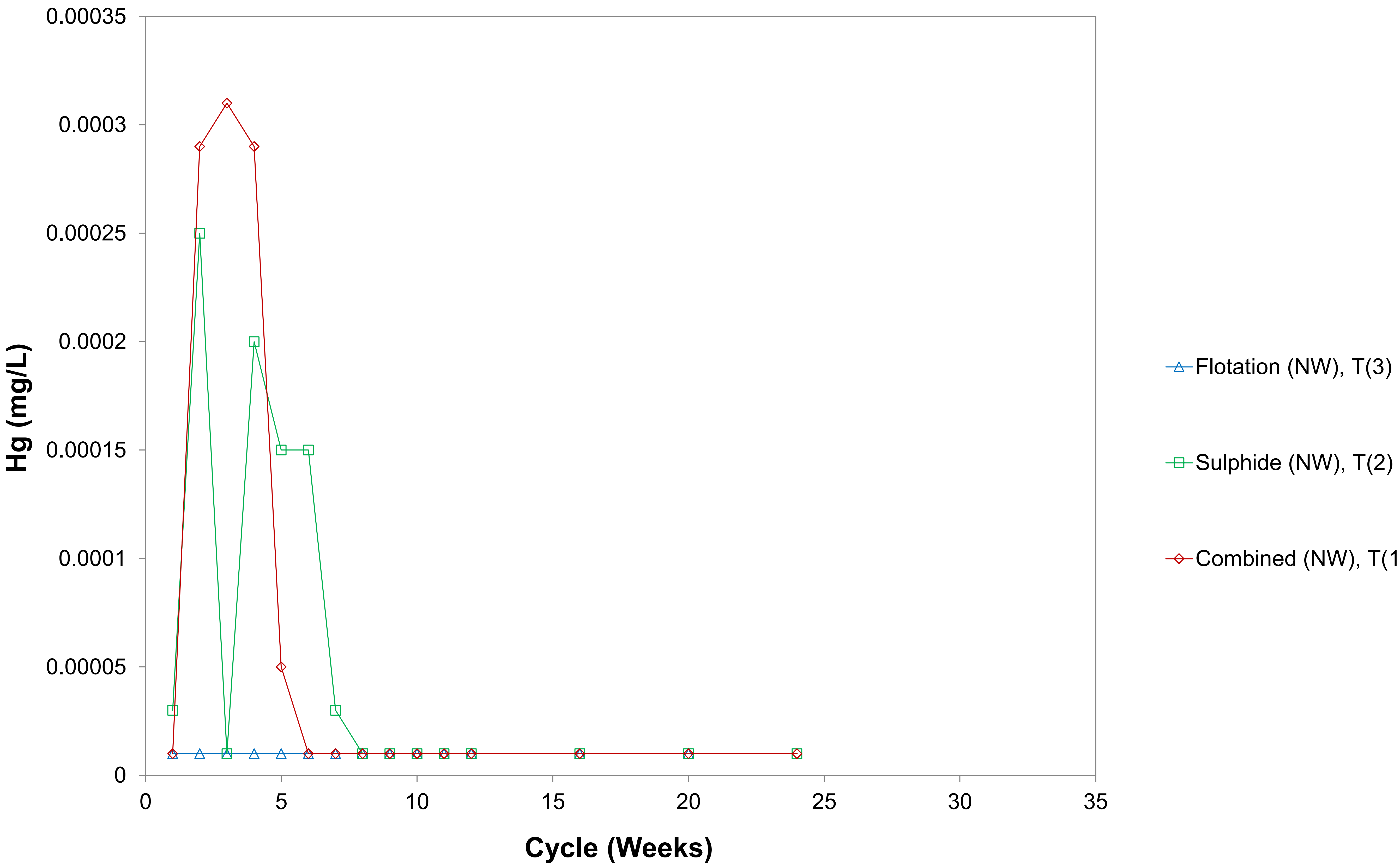

https://srk.sharepoint.com/sites/NACAPR002672/Internal/600 Metallurgical Tailings/2. HC Files/[HB_Madrid_Conc_Charts_HCT_CAPR002672_mlt_rev00.xlsm

Appendix I Current Aging Test Results

SGS proposal: 19736-PR-R1
SGS project #: 2244

Work order date: 15-May-23
Report date: 27-Oct-23
Sample receipt date: 15-May-23
Version: Partial draft

Aging Tests - OXIC

Sample ID - as per label				Oxic-0-Test 1 May 15 2023 Unfiltered	Oxic-0-Test 1 May 15 2023 filtered	Oxic-1-Test 1 May 29 2023 Unfiltered	Oxic-1-Test 1 May 29 2023 filtered	Oxic-2-Test1 June 15 2023 Unfiltered	Oxic-2-Test 1 June 15 2023 filtered	Oxic-3-Test1 July 14 2023 Unfiltered	Oxic-3-Test 1 July 14 2023 filtered	Oxic-4-Test1 Aug 15 2023 Unfiltered	Oxic-4-Test 1 Aug 15 2023 filtered	Oxic-5-Test 1 Sep 15 2023 Unfiltered	Oxic-5-Test 1 Sep 15 2023 filtered
Time				Time zero	Time zero	2 weeks	2 weeks	1 month	1 month	2 months	2 months	3 months	3 months	4 months	4 months
Parameter	**Method**	**Units**	**RDL**												
pH	meter		0.01	8.56	8.58	8.54	8.51	8.45	8.45	8.35	8.35	8.23	8.22	8.22	8.2
Redox	meter	mV	1	181.69	194.58	192	234.2	207.65	208.04	196.37	192.72	215.09	243.63	246.17	195.78
Conductivity	meter	uS/cm	1	9161.4	9203.3	9460	9619.8	9649.2	9690.7	9963	9988.9	9822.1	9884	10087.1	10114.6
Acidity (to pH 4.5)	titration	mg CaCO3/L	0.1		0		0		0		0		0		0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	0.1		0		0		0		0		4.57		4.86
Alkalinity	titration	mg CaCO3/L	0.1		238.88		240.82		239.35		221.4		174.45		141.32
Total Dissolved Solids		mg/L	2		8180	---	7530	---	7400	---	7620		7760	---	8140
Total Suspended Solids		mg/L	30	6		102		91	---	67	---	60		42	---
Bromide		mg/L	0.3	---	< 3	---	< 3	---	< 3	---	< 3		<3	---	< 3
Chloride		mg/L	0.2	---	7.5	---	< 2	---	7	---	6.8		8.7	---	8.7
Nitrite (as N)		as N mg/L	0.03	---	< 0.3	---	< 0.3	---	< 0.3	---	< 0.3		<0.3	---	< 0.3
Nitrate (as N)		as N mg/L	0.06	---	< 0.6	---	< 0.6	---	< 0.6	---	< 0.6		<0.6	---	< 0.6
Thiosalts as S2O3		as S2O3 mg/L	10	---	**	---	**	---	< 10	---	**			---	**
Thiosulfate		mg/L	0.2		<20		<20				< 20		<2	---	< 2
Fluoride		mg/L	0.06	---	0.35		0.37	---	0.3	---	0.29		0.21	---	0.2
DOC		mg/L	1	---	69	---	78	---	59	---	43		47	---	48
NH3+NH4 (as N)		as N mg/L	0.1	---	11.2	---	19.2	---	26.2	---	33.3		39.3	---	37.5
PO4		as P mg/L	0.03	---	3.71	---	3.86	---	3.1	---	1.96		1.36	---	0.83
Total CN		mg/L	0.01	---	0.42	---	0.16	---	0.15	---	0.1		0.12	---	0.13
CN WAD		mg/L	0.01	---	0.04	---	< 0.01	---	< 0.01	---	< 0.01		<0.01	---	< 0.01
CN free		mg/L	0.005	---	0.04	---	0.006	---	0.008	---	0.008		<0.005	---	0.005
CNO		mg/L	1	---	320	---	260	---	200	---	140		98	---	82
SCN		mg/L	0.2	---	37	---	38	---	38	---	37		40	---	42
Sulphate	Turbidity	mg/L	1		4859		5137.5		4510		4579		4948.3		5414.3
Ion Balance															
Major Anions	Calc	meq/L	-		114.85		119.09		104.68		104.19		109.99		118.64
Major Cations	Calc	meq/L	-		83.51		101.46		103.32		95.85		103.82		108.80
Difference	Calc	meq/L	-		31.34		17.62		1.35		8.34		6.17		9.83
Balance (%)	Calc	%	-		15.8%		8.0%		0.6%		4.2%		2.9%		4.3%
Dissolved Metals															
Hardness		mg/L	0.05	250	261	532	512	643	627	695	682	817	826	1070	1060
Aluminum	ICP-MS	mg/L	0.001	0.161	0.043	0.620	0.040	0.923	0.05	1.20	0.04	0.40	0.04	0.977	0.033
Antimony	ICP-MS	mg/L	0.0009	0.0463	0.0450	0.0460	0.0470	0.0493	0.050	0.049	0.049	0.039	0.039	0.0304	0.0305
Arsenic	ICP-MS	mg/L	0.0002	11.10	11.40	9.48	9.21	8.17	8.09	6.16	6.09	3.39	3.34	2.34	2.43
Barium	ICP-MS	mg/L	0.00002	0.06606	0.07154	0.1150	0.1130	0.1040	0.1060	0.0731	0.0840	0.0463	0.0452	0.0382	0.0356
Beryllium	ICP-MS	mg/L	0.000007	< 0.000007	< 0.000007	< 0.00007	< 0.00007	0.000040	< 0.00007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	0.000021	< 0.000007
Bismuth	ICP-MS	mg/L	0.000010	< 0.00001	< 0.00001	< 0.0001	< 0.0001	0.000010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00001	< 0.00001
Boron	ICP-MS	mg/L	0.002	0.077	0.087	0.110	0.110	0.118	0.120	0.130	0.120	0.150	0.160	0.118	0.116
Cadmium	ICP-MS	mg/L	0.000003	0.000529	< 0.000003	0.00014	0.00012	0.00014	0.00376	0.00104	0.00158	0.00010	0.00003	0.000077	0.000062
Calcium	ICP-MS	mg/L	0.01	69.20	72.10	170	164	207	202	224	223	268	273	352	351
Chromium	ICP-MS	mg/L	0.00008	0.00306	0.00317	0.0083	< 0.0008	0.0136	< 0.0008	0.0325	< 0.0008	0.0062	< 0.0008	0.01400	0.00014
Cobalt	ICP-MS	mg/L	0.000004	0.980	1.050	0.706	0.678	0.655	0.675	0.551	0.546	0.478	0.476	0.501	0.494
Copper	ICP-MS	mg/L	0.0002	0.906	0.789	0.926	0.781	0.793	0.679	0.425	0.354	0.281	0.236	0.178	0.129
Iron	ICP-MS	mg/L	0.007	0.989	0.040	1.370	< 0.07	3.540	< 0.07	5.470	0.450	2.520	< 0.07	1.980	0.008
Lead	ICP-MS	mg/L	0.000090	0.00063	0.00019	< 0.0009	< 0.0009	0.00114	< 0.0009	0.00220	0.00110	< 0.0009	< 0.0009	0.00059	0.00014
Lithium	ICP-MS	mg/L	0.0001	0.0049	0.0047	0.0080	0.0080	0.0105	0.0100	0.0080	0.0080	0.0100	0.0090	0.0100	0.0104
Magnesium	ICP-MS	mg/L	0.001	18.7	19.6	25.8	24.8	30.5	29.9	32.6	30.5	36.2	35.2	45.9	44.9
Manganese	ICP-MS	mg/L	0.00001	0.02340	0.0180	0.0598	0.0251	0.1100	0.0339	0.1090	0.0336	0.1070	0.0455	0.10500	0.06170
Mercury (total)	CVAAS	mg/L	0.00001	0.00004	0.00003	0.00004	0.00002	0.00003	< 0.00001	0.00002	0.00001	0.00005	0.00005	< 0.00001	< 0.00001
Molybdenum	ICP-MS	mg/L	0.00004	0.03360	0.0336	0.0392	0.0375	0.0392	0.0388	0.0392	0.0395	0.0385	0.0395	0.03960	0.04020
Nickel	ICP-MS	mg/L	0.0001	0.0329	0.0327	0.04	0.02	0.07	0.02	0.09	0.03	0.07	0.03	0.0604	0.0325
Phosphorus	ICP-MS	mg/L	0.003	0.149	0.080	< 0.03	< 0.03	0.040	0.030	< 0.03	< 0.03	0.05	0.04	0.02	0.01
Potassium	ICP-MS	mg/L	0.009	32.7	35.8	40.2	39.3	40.9	42.2	39.2	39.0	38.5	40.4	39.7	39.1
Selenium	ICP-MS	mg/L	0.00004	0.00866	0.00762	0.0069	0.0072	0.0054	0.0046	0.0083	0.0068	0.0062	0.0069	0.00705	0.00690
Silicon	ICP-MS	mg/L	0.02	4.65	5.16	6.30	5.30	6.94	5.70	5.40	3.80	5.40	4.80	5.62	4.01
Silver	ICP-MS	mg/L	0.00005	0.00005	0.00005	< 0.0005	< 0.0005	< 0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.00005	< 0.00005
Sodium	ICP-MS	mg/L	0.01	1680	1720	2030	2010	1910	1990	1780	1790	1840	1906	1880	1920
Strontium	ICP-MS	mg/L	0.00002	0.107	0.103	0.205	0.199	0.238	0.242	0.275	0.278	0.250	0.250	0.289	0.293
Sulfur	ICP-MS	mg/L	1	1220	1250	1480	1490	1720	1750	1620	1660	1619	1671	1700	1710
Thallium	ICP-MS	mg/L	0.000005	0.000052	0.00003	0.00008	0.00008	0.00005	0.00011	0.00013	0.00014	0.00007	0.00010	0.000123	0.000113
Tin	ICP-MS	mg/L	0.00006	0.02240	0.00122	< 0.0006	< 0.0006	0.00025	< 0.0006	0.00100	< 0.0006	< 0.0006	< 0.0006	0.00033	0.00022
Titanium	ICP-MS	mg/L	0.00005	0.00150	0.00040	0.01110	< 0.0005	0.01570	< 0.0007	0.02570	< 0.0007	0.00630	< 0.0007	0.05030	< 0.00007
Uranium	ICP-MS	mg/L	0.000002	0.00122	0.00146	0.00182	0.00174	0.00187	0.00195	0.00186	0.00194	0.00158	0.00163	0.00133	0.00135
Vanadium	ICP-MS	mg/L	0.00001	0.01140	0.01110	0.01020	0.00780	0.00952	0.00570	0.00930	0.00450	0.00530	0.00390	0.00620	0.00234
Zinc	ICP-MS	mg/L	0.002	0.189	0.007	< 0.02	< 0.02	0.034	0.150	0.170	0.170	0.030	< 0.02	0.015	0.007
Zirconium	ICP-MS	mg/L	0.002	< 0.002	< 0.002	< 0.02	< 0.02	< 0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.002	< 0.002

SGS

SGS proposal: 19736-PR-R1
SGS project #: 2244

Work order date: 15-May-23
Report date: 27-Oct-23
Sample receipt date: 15-May-23
Version: Partial draft

Aging Tests - OXIC

Sample ID - as per label				Oxic-0-Test 2 May 26 2023 Unfiltered	Oxic-0-Test 2 May 26 2023 filtered	Oxic-1-Test 2 June 9 2023 Unfiltered	Oxic-1-Test 2 June 9 2023 filtered	June 26 2023 Unfiltered	Oxic-2-Test 2 June 26 2023 filtered	Oxic-3-Test2 July 26 2023 Unfiltered	Oxic-3-Test 2 July26 2023 filtered	Oxic-4-Test2 Aug 25 2023 Unfiltered	Oxic-4-Test 2 Aug 25 2023 filtered	Oxic-5-Test2 Sep26 2023 Unfiltered	Oxic-5-Test 2 Sep26 2023 filtered
Time				Time zero	Time zero	2 weeks	2 weeks	1 month	1 month	2 mponths	2 months	3 months	3 months	4 months	4 months
Parameter	**Method**	**Units**	**RDL**												
pH	meter		0.01	8.39	8.43	8.41	8.39	**8.32**	**8.29**	**8.27**	**8.27**	**8.18**	**8.15**	8.19	8.16
Redox	meter	mV	1	197.33	177.82	147.68	129.26	167.88	168.64	191.52	193.35	168.05	156.51	151.02	137.75
Conductivity	meter	uS/cm	1	16116.7	16045.3	16119.9	16170.3	16233.2	16306.5	16504	16525	15674	15575.6	16585.6	16761.4
Acidity (to pH 4.5)	titration	mg CaCO3/L	0.1		0		0		0		0		0		0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	0.1		0		0		8.7		8.09		16.43		9.76
Alkalinity	titration	mg CaCO3/L	0.1		915.78		685.23		521.75		358.22		316		189.7
Total Dissolved Solids		mg/L	2	---	13200		820	---	14300	---	13900	---	13400	---	14600
Total Suspended Solids		mg/L	30	28	---	106		46	---	62	---	67	---	43	---
Bromide		mg/L	0.3	---	< 3		<3	---	< 3	---	< 3	---	< 3	---	< 3
Chloride		mg/L	0.2	---	10		7.5	---	10	---	11	---	13	---	6.9
Nitrite (as N)		as N mg/L	0.03	---	< 0.3		<0.3	---	< 0.3	---	< 0.3	---	0.32	---	< 0.3
Nitrate (as N)		as N mg/L	0.06	---	< 0.6		<0.6	---	< 0.6	---	< 0.6	---	< 0.6	---	< 0.6
Thiosalts as S2O3		as S2O3 mg/L	10	---	**	**	**	---	**	---	**	---	**	---	**
Thiosulfate		mg/L	0.2		<20		<20	---	< 20	---	< 20	---	< 2	---	< 10
Fluoride		mg/L	0.06	---	0.48		0.33	---	0.30	---	0.2	---	0.15	---	0.12
DOC		mg/L	1	---	199		160	---	146	---	139	---	148	---	134
NH3+NH4 (as N)		as N mg/L	0.1	---	28.9		48	---	58.3	---	77.2	---	79.5	---	82.8
PO4		as P mg/L	0.03	---	8.02		5.31	---	5.41	---	3.39	---	2.4	---	1.32
Total CN		mg/L	0.01	---	0.76		0.18	---	0.25	---	0.2	---	0.26	---	0.27
CN WAD		mg/L	0.01	---	0.05		0.01	---	0.01	---	< 0.01	---	0.01	---	< 0.01
CN free		mg/L	0.005	---	0.052		0.011	---	0.011	---	0.008	---	0.013	---	< 0.005
CNO		mg/L	1	---	710		490	---	390	---	190	---	110	---	89
SCN		mg/L	0.2	---	200		230	---	240	---	250	---	260	---	250
Sulphate	Turbidity	mg/L	1		8041		6883.5		10422.4		8419	---	9817.3	---	8966.7
Ion Balance															
Major Anions	Calc	meq/L	-		207.27		173.49		241.81		192.04		218.56		197.36
Major Cations	Calc	meq/L	-		202.56		214.67		184.24		172.85		178.22		210.85
Difference	Calc	meq/L	-		4.71		-41.19		57.58		19.20		40.34		-13.49
Balance (%)	Calc	%	-		1.2%		-10.6%		13.5%		5.3%		10.2%		-3.3%
Dissolved Metals															
Hardness		mg/L	0.05	1340	1340	1330	1360	1270	1260	1100	1120	1460	1480.00	1380	1440.00
Aluminum	ICP-MS	mg/L	0.001	0.160	0.040	0.530	0.032	0.170	0.030	0.220	0.050	0.498	0.028	0.239	0.023
Antimony	ICP-MS	mg/L	0.0009	0.127	0.125	0.137	0.135	0.122	0.120	0.126	0.125	0.1030	0.1030	0.0882	0.0848
Arsenic	ICP-MS	mg/L	0.0002	21.00	21.00	16.40	15.60	13.40	13.30	8.66	8.73	5.8900	5.9300	4.4600	4.1500
Barium	ICP-MS	mg/L	0.00002	0.1580	0.1610	0.0802	0.0956	0.0501	0.0511	0.0362	0.0345	0.03420	0.03780	0.02880	0.04110
Beryllium	ICP-MS	mg/L	0.000007	< 0.00007	< 0.00007	0.000014	< 0.000007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	0.000011	< 0.000007	<0.00001	< 0.000007
Bismuth	ICP-MS	mg/L	0.000010	< 0.0001	< 0.0001	< 0.00001	< 0.00001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.000020	< 0.00001	< 0.00001	< 0.00001
Boron	ICP-MS	mg/L	0.002	0.100	0.100	0.106	0.110	0.130	0.130	0.310	0.340	0.159	0.157	0.174	0.165
Cadmium	ICP-MS	mg/L	0.000003	0.000130	0.000250	0.000268	0.000254	0.000260	0.000220	0.000370	0.000270	0.000352	0.000248	0.000286	0.000197
Calcium	ICP-MS	mg/L	0.01	486	484	470	481	443	442	377	384	509.00	519.00	469.00	496.00
Chromium	ICP-MS	mg/L	0.00008	0.0050	0.0030	0.0066	0.0007	0.0021	< 0.0008	0.0027	< 0.0008	0.00824	0.00243	0.00294	< 0.00008
Cobalt	ICP-MS	mg/L	0.000004	2.720	2.690	1.810	1.830	1.390	1.380	0.901	0.912	1.110000	1.150000	1.010000	0.957000
Copper	ICP-MS	mg/L	0.0002	1.430	1.370	1.470	1.300	1.000	0.972	0.505	0.465	0.4160	0.2990	0.2310	0.1520
Iron	ICP-MS	mg/L	0.007	0.370	< 0.07	3.000	0.082	1.130	< 0.07	1.440	0.080	2.120	0.020	1.070	0.009
Lead	ICP-MS	mg/L	0.000090	< 0.0009	< 0.0009	0.00240	0.00047	0.00170	0.00110	0.00110	< 0.0009	0.001890	0.000760	0.000910	0.000300
Lithium	ICP-MS	mg/L	0.0001	0.0080	0.0080	0.0089	0.0091	0.0100	0.0090	0.0090	0.0090	0.0129	0.0118	0.0095	0.0104
Magnesium	ICP-MS	mg/L	0.001	32.0	32.3	38.9	39.4	39.0	38.4	38.9	39.1	45.300	44.100	49.500	49.900
Manganese	ICP-MS	mg/L	0.00001	0.0551	0.0463	0.1230	0.0549	0.0792	0.0512	0.0819	0.0553	0.11900	0.07530	0.11200	0.08380
Mercury (total)	CVAAS	mg/L	0.00001	0.00001	0.00002	0.00010	0.00005	0.00004	0.00003	0.00001	0.00001	0.00002	< 0.00001	0.00003	<0.00001
Molybdenum	ICP-MS	mg/L	0.00004	0.0668	0.0763	0.0754	0.0743	0.0723	0.0718	0.0695	0.0708	0.07860	0.07930	0.07330	0.07210
Nickel	ICP-MS	mg/L	0.0001	0.169	0.158	0.176	0.123	0.132	0.118	0.133	0.116	0.2210	0.1910	0.2560	0.1670
Phosphorus	ICP-MS	mg/L	0.003	0.030	0.030	0.043	0.021	< 0.03	< 0.03	< 0.03	< 0.03	0.086	0.067	0.026	0.023
Potassium	ICP-MS	mg/L	0.009	38.0	39.5	41.0	41.9	38.8	38.8	33.4	34.0	45.500	44.400	39.500	39.100
Selenium	ICP-MS	mg/L	0.00004	0.0273	0.0281	0.0179	0.0166	0.0157	0.0166	0.0120	0.0102	0.01085	0.00880	0.01500	0.01570
Silicon	ICP-MS	mg/L	0.02	6.60	6.60	6.65	5.73	5.80	5.50	5.20	5.20	7.15	6.19	4.94	4.63
Silver	ICP-MS	mg/L	0.00005	< 0.0005	< 0.0005	< 0.00005	0.00008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.00007	0.00020	< 0.00005	0.00009
Sodium	ICP-MS	mg/L	0.01	3726	3895	4040	4150	3440	3490	3210	3280	3229.00	3240.00	4130.00	4010.00
Strontium	ICP-MS	mg/L	0.00002	0.322	0.320	0.332	0.341	0.339	0.332	0.287	0.288	0.26500	0.27100	0.33700	0.34700
Sulfur	ICP-MS	mg/L	1	2890	3000	3210	3220	3160	3090	3050	3060	3180	3187	3670	3590
Thallium	ICP-MS	mg/L	0.000005	0.000060	< 0.00005	< 0.000005	< 0.000005	0.000060	0.000050	0.000080	0.000070	0.000060	0.000070	0.000069	0.000055
Tin	ICP-MS	mg/L	0.00006	< 0.0006	< 0.0006	< 0.00006	< 0.00006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	0.00087	0.00077	0.00014	0.00014
Titanium	ICP-MS	mg/L	0.00005	0.00640	< 0.0005	0.00201	0.00025	< 0.0007	< 0.0007	0.00730	< 0.0007	0.04223	0.00020	0.01740	0.00014
Uranium	ICP-MS	mg/L	0.000002	0.00297	0.00288	0.00311	0.00303	0.00333	0.00310	0.00309	0.00295	0.002500	0.002600	0.002320	0.002390
Vanadium	ICP-MS	mg/L	0.00001	0.0118	0.0104	0.0111	0.0083	0.0070	0.0066	0.0058	0.0047	0.00508	0.00357	0.00356	0.00314
Zinc	ICP-MS	mg/L	0.002	0.030	0.020	0.069	0.030	0.040	0.030	0.070	0.030	0.051	0.029	0.038	0.023
Zirconium	ICP-MS	mg/L	0.002	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.002	< 0.002	< 0.002	< 0.002

SGS

SGS proposal: 19736-PR-R1
SGS project #: 2244

Work order date: 15-May-23
Report date: 19-Dec-23
Sample receipt date: 15-May-23
Version: Partial draft

Aging Tests - OXIC

Sample ID - as per label / Time				Oxic-0-Test 3 June 12 2023 Unfiltered Time zero	Oxic-0-Test 3 June 12 2023 filtered Time zero	Oxic-1-Test 3 June 26 2023 Unfiltered 2 weeks	Oxic-1-Test 3 June 26 2023 filtered 2 weeks	Oxic-2-Test 3 July 12 2023 unfiltered 1 month	Oxic-2-Test 3 July 12 2023 filtered 1 month	Oxic-3-Test 3 Aug 11 2023 unfiltered 2 months	Oxic-3-Test 3 Aug 11 2023 filtered 2 months	Oxic-4-Test 3 Sep 12 2023 unfiltered 3 months	Oxic-4-Test 3 Sep 12 2023 filtered 3 months
Parameter	**Method**	**Units**	**RDL**										
pH	meter		0.01	8.56	8.57	8.58	8.65	8.55	8.52	8.41	8.37	8.29	8.25
Redox	meter	mV	1	85	88	186.08	146.47	190.67	186.64	155.49	183.81	216.58	260.37
Conductivity	meter	uS/cm	1	10166	10183	10188.7	10212.6	10139	10185.1	10721.5	10736.4	10622.9	10719.5
Acidity (to pH 4.5)	titration	mg CaCO3/L	0.1		0.0		0		0		0		0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	0.1		0.0		0		0		0		3.01
Alkalinity	titration	mg CaCO3/L	0.1		177.2		229.23		207.35		173.73		159.93
Total Dissolved Solids		mg/L	2	---	7530	---	7900	---	7860	---	8400	---	8880
Total Suspended Solids		mg/L	30	86.0	---	33	---	42	---	45	---	31	---
Bromide		mg/L	0.3	---	< 3	---	< 3	---	< 3	---	< 3	---	< 3
Chloride		mg/L	0.2	---	6.8	---	2.4	---	7.3	---	6.3	---	7.5
Nitrite (as N)		as N mg/L	0.03	---	< 0.3	---	< 0.3	---	< 0.3	---	< 0.3	---	< 0.3
Nitrate (as N)		as N mg/L	0.06	---	< 0.6	---	< 0.6	---	< 0.6	---	< 0.6	---	< 0.6
Thiosalts as S2O3		as S2O3 mg/L	10			---	**	---	**	---	**	---	**
Thiosulfate		mg/L	0.2			---	< 20	---	< 20	---	< 2	---	< 10
Fluoride		mg/L	0.06	---	0.34	---	0.41	---	0.35	---	0.28	---	0.24
DOC		mg/L	1	---	46.0	---	31	---	43	---	6	---	24
NH3+NH4 (as N)		as N mg/L	0.1	---	3.1	---	16	---	14.4	---	51.2	---	24.8
PO4		as P mg/L	0.03	---	6.5	---	5.75	---	4.79	---	4.2	---	3.05
Total CN		mg/L	0.01	---	5.4	---	1.96	---	0.48	---	0.3	---	0.36
CN WAD		mg/L	0.01	---	0.01	---	0.01	---	0.03	---	0.01	---	0.01
CN free		mg/L	0.005	---	0.01	---	0.011	---	0.027	---	0.013	---	0.013
CNO		mg/L	1	---	210.0	---	170	---	170	---	7.8	---	100
SCN		mg/L	0.2	---	8.5	---	8	---	7.4	---	6.9	---	5.7
Sulphate	Turbidity	mg/L	1		6234.5		5959.7		5048.2		5383.9		5923.2
Ion Balance													
Major Anions	Calc	meq/L	-		139.42		133.58		114.18		116.54		129.60
Major Cations	Calc	meq/L	-		105.76		105.15		119.61		110.20		118.52
Difference	Calc	meq/L	-		33.66		28.42		-5.43		6.34		11.08
Balance (%)	Calc	%	-		13.7%		11.9%		-2.3%		2.8%		4.5%
Dissolved Metals													
Hardness		mg/L	0.05	374.0	356.0	446	413	649	638	636	640	1050	1080
Aluminum	ICP-MS	mg/L	0.001	0.78	0.030	0.62	0.06	0.34	0.05	0.60	0.06	0.100	0.420
Antimony	ICP-MS	mg/L	0.0009	0.048	0.05	0.053	0.055	0.052	0.052	0.042	0.043	0.0390	0.0350
Arsenic	ICP-MS	mg/L	0.0002	19.3	19.8000	15.7	16.4	14.0	13.3	10.9	10.9	7.16	7.58
Barium	ICP-MS	mg/L	0.00002	0.0583	0.05730	0.0688	0.0646	0.0908	0.0918	0.0806	0.0796	0.0710	0.0704
Beryllium	ICP-MS	mg/L	0.000007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	< 0.00007
Bismuth	ICP-MS	mg/L	0.000010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Boron	ICP-MS	mg/L	0.002	0.090	0.090	0.10	0.12	0.11	0.12	0.17	0.16	0.170	0.160
Cadmium	ICP-MS	mg/L	0.000003	< 0.00003	< 0.00003	0.00004	0.00006	< 0.00003	0.00005	< 0.00003	< 0.00003	0.000090	0.000060
Calcium	ICP-MS	mg/L	0.01	108.0	104	137	124	210	204	212	213	353.00	366.00
Chromium	ICP-MS	mg/L	0.00008	0.0172	0.00680	0.0110	< 0.0008	0.0051	< 0.0008	0.0093	< 0.0008	< 0.0008	0.00640
Cobalt	ICP-MS	mg/L	0.000004	1.44000	1.4700	0.974	1.090	1.050	1.060	0.642	0.631	0.8980	0.8540
Copper	ICP-MS	mg/L	0.0002	0.0140	0.1700	0.041	0.134	0.072	0.089	0.262	0.098	0.117	0.081
Iron	ICP-MS	mg/L	0.007	2.610	1.780	1.41	0.92	2.09	0.28	1.78	< 0.07	0.170	1.790
Lead	ICP-MS	mg/L	0.000090	< 0.0009	< 0.0009	0.0018	0.0009	0.0010	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.001500
Lithium	ICP-MS	mg/L	0.0001	0.0050	0.0040	0.005	0.005	0.006	0.006	0.006	0.006	0.0090	0.0070
Magnesium	ICP-MS	mg/L	0.001	25.3	23.2	25.1	24.8	30.5	31.1	26.0	26.2	41.600	40.800
Manganese	ICP-MS	mg/L	0.00001	0.11	0.02	0.0483	0.0158	0.0756	0.0248	0.0639	0.0211	0.04180	0.08150
Mercury (total)	CVAAS	mg/L	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	< 0.00001	< 0.00001	< 0.00001	0.00003
Molybdenum	ICP-MS	mg/L	0.00004	0.02090	0.0252	0.0263	0.0278	0.0331	0.0306	0.0256	0.0275	0.02770	0.02650
Nickel	ICP-MS	mg/L	0.0001	0.0710	0.042	0.025	0.005	0.041	0.013	0.048	0.017	0.0130	0.0340
Phosphorus	ICP-MS	mg/L	0.003	< 0.03	< 0.03	< 0.03	< 0.03	0.030	< 0.03	0.060	0.030	< 0.03	< 0.03
Potassium	ICP-MS	mg/L	0.009	37.30	38	39.6	40.4	42.8	44.7	41.4	42.3	45.200	46.200
Selenium	ICP-MS	mg/L	0.00004	0.00530	0.00600	0.0059	0.0061	0.0050	0.0052	0.0043	0.0051	0.00390	0.00410
Silicon	ICP-MS	mg/L	0.02	6.00	5.00	4.5	4.0	5.0	5.0	4.9	4.5	5.0	7.0
Silver	ICP-MS	mg/L	0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Sodium	ICP-MS	mg/L	0.01	2120.00	2170.00	2060	2120	2310	2360	2068	2092	2140	2130
Strontium	ICP-MS	mg/L	0.00002	0.134	0.13	0.166	0.155	0.234	0.232	0.261	0.262	0.346	0.341
Sulfur	ICP-MS	mg/L	1	1860	1930	1600	1690	1830	1870	1770	1790	1940	1970
Thallium	ICP-MS	mg/L	0.000005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.000050	< 0.00005	< 0.00005	< 0.00005
Tin	ICP-MS	mg/L	0.00006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	0.00100
Titanium	ICP-MS	mg/L	0.00005	0.0125	< 0.0007	0.16200	< 0.0007	0.01500	< 0.0007	0.01540	< 0.0007	< 0.0007	0.00190
Uranium	ICP-MS	mg/L	0.000002	0.001630	0.001680	0.00210	0.00217	0.00203	0.00197	0.00179	0.00208	0.00216	0.00210
Vanadium	ICP-MS	mg/L	0.00001	0.02180	0.01970	0.0203	0.0178	0.0160	0.0141	0.0133	0.0160	0.0078	0.0090
Zinc	ICP-MS	mg/L	0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Zirconium	ICP-MS	mg/L	0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0002	< 0002	< 0.02	< 0.02	< 0.02	< 0.02

Oxic-5-Test 3 Oct 12 2023 unfiltered 4 months	Oxic-5-Test 3 Oct 12 2023 filtered 4 months
8.23	8.22
245.62	275.37
10966.8	10947.6
	0
	3.21
	145.45
---	9080
39	---
---	< 3
---	9.2
---	< 0.3
---	< 0.6
---	**
---	< 10
---	0.24
---	25
---	48
---	2.51
---	0.58
---	0.01
---	0.01
---	83
---	5.4
	5360.2
	117.16
	128.15
	-10.99
	-4.5%
1170	1190
0.300	0.030
0.0330	0.0320
6.72	6.11
0.0560	0.0612
< 0.00007	0.000100
< 0.0001	< 0.0001
0.200	0.220
0.000050	0.000040
395.00	398.00
0.00410	< 0.0008
0.8960	0.9100
0.043	0.078
2.160	0.160
< 0.0009	< 0.0009
0.0080	0.0090
44.700	47.400
0.09620	0.04970
< 0.00001	< 0.00001
0.02830	0.02800
0.0400	0.0150
0.040	< 0.03
48.900	48.200
0.00510	0.00480
5.2	4.7
< 0.0005	< 0.0005
2260	2270
0.382	0.391
2210	2210
< 0.00005	0.000050
< 0.0006	< 0.0006
< 0.0007	< 0.0007
0.00192	0.00205
0.0086	0.0068
< 0.02	< 0.02
< 0.02	< 0.02

SGS

SGS proposal: 19736-PR-R1
SGS project #: 2244

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Version: Partial draft

Aging Test - Anoxic

Sample ID				AnOxic-1-Test 1 June 15 2023 Unfiltered	AnOxic-1-Test 1 June15 2023 filtered	AnOxic-2-Test 1 July 14 2023 Unfiltered	AnOxic-2-Test 1 July 14 2023 filtered	AnOxic-3-Test1 Sep15 2023 Unfiltered	AnOxic-3-Test 1 Sep 15 2023 filtered	AnOxic4-Test1 Nov15 2023 Unfiltered	AnOxic4-Test 1 Nov15 2023 filtered
Time				1 month	1 month	2 months	2 months	4 months	4 months	6 months	6 months
Parameter	**Method**	**Units**	**RDL**								
pH	meter		0.01	8.72	8.7	8.44	8.43	8.6	8.61	8.39	8.39
Redox	meter	mV	1	225.11	229.3	229.15	239.76	143.66	134.69	198.38	257.28
Conductivity	meter	uS/cm	1	9220.6	9271	9617.1	9637.1	9369.4	9404.6	9536.4	9563.8
Acidity (to pH 4.5)	titration	mg CaCO3/L	0.1		0		0		0		0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	0.1		0		0		0		0
Alkalinity	titration	mg CaCO3/L	0.1		261.68		236.32		260.6		209.25
Tota Dissolved Solids		mg/L	2	---	6990		7520	---	7410	---	7180
Total Suspended Solids		mg/L	30	135	---	30		41	---	111	---
Bromide		mg/L	0.3	---	< 3		<3	---	< 3	---	< 3
Chloride		mg/L	0.2	---	7		6.8	---	8.8	---	8
Nitrite (as N)		as N mg/L	0.03	---	< 0.3		<0.3	---	< 0.3	---	0.32
Nitrate (as N)		as N mg/L	0.06	---	< 0.6		<0.6	---	< 0.6	---	<0.6
Thiosalts as S2O3		as S2O3 mg/L	10	---	< 10			---	**	---	**
Thiosulfate							<20	---	< 2	---	< 2
Fluoride		mg/L	0.06	---	0.35		0.32	---	0.41	---	0.3
DOC		mg/L	1	---	59		51	---	49	---	19
NH3+NH4 (as N)		as N mg/L	0.1	---	23		28.7	---	37.9	---	36.5
PO4		mg/L	0.03	---	4.45		2.26	---	0.8	---	2.32
Total CN		mg/L	0.01	---	0.4		0.37	---	0.51	---	0.32
CN WAD		mg/L	0.01	---	0.05		0.03	---	0.09	---	0.04
CN free		mg/L	0.005	---	0.054		0.032	---	0.086	---	0.044
CNO		mg/L	1	---	220		150	---	99	---	51
SCN		mg/L	0.2	---	39		36	---	42	---	44
Sulphate	Turbidity	mg/L	1		4393.7		4188		4562.8		5762
Ion Balance											
Major Anions	Calc	meq/L	-		103.33		96.60		103.70		126.69
Major Cations	Calc	meq/L	-		96.97		92.74		92.08		98.58
Difference	Calc	meq/L	-		6.36		3.86		11.62		28.11
Balance (%)	Calc	%	-		3.2%		2.0%		5.9%		12.5%
Dissolved Metals											
Hardness		mg/L	0.05	363	342	590	575	376.00	384.00	436.00	478.00
Aluminum	ICP-MS	mg/L	0.001	1.200	0.05	0.690	0.04	1.380	0.04	0.610	0.06
Antimony	ICP-MS	mg/L	0.0009	0.0524	0.056	0.0520	0.052	0.0436	0.044	0.0460	0.046
Arsenic	ICP-MS	mg/L	0.0002	11.30	11.20	7.91	7.9	10.8000	10.1	6.6800	7.2
Barium	ICP-MS	mg/L	0.00002	0.08250	0.0832	0.08840	0.0845	0.07530	0.0736	0.08160	0.0819
Beryllium	ICP-MS	mg/L	0.000007	0.000050	< 0.00007	< 0.00007	< 0.00007	0.000031	< 0.000007	< 0.00007	< 0.00007
Bismuth	ICP-MS	mg/L	0.000010	0.000030	< 0.0001	< 0.0001	< 0.0001	< 0.00001	< 0.00001	< 0.0001	< 0.0001
Boron	ICP-MS	mg/L	0.002	0.095	0.09	0.090	0.09	0.107	0.10	0.120	0.12
Cadmium	ICP-MS	mg/L	0.000003	0.000190	0.00036	0.000220	0.00021	0.000043	0.00003	0.000110	0.00009
Calcium	ICP-MS	mg/L	0.01	104	99.6	188	185.0	106.00	112.0	130.00	144.0
Chromium	ICP-MS	mg/L	0.00008	0.01780	< 0.0008	0.00840	< 0.0008	0.01860	< 0.00008	0.00750	< 0.0008
Cobalt	ICP-MS	mg/L	0.000004	1.11	1.11	0.936	0.93	0.855000	0.85	0.480000	0.53
Copper	ICP-MS	mg/L	0.0002	0.8130	0.772	0.4560	0.403	0.4970	0.366	0.3070	0.271
Iron	ICP-MS	mg/L	0.007	5.480	< 0.07	1.740	0.1	1.980	0.017	2.990	< 0.07
Lead	ICP-MS	mg/L	0.000090	0.001760	< 0.0009	0.001200	< 0.0009	0.000650	0.00026	0.002200	< 0.0009
Lithium	ICP-MS	mg/L	0.0001	0.0089	0.008	0.0080	0.007	0.0069	0.008	0.0080	0.008
Magnesium	ICP-MS	mg/L	0.001	25.200	22.8	29.400	27.4	26.800	25.6	27.100	29.1
Manganese	ICP-MS	mg/L	0.00001	0.13200	0.0132	0.05980	0.0231	0.05130	0.0104	0.10000	0.0195
Mercury (total)	CVAAS	mg/L	0.00001	0.00003	< 0.0001	0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001
Molybdenum	ICP-MS	mg/L	0.00004	0.03880	0.0396	0.03780	0.0395	0.03970	0.0398	0.04650	0.0434
Nickel	ICP-MS	mg/L	0.0001	0.0965	0.014	0.0470	0.020	0.0391	0.010	0.0640	0.012
Phosphorus	ICP-MS	mg/L	0.003	0.070	< 0.03	< 0.03	< 0.03	0.023	0.006	0.050	0.04
Potassium	ICP-MS	mg/L	0.009	40.7	41.1	37.7	38.2	37.100	37.2	36.400	41.6
Selenium	ICP-MS	mg/L	0.00004	0.00667	0.0079	0.00780	0.0070	0.00832	0.0082	0.00810	0.0067
Silicon	ICP-MS	mg/L	0.02	6.82	5.1	4.40	3.7	5.34	4.0	5.40	4.8
Silver	ICP-MS	mg/L	0.00005	< 0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.00005	< 0.00005	< 0.0005	< 0.0005
Sodium	ICP-MS	mg/L	0.01	1950	1970	1760	1770	1830.00	1820	1702.00	1936
Strontium	ICP-MS	mg/L	0.00002	0.155	0.149	0.257	0.254	0.17000	0.177	0.20800	0.224
Sulfur	ICP-MS	mg/L	1	1620	1620	1570	1580	1440	1420	1304	1672
Thallium	ICP-MS	mg/L	0.000005	0.00005	0.00007	0.00012	0.00012	0.000098	0.00009	0.000130	0.00013
Tin	ICP-MS	mg/L	0.00006	0.00019	< 0.0006	0.00070	< 0.0006	0.00036	0.00019	0.00110	< 0.0006
Titanium	ICP-MS	mg/L	0.00005	0.00259	< 0.0007	0.00640	< 0.0007	0.05570	0.0001	0.01420	< 0.0007
Uranium	ICP-MS	mg/L	0.000002	0.00189	0.00180	0.00192	0.00197	0.001610	0.00169	0.001710	0.00182
Vanadium	ICP-MS	mg/L	0.00001	0.01670	0.0098	0.01140	0.0057	0.01150	0.0064	0.00740	0.0060
Zinc	ICP-MS	mg/L	0.002	0.037	0.02	0.080	0.05	0.010	0.00	0.030	< 0.02
Zirconium	ICP-MS	mg/L	0.002	< 0.002	< 0.02	< 0.02	< 0.02	0.002	< 0.002	< 0002	< 0002

SGS

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SGS project #: 2244

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Report date: 19-Dec-23
Sample receipt date: 15-May-23
Version: Partial draft

Aging Test - Anoxic

Sample ID				AnOxic-1-Test 2 June 26 2023 Unfiltered	AnOxic-1-Test 2 June 26 2023 filtered	AnOxic-1-Test 2 July 26 2023 Unfiltered	AnOxic-1-Test 2 July 26 2023 filtered	AnOxic-3-Test 2 Sep23 2023 Unfiltered	AnOxic-3-Test 2 Sep23 2023 filtered	AnOxic-4-Test 2 Nov27 2023 Unfiltered	AnOxic-4-Test 2 Nov27 2023 filtered
Time				1 month	1 month	2 months	2 months	4 months	4 months	6 months	6 months
Parameter	**Method**	**Units**	**RDL**								
pH	meter		0.01	8.42	8.44	8.31	8.31	8.37	8.36	8.19	8.17
Redox	meter	mV	1	146.57	151.31	209	209.06	117.29	113.42	148.28	169.06
Conductivity	meter	uS/cm	1	16038.2	15870.1	16287	16288.8	16170.8	16281.8	16264.3	16341.9
Acidity (to pH 4.5)	titration	mg CaCO3/L	0.1		0		0		0		0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	0.1		0		3.68		0		12.2
Alkalinity	titration	mg CaCO3/L	0.1		540.48		357		309.75		296.2
Tota Dissolved Solids		mg/L	2	---	14000		13800	---	13600	---	14000
Total Suspended Solids		mg/L	30	22	---	45		74	---	52	---
Bromide		mg/L	0.3	---	< 3		<3	---	< 3	---	< 3
Chloride		mg/L	0.2	---	6.5		8.1	---	< 20	---	9.8
Nitrite (as N)		as N mg/L	0.03	---	< 0.3		<0.3	---	< 0.3	---	< 0.3
Nitrate (as N)		as N mg/L	0.06	---	< 0.6		<0.6	---	< 0.6	---	< 0.6
Thiosalts as S2O3		as S2O3 mg/L	10	---	**			---	**	---	21
Thiosulfate				---	< 20		<20	---	< 10		
Fluoride		mg/L	0.06	---	0.30		0.26	---	0.18	---	0.19
DOC		mg/L	1	---	165		141	---	135	---	99
NH3+NH4 (as N)		as N mg/L	0.1	---	45.1		71.8	---	89.3	---	80.6
PO4		mg/L	0.03	---	5.65		4.18	---	2.30	---	1.76
Total CN		mg/L	0.01	---	0.56		0.72	---	0.70	---	0.61
CN WAD		mg/L	0.01	---	0.04		0.09	---	0.06	---	0.07
CN free		mg/L	0.005	---	0.045		0.094	---	0.062	---	0.072
CNO		mg/L	1	---	410		220	---	85	---	28
SCN		mg/L	0.2	---	250		250	---	270	---	290
Sulphate	Turbidity	mg/L	1		9989.9		8495		8498.7		9872.7
Ion Balance											
Major Anions	Calc	meq/L	-		233.75		194.32		190.16		217.46
Major Cations	Calc	meq/L	-		178.34		150.33		209.41		209.62
Difference	Calc	meq/L	-		55.41		43.99		-19.25		7.84
Balance (%)	Calc	%	-		13.4%		12.8%		-4.8%		1.8%
Dissolved Metals											
Hardness		mg/L	0.05	1080	1090	1050	911	1040	1060	1200	1200
Aluminum	ICP-MS	mg/L	0.001	0.140	0.030	0.18	0.050	0.257	0.028	0.640	0.040
Antimony	ICP-MS	mg/L	0.0009	0.121	0.121	0.128	0.111	0.098	0.097	0.091	0.090
Arsenic	ICP-MS	mg/L	0.0002	13.70	14.10	10.50	8.97	8.31	7.89	5.51	5.25
Barium	ICP-MS	mg/L	0.00002	0.0524	0.0537	0.0431	0.0376	0.0369	0.0423	0.0347	0.0416
Beryllium	ICP-MS	mg/L	0.000007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	0.000013	< 0.000007	< 0.00007	< 0.00007
Bismuth	ICP-MS	mg/L	0.000010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.000020	< 0.00001	< 0.0001	< 0.0001
Boron	ICP-MS	mg/L	0.002	0.100	0.100	0.130	0.110	0.120	0.123	0.140	0.140
Cadmium	ICP-MS	mg/L	0.000003	0.00031	0.00021	0.00021	0.00019	0.00018	0.00016	0.00024	0.00014
Calcium	ICP-MS	mg/L	0.01	371	379	358	310	339	344	385	406
Chromium	ICP-MS	mg/L	0.00008	0.00170	< 0.0008	0.0013	< 0.0008	0.00345	< 0.00008	0.00900	< 0.0008
Cobalt	ICP-MS	mg/L	0.000004	2.49	2.50	1.98	1.71	2.17	2.16	1.90	1.88
Copper	ICP-MS	mg/L	0.0002	1.400	1.410	0.593	0.495	0.546	0.466	0.247	0.180
Iron	ICP-MS	mg/L	0.007	0.530	< 0.07	0.690	< 0.07	1.580	0.052	1.790	0.110
Lead	ICP-MS	mg/L	0.000090	0.0014	0.0010	< 0.0009	< 0.0009	0.0014	0.0005	0.0021	< 0.0009
Lithium	ICP-MS	mg/L	0.0001	0.009	0.009	0.009	0.008	0.009	0.010	0.014	0.016
Magnesium	ICP-MS	mg/L	0.001	36.100	36.000	37.3	33.000	47.600	48.000	53.600	55.800
Manganese	ICP-MS	mg/L	0.00001	0.05200	0.03910	0.05	0.03610	0.08720	0.04670	0.11100	0.07420
Mercury (total)	CVAAS	mg/L	0.00001	0.00005	0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	ICP-MS	mg/L	0.00004	0.06970	0.06950	0.06800	0.05880	0.07080	0.07170	0.06580	0.06740
Nickel	ICP-MS	mg/L	0.0001	0.096	0.084	0.096	0.071	0.100	0.069	0.128	0.088
Phosphorus	ICP-MS	mg/L	0.003	< 0.03	< 0.03	< 0.03	< 0.03	0.035	0.023	0.060	0.040
Potassium	ICP-MS	mg/L	0.009	36.8	37.4	34.0	30.1	40.1	40.3	44.6	44.4
Selenium	ICP-MS	mg/L	0.00004	0.0214	0.0208	0.0120	0.0105	0.0148	0.0158	0.0068	0.0064
Silicon	ICP-MS	mg/L	0.02	5.20	5.20	5.40	4.50	5.52	5.21	7.10	6.00
Silver	ICP-MS	mg/L	0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.00016	0.00044	< 0.0005	< 0.0005
Sodium	ICP-MS	mg/L	0.01	3350	3450	3330	2870	4040	4130	3800	4070
Strontium	ICP-MS	mg/L	0.00002	0.292	0.298	0.288	0.247	0.281	0.292	0.287	0.307
Sulfur	ICP-MS	mg/L	1	2960	2970	2980	3050	3390	3490	3970	4080
Thallium	ICP-MS	mg/L	0.000005	0.00005	0.00005	0.00005	< 0.00005	0.00006	0.00006	0.00008	0.00008
Tin	ICP-MS	mg/L	0.00006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	0.00011	0.00017	< 0.0006	< 0.0006
Titanium	ICP-MS	mg/L	0.00005	0.00140	< 0.0007	< 0.0007	< 0.0007	0.00472	< 0.00007	0.01680	< 0.0007
Uranium	ICP-MS	mg/L	0.000002	0.00300	0.00299	0.00298	0.00258	0.00271	0.00286	0.00305	0.00312
Vanadium	ICP-MS	mg/L	0.00001	0.0098	0.0068	0.0059	0.0048	0.0054	0.0049	0.0053	0.0054
Zinc	ICP-MS	mg/L	0.002	0.04	0.03	0.03	0.03	0.03	0.01	0.04	0.02
Zirconium	ICP-MS	mg/L	0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02

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SGS project #: 2244

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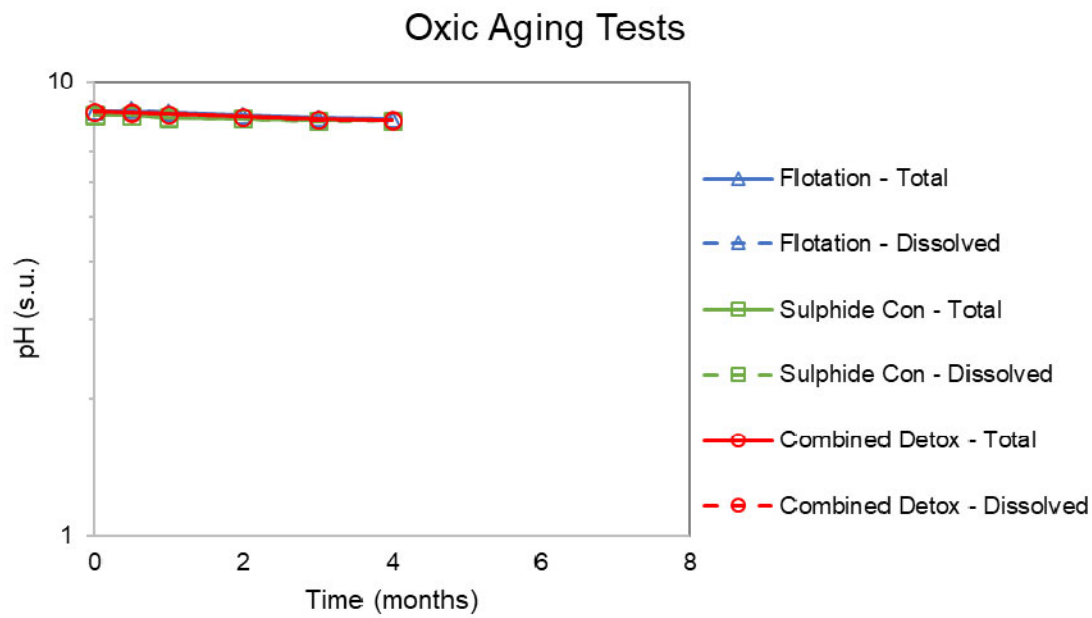
Version: Partial draft

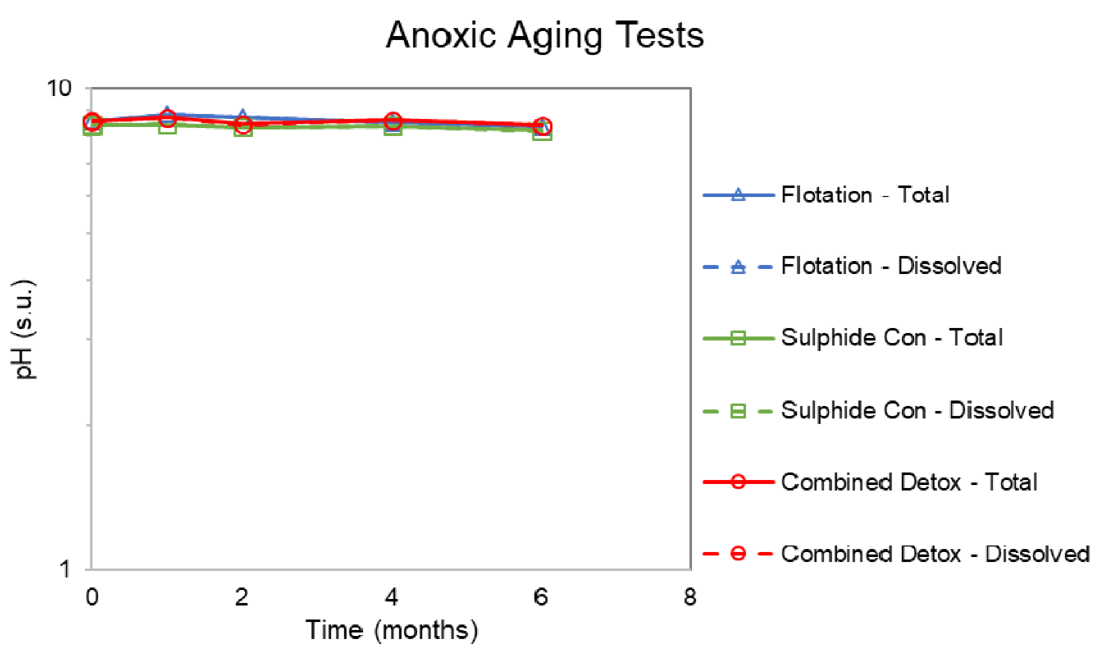
Aging Test - Anoxic

Sample ID				Anoxic-1-Test 3 - July 12 2023 unfiltered	Anoxic-1-Test 3 July 12 2023 filtered	Anoxic-2-Test 3 - Aug 11 2023 unfiltered	Anoxic-2-Test 3 Aug 11 2023 filtered	Anoxic-3-Test 3 - Oct 12 2023 unfiltered	Anoxic-3-Test 3 Oct 12 2023 filtered	AnOxic-4-Test 3 Dec12 2023 Unfiltered	AnOxic-4-Test 3 Dec 12 2023 filtered
Time				1 month	1 month	2 months	2 months	4 months	4 months	6 months	6 months
Parameter	**Method**	**Units**	**RDL**								
pH	meter		0.01	8.83	8.83	8.73	8.72	8.51	8.53	8.35	8.31
Redox	meter	mV	1	143.99	129.17	127	126	236	226	263.29	304.26
Conductivity	meter	uS/cm	1	10173.9	10227.3	10342	10406	10477	10503	10592.4	10730.4
Acidity (to pH 4.5)	titration	mg CaCO3/L	0.1		0		0.0		0.0		0
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	0.1		0		0.0		0.0		0
Alkalinity	titration	mg CaCO3/L	0.1		227.07		236.7		203.8		162.5
Tota Dissolved Solids		mg/L	2	---	7840	---	7860	---	6950		
Total Suspended Solids		mg/L	30	57	---	56.0	---	65.0	---		
Bromide		mg/L	0.3	---	< 3	---	< 3	---	< 3		
Chloride		mg/L	0.2	---	6.2	---	11.0	---	8.9		
Nitrite (as N)		as N mg/L	0.03	---	< 0.3	---	< 0.3	---	< 0.3		
Nitrate (as N)		as N mg/L	0.06	---	< 0.6	---	< 0.6	---	< 0.6		
Thiosalts as S2O3		as S2O3 mg/L	10	---	**	---	**	---	< 10		
Thiosulphate		mg/L		---	< 20	---	< 2	---	---		
Fluoride		mg/L	0.06	---	0.42	---	0.4	---	0.4		
DOC		mg/L	1	---	29	---	15.0	---	8.0		
NH3+NH4 (as N)		as N mg/L	0.1	---	22.9	---	41.8	---	49.2		
PO4		mg/L	0.03	---	6.05	---	6.7	---	6.2		
Total CN		mg/L	0.01	---	1.96	---	0.8	---	0.5		
CN WAD		mg/L	0.01	---	< 0.01	---	0.0	---	0.1		
CN free		mg/L	0.005	---	0.008	---	0.0	---	0.1		
CNO		mg/L	1	---	130	---	46.0	---	4.4		
SCN		mg/L	0.2	---	8.7	---	7.9	---	7.6		
Sulphate	Turbidity	mg/L	1		4591.6		5424.1		5216.6		6663.5
Ion Balance											
Major Anions	Calc	meq/L	-		104.23		119.94		113.86		
Major Cations	Calc	meq/L	-		117.48		104.76		116.06		
Difference	Calc	meq/L	-		-13.25		15.18		-2.20		
Balance (%)	Calc	%	-		-6.0%		6.8%		-1.0%		
Dissolved Metals											
Hardness		mg/L	0.05	311.00	293.00	290	288	391	380		
Aluminum	ICP-MS	mg/L	0.001	0.630	0.070	0.4	0.08	0.6	0.05		
Antimony	ICP-MS	mg/L	0.0009	0.0550	0.0540	0.047	0.046	0.043	0.043		
Arsenic	ICP-MS	mg/L	0.0002	18.0000	17.5000	16.1000	15.4	16.1000	16		
Barium	ICP-MS	mg/L	0.00002	0.05830	0.05880	0.05190	0.0730	0.06330	0.0650		
Beryllium	ICP-MS	mg/L	0.000007	< 0.00007	< 0.00007	< 0.00007	< 0.00007	0.00009	< 0.00007		
Bismuth	ICP-MS	mg/L	0.000010	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		
Boron	ICP-MS	mg/L	0.002	0.100	0.090	0.100	0.100	0.100	0.110		
Cadmium	ICP-MS	mg/L	0.000003	< 0.00003	0.000050	< 0.00003	0.000040	0.000050	0.000030		
Calcium	ICP-MS	mg/L	0.01	84.00	81.00	82	82.3	115	112.0		
Chromium	ICP-MS	mg/L	0.00008	0.00830	< 0.0008	0.00500	< 0.0008	0.00780	< 0.0008		
Cobalt	ICP-MS	mg/L	0.000004	1.390000	1.370000	1.2700	1.27000	1.2000	1.22000		
Copper	ICP-MS	mg/L	0.0002	0.2190	0.2840	0.3460	0.2620	0.1930	0.1370		
Iron	ICP-MS	mg/L	0.007	3.510	2.080	2.220	0.140	3.460	< 0.07		
Lead	ICP-MS	mg/L	0.000090	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.00090	< 0.0009		
Lithium	ICP-MS	mg/L	0.0001	0.0050	0.0040	0.0040	0.0040	0.0060	0.0060		
Magnesium	ICP-MS	mg/L	0.001	24.200	22.200	21.1	20.1	25.5	24.3		
Manganese	ICP-MS	mg/L	0.00001	0.09290	0.03970	0.06	0.01	0.09	0.01		
Mercury (total)	CVAAS	mg/L	0.00001	<0.00001	<0.00001	< 0.00001	< 0.00001	< 0.01	< 0.01		
Molybdenum	ICP-MS	mg/L	0.00004	0.02840	0.02730	0.0256	0.02510	0.0268	0.02640		
Nickel	ICP-MS	mg/L	0.0001	0.0580	0.0120	0.047	0.0120	0.068	0.0160		
Phosphorus	ICP-MS	mg/L	0.003	0.050	< 0.03	0.060	0.040	0.040	< 0.03		
Potassium	ICP-MS	mg/L	0.009	43.900	42.900	41	41.00	45	45.90		
Selenium	ICP-MS	mg/L	0.00004	0.00620	0.00640	0.00580	0.00500	0.00490	0.00520		
Silicon	ICP-MS	mg/L	0.02	5.00	4.00	4.30	3.90	5.00	4.30		
Silver	ICP-MS	mg/L	0.00005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	**< 0.0005**		
Sodium	ICP-MS	mg/L	0.01	2460.00	2440.00	2103.00	2129.00	2330.00000	2330.00000		
Strontium	ICP-MS	mg/L	0.00002	0.13000	0.12600	0.13	0.145	0.16200	0.16000		
Sulfur	ICP-MS	mg/L	1	1820	1810	1630	1650	2030.00000	2060.00000		
Thallium	ICP-MS	mg/L	0.000005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.00007	0.00008		
Tin	ICP-MS	mg/L	0.00006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006		
Titanium	ICP-MS	mg/L	0.00005	0.06990	< 0.0007	0.01000	< 0.0007	0.0043	< 0.0007		
Uranium	ICP-MS	mg/L	0.000002	0.001800	0.001820	0.001790	0.001820	**0.0019**	**0.00189**		
Vanadium	ICP-MS	mg/L	0.00001	0.02710	0.02390	0.02000	0.01750	**0.0194**	**0.0164**		
Zinc	ICP-MS	mg/L	0.002	< 0.02	0.070	0.020	< 0.02	**< 0.02**	**< 0.02**		
Zirconium	ICP-MS	mg/L	0.002	< 0002	< 0002	< 0.02	< 0.02	< 0.02	< 0.02		

Appendix J Aging Test Time Series Concentration Charts

Appendix J: Naartok West Metallurgical Tailings Aging Test Concentration Timeseries Charts





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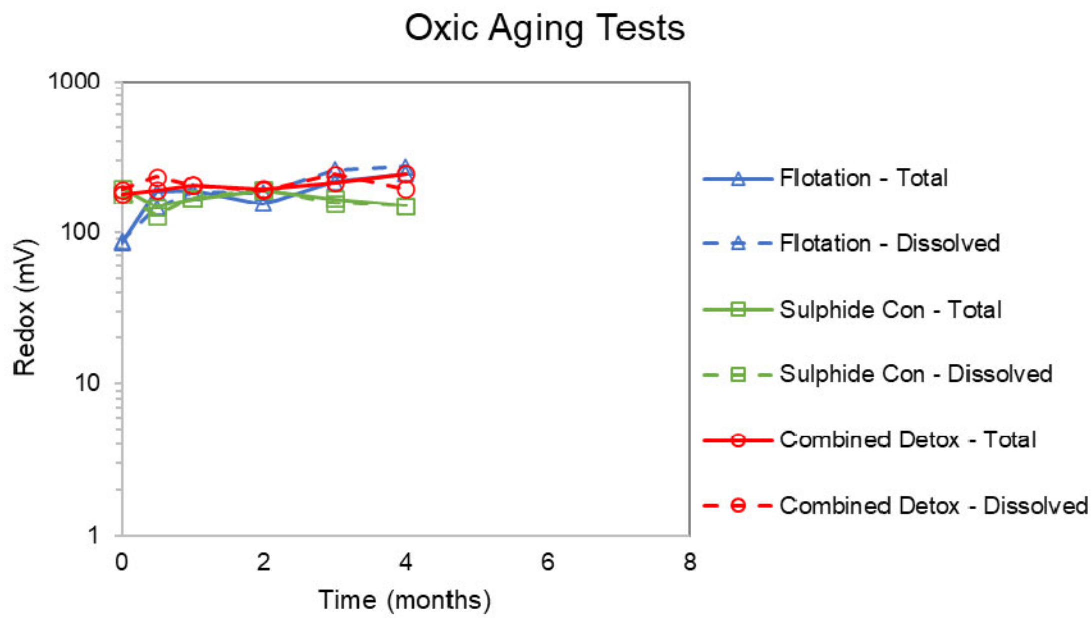

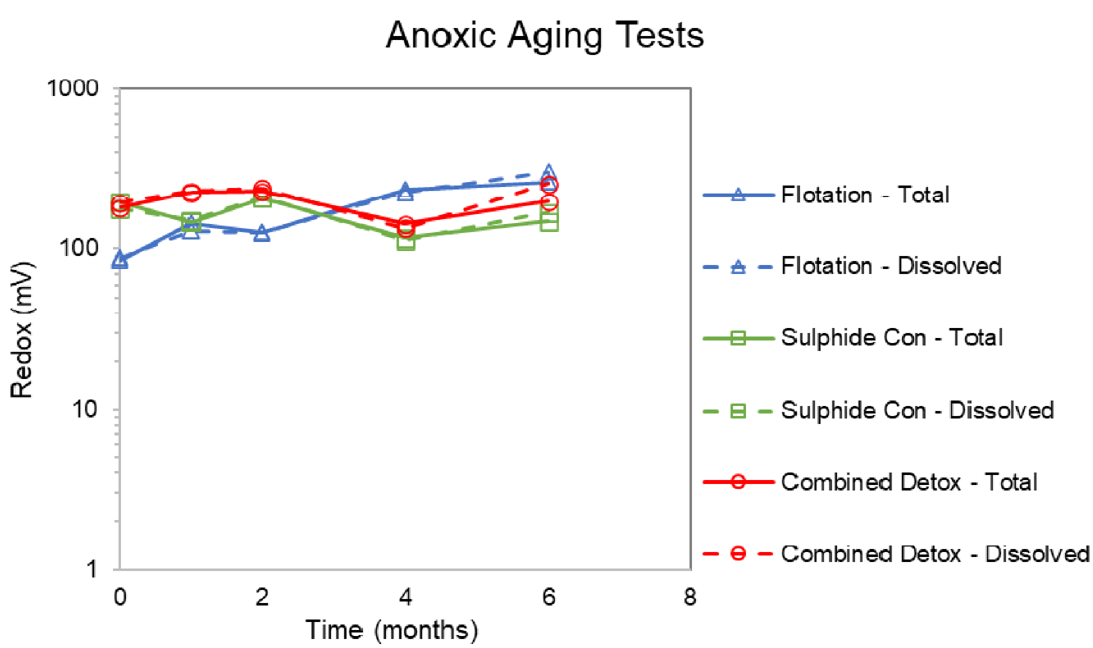

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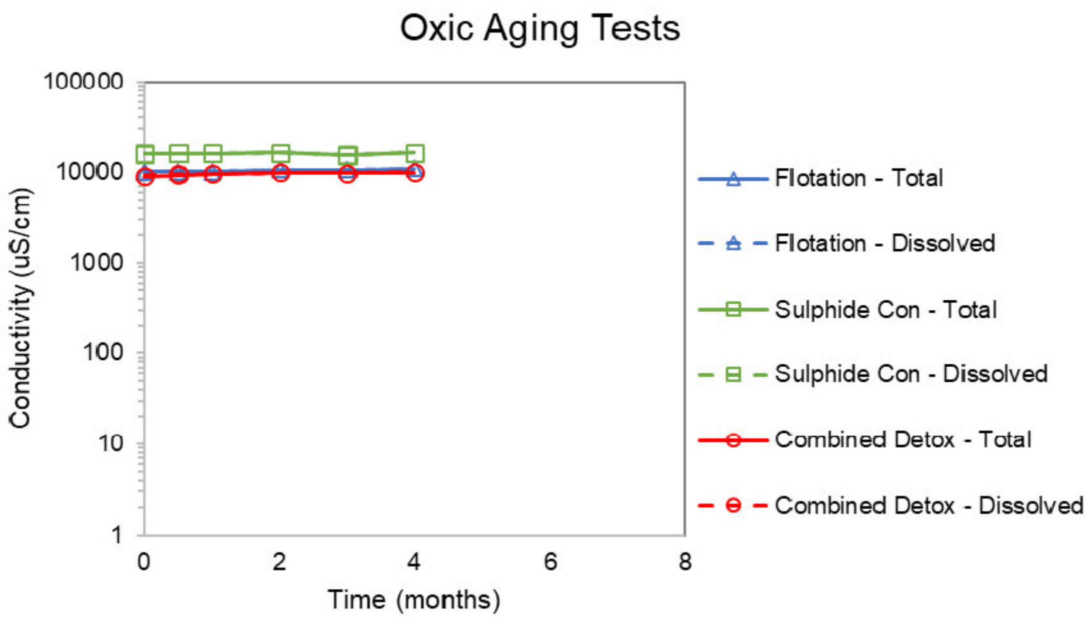

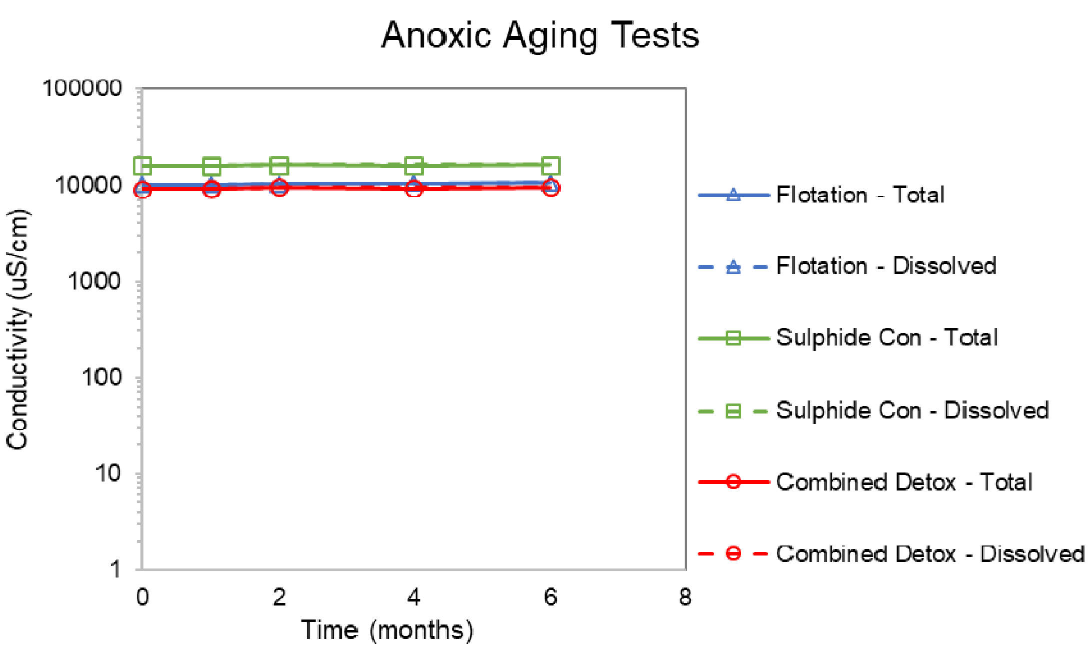

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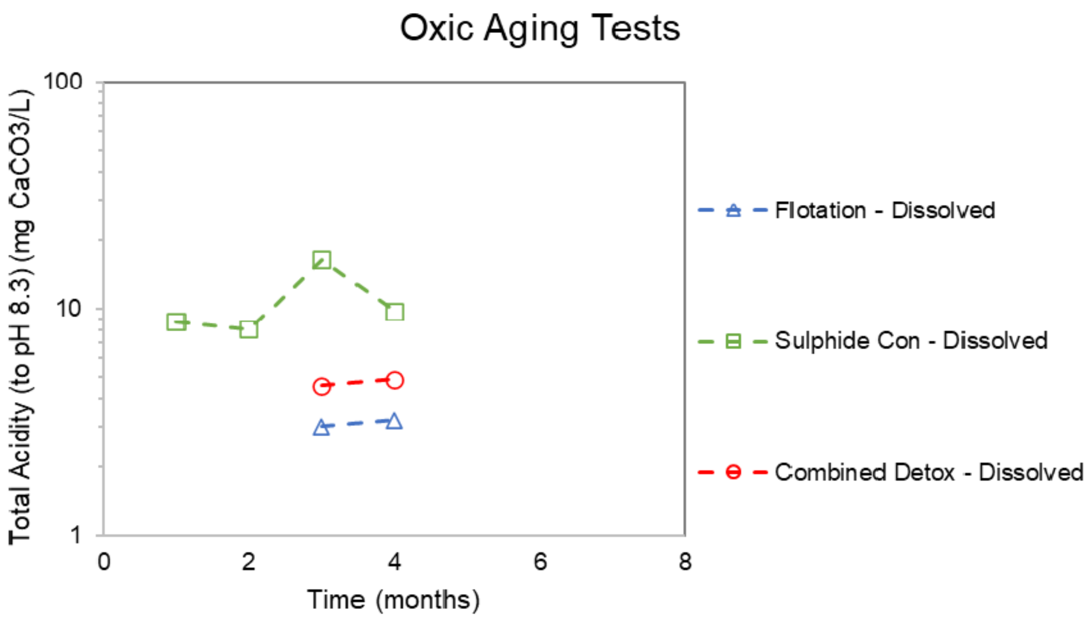

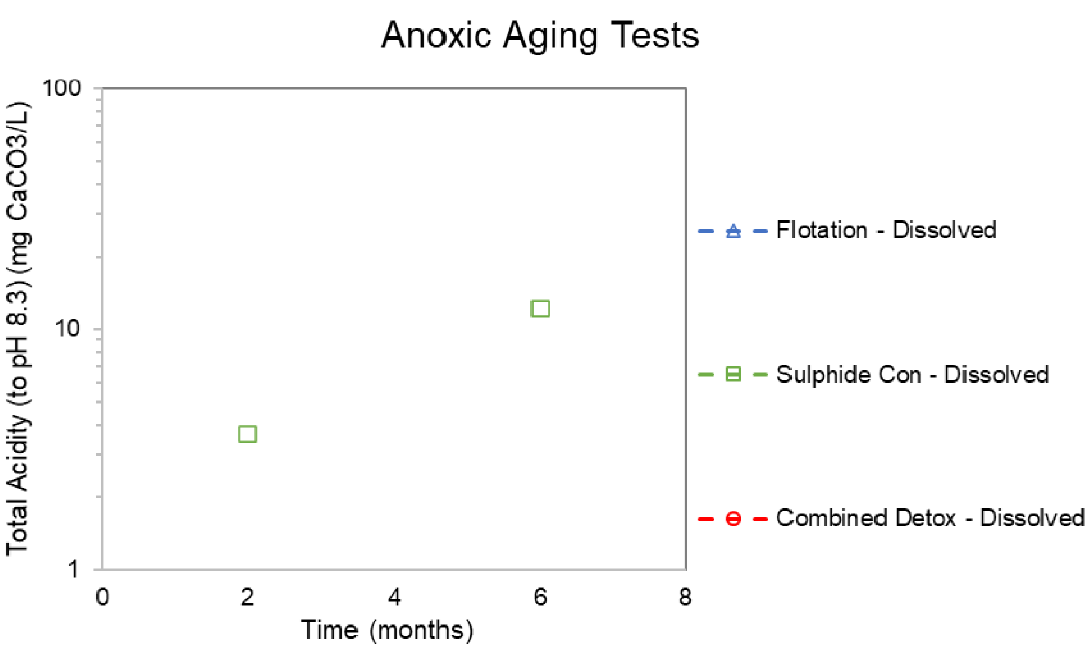

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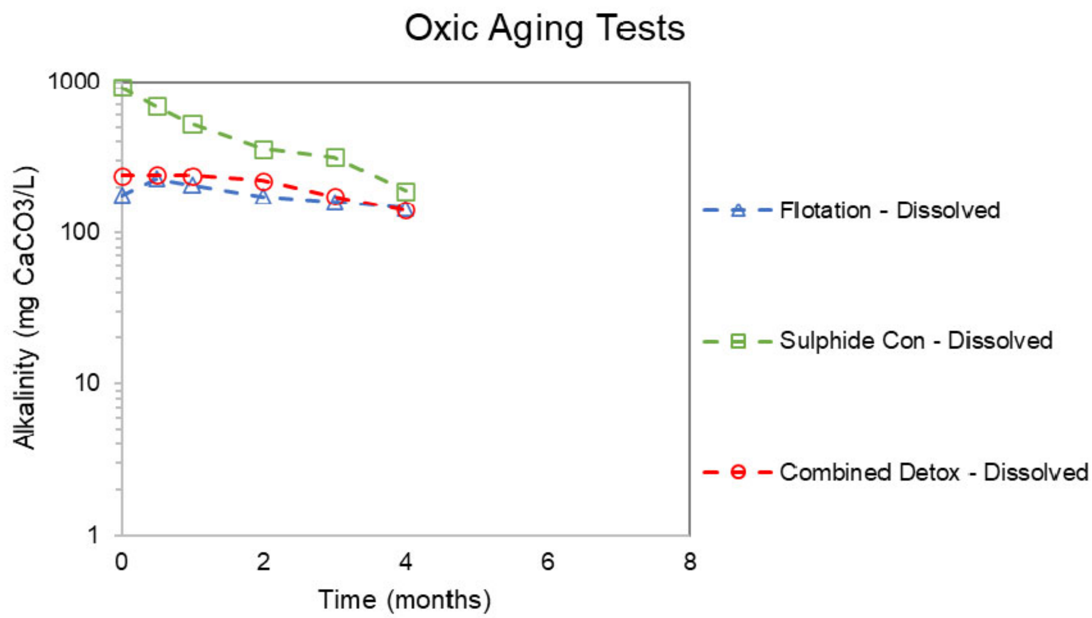

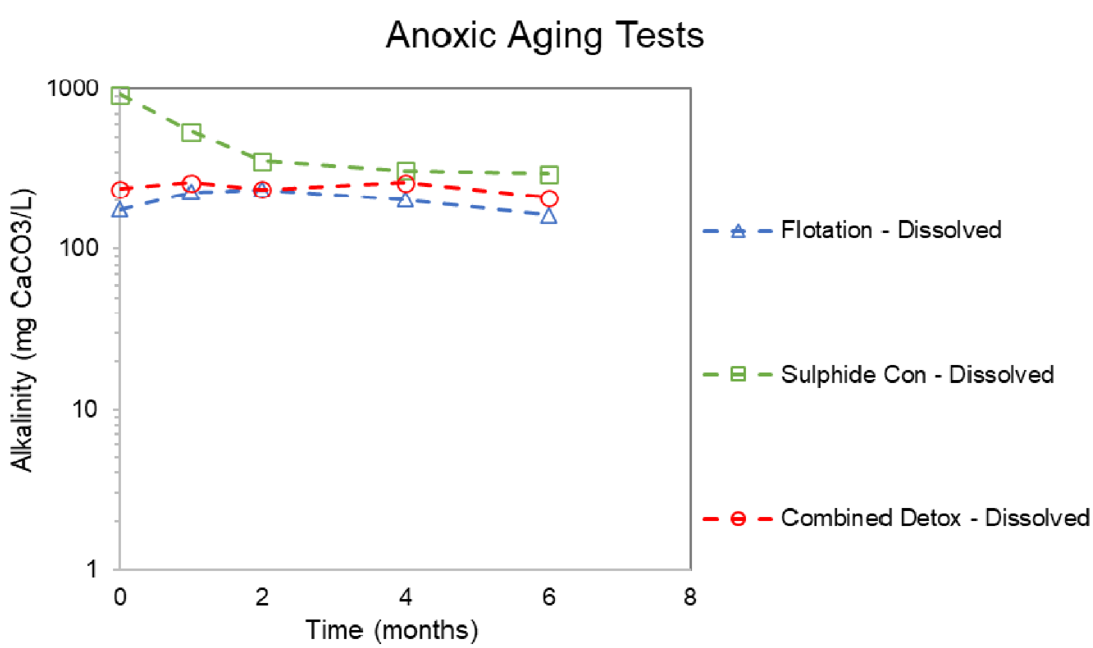

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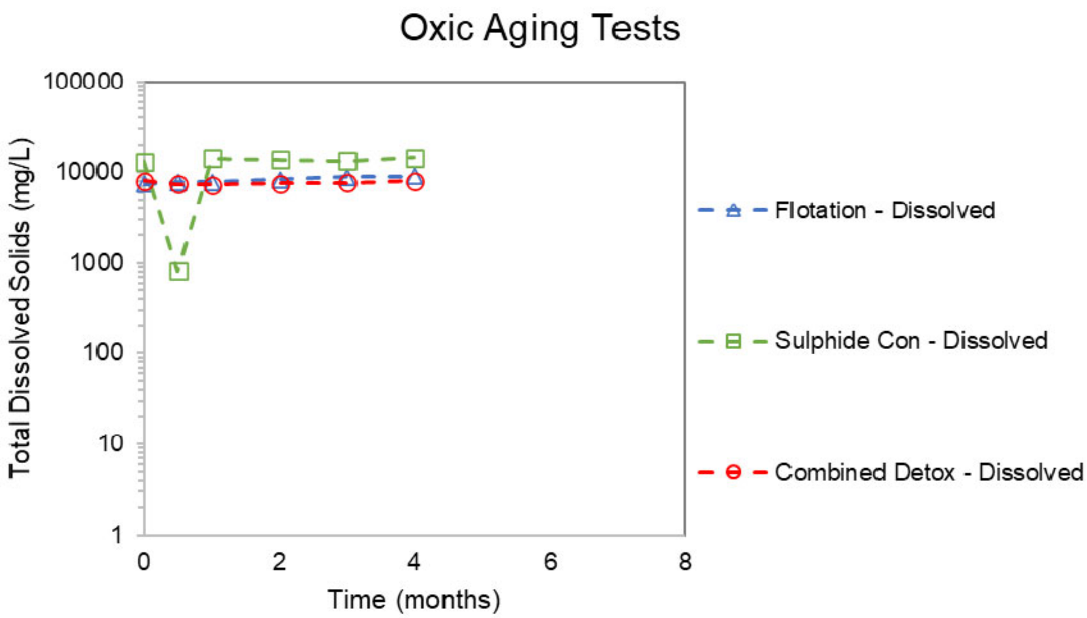

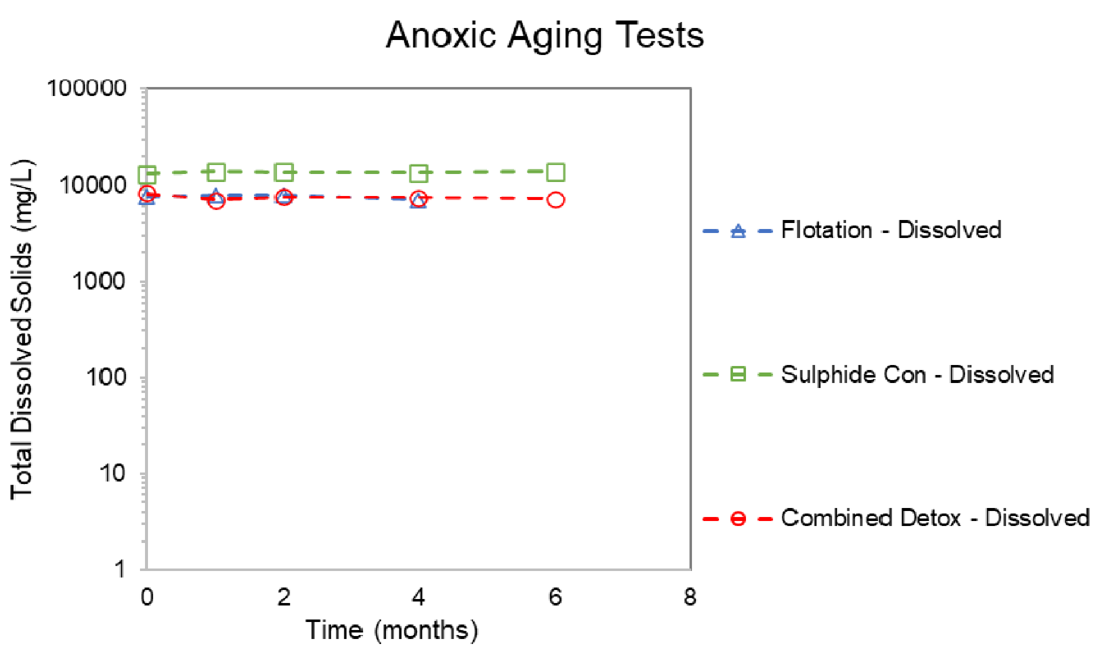

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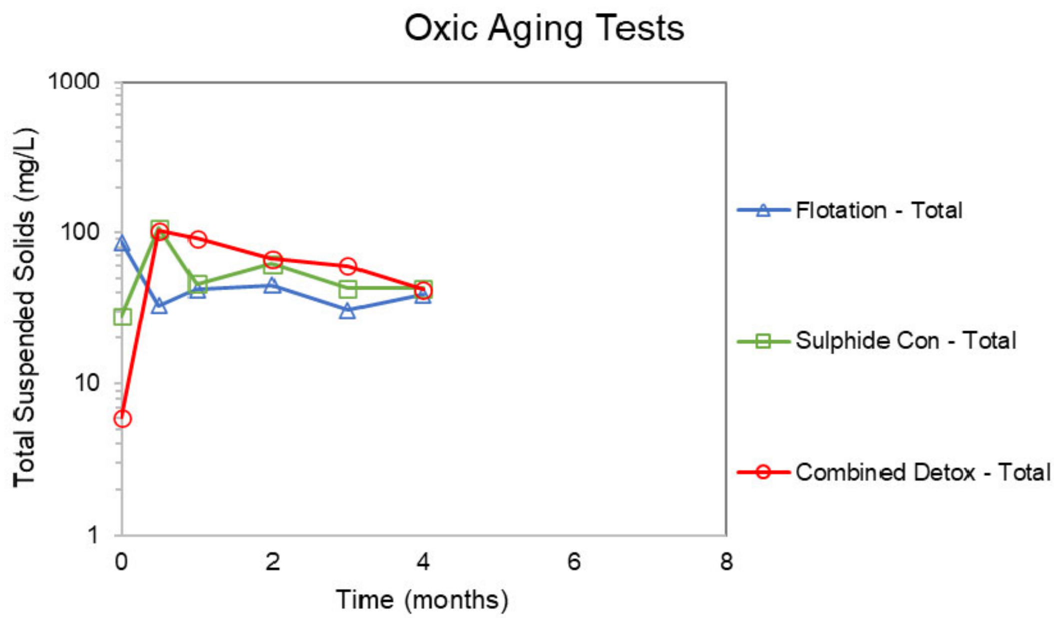

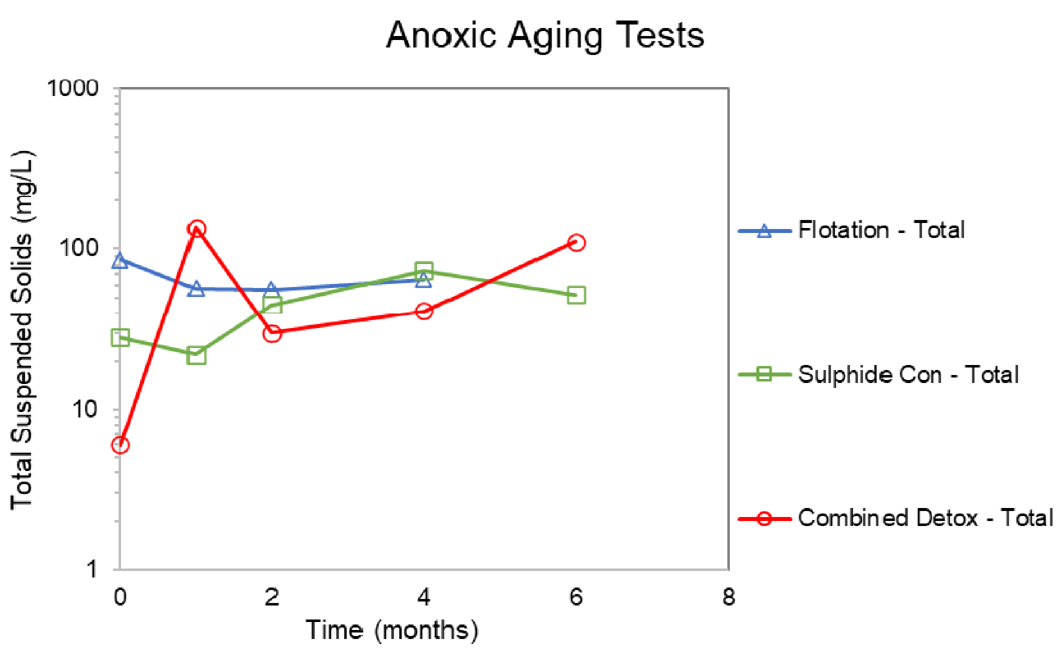

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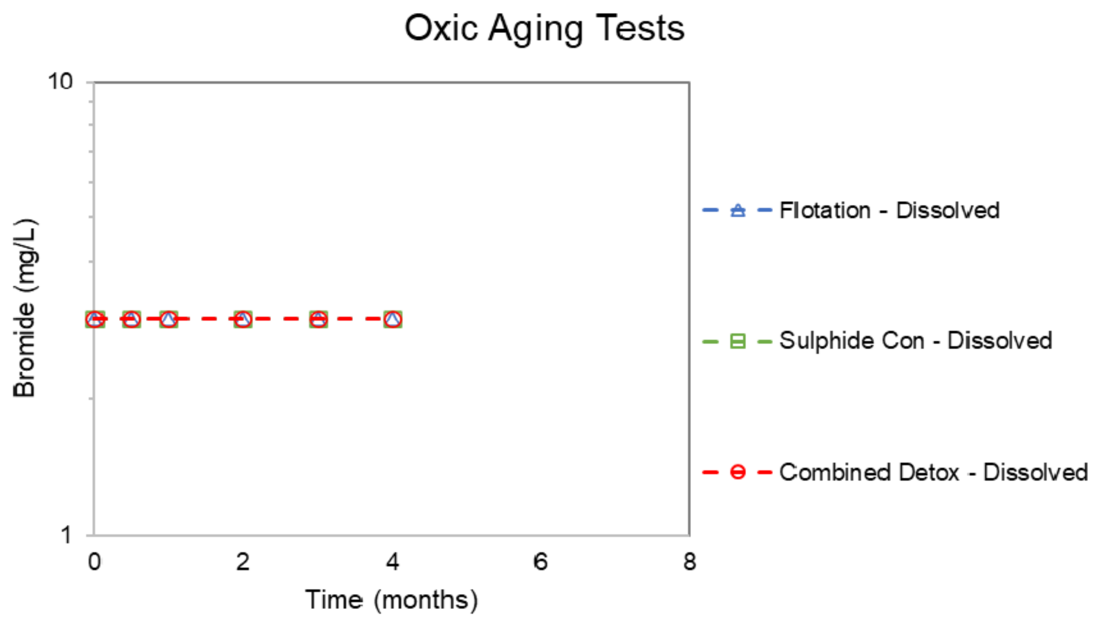

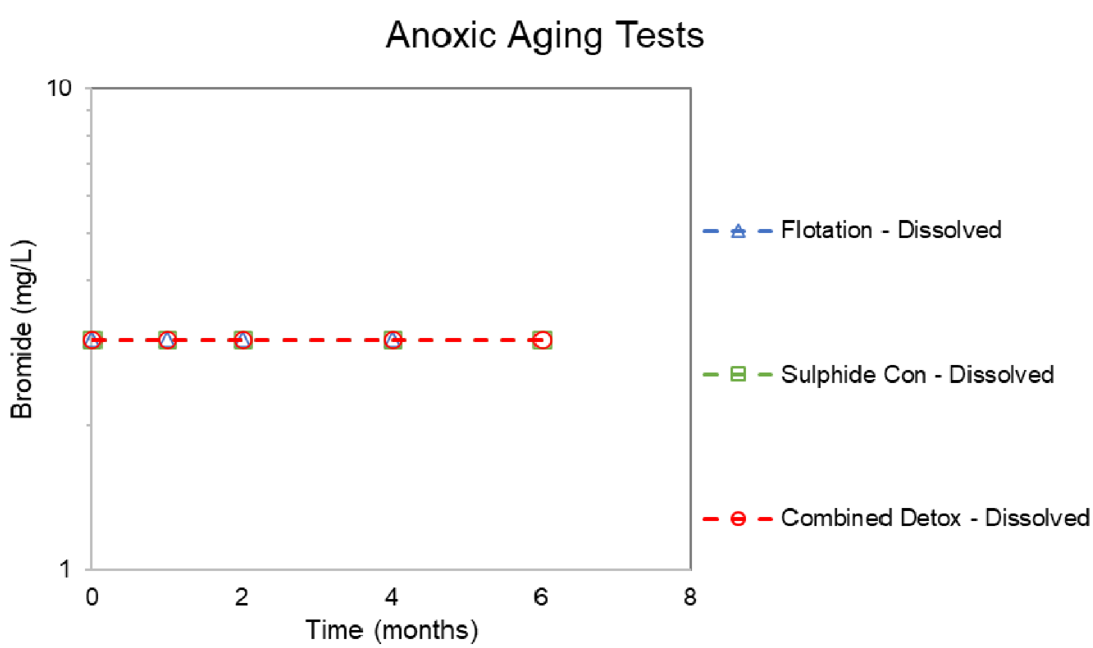

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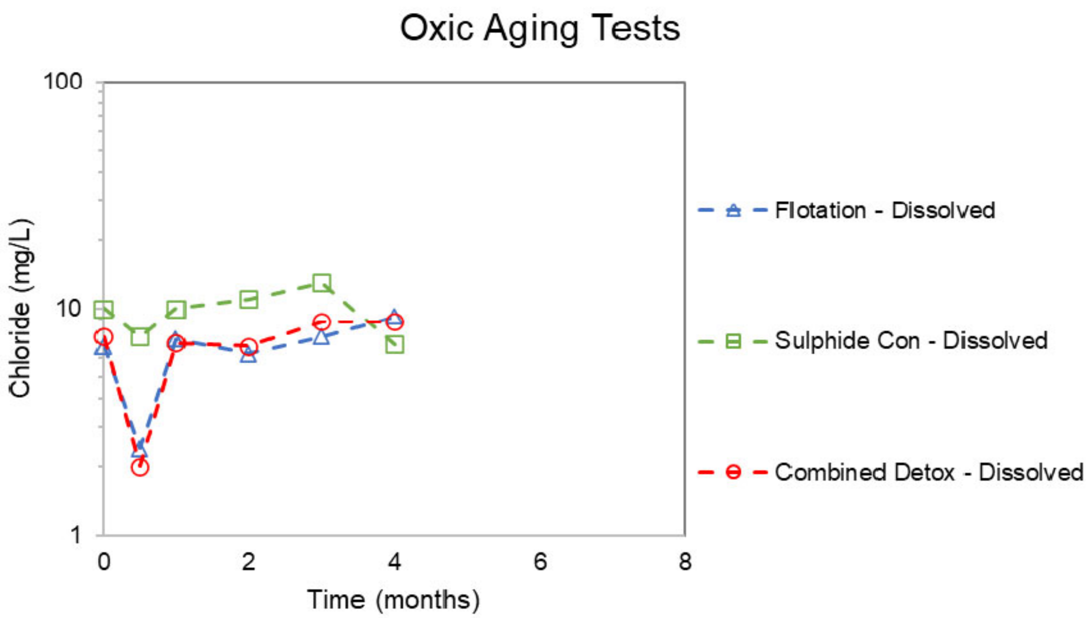

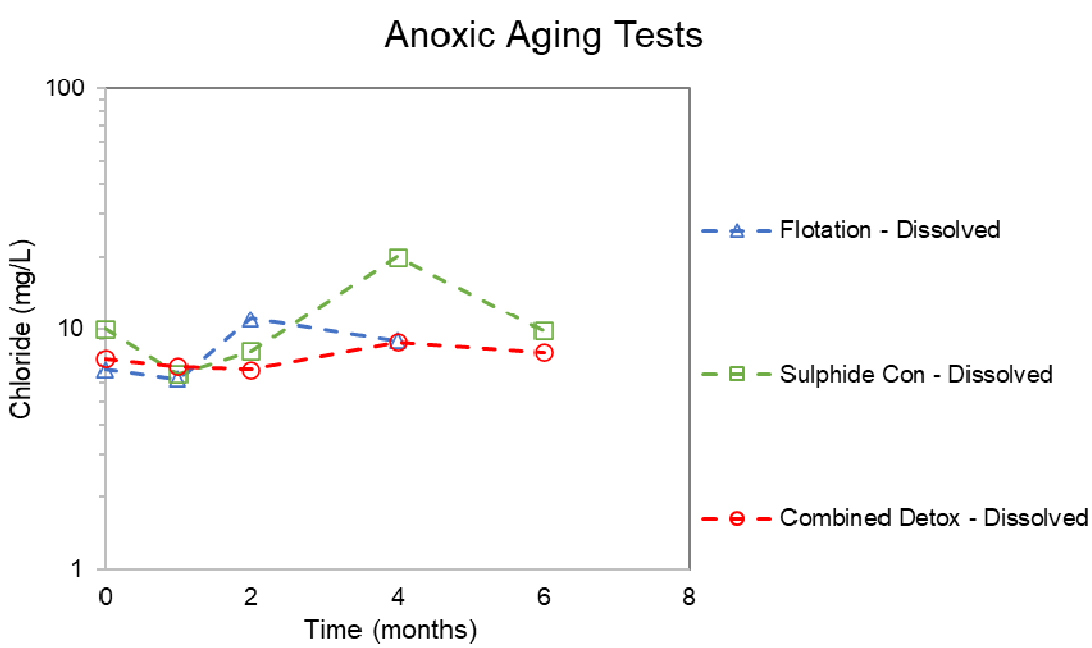

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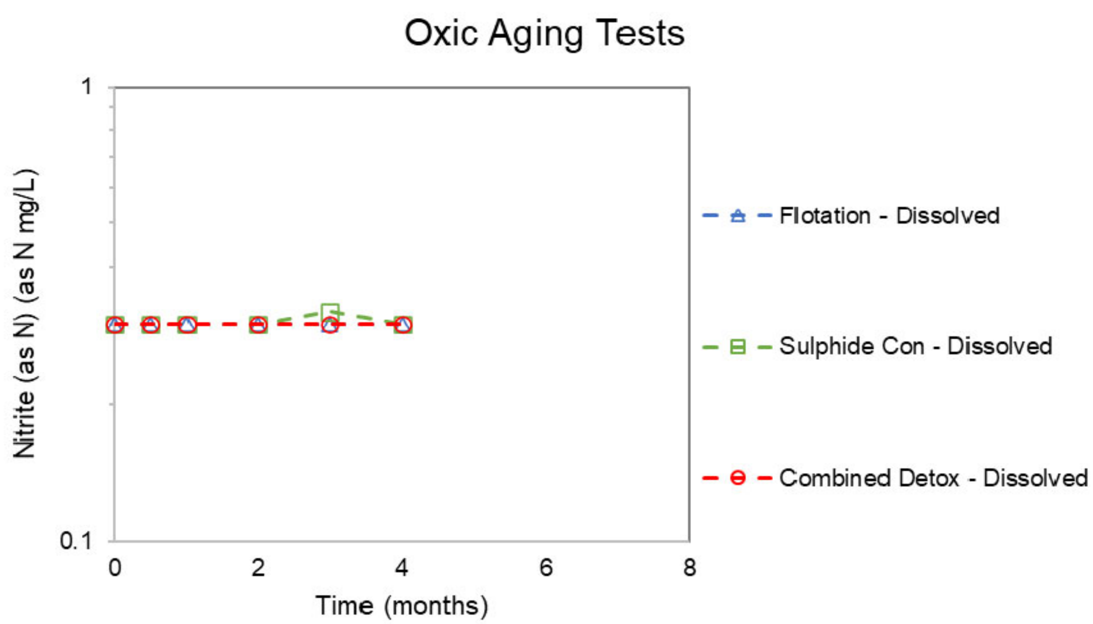

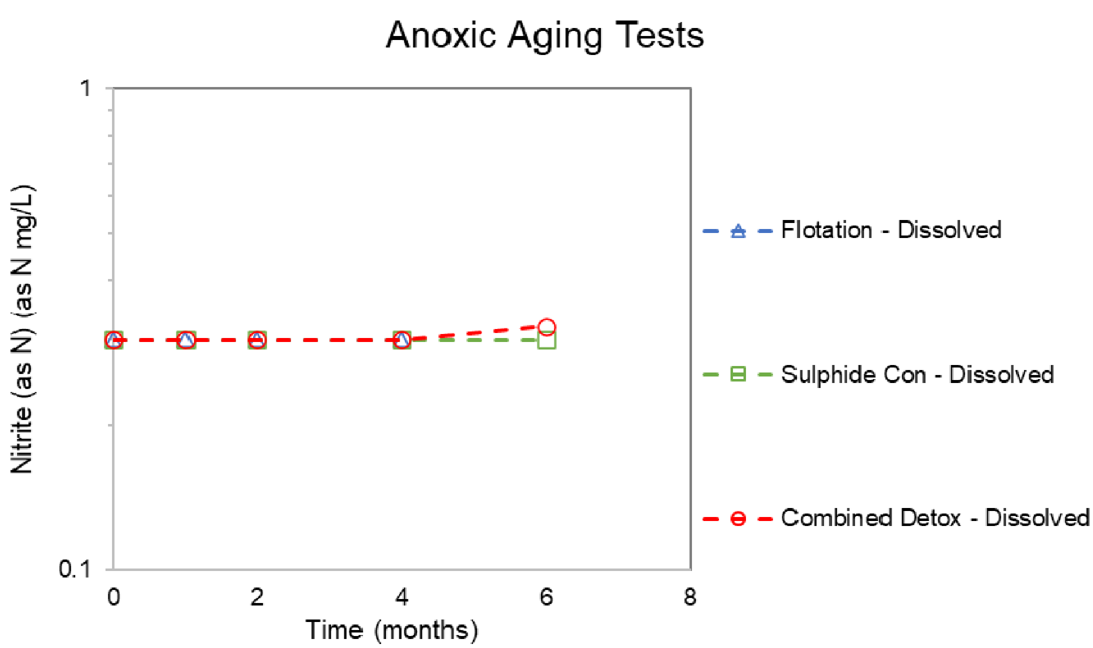

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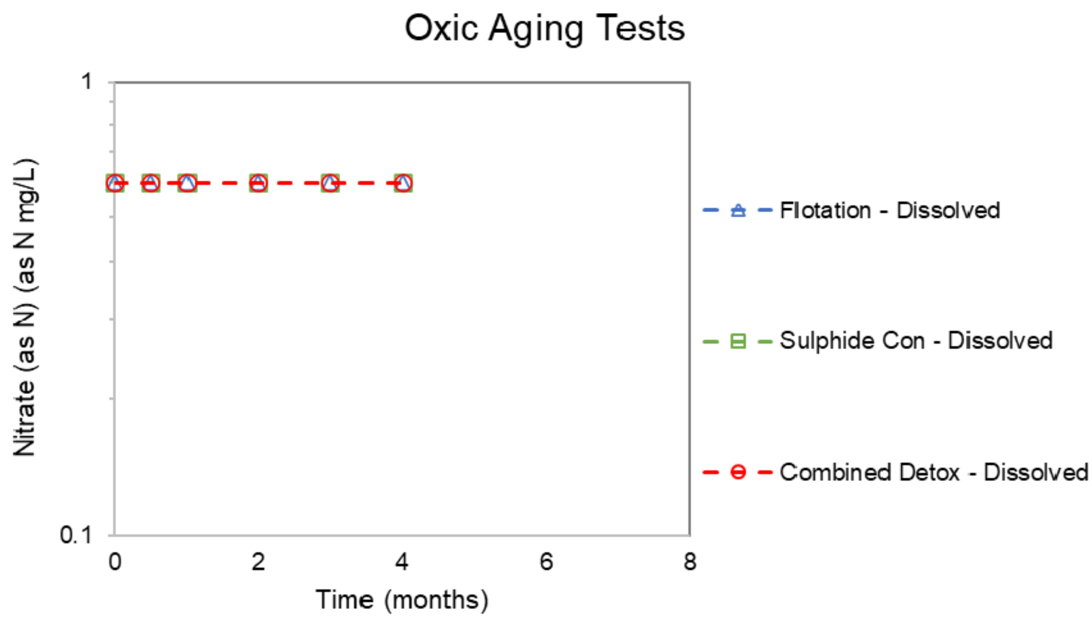

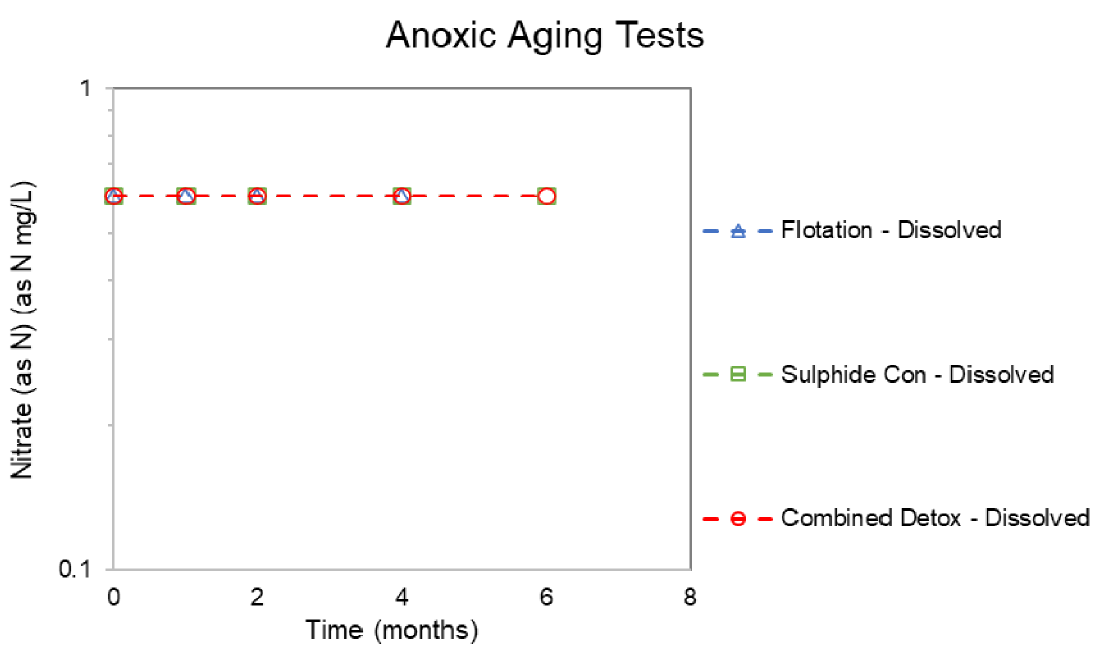

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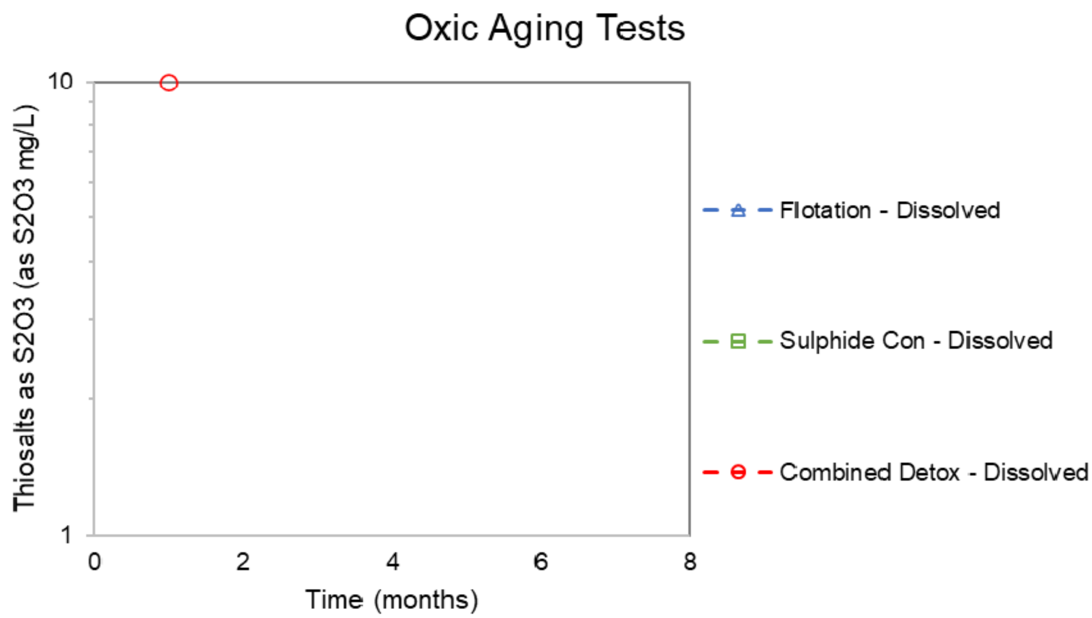

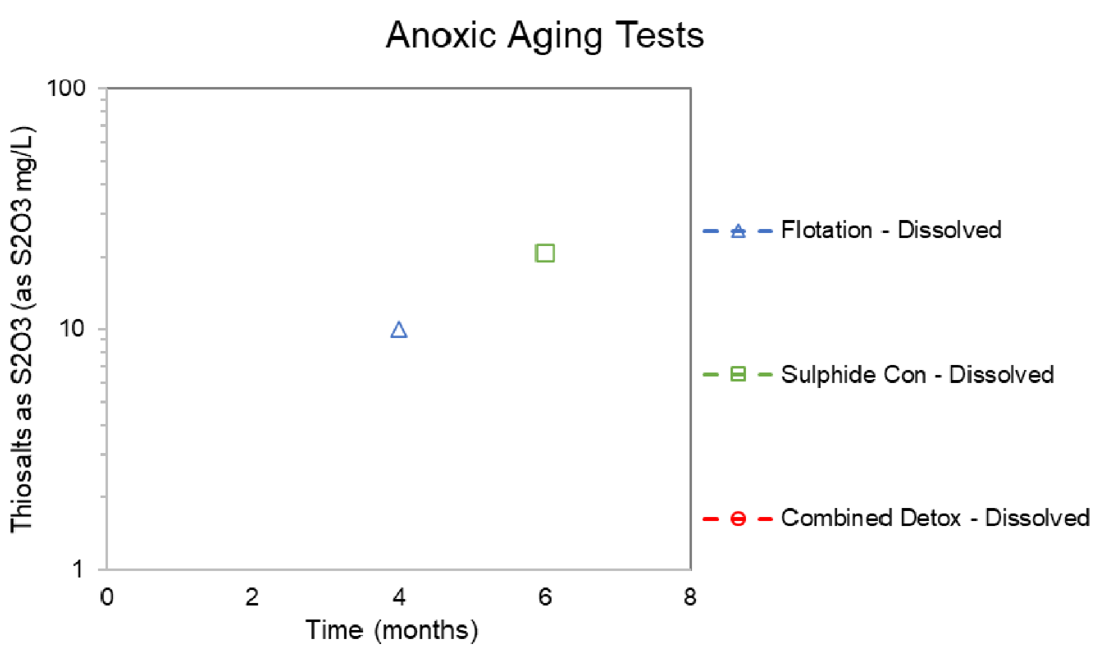

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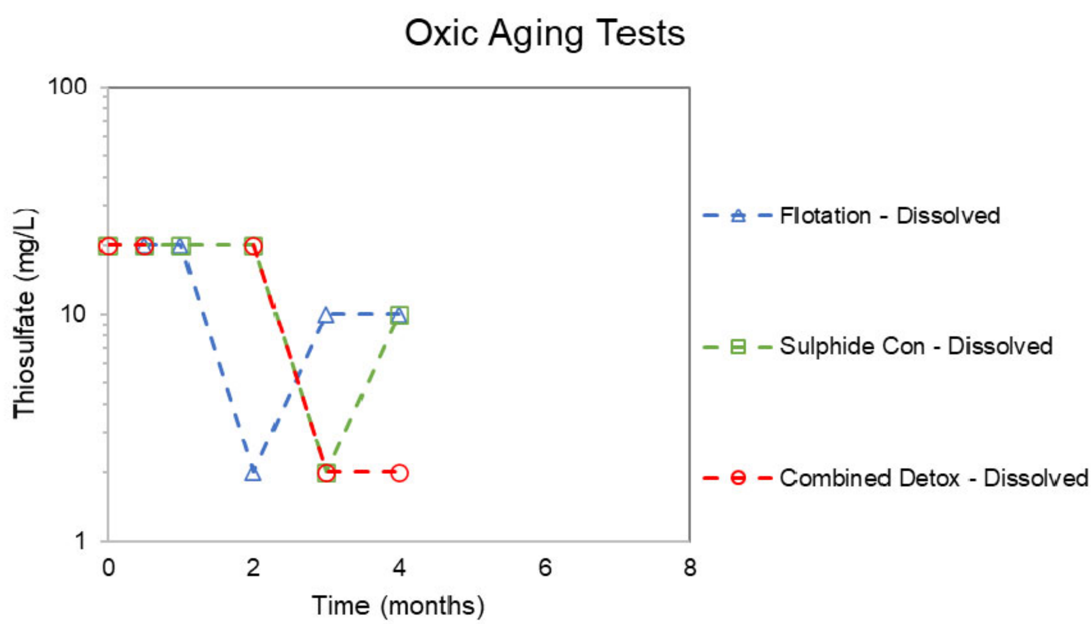

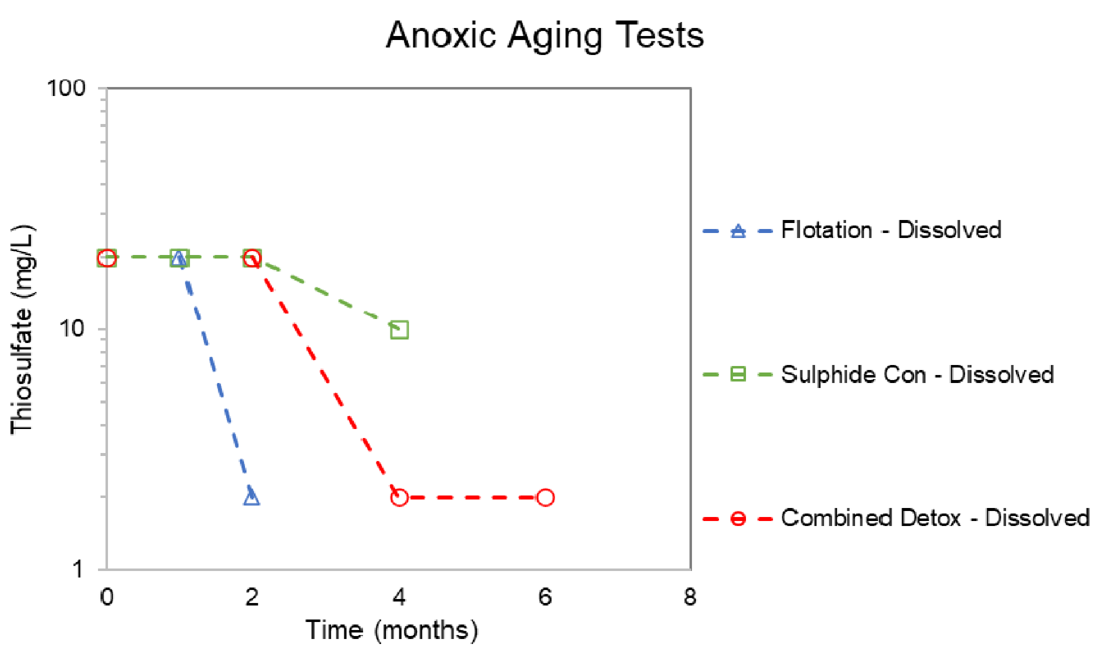

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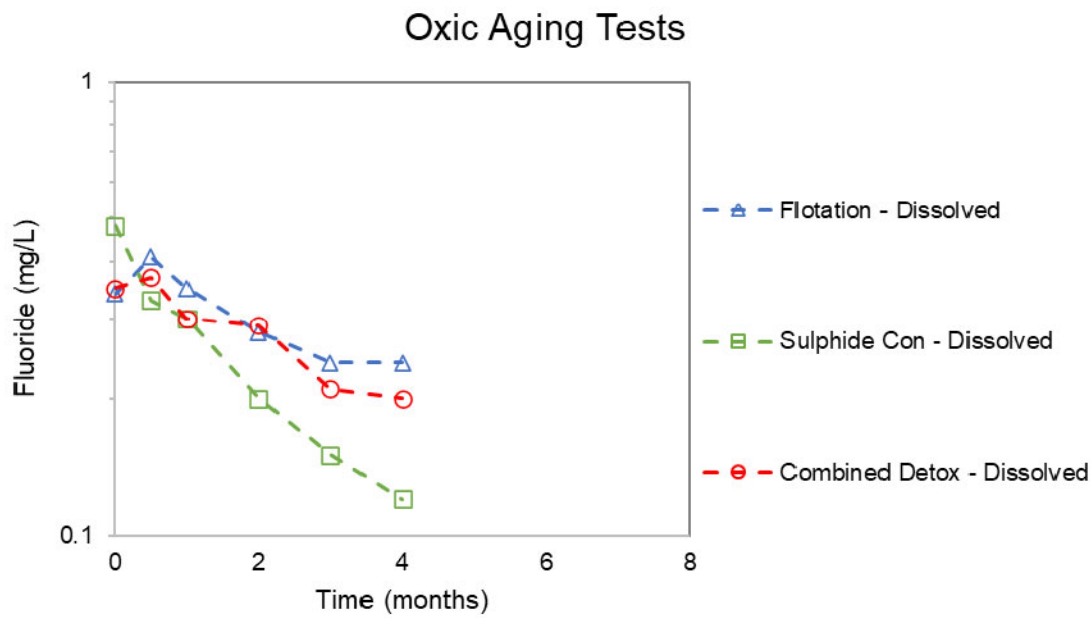

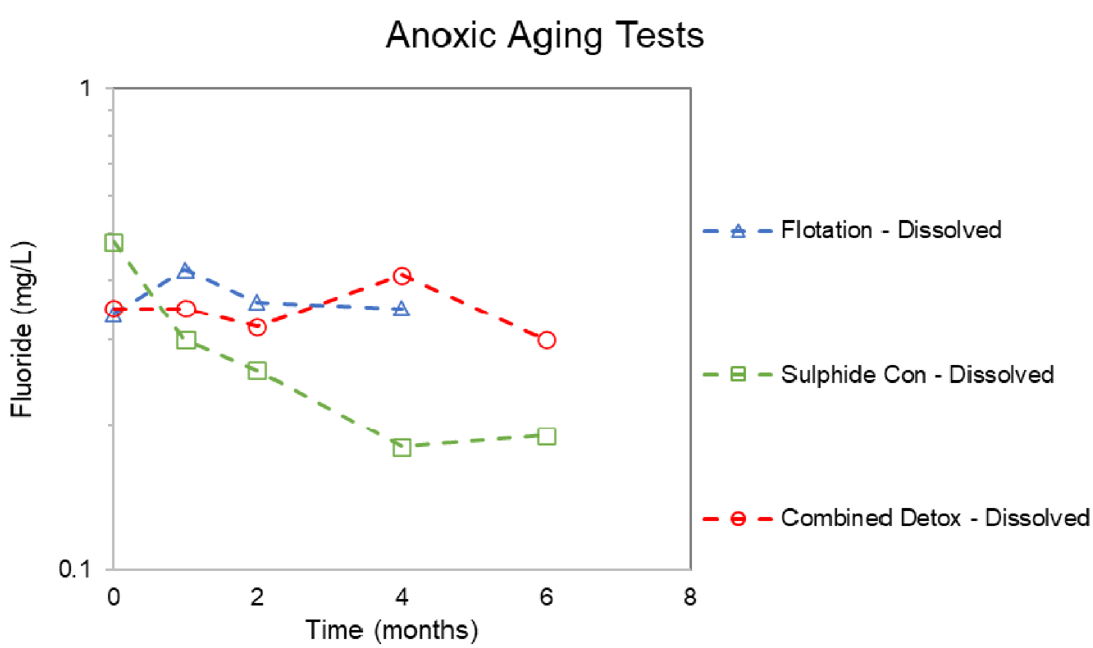

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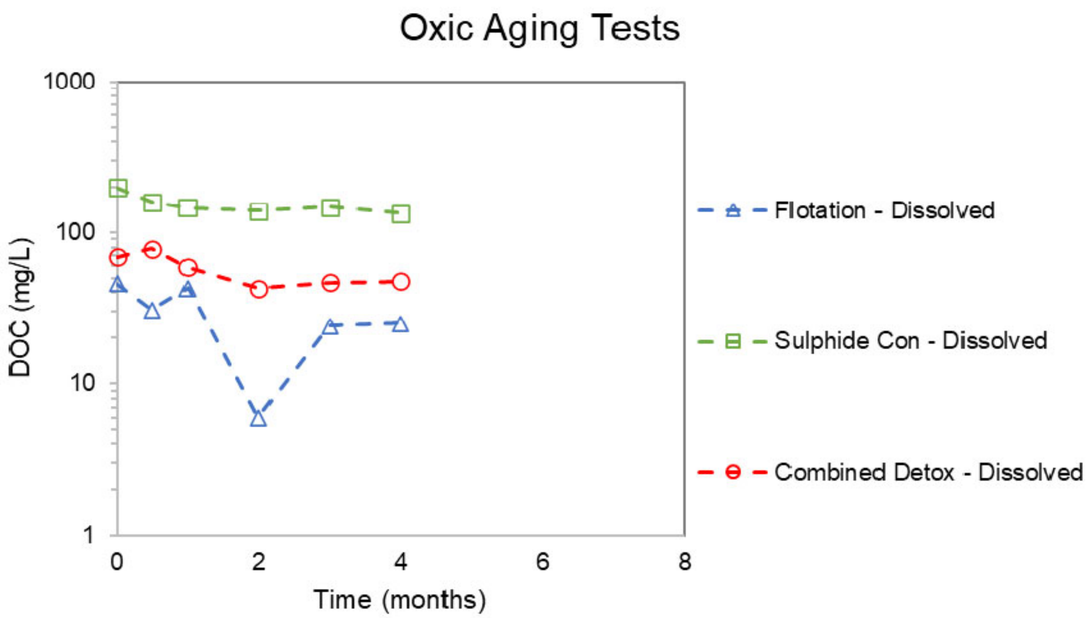

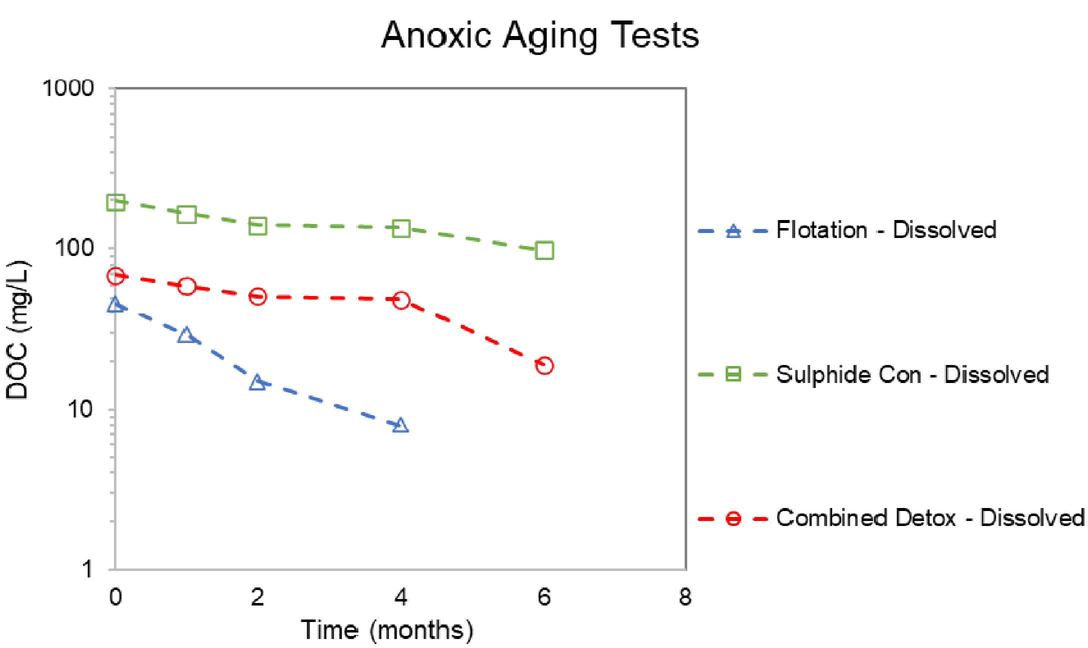

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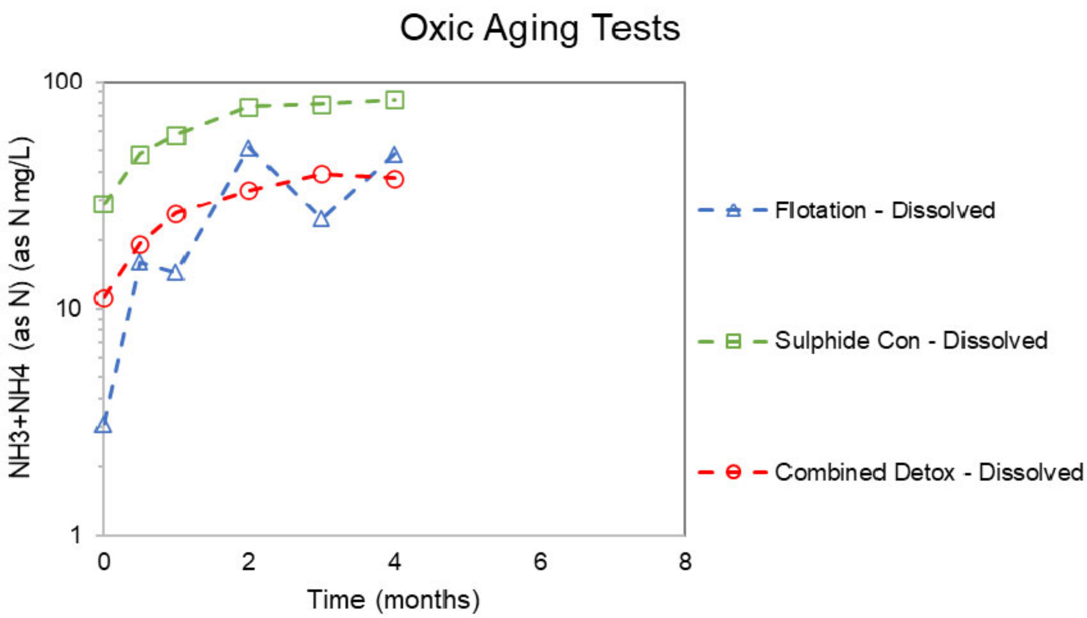

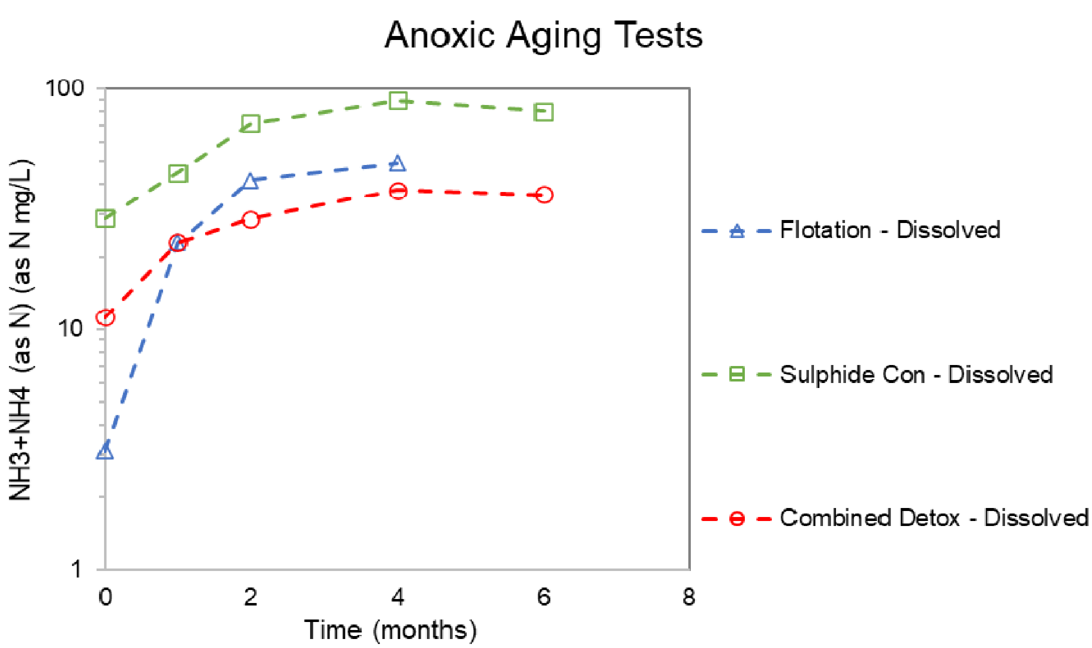

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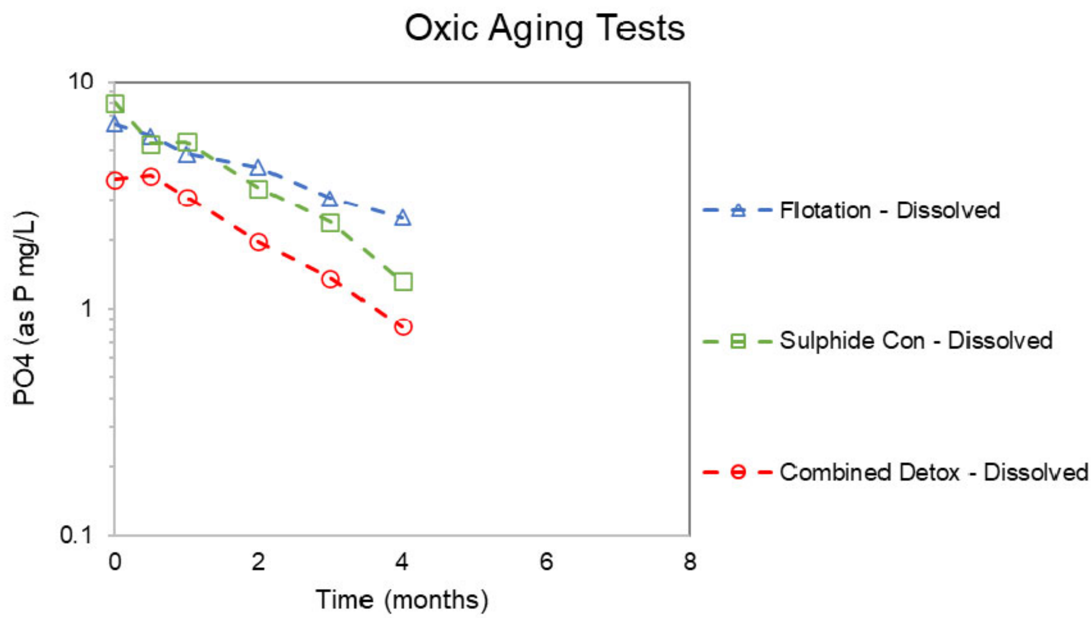

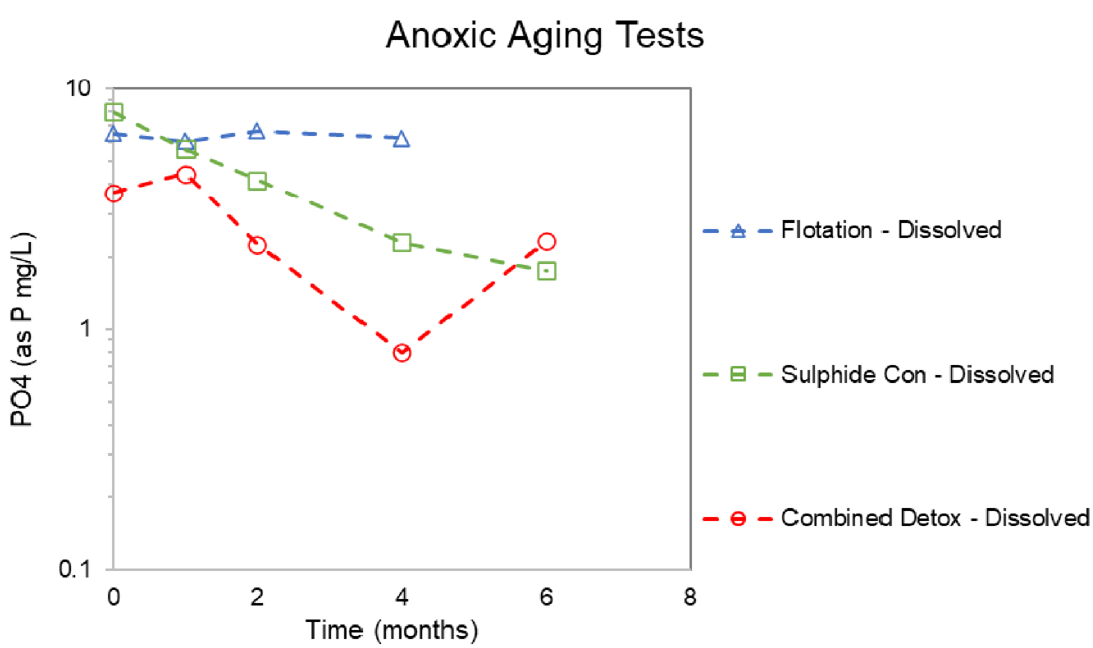

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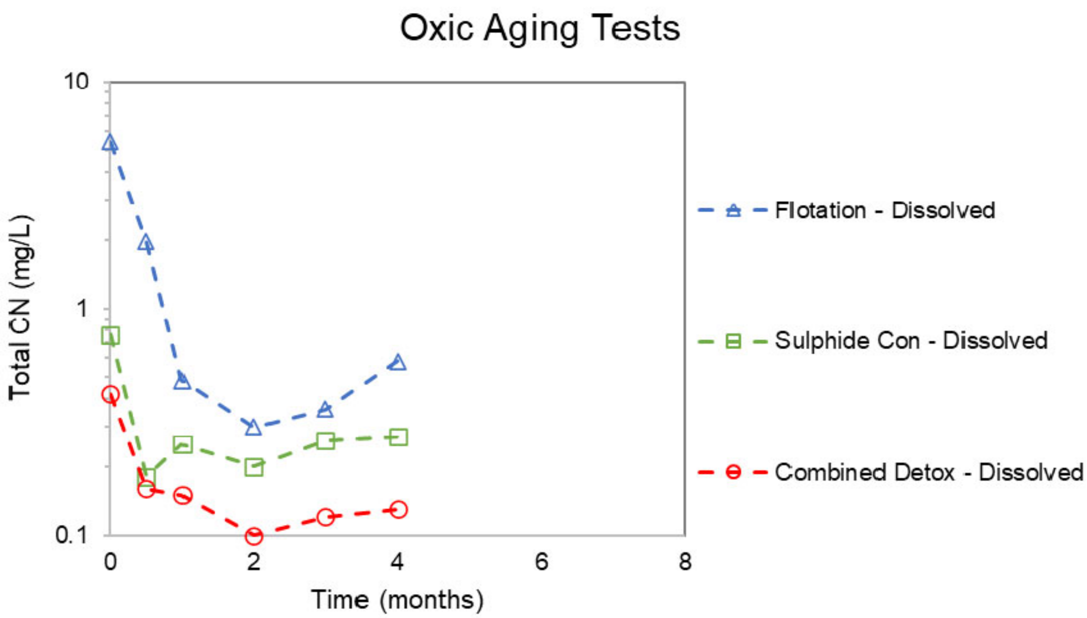

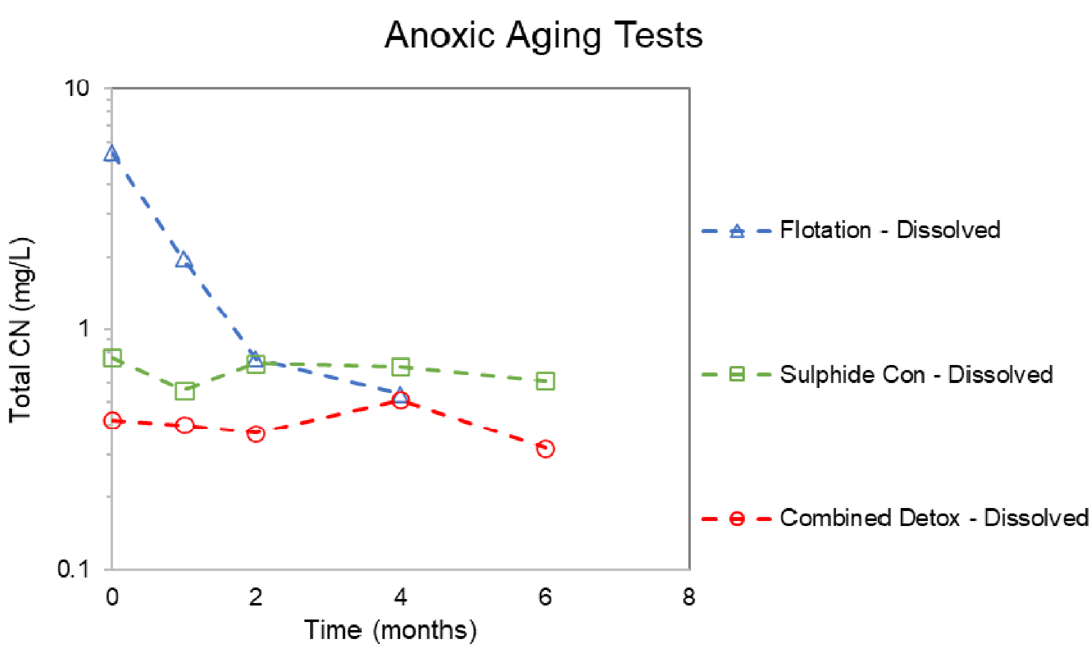

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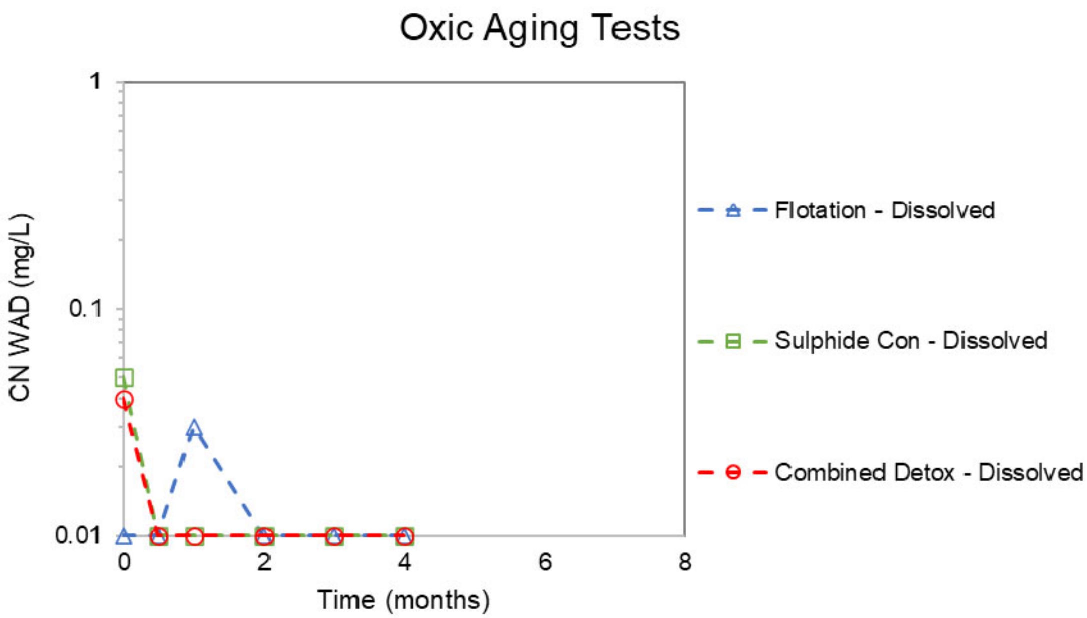

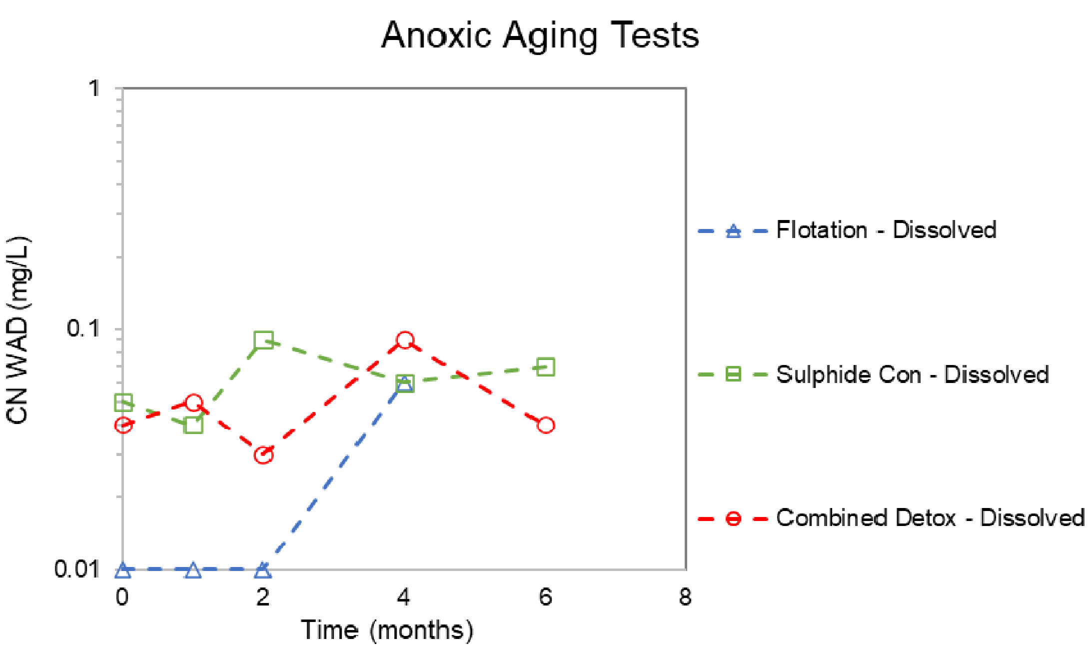

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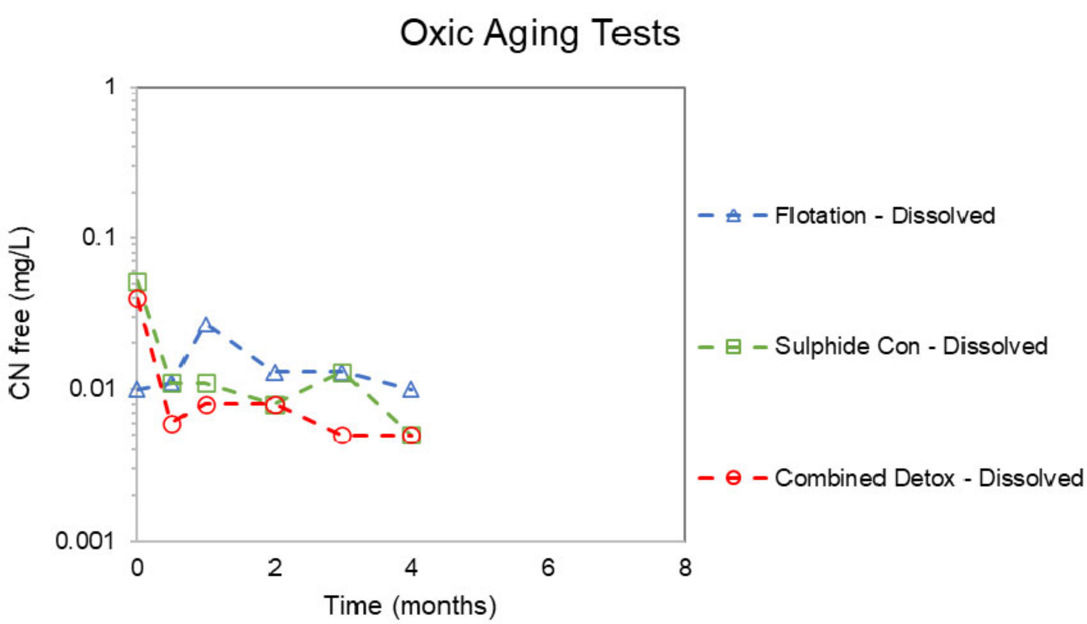

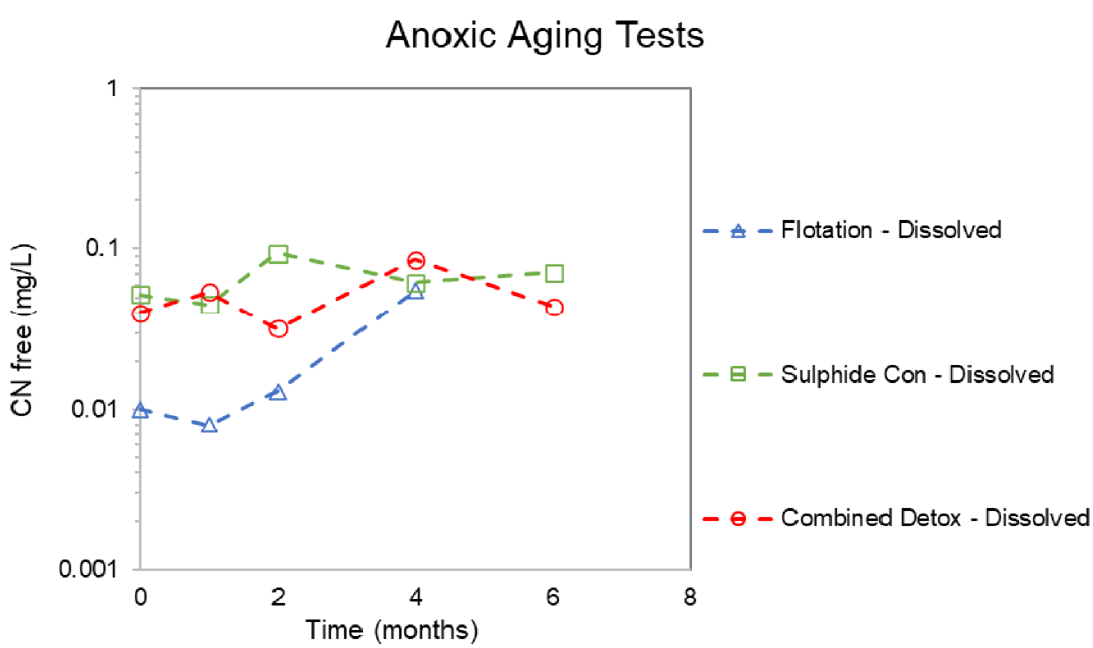

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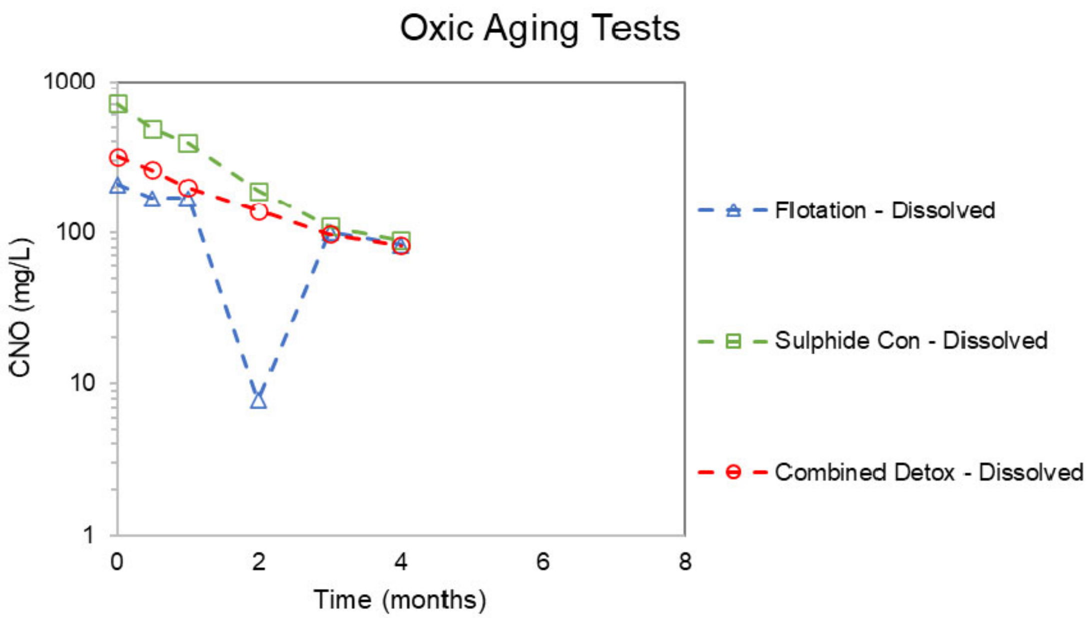

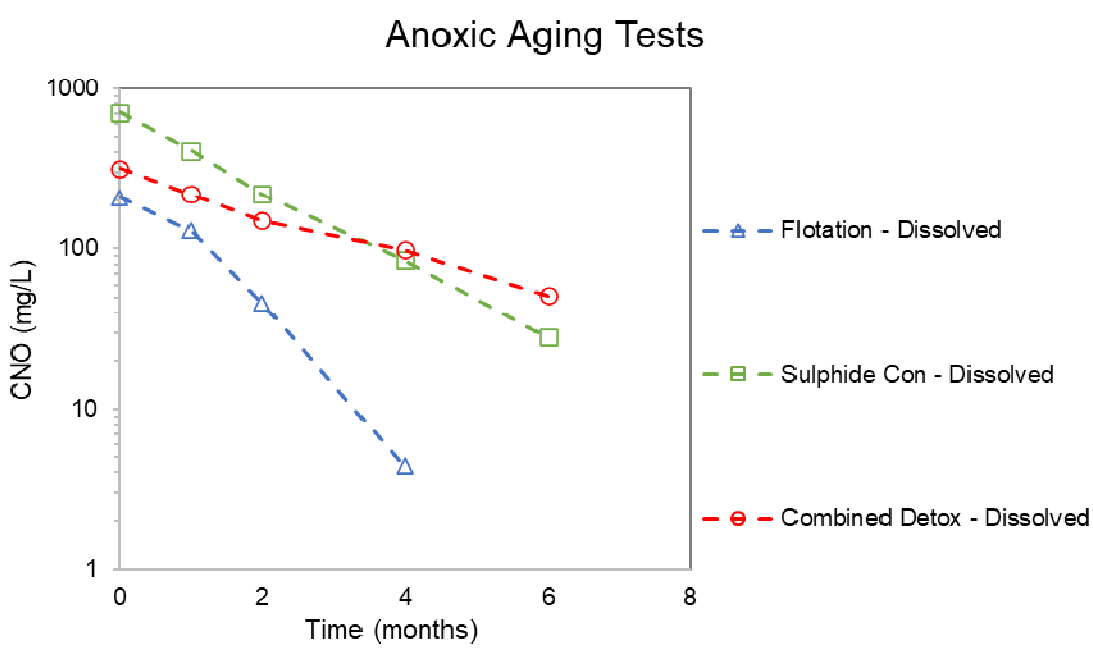

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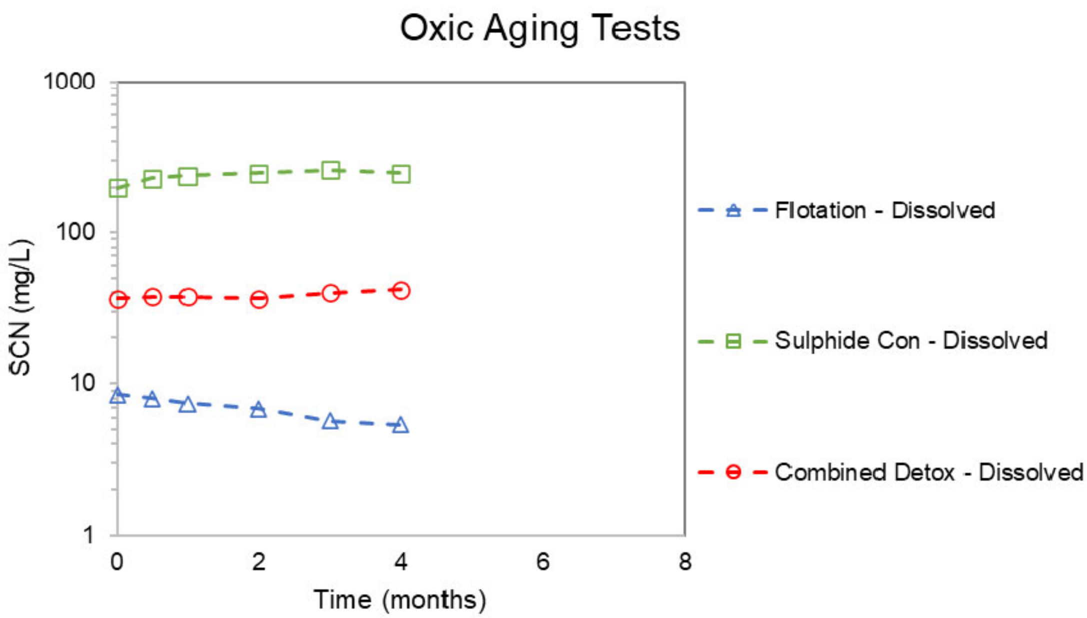

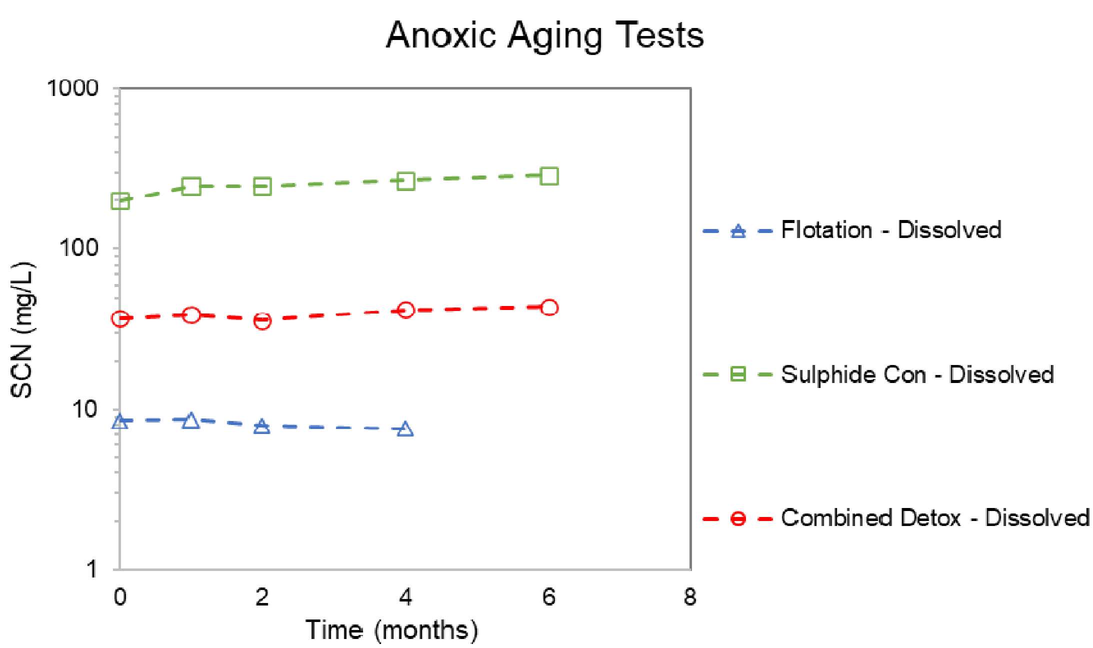

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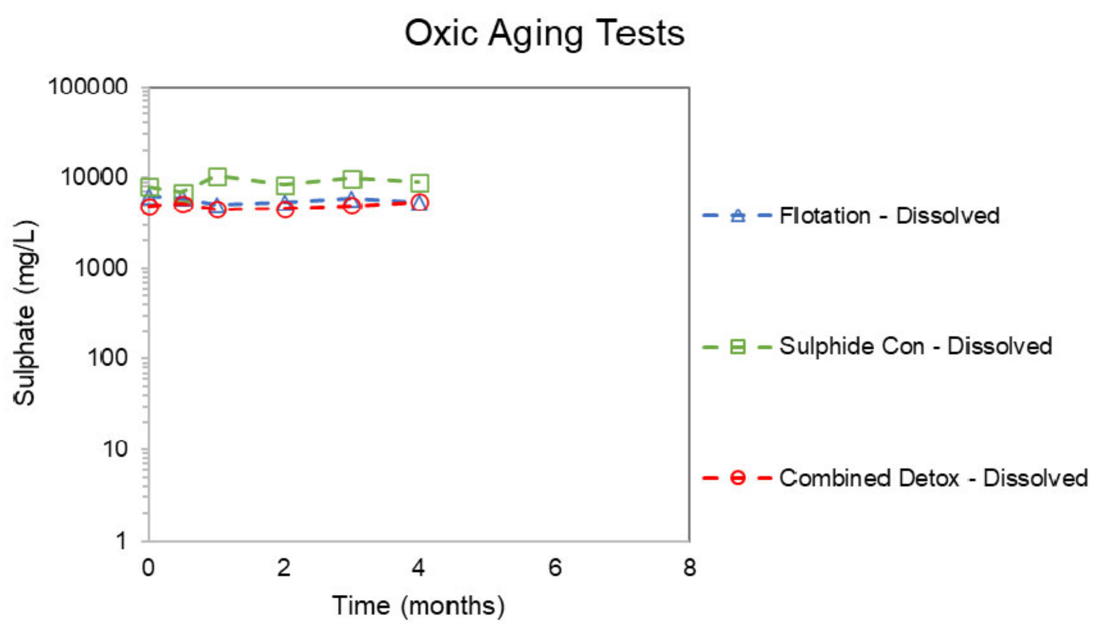

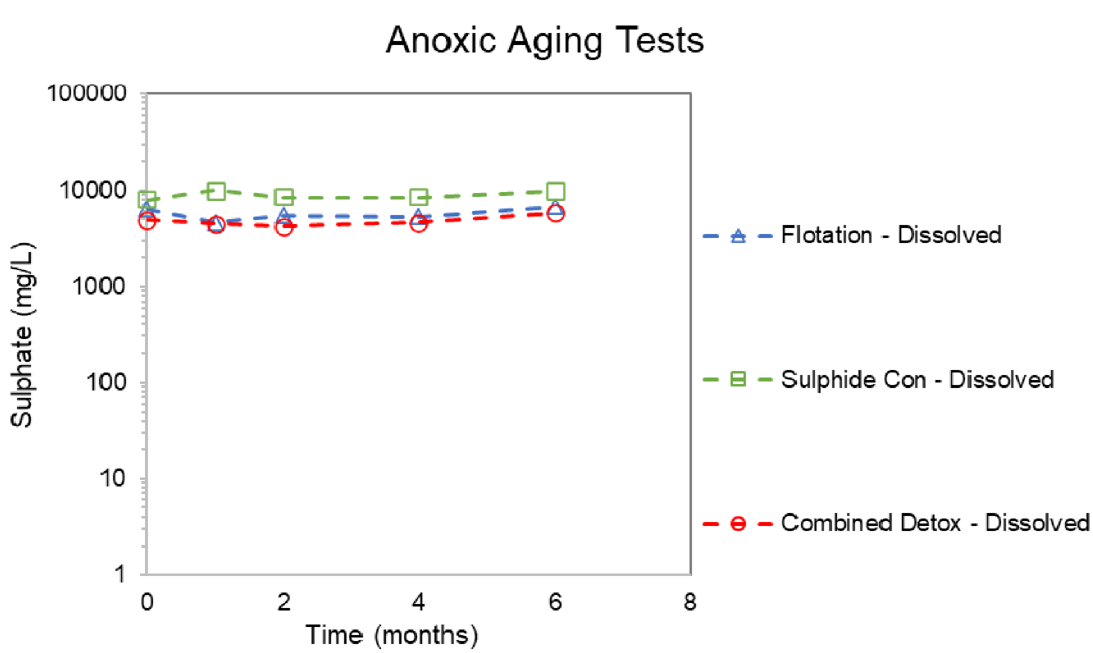

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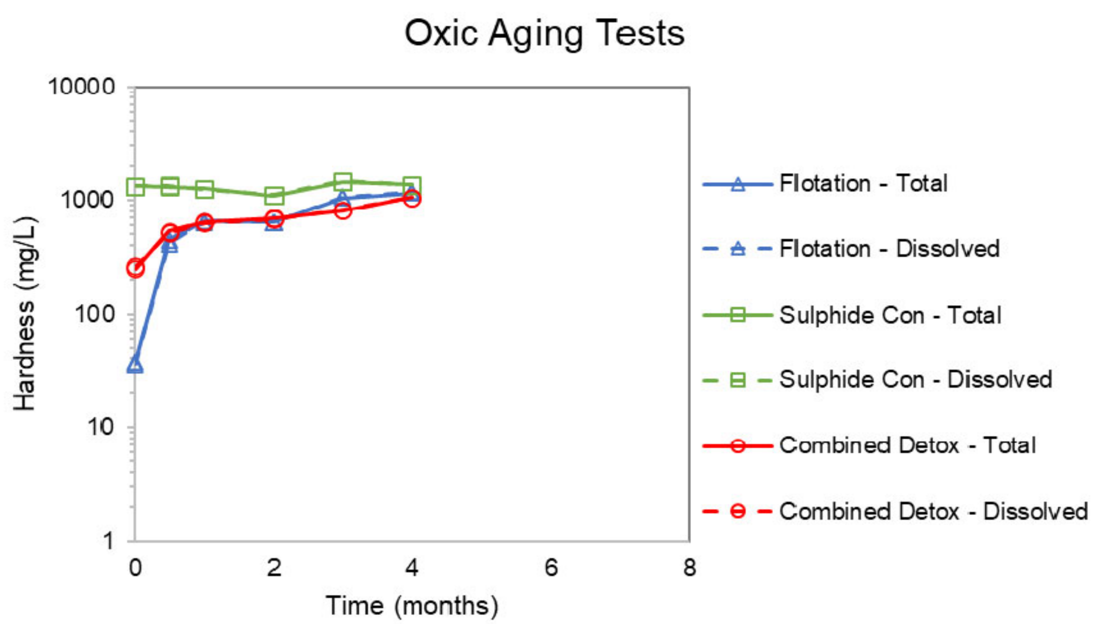

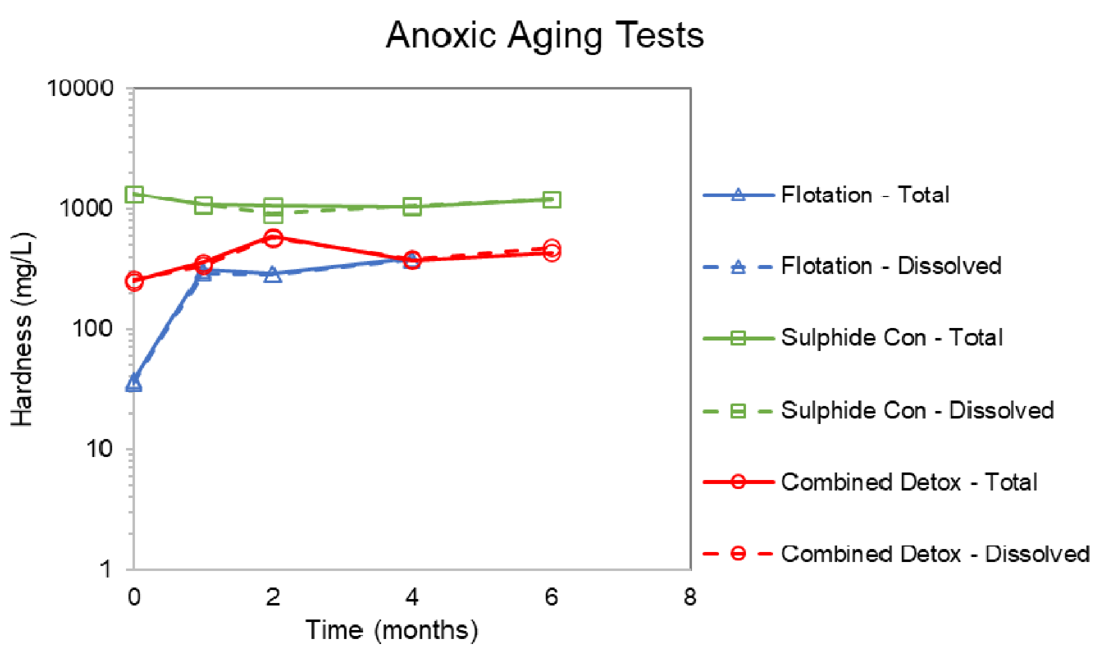

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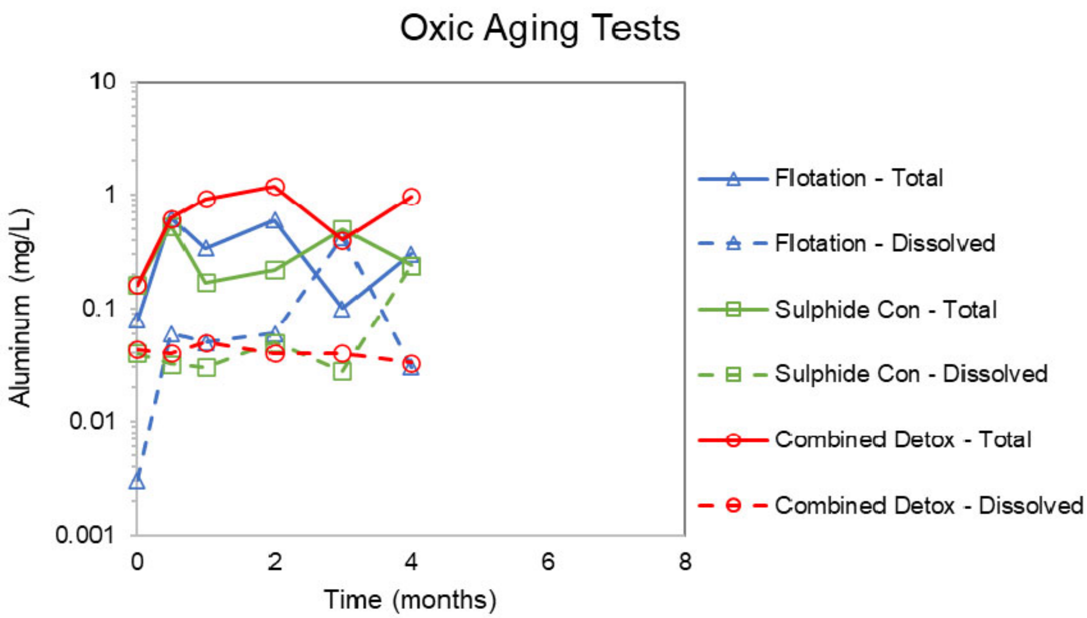

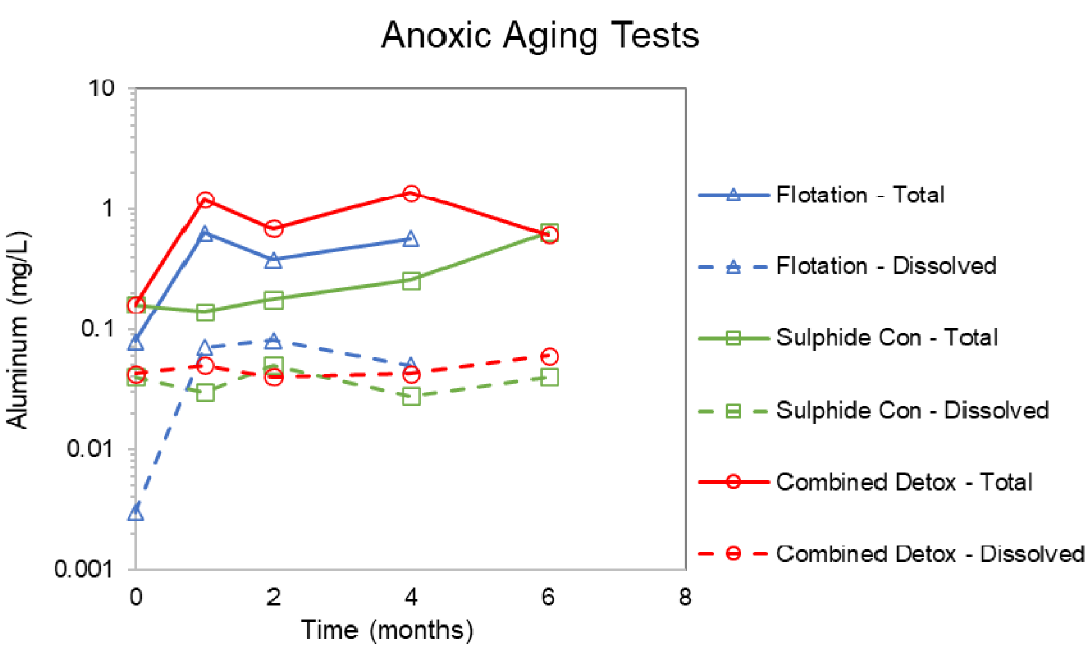

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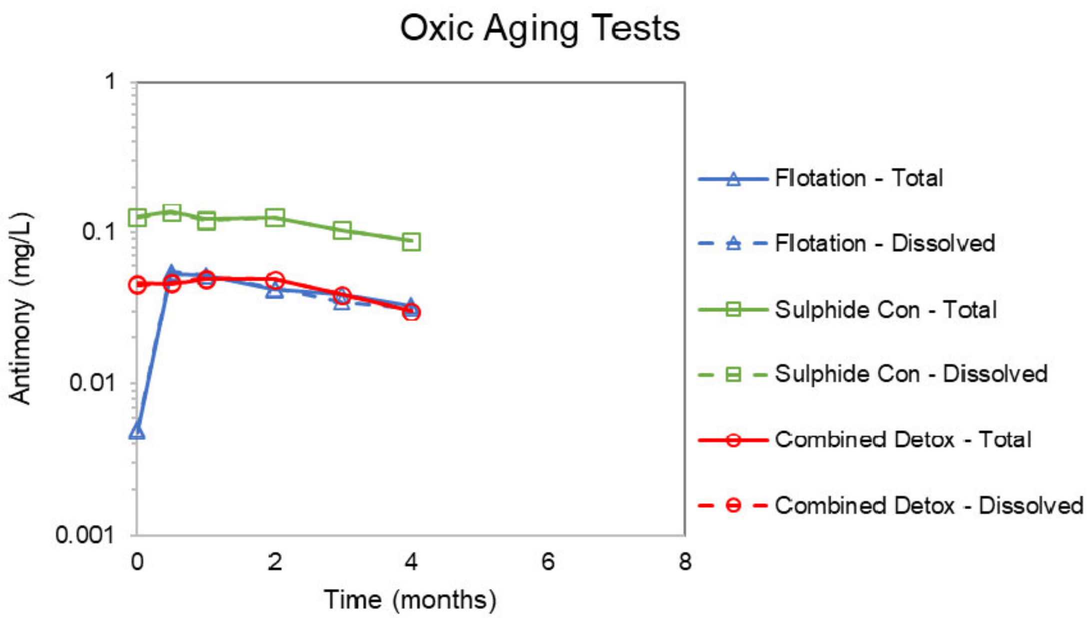

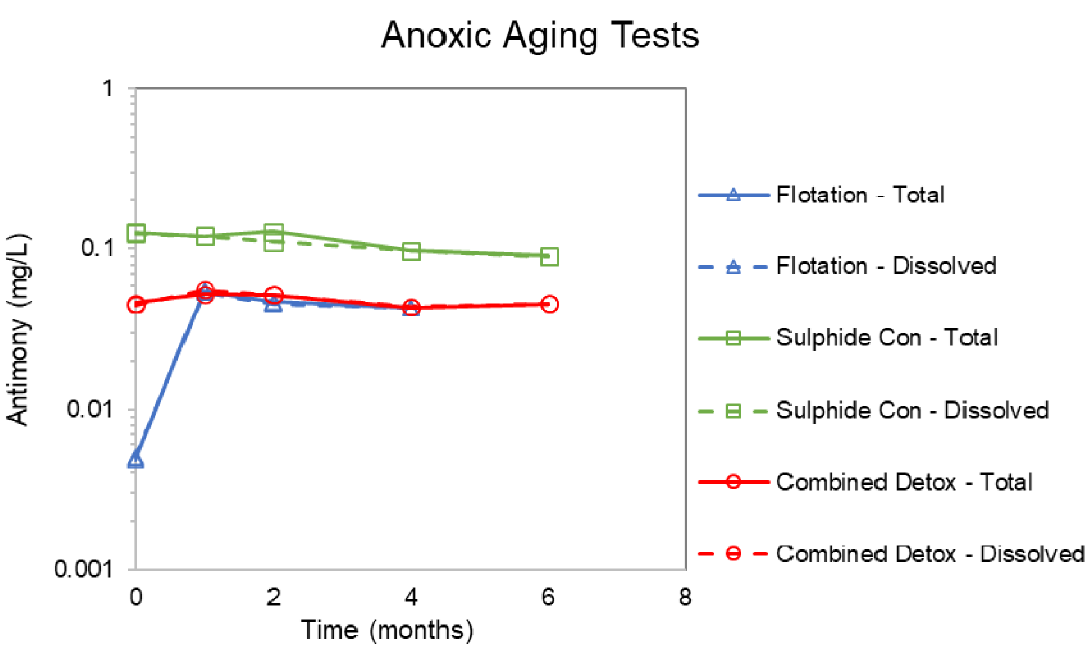

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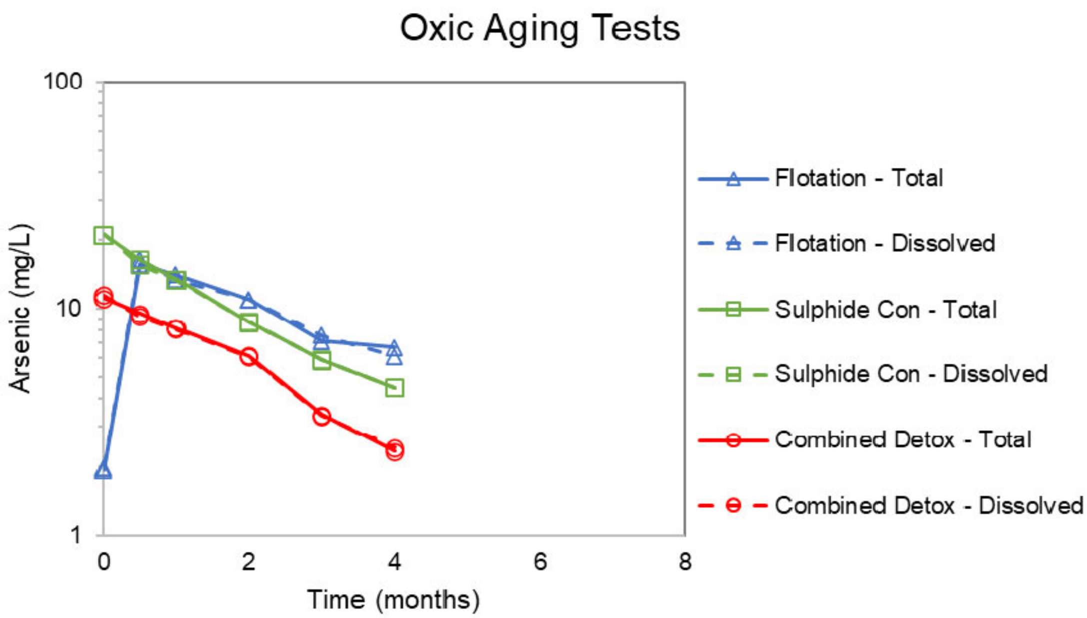

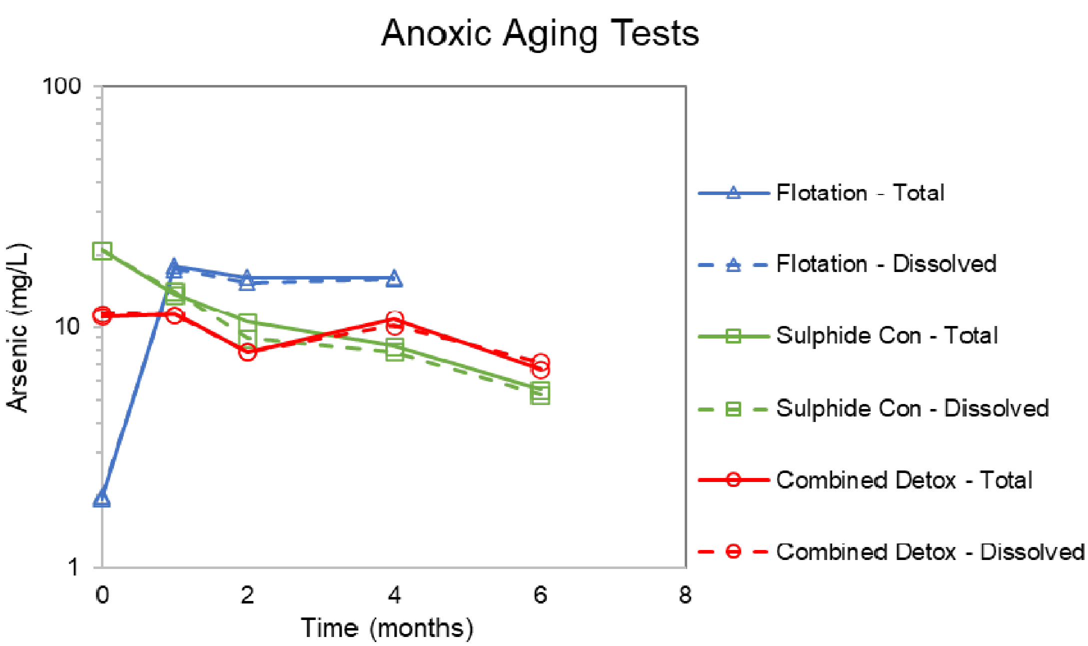

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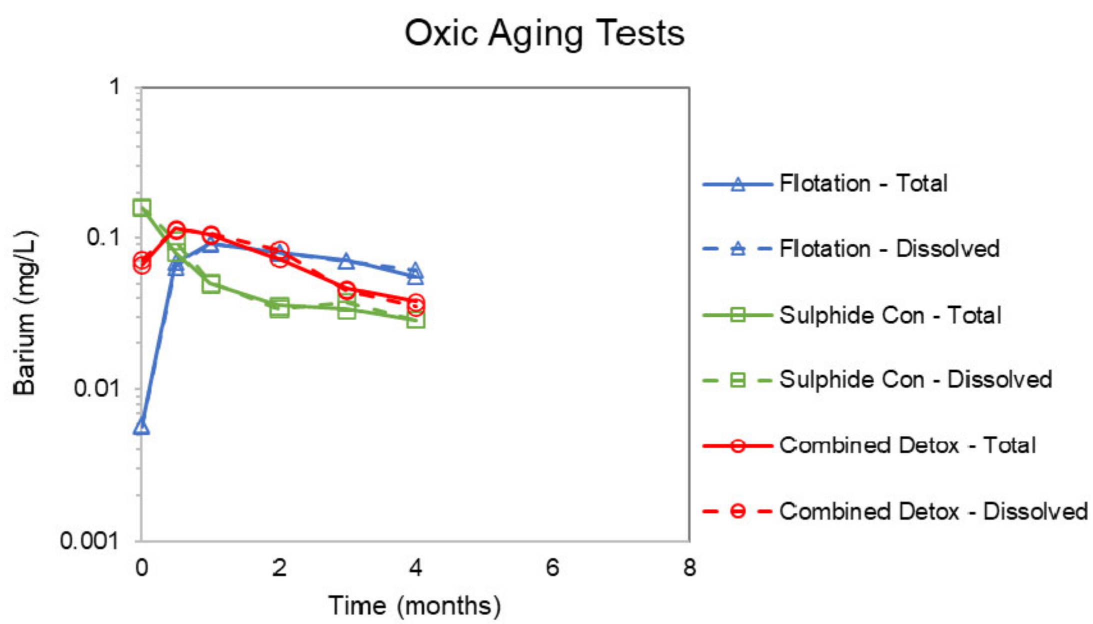

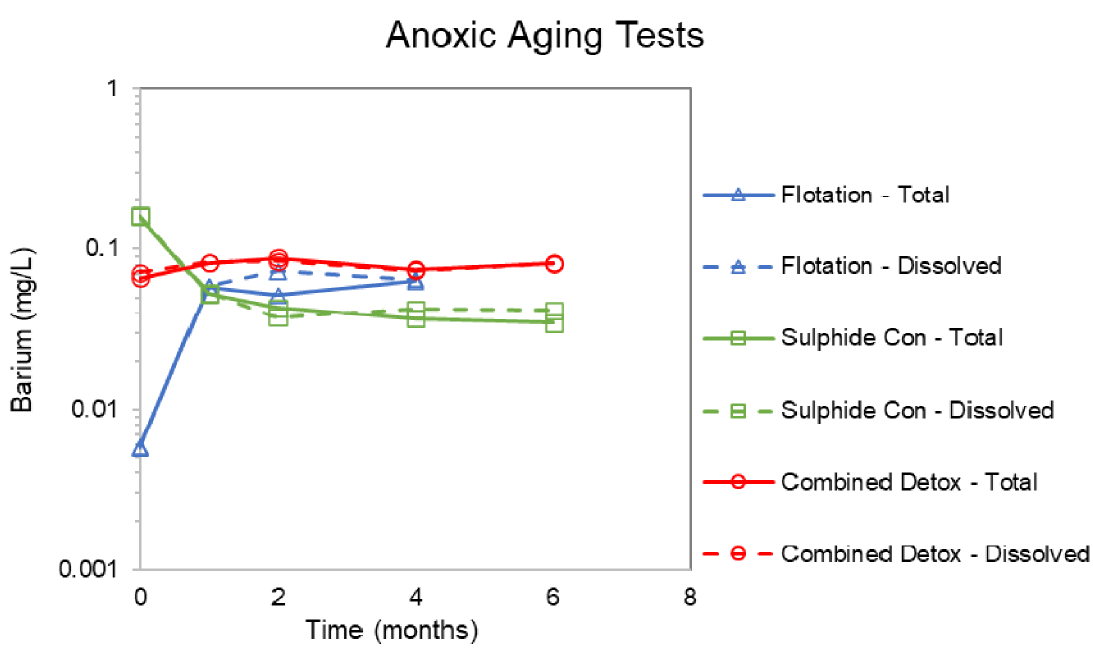

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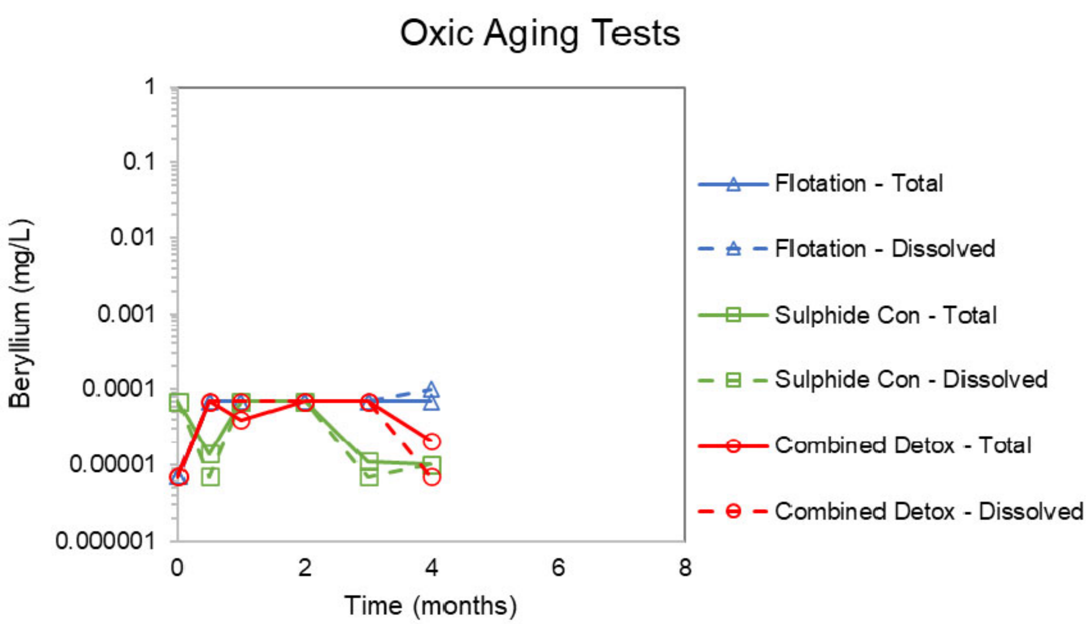

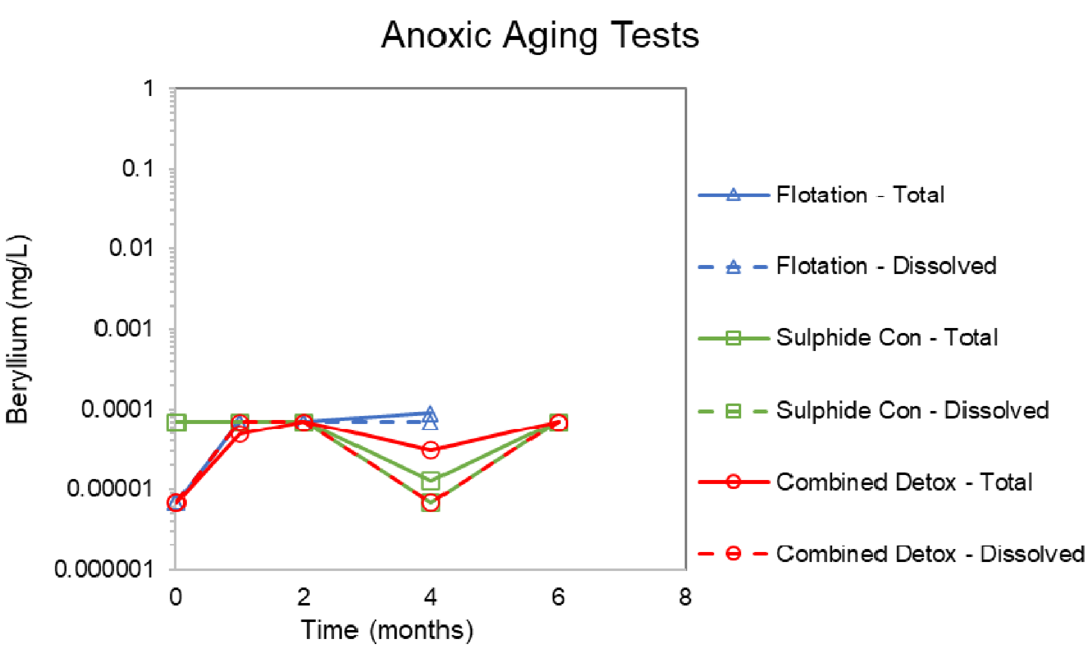

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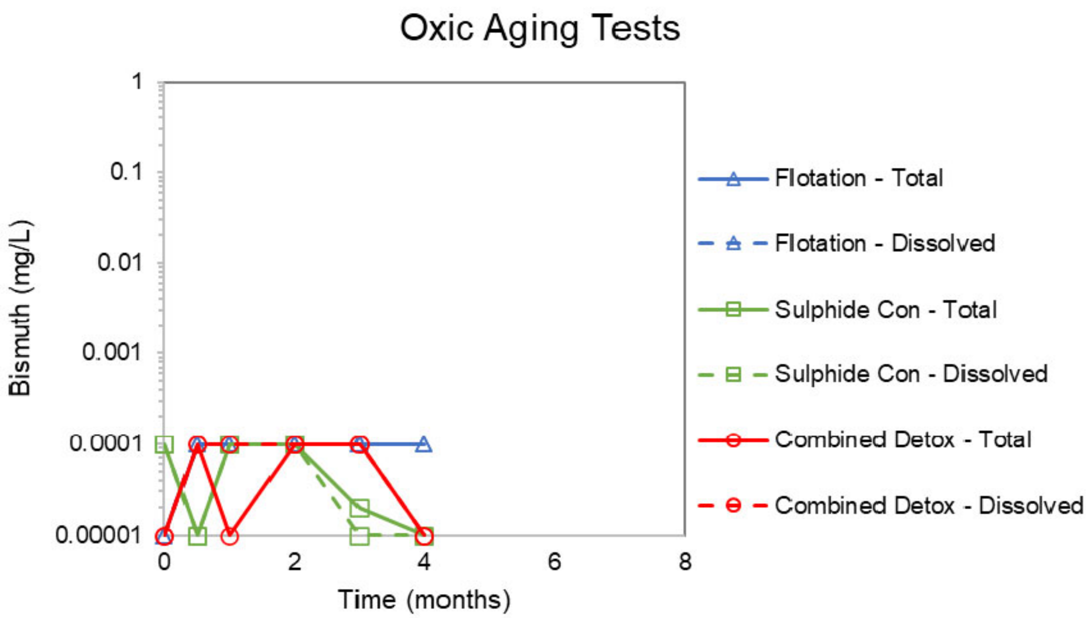

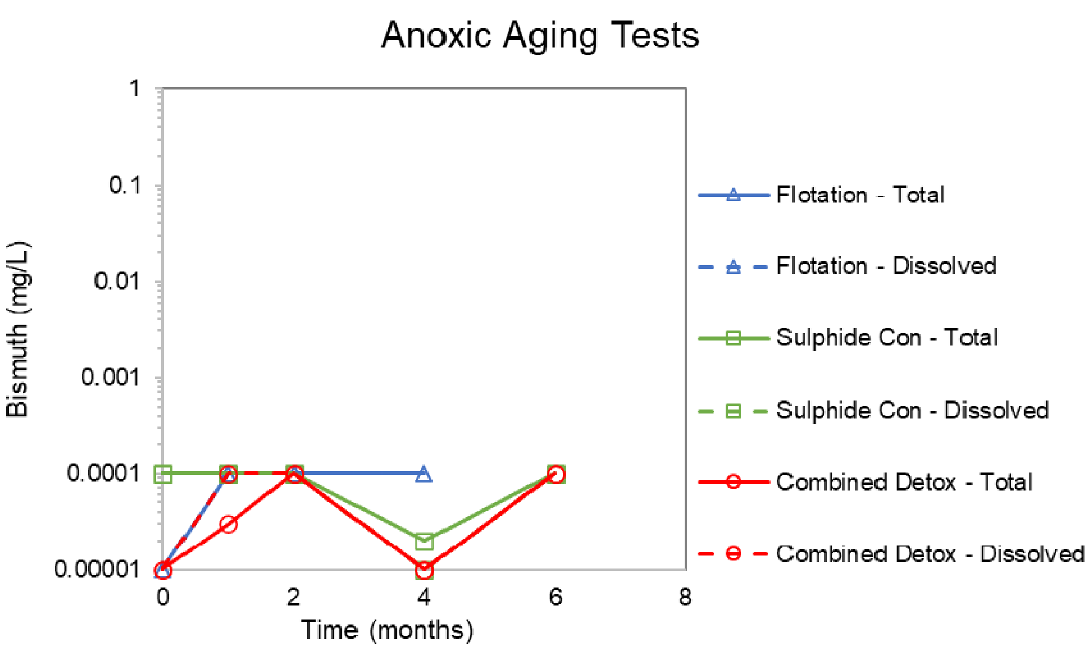

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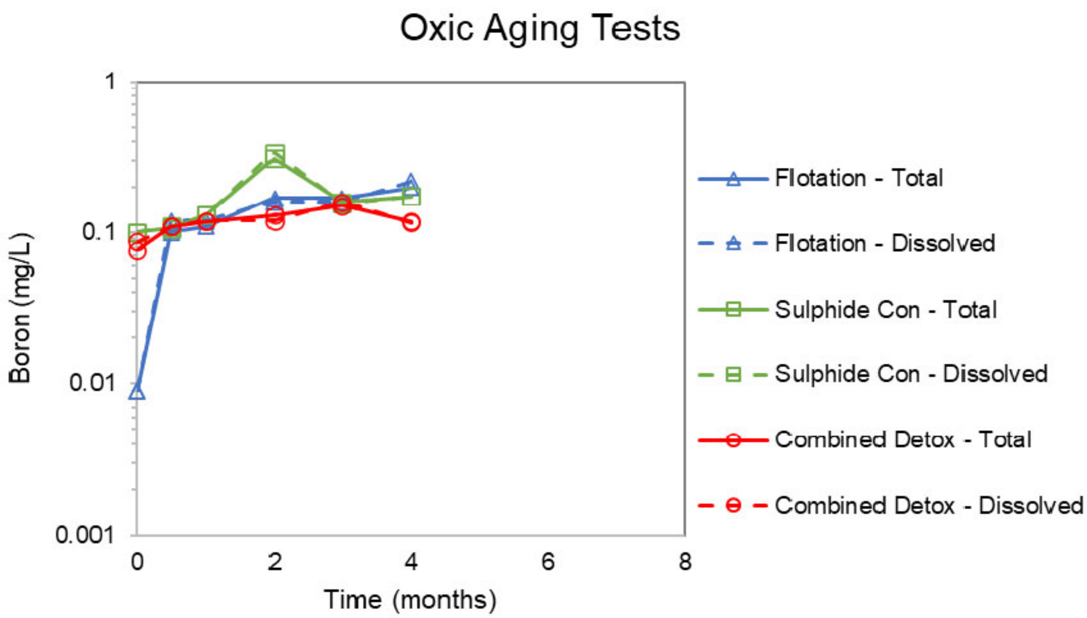

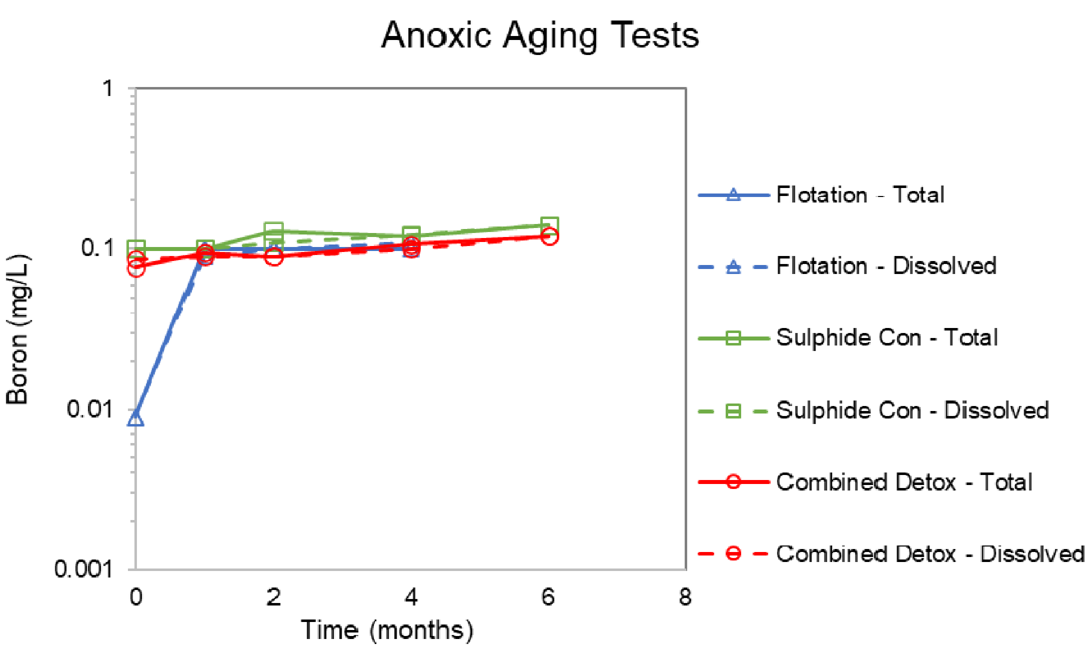

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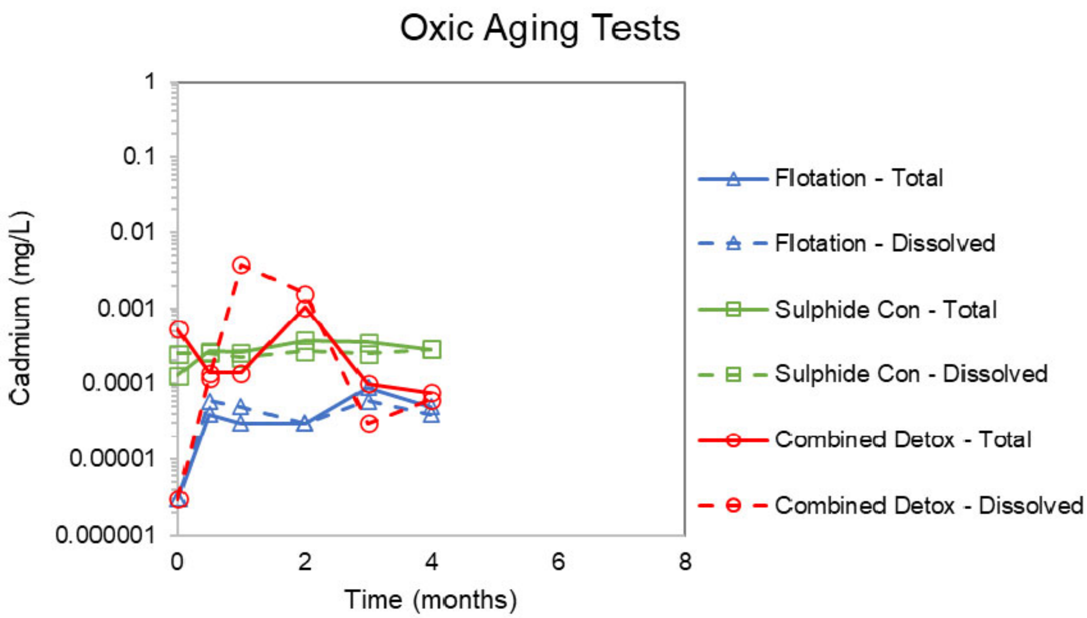

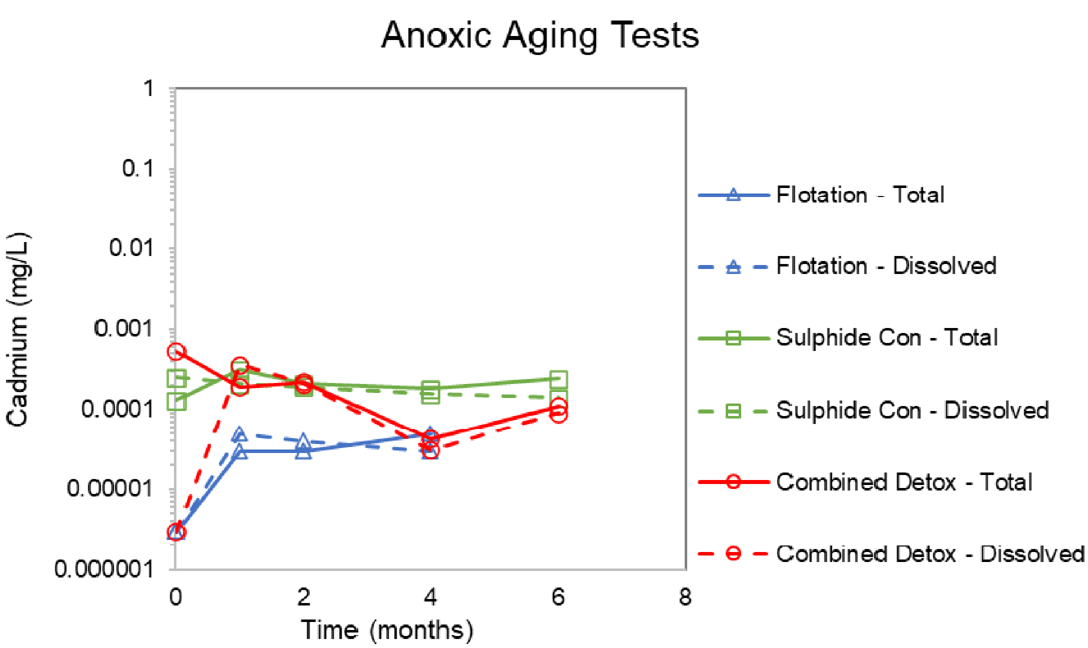

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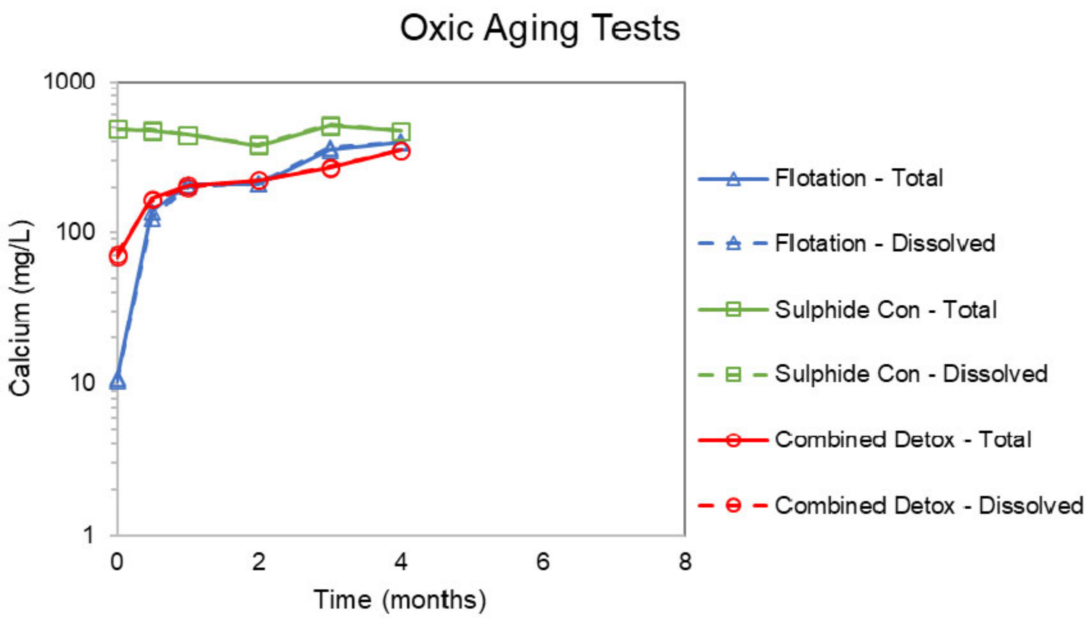

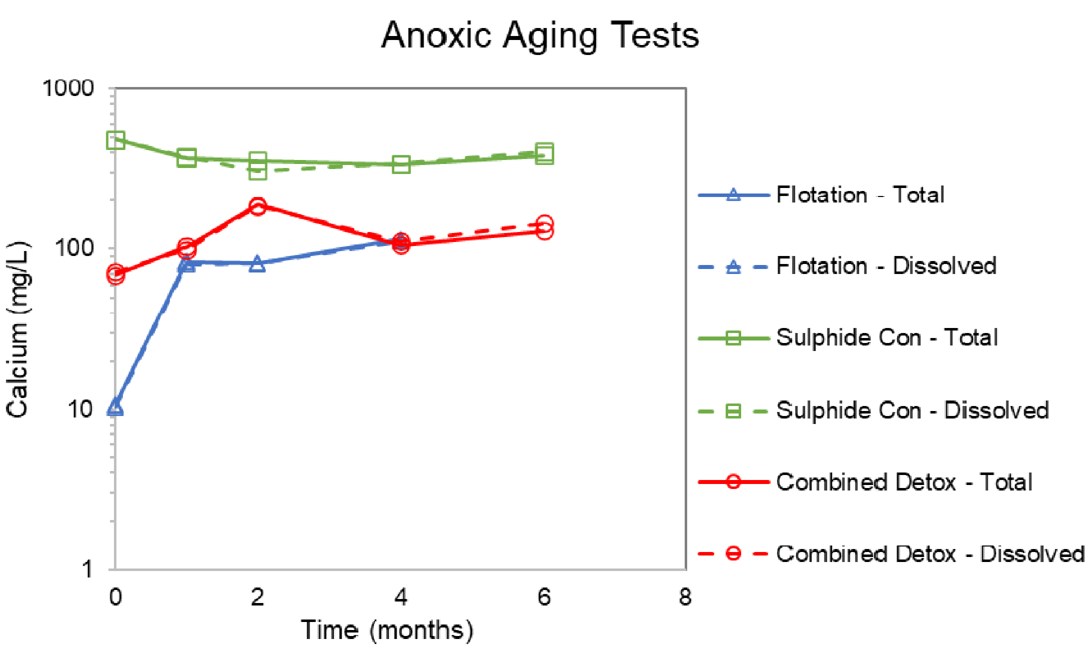

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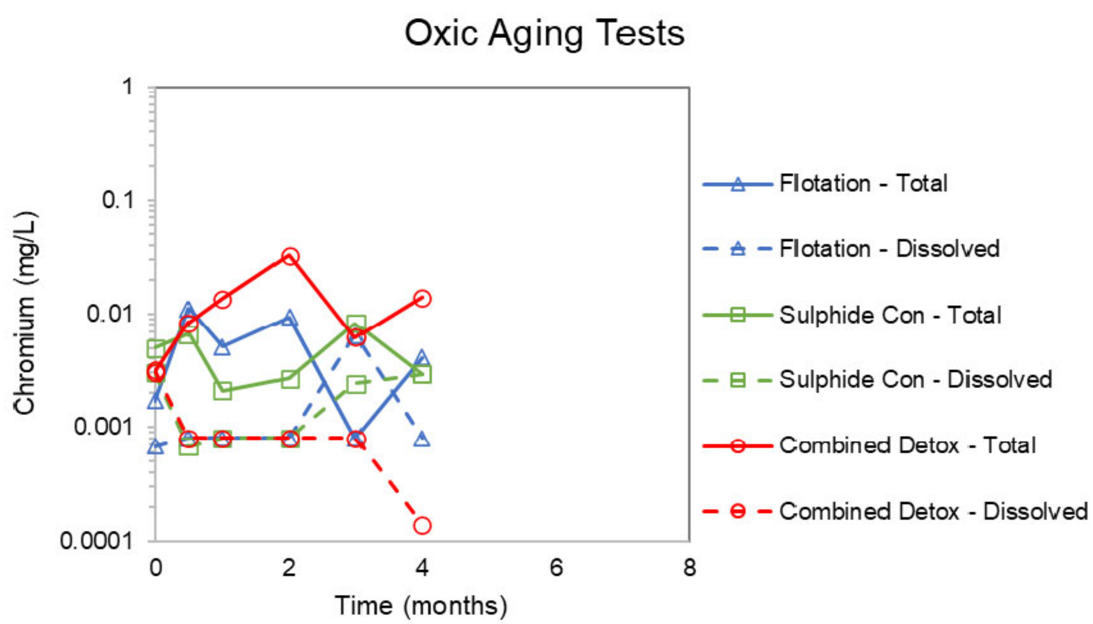

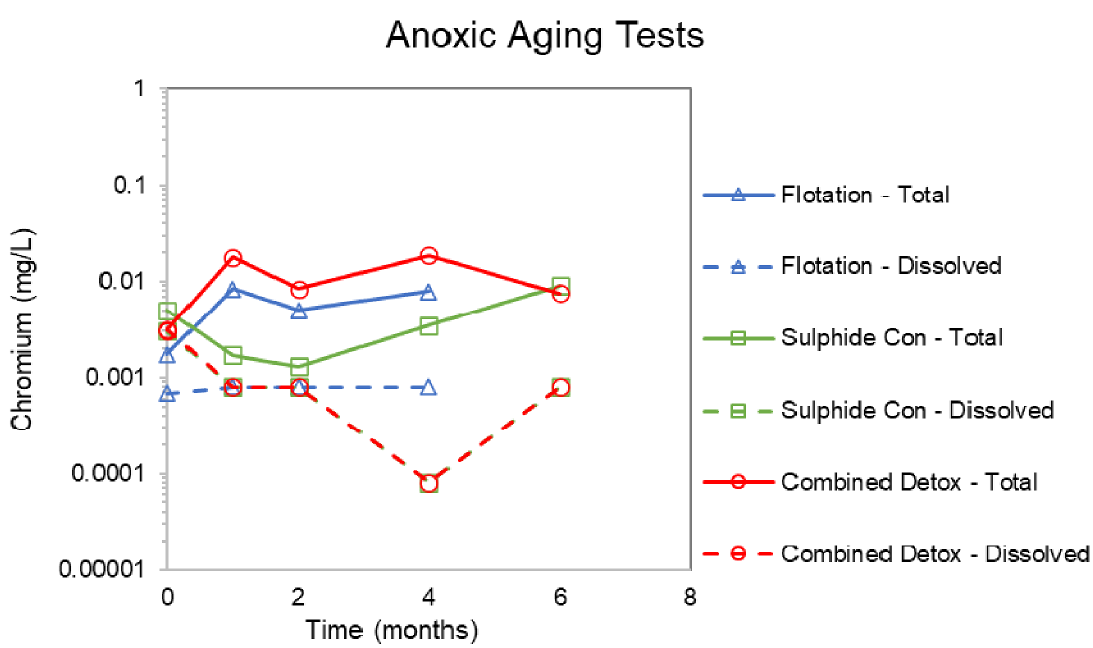

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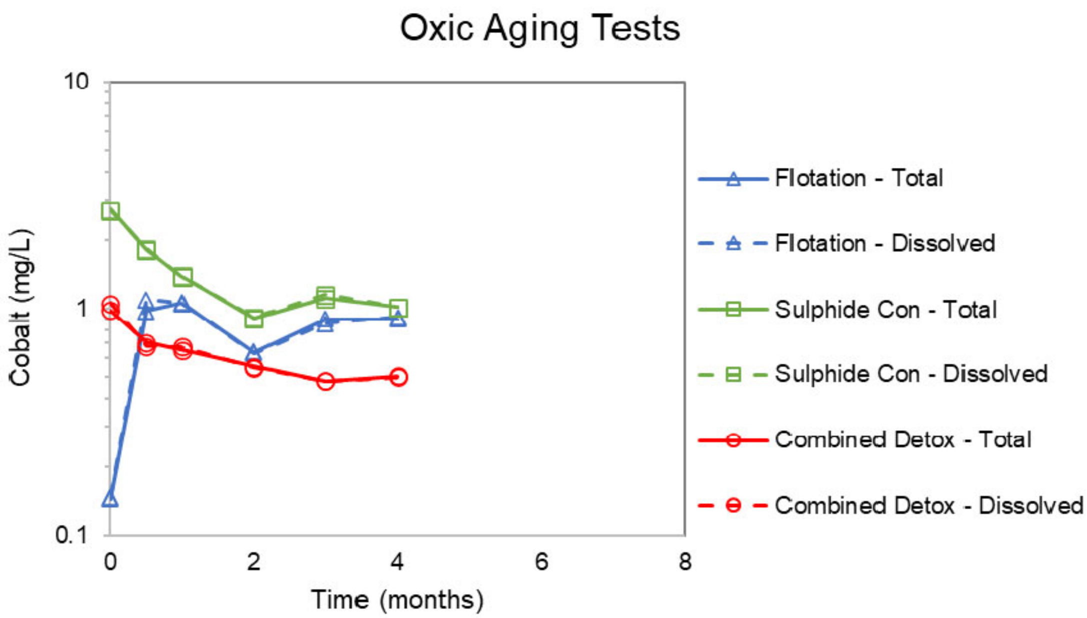

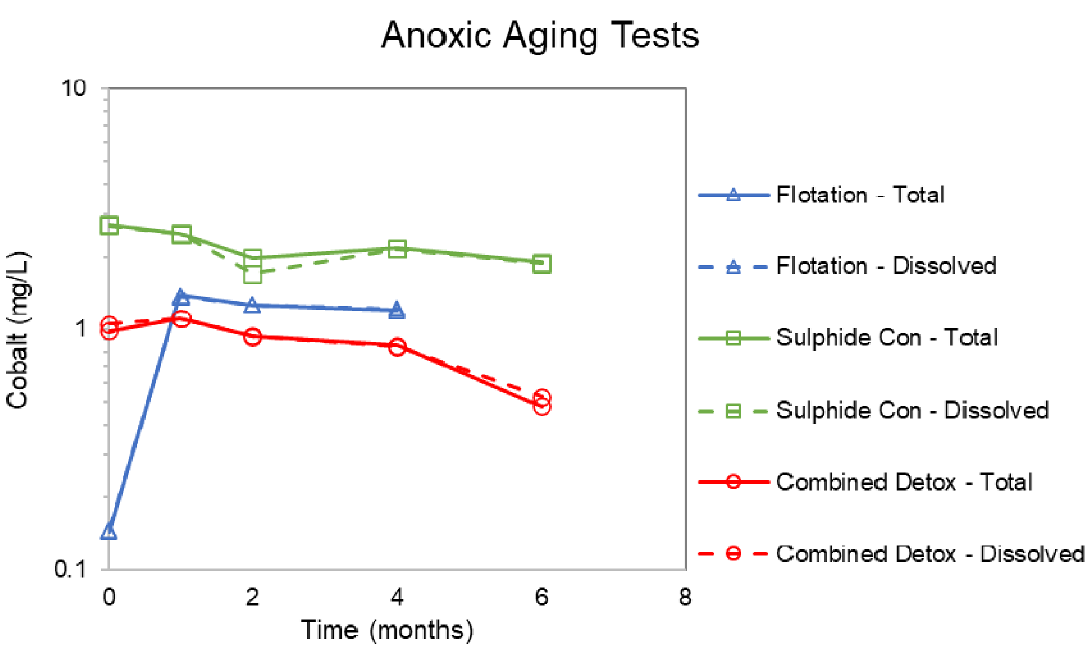

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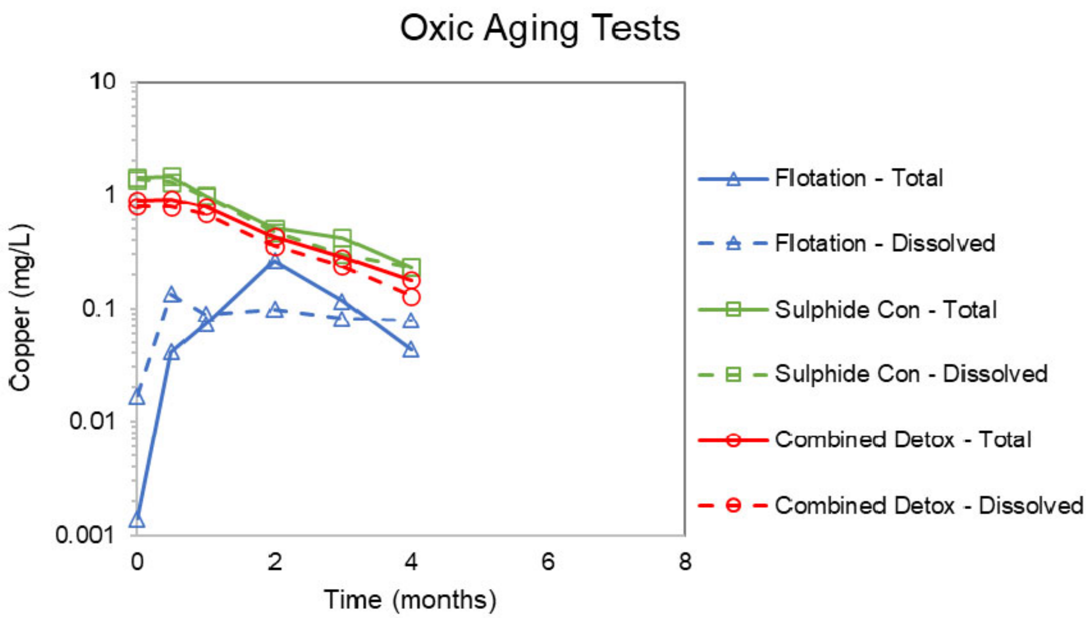

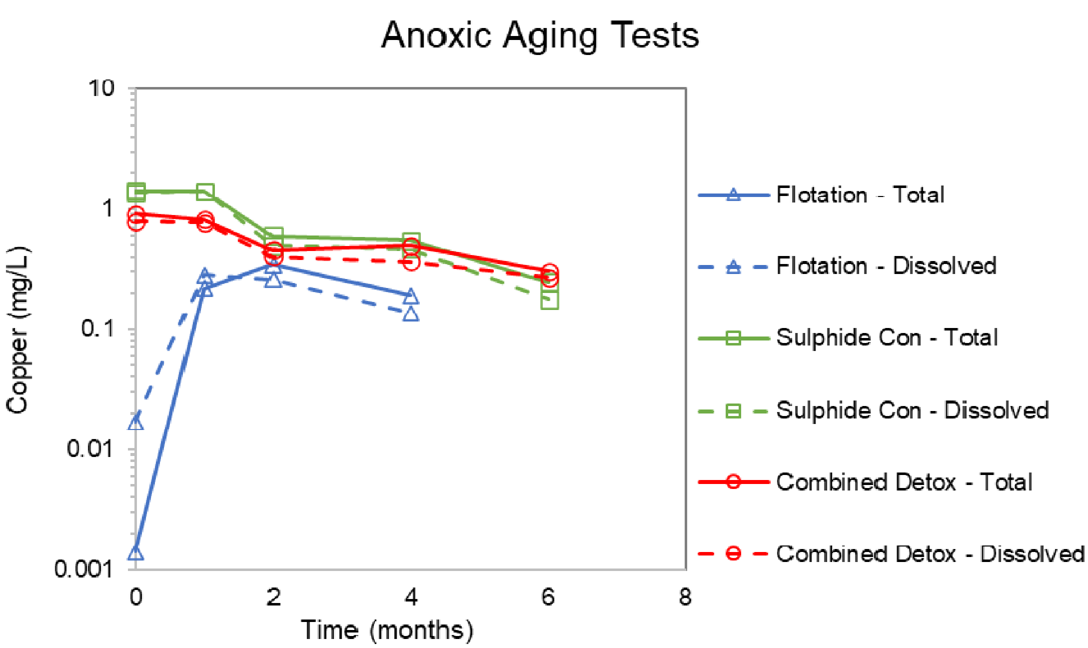

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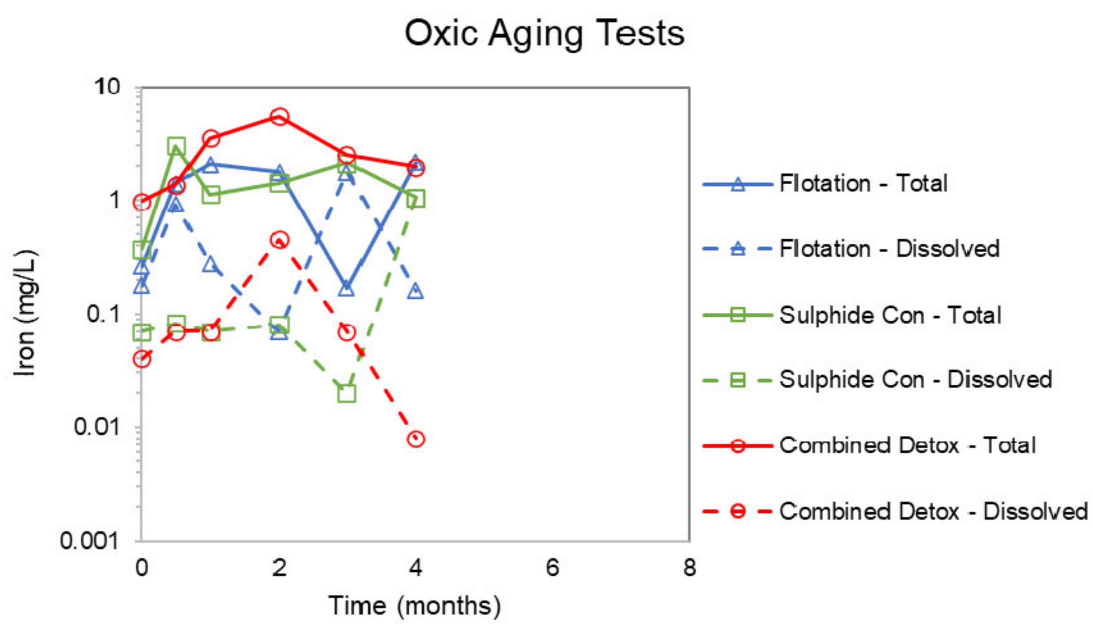

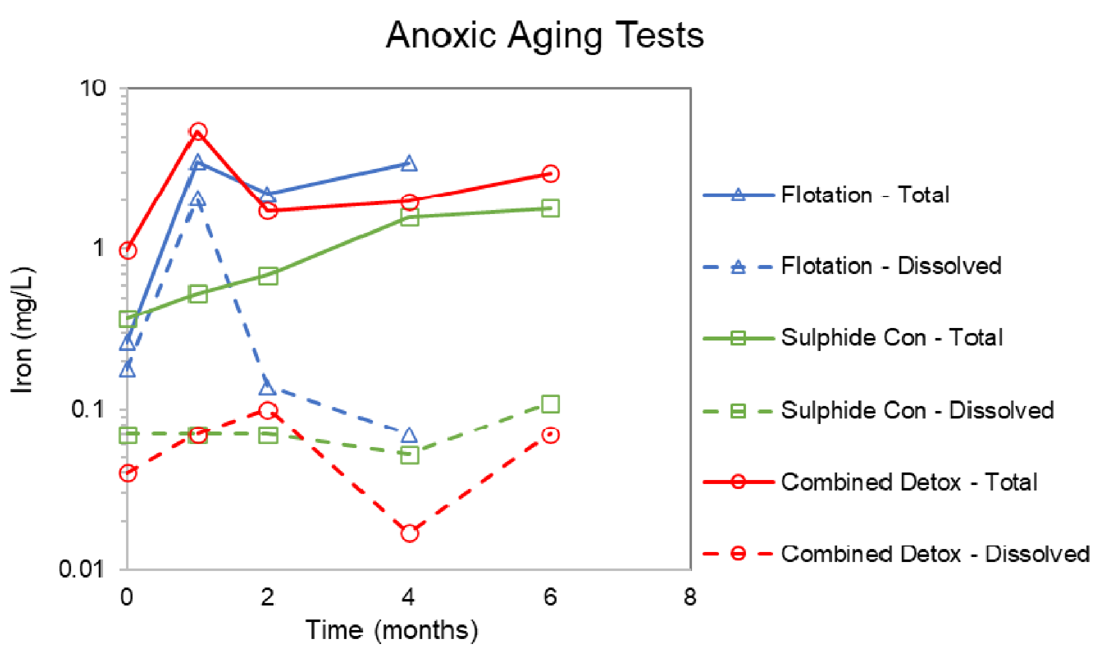

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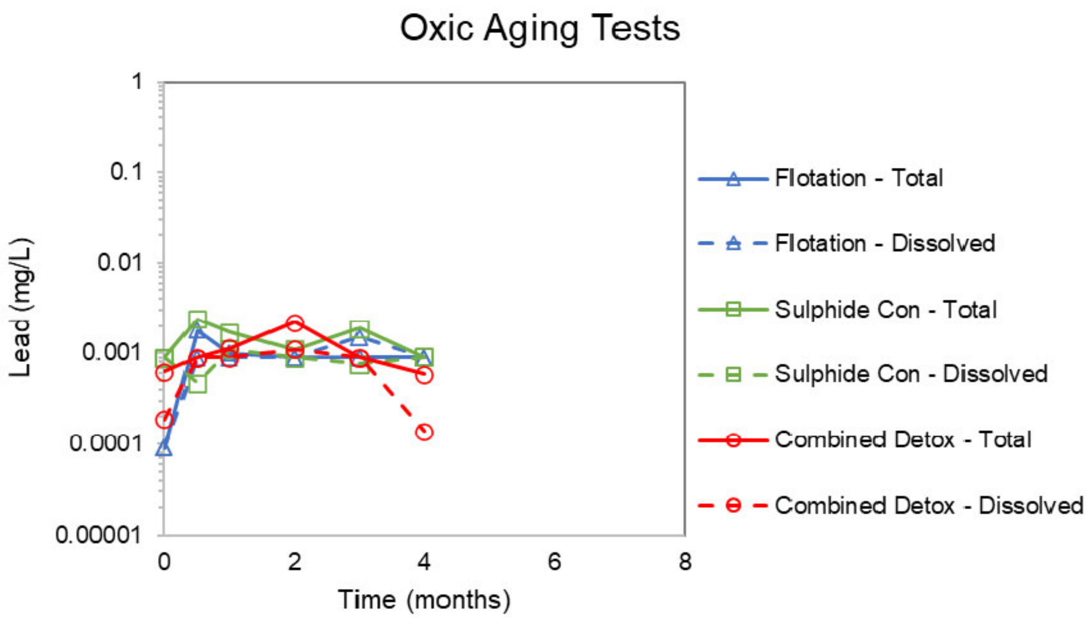

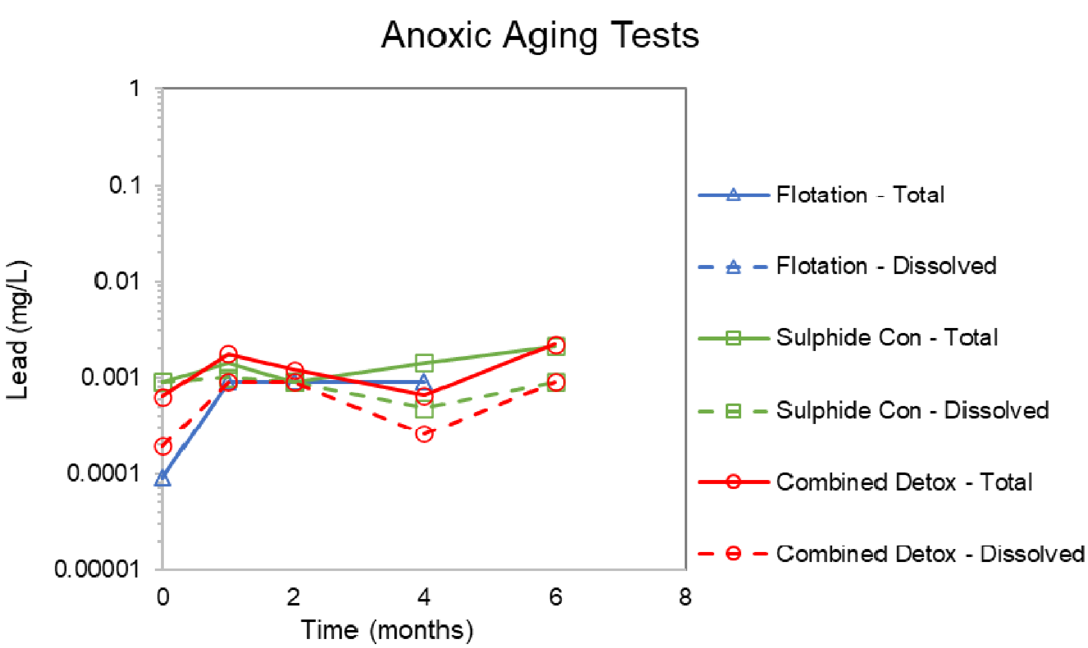

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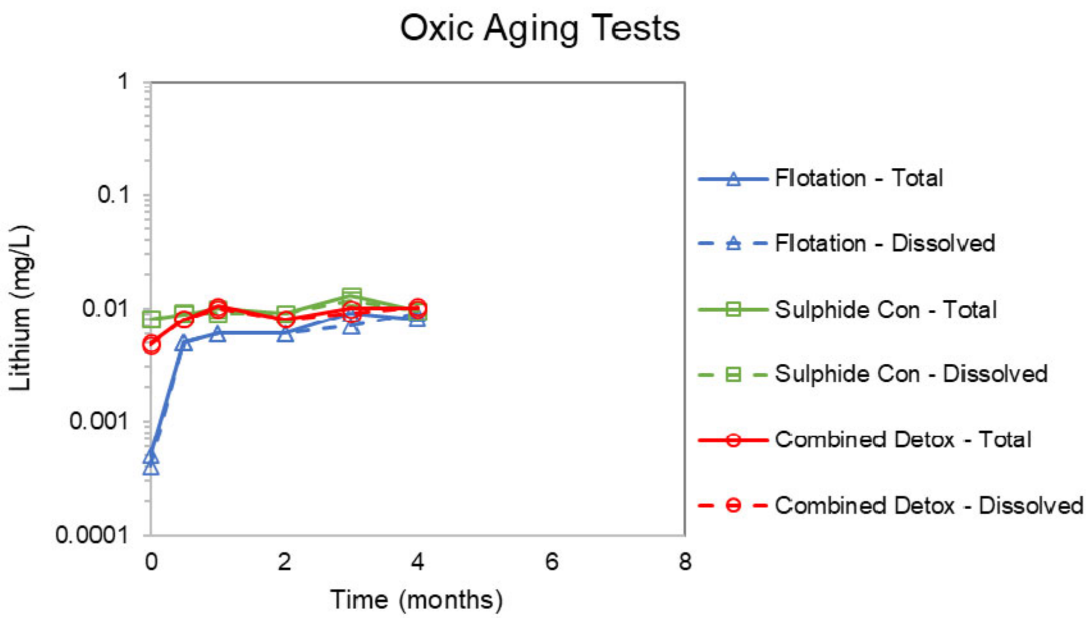

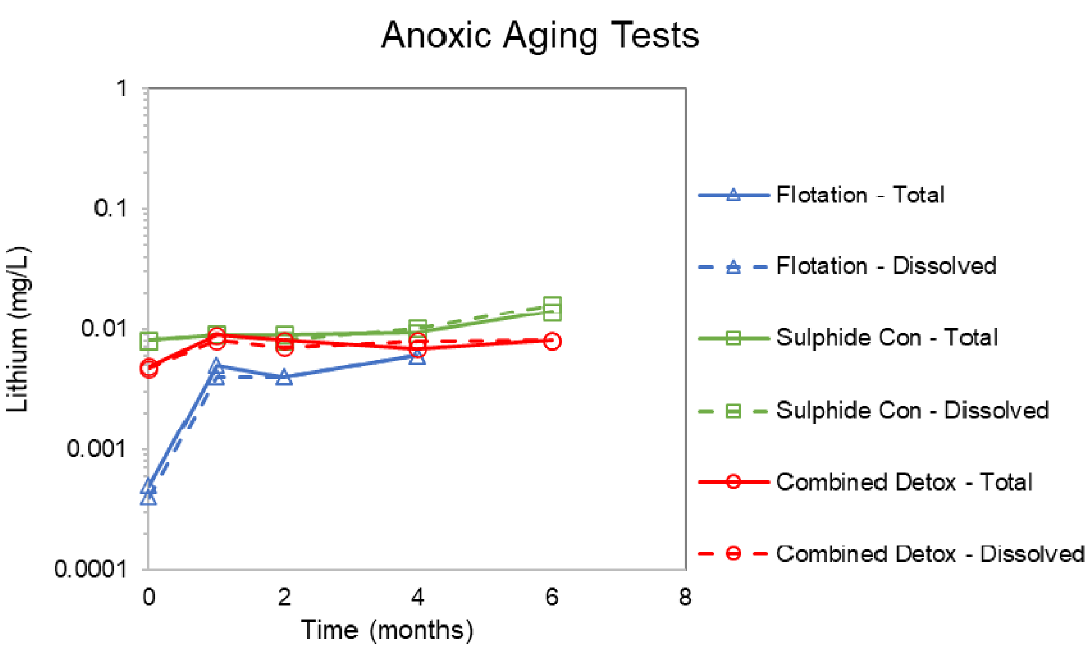

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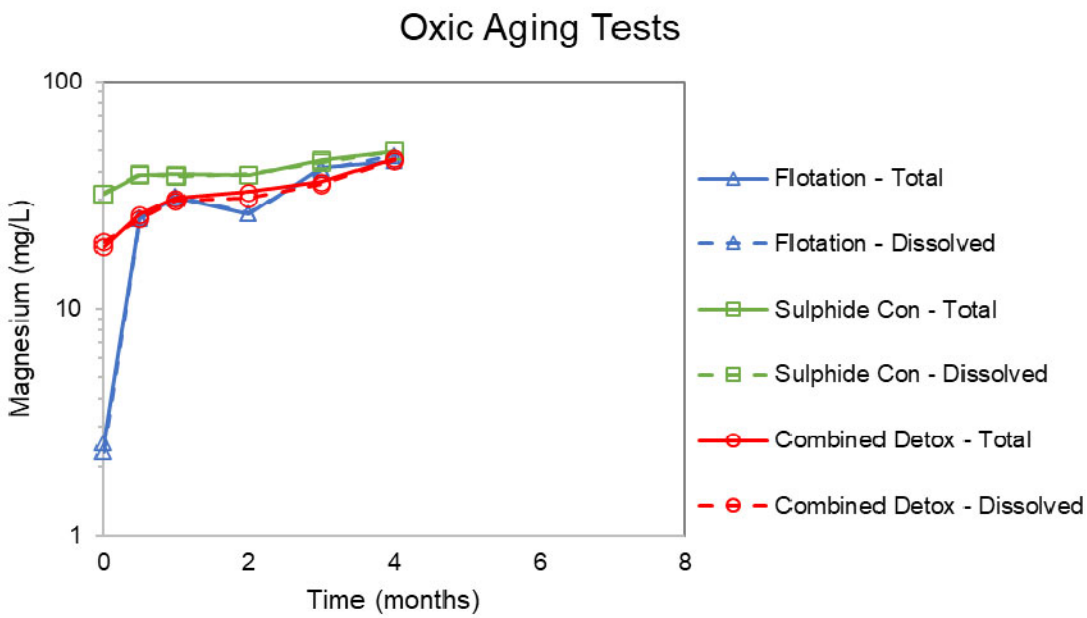

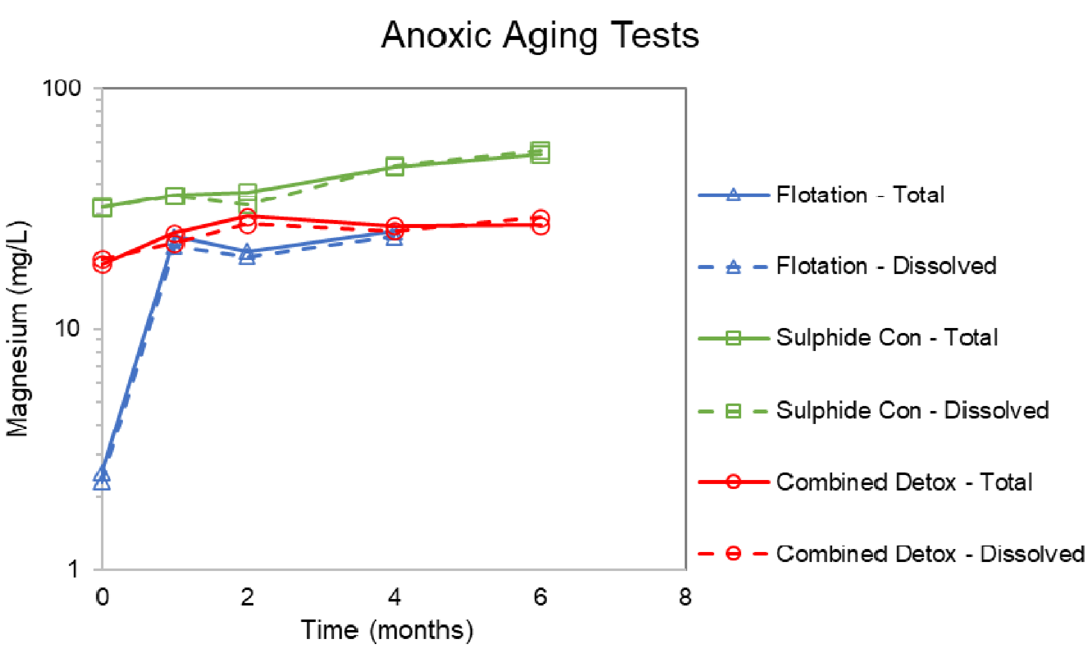

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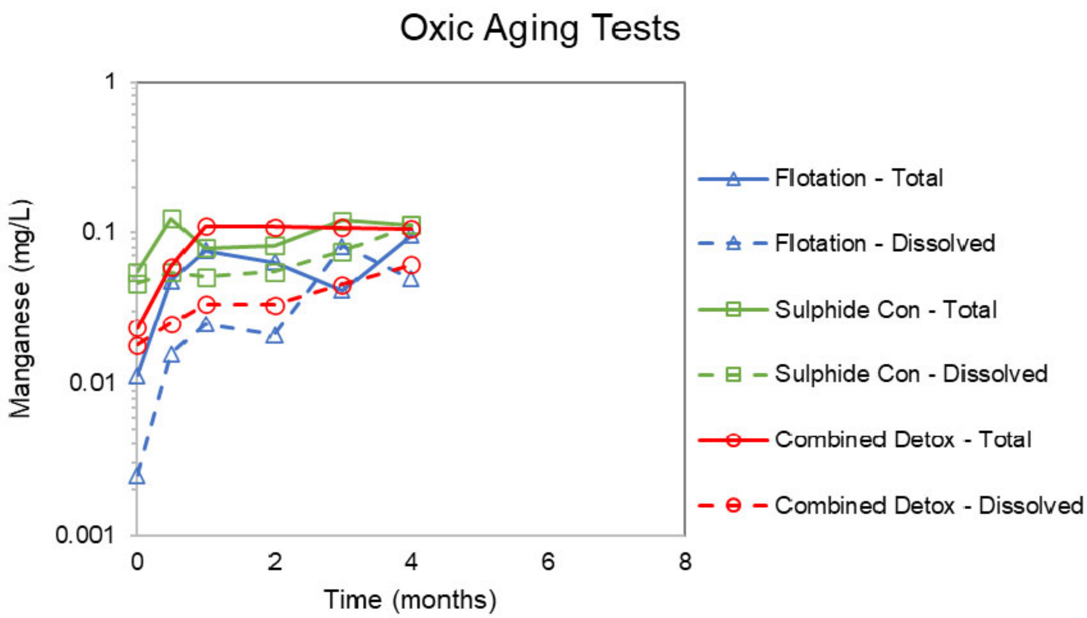

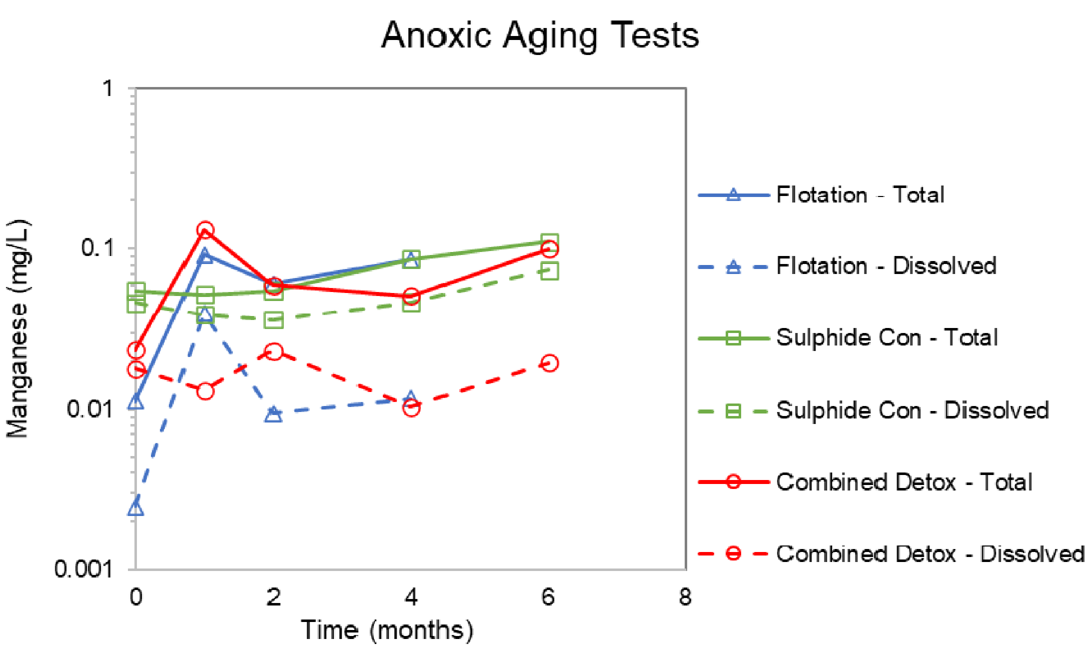

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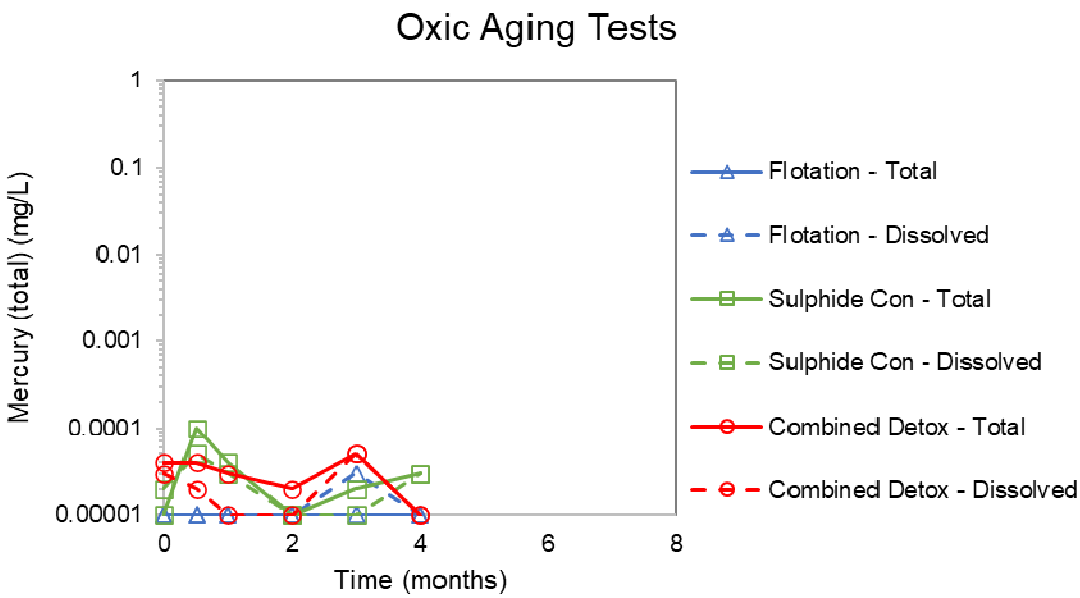

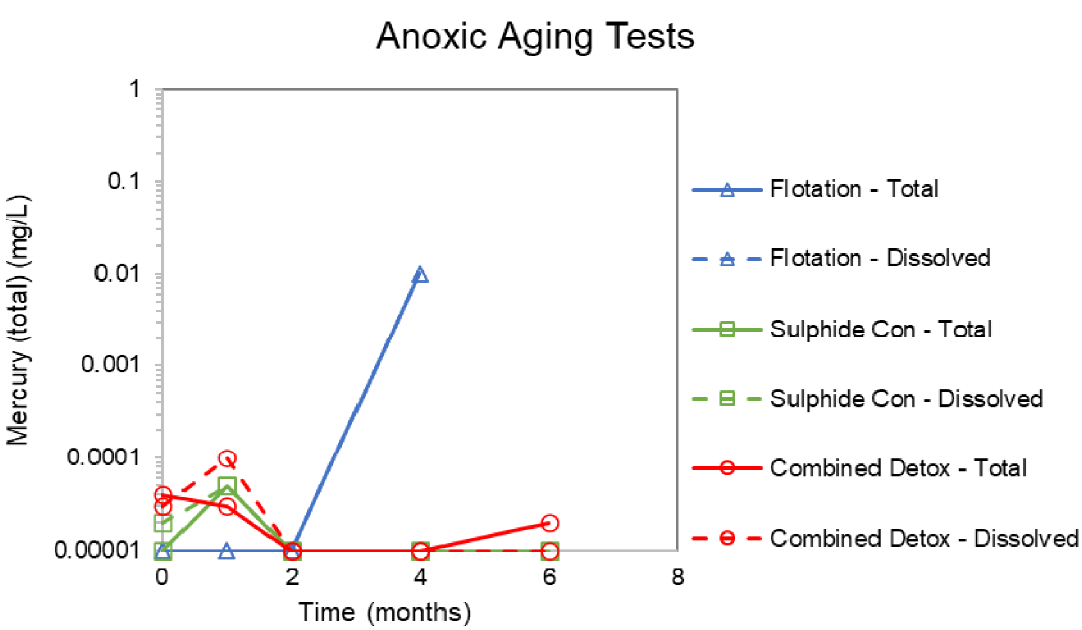

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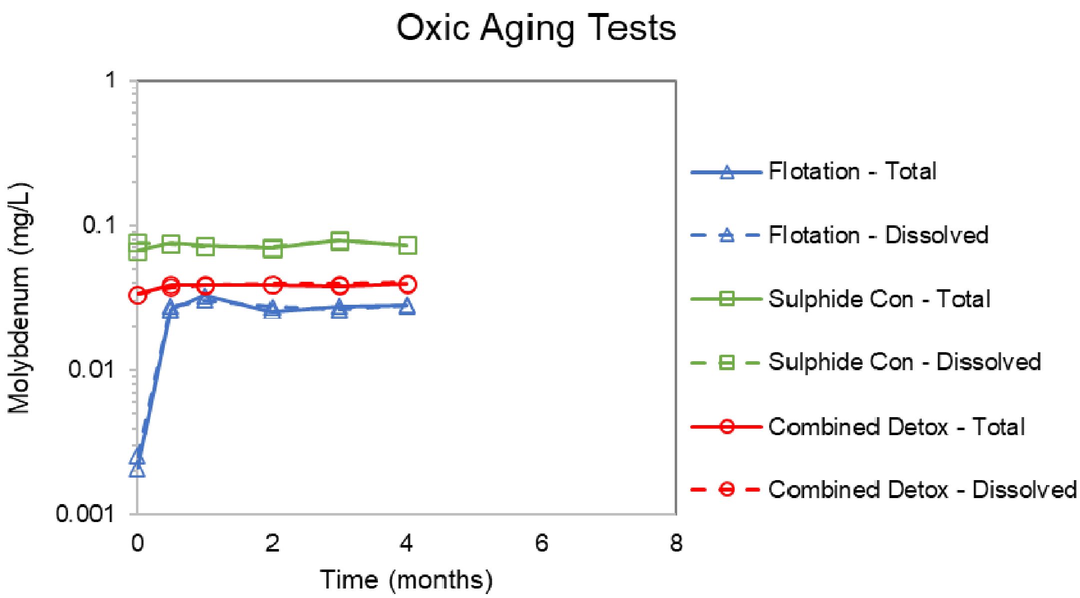

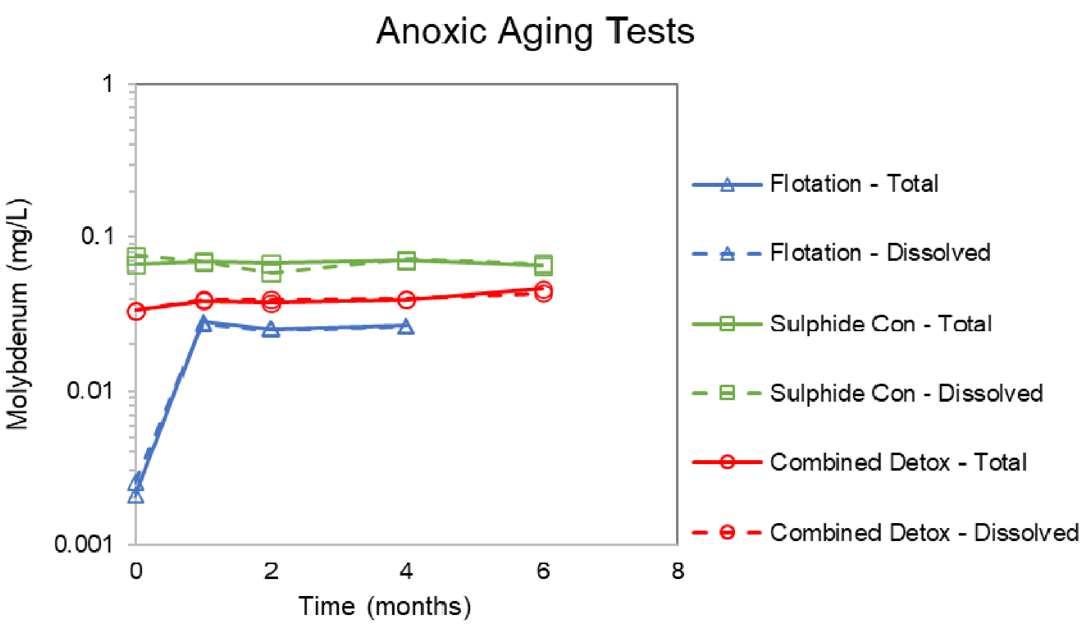

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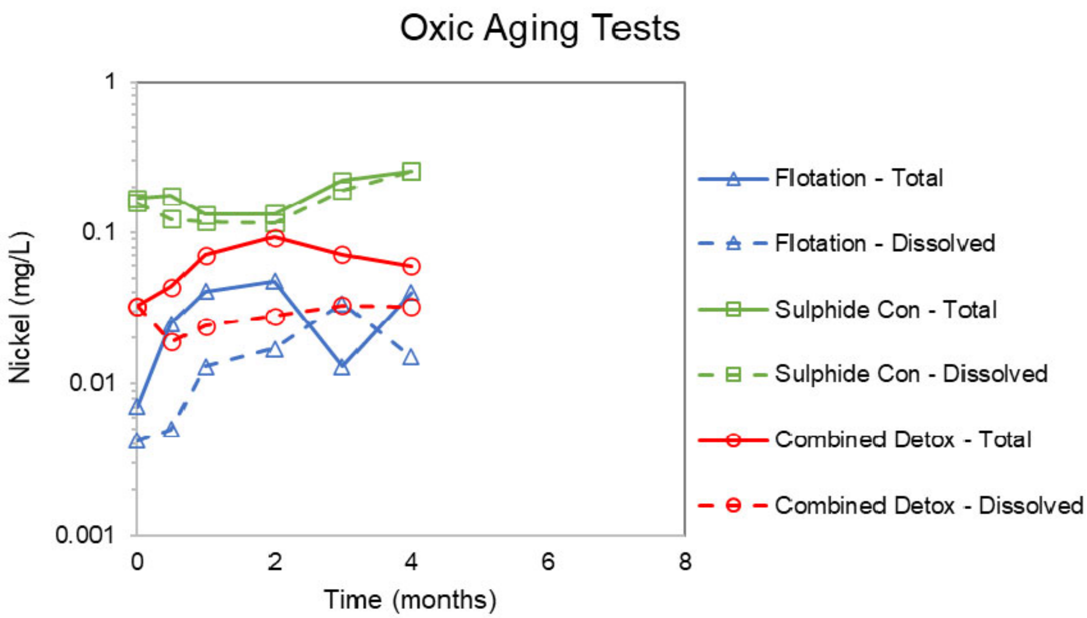

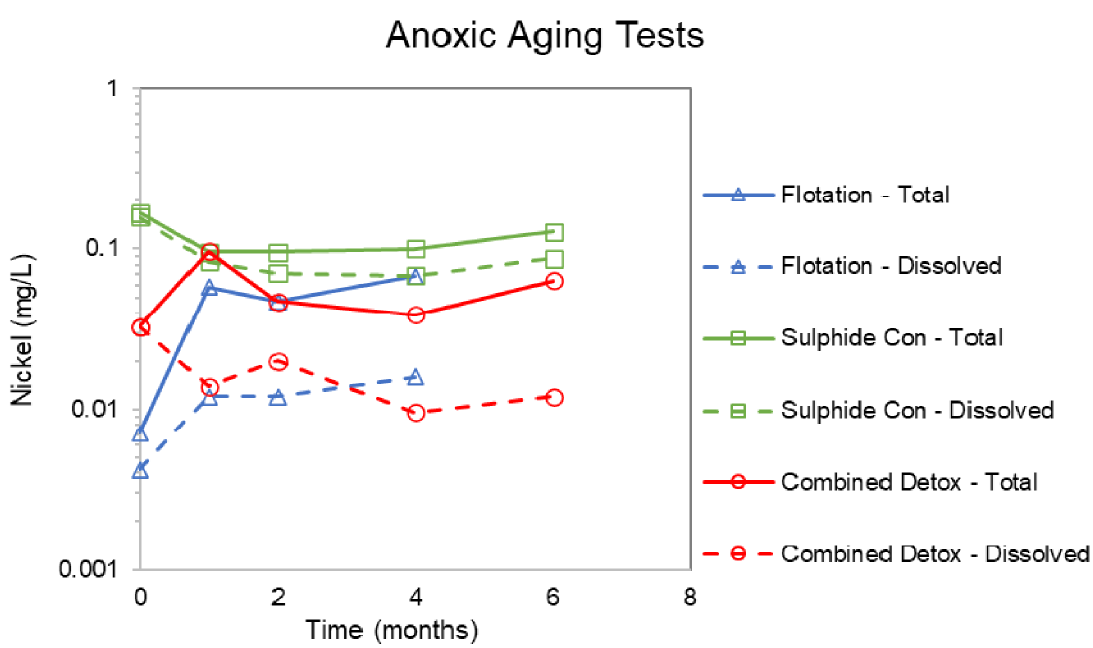

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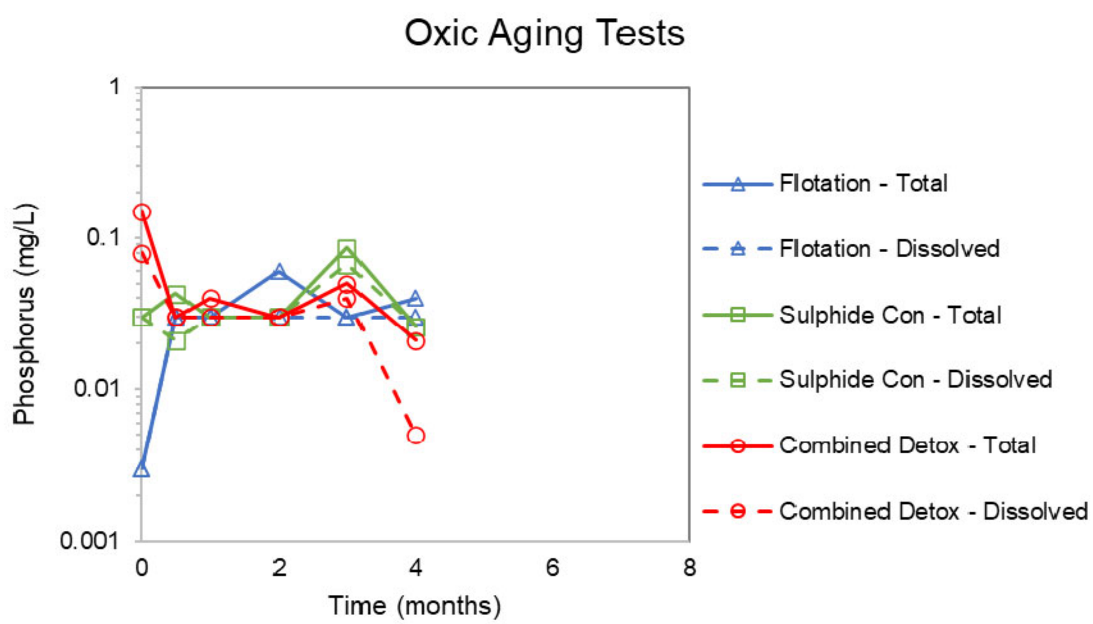

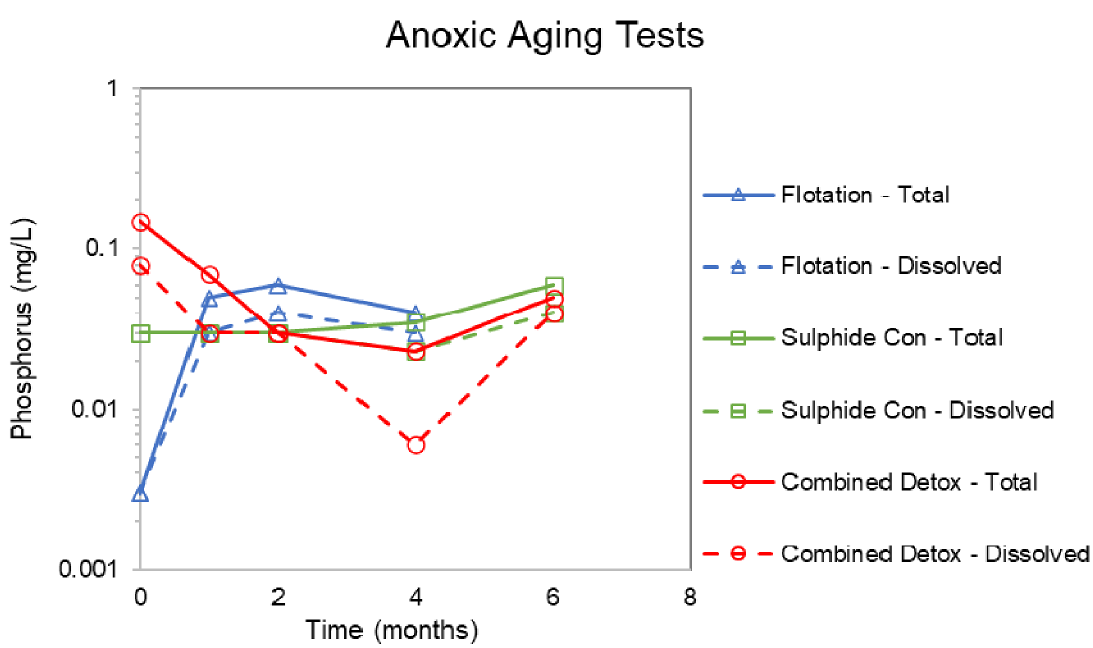

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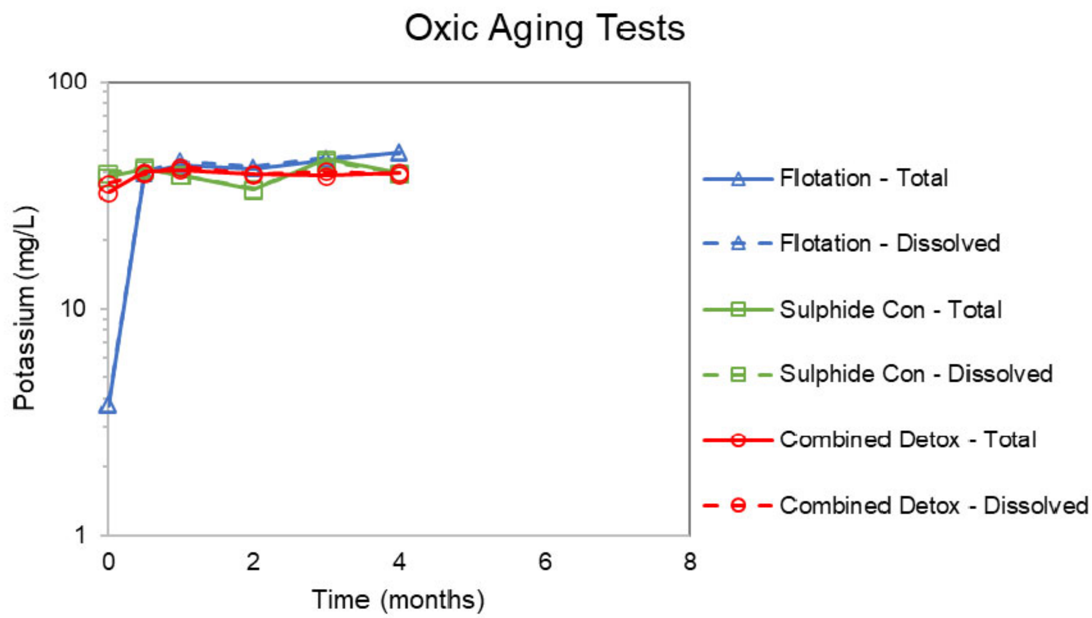

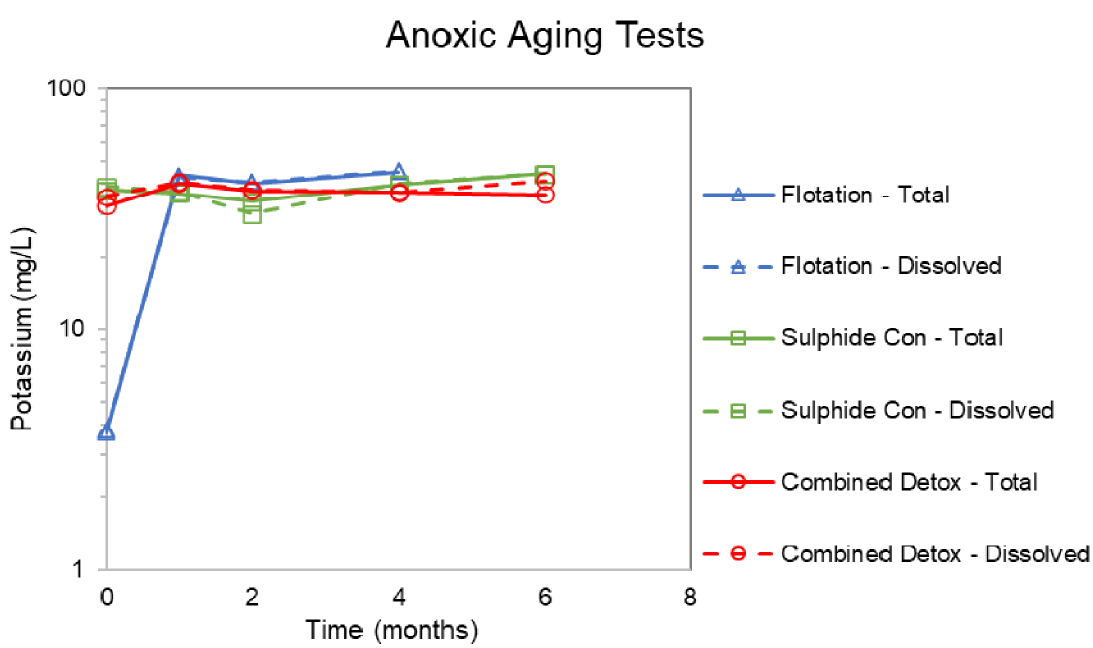

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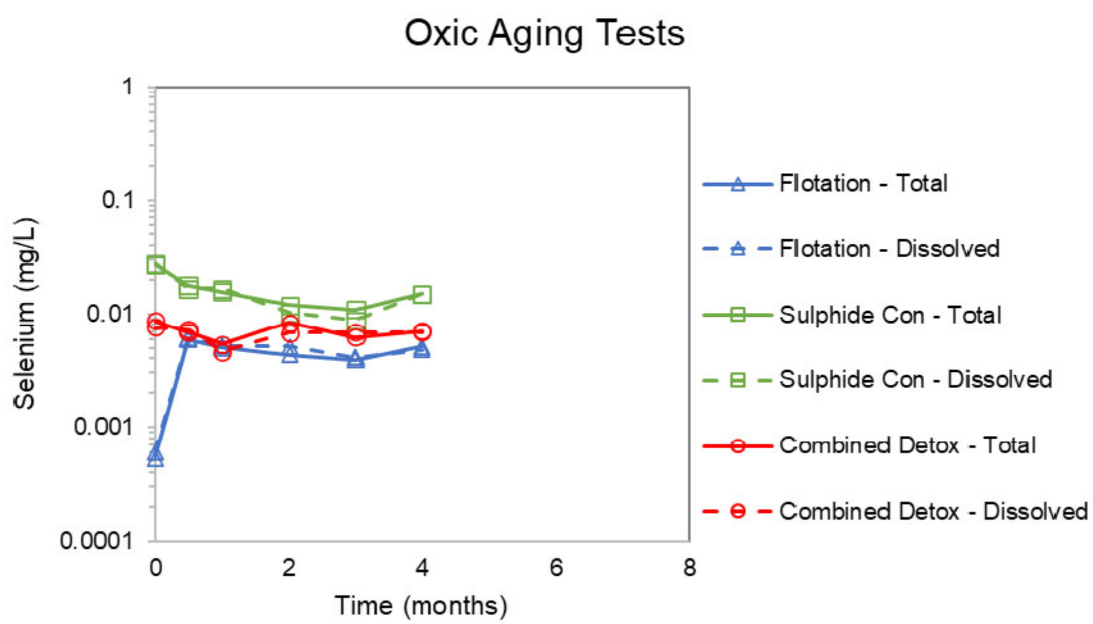

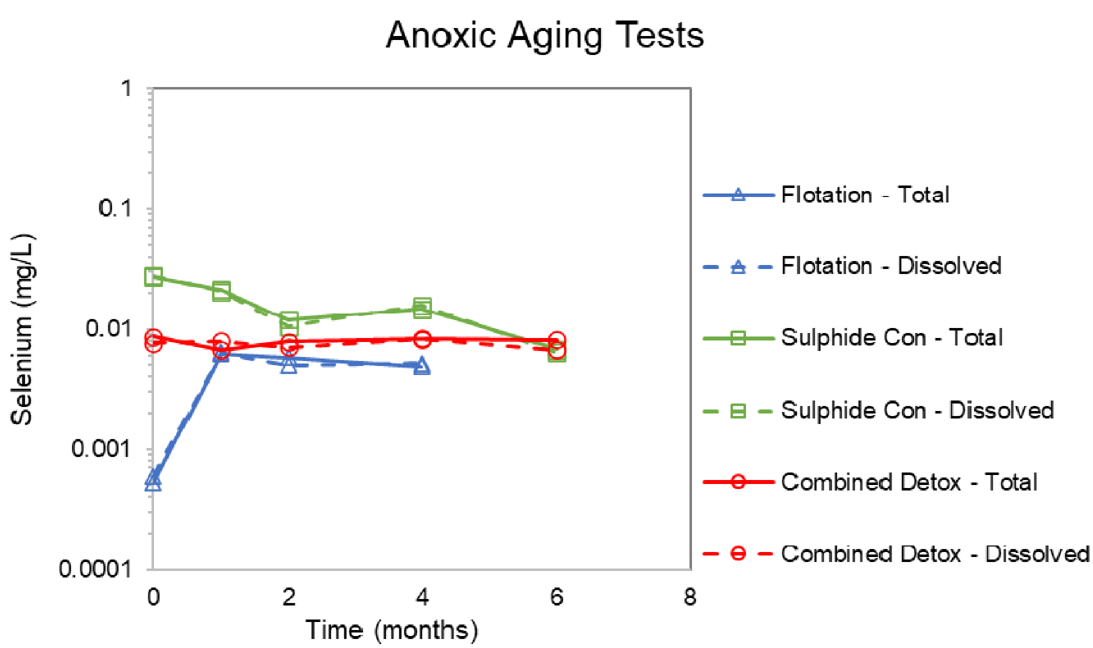

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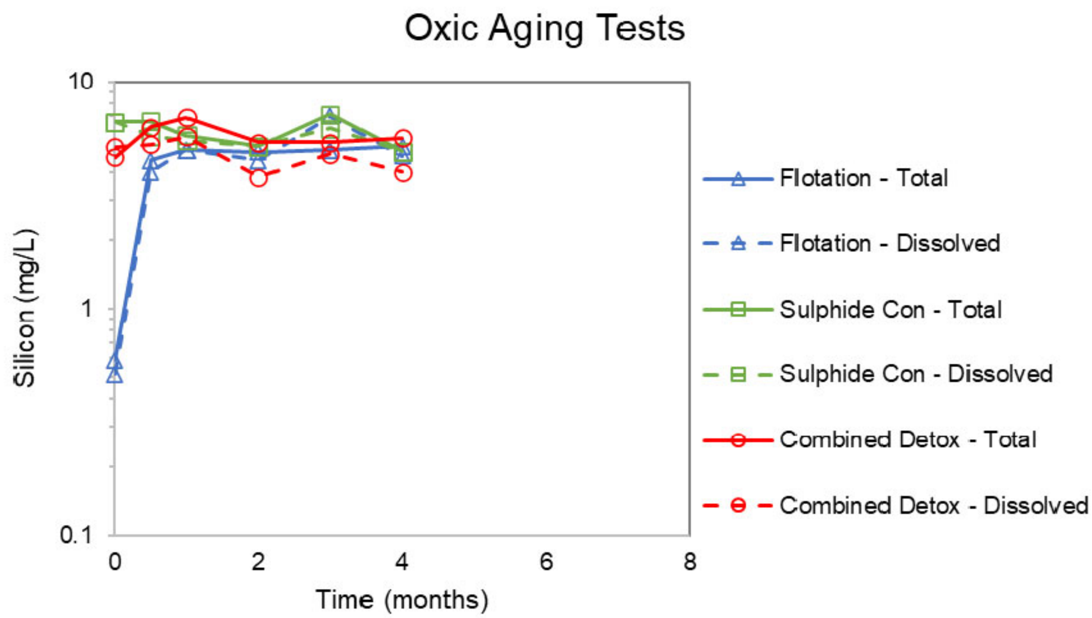

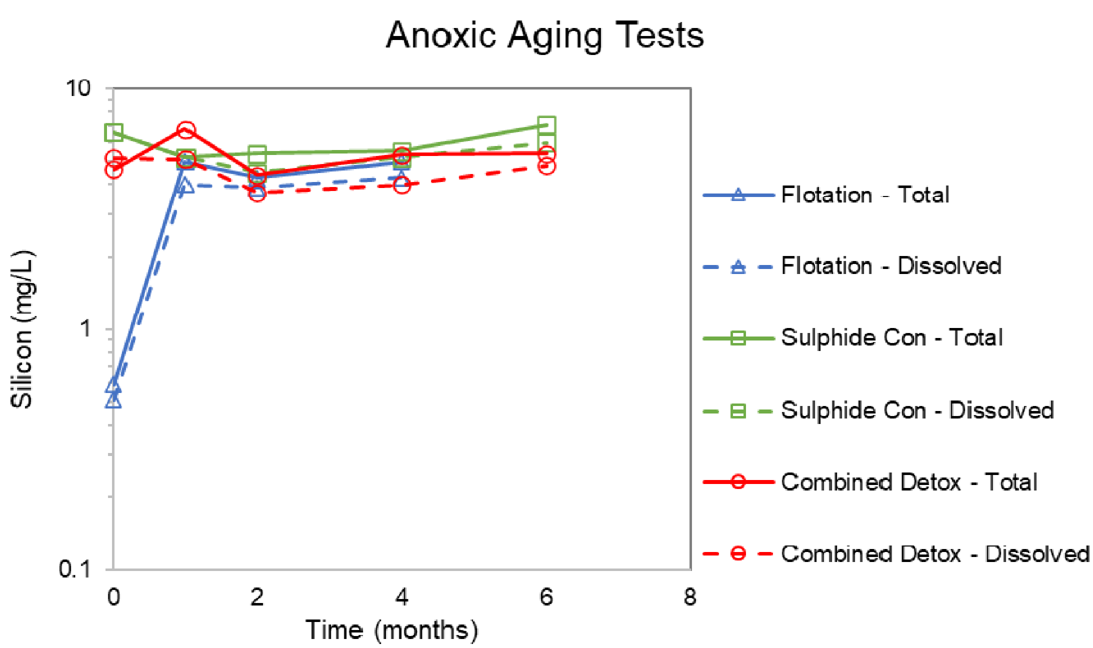

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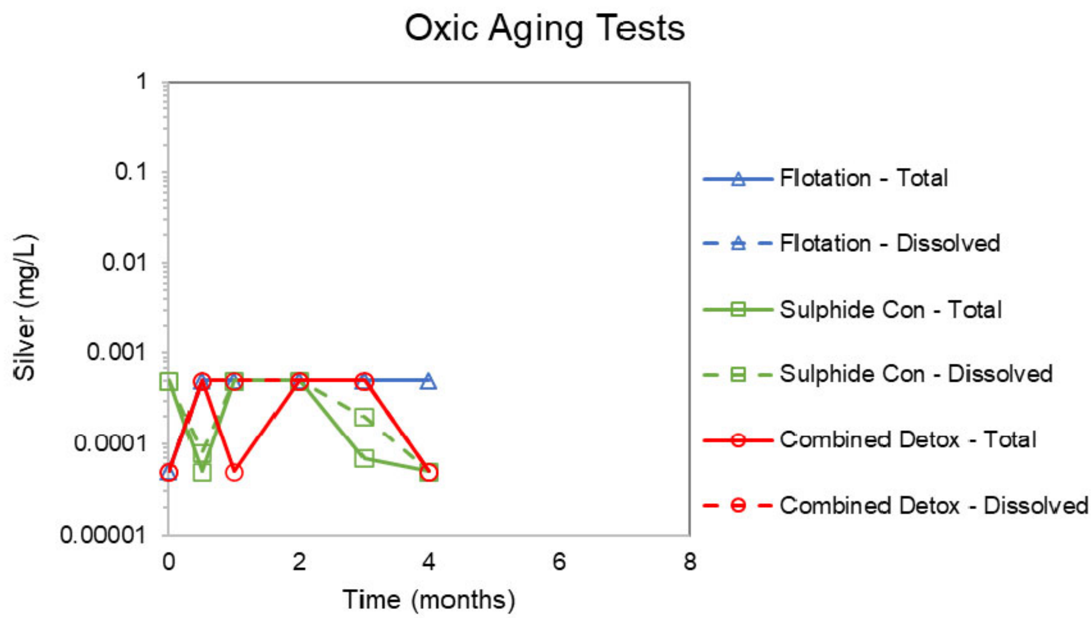

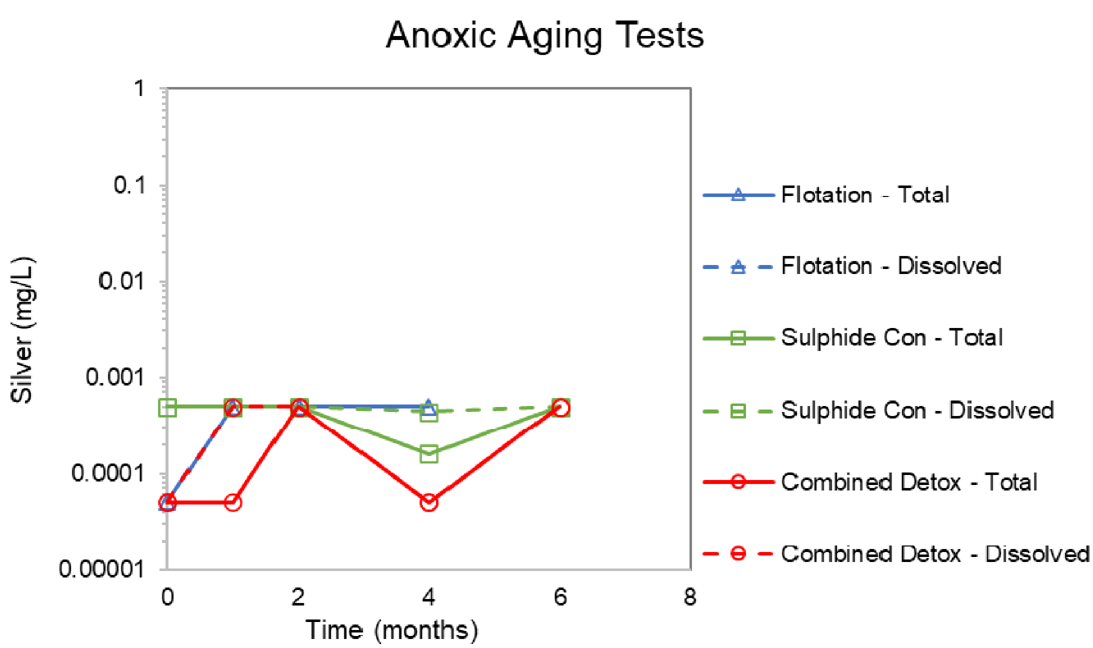

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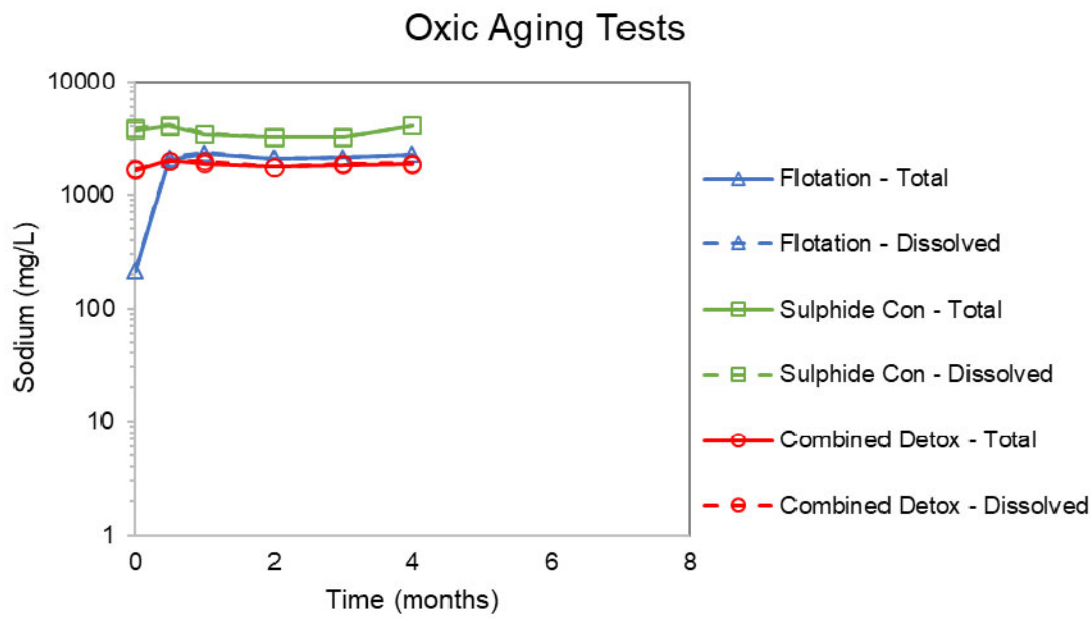

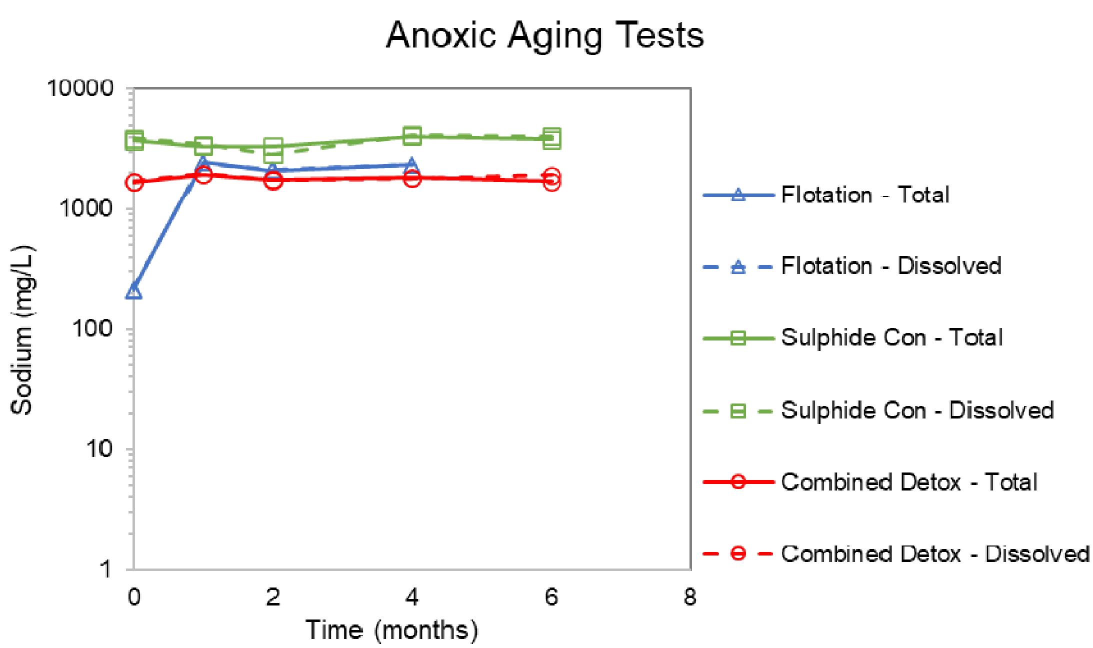

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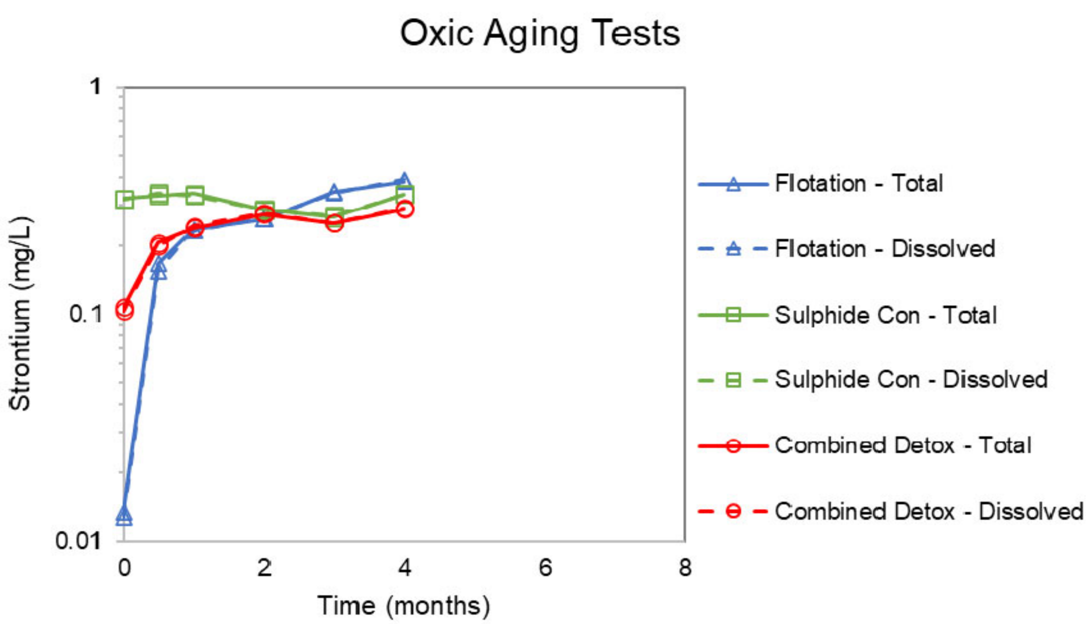

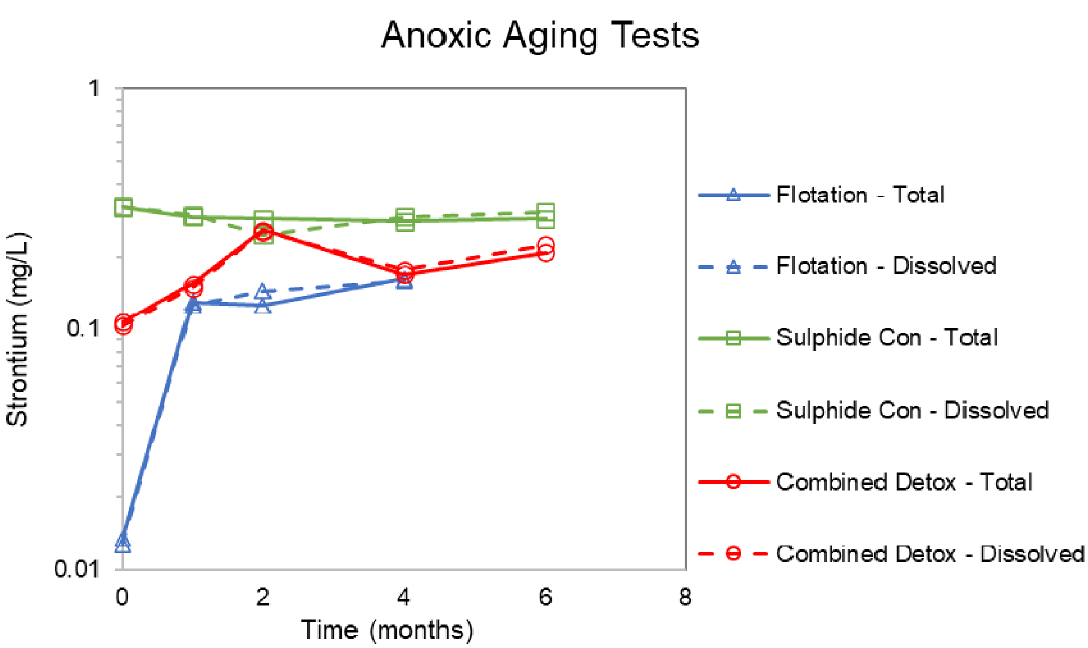

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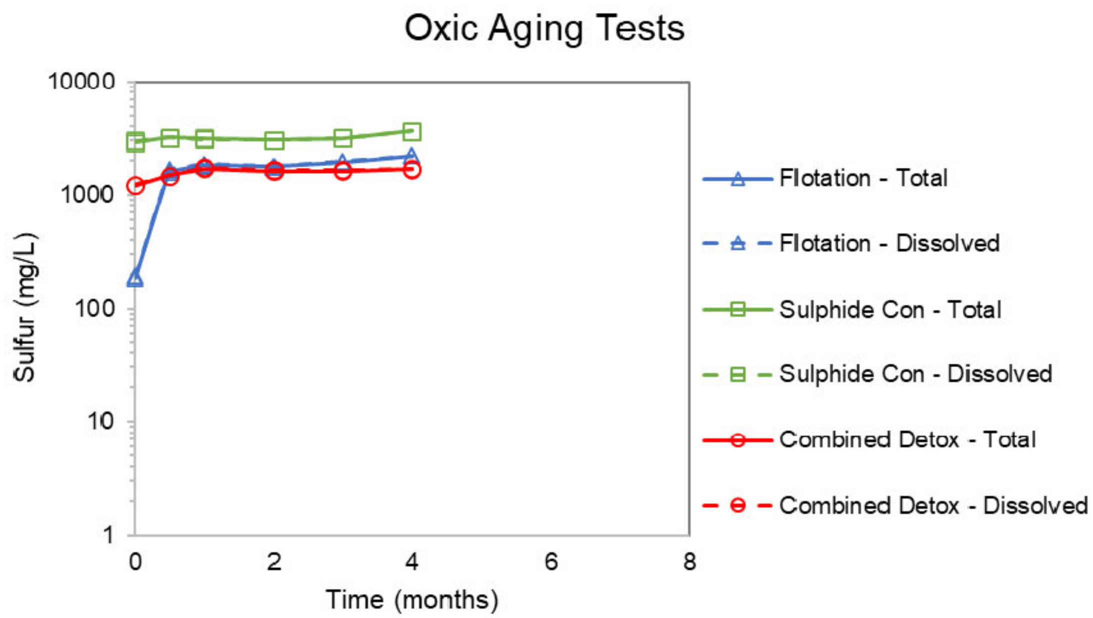

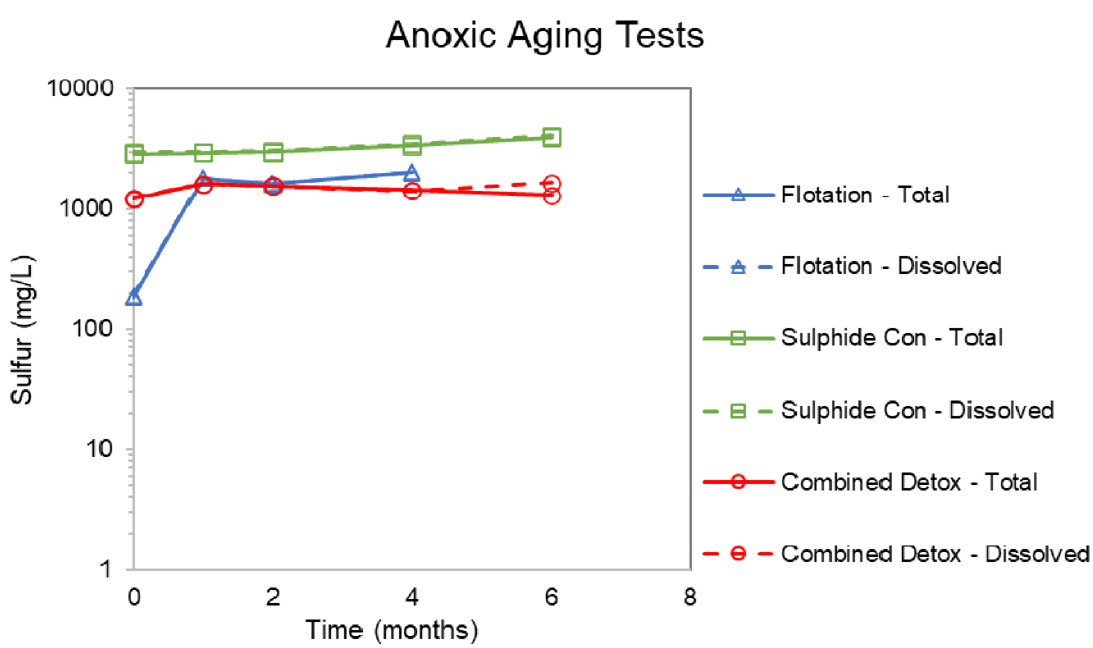

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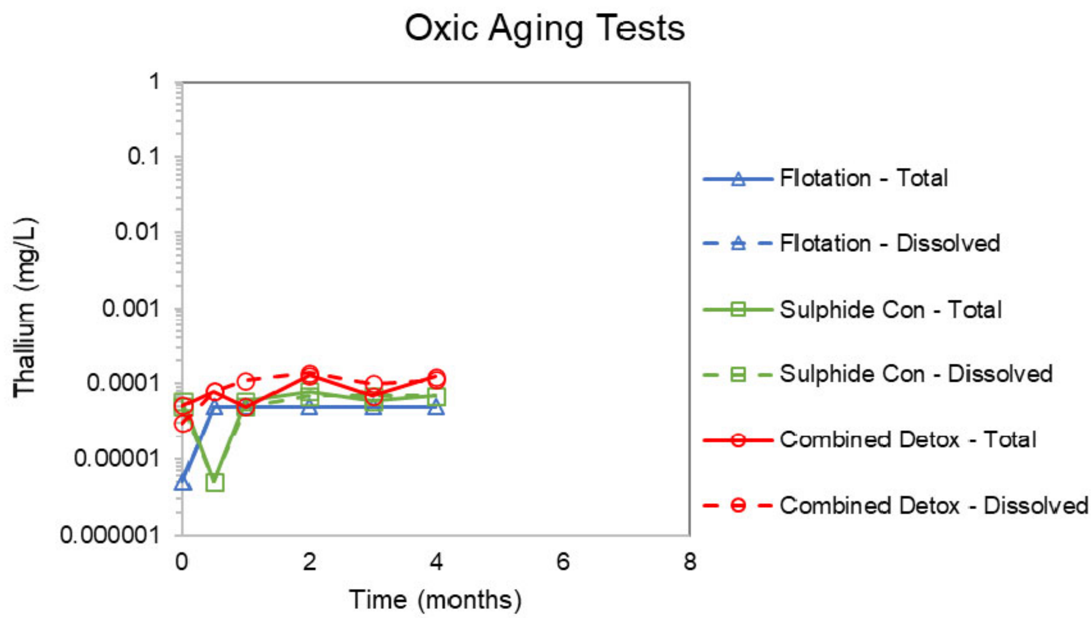

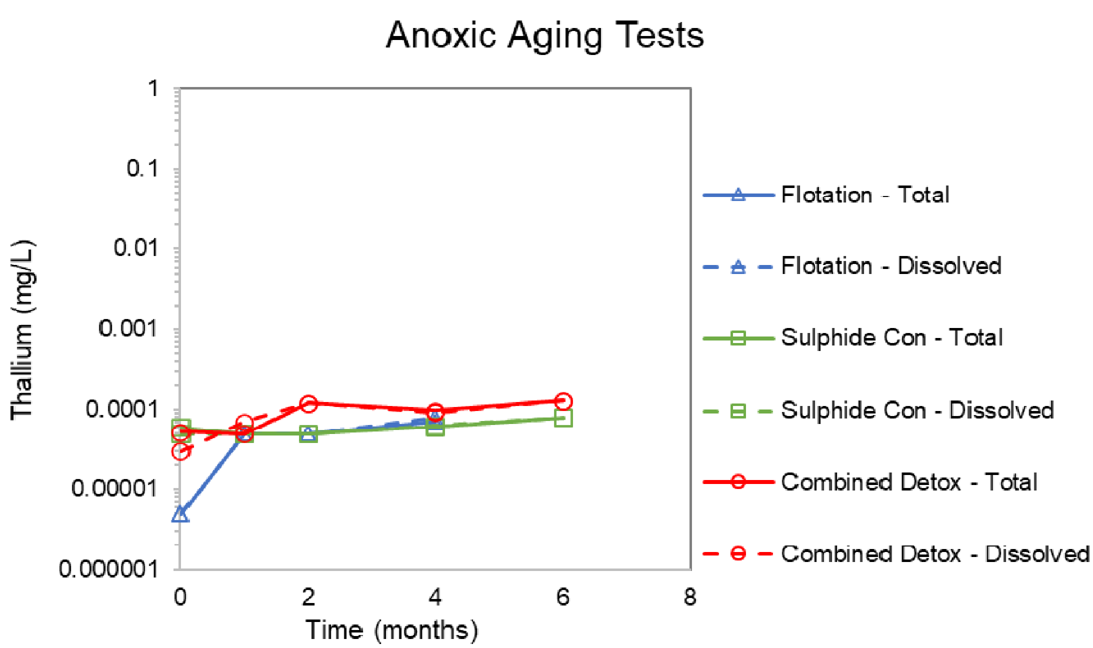

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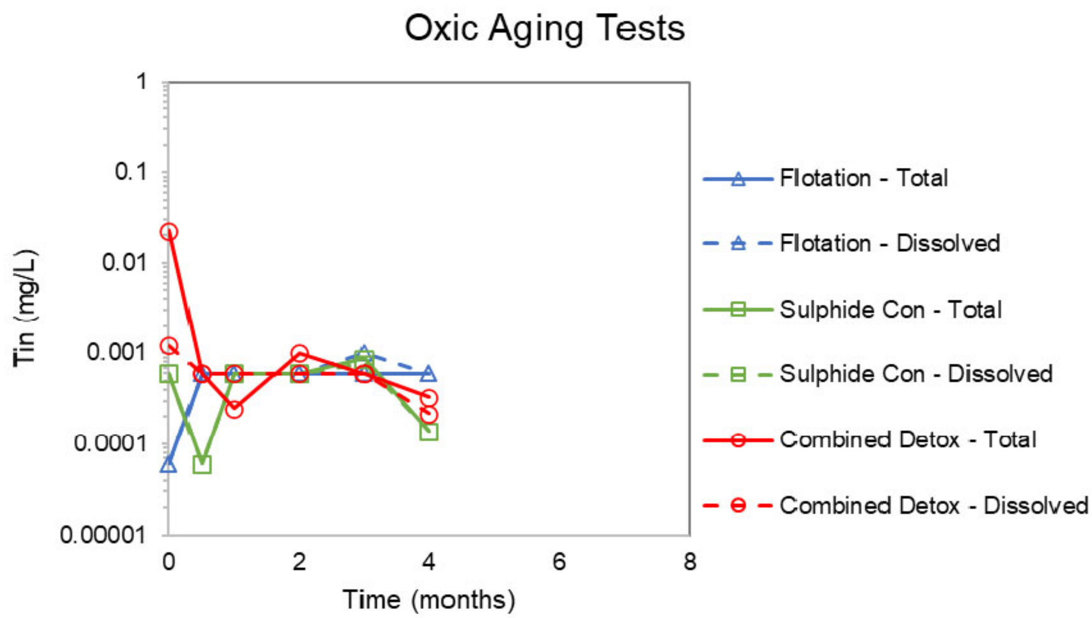

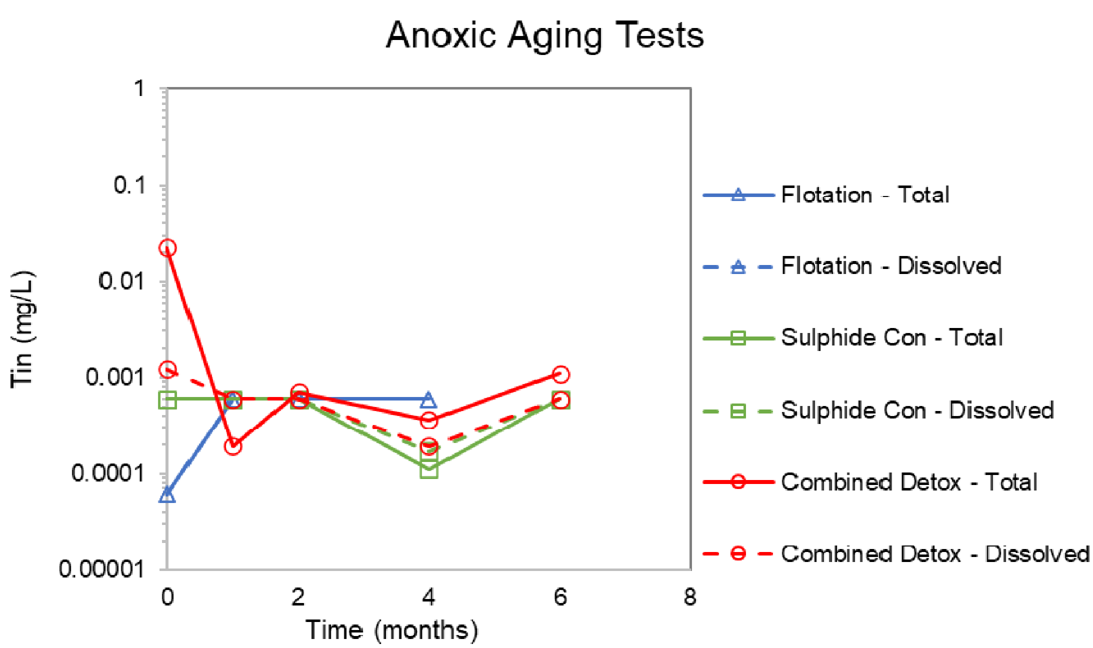

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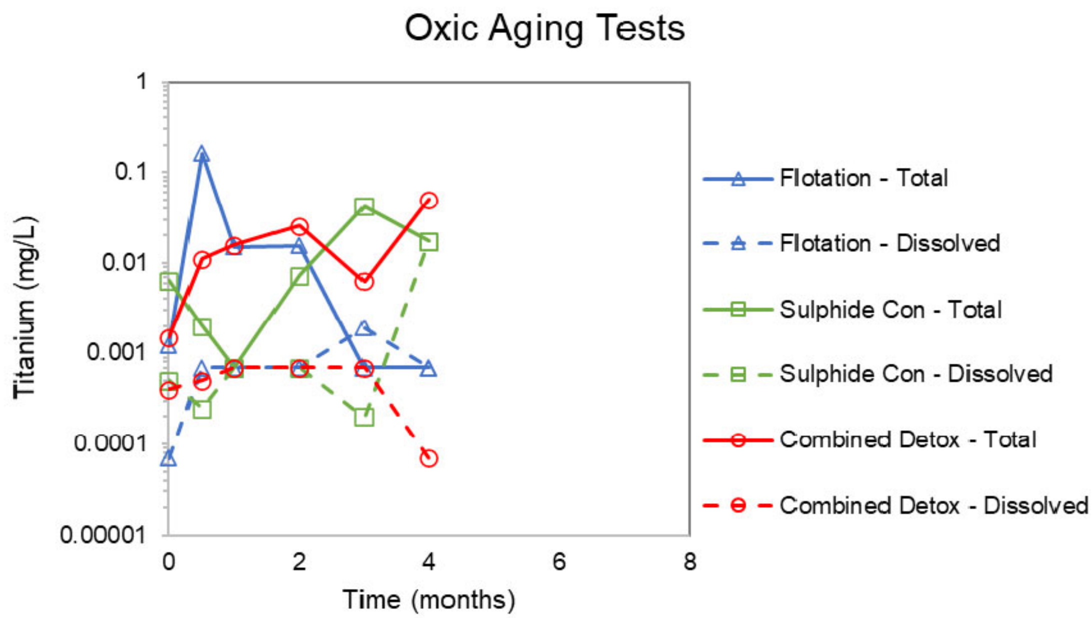

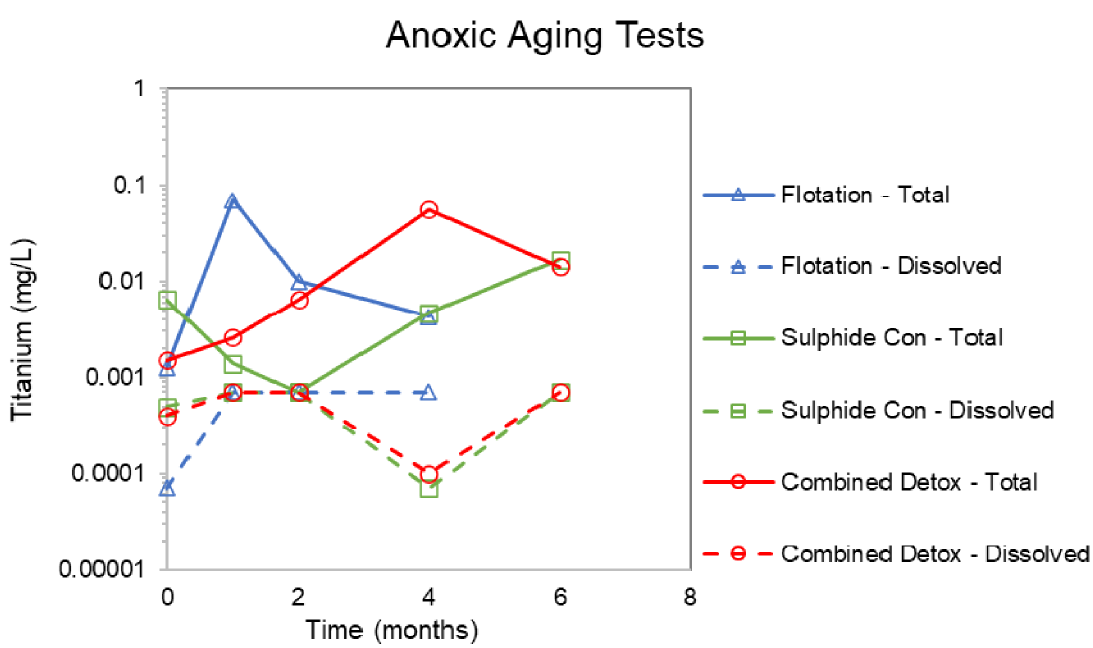

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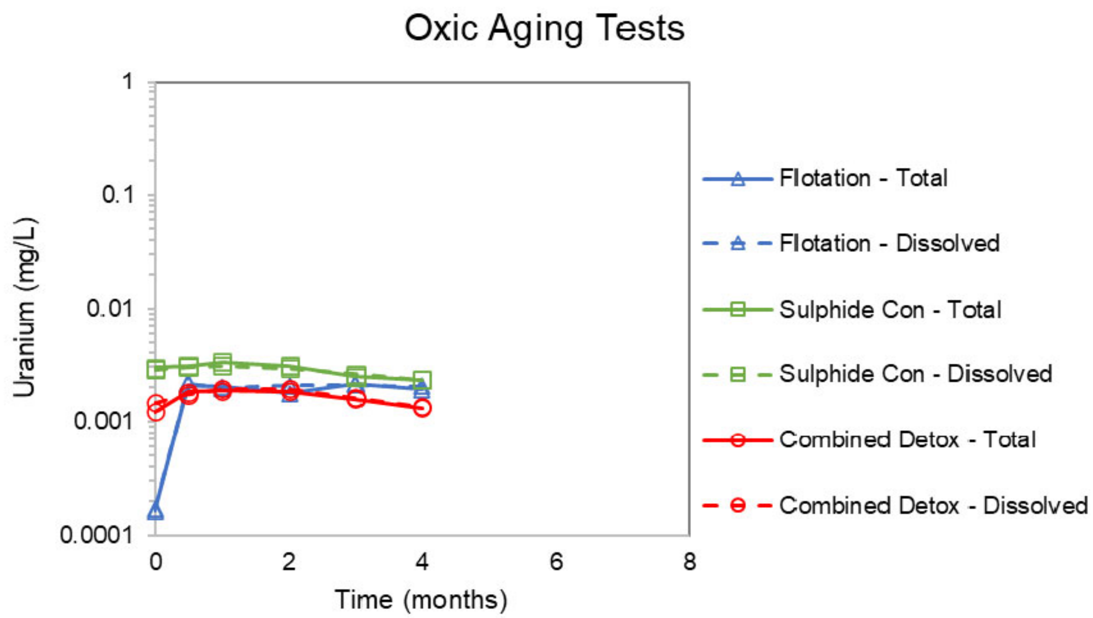

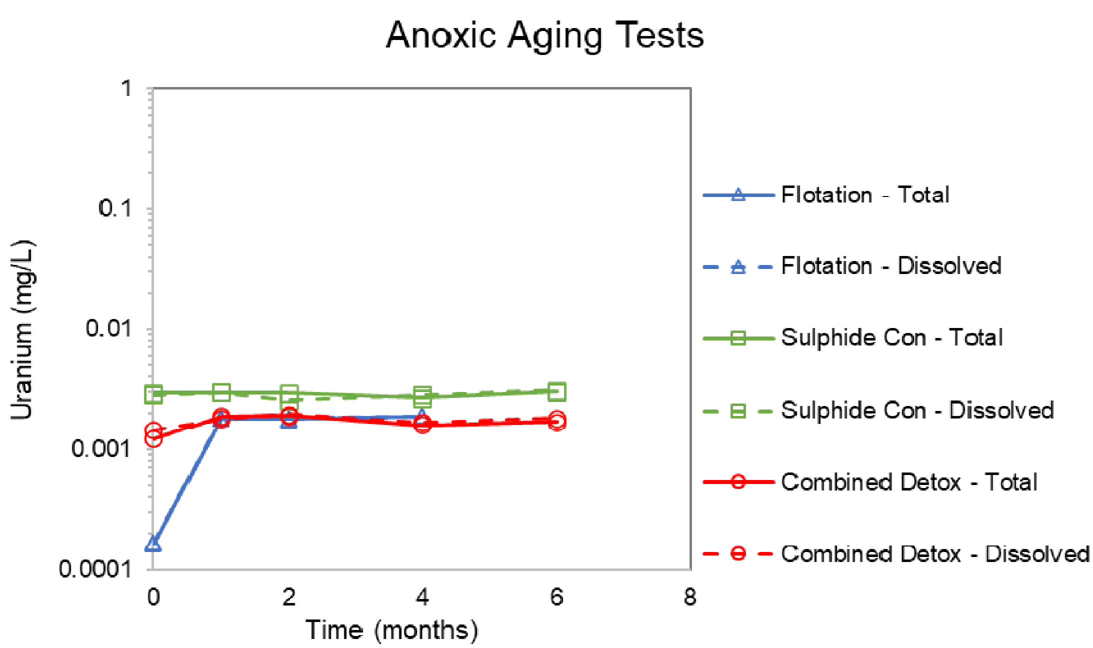

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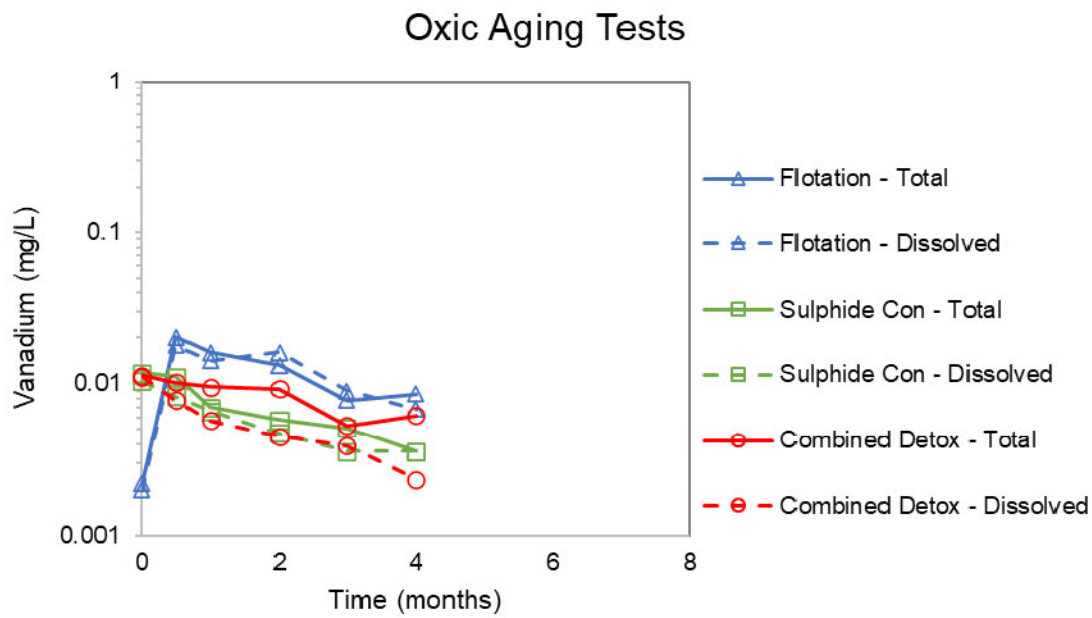

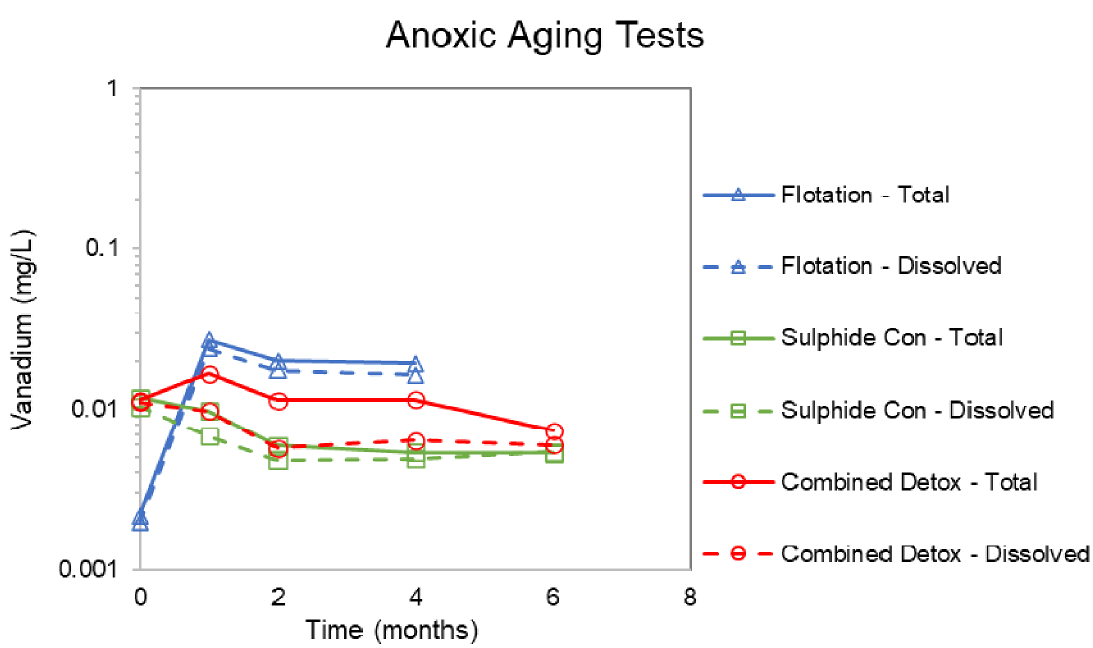

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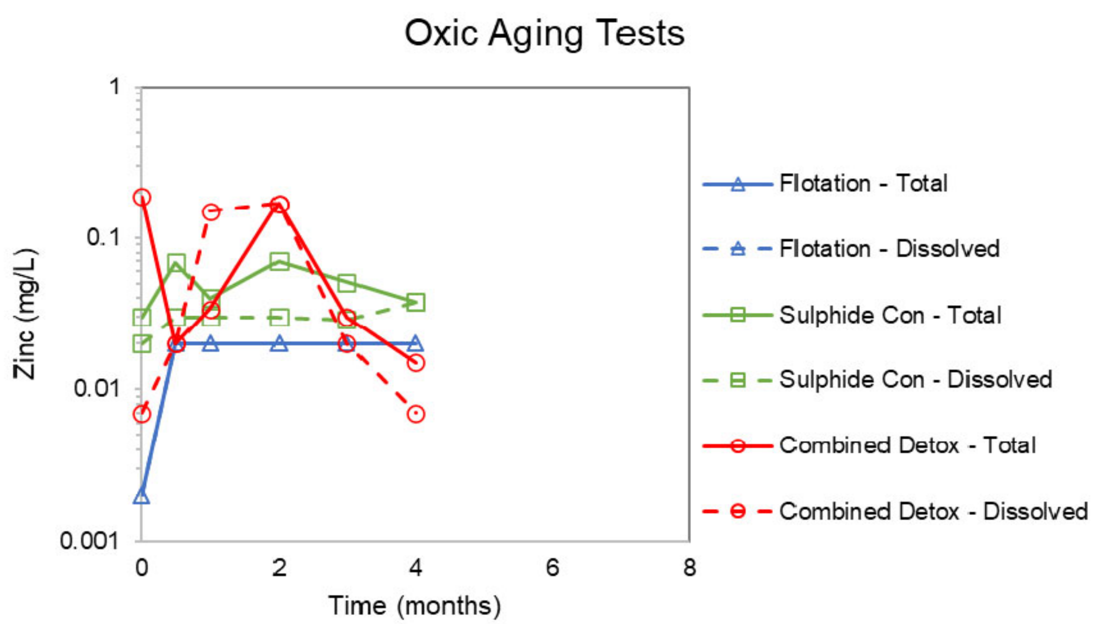

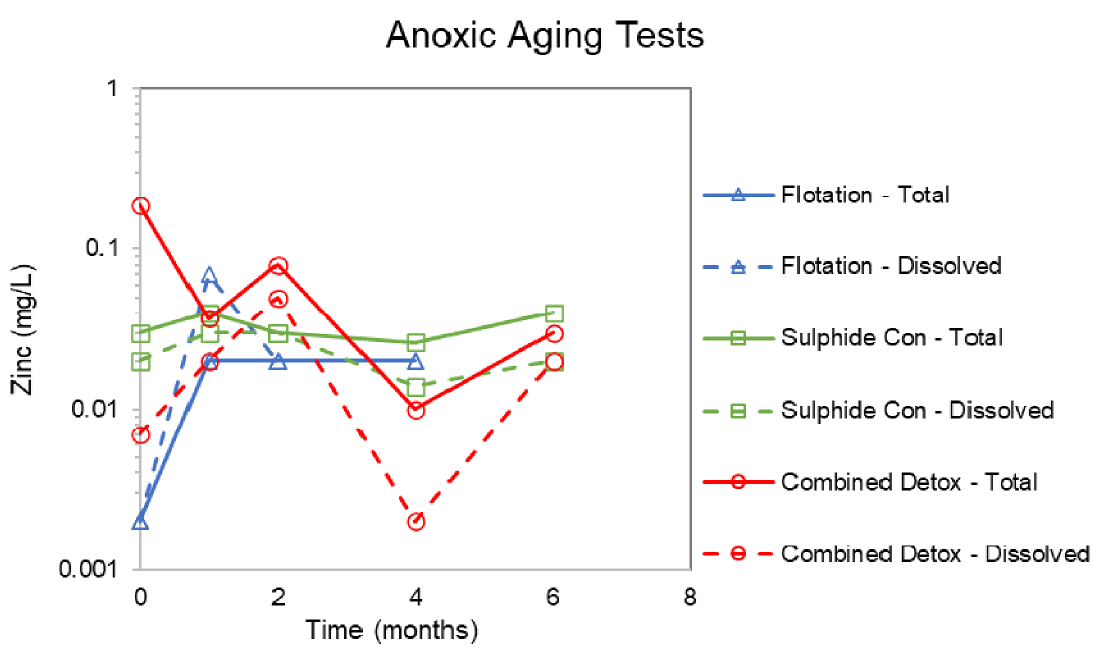

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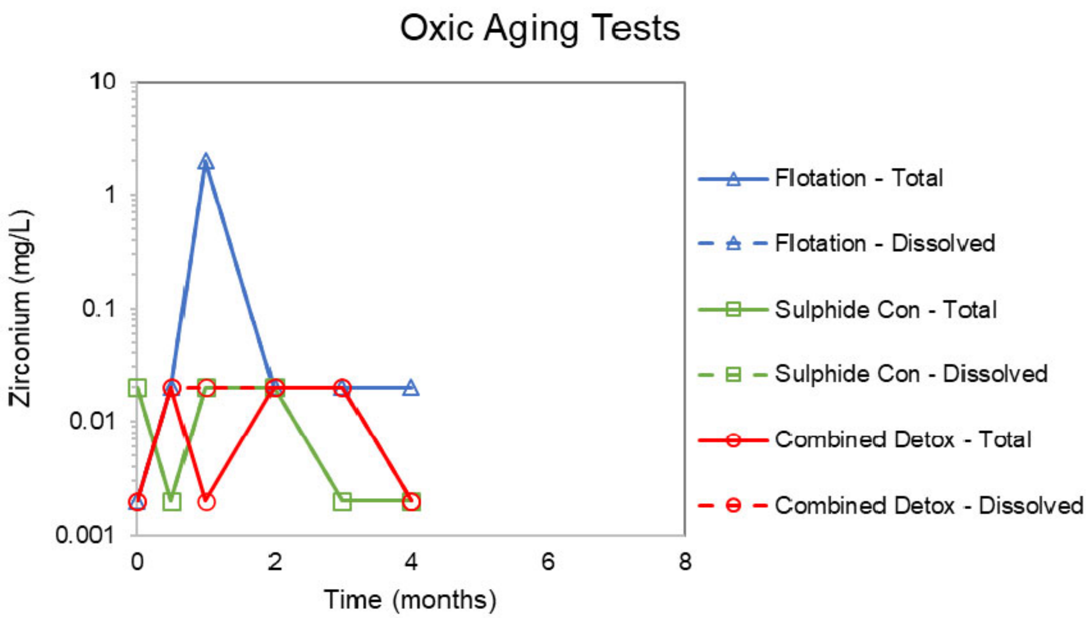

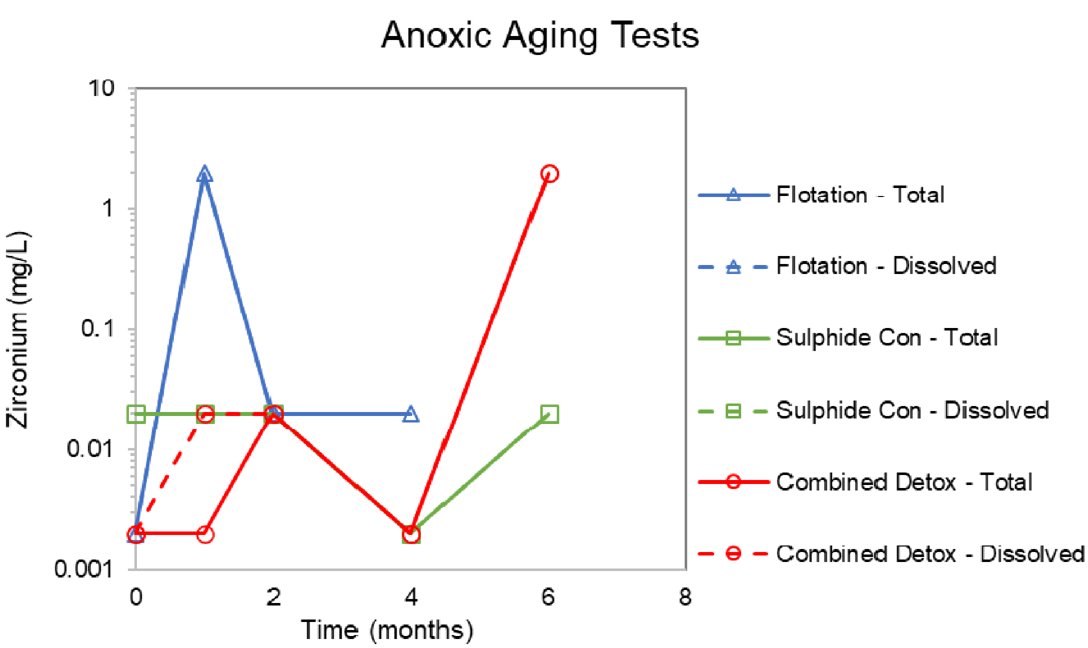

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Appendix K 2017 Source Term Input Data for the Doris TIA and Doris Underground (SRK 2017c)

Appendix K

Doris TIA 2017 Source Term Input Data

Scenario	HCT	Mine	Time Frame	Tailings Type	SO4	Alk	F	Al	Sb	As	Ba	Be	B	Cd
					mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week
Base	Madrid	Doris	Ops / Closure	Flotation	1.3	33	0.0063	0.015	0.00038	0.025	0.02	0.0000056	0.025	0.0000044
Upper	Madrid	Doris	Ops / Closure	Flotation	4	38	0.01	0.018	0.00046	0.031	0.03	0.000016	0.025	0.0000053

Scenario	HCT	Mine	Time Frame	Tailings Type	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn
					mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week
Base	Madrid	Doris	Ops / Closure	Flotation	6.5	0.00016	0.000047	0.0002	0.0045	0.000017	0.00059	5.6	0.0052
Upper	Madrid	Doris	Ops / Closure	Flotation	7	0.00023	0.000059	0.00073	0.0052	0.000026	0.00071	5.9	0.014

Scenario	HCT	Mine	Time Frame	Tailings Type	Hg	Mo	Ni	Se	Ag	Tl	U	V	Zn
					mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week
Base	Madrid	Doris	Ops / Closure	Flotation	0.0000013	0.00055	0.00022	0.00008	0.0000031	0.0000035	0.0000071	0.00014	0.00048
Upper	Madrid	Doris	Ops / Closure	Flotation	0.0000018	0.001	0.00033	0.00012	0.000006	0.0000045	0.000011	0.0004	0.0007

Appendix K

Doris Underground Mine 2017 Source Term Input Data

HCT Data Set	Scenario	Mine	Time Frame	Tailings Type	SO4	Alk	F	Al	Sb	As	Ba	Be	B	Cd
					mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week
Max from all HCTs	Base, Upper	Doris	Ops / Closure	CND neutral	380	30	0.029	0.014	0.0007	0.004	0.0068	0.0000074	0.037	0.00006
Max w. acidic tailings	Base, Upper	Doris, MN	Ops / Closure	CND acidic	380	0.42	0.029	0.31	0.0007	0.004	0.0068	0.000022	0.11	0.0004
Max from Madrid & Boston	Base, Upper	Madrid N	Ops / Closure	CND neutral	380	30	0.029	0.014	0.0007	0.004	0.0018	0.0000074	0.037	0.0000094

HCT Data Set	Scenario	Mine	Time Frame	Tailings Type	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn
					mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week
Max from all HCTs	Base, Upper	Doris	Ops / Closure	CND neutral	110	0.000074	0.029	0.0011	0.0042	0.000019	0.019	39	0.55
Max w. acidic tailings	Base, Upper	Doris, MN	Ops / Closure	CND acidic	63	0.0023	0.029	0.014	1.7	0.0022	0.019	16	0.55
Max from Madrid & Boston	Base, Upper	Madrid N	Ops / Closure	CND neutral	110	0.000074	0.029	0.0011	0.0041	0.000019	0.0023	30	0.26

HCT Data Set	Scenario	Mine	Time Frame	Tailings Type	Hg	Mo	Ni	Se	Ag	Tl	U	V	Zn
					mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week	mg/kg/week
Max from all HCTs	Base, Upper	Doris	Ops / Closure	CND neutral	0.0000015	0.00059	0.11	0.012	0.0000037	0.000069	0.000049	0.0002	0.0097
Max w. acidic tailings	Base, Upper	Doris, MN	Ops / Closure	CND acidic	0.0000015	0.000093	0.11	0.00049	0.000011	0.000069	0.000049	0.00044	0.045
Max from Madrid & Boston	Base, Upper	Madrid N	Ops / Closure	CND neutral	0.0000015	0.00059	0.11	0.0016	0.0000037	0.000028	0.000013	0.0002	0.00069