MEMORANDUM

TO Sabina Gold & Silver Corp. **DATE** September 28, 2017

CC

FROM Golder Associates Ltd. **REFERENCE No.** 1776921 _015_MEM_Rev0

TECHNICAL REVIEW OF WATER, WASTE ROCK, AND TAILINGS MANAGEMENT/DESIGN

1.0 INTRODUCTION

In support of Sabina Gold & Silver Corp.'s (Sabina) Type A Water Licence application for the Back River Project (Project), Sabina has retained Golder Associates Ltd. (Golder) to complete a review of the following:

- Tailings and waste rock storage area (WRSA) designs
- Geochemical characterization
- Water balance, load balance, and water management designs

The preliminary design and engineering analyses for the tailings management system, water balance, load balance, water management plan and infrastructure, and geochemical characterization were completed by SRK Consulting (Canada) Ltd. (SRK). For the WRSAs, the preliminary design was completed by JDS Energy and Mining Inc. (JDS), and the geotechnical engineering analyses were completed by SRK.

This memorandum provides a summary of the documents reviewed, results of the review, and recommendations for the Type A Water Licence Application.

2.0 TAILINGS MANAGEMENT AND DESIGN

2.1 Document Review

The following key documents were reviewed as part of the tailings storage facility (TSF) design review:

- Tailings Management System Preliminary Design Report, Back River Property, Nunavut, Canada. (Main Application Document [MAD] Appendix F-4))
- Goose Property – 2015 Overburden Geotechnical Investigation Program (SRK 2015a)

Other supporting documents were also reviewed for specific information associated with the TSF to aid in the design review. Design analyses modelling files were not reviewed, however all model results were included in this review.

2.2 Results of Review

Overall, the tailings facility design criteria and analyses are consistent with the state of practice and with other projects located in Nunavut/Northwest Territories.

There were some minor inconsistencies found in the design reports that will require review and confirmation during the final engineering design phase, but the overall design is considered to be conservative and the inconsistencies are not considered to be consequential for the overall design.

Due to some of the conservative assumptions used in the preliminary design, there may be opportunities to refine and optimize the TSF design during the final engineering design phase of the Project.

2.3 Recommendations

Golder understands the TSF design analyses and modelling will be reassessed in detail as part of the final engineering design phase prior to construction. This will allow for refinement of the input parameters and assumptions.

3.0 WASTE ROCK MANAGEMENT

3.1 Document Review

The following key documents were reviewed as part of the WRSA design review:

- Back River Property: Waste Rock Storage Area Management Approach and Associated Design Criteria – Final (MAD Appendix F-3)
- Goose Property – 2015 Overburden Geotechnical Investigation Program (SRK 2015a)

Design analyses modelling files were not reviewed, however all model results were included in this review.

3.2 Results of Review

The WRSA designs were generally considered reasonable and in line with the current state of practice and with other projects located in Nunavut/Northwest Territories. There were some minor inconsistencies found in the WRSA Design Report (MAD Appendix F-3) and TSF Design Report (MAD Appendix F-4; TSF WRSA design) that will require review and confirmation during the final engineering design phase, but they are considered to be inconsequential for the overall design.

As part of the review, Golder also modelled a typical cross-section of the TSF WRSA presented in the TSF Design Report (MAD Appendix F-4) to verify slope stability. The model results indicate that the slope stability of the final TSF WRSA meets the minimum required factors of safety.

The thermal modelling completed for the WRSAs included many sensitivity cases and is considered very thorough. Although some of the time estimates that are reported in the thermal modelling seem to vary from Golder's experience with other projects, the general trends are consistent. It should be noted that thermal modelling includes many inputs and assumptions that can influence timelines, so review of model results were focussed on general trends rather than specific timelines.

3.3 Recommendations

Golder understands the WRSA design analyses and modelling will be reassessed in detail as part of the final engineering design phase prior to construction. This will allow for refinement of the input parameters and assumptions.

4.0 GEOCHEMISTRY

4.1 Document Review

Documents considered in the review of existing geochemical characterization data include:

- Geochemical Characterization in Support of the Final Environmental Impact Statement (FEIS) for the Back River Project, Nunavut, Sabina Gold & Silver Corp. Back River Project, Nunavut, Canada, dated November 2015 (MAD Appendix E-3)
- Results of ongoing tailings characterization, as outlined in Back River Project Basic Engineering – Tailings Characterization Factual Memo and Recommendations on Tailings Segregation, dated May 2017 (Golder 2017)

The information presented in the MAD Appendix E-3 was inventoried and compared against geochemical metal leaching (ML) and acid rock drainage (ARD) characterization information requirements outlined in the following guidance documents:

- Mine Environment Neutral Drainage (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. December 2009.
- International Network for Acid Prevention (INAP), 2017. *The Global Acid Rock Drainage Guide*

In addition, the 2017 Final Environmental Impact Statement for the Project was reviewed for changes to the Project since the completion of MAD Appendix E-3. Specifically, the Project description was checked for changes to the geographical scope of the Project, and the terrestrial environment scope of work was checked for any changes to the geochemical characterization required at the Project:

- Volume 2 Addenda: Project Description and Alternatives (Sabina 2017a)
- Volume 5 Addenda: Terrestrial Environment (Sabina 2017b)

Finally, the Rescan (2014) geochemical characterization was used to clarify some sample sources, treatment methods, and rationale differences between the geochemical analyses completed by different consulting firms presented in MAD Appendix E-3:

- Rescan. 2014. Back River Project: 2013 Geochemistry Baseline Report.

4.2 Results of Review

Overall, the geochemical characterization and analyses are consistent with the state of practice and with other projects located in Nunavut/Northwest Territories.

Geochemical characterization has been completed in several stages between 2007 and 2015. The geochemical dataset described in MAD Appendix E-3 includes 676 samples of waste rock, 60 samples of overburden, 68 samples of quarry rock, and 34 tailings samples. Since the submission of MAD Appendix E-3, geochemical testing of 33 samples of bedrock and 13 overburden samples from the Goose Plant Site, and 3 tailings samples have been initiated. The geochemical dataset consists of static (i.e., one-time, short-term) test results including acid base accounting (ABA), net acid generation testing (NAG), whole rock and trace metal analysis, short-term leach testing, and mineralogical analysis. The geochemical dataset also includes kinetic testing (i.e., long-term) in the

form of humidity cell tests (HCTs) were undertaken on 43 waste rock samples and 4 tailings samples (including the ongoing tailings HCT) for up to 136 weeks.

Samples were collected from the Goose Main (161 samples), Echo (19 samples), Llama (388 samples), and Umwelt (108 samples) deposits. There have been no changes to the geographical scope of the Project that would necessitate characterization of additional mineral deposits (Sabina 2017a). Overburden and waste rock sampling presented in MAD Appendix E-3 includes all deposit and infrastructure areas.

The key conclusions of the geochemical testing program (MAD Appendix E-3) were as follows:

- **Overburden / quarry rock:** Overburden has a negligible potential for ML/ARD. However, the ARD potential for quarry rock varied by area. Potential quarry material from the Airstrip and Goose Plant Site excavation areas had a variable ARD potential; this variability can be managed prior or during quarry development with an appropriate sampling program. Potential quarry material from the Marine Laydown Area and Umwelt quarries had negligible and limited ARD potential, respectively.
- **Waste rock:** According to the results of static and kinetic testing, waste rock has a variable potential for ML/ARD. Potentially acid generating (PAG) waste rock, and non-potentially acid generating (NPAG) waste occurs in all stratigraphic units and lithological units that will be encountered at the proposed mining areas. Acidic conditions will enhance ML potential. Waste rock management strategies developed to mitigate the acid generation potential of waste rock include waste rock classification criteria based on the results of sulphur and total inorganic carbon content, and operational segregation of PAG and NPAG waste rock. Encapsulation of PAG waste rock in the WRSA with a cover of NPAG material, and the ultimate aggradation of permafrost into the WRSA will limit the long-term acid generation potential of this material. Acidic conditions are not anticipated to be achieved during the WRSA freeze back period (10 years).
- **Tailings:** Geochemical test results presented in MAD Appendix E-3 included a tailings composite sample representative of ore from various deposits, and a composite of Goose Main ore. The results of testing of these samples indicate that tailings are PAG and have the potential to leach metals including arsenic, iron, aluminium, and copper. Process water may have elevated concentrations of ammonia, cyanate / thiocyanate, sulphate, aluminum, antimony, arsenic, copper, and iron. Conclusions in MAD Appendix E-3 stated that, depending on the residence time of process water, treatment of process water may be required. The ore processing plan has evolved since the completion of the geochemical testing in MAD Appendix E-3; therefore, supplemental geochemical testing of representative tailings samples is underway.

The scope of the existing geochemical characterization program is sufficient to meet the requirements of MEND (2009) and INAP (2009). Golder has identified no major flaws with the approach, results or interpretation presented in MAD Appendix E-3. The geochemical characterization program is of a sufficient scope to develop criteria for waste rock and tailings management.

4.3 Recommendations

Golder understands that during the final engineering design phase and prior to construction, the geochemical characteristics of tailings will be further evaluated with respect to the ore processing method and tailings management plans.

Recommendations presented in MAD Appendix E-3 related to quarry rock waste rock include collection and analysis of non-weathered bedrock samples from the Marine Laydown Area and the Airstrip quarry to further delineate PAG and non-potentially acid generating material. Golder agrees with this recommendation.

The geochemical dataset should continue to be used to support the decision-making process with respect to waste rock management and material use at the Project. Geochemical characterization should continue through the Construction and Operations phases of the Project. Recommendations in MAD Appendix E-3 note geostatistical analysis of the existing dataset to establish an appropriate sampling density for sample collection for the purpose of material segregation during Construction and Operations; Golder agrees with this recommendation.

5.0 WATER MANAGEMENT AND WATER BALANCE

5.1 Document Review

The following key documents were reviewed as part of the water management and water balance review:

- Back River Project Water and Load Balance Report, Sabina Gold & Silver Corp. Back River Project, Nunavut, Canada, dated October 2015 (MAD Appendix E-2).
- Back River Project Water and Load Balance Model, received from Sabina on date June 27th 2017. FEIS_Goose_Rev17G_spb_kpw_SAB_withresults.gsm (SRK 2015b).
- Back River Project Site-Wide Water Management Report, Sabina Gold & Silver Corp. Back River Project, Nunavut, Canada, dated September 2015 (MAD Appendix F-1).
- Back River Project Hydraulic Calculations, received from Sabina on date March 3rd 2017. Channel Design_MasterSheet_r20_SB_VM.xlsm (SRK. 2015c).
- Back River Project: Hydrology Report, Sabina Gold & Silver Corp. Back River Project, Nunavut, Canada, dated September 2015 (SRK 2015d).
- Back River Project: Hydrogeological Characterization and Modeling Report, Sabina Gold & Silver Corp. Back River Project, Nunavut, Canada, dated October 2015 (MAD Appendix F-5).

The Back River Project Water and Load Balance Report (MAD Appendix E-2) documents inputs, assumptions, and results for a water and load balance model developed in GoldSim (SRK 2015b). The model was developed for the Back River Project to optimize the water management strategy and tailings deposition schedule, and to evaluate water treatment needs during the life of the Project to meet water quality guidelines. The model results documented in the report formed part of the FEIS in support of the Project application.

The review of the hydrology report (SRK 2015d) and the hydrogeological characterization and modelling report (MAD Appendix F-5) was limited to a high-level review of approaches and methodologies.

5.2 Results of Review

Overall, Golder found no major flaws in any of the water management and water balance information reviewed, and in general, agrees with the approaches and methodologies used. The majority of the findings of the review relate to inconsistencies between models and reports, inconsistencies between input parameters used in the models and the FEIS supporting studies, and/or typos in the reports.

As part of the review, Sabina requested that Golder update the water balance model to address the following inconsistencies:

- Groundwater inflows to the open pits and underground mines were updated for consistency with the values reported in MAD Appendix F-5.
- Schedule of start and completion of the some of the open pits and underground mines was updated for consistency with overall Project schedule.
- Catchment areas (disturbed and undisturbed) draining to the various mine and water management facilities were reviewed and updated, as required.

Updated key water balance results plots are provided in Attachment 1. No changes were required to the sizing and design of the water management infrastructure. Overall, the updates performed to the water balance model resulted in minor changes to the key water balance results, with effectively no impact on Project wide water management strategy and sizing of water management infrastructure.

5.3 Recommendations

Golder understands the water balance model, as well as the design of the water management infrastructure, will be further re-assessed as part of the final engineering design phase prior to construction. This will allow for refinement of input parameters and assumptions, as required.

6.0 LOAD BALANCE

6.1 Document Review

The following key documents were reviewed as part of the load balance review:

- Back River Project Water and Load Balance Report, Sabina Gold & Silver Corp. Back River Project, Nunavut, Canada, dated October 2015 (MAD Appendix E-2).
- Back River Project Water and Load Balance Model, received from Sabina on date June 27th 2017. FEIS_Goose_Rev17G_spb_kpw_SAB_withresults.gsm. SRK. 2015b.

Information presented in sections 2, 4, 5, and 7, and Appendix C, of the MAD Appendix E-2 were reviewed and compared to water quality inputs and load balance calculations in the GoldSim model to confirm that the model inputs, logic, and calculations are consistent with the report documentation. The report was also reviewed to confirm that water quality guidelines used in the report are accurate.

6.2 Results of Review

Overall, Golder agrees with the approaches and methodologies used in the load balance and as found no major flaws in the information reviewed. The findings of the review relate to inconsistencies between the GoldSim model and supporting documentation.

As part of the review, Sabina requested that Golder update the load balance to address the following inconsistencies:

- Groundwater inputs in the GoldSim model were updated for consistency with values in Tables 4-2 and 4-3 of MAD Appendix E-2

- Umwelt Pit high wall input concentrations were updated for consistency with in Appendix C of MAD Appendix E-2
- waste rock status trigger definitions were revised to remove a day of zero load in flows in contact with waste rock on the day it is assumed to become frozen (i.e., 10 years after waste rock deposition ends in a particular WRSA)
- Model input for industrial pad runoff (which is applied to road runoff in the model) was assigned to industrial water and background surface water chemistry was used to fill in missing substances
- Missing substances in the Sewage Treatment Plant treated effluent model input (Table 4-6 in MAD Appendix E-2) were filled in with background surface water values
- The cadmium inputs from Table 7-8, Section 7.3 of MAD Appendix E-3, were added to the model to support updated cadmium predictions for comparison with guideline values

Overall the updates performed to the load balance model resulted in minor changes to the key load balance results, with effectively no impact on Project-wide water management strategy and sizing of water management infrastructure.

Tables 7-3 through 7-8 and Appendix D from MAD Appendix E-2 were reproduced with updated model results and are included in Attachment 2. The revised Appendix D table includes maximum concentrations at Closure that are based on the highest monthly average concentration predicted in the last year of Post-Closure (Year 23). The updated results are outlined below; however, they do not change the conclusions outlined in the MAD Appendix E-2:

- Higher maximum chloride concentrations, most notably at node PN04 where guideline exceedances were already predicted to occur
- Additional nitrite guideline exceedance at node PN04
- Maximum arsenic concentration at node PN09 exceeds site-specific guideline
- Maximum cadmium concentrations exceed CCME water quality guidelines at nodes PN04, PN06, and in Goose Lake
- Maximum copper concentration in Goose Lake exceeds site-specific guideline
- New selenium guideline exceedance at node PN06
- Silver concentrations now only exceed the higher revised CCME water quality guideline at node PN06

Discharges from open pits and tailings facilities (including predictions at node PN10) remain below Metal Mining Effluent Regulation limits. The above noted guideline exceedances for chloride, nitrite, arsenic, cadmium, copper, and selenium are short in duration (Attachment 2, Figures A2-1 to A2-6), and do not require changes to the existing commitments to water treatment. Long-term average predictions remain below CCME guidelines.

6.3 Recommendations

Source concentrations developed for contact waters across the Project site represent dissolved metal concentrations and, as noted in MAD Appendix E-3, do not account for additional loading that may result from total suspended sediments, particularly for aluminum and iron. Many of the source inputs are expected to have negligible particulate associated with them (e.g., groundwater flows and runoff from pit walls and waste rock) or will have limited potential for particulate to reach the receiving environment due to Project design features (e.g., planned active water treatment, passive water treatment in sediment ponds, limited potential for sediment resuspension in pits and tailings facilities).

Sabina has committed to providing total metal predictions or providing a rationale for why the total metal predictions are not necessary (e.g., that dissolved predictions are sufficiently conservative and there is limited potential for particulate loading from Project sources) as part of the Water Licence application process (INAC-C-1).

Golder understands that particulate loading estimates will be developed as part of final engineering design phase, and the GoldSim model will be updated accordingly to produce both total and dissolved concentration predictions. This could be efficiently implemented in the GoldSim model as a selectable deterministic scenario for input concentrations. Golder does not consider it necessary to provide total metal concentrations as there is limited potential for concentrations to exceed available guidelines as the constituent concentrations in process water are not expected to exceed guidelines.

7.0 SUMMARY

At the request of Sabina, Golder has completed a review of the tailings and WRSA designs, geochemical characterization, and water balance, load balance, and water management designs for the Type A Water Licence Application for the Project.

In general, the tailings facility design criteria and analyses and waste rock storage area designs are consistent with the state of practice and with other projects located in Nunavut/Northwest Territories. While some inconsistencies were found in design reports, the overall designs are considered conservative and inconsistencies are considered to be an inconsequential to the overall designs. These inconsistencies can be addressed during the final engineering design phase.

The scope of the existing geochemical characterization program is sufficient to meet the requirements of MEND (2009) and INAP (2009). Golder has identified no major flaws with the approach, results, or interpretation presented in MAD Appendix E-3. The geochemical characterization program as outlined in the Mine Waste Rock Management Plan and the Tailings Management Plan submitted with the current Type A Water Licence Application is of a sufficient scope to develop criteria for waste rock and tailings management.

Overall Golder did not identify any major flaws in the water management and water balance information reviewed, and in general agrees with the approaches and methodologies used. The majority of the findings of the review relate to inconsistencies between models and reports, inconsistencies between input parameters used in the models and the FEIS supporting studies, and/or typos in the reports. Updated key water balance result plots addressing the inconsistencies are provided as attachments to this memo. Overall the updates performed to the water balance model resulted in minor changes to the key water balance results, with effectively no impact on Project wide water management strategy and sizing of water management infrastructure.

Golder agrees with the approaches and methodologies used in the load balance information reviewed, and did not find any major flaws. The findings of the review relate to inconsistencies between GoldSim model and supporting documentation. Updated load balance results are provided, but do not change the conclusions presented in the MAD Appendix E-2, and do not require changes to the existing commitments to water treatment.

REFERENCES

CCME (Canadian Council of Ministers of the Environment). 1999. Canadian Environmental Quality Guidelines. 1999 with updates to 2015. Winnipeg, MB.

Golder (Golder Associates Ltd.). 2017. Back River Project Basic Engineering – Tailings Characterization Factual Memo and Recommendations on Tailings Segregation. SBR5G-C-MEM-002. Prepared for Sabina Gold & Silver Corp. May 2017.

INACP (International Network for Acid Prevention). 2017. The Global Acid Rock Drainage Guide.

MEND (Mine Environment Neutral Drainage). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. December 2009.

Paul, C. 2017b. Project Engineer. Sabina Gold & Silver Corp., Vancouver, BC. E-mail. July 19, 2017.

Sabina (Sabina Gold & Silver Corp.). 2017a. Volume 2 Addenda: Project Description and Alternatives. Submitted to Nunavut Impact Review Board. February 2017.

Sabina. 2017b. Volume 5 Addenda: Terrestrial Environment. Submitted to Nunavut Impact Review Board. February 2017.

SRK (SRK Consulting (Canada) Inc.). 2015a. Goose Property – 2015 Overburden Geotechnical Investigation Program. Submitted to Sabina Gold & Silver Corp. December 2015

SRK. 2015b. Back River Project Water and Load Balance Model, received from Sabina on date June 27th 2017. FEIS_Goose_Rev17G_spb_kpw_SAB_withresults.gsm.

SRK. 2015c. Back River Project Hydraulic Calculations, received from Sabina on date March 3rd 2017. Channel Design_MasterSheet_r20_SB_VM.xlsm

SRK. 2015d. Back River Project: Hydrology Report, Sabina Gold & Silver Corp. Back River Project, Nunavut, Canada, dated September 2015.

ATTACHMENT 1

Update Water Balance Key Results Plots

Figure 1 - Llama Lake Storage Volume

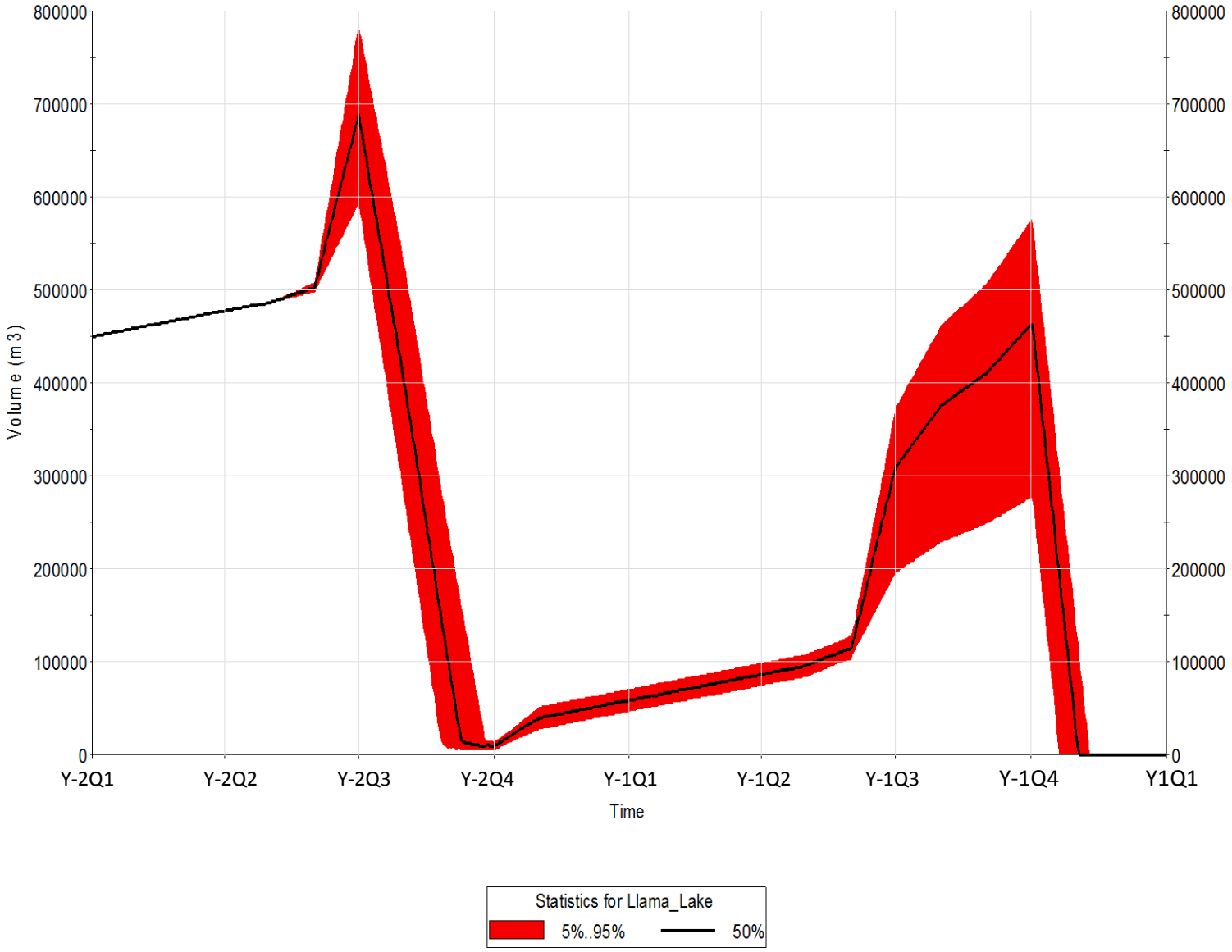


Figure 2 - TSF Water Storage Volume

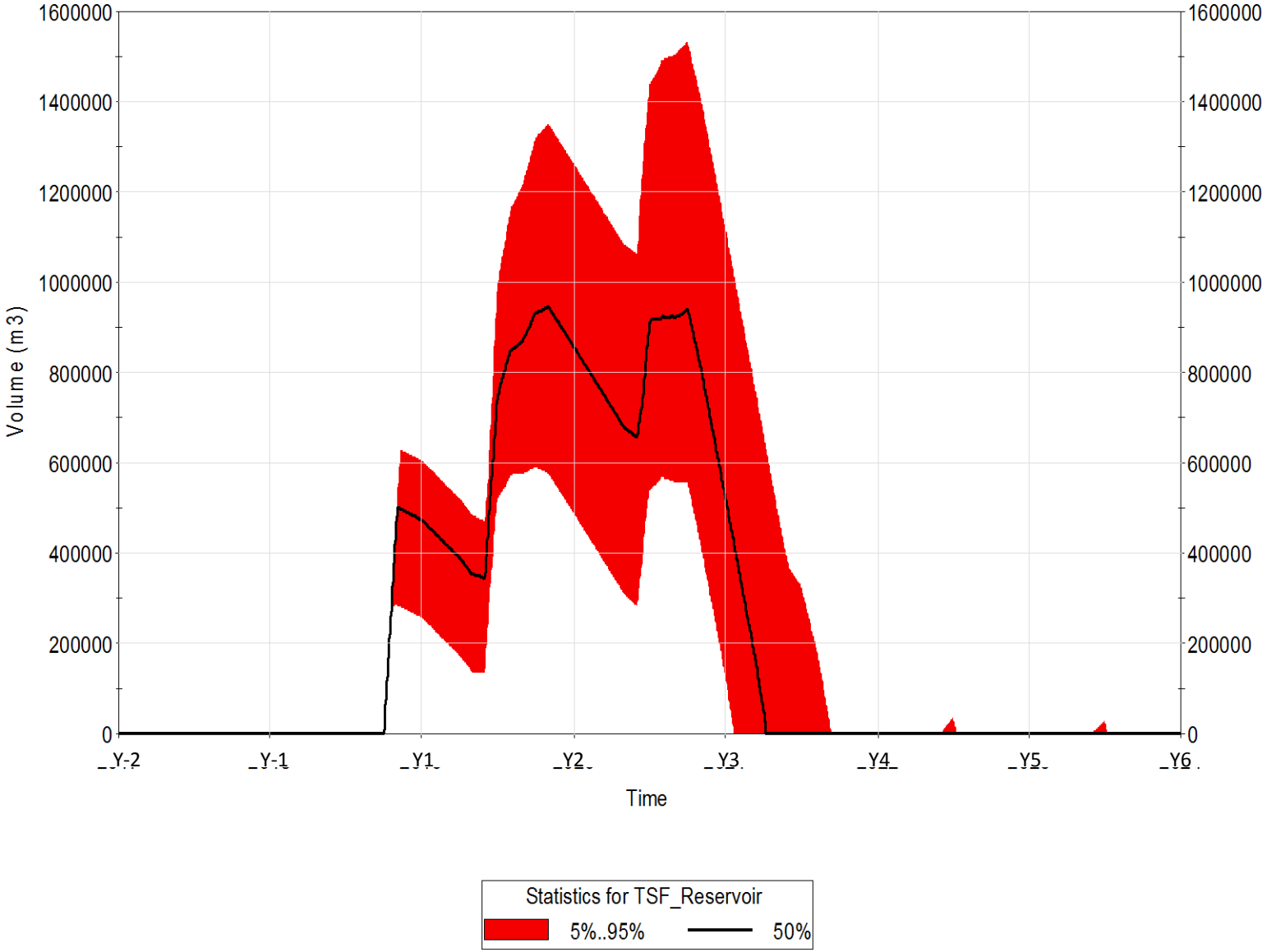


Figure 3 - Umwelt TF Water Storage Volume

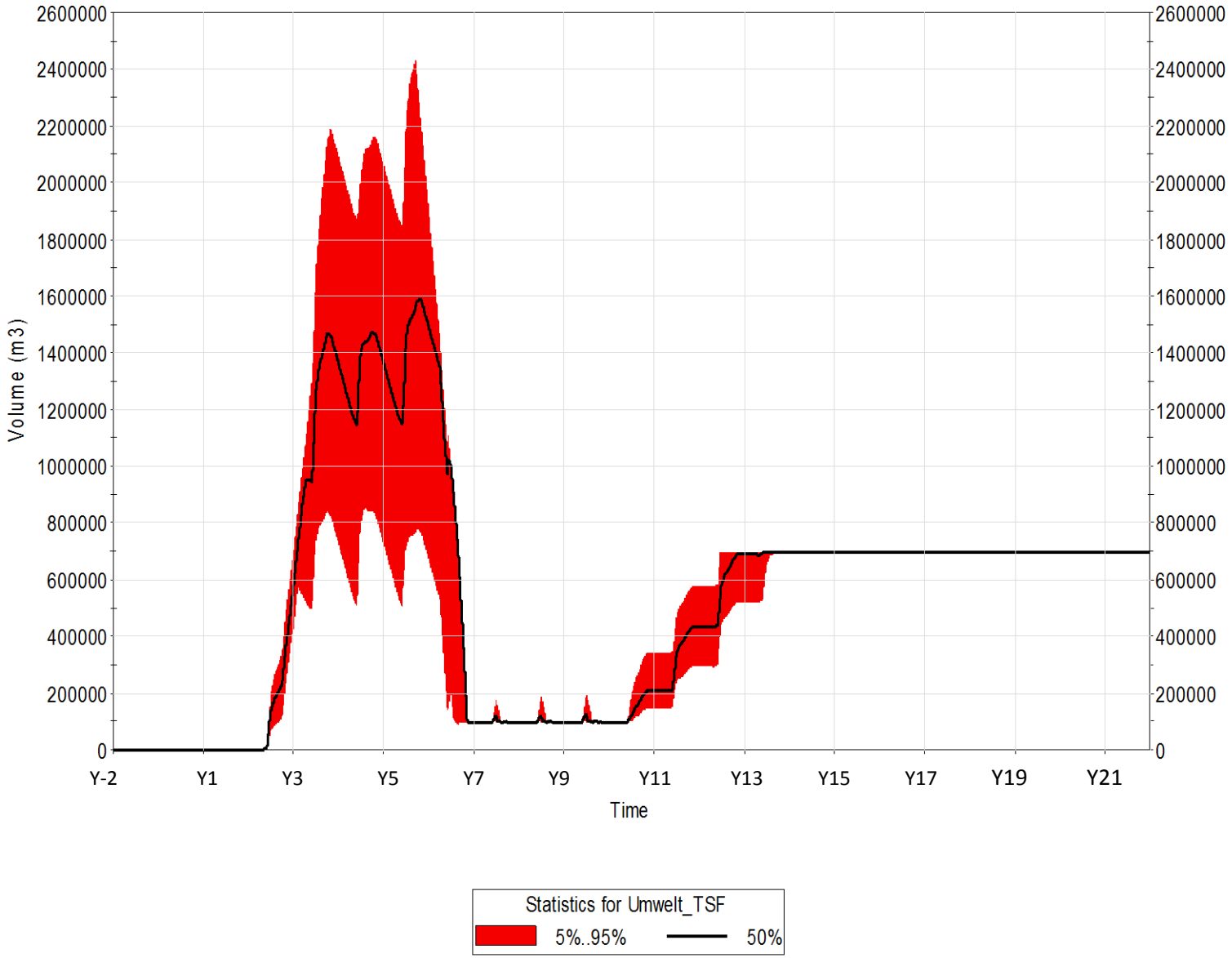


Figure 4 - Llama Reservoir Storage Volume

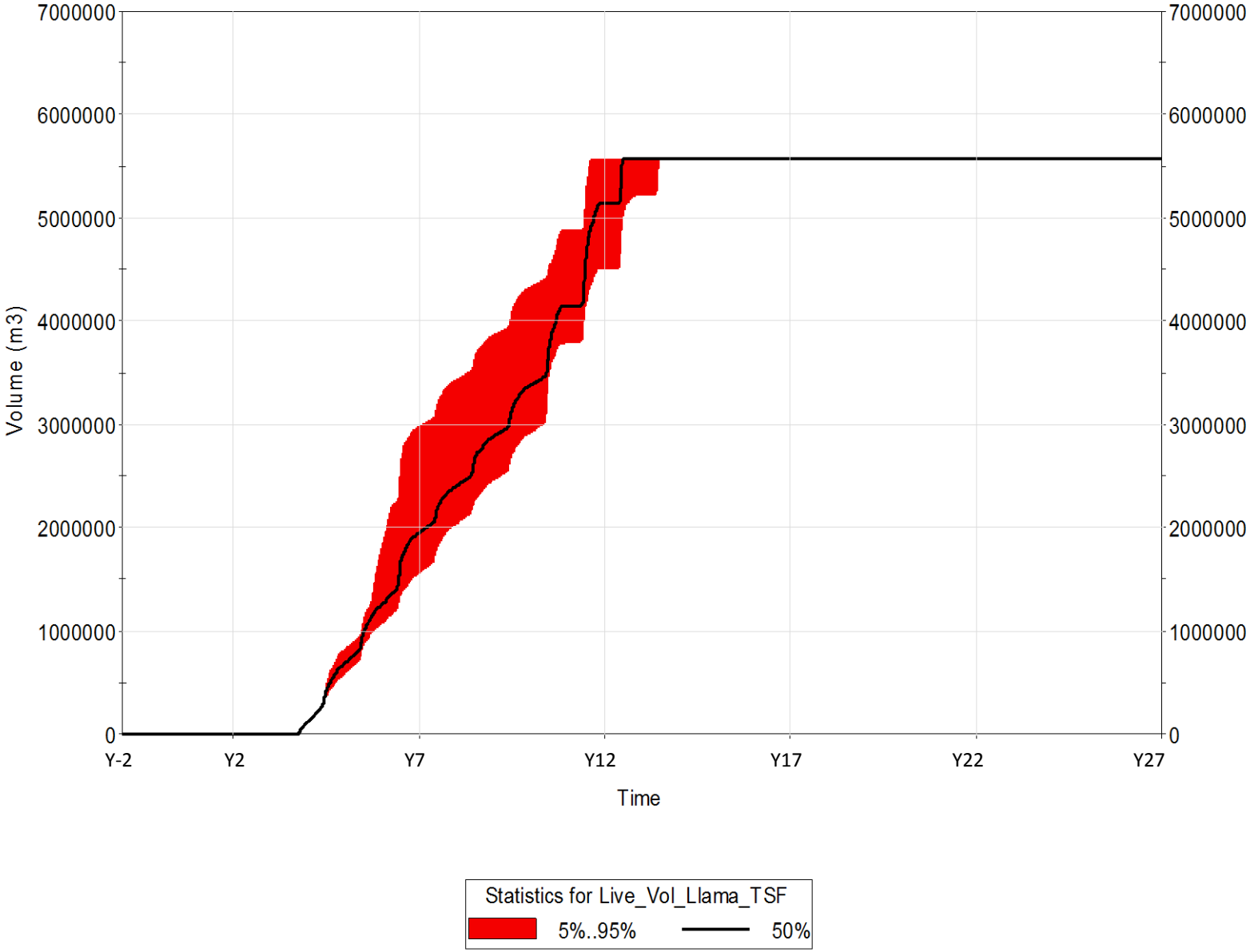


Figure 5 - Goose TF Storage Volume

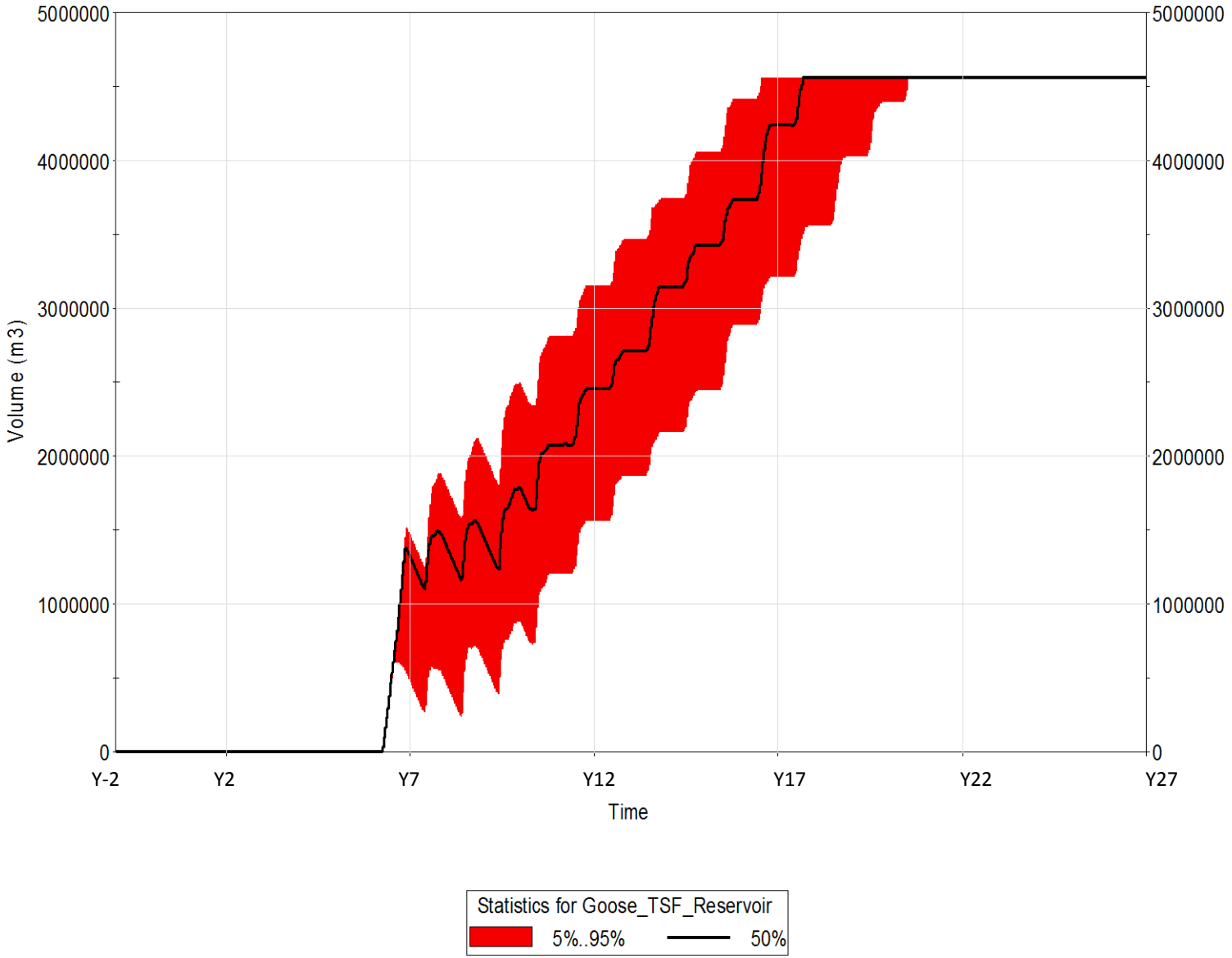


Figure 6 - Echo Open Pit Storage Volume

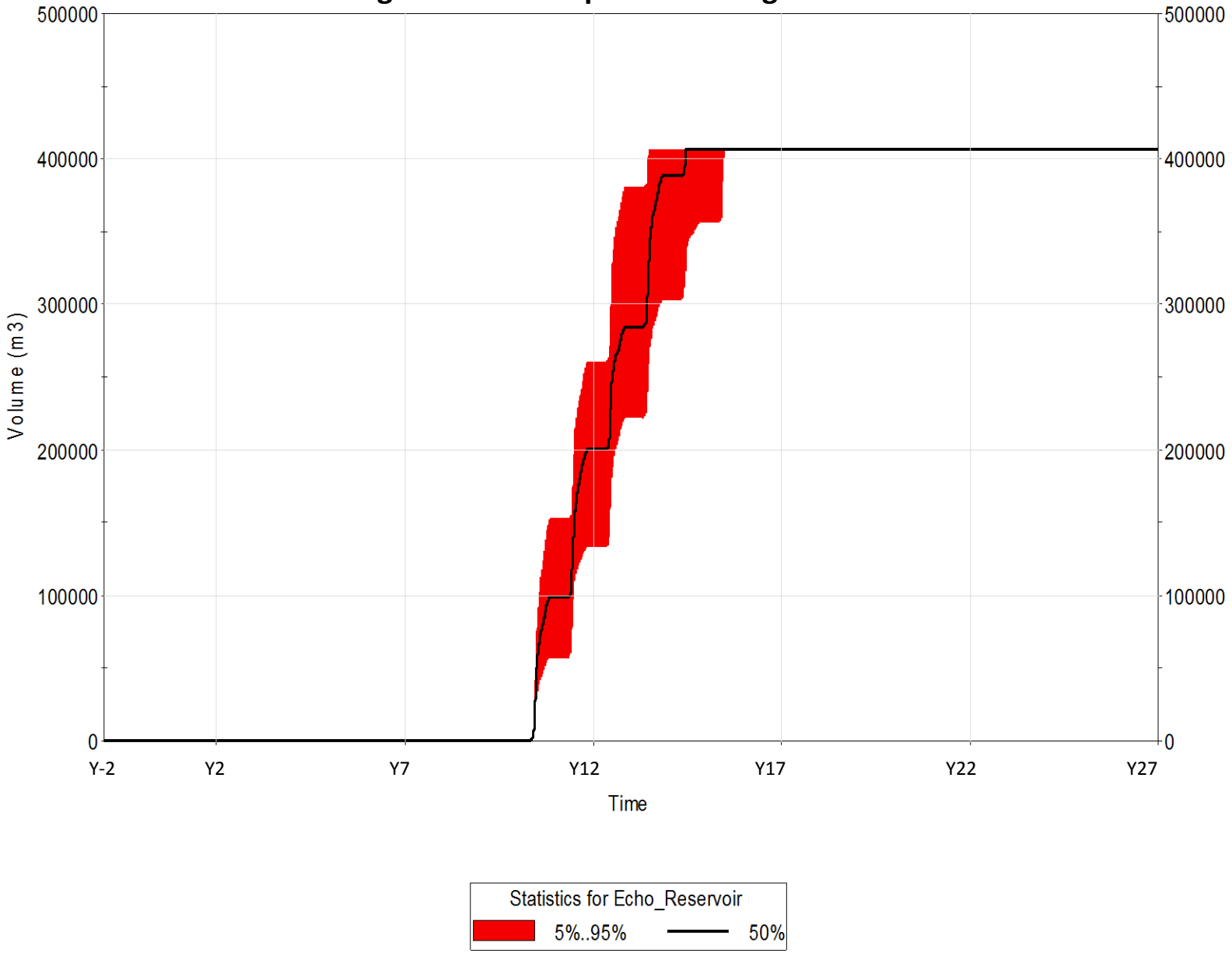


Figure 7 - Saline Water Pond Storage Volume

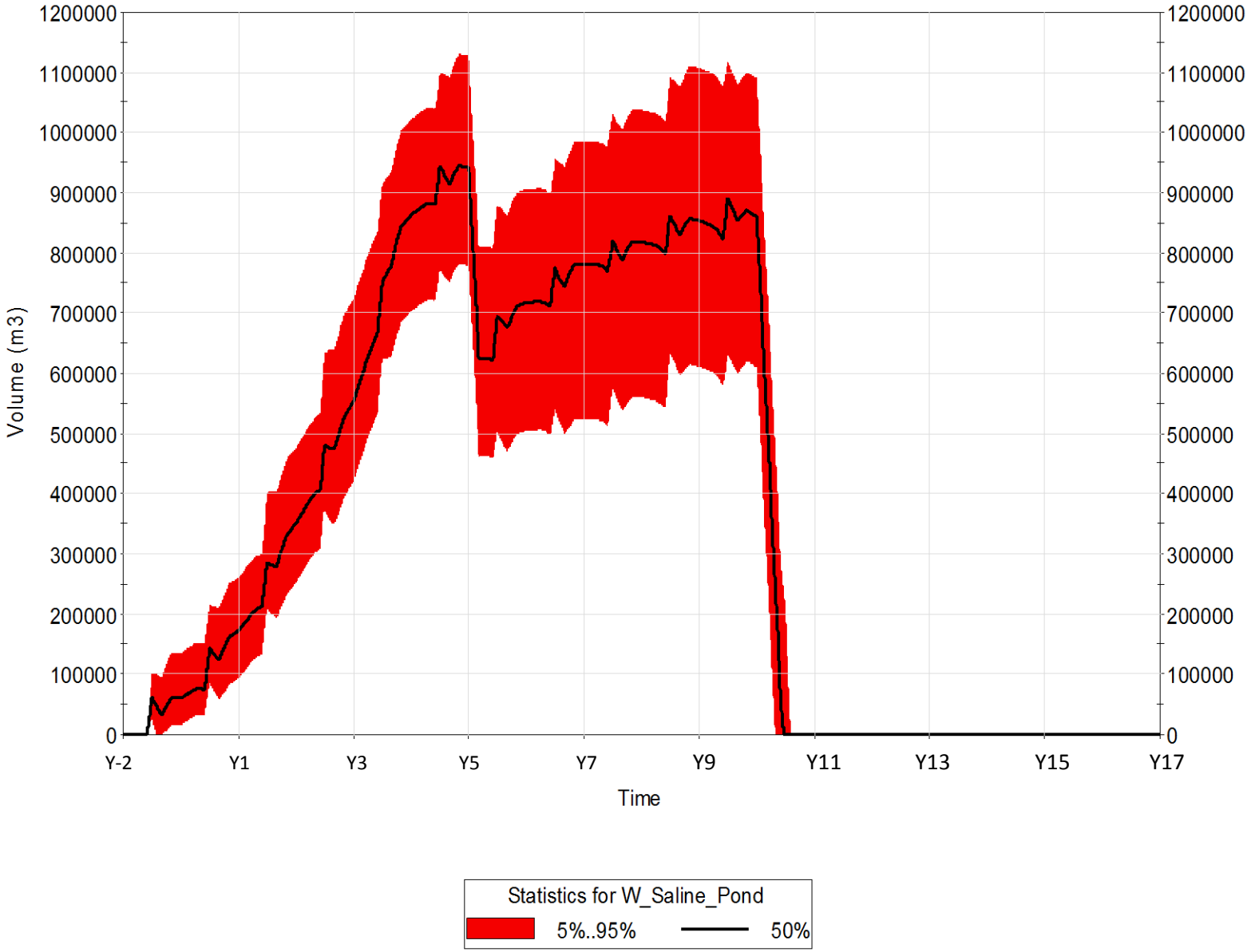


Figure 8 - PN04

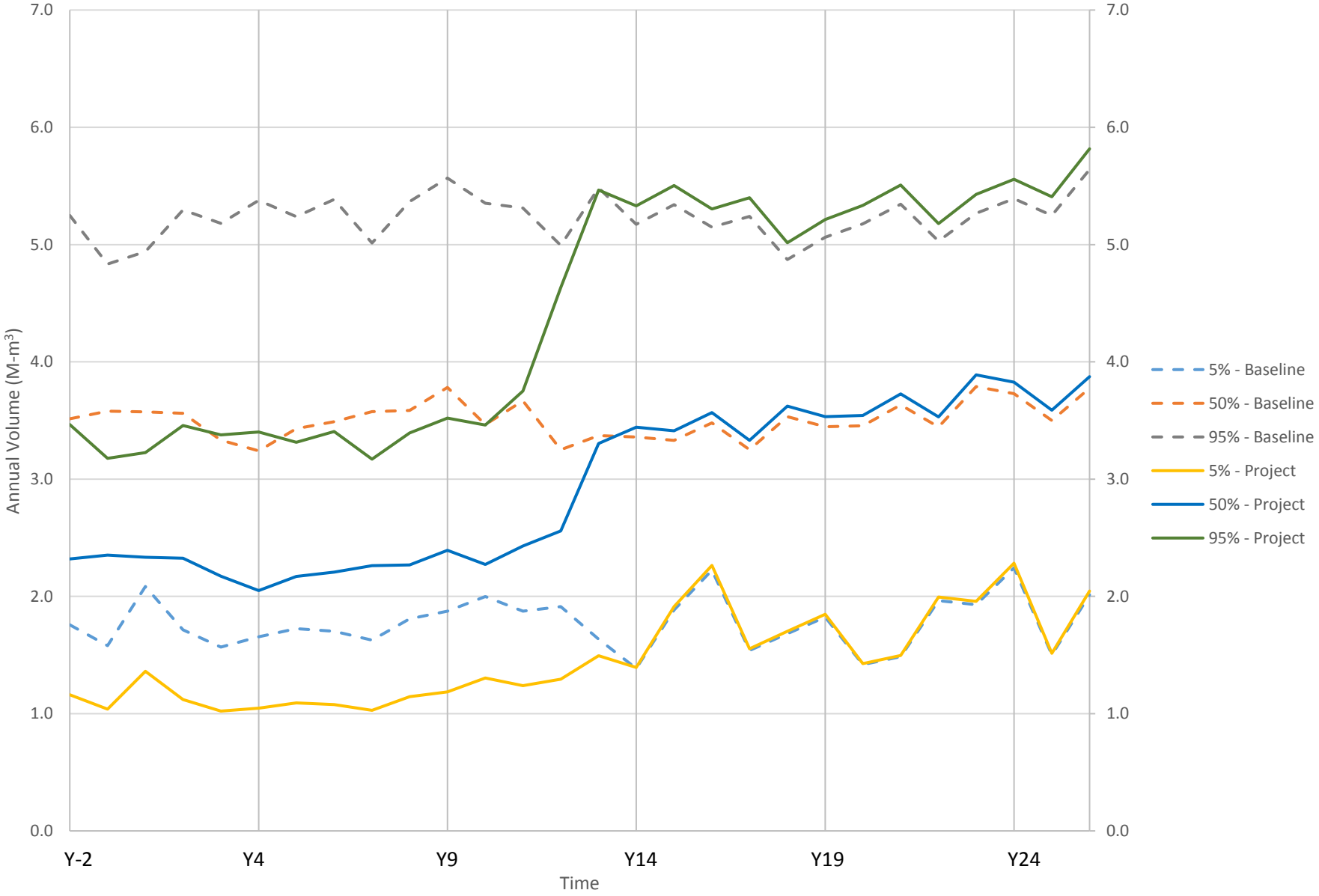
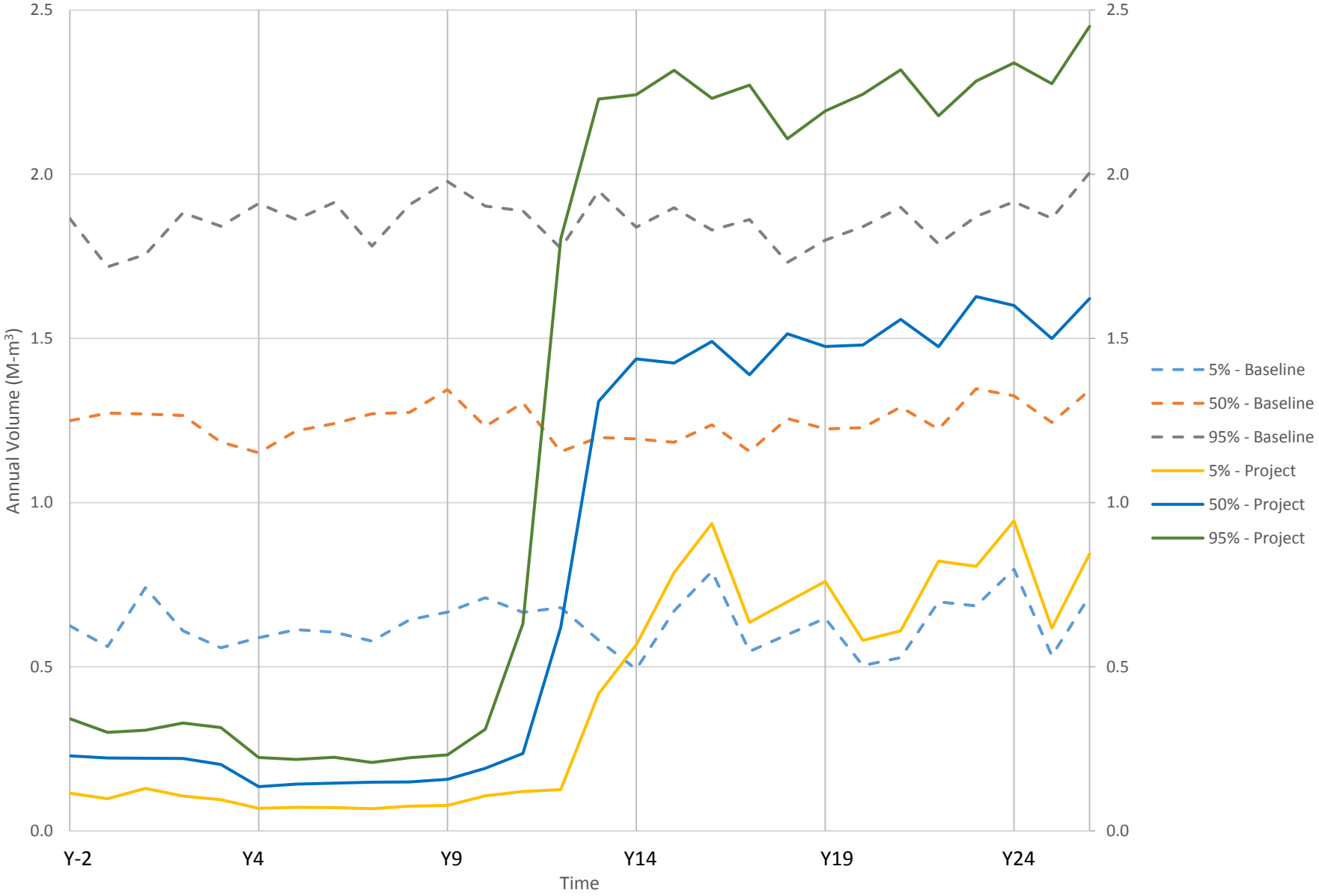
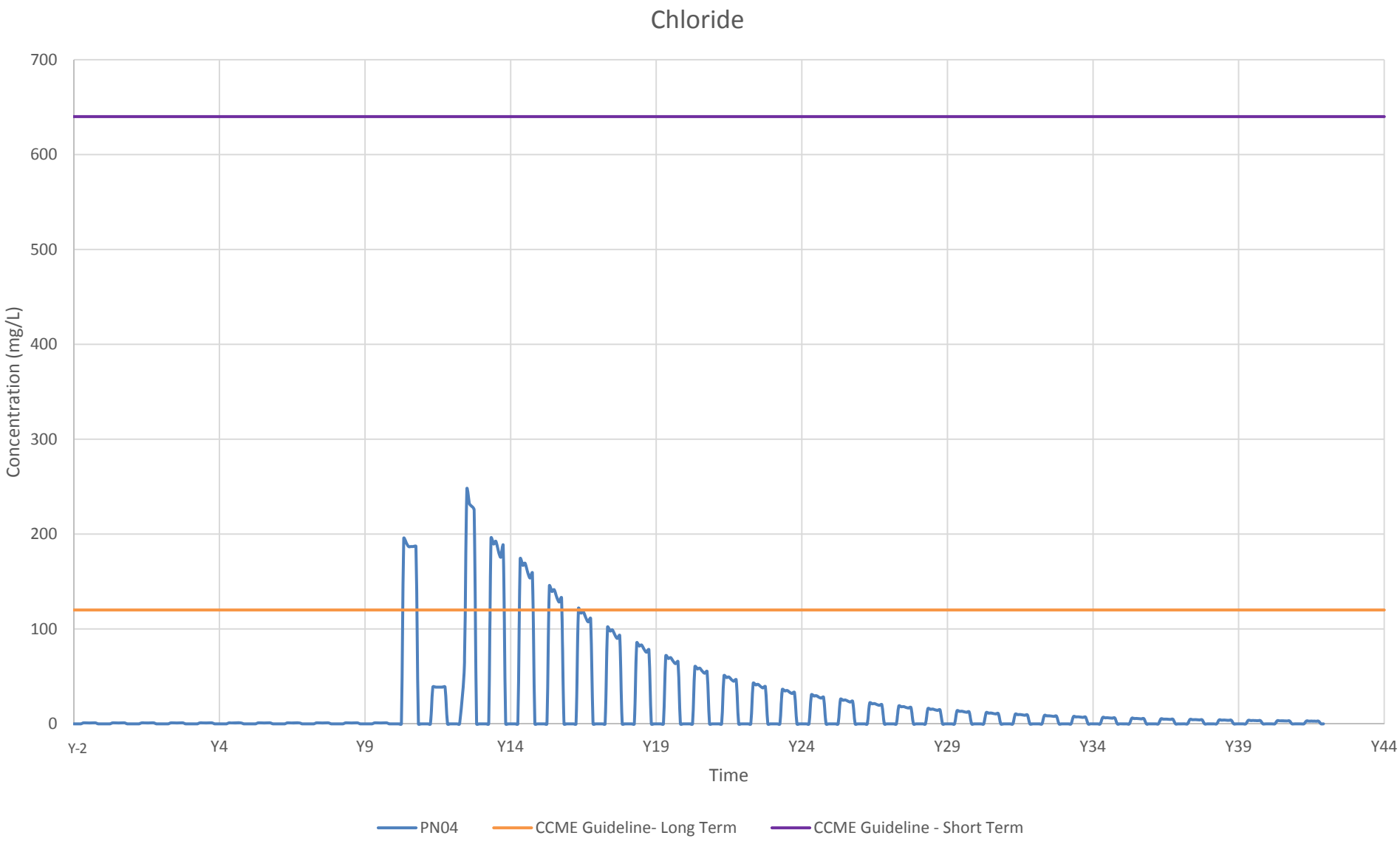


Figure 9 - PN10



ATTACHMENT 2

Updated Water Quality Prediction Tables and Figures



CLIENT
Sabina Gold and Silver Corp.

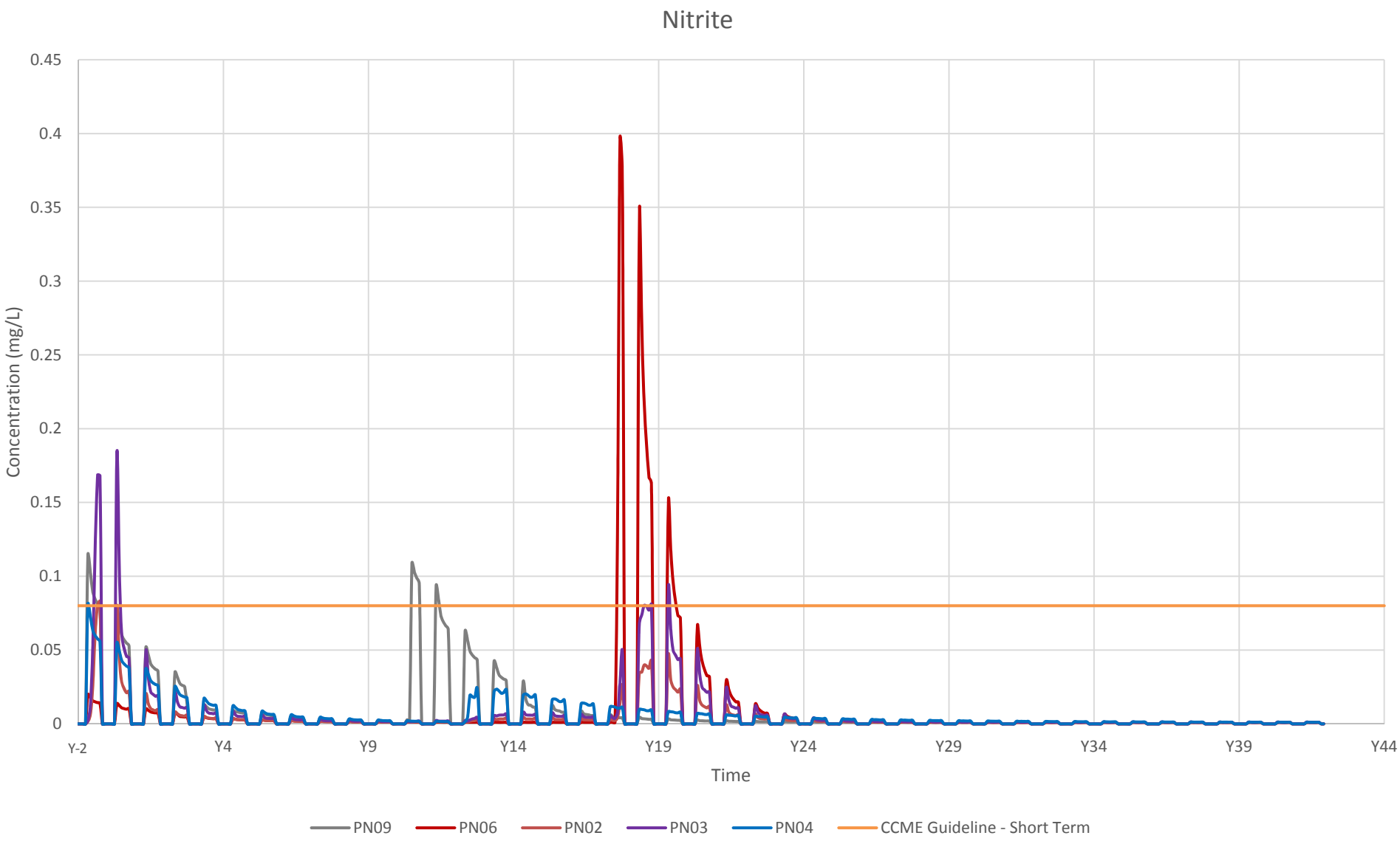
PROJECT
Sabina Black River Project

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	TG
DESIGN	JP
REVIEW	JP
APPROVED	SF

TITLE
Prediction Node Results - Chloride

PROJECT No.	PHASE	Rev.	FIGURE
1776921	**WO003**	**A**	**A2-1**



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PROJECT
Sabina Black River Project

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	TG
DESIGN	JP
REVIEW	JP
APPROVED	SF

TITLE
Prediction Node Results - Nitrite

PROJECT No.	PHASE	Rev.	FIGURE
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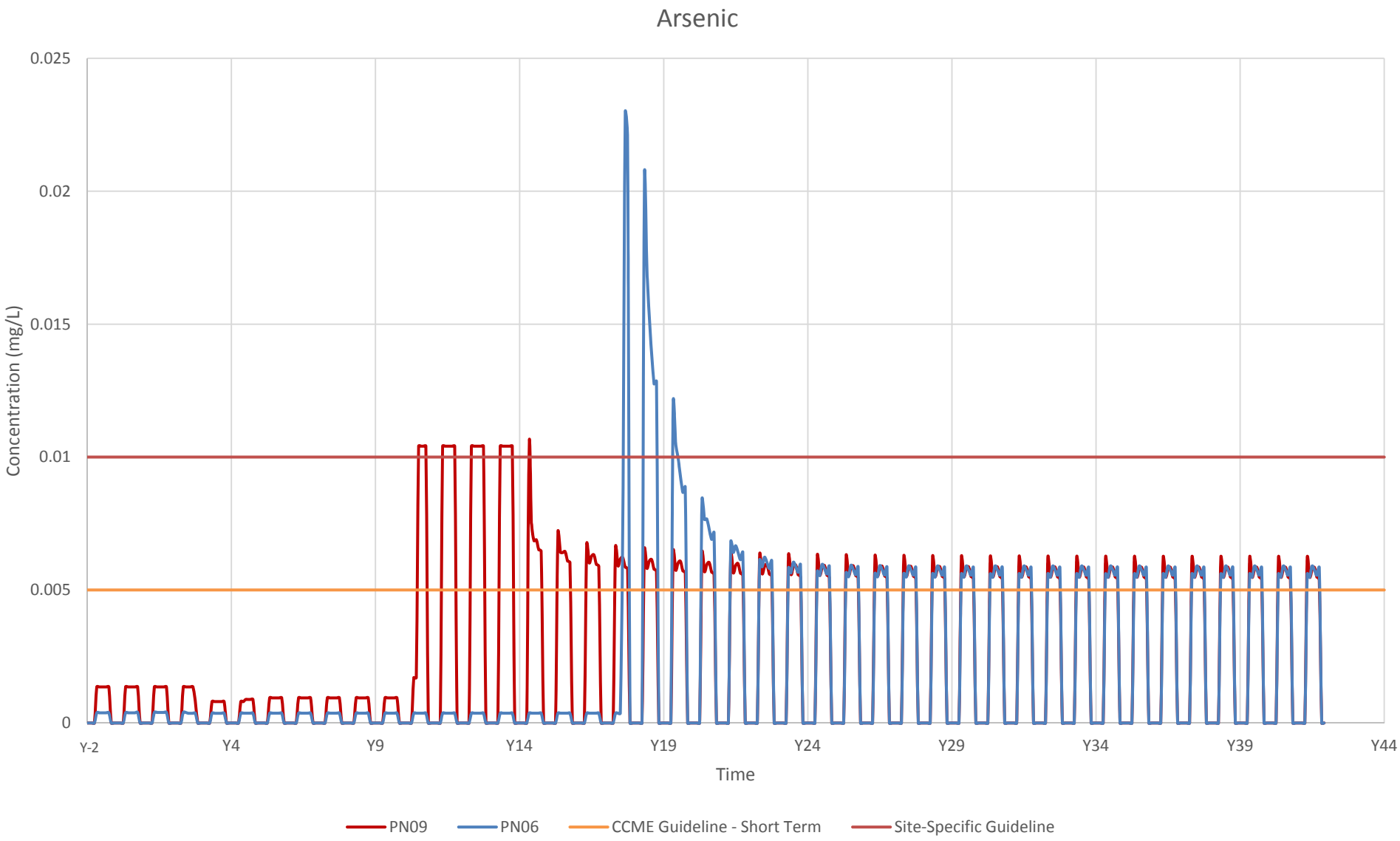

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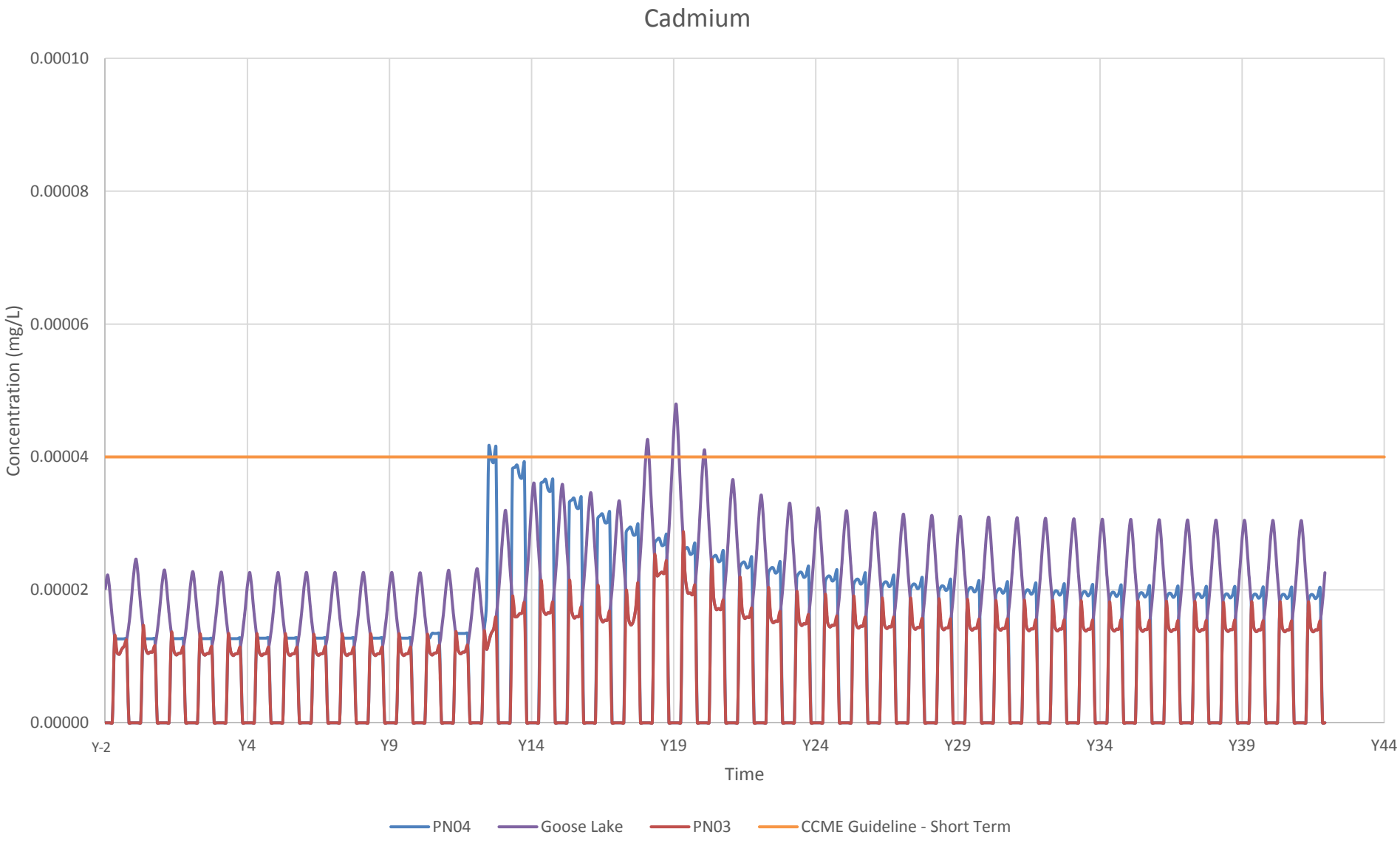
PROJECT
Sabina Black River Project

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	TG
DESIGN	JP
REVIEW	JP
APPROVED	SF

TITLE
Prediction Node Results - Arsenic

PROJECT No.	PHASE	Rev.	FIGURE
1776921	**WO003**	**A**	**A2-3**



CLIENT
Sabina Gold and Silver Corp.

PROJECT
Sabina Black River Project

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-04
PREPARED	TG
DESIGN	JP
REVIEW	JP
APPROVED	SF

TITLE
Prediction Node Results - Cadmium

PROJECT No.	PHASE	Rev.	FIGURE
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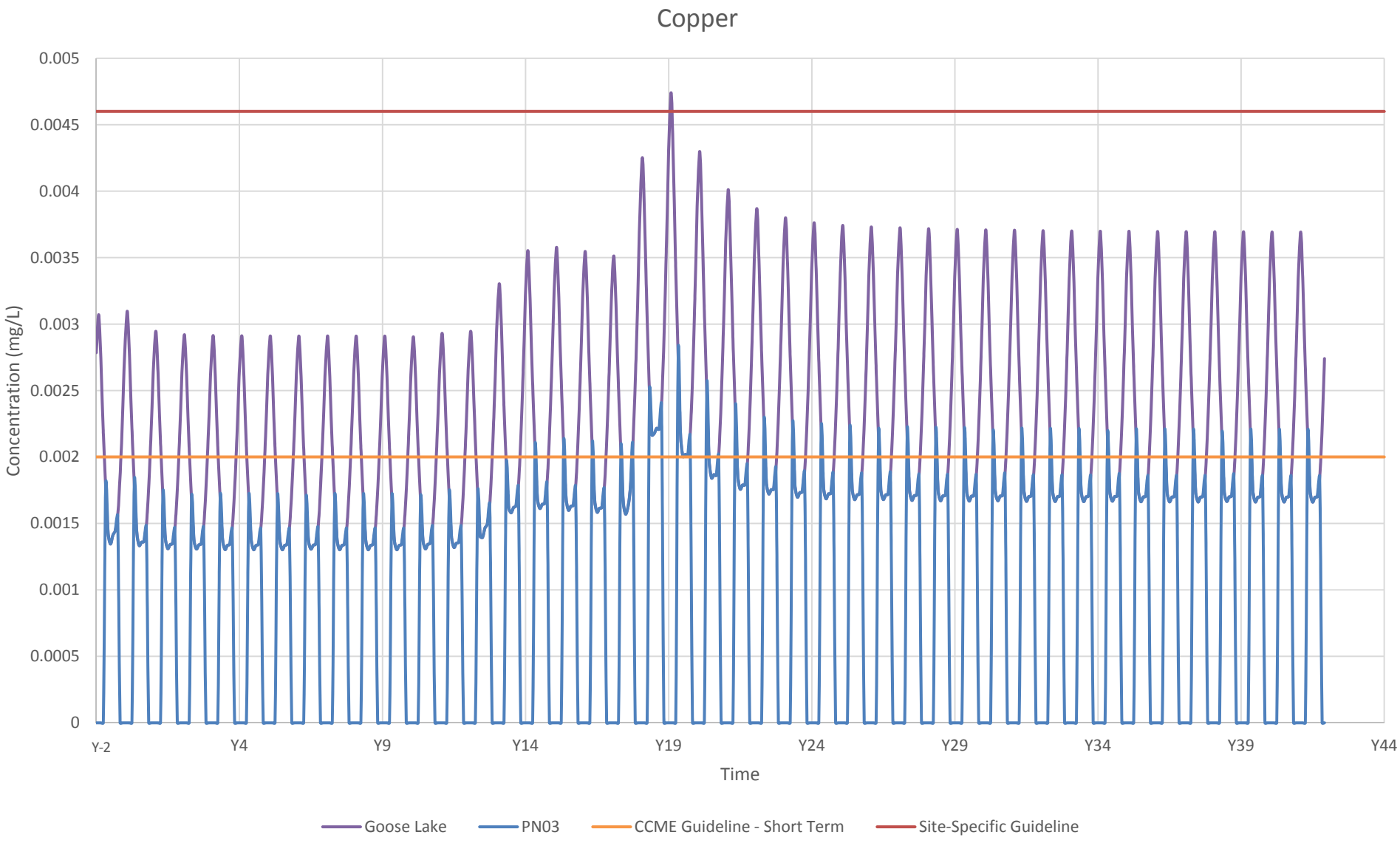

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PROJECT
Sabina Black River Project

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YYYY-MM-DD	2017-08-04
PREPARED	TG
DESIGN	JP
REVIEW	JP
APPROVED	SF

TITLE
Prediction Node Results - Copper

PROJECT No.	PHASE	Rev.	FIGURE
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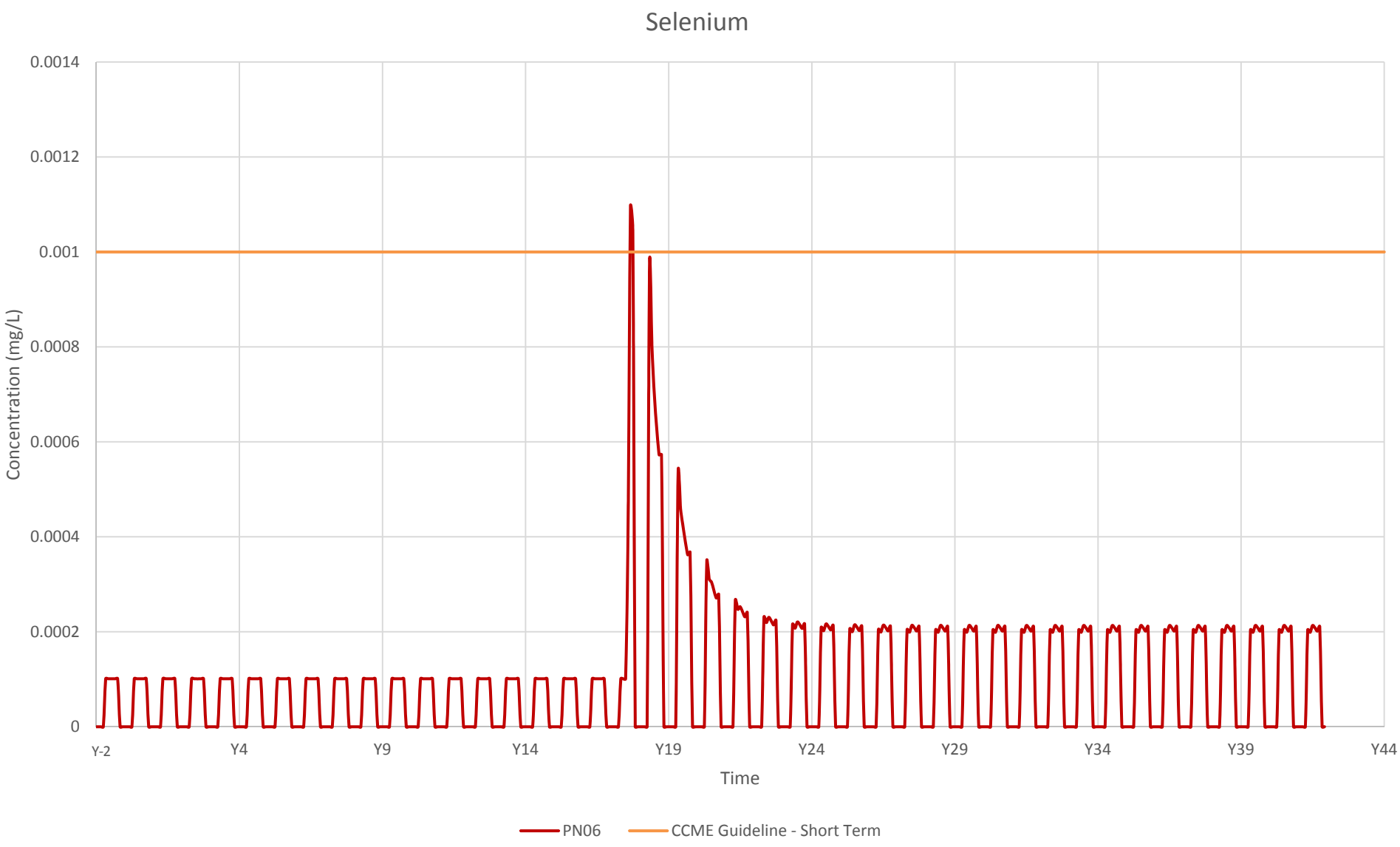

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PROJECT
Sabina Black River Project

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YYYY-MM-DD	2017-08-04
PREPARED	TG
DESIGN	JP
REVIEW	JP
APPROVED	SF

TITLE
Prediction Node Results - Selenium

PROJECT No.	PHASE	Rev.	FIGURE
1776921	**WO003**	**A**	**A2-6**

	Guidelines			PN01			PN02			PN03			PN04			PN06			PN07			PN08		
	MMER	CCME	Site-Specific	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]
Parameter	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	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Free_CN	-	-	-	0.00099	0.00098	0.00099	0.0011	0.00099	0.0011	0.0013	0.00099	0.0012	0.001	0.00093	0.00093	0.001	0.00095	0.00098	0	0	0	0.001	0.001	0.001
Total_CN_N	1	-	-	0.00053	0.00053	0.00053	0.00059	0.00044	0.00047	0.0007	0.00035	0.0004	0.00054	0.00038	0.00039	0.00054	0.00025	0.0003	0	0	0	0.00054	0.00054	0.00054
WAD_CN	-	-	-	0.0011	0.00098	0.00099	0.0048	0.00099	0.0013	0.0086	0.00099	0.0016	0.002	0.00093	0.0011	0.034	0.00095	0.0014	0	0	0	0.001	0.001	0.001
CNO_N	-	-	-	0.0000024	0.0000018	0.0000024	0.000073	0.000054	0.000073	0.00015	0.00011	0.00014	0.000029	0.000026	0.000028	0.00014	0.00012	0.00014	0	0	0	0	0	0
SCN_N	-	-	-	0.00000017	6.8E-11	9.5E-09	0.0000051	2.1E-09	0.00000028	0.00001	4.3E-09	0.00000057	0.0000041	1.6E-08	0.00000045	0.000046	9.9E-14	0.00000053	0	0	0	0	0	0
Sulphate	-	-	-	5.3	4.2	4.3	41	10.0	13	78	16	23	62	26	30	282	21	25	0	0	0	4.1	4.1	4.1
Chloride	-	120	-	1.8	0.99	1.2	28	1.2	7.4	57	1.5	14	247	2.8	36	100	0.95	2.2	0	0	0	1.0	1.0	1.0
Ammonia_N	6	-	-	0.0068	0.0049	0.0049	0.066	0.0038	0.0041	0.14	0.0026	0.0032	0.99	0.0034	0.0038	0.24	0.002	0.003	0	0	0	0.005	0.005	0.005
Nitrate	-	2.9	-	0.015	0.0064	0.0071	0.29	0.0067	0.028	0.66	0.0068	0.049	1.6	0.0076	0.053	2.0	0.0062	0.04	0	0	0	0.0065	0.0065	0.0065
Nitrite	-	0.08	-	0.0036	0.00098	0.0011	0.083	0.001	0.0038	0.18	0.001	0.0066	0.081	0.001	0.0043	0.4	0.00095	0.0065	0	0	0	0.001	0.001	0.001
Aluminum	-	0.1	-	0.012	0.011	0.011	0.031	0.02	0.023	0.05	0.029	0.035	0.049	0.044	0.048	0.11	0.033	0.035	0	0	0	0.011	0.011	0.011
Antimony	-	-	-	0.00015	0.000051	0.000057	0.0029	0.0001	0.00027	0.0058	0.00016	0.00049	0.0011	0.00026	0.0004	0.025	0.00019	0.00051	0	0	0	0.00005	0.00005	0.00005
Arsenic	0.05	0.005	0.01	0.00034	0.00026	0.00028	0.0046	0.0023	0.0028	0.009	0.0044	0.0055	0.011	0.0083	0.0094	0.023	0.0057	0.006	0	0	0	0.0002	0.0002	0.0002
Barium	-	-	-	0.0057	0.005	0.0052	0.027	0.0052	0.01	0.05	0.0053	0.015	0.2	0.0058	0.032	0.009	0.0049	0.0051	0	0	0	0.0051	0.0051	0.0051
Beryllium	-	-	-	0.0002	0.0002	0.0002	0.00022	0.0002	0.00022	0.00026	0.0002	0.00024	0.00021	0.00019	0.00019	0.0002	0.00019	0.0002	0	0	0	0.0002	0.0002	0.0002
Bismuth	-	-	-	0.0005	0.00049	0.00049	0.0007	0.0005	0.00058	0.00091	0.00049	0.00065	0.0019	0.00047	0.00066	0.0005	0.00048	0.00049	0	0	0	0.0005	0.0005	0.0005
Boron	-	1.5	-	0.0054	0.0049	0.005	0.019	0.0051	0.0085	0.034	0.0051	0.012	0.13	0.0053	0.022	0.015	0.0048	0.005	0	0	0	0.005	0.005	0.005
Cadmium	-	0.00004	-	0.00001	0.0000099	0.000010	0.000019	0.000012	0.000015	0.000028	0.000015	0.000019	0.000042	0.000019	0.000023	0.000051	0.000016	0.000016	0	0	0	0.00001	0.00001	0.00001
Calcium	-	-	-	3.9	2.2	2.6	59	3.9	17	121	5.8	31	522	10	80	50	6.1	6.7	0	0	0	2.1	2.1	2.1
Chromium	-	-	-	0.00015	0.00015	0.00015	0.00021	0.00015	0.00017	0.00027	0.00015	0.00019	0.00034	0.00014	0.00017	0.00048	0.00014	0.00015	0	0	0	0.00015	0.00015	0.00015
Cobalt	-	-	-	0.00019	0.00012	0.00012	0.0023	0.00014	0.00027	0.0045	0.00016	0.00042	0.0011	0.00019	0.00031	0.019	0.00016	0.00041	0	0	0	0.00012	0.00012	0.00012
Copper	0.3	0.002	0.0046	0.0014	0.0014	0.0014	0.0021	0.0016	0.0018	0.0028	0.0018	0.0022	0.0028	0.0021	0.0023	0.0044	0.0019	0.002	0	0	0	0.0014	0.0014	0.0014
Iron	-	0.3	-	0.015	0.014	0.014	0.057	0.024	0.032	0.099	0.035	0.05	0.17	0.055	0.076	0.24	0.039	0.042	0	0	0	0.014	0.014	0.014
Lead	0.2	0.001	-	0.000051	0.000049	0.00005	0.000093	0.00005	0.00006	0.00014	0.000049	0.000069	0.0002	0.000047	0.000068	0.00033	0.000048	0.000051	0	0	0	0.00005	0.00005	0.00005
Lithium	-	-	-	0.0057	0.0049	0.0051	0.03	0.0051	0.011	0.057	0.0052	0.016	0.23	0.0058	0.036	0.005	0.0048	0.0049	0	0	0	0.005	0.005	0.005
Magnesium	-	-	-	1.4	1.3	1.3	5.0	1.5	2.5	9.0	1.8	3.6	34	2.2	6.5	8.7	1.8	1.9	0	0	0	1.3	1.3	1.3
Manganese	-	-	-	0.0022	0.0019	0.002	0.013	0.0037	0.0064	0.025	0.0055	0.011	0.096	0.0091	0.021	0.033	0.006	0.0064	0	0	0	0.0019	0.0019	0.0019
Mercury	-	0.000026	-	0.0000099	0.0000099	0.0000099	0.000013	0.000011	0.000012	0.000016	0.000012	0.000014	0.000013	0.000013	0.000013	0.000024	0.000012	0.000013	0	0	0	0.00001	0.00001	0.00001
Molybdenum	-	0.073	-	0.00022	0.000053	0.000063	0.0051	0.00015	0.00047	0.01	0.00026	0.00088	0.0029	0.00045	0.00084	0.044	0.00033	0.0009	0	0	0	0.00005	0.00005	0.00005
Nickel	0.5	0.025	-	0.0034	0.0033	0.0033	0.0065	0.0047	0.0054	0.0096	0.0062	0.0075	0.0095	0.0088	0.0093	0.018	0.0067	0.007	0	0	0	0.0033	0.0033	0.0033
Phosphorus	-	-	-	0.0042	0.0038	0.0039	0.016	0.0039	0.0071	0.029	0.004	0.01	0.11	0.0042	0.019	0.061	0.0037	0.0045	0	0	0	0.0039	0.0039	0.0039
Potassium	-	-	-	0.39	0.33	0.34	2.2	0.34	0.63	4.0	0.34	0.92	8.5	0.36	1.5	13	0.32	0.49	0	0	0	0.34	0.34	0.34
Selenium	-	0.001	-	0.0001	0.00010	0.0001	0.00027	0.00014	0.00017	0.00043	0.00018	0.00023	0.00044	0.00024	0.00029	0.0011	0.00021	0.00022	0	0	0	0.0001	0.0001	0.0001
Silicon	-	-	-	0.28	0.27	0.27	0.32	0.28	0.31	0.37	0.27	0.33	0.28	0.26	0.26	0.44	0.27	0.27	0	0	0	0.28	0.28	0.28
Silver	-	0.00025	-	0.000011	0.0000099	0.000010	0.000047	0.000011	0.000014	0.000084	0.000011	0.000019	0.000048	0.000012	0.000017	0.00031	0.000012	0.000016	0	0	0	0.00001	0.00001	0.00001
Sodium	-	-	-	1.4	0.66	0.83	24	0.81	6.2	50	0.96	12	217	1.8	31	56	0.63	1.4	0	0	0	0.66	0.66	0.66
Strontium	-	-	-	0.045	0.0095	0.018	1.1	0.017	0.26	2.3	0.024	0.5	10	0.063	1.5	0.12	0.009	0.01	0	0	0	0.0094	0.0094	0.0094
Tellerium	-	-	-	0.002	0.002	0.002	0.0022	0.002	0.0022	0.0026	0.002	0.0023	0.002	0.0019	0.0019	0.002	0.0019	0.002	0	0	0	0.002	0.002	0.002
Thallium	-	0.0008	-	0.00005	0.000049	0.000049	0.00007	0.00005	0.000058	0.000091	0.000049	0.000065	0.00019	0.000047	0.000066	0.00005	0.000048	0.000049	0	0	0	0.00005	0.00005	0.00005
Thorium	-	-	-	4.6E-08	9.5E-12	2.4E-09	0.0000014	2.9E-10	7.3E-08	0.0000027	5.9E-10	0.00000014	0.00000042	2.2E-09	6.0E-08	0.000012	3.0E-14	0.00000016	0	0	0	0	0	0
Tin	-	-	-	0.00010	0.000098	0.000099	0.00014	0.00010	0.00012	0.00018	0.000099	0.00013	0.00038	0.000094	0.00013	0.00021	0.000095	0.000099	0	0	0	0.0001	0.0001	0.0001
Titanium	-	-	-	0.0099	0.0098	0.0099	0.011	0.0099	0.011	0.013	0.0099	0.012	0.013	0.0093	0.0098	0.01	0.0095	0.0098	0	0	0	0.01	0.01	0.01
Uranium	-	0.015	-	0.000010	0.0000098	0.0000099	0.000014	0.000010	0.000012	0.000018	0.0000099	0.000013	0.000037	0.0000094	0.000013	0.00001	0.0000095	0.0000098	0	0	0	0.00001	0.00001	0.00001
Vanadium	-	-	-	0.000059	0.000052	0.000053	0.00025	0.000053	0.00009	0.00044	0.000054	0.00013	0.0011	0.000055	0.00021	0.0013	0.00005	0.000066	0	0	0	0.000053	0.000053	0.000053
Zinc	0.5	0.03	-	0.003	0.003	0.003	0.0045	0.0034	0.004	0.0061	0.0037	0.0049	0.013	0.0043	0.0056	0.0059	0.0038	0.0039	0	0	0	0.003	0.003	0.003
Zirconium	-	-	-	0.00039	0.00039	0.00039	0.00044	0.0004	0.00044	0.00052	0.00039	0.00047	0.0004	0.00037	0.00037	0.0004	0.00038	0.00039	0	0	0	0.0004	0.0004	0.0004

Notes:
Highlighted purple cells exceed CCME (Canadian Council of Ministers of the Environment) guidelines.
Highlighted orange cells exceed Site-Specific Guidelines.
MMER - Metal Mining Effluent Regulations, average concentration limits.
CCME - Canadian Council of Ministers of the Environment
mg/L - milligrams per litre
Node PN07 is effectively removed by the Project due to Goose Main pit development
1 - Monthly Average, 2- Annual Open Water Average

	Guidelines			PN09			PN10			PN11			PN12			PN13			Goose Lake		
	MMER	CCME	Site-Specific	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]	Maximum[1]	Long-Term[2]	Max at Closure[1]
Parameter	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	mg/L	mg/L	mg/L	mg/L
Free_CN	-	-	-	0.001	0.00097	0.00099	0.001	0.00082	0.00084	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0022	0.00099	0.002
Total_CN_N	1	-	-	0.00054	0.00052	0.00053	0.00054	0.00015	0.00017	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.0012	0.00035	0.00068
WAD_CN	-	-	-	0.001	0.00097	0.00099	0.0038	0.00084	0.0013	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.015	0.00099	0.0027
CNO_N	-	-	-	0	0	0	0.000066	0.000062	0.000064	0	0	0	0	0	0	0	0	0	0.00027	0.00011	0.00025
SCN_N	-	-	-	0	0	0	0.000011	3.8E-08	0.0000012	0	0	0	0	0	0	0	0	0	0.000017	4.3E-09	0.00000098
Sulphate	-	-	-	20	12	13	135	51	58	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	135	16	39
Chloride	-	120	-	1.0	0.97	0.99	2957	5.5	92	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	98	1.5	24
Ammonia_N	6	-	-	1.4	0.0049	0.01	0.024	0.0012	0.0019	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.14	0.0026	0.0053
Nitrate	-	2.9	-	2.3	0.0063	0.015	0.85	0.0092	0.13	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	1.1	0.0068	0.084
Nitrite	-	0.08	-	0.11	0.00097	0.0014	0.057	0.0011	0.0096	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.32	0.001	0.011
Aluminum	-	0.1	-	0.049	0.036	0.039	0.083	0.076	0.082	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.086	0.029	0.06
Antimony	-	-	-	0.00024	0.00018	0.00019	0.0027	0.00047	0.00079	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.010	0.00016	0.00084
Arsenic	0.05	0.005	0.01	0.01	0.0057	0.0063	0.022	0.016	0.018	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.015	0.0044	0.0094
Barium	-	-	-	0.0051	0.005	0.005	0.53	0.0067	0.076	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	0.086	0.0053	0.026
Beryllium	-	-	-	0.0002	0.00019	0.0002	0.00023	0.00017	0.00018	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00044	0.0002	0.0004
Bismuth	-	-	-	0.0005	0.00049	0.00049	0.0041	0.00043	0.00094	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0016	0.00049	0.0011
Boron	-	1.5	-	0.005	0.0049	0.0049	0.34	0.0057	0.05	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.059	0.0051	0.02
Cadmium	-	0.00004	-	0.000025	0.000019	0.00002	0.000088	0.000026	0.000036	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000048	0.000015	0.000033
Calcium	-	-	-	5.5	4.6	4.9	1399	20	203	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	208	5.8	53
Chromium	-	-	-	0.00015	0.00015	0.00015	0.00067	0.00013	0.0002	0.00015	0.00015	0.00015	0.00015	0.00015	0.00015	0.00015	0.00015	0.00015	0.00047	0.00015	0.00032
Cobalt	-	-	-	0.00023	0.00019	0.0002	0.0026	0.00025	0.00056	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.00012	0.0077	0.00016	0.00073
Copper	0.3	0.002	0.0046	0.0018	0.0017	0.0018	0.0045	0.0029	0.0033	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0047	0.0018	0.0038
Iron	-	0.3	-	0.082	0.056	0.06	0.4	0.088	0.13	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.17	0.035	0.085
Lead	0.2	0.001	-	0.00005	0.000049	0.000049	0.00044	0.000043	0.000098	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00023	0.000049	0.00012
Lithium	-	-	-	0.005	0.0049	0.0049	0.61	0.007	0.087	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.097	0.0052	0.028
Magnesium	-	-	-	1.9	1.7	1.8	89	3.2	15	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	16	1.8	6.2
Manganese	-	-	-	0.013	0.0089	0.0096	0.25	0.015	0.046	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.043	0.0055	0.019
Mercury	-	0.000026	-	0.000011	0.000011	0.000011	0.000017	0.000016	0.000016	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000028	0.000012	0.000024
Molybdenum	-	0.073	-	0.00025	0.0002	0.00022	0.0077	0.0009	0.0018	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.018	0.00026	0.0015
Nickel	0.5	0.025	-	0.013	0.009	0.0096	0.014	0.013	0.014	0.0033	0.0033	0.0033	0.0033	0.0033	0.0033	0.0033	0.0033	0.0033	0.016	0.0062	0.013
Phosphorus	-	-	-	0.0039	0.0038	0.0038	0.29	0.0046	0.043	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.05	0.004	0.018
Potassium	-	-	-	0.34	0.33	0.33	22	0.38	3.3	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	7.0	0.34	1.6
Selenium	-	0.001	-	0.00017	0.00015	0.00016	0.00091	0.00041	0.00051	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00074	0.00018	0.0004
Silicon	-	-	-	0.28	0.27	0.27	0.28	0.23	0.24	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.63	0.27	0.57
Silver	-	0.00025	-	0.000011	0.000011	0.000011	0.00011	0.000015	0.000028	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00015	0.000011	0.000032
Sodium	-	-	-	0.66	0.64	0.65	583	3.3	80	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	86	0.96	20
Strontium	-	-	-	0.0094	0.0092	0.0093	28	0.14	3.8	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	0.0094	4.0	0.024	0.86
Tellerium	-	-	-	0.002	0.0019	0.002	0.002	0.0016	0.0017	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.0044	0.002	0.004
Thallium	-	0.0008	-	0.00005	0.000049	0.000049	0.00041	0.000043	0.000094	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00016	0.000049	0.00011
Thorium	-	-	-	0	0	0	0.0000011	5.3E-09	0.00000016	0	0	0	0	0	0	0	0	0	0.0000047	5.9E-10	0.00000025
Tin	-	-	-	0.0001	0.000097	0.000099	0.00084	0.000086	0.00019	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00031	0.000099	0.00023
Titanium	-	-	-	0.01	0.0097	0.0099	0.016	0.0083	0.0097	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.022	0.0099	0.02
Uranium	-	0.015	-	0.00001	0.0000097	0.0000099	0.000083	0.0000086	0.000019	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000031	0.0000099	0.000022
Vanadium	-	-	-	0.000053	0.000051	0.000052	0.003	0.000058	0.00045	0.000053	0.000053	0.000053	0.000053	0.000053	0.000053	0.000053	0.000053	0.000053	0.00075	0.000054	0.00022
Zinc	0.5	0.03	-	0.005	0.0042	0.0044	0.029	0.0053	0.0084	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.011	0.0037	0.0084
Zirconium	-	-	-	0.0004	0.00039	0.00039	0.0004	0.00033	0.00034	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00089	0.00039	0.0008

Notes:
Highlighted purple cells exceed CCME (Canadian Council of
Highlighted orange cells exceed Site-Specific Guidelines.
MMER - Metal Mining Effluent Regulations, average concenti
CCME - Canadian Council of Ministers of the Environment
mg/L - milligrams per litre
Node PN07 is effectively removed by the Project due to Goos
1 - Monthly Average, 2- Annual Open Water Average

Parameter	MMER Limit	Umwelt TF		Llama Reservoir		Goose Main TF		Echo Open Pit	
		At Flooding[1]	Long-Term[2]	At Flooding[1]	Long-Term[2]	At Flooding[1]	Long-Term[2]	At Flooding[1]	Long-Term[2]
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total_CN_N	1	0.00021	0.00015	0.000084	0.000065	0.0002	0.00017	0.00053	0.00052
Chloride	-	0.57	0.43	822	5.2	130	0.93	0.98	0.96
Ammonia	6	0.071	0.0011	0.02	0.00042	0.0077	0.0012	0.0049	0.0048
Nitrate as N	-	2.4	0.0029	0.75	0.012	2.7	0.006	0.0064	0.0062
Nitrite as N	-	0.12	0.00043	0.065	0.0013	0.52	0.00093	0.00098	0.00096
Aluminum	-	0.21	0.23	0.047	0.051	0.13	0.038	0.022	0.013
Arsenic	0.5	0.089	0.054	0.0098	0.01	0.029	0.0069	0.0024	0.00045
Boron	-	0.0028	0.0021	0.45	0.0068	0.017	0.0046	0.0049	0.0048
Cadmium	-	0.000062	0.000063	0.00011	0.00002	0.000062	0.000016	0.000011	0.00001
Copper	0.3	0.0063	0.0066	0.0054	0.0023	0.0052	0.002	0.0017	0.0014
Iron	-	0.25	0.25	0.53	0.061	0.3	0.043	0.025	0.016
Lead	0.2	0.000028	0.000021	0.00057	0.000047	0.00041	0.000046	0.000049	0.000048
Mercury	-	0.00003	0.000031	0.0000094	0.000014	0.000027	0.000013	0.00001	0.0000098
Molybdenum	-	0.0026	0.0028	0.01	0.0006	0.057	0.0004	0.000067	0.000051
Nickel	0.5	0.035	0.036	0.0062	0.0094	0.021	0.0072	0.0048	0.0036
Selenium	-	0.001	0.0011	0.0012	0.00029	0.0014	0.00023	0.00011	0.0001
Silver	-	0.000026	0.000026	0.00015	0.000014	0.0004	0.000012	0.00001	0.0000098
Thallium	-	0.000028	0.000021	0.00054	0.000047	0.000036	0.000046	0.000049	0.000048
Uranium	-	0.0000057	0.0000043	0.00011	0.0000094	0.0000072	0.0000093	0.0000098	0.0000096
Zinc	0.5	0.01	0.01	0.037	0.0046	0.0065	0.0039	0.0034	0.003

Notes:

MMER - Metal Mining Effluent Regulations, average concentration limits.

CCME - Canadian Council of Ministers of the Environment

mg/L - milligrams per litre

1 - monthly average maximum after initial discharge, 2 - annual open water average

Parameter	Guidelines			PN01		PN02		PN03		PN04	
	MMER	CCME	Site-Specific	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total CN as N	1	-	-	0.00053	0.00053	0.00059	0.00044	0.0007	0.00035	0.00054	0.00038
Chloride	-	120	-	1.8	0.99	28	1.2	57	1.5	247	2.8
Ammonia as N	6	-	-	0.0068	0.0049	0.066	0.0038	0.14	0.0026	0.99	0.0034
Nitrate as N	-	2.9	-	0.015	0.0064	0.29	0.0067	0.66	0.0068	1.6	0.0076
Nitrite as N	-	0.08	-	0.0036	0.00098	0.083	0.001	0.18	0.001	0.081	0.001
Aluminum	-	0.1	-	0.012	0.011	0.031	0.02	0.05	0.029	0.049	0.044
Arsenic	0.05	0.005	0.01	0.00034	0.00026	0.0046	0.0023	0.009	0.0044	0.011	0.0083
Boron	-	1.5	-	0.0054	0.0049	0.019	0.0051	0.034	0.0051	0.13	0.0053
Cadmium	-	0.00004	-	0.00001	0.0000099	0.000019	0.000012	0.000028	0.000015	0.000042	0.000019
Copper	0.3	0.002	0.0046	0.0014	0.0014	0.0021	0.0016	0.0028	0.0018	0.0028	0.0021
Iron	-	0.3	-	0.015	0.014	0.057	0.024	0.099	0.035	0.17	0.055
Lead	0.2	0.001	-	0.000051	0.000049	0.000093	0.00005	0.00014	0.000049	0.0002	0.000047
Mercury	-	0.000026	-	0.0000099	0.0000099	0.000013	0.000011	0.000016	0.000012	0.000013	0.000013
Molybdenum	-	0.073	-	0.00022	0.000053	0.0051	0.00015	0.01	0.00026	0.0029	0.00045
Nickel	0.5	0.025	-	0.0034	0.0033	0.0065	0.0047	0.0096	0.0062	0.0095	0.0088
Selenium	-	0.001	-	0.0001	0.00010	0.00027	0.00014	0.00043	0.00018	0.00044	0.00024
Silver	-	0.00025	-	0.000011	0.0000099	0.000047	0.000011	0.000084	0.000011	0.000048	0.000012
Thallium	-	0.0008	-	0.00005	0.000049	0.00007	0.00005	0.000091	0.000049	0.00019	0.000047
Uranium	-	0.015	-	0.000010	0.0000098	0.000014	0.000010	0.000018	0.0000099	0.000037	0.0000094
Zinc	0.5	0.03	-	0.003	0.003	0.0045	0.0034	0.0061	0.0037	0.013	0.0043

Notes:
Highlighted orange cells exceed Site-Specific Guidelines and highlighted purple cells exceed CCME (Canadian Council of Ministers of the Environment) guidelines.
MMER - Metal Mining Effluent Regulations, average concentration limits.
CCME - Canadian Council of Ministers of the Environment

	Guidelines			PN06		PN07		PN08		PN09	
Parameter	MMER	CCME	Site-Specific	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total CN as N	1	-	-	0.00054	0.00025	0	0	0.00054	0.00054	0.00054	0.00052
Chloride	-	120	-	100	0.95	0	0	1.0	1.0	1.0	0.97
Ammonia as N	6	-	-	0.24	0.002	0	0	0.005	0.005	1.4	0.0049
Nitrate as N	-	2.9	-	2.0	0.0062	0	0	0.0065	0.0065	2.3	0.0063
Nitrite as N	-	0.08	-	0.4	0.00095	0	0	0.001	0.001	0.11	0.00097
Aluminum	-	0.1	-	0.11	0.033	0	0	0.011	0.011	0.049	0.036
Arsenic	0.05	0.005	0.01	0.023	0.0057	0	0	0.0002	0.0002	0.01	0.0057
Boron	-	1.5	-	0.015	0.0048	0	0	0.005	0.005	0.005	0.0049
Cadmium	-	0.00004	-	0.000051	0.000016	0	0	0.00001	0.00001	0.000025	0.000019
Copper	0.3	0.002	0.0046	0.0044	0.0019	0	0	0.0014	0.0014	0.0018	0.0017
Iron	-	0.3	-	0.24	0.039	0	0	0.014	0.014	0.082	0.056
Lead	0.2	0.001	-	0.00033	0.000048	0	0	0.00005	0.00005	0.00005	0.000049
Mercury	-	0.000026	-	0.000024	0.000012	0	0	0.00001	0.00001	0.000011	0.000011
Molybdenum	-	0.073	-	0.044	0.00033	0	0	0.00005	0.00005	0.00025	0.0002
Nickel	0.5	0.025	-	0.018	0.0067	0	0	0.0033	0.0033	0.013	0.009
Selenium	-	0.001	-	0.0011	0.00021	0	0	0.0001	0.0001	0.00017	0.00015
Silver	-	0.00025	-	0.00031	0.000012	0	0	0.00001	0.00001	0.000011	0.000011
Thallium	-	0.0008	-	0.00005	0.000048	0	0	0.00005	0.00005	0.00005	0.000049
Uranium	-	0.015	-	0.00001	0.0000095	0	0	0.00001	0.00001	0.00001	0.0000097
Zinc	0.5	0.03	-	0.0059	0.0038	0	0	0.003	0.003	0.005	0.0042

Notes:
Highlighted orange cells exceed Site-Specific Guidelines and highlighted purple cells exceed CCME (Canadian Council of Ministers of the Environment) guidelines.
MMER - Metal Mining Effluent Regulations, average concentration limits.
CCME - Canadian Council of Ministers of the Environment

Parameter	Guidelines			PN11		PN12		PN13	
	MMER	CCME	Site-Specific	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]	Maximum[1]	Long-Term[2]
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total CN as N	1	-	-	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054
Chloride	-	120	-	1.0	1.0	1.0	1.0	1.0	1.0
Ammonia as N	6	-	-	0.005	0.005	0.005	0.005	0.005	0.005
Nitrate as N	-	2.9	-	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
Nitrite as N	-	0.08	-	0.001	0.001	0.001	0.001	0.001	0.001
Aluminum	-	0.1	-	0.011	0.011	0.011	0.011	0.011	0.011
Arsenic	0.05	0.005	0.01	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Boron	-	1.5	-	0.005	0.005	0.005	0.005	0.005	0.005
Cadmium	-	0.00004	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Copper	0.3	0.002	0.0046	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
Iron	-	0.3	-	0.014	0.014	0.014	0.014	0.014	0.014
Lead	0.2	0.001	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury	-	0.000026	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum	-	0.073	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel	0.5	0.025	-	0.0033	0.0033	0.0033	0.0033	0.0033	0.0033
Selenium	-	0.001	-	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silver	-	0.00025	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Thallium	-	0.0008	-	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Uranium	-	0.015	-	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Zinc	0.5	0.03	-	0.003	0.003	0.003	0.003	0.003	0.003

Notes:

Highlighted orange cells exceed Site-Specific Guidelines and highlighted purple cells exceed CCME (Canadian Council of Ministers of the Environment) guidelir

MMER - Metal Mining Effluent Regulations, average concentration limits.

CCME - Canadian Council of Ministers of the Environment

Parameter	MMER Limits	PN10	
		Maximum[1]	Long-Term[2]
Units	mg/L	mg/L	mg/L
Total CN as N	1	0.00054	0.00015
Chloride	-	2957	5.5
Ammonia as N	6	0.024	0.0012
Nitrate as N	-	0.85	0.0092
Nitrite as N	-	0.057	0.0011
Aluminum	-	0.083	0.076
Arsenic	0.05	0.022	0.016
Boron	-	0.34	0.0057
Cadmium	-	0.000088	0.000026
Copper	0.3	0.0045	0.0029
Iron	-	0.4	0.088
Lead	0.2	0.00044	0.000043
Mercury	-	0.000017	0.000016
Molybdenum	-	0.0077	0.0009
Nickel	0.5	0.014	0.013
Selenium	-	0.00091	0.00041
Silver	-	0.00011	0.000015
Thallium	-	0.00041	0.000043
Uranium	-	0.000083	0.0000086
Zinc	0.5	0.029	0.0053

Notes:
MMER - Metal Mining Effluent Regulations, average concentration limits.

Parameter	Guidelines			Goose Lake	
	MMER	CCME	Site-Specific	Maximum[1]	Long-Term[2]
Units	mg/L	mg/L	mg/L	mg/L	mg/L
Total CN as N	1	-	-	0.0012	0.00035
Chloride	-	120	-	98	1.5
Ammonia as N	6	-	-	0.14	0.0026
Nitrate as N	-	2.9	-	1.1	0.0068
Nitrite as N	-	0.08	-	0.32	0.001
Aluminum	-	0.1	-	0.086	0.029
Arsenic	0.05	0.005	0.01	0.015	0.0044
Boron	-	1.5	-	0.059	0.0051
Cadmium	-	0.00004	-	0.000048	0.000015
Copper	0.3	0.002	0.0046	0.0047	0.0018
Iron	-	0.3	-	0.17	0.035
Lead	0.2	0.001	-	0.00023	0.000049
Mercury	-	0.000026	-	0.000028	0.000012
Molybdenum	-	0.073	-	0.018	0.00026
Nickel	0.5	0.025	-	0.016	0.0062
Selenium	-	0.001	-	0.00074	0.00018
Silver	-	0.00025	-	0.00015	0.000011
Thallium	-	0.0008	-	0.00016	0.000049
Uranium	-	0.015	-	0.000031	0.0000099
Zinc	0.5	0.03	-	0.011	0.0037

Notes:
Highlighted orange cells exceed Site-Specific Guidelines and highlighted purple cells exceed CCME (Canadian Council of Ministers of the
MMER - Metal Mining Effluent Regulations, average concentration limits.
CCME - Canadian Council of Ministers of the Environment
mg/L - milligrams per litre