In accordance with the Terms of Reference, which instructed the developer to provide a comprehensive analysis of the key line inquiry, Tyhee should put more emphasis on the questions related to the key line of inquiry. To facilitate this, the information requests in part one contain short descriptions of the information gaps that the Review Board identified in the DAR.

Part 1 - Key Line of Inquiry Issues

IR Number: 1-1-1

Source:	*Mackenzie Valley Review Board*
To:	*Tyhee*
Issue:	***Estimation of Tailings Containment Area Concentrations***

Background

The DAR identifies effluent concentrations, estimated Tailings Containment Area (TCA) concentrations and TCA concentrations that would be required to achieve CCME guidelines in Narrow Lake (section 6.2, Technical Memo from EBA) for 6 elements. There are significant differences between the "estimated TCA" and "required TCA" concentrations, e.g. 199.7 µg/l vs. 5.8 µg/l for arsenic and 24.1 µg/l vs. 5.8 µg/l for cyanide. While the DAR provides detailed information on simulation modeling of contaminant behaviour in Narrow Lake, it provides virtually no information on how the "required TCA concentration" will be achieved from the "estimated TCA concentration".

Request

1. *Please provide an explanation for how the "required TCA concentrations" will be achieved for all six elements.*

Tyhee NWT Corp Response

Information Response 1-1-1 seeks to understand how the Tailings Containment Area (TCA) concentrations of six key elements will be controlled in order for Narrow Lake to meet Canadian Council of Ministries of the Environment (CCME) guidelines. During the current feasibility study now in progress, this Information Request (IR) response cannot be more thoroughly addressed until updated water balance and water quality modeling are finalized. Additional modeling is needed due to a revised mine plan design and additional analytical geochemical characterization of only the Ormsby tailings instead of combined Ormsby/Nicholas Lake tailings (the revised mine plan design is outlined in the covering letter to these Information Request responses).

With the above in mind, the response to this IR is affected by the planned exclusion of Nicholas Lake ore from the revised mine plan/mill process and the change in TCA design concept. Previous geochemical characterization determined processed Nicholas Lake ore is potentially acid generating and may liberate elevated of metals (mainly arsenic). The exclusion of Nicholas Lake ore from the revised mine plan will improve TCA effluent water quality. The revised mine plan includes a revised TCA design, which will improve control

over discharges to Narrow Lake, and improve estimated TCA water quality. The revised TCA design calls for:

1. Disposing the leach tailings sub-aqueously to avoid oxidation and acid generation, and
2. Increasing controls on TCA discharge allowing interception and additional treatment of the effluent if necessary.

Geochemical characterization of tailings from the Acid Rock Drainage report in the DAR Appendix H and recent tailings samples will be compared in this IR response to demonstrate how the absence of Nicholas Lake ore in the mill process is likely to improve water quality discharged from the TCA. The changes in TCA design will also be discussed with respect to improving TCA water quality. The project is committed to meeting Metal Mining Effluent Regulations (MMER) standards in effluent and CCME water quality guidelines in receiving water bodies downstream of the mine. If necessary, water leaving the TCA could be treated to meet environmental targets. Treatment options will be discussed briefly in this IR response and in more detail in IR 1-1-3. Cyanide treatment will be specifically discussed in IR 1-1-2.

Because water balance modeling for the TCA will not be available for this IR response, Tyhee would expect to see a similar IR from the Mackenzie Valley Environmental Impact Review Board (MVEIRB) once other interested parties have reviewed the DAR and provided their concerns to the MVEIRB and then submitted to Tyhee for further clarification. This strategy would allow the current EA to proceed and in the interim of other interested party review of the DAR, provide the additional time for Tyhee to obtain further results to better respond to this IR.

Expected Improvement in TCA Discharge Water Quality

The original mine plan presented in the DAR involved using ore from both the Nicholas Lake and Ormsby deposits. Tailings from both deposits would have been placed in the TCA. However, the revised mine plan excludes ore from the Nicholas Lake deposit. The following is a comparison of the geochemical data for Nicholas and Ormsby tailings, including data provided in the DAR and recent tailings analysis initiated to support the revised mine plan. The comparison will show that the exclusion of the Nicholas Lake ore is likely to improve the TCA water quality.

Recent flotation tailings geochemical characterization has been completed using solely Ormsby ore. One flotation tailings sample from Ormsby ore was submitted for ABA analysis. Metals analysis was also completed on three master composite samples and four variability composite tailings samples from the Ormsby ore. A summary of these samples and results are presented in Tables 1.1 through 1.3. The results of these tests and their impact on the TCA water quality are outlined in the following sections.

Acid Base Accounting and Acid Generating Potential

In general, the ABA and AGP results show the Ormsby flotation tailings are non–acid generating (NAG) while the Nicholas Lake flotation tailings have the potential to generate acid (PAG). The exclusion of Nicholas Lake ore will result in the improvement of the TCA

water quality by minimizing the risk of acid rock drainage issues. A summary of the ABA sample results are presented in Table 1.1.

Ormsby flotation tailings results have a nearly neutral Net Acid Generation (NAG) pH of 6.1, a low sulfide value of 0.12 percent, and a high Neutralization Potential Ratio (NPR) of 9.7. Recent ABA analysis completed on only Ormsby flotation tailings reported paste pH as 8.5, sulfide as 0.13 percent, acid generating potential as 4.1, and the NPR is 5.3. All of the Ormsby tailings samples have an ARD designation of non-acid generating.

The Nicholas Lake flotation tailings sample has a low NAG pH of 3.3, a sulfide value of 0.24 percent, and a low NPR of 0.85. The Nicholas Lake sample has an ARD designation of acid generating.

The Ormsby-Nicholas Lake combination flotation tailings sample has a nearly neutral NAG pH of 5.9, a sulfide value of 0.2 percent, and an NPR of 4.9, falling between the same parameters for the end members. The negative effect of Nicholas Lake ore on acid generation potential lowered the NAG pH values and increased sulfur content in the combined flotation sample.

Combined concentrate tailings have a NAG pH of 2.4, indicating the potential for acid generation. Additionally, this same sample has an NPR of 0.019 and 25.8 percent sulfide sulfur. This sample is acid generating.

While concentrate tailings information is not yet available for Ormsby tailings alone, it is believed, based on the difference in acid generating potential between Ormsby and Nicholas Lake ore, that concentrate tailings derived only from Ormsby ore will have less acid generating potential than the combined ore concentrate tailings. This will be confirmed during our ongoing testing.

Trace Metals

Trace metals analysis on Ormsby and Nicholas Lake tailings solids were presented in the DAR Appendix C, and more recently data has been collected on head assay Ormsby flotation tailings. Ormsby average floatation tailings whole rock concentrations are an average of the data in DAR, and the new data from the Ormsby ore only metallurgical campaign. Overall, the metal concentrations for arsenic, nickel, lead, and zinc are the higher in the Nicholas Lake flotation tailings sample. Average copper concentration is slightly higher in the Ormsby flotation tailings. Thus, the exclusion of Nicholas Lake ore will result in the improvement of the TCA water quality. The trace metal analytical results on solid tailings samplings (not supernatant) are presented in Table 1.2 for and summarized below:

Ormsby Flotation Tailings:

- Arsenic – 1,577 mg/kg
- Copper – 31 mg/kg
- Nickel – 21 mg/kg
- Lead – 27 mg/kg
- Zinc - 196 ppm

Nicholas Lake Flotation Tailings:

- Arsenic – 6,692 mg/kg
- Copper – 23 mg/kg
- Nickel – 125 mg/kg
- Lead – 252 mg/kg
- Zinc – 124 mg/kg

Shaker Flask Extraction Results

SFE analysis was completed on tailings generated from the Ormsby and Nicholas Lake ore deposits. The liquid from the SFE was analyzed to determine what constituents might load into tailings contact water. Overall, the metal concentrations for arsenic, copper, nickel, and zinc are the highest in the Nicholas Lake flotation tailings sample. Ormsby-Nicholas Lake combined concentrate tailings result for lead is the highest due the inclusion of 25 percent Nicholas Lake ore. Thus, the exclusion of Nicholas Lake ore in the revised mine plan, will result in the improvement of the TCA water quality. The SFE analytical results are presented in Table 1.3 and summarized below:

Ormsby Flotation Tailings:

- Arsenic –0.36 milligrams per liter (mg/L)
- Copper – <0.0005 mg/L
- Nickel – 0.0024 mg/L
- Lead – 0.0002 mg/L
- Zinc – 0.003 mg/L

Nicholas Lake Flotation Tailings:

- Arsenic – 42 mg/L
- Copper – 0.001 mg/L
- Nickel – 0.33 mg/L
- Lead – 0.00042 mg/L
- Zinc – 0.5 mg/L

In general, the Nicholas Lake flotation tailings samples are potentially acid generating, have high metals, and have high SFE metals concentrations compared to the Ormsby flotation tailings. Based on the discussion above, if the Nicholas Lake ore is no longer contributing to the TCA solute load, effluent water quality should be improved. The water quality can be estimated once the water balance is complete.

Change in TCA Design Concept

The original TCA design called for co-deposited flotation and leach concentrate tailings. Potential acid generating leach concentrate tailings would be deposited with flotation tailings throughout the TCA. The conceptual TCA design embankments were to be comprised of homogenous rock fill, which were thought to self-plug to create filtration of the tailings through the embankment over time. There was a risk the homogenous rock fill embankment would not self-clog resulting in discharge of untreated tailings to the downstream environment. For this reason, and to reduce the oxygen exposure of leach concentrate tailings, the TCA design has been updated.

The revised mine plan includes a TCA design in which the tailings are deposited in separate cells. Flotation tails are deposited in the southern and northern cells while the leached tailings are deposited sub-aqueously in a center cell mixed with a yet to be determined amount of flotation tailings. The northern and southern embankments are designed with graded rock layers with a low-permeability core to minimize leakage. The center cell will contain the leach concentrate tailings which will be deposited sub-aqueously to decrease the potential for oxidation. Interception or pump back wells located downstream of the tailings embankments will collect and pump effluent back to the TCA or to an onsite treatment facility if necessary to meet water quality discharge criteria.

The revised mine plan allows for the interception, storage, and treatment of effluent passing through the TCA embankments and decreases the potential for oxidation of leach concentrate tailings. These design improvements mitigate the potential for acid generation, leading to a likely reduction in metals concentration, and decrease the likelihood for uncontrolled discharge to the surrounding environment. TCA effluent can be treated if necessary to meet MMER standards. The TCA treated effluent water quality can be treated to a higher standard if needed to meet CCME guidelines in Narrow Lake. Information Request Responses 1-1-3 and 1-1-2 further discusses the potential treatment options.

Closing

In summary the revised mine plan, including the absence of Nicholas Lake ore and a new TCA design, indicates that improved water quality will be realized in the TCA and TCA discharge. However, a new water balance for the TCA is currently being completed. The full extent of the improvements will be known when the water balance is available and has been presented to the MVEIRB.

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Table 1.1
Tyhee NWT Corp.
Yellowknife Gold Project
Part I Information Request Responses

ABA Results for Tailings

Sample ID	Location	Type	ABA					ARD Designation
			NAG pH	Paste pH	S^{2-}	NPR	AP	
			pH units	pH units	%	unitless	$tCaCO_3/1000t$	unitless
NL FLC1 Final Tail	Nicholas Lake	Floatation Tailings	3.3	5.9	0.24	0.85	7.5	PAG
OM FLC2 Final Tail	Ormsby Lake	Floatation Tailings	6.1	8.3	0.12	9.7	3.8	non PAG
YG1 FLC3 Final Tail	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Floatation Tailings	5.9	8.1	0.2	4.9	6.3	non PAG
YG1 Barren Conc	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Concentrate	2.4	7.6	25.8	0.019	805	PAG
YG1 Combine	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Whole Tailings	2.4	7.8	2.5	0.35	78	PAG
ST-1	Ormsby Lake	Floatation Tailings	NA	8.5	0.13	5.3	4.1	non PAG

Notes:

NAG	Net Acid Generation
NPR	Neutralization Potential Ratio
AP	Acid Potential
ARD	Acid Rock Drainage
ABA	Acid Base Accounting
NA	Not Available

Key:
ARD data-DAR Appendix H
Recent Data

References:
Inspectorate, 2011, Tyhee NWT Corp, ABA on Ormsby Floatation Tails, Project#1105509, December 13
Tyhee NWT Corp., 2011, Yellowknife Gold Project Developer's Assessment Report, MVEIRB File: EA 0809-003, Appendix H Acid Rock Drainage, April

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Table 1.2
Tyhee NWT Corp.
Yellowknife Gold Project
Part I Information Request Responses

Metals Concentration for Tailings

Sample ID	Location	Type	As		Cu		Ni		Pb		Zn		Cyanide
			ppm	ug/L	ppm	ug/L	ppm	ug/L	ppm	ug/L	ppm	ug/L	ug/L
NL FLC1 Final Tail	Nicholas Lake	Floatation Tailings	6992	NA	23	NA	125	NA	252	NA	124	NA	NA
OM FLC2 Final Tail	Ormsby Lake	Floatation Tailings	66	NA	7	NA	49	NA	3.3	NA	72	NA	NA
YG1 FLC3 Final Tail	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Floatation Tailings	1688	NA	11	NA	70	NA	57	NA	108	NA	NA
YG1 Barren Conc	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Concentrate	>10,000	NA	1433	NA	38	NA	6374	NA	2585	NA	NA
YG1 Combine	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Whole Tailings	>10,000	NA	195	NA	11	NA	624	NA	536	NA	NA
Ormsby Master Comp Average	Ormsby Lake	Ormsby Master Comp Floatation Tailings	582	NA	9.3	NA	14	NA	94	NA	359	NA	NA
OM-105-Comp Average	Ormsby Lake	Ormsby Variability Comp Floatation Tailings	462.3	NA	35.7	NA	8	NA	17	NA	204	NA	NA
OM-417-Comp Average	Ormsby Lake	Ormsby Variability Comp Floatation Tailings	853.7	NA	28	NA	4	NA	19	NA	205	NA	NA
OM-559-Comp Average	Ormsby Lake	Ormsby Variability Comp Floatation Tailings	7332.7	NA	30	NA	15	NA	16	NA	185	NA	NA
OM-723-Comp Average	Ormsby Lake	Ormsby Variability Comp Floatation Tailings	167.3	NA	81.3	NA	36	NA	15	NA	153	NA	NA
5-2WK Bulk Float	Unknown	2-week old tailings effluent sample	NA	256	NA	6.4	NA	2.1	NA	1.1	NA	33.9	30.9
Average of All Ormsby Floatation Tailings			1577		32		21		27		196		

Notes:

NAG	Net Acid Generation
NPR	Neutralization Potential Ratio
AP	Acid Potential
ARD	Acid Rock Drainage
ABA	Acid Base Accounting
NA	Not Available

Key:
ARD data-DAR Appendix C
Recent Data
Lock Cycle Test

References:
Inspectorate, 2010, Tyhee NWT Corp., Project#0907410 Certificate#10D1248(R), April 30
Inspectorate, 2011, Tyhee NWT Corp., Ormsby Variability Comp, October 31
Inspectorate, 2011, Tyhee NWT Corp., Ormsby Master Comp, October 18
Inspectorate, 2011, Tyhee NWT Corp., ABA on Ormsby Floatation Tails, Project#1105509, December 13
Tyhee NWT Corp., 2011, Yellowknife Gold Project Developer's Assessment Report, MVEIRB File: EA 0809-003, Appendix C Water Quality, Technical memo-Narrow Lake Water Quality Modeling, April
Tyhee NWT Corp., 2011, Yellowknife Gold Project Developer's Assessment Report, MVEIRB File: EA 0809-003, Appendix H Acid Rock Drainage, April

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Table 1.3
Tyhee NWT Corp.
Yellowknife Gold Project
Part I Information Request Responses

Shake Flask Extraction for Tailings

Sample ID	Location	Type	As	Cu	Ni	Pb	Zn
			mg/L	mg/L	mg/L	mg/L	mg/L
NL FLC1 Final Tail	Nicholas Lake	Floatation Tailings	42	0.001	0.33	0.00042	0.5
OM FLC2 Final Tail	Ormsby Lake	Floatation Tailings	0.36	<0.0005	0.0024	0.0002	0.003
YG1 FLC3 Final Tail	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Floatation Tailings	1.6	<0.0005	0.0009	0.00002	0.001
YG1 Barren Conc	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Concentrate	0.047	0.001	0.0024	0.14	0.052
YG1 Combine	Ormsby + Nicholas Lake	Combined 25%NL + 75% Ormsby Whole Tailings	0.14	<0.0005	0.0013	0.00067	0.003

Notes:

NAG	Net Acid Generation
NPR	Neutralization Potential Ratio
AP	Acid Potential
ARD	Acid Rock Drainage
ABA	Acid Base Accounting
NA	Not Available

Key:
ARD data-DAR Appendix C

References:
Tyhee NWT Corp., 2011, Yellowknife Gold Project Developer's Assessment Report, MVEIRB File: EA 0809-003, Appendix H Acid Rock Drainage, April