Stantec

Technical Memo

To:	Karyn Lewis, Project Manager Lupin Project	From:	Alvin Tong, P.Eng. Jim McKinley, Ph.D., P.Eng.
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File:	Lupin Gold Project – 129500081	Date:	October 15, 2019

Reference: 2AM-LUP1520 Technical Meeting Commitment Number 10 Response – Cover Data from Lupin Mine Tailings Containment Area

INTRODUCTION

Lupin Mine Incorporated (LMI), a wholly owned subsidiary of Mandalay Resources Corporation is requesting the renewal and amendment of their existing Type "A" Water Licence No: 2AM-LUP1520, to allow for Final Closure and Reclamation of the Lupin Mine Project (Lupin). The Nunavut Water Board (NWB or Board) Water Licence Application No. 2AM-LUP1520 Technical Meeting was held June 6-7, 2019 in Kugluktuk, Nunavut. Appendix D of the June 18, 2018 Pre-Hearing Conference Decision Report outlines the agreed upon List of Commitments (Commitments). Stantec Consulting Ltd. (Stantec) was retained by LMI to support the responses to select commitments and this technical memo provides the responses to fulfill Commitment No. 10, shown below, which relates to data collection from Cell 1 and Cell 2 in the Lupin Tailings Containment Area (TCA).

10	LMI	ECCC	One-time visual inspection (testpit) to "ground truth" the status of the cover nearby one of the installed standpipes (note: water quality data will be collected from all standpipes and presented in the context of historical water quality data from the standpipe information).	15-Oct-19	Technical Memo

At Cell 1 in the Lupin TCA, Stantec excavated a test pit and collected water level and water quality data in standpipes completed in the esker cover. The water quality data is compared to historical information collected between 2002 and 2004 as part of the TCA Closure Plan (Holubec, 2005). A second test pit was also excavated in Cell 2 of the Lupin TCA. This memo contains a brief description of the field work and presents the data to fulfill the commitment listed above.

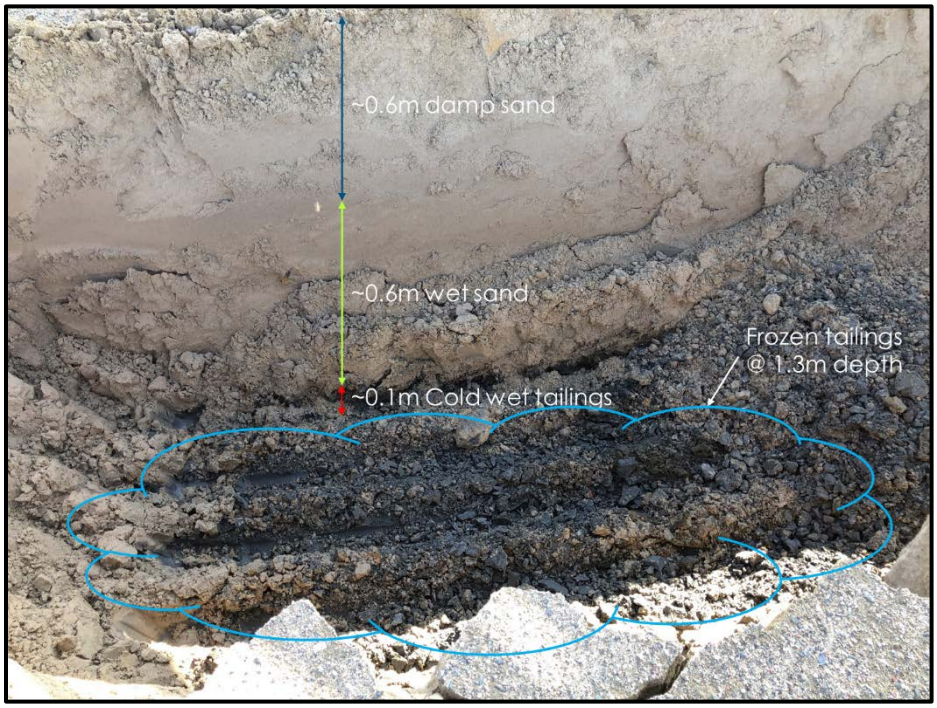
TEST PIT OBSERVATIONS

Two test pits were completed in Cell 1 and Cell 2 using an excavator and the locations are presented on Figure 1. Mr. Alvin Tong, P.Eng., a senior Geotechnical Engineer with Stantec, oversaw the excavation of the test pit on August 24 and 25, 2019. The weather during the excavation work was clear and warm. The general condition of the cover was dry without any nearby ponded water.

Test Pit 1

Test Pit 1 was excavated within Cell 2, which was covered in 2004. The cover material was observed to be a well graded sand with some gravel. Wet material was encountered approximately 0.6 m below ground surface (bgs). A thin layer of cold, wet tailings was encountered approximately 1.2 m bgs and frozen tailings was encountered approximately 1.3 m bgs. No oxidized tailings were observed in the test pit. A photograph of the test pit is provided below.

Test Pit 1 Photograph and Descriptions



Test Pit 2

Test Pit 2 was excavated within Cell 1, which was covered in 1995. The test pit is located approximately 30 m southwest of standpipe P-7. The cover material was observed to be a well graded sand and gravel with cobbles. Wet material was encountered approximately 0.6 m bgs, which generally corresponds with the water level measured in standpipe P-7 at 0.83 m bgs. A layer of cold wet tailings was encountered approximately 1.3 m bgs and frozen tailings was encountered approximately 1.5 m bgs. No oxidized tailings were observed in the test pit. Groundwater was observed seeping into the test pit at approximately 1.3 m bgs. A photograph of the test pit is provided below.

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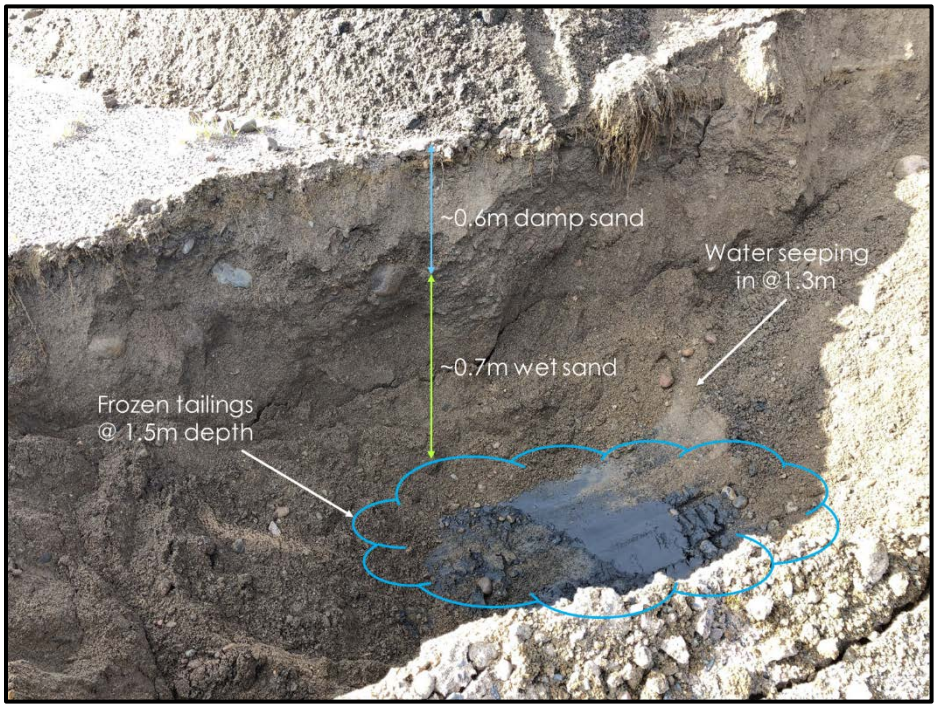

Test Pit 2 Photograph and Descriptions

STANDPIPE DATA COLLECTION

From August 23 to 26, 2019 water levels were measured and water quality samples were collected from standpipes completed in Cell 1 of the Lupin TCA. A minimum of three wellbore volumes were purged from the standpipes prior to sample collection. Cover saturated thickness, estimated based on the depth of water in the wells, and water quality results are presented in Table 1 and Table 2 with historical data from Holubec (2005). Each parameter is split into two columns in the tables; the first column represents historical data collected in 2002 and the second column represents data collected in 2019.

Table 1 – TCA Cell 1 Cover Saturated Thickness

Standpipe ID	Cover Saturated Thickness - (m)	
	2002	2019
P-2	0.32	0.44
P-3	0.22	0.17
P-4	0.49	0.58
P-5	0.94	0.74
P-6	0.62	0.61
P-7	0.21	0.37
P-8	0.42	0.59
P-9	0.20	0.28

Table 2 – TCA Cell 1 Standpipe Water Quality Results

Standpipe ID	pH		Arsenic-Total (mg/L)		Copper-Total (mg/L)		Cyanide-Total (mg/L)		Lead-Total (mg/L)		Nickel-Total (mg/L)		Zinc-Total (mg/L)	
	2002	2019	2002	2019	2002	2019	2002	2019	2002	2019	2002	2019	2002	2019
P-2	3.96	4.80	0.005	0.008	0.310	0.177	0.002	<0.0050	0.025	0.001	1.320	0.319	0.620	0.191
P-4	5.70	5.10	0.004	0.013	0.190	0.079	0.060	<0.0050	0.010	0.001	0.850	0.318	0.320	0.120
P-5	5.00	5.10	0.020	0.676	0.250	0.023	0.004	<0.0050	0.020	0.003	3.510	0.550	0.910	0.152
P-6	5.90	5.10	0.004	0.078	0.006	0.013	0.002	<0.0050	0.002	0.001	0.015	0.125	0.035	0.049
P-8	4.90	4.90	0.019	0.058	0.042	0.288	0.002	<0.0050	0.003	0.004	1.110	0.661	0.300	0.342

CONCLUSIONS

The test pit observations and standpipe water level measurements indicate that there is a saturated layer of cover above the tailings in the cells that were studied. Oxidized tailings were not observed within the test pits. In general, the water quality results from 2002 and 2019 are comparable. Based on these observations and measurements, the cover appears to be functioning as permitted.

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References

I. Holubec Consulting Inc. 2005. Closure Plan for Tailings Containment Area. Prepared for Kinross Gold Corporation – Lupin Operation.

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