TMAC Resources Inc.

HOPE BAY BELT PROJECT
2017 Nunavut Water Board Annual Report

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2017 Nunavut Water Board Annual Report

Prepared by
TMAC Resources Inc.
Toronto, ON

Prepared for
Kitikmeot Inuit Association

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Executive Summary – English

The Hope Bay Greenstone Belt is an approximately 20 km × 80 km property along the south shore of Melville Sound in Nunavut, Canada. The Belt is TMAC Resources Inc.'s ("TMAC") prime holding and is its sole focus for exploration, development and mining. This report to the Nunavut Water Board (NWB) has been prepared to summarize the Project activities and monitoring conducted under TMAC Resources Inc. (TMAC) Type A Water Licence 2AM-DOH1323, Type B Water Licence(s) 2BB-MAE1727, 2BB-BOS1727 and the exploration Type B Water Licence 2BE-HOP1222.

In 2017, activities conducted along the Belt related to a transition from construction into commercial operations at Doris. The mill was fully commissioned in April 2017 and efforts were concentrated on a progressive ramp up in order to increase ore throughput and optimize gold recovery. In 2017 the mill processed 208,951 tons of ore and poured 49,177 ounces of gold and successfully treated 37,285 tons of cyanide solutions.

Civil construction activities included a light duty mechanical shop, additional warehousing, an arctic corridor to connect the main camp and the mill building and a fully functional Assay Lab. Earthworks continued in order to expand the Doris Airstrip south apron to include a lined aircraft de-icing and refueling pad. This also included the construction of another Tailings Catchment Basin, the Reagents Storage berm and the South Dam access road. Underground waste development continued in 2017 with further advancement of the below the dyke (BTD) decline and necessary support infrastructure.

Exploration activities along the Belt consisted of reverse circulation (RC) drilling, detailed geologic mapping, regional prospecting, and till sampling. TMAC Resources Inc. contracted Geotech Drilling Services Ltd. to complete a reverse circulation (RC) drilling program northwest of the Doris Deposit in the Belt. No drill setup or associated items were placed within 31m of any waterbody during the open water season and all cuttings were contained within a recirculation system and stored an approved containment area. TMAC brought the Boston exploration camp out of care and maintenance to support the exploration programs between June and August, 2017.

In the Fall of 2017, TMAC concluded another successful sealift operation including the purchase and delivery of 12,000,000 L of fuel as well as explosives and reagents to support mining and milling activities. The sealift also included additional heavy equipment to support mining and construction operations as well as the acquisition of a 100 person accommodations facility to house TMAC's expanding workforce.

Waste disposal, fuel usage and chemical storage stayed consistent with previous years and 11 spills were reported to reported to the Nunavut Spill Line, Water Licence Inspector and KIA Major Projects office. The remaining spills that occurred during 2017 were minor in nature, occurring on land, with quick response and clean up resulting in negligible impact to the receiving environment. Empty cargo aircraft were utilized in 2017 for waste backhaul from the Doris Camp in April and hydrocarbon-contaminated plastic/rubber were transported to KBL Environmental in Yellowknife to arrange for final remediation/disposal.

Water use in 2017 was conducted in accordance with Type A Water Licence 2AM-DOH1323, the Type B Water Licences 2BB-BOS1727 for Boston, the Type B Water Licences 2BB-MAE1727 for Advanced Exploration at Madrid, and the Type B Water Licence 2BE-HOP1222 for regional exploration. The Type B Water Licence No. 2BB-BOS1727 was renewed by the NWB in July 2017. The referenced water licences include provisions for sampling programs that involve recording data related to the volume of water

extracted for any purpose, testing of effluents (e.g., treated sewage effluents) discharged to the environment, and monitoring water quality within specific Project areas (e.g., surface discharge downstream of construction areas, storm water from an engineered containment structure, sewage and oily water effluent, etc.). Water usage in 2017 was conducted within approved limits. There were two cases of discharges of non-compliant effluent in 2017. First occurred on July 8, 2017, when an estimated 256 m^3 effluent from the Robert's Bay 3x5ML Tank Farm facility (ST6B) exceeded the discharge criteria for toluene. Discharge to tundra was stopped immediately and water was redirected to TIA. Second occurred on July 10, 2018 when an operator discharged 30 m^3 of effluent of unknown water quality to the tundra from the Containment Pond facility to the tundra at Boston Camp. Effluent was treated through an oil-water separator on discharge, but no water quality sample was collected prior to discharge to ensure the effluent met applicable discharge criteria. The discharge event was reported to the NT-NU Spills line and corrective actions were initiated to avoid reoccurrence.

On-going progressive reclamation of legacy drill holes in 2017 focused on reclaiming sites built in late 2008 that comprise a series of 32 diamond drill holes and ensuring appropriate financial security is in place. Community consultation in 2017 focused on engaging positively and effectively with local communities regarding TMAC operations, employment and contracting opportunities and consultation on TMAC's Boston-Madrid Proposal.

As demonstrated above, TMAC strives to continually achieve compliance with the various regulatory requirements and maintain community relationships. Environmental monitoring in accordance with the existing Water Licences, Framework Agreement, Project Certificate, authorizations, management plans and environmental effects monitoring plans will continue during 2018.

ᐱᒻᒪᕆᐅᔪᒃᑯᑦ ᓇᐃᓈᖅᓯᒪᔪᑦ ᐅᓂᒃᑳᓕᐊᑦ – ᐃᓄᒃᑎᑐᑦ

Hᐅᑉ ᐲ ᒍᓅᓐ ᔅᑑᓐ ᐱᐅᑦ ᐃᒻᒫᖅ 20 ᑭᓛᒥᑕᓂ ᐊᒻᒪᓗ 80 ᑭᓛᒥᑕᓂᒃ ᓇᒻᒥᓂ

ᕆᔭᐅᔪᖅ ᓂᒡᕿᐊᑕ ᓯᔾᔭᒥ ᒥᐅᕚᐅᓪ ᓴᐅᓪ ᓄᓇᕗᒻᒥ, ᑲᓇᑕ. ᐱᐅᑦ TMAC ᓄᓇᓃᖅᑐᓕᕆᔨᒃᑯᑦ ("TMAC) ᑎᒍᒻᒥᔪᑦ ᐊᒻᒪᓗ ᑎᒥᖃᖅᑐᑦ ᑐᕌᖅᓯᒪᔪᑦ ᕿᒥᕐᕈᐊᕐᓂᕐᒧᑦ, ᐱᕙᓪᓕᐊᓂᕐᒧᑦ ᐊᒻᒪᓗ ᐅᔾᔨᕐᓂᐊᕐᓂᕐᒧᑦ. ᑕᒪᓐᓇ ᐅᓂᒃᑳᓕᐊᖅ ᓄᓇᕗᒻᒥ ᐃᒪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᓐᓄᑦ (NWB) ᐋᖅᑭᒃᑕᐅᓯᒪᔪᑦ ᓇᓗᓇᐃᔭᕆᐊᕐᓗᒋᑦ ᐱᓕᕆᐊᔅᓴᐅᑉ ᐱᕙᓪᓕᐊᓯᒪᓂᖏᓐᓄᑦ ᐊᒻᒪᓗᖃᐅᔨᓴᖅᑕᐅᓯᒪᔪᑦ TMAC–ᑯᓐᓂᑦ. Type A ᐃᒪᒧᑦ ᓚᐃᓴᖓ 2AM-DOH1323, Type B ᐃᒪᒧᑦ ᓚᐃᓴ 2BB-MAE1727, 2BB-BOS1727 ᐊᒻᒪᓗ ᕿᒥᕐᕈᐊᕐᓂᖅ Type B ᐃᒪᒧᑦ ᓚᐃᓴ 2BE-HOP1222

2017–ᖑᑎᓪᓗᒍ, ᐱᕙᓪᓕᐊᓯᒪᔪᑦ ᐱᐅᑦ ᖃᓂᐊᓂ ᐃᓚᖃᖅᑐᑦ ᐊᓯᙳᖅᐸᓪᓕᐊᓂᖓᓄᑦ ᓴᓇᑎᓪᓗᒋᑦ ᓂᐅᕚᐊᒃᓴᕆᓕᕆᕙᓪᓕᐊᓂᕐᒧᑦ ᐊᐅᓚᑕᐅᔪᑦ ᑐᐊᕆᔅᒥ. ᓯᕐᑯᑎᓯᕙᓪᓕᐊᓂᖅ ᐃᑲᔪᖅᑕᐅᓯᒪᓪᑎᐊᖅᑐᑦ ᑮᓇᐅᔭᑎᒍᑦ ᐊᐃᕆᓕ 2017-ᖑᑎᓪᓗᒍ ᐊᒻᒪᓗ ᐱᕚᓪᓕᕈᑕᐅᔪᑦ ᑐᕌᖅᓯᒪᔪᑦ ᓱᒃᑲᔫᒃᑯᑦ ᐊᖅᑯᑎᓕᐅᕐᓂᕐᒧᑦ ᐊᒥᓲᕐᑯᕙᓪᓕᐊᓪᓗᒋᑦ ᓴᕕᔅᓴᐃᑦ ᓄᓇᒋᔭᓗᑦᑖᒥ ᐊᒻᒪᓗ ᑲᓐᓄᖄᓄᑦ ᓇᓂᓯᓂᕐᒧᑦ. 2017-ᖑᑎᓪᓗᒍ ᓯᕐᑯᑎᓯᕙᓪᓕᐊᓂᖅ ᑲᑎᓪᓗᕆᑦ 208,951 tons-ᓂᒃ ᓴᕕᔅᓴᐃᑦ ᐊᒻᒪᓗ ᑯᕚᓯᓪᓗᑎᒃ 49,177 ounces ᑲᓐᓄᖄᓂᑦ ᐊᒻᒪᓗ ᐱᐊᓂᑦᑎᐊᖅᑐᑎᒃ ᓴᓗᒻᒪᖅᓴᐃᓪᓗᑎᒃ 37,285 tons-ᓂᒃ ᑐᕐᑯᓐᓇᖅᑐᓂᑦ ᐃᓚᔅᓴᓂᒃ.

ᐃᑲᔪᖅᑎᒋᒃᑐᒃᑯᑦ ᓴᓇᔪᑦ ᐃᓚᖃᖅᑐᑦ ᐊᔅᓯᕈᔭᕆᐊᖃᙱᑦᑐᒃᑯᑦ ᐃᑯᒪᓕᕆᓂᕐᒧᑦ, ᐃᓚᒋᐊᕐᓗᒍ ᓴᓇᕙᒃ, ᐅᑭᐅᖅᑕᖅᑐᒥ ᐃᓱᐊᒤᖅᑐᒃᑯᑦ ᐅᒃᑯᐊᓂᒃ ᐃᓚᒋᐊᕐᓗᒋᑦ ᑕᒻᒫᕐᕙᒻᒧᑦ ᐊᒻᒪᓗ ᓯᕐᑯᑎᓯᕙᓪᓕᐊᓂᕐᒧᑦ ᓴᓇᕙᐊᓄᑦ ᐊᒻᒪᓗ ᐊᑕᖏᕐᓗᒋᑦ ᐊᐅᓚᕙᓪᓕᐊᓗᒍ ᐊᐅᓚᕙᓪᓕᐊᓂᕐᒧᑦ ᖃᐅᔨᓴᕐᕕᓂᑦ. ᓯᓚᕐᔪᐊᒥ-ᐱᓕᕆᐊᔅᓴᐃᑦ ᖃᔪᓯᔪᑦ ᐊᖏᓪᓕᕙᓪᓕᐊᕐᑯᓪᓗᒍ ᑐᐊᕆᔅ ᒥᑦᑕᕐᕕᖓᑕ ᓂᒡᕿᐊᑕ ᓇᔪᕐᕕᒋᓂᐊᖅᑕᖓᑕ ᐊᒻᒪᓗ ᐋᖅᑭᒃᓯᒪᔫᒃᑯᑦ ᑎᒻᒥᑌᓄᑦ ᓯᑯᐃᖅᓯᔾᔪᑎᔅᓯᒥᑦ ᐊᒻᒪᓗ ᐅᖅᓴᒃᓴᒧᑦ. ᑕᒪᓐᓇ ᐃᓚᒋᔭᐅᓚᐅᖅᑐᑦ ᓴᓇᓂᕐᒧᑦ ᐊᓯᐊᑕ ᓴᐅᔭᐅᕚᔅᓴᐅᓂᐊᖅᑐᒥᑦ ᐃᒪᔅᓴᒧᑦ, ᐃᓚᔅᓴᐃᑦ ᐊᑐᖅᑕᐅᓃᑦ ᑐᖅᑰᓯᕝᕙᖓᑕ ᐃᓂᔅᓴᖓ ᐊᒻᒪᓗ ᓂᒡᕿᐊᓂ ᑕᓯᐊᓄᑦ ᐊᖅᑯᑎᔅᓴᖓᓂᑦ. ᓄᓇᐅᑉ ᐊᑖᒍᑦ ᐊᑦᑕᑯᐃᑦ ᐱᕙᓪᓕᐊᓂᖓ ᑲᔪᓯᓚᐅᖅᑐᖅ 2017-ᖑᑎᓪᓗᒍ ᓴᓇᒃᑲᓐᓂᕆᐊᖅᓯᒍ ᑕᓯᕝᕚᐅᑉ ᐊᑖᓂ (BTD) ᓄᖑᕙᓪᓕᐊᓂᖏᑕ ᐊᒻᒪᓗ ᑕᐃᒪᐅᔭᕆᐊᖅᑐᑦ ᐃᑲᔫᓯᐊᑦ ᓴᓇᓂᕐᒧᑦ.

ᕿᒥᕐᕈᐊᕐᓂᖅ ᐱᕙᓪᓕᐊᔪᑦ ᐱᐅᑦ ᖃᓂᐊᓂ ᐃᓚᖃᖅᑐᑦ ᐅᑎᒧᑦ ᐊᐅᓚᔪᑦ (RC) ᐃᑰᑕᕐᓂᖅ, ᓇᓗᓇᐃᖅᓯᒪᑦᑎᐊᖅᑐᑦ ᓄᓇᒥ ᓄᓇᙳᐊᓕᐅᕐᓂᖅ ᓄᓇᒋᔭᐅᔪᒥ ᐃᓯᒪᔅᓴᖅᓯᐅᕐᓂᖅ ᓯᕗᒧᑦ, ᐊᒻᒪᓗ ᓴᐅᔭᐅᓯᒪᔪᒥᓂᕐᓄᑦ ᑲᑎᖅᓱᐃᓂᖅ ᖃᐅᔨᓴᕈᑎᔅᓴᓂᒃ. TMAC-ᑯᑦ ᓄᓇᓃᖅᑐᓕᕆᔨᒃᑯᑦ ᐊᖏᕈᑎᔅᓴᒃᑯᑦ ᐃᖅᑲᓇᐃᔮᒧᑦ Geotech ᐃᑰᑕᓕᕆᔩᑦ ᐱᔨᑦᑎᕋᐅᑎᖏᑦ ᐱᐊᓂᒋᐊᕐᓗᒍ ᐅᑎᒧᑦ ᐊᐅᓚᔪᑦ (RC) ᐃᑰᑕᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᔅᓴᖓᑕ ᐱᖓᓇᖅ ᐅᐊᓐᓇᖓᓂ ᑐᐊᕆᔅ ᐃᓕᓯᕚᖓᑕ ᐱᐅᕐᒥ. ᐃᑰᑖᕐᕕᔅᓴᖃᙱᑦᑐᑦ ᐋᖅᑭᒃᓯᒪᔪᓂᒃ ᐅᕝᕙᓅᓐᓃᑦ ᐃᓚᒋᔭᐅᔪᓂᑦ ᐃᓕᓯᓯᒪᔪᑦ ᐅᖓᓯᓂᖅᑲᖅᑐᑎᒃ 31 ᒥᑕᓂᒃ ᓇᒥᑐᐃᓐᓇᖅ ᐃᒪᖅᑲᖅᑐᒥ ᐊᐅᑦᑎᖅᐸᓪᓕᐊᓐᓇᖅᓯᑉᐸᑦ ᐊᒻᒪᓗ ᓯᕐᑯᒥᑦᑕᐅᕙᓪᓕᐊᔪᑦ ᐃᓚᖃᓚᐅᖅᑐᑦ ᐊᐅᓚᐃᓐᓇᖅᑐᒥᑦ ᐋᖅᑭᒃᓯᒪᔪᒥᑦ ᐊᒻᒪᓗ ᑐᖅᑯᖅᑕᐅᓪᓗᑎᒃ ᓴᓗᒪᙱᑦᑐᓄᑦ ᓇᔪᕐᕕᖓᓄᑦ. TMAC-ᑯᑦ ᓂᐅᕚᓚᐅᖅᑐᑦ ᐋᔅᑕᓐ ᕿᒥᕐᕈᐊᕐᓂᕐᒧᑦ ᑕᒻᒫᕐᕕᖓᓂᑦ ᒥᐊᓂᕆᓪᓗᓂᔾᔪᒃ ᐊᒻᒪᓗ ᑲᒪᐃᓐᓇᕆᓪᓗᓂᔾᔪᒃ ᐃᑲᔫᑎᖃᕐᓗᓂ ᕿᒥᕐᕈᐊᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᔅᓯᖏᓐᓄᑦ ᔪᓂ ᐊᒻᒪᓗ ᐅᒡᒍᓯ 2017 ᐊᑯᓐᖓᓂ.

ᐅᑭᐊᒃᓵᖅ 2017-ᖑᑎᓪᓗᒍ, TMAC-ᑯᑦ ᐱᐊᓂᑦᑎᐊᒃᑲᓐᓂᓚᐅᖅᑐᑦ ᐅᒥᐊᕐᔪᐊᓕᕆᓂᒃᑯᑦ ᐊᐅᓚᑎᓪᓗᕆᑦ ᐃᓚᖃᖅᑐᑦ ᓂᐅᕕᖅᓱᑎᒃ ᐊᒻᒪᓗ ᐊᔾᔭᖅᑕᐅᓪᓗᑎᒃ 12,000,000 ᓕᑕᓂᒃ ᐅᖅᓱᓂᒃ ᐊᒻᒪᓗ ᖃᖅᑎᑦᑎᓲᖑᔪᓂᑦ ᐊᒻᒪᓗ ᐃᓚᔅᓴᓂᒃ ᐃᑲᔫᑎᖃᕐᓗᑎᒃ ᐅᔾᔨᕐᓂᐊᕐᓂᕐᒧᑦ ᐊᒻᒪᓗ ᓯᕐᑯᑎᕆᕙᓪᓕᐊᓂᕐᒧᑦ. ᐅᒥᐊᕐᔪᐊᓕᕆᓂᖅ ᐃᓚᖃᓚᐅᕐᒥᔪᑦ ᐅᕐᑯᒪᐃᑦᑐᓂᒃ ᓴᓇᕈᑎᔅᓯᓂᒃ ᐃᑲᔫᑎᖃᕐᓗᑎᒃ ᐅᔾᔨᕐᓂᐊᕐᓂᕐᒧᑦ ᐊᒻᒪᓗ ᓴᓇᓂᕐᒧᑦ ᐊᐅᓚᔪᓂᑦ ᐊᒻᒪᓗ ᐃᓚᒋᐊᕐᓗᑎᒃ 100 ᐃᓄᓐᓄᑦ ᓯᓂᑦᑕᕐᕕᔅᓯᓂᒃ ᐃᖅᑲᓇᐃᔭᖅᑐᑦ TMAC-ᑯᓐᓂ ᐊᖏᓪᓕᕙᓪᓕᐊᑎᓪᓗᒍ.

ᐊᑦᑕᑯᐃᑦ, ᐅᖅᓯᐃᑦ ᐊᑐᖅᑕᐅᔪᑦ ᐊᒻᒪᓗ ᐃᓚᔅᓴᐃᑦ ᑐᖅᑰᓯᕙᖏᑦ ᑕᐃᓖᑦᑎᐊᖅ ᐋᖅᑭᒃᓯᒪᔪᑦ 11 ᐅᑭᐅᑦ ᖄᖏᖅᓯᒪᓕᖅᑐᑎᑐᑦ ᐊᒻᒪᓗ 11 ᑯᕚᔪᖃᖅᓯᒪᔪᓂᑦ ᐅᓂᒃᑳᕆᔭᐅᓯᒪᔪᑦ ᓄᓇᕗᒻᒧᑦ ᑯᕚᔪᖃᖅᑎᓪᓗᒍ ᐅᖃᓚᐅᑎᖓᓄᑦ, ᐃᒪᒧᑦ ᓚᐃᓴᓄᑦ ᖃᐅᔨᓴᖅᑎ ᐊᒻᒪᓗ KIA ᐊᖏᔪᑦ ᐱᓕᕆᐊᔅᓴᓄᑦ ᐊᓪᓚᕕᖓ. ᐊᒥᐊᒃᑯᖏᑦ ᑯᕚᔪᑦ 2017-ᖑᑎᓪᓗᒍ ᒥᑭᔪᑦ ᑯᕚᔪᑦ, ᓄᓇᒧᑦ, ᓱᒃᑲᔫᒃᑯᑦ ᓴᓗᒻᒪᖅᓴᖅᑕᐅᓪᓗᓂ ᑭᐅᔭᐅᓪᓚᔅᓇᖅᑐᖅ ᐊᒻᒪᓗ ᓴᓗᒻᒪᖅᓴᖅᑕᐅᓪᓗᓂ ᐱᒻᒪᕆᐅᓗᐊᙱᑦᑐᑦ ᑯᕚᓂᖓ ᐊᕙᑎᒧᑦ. ᐃᓗᓕᖃᙱᑦᑐᑦ ᐃᓗᓕᓯᕚᑦ

ᑎᒻᒥᓲᓂᙶᕐᑐᑦ ᐊᑐᖅᑕᐅᓚᐅᖅᑐᑦ 2017-ᖑᑎᓪᓗᒍ ᐊᑦᑕᒎᔅᓴᓄᑦ ᑐᐊᕆᔅ ᑕᒻᒫᕐᕕᓂᙶᕐᑐᓂᑦ ᐊᐃᕆᓕᐅᑎᓪᓗᒍ ᐊᒻᒪᓗ ᐸᐅ-ᐃᓚᔅᓵᓪᑦ plastic/rubber ᐊᐅᓪᓚᖅᑎᑕᐅᓪᓗᑎᒃ KBL ᐊᕙᑎᓕᕆᔩᒃᑯᓐᓄᑦ ᔭᓗᓇᐃᒥ ᐊᑦᑕᑰᖅᑕᐅᑦᑎᐊᕐᓂᐊᖅᑎᓪᓗᒋᑦ.

ᐃᒥᕐᒥᑦ ᐊᑐᕐᓂᖅ 2017-ᖑᑎᓪᓗᒍ ᐊᑐᖅᑕᐅᓚᐅᖅᑐᑦ ᐅᑯᓇᖓ ᒪᓕᓪᓗᒋᑦ Type A ᐃᒪᒨᑦ ᓚᐃᓴ 2AM-DOH1323, Type B ᐃᒪᒨᑦ ᓚᐃᓴ 2BB-BOS1727 for Boston, the Type B ᐃᒪᒨᑦ ᓚᐃᓴ 2BB-MAE1727 ᕿᒥᕐᕈᐊᒃᑲᓐᓂᕈᑕᐅᓪᓗᑎᒃ ᒫᑦᓇᕐᒥ ᐊᒻᒪᓗ Type B ᐃᒪᒨᑦ ᓚᐃᓴ 2BE-HOP1222 ᓄᓇᕆᔭᐅᔪᒥ ᕿᒥᕐᕈᐊᕐᓂᕐᒧᑦ. Type B ᐃᒪᒨᑦ ᓚᐃᓴ No. 2BB-BOS1727 ᓄᑖᙳᖅᑕᐅᓯᒪᔪᑦ NWB-ᑯᓐᓂᑦ ᔪᓚᐃ 2017-ᖑᑎᓪᓗᒍ. ᓇᓗᓇᐃᖅᑕᐅᓯᒪᔪᖅ ᐃᒪᒨᑦ ᓚᐃᓴ ᐃᓚᖃᖅᑐᑦ ᓯᕗᓂᔅᓴᒧᑦ ᑲᑎᖅᓱᖅᑕᐅᓯᒪᔪᓄᑦ ᖃᐅᔨᓴᕈᑎᔅᓴᓄᑦ ᐱᓕᕆᐊᔅᓴᐃᑦ ᐃᓚᖃᖅᑐᑦ ᑎᑎᕋᖅᑕᐅᓪᓗᑎᒃ ᐅᖁᒪᐃᓐᓂᖓᑎᒍᑦ ᐃᒪᐅᑉ ᓲᓇᑐᐃᓐᓇᓄᑦ, ᖃᐅᔨᓴᖅᑕᐅᓪᓗᑎᒃ ᓴᓗᒪᙱᑦᑐᓂᑦ ᐃᓚᔅᓯᓂᑦ ᐊᑦᑕᑯᓂᑦ (ᐆᑦᑑᑎᒋᓗᒍ ᓴᓗᒻᒪᖅᓴᐅᑎᓕᖅᓯᒪᔪᑦ ᐊᓇᖅᑕᕐᕖᑦ) ᓄᓇᒧᐊᖅᑕᐅᑐᐃᓐᓇᖅᑐᓂᑦ, ᐊᒻᒪᓗ ᖃᐅᔨᓴᕐᓗᑎᒃ ᐃᒪᐅᑉ ᖃᓄᐃᓐᓂᖓᓐᓄᑦ ᓂᕈᐊᖅᑕᐅᓯᒪᔪᑦ ᐱᓕᕆᐊᔅᓴᓄᑦ ᓇᔪᕐᕕᖏᓐᓂ (ᐆᑦᑑᑎᒋᓗᒍ ᐃᒪᐅᑉ ᖄᖓᓂᑦ, ᑰᑦᑐᒥ ᓴᓇᕕᐅᑉ ᖃᓂᐊᓂ, ᓴᓗᒪᐃᑦᑐᑦ ᐃᒪᖅ ᓴᓇᕕᒻᒥᙶᕐᑐᓂᑦ ᐋᖅᑭᒃᓯᒪᔪᒥᑦ, ᐊᓇᑦᑕᕐᕕᒻᒥᑦ ᐊᒻᒪᓗ ᐅᖅᓱᐊᓗᔅᓴᖃᖅᑐᑦ ᐃᓚᔅᓯᓂᑦ). ᐃᒪᐃᑦ ᐊᑐᖅᑕᐅᔪᑦ 2017-ᖑᑎᓪᓗᒍ ᒪᓕᓪᓗᑎᒃ ᐊᖏᖅᑕᐅᓯᒪᔪᒃᑯᑦ ᑭᒻᓕᖃᖅᑎᑕᐅᓂᒃᑯᑦ. ᒪᕐᕉᓚᐅᖅᑐᑦ ᑯᕕᑕᐅᓯᒪᔪᑦ ᐊᓇᑦᑕᕐᕕᔅᓴᖃᙱᑦᑐᑦ 2017-ᖑᑎᓪᓗᒍ. ᓯᕗᓪᓕᖅᐹᖅ ᔪᓚᐃ 8, 2017-ᖑᑎᓪᓗᒍ, ᓇᓚᐅᑦᑖᖅᑕᐅᔪᒃᑯᑦ 256 m^3 ᐊᓇᖅᑕᐃᑦ ᕋᐳ ᐃᑭᕋᓴᖓᓂ 3x5ML ᐃᒻᒪᕕᐅᑉ ᓴᓇᕕᖓ (ST6B) ᑯᕕᓯᓯᒪᔪᑦ ᐃᑭᔪᓐᓇᖅᑐᓂᑦ ᐃᓚᔅᓯᓂᑦ. ᑯᕕᔭᐅᔪᑦ ᓄᓇᒧᑦ ᓄᖅᑲᖅᑎᑕᐅᓯᒪᔪᑦ ᑕᐃᒫᑦᑎᐊᖅ ᐊᒻᒪᓗ ᐃᒪᒨᑦ ᓴᓗᒻᒪᖅᓴᖅᑕᐅᓪᓗᓂ TIA-ᑯᑦ. ᐊᐃᑉᐸᖓ ᔪᓚᐃ 10, 2018-ᖑᑎᓪᓗᒍ ᐊᐅᓚᑦᑎᔩ ᑯᕕᓯᑎᓪᓗᒍ ᐞᒃᐞᒃ ᐃᓚᔅᓯᓃ ᖃᐅᔨᒪᔭᐅᙱᑦᑐᓃ ᐃᒪᐅᑉ ᖃᓄᐃᓐᓂᖓᑕ ᓄᓇᒧᑦ ᓴᓗᒻᒪᕆᑦᑐᒥ ᑕᓯᒥ ᓴᓇᕚᖓᓂᑦ ᓄᓇᒧᑦ ᐸᔾᑕᓐ ᑕᒻᒫᕐᕕᖓᓂ. ᐃᓚᔅᓴᖅ ᓴᓗᒻᒪᖅᓴᖅᑕᐅᓯᒪᔪᖅ ᐅᖅᓱᖅ-ᐃᒥᖅ ᐊᕕᑎᑦᑎᓲᖑᔪᒧᑦ, ᑭᓯᐊᓂ ᑲᑎᖅᓯᐃᓯᒪᙱᑦᑐᑦ ᖃᐅᔨᓴᕈᑎᔅᓂᒃ ᐱᕆᐊᖅᑳᖅᑎᓐᓇᑎᒃ ᑯᕕᔭᐅᖅᑳᖅᑎᓐᓇᕆᑦ ᓇᓗᓇᐃᖅᓯᕆᐊᑦᑎᐊᕐᓗᒋᑦ ᐃᓚᔅᖅ ᐊᑲᐅᓈᖅᑐᒃᑯᑦ ᑯᕕᔭᐅᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᓃ. ᑯᕕᔭᐅᓯᒪᔪᑦ ᖃᓄᐃᓕᐅᕐᓂᖏᑦ ᐅᓂᒃᑳᓚᔅᓲᖅᓯᒪᔪᑦ NT-NU ᑯᕕᔪᖃᖅᑎᓪᓗᒍ ᐅᖆᓚᐅᑎᖓᓄᑦ ᐊᒻᒪᓗ ᐋᖅᑭᒃᑕᐅᓪᓗᓂ ᓇᓗᓇᐃᖅᓯᓪᓗᑎᒃ ᑕᐃᒪᓐᓇᐃᓕᐅᕝᑲᓐᓂᖅᑕᐃᓕᔪᓐᓇᕐᓂᕐᒧᑦ.

ᑲᔪᓯᔫᑯᑦ ᐱᕚᓪᓕᕈᑕᐅᓂᕐᒧᑦ ᐅᑎᖅᑎᑦᑎᓂᖅ ᐃᑰᑕᕐᓂᕐᒧᑦ 2017-ᖑᑎᓪᓗᒍ ᑐᕌᖅᓯᒪᔪᑦ ᐅᑎᖅᑎᑦᑎᓗᑎᒃ ᓇᔪᕐᕕᐅᔪᓂᑦ ᓴᓇᔭᐅᓯᒪᔪᑦ 2008-ᖑᑎᓪᓗᒍ ᑲᑎᓪᓗᒋᑦ 32 ᖃᒃᓱᖓᐅᑎᓂᑦ ᐃᑰᑕᒧᑦ ᐊᒻᒪᓗ ᓇᓗᓇᐃᖅᓯᓗᑎᒃ ᓈᒻᒪᓈᑦᑎᐊᖅᑐᓂᑦ ᑮᓇᐅᔭᓕᕆᓂᕐᒧᑦ ᐊᑦᑕᕐᓇᖅᑕᐃᓕᒪᓂᕐᒧᑦ ᑕᐃᒪᐅᓪᓗᑎᒃ. ᓄᓇᕆᔭᐅᔪᒥ ᖃᐅᔾᑲᐃᓂᖅ 2017-ᖑᑎᓪᓗᒍ ᑐᕌᖅᓯᒪᔪᑦ ᑐᓴᖅᑎᑦᑎᓗᒋᑦ ᐊᑲᐅᓈᖅᑐᒃᑯᑦ ᐊᒻᒪᓗ ᑲᔪᓯᑦᑎᐊᖅᑐᒃᑯᑦ ᓄᓇᖃᖅᑐᓂᑦ ᐱᔾᔪᑎᒋᓪᓗᒍ TMAC-ᑯᑦ ᐊᐅᓚᓂᖓᑕ, ᐃᖅᑲᓇᐃᔮᔅᓴᐃᑦ ᐊᒻᒪᓗ ᐊᖏᕈᑏᑦ ᐃᖅᑲᓇᐃᔮᔅᓴᓄᑦ ᐃᓱᐊᓈᕈᑎᔅᓴᓂᑦ ᐊᒻᒪᓗ ᐅᖃᖃᑎᒌᓐᓂᕐᒧᑦ TMAC-ᑯᑦ ᐹᔅᑕᓐ-ᒫᑦᓇᑦ ᑐᔅᓯᕋᐅᑎᔅᓴᖏᓐᓂᑦ.

ᐅᖃᐅᓯᐅᔫᑯᑦ ᖁᓚᓂ, TMAC-ᑯᑦ ᐱᔪᒪᑦᑎᐊᖅᑐᑦ ᑲᔪᓯᓂᒃᑯᑦ ᐱᐊᓂᑦᑎᐊᕐᓗᑎᒃ ᒪᓕᑦᑎᐊᕐᓂᒃᑯᑦ ᐊᔾᔩᙱᑦᑐᒃᑯᑦ ᒪᓕᒐᔅᓂᑦ ᐊᑐᖅᑕᐅᔭᕆᐊᖃᖅᑐᓂᑦ ᐊᒻᒪᓗ ᑲᔪᓯᓗᑎᒃ ᓄᓇᕆᔭᐅᔪᒥ ᐃᑲᔪᖅᑎᕆᓂᕐᒧᑦ. ᐊᕙᑎᒧᑦ ᖃᐅᔨᓴᕐᓂᖅ ᒪᓕᓪᓗᒍ ᐃᒪᒨᑦ ᓚᐃᓴᖓᑕ, ᐱᓕᕆᐊᔅᓴᖓᑕ ᐊᖏᕈᑎᖏᓐᓄᑦ, ᐱᓕᕆᐊᔅᓴᒧᑦ ᐊᔪᙱᔾᔪᑎᓴᐃᑦ, ᐊᖏᖅᑕᐅᓯᒪᔪᑦ, ᐊᐅᓚᓂᕐᒧᑦ ᐸᕐᓇᐅᑎᔅᓴᐃᑦ ᐊᒻᒪᓗ ᐊᕙᑎᒧᑦ ᐱᕚᓪᓕᐊᔪᓄᑦ ᖃᐅᔨᓴᕐᓂᖅ ᐸᕐᓇᐅᑎᔅᓴᓄᑦ ᑲᔪᓯᓂᐊᖅᑐᑦ 2018-ᒥ.

Aulapkaiyiryuat Naunaitkutait – Inuinnaqtun

Taamna Kapihiliktuumi Greenstone Belt Nunauyuq aktigiyuq 20 km-nik x 80 km-niklu nanminiriyauyuq hivuraqhianit hinaani Melville Sound-mi Nunavunmi, Kanatami. Taamna Nuna TMAC Resources Inc.-kut ("TMAC") nanminirilluaqtaat ihumagilluaqhugu nalvaaqhiuqvighaq, hanavighaq uyaraghiuqvighaqlu. Hapkua naunaitkutat talvunga Nunavunmi Imaliqiyit Katimayiit (NWB) parnaiyaqtauhimayuq ilittuqhitighaq Havakvingnit hulihimayainik munaqtainiklu qauyihaqtainik ataagut TMAC Resources Inc.-kut (TMAC) Type A-mik Imaqmut Laisiutaat 2AM-DOH1323, Type B Imaqmut Laisiutainik(t) 2BB-MAE1727, 2BB-BOS1727 taamnalu nalvaaqhiuqtunut Type B Imaqmut Laisiutaat 2BE-HOP1222.

2017-mi, havaariyauhimayut talvani Nunami nuutitirivalliavaktut hanayunit talvunga maniliurniqmut aulapkaiplutik Doris-mi. Taamna qipliqhiivik aullaqtitaulaqihimayuq April 2017-mi havakluaqhimaplutiklu mayurautimik taimaa uyaqqat anialattigivagaat kuluniklu hauyihivigiplugu. 2017-mi qipliqhiivik hannaviat hauyihivaktut 208,951 tons-nik kulunik kuvihivaghutiklu 49,177 ounces-nik kulunik imaalu ihuaqtukkut halummaqhihimayut 37,285 tons-nik cyanide-mik.

Hanahimaplutiklu havaktit ingilrutinik hanalrutinik, tutquumavigiplugu, aniviittumiklu pihukvingmik akunngani hiniktarvilluangat taamnalu qipliqhiiviat hannavik Aughiiviqaqhutiklu Hannavingmik. Nunahiuqpaghutiklu ilaaqtuqhugu Doris-mi milviat hivuraniqhiat taimaa hikuiyaqviqariamik tingmitjanik uqhiqtuqviulunilu. Hanahimaplutiklu tuklianik Kuvviqmik Hiqupluqhimayunut, Ikkighat Avughait Tutquumaviat kingighilaaqhimayuq taamnalu Hivuraani Haputiliuqhimayumut apqutik. Nunam iluani kuvviqnik hanahimmaaqpaktut 2017-mi tutqighaiplugu ataa haputim (BTD) kuujjaqpalliaviat ihuaqutaitalu tunngaviit.

Nalvaaqhiuqtut hanayut talvani Nunami kingupitaqhutik (RC) ikuutaqpaktut, ilitturinnattiaqtunik nunauyaliqivaktut, aviktuqhimayuni nalvaaqhiuqtut, qauyihaiplutiklu nunanik. TMAC Resources Inc.-kut kaantulaaktittihimayut Geotech Ikuutaqtiinik inirumaplugu kingupitaqtut (RC) ikuutaqtut tununganianit uataaniqhiani Doris-mit talvani Nunami. Ikuutarnik ahiniklu ingilrutinik atqaqhiyuittut 31m-nik ungahiaqtumut imaqnit hikuiqhimatillugu tamangniklu hiqupluqtauhimayut tutquumaplugit ingulaqtumut halummaqhiyimik tutquqtauvaghutiklu naammagiyauyunik tutquumavingmik. TMAC-kut Boston uyaraghiuqvianik munaqtinit munariliqtait ikayuriamik uyaraghiuqtut June-mit August-mut, 2017-mi.

Ukiaghami 2017-mi, TMAC-kut naammaktumik umiakkut agyaqtaqhimayut niuviqhimaplutik agyaqhutiklu 12,000,000 L-nik uqhughamik qagaqtautiniklu ikkighatiniklu avughat uyaraghiuqtit qipliqhaiyullu hanalrutighait. Umiakkullu agyaqtaqtuni aghaluutitaqhimayut angiyunik ingilrutighait uyaraghiuqtut hanayullu niuviqhimaplutiklu 100-nik inungnik inighalingmik hiniktarvighamik nayugaghaita TMAC-kut amigaiqpalliayut havaktiit.

Hunakunik kuvviit, uqhughanik atuqtut ikkighatiniklu tutquumaviit aulayuittut hivulliqnit ukiunit 11-nguplutiklu kuviyuqaqhimayut ilittuqhitiyauhimayunik talvunga Nunavunmi Kuviyuqaqtunik Hivayaqvik, Imaqnik Laisinut Ihivriuqhiyi talvungalu KIA-kut havaaghalluanut havakviat. Taapkualu ahiit kuvihimayut 2017-mi mikiyut, nunainnaqmiittutiklu, kiuhinariqtuqaqhunilu halummaqhinariqhutiklu taimaa ihuilutauvallaanngittut avatinut. Uhiittut tingmitjat atuqtauhimayut 2017-mi iqqakunik agyaqhutik talvanngat Doris-mi havakvianit April-mi halumaittuniklu atuqhimayunik qipliqtunik/ulapaniklu agyaqhimayut talvunga KBL Avatiliqiyit Yellowknife-mi iqqakuqtauyughat.

Imaqmik atuqtunik 2017-mi qauyihaihimayut malighugu taamna Type A-mut Imaqmut Laisiutaat 2AM-DOH1323, taamnalu Type B Imaqmut Laisiutaat 2BB-BOS1727 Boston havakvianut, taamnalu Type B

Imaqmut Laisiutaat 2BB-MAE1727 Uyaraghiuqtunut Madrid-mi, taamnalu Type B Imaqmut Laisiutaat 2BE-HOP1222 aviktuqhimayumi nalvaaqhiuqtunut. Taamna Type B Imaqmut Laisiutaat 2BB-BOS1727 nutaangnuqtiqtauhimayuq NWB-kunnit July, 2017-mi. Ilittuqhitiuyut imaqmut laisiutainit titiraqhimayulik qauyihaiyunut taapkuninngalu titiraqhutik naunaitkutanik qanuq imaqtuqhimayaangit hughariyainut, qauyihaqhugit kuvviit (taapkuatut annakkuit) anialattiyauyut avatinut, munariplugillu immat qanuriningaa kitunikiat Havakvingnit (taapkuatut qaanganut kuviyauyut qurluraqtut hannaviit ataanut, nipalum immaukkaqviit hittiriipkuhiqhimayunik, annakkuit uqhuinnaqlu kuvviit, qanuqlu). Imaqmik atuqtut 2017-mi qauyihaihimayut naammagiyauyunit kikliliuqhimayunit. Malruuyut anialattivaktunik hunikunik kuvviqnik maliguattianngittugit 2017-mi. Hivullia kuvihimayuq July 8-mi, 2017-mi, talvani haniani 256 m^{3-}nik kuvikkunik anialattihimayut taimaa 3x5ML-nik Uqhuqyuanik Qattaryuinit (ST6B) avatquttugu angiqtauhimayut toluene-mut talvani Roberts Bay-mi. Anialattiyut nunainnaqmut nutqaqtitauhimayuq qilaminnuaq ahikkuuqtitaupluni talvunga TIA-mut. Aippaa kuvihimayuq July 10-mi, 2017-mi taamna havakti anialattigami 30 m^3-nik hunikunik kuvviqnik qanurinmangaat imaq naluplugu talvunga nunainnaqmut talvanngat Kuvviqluanganit nunainnaqmut talvani Boston Havakvianit. Kuviyuq halummaqtiqtauhimayuq talvuuna avgutinik uqhuqyuanik imakkut kuvitillugu, kihimi qauyihaiyuqanngittuq imaqmik kuviyautinnagu naunairiaghainik taamna kuviyauyuq naammagiaghaat kuviinnariami. Kuviyut ilittuqhitiyauhimayut talvunga NT-NU Kuviyunik Hivayaqviat kiuvigiyauplutiklu havaaghaniklu aullaqtittihimayut pittailinahuariamik.

AUlahimmaaqhutik utiqtittinahuaqpaktut nunanik ilitquhianut ikuutaqhimayunik 2017-mi ikuutaqtauhimayunik 2008-mi naallugit 32-nguyut qipliqtunik uyaraghiuqtut imaalu maniilliuqtailinahuarniqmik aulatillugit. Nunallaaqnik katimaqtigihimayut 2017-mi ilittuqhitiplutik tmac-kut havaanginnik, havaaghanik kaanutaaktitaghaniklu ilittuqhitiyumaplutiklu tmac-kut boston-mi/madrid-milu tughirautainik.

Ilittuqhitihimayutut qulaani, TMAC-kut aghuuqhutik havagahuaqpaktut maliguattiarahuaqhugit aallatqiik maliktaghat ilagiittiarahuaqhugit nunallaaqmiut. Avatiliqiniqmut havauhiit aturahuaqpangniarait malighugit atuqtait Imaqnut Laisiutait, Havakvighaanut Angirutit, Havakvingnut Titiqqat, piinnarialiutit, ataniqtuqtuiniqmut parnaiyaiyut avatinullu ihuilutinit munaqhiyut parnaiyaivangniat huli 2018-mi.

HOPE BAY BELT PROJECT
2017 Nunavut Water Board Annual Report

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Acronyms and Abbreviations

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

AEMP	Aquatic Effects Monitoring Program
DNSEMC	Doris North Project Specific Committee
KitSEMC	Kitikmeot Socio-Economic Monitoring Committee
m	Metre
MSDS	Material Safety Data Sheets
NEF	Nunavut Economic Forum
NWB	Nunavut Water Board
TDGA	*Transportation of Dangerous Goods Act*
TIA	Tailings Impoundment Area
TMAC	TMAC Resources Inc.
WRIA	Waste rock influenced area
WWTF	Wastewater treatment facility

1. Introduction

This report to the Nunavut Water Board (NWB) has been prepared to summarize the Project activities and monitoring conducted under TMAC Resources Inc. (TMAC) Type A Water Licence 2AM-DOH1323, Type B Water Licence(s) 2BB-MAE1727, 2BB-BOS1727 and the exploration Type B Water Licence 2BE-HOP1222. Concordance tables referencing where in this report the requirements of the reporting outlined in each of the referenced water licences has been met are presented in Appendix A.

The referenced water licences include provisions for sampling programs that involve recording data related to the volume of water extracted for any purpose, testing of effluents (e.g., treated sewage effluents) discharged to the environment, and monitoring water quality within specific Project areas (e.g., surface discharge downstream of construction areas, storm water from an engineered containment structure, sewage and oily water effluent, etc.). These data are summarized and referenced on the completed NWB Annual Report Forms, included as Appendix B and all monitoring data is provided in Appendix D of this report.

2. Regulatory Framework and Legal Matters

The key regulatory and legal document that relates to this report is the Framework Agreement, however this report is presented in context of other applicable regulatory authorizations and schedules. TMAC holds, or will soon hold, the permits and authorizations required to carry out the future work scope. A listing of the key regulatory instruments that allowed for work to be completed in 2017 is provided in Table 2-1.

Table 2-1. Key TMAC Permits/Licences and Approvals

Name	Approval No.	Scope / Purpose	Term / Duration	Expiration Date
NIRB Project Certificate	003	Authorization for Doris to proceed provided certain conditions and requirements are incorporated in the various regulatory permits and authorizations issued by the regulatory agencies with permitting authority for the Hope Bay Project.	Life of Doris Project	None
NWB Type "A" Water Licence Amendment No.1	2AM-DOH1323	Water Licence for Doris with a 10-year term that authorizes the construction, operation and reclamation of the Doris Project. Licence was renewed (with certain amendments) in November 2016.	10 years	August 2023
Framework Agreement		Framework Agreement provides comprehensive land tenure governing the issuance of surface exploration licences, advanced exploration leases, commercial leases, and compensation associated with tenure. Framework Agreement includes a belt-wide Land Use Licence, an Inuit Impact and Benefits Agreement (IIBA) and a Water and Wildlife Agreement. Framework Agreement was signed in March 2015 for belt-wide land tenure.	20 years	March 2035
Water and Wildlife Agreement		Included as a Schedule to the Framework Agreement, this Agreement details compensation to be provided to the KIA and Inuit beneficiaries for negative effects that may occur to wildlife harvesting and water as a result of mining related activities across the belt.	20 years	March 2035
Amended and Restated Inuit Owned Lands Commercial Lease	KTCL 313D001	Commercial Lease for use of designated lands associated with the Hope Bay Volcanic Belt (HBVB) area. Currently, lands have been designated that encompass Doris. Expansion to include other areas of the HBVB is administrative in nature. Original Commercial Lease was amended and restated in March 2015 as a means to obtain surety of belt-wide land tenure.	20 years	March 2035

(continued)

Table 2-1. Key TMAC Permits/Licences and Approvals (completed)

Name	Approval No.	Scope / Purpose	Term / Duration	Expiration Date
Inuit Impact and Benefits Agreement		Included as a Schedule to the Framework Agreement, this Agreement details the benefits to be provided to the KIA and Inuit beneficiaries from the Hope Bay Project, including compensation, employment and contracting opportunities. The IIBA originally signed in association with Doris was revised in March 2015 and expanded in scope to encompass belt-wide activities.	20 years	March 2035
KIA Advanced Exploration Agreements	KTAEL15C001 KTAEL15C002	Two agreements as per the terms of the Framework Agreement enabling quarry operations at designated locations in the Hope Bay Belt and advanced exploration at Boston.	5 year renewable annually thereafter for up to 20 years	March 2020
KIA Land Use Licences		Enables exploration activities across the Hope Bay belt as per the terms of the Framework Agreement.	1 year automatic renewable for 20 years	March 2016
DFO authorization	NU-02-0117.2	Construction of the jetty in Roberts Bay.		December 2009
DFO authorization	NU-1000-0028	Changes to the Doris jetty.		July 2012
DFO authorizations	NU-02-01117.3	Construction of the Doris Tailings Impoundment Area (TIA) north dam.	Life of Mine	None
Navigable Waters Permit	8200-02-6565	Installation of the jetty in Roberts Bay.	N/A	N/A
Jetty Lease	77A3-1-2	Foreshore lease from the Crown for construction and operation of the Roberts Bay Jetty.	10 years	June 2017
Amendment to Schedule 2 of the Metal Mining Effluent Regulations (MMER)	Registration SOR/2008-216	Designation of Tail Lake as a tailings impoundment.	Life of Mine	None
Type “B” Water Licence for the HBVB including a camp at Windy Lake	2BE-HOP1222	Water Licence that allows for the use of water and disposal of waste associated with regional exploration program for the HBVB including drilling and camp operations.	10 years	June 2022
Type “B” Water Licence for bulk sample exploration at Boston	2BB-BOS1727	Water licence that allows for the use of water and the disposal of waste for the Boston Advanced Exploration Project. Licence was renewed in July 2017, was formerly 2BB-BOS1217.	10 years	July 2027
Type “B” Water Licence for Madrid Advanced Exploration	2BB-MAE1727	Water licence that allows for the use of water and the disposal of waste for an undertaking classified as Mining and Milling as per Schedule II of the Regulations for the Madrid Advanced Exploration Project.	10 years	May 2027

3. Summary of Project Activities for 2017

3.1 CONSTRUCTION AND OPERATIONS

2017 was a transition year for the Belt as it transitioned from a construction phase into commercial operations at Doris. The mill was fully commissioned in April 2017 and efforts were concentrated on a progressive ramp up in order to increase ore throughput and optimize gold recovery. In 2017 the mill processed 208,951 tons of ore and poured 49,177 ounces of gold and successfully treated 37,285 tons of cyanide solutions. Projects such as the installation of a dewatering cone prior to the leach circuit and redesigning process equipment within the mill have contributed to successes in ensuring a stable production.

Civil construction activities included a light duty mechanical shop, additional warehousing, an arctic corridor to connect the main camp and the mill building. Earthworks continued in order to expand the Doris Airstrip south apron to include a lined aircraft de-icing and refueling pad. This also included the completion of another Tailings Catchment Basin, the Reagents Storage berm and the South Dam access road. In an effort to provide onsite monitoring of the milling processes and discharges to the Tailing Impoundment Area (TIA), a fully functional Assay Lab was installed in 2017.

Underground waste development continued in 2017 with further advancement of the below the dyke (BTD) decline and necessary support infrastructure. TMAC continued to drive ore development above the dyke for long hole drilling and blasting in Doris North, with the first ore sill for future long hole stopping blocks in BTD commencing in late Q2 2017.

TMAC also initiated waste development of the Doris Connector (DCO) for future mining horizons in early Q3. Long hole blasting continued throughout 2017, with all ore production trucked to surface and added to the stockpile. TMAC continued underground exploration diamond drilling below the dyke at Doris, focused on the BTD East limb in 2017.

In the Fall of 2017, TMAC concluded another successful sealift operation including the purchase and delivery of 12,000,000 L of fuel as well as explosives and reagents to support mining and milling activities. The sealift also included additional heavy equipment to support mining and construction operations as well as the acquisition of a 100 person accommodations facility to house TMAC's expanding workforce.

Site layouts and aerial photos for the Belt are provided in Appendix C of this report and provide details of the existing camps, infrastructure and equipment at site.

3.2 EXPLORATION

The 2017 Exploration and Geoscience program for the Belt consisted of reverse circulation (RC) drilling, detailed geologic mapping, regional prospecting, and till sampling. RC drilling was focused on the Doris region within the Belt. The detailed geologic mapping, prospecting, and till sampling programs focused on exploration outside of the main deposit areas, in an effort to understand the potential for additional mineralization.

RC drilling occurred during the winter month and detailed geologic mapping, prospecting, and till sampling programs occurred between June and September while the tundra and outcrops were snow free, however the detailed geologic mapping, prospecting, and till sampling programs did not involve the

usage of heavy equipment which minimized impact on the tundra or outcrops. The sub-sections below provide summaries of the ground disturbances associated with the exploration and geoscience activities throughout 2017.

It is also noted in addition to the exploration and geoscience programs described, TMAC brought the Boston exploration camp out of care and maintenance to support the exploration programs between June and August, 2017. While the camp was occupied additional efforts were dedicated to the reclamation of legacy drill sites and to bring parts of the site back into a state of repair.

3.2.1 Drilling

During the 2017 Exploration and Geoscience program, TMAC Resources Inc. contracted Geotech Drilling Services Ltd. to complete a reverse circulation drilling program northwest of the Doris Deposit in the Hope Bay Belt. Drill rigs where positioned on land, resulting in the completion of 24 surface drillholes for a combined total of 464.2m. No drill setup or associated items were placed within 31m of any waterbody during the open water season and no spills were reported during the 2017 program. Water quality monitoring was performed on runoff from drill sites and water used for drilling to ensure the respective Water License criteria were met. Drill cuttings and mud were contained within a recirculation system and were transported and stored in an approved containment area. Additional details related to drilling programs in 2017 can be found in the 2017 KIA Annual Report.

4. Summary of Project Plans for 2018

4.1 CONSTUCTION AND OPERATIONAL WORK PLANS FOR FUTHURE YEAR (2018)

The following activities are planned for the Doris site and associated permitted infrastructure for 2018:

- Installation of second concentrator line within the mill process to facilitate ramp up;
- Construction of the effluent mixing box at the mill;
- Commissioning of existing diesel power generators within the power plant building;
- Installation of the ocean discharge line between the mill and into Robert's Bay;
- Discharge of MMER-complaint effluent to Roberts Bay;
- Active quarrying and crushing at Quarry 2 and 3;
- Construction of the permitted South Dam;
- Mining, exploration and underground development at Doris;
- Ore stockpiling and processing;
- Waste rock stockpiling and backfill underground;
- Expansion of accommodations to house additional personnel;
- Expansion of site laydown areas (Pad U and Roberts Bay Laydown);
- Construction of Doris Connector vent raise access roads;
- Geotechnical drilling for West Dam construction and Madrid North infrastructure;
- Windy Camp and reclamation activities;
- Continue with legacy drill site reclamation activities; and
- Upgrades to aerodrome to facilitate jet accessibility.

TMAC will also continue exploration on the Hope Bay Belt and will operate from the Doris site for exploration. It is anticipated that TMAC will also start construction of the Portal at Madrid North under the Advanced Exploration Water Licence.

4.2 EXPLORATON WORK PLANS FOR THE FUTURE YEAR (2018)

Exploration activities for 2018 in the Hope Bay Belt include underground diamond drilling at Doris, prospecting, glacial till sampling and regional exploration drilling. TMAC anticipates the start-up of a helicopter-supported, surface-based, diamond drilling program on the Naartok zone of the Madrid deposit. Similarly, this drilling will focus on the upgrading and expansion of existing resources. The June-September period will see manual till sampling as well as geological mapping and a helicopter-supported, surface diamond drilling on regional targets within the Belt.

5. Water Use and Waste Disposal

During 2017, water management at Hope Bay Project Site was in line with the authorized Doris Site, Type A Water Licence 2AM-DOH1323, the Type B Regional Exploration Licence 2BE-HO1222, Type B Water Licences for Madrid 2BB-MAE1727, and the Type B Water Licence for Boston 2BB-BOS1727.

An overview of the sampling programs for each of the sites (Doris, Windy, Madrid and Boston) including site photographs showing the locations of monitoring sites as well as annual water sampling programs for the Hope Bay Project are provided in Appendix D of this report.

5.1 DORIS

A summary of water sampling for Doris under the Type A Water Licence 2AM-DOH1323 is presented in Appendix D.1 of this report as outlined in Schedule J.

Water for domestic use at Doris Camp is obtained from Windy Lake. Water is drawn from the lake at the freshwater intake and trucked to Doris Camp. The Doris Lake pumphouse was not supplying domestic water to Doris Camp in 2017.

Sewage and greywater produced onsite is processed in the sewage treatment plant at Doris and is in line with Part G Item 4 of the existing Type A Water Licence 2AM-DOH1323. Sludge produced by the treatment plant is disposed of within the TIA as outlined in existing Domestic Waste Water Treatment Management Plan.

All containment berm water is sampled for water quality against the discharge criteria of the licence. Water that meets the standards for discharge is released in accordance with the licence following a notification to the Inspector; water that does not meet the licence criteria is treated onsite until it is remediated to acceptable levels for discharge to the tundra, and/or it is discharged to the TIA.

Runoff and contact seepage at site is managed in accordance with the approved Quarry Management and Monitoring Plan and Water Management Plan for the Doris Site.

During 2017, TMAC collected data from the following active or seasonally active monitoring stations: TL-1, TL-2, TL-5, TL-6, TL-7, TL-9, TL-11, ST-1, ST-2, ST-4, ST-5, ST-6a, ST-6b, ST-7, ST-7a, ST-8, ST-9, ST-10, and ST-12.

Monitoring at station TL-12 (Mine Water Discharge Point) did not occur, as mine water was not discharged in 2017.

Monitoring at station ST-3 (Landfill Sump) and station ST-13 (Pollution Control Pond #2) did not occur, as these facilities were not constructed as of 2017.

Monitoring at station ST-11 (Reagent and Cyanide Storage Facility Sumps) did not occur, as construction of this facility was not completed until the end of 2017 during the winter season.

Monitoring of the TIA was undertaken at monitoring station TL-1. Construction of the processing plant was completed in 2017, and monitoring of the tailings deposited into the TIA was conducted at monitoring stations TL-5 and TL-6. Monitoring of detoxified tailings backfilled underground was completed at

monitoring stations TL-7 and TL-11.As described in the Hope Bay Water Management Plan, the sedimentation pond (ST-1) was used as a collection pond for the water that accumulated in the pollution control pond (ST-2) and the two underflow sumps (ST2-S1 and ST2-S2). The water collected in ST-1 was then transferred to the TIA by pipeline. Dewatering of the TIA did not occur in 2017.

All monitoring was conducted in accordance with the Hope Bay Project Quality Assurance and Quality Control Plan (2017).

TMAC uses an external certified laboratory to carry out all analyses reported in the monthly and annual reports. The QA/QC data produced by ALS Canada Ltd. are used to determine the accuracy and precision of results in these reports.

Analytical results for all monitoring stations can be found in Appendix D.1.

5.1.1 Water Balance and Water Quality Model

During 2017, mill operations and tailings deposition into the TIA commenced which triggered monitoring at the associated SNP stations. Water quality, hydrology and climate monitoring data were input into the water quality model to compare against the predicted water quality and water elevation. Results of the Water and Load Balance Assessment have been summarized in the Doris Mine Annual Water and Load Balance Assessment found in Appendix E.

5.1.2 Tailings Impoundment Area

The North Dam which ensures containment of the TIA was completed in 2012. Deposition of flotation tailings into the TIA commenced in January 2017. The total tonnage of tailings solids deposited in 2017 was 0.2 Mt, this represents 8% of the licensed 2.5Mt TIA tailings capacity. The water level at the end of December 2017 was 29.9 masl. The full supply level of the TIA is 33.5 masl. This equates to approximately 3.9 Mm^3 of available water storage. Approximately 8,333 tonnes of detoxified tailings were placed underground as backfill.

5.2 WINDY – 2BE-HOP1222

The Type B Water Licence No. 2BE-HOP1222 issued to TMAC by the NWB details the sampling and analysis requirements for the SNP program. Windy Camp and the Patch Lake Laydown facility were not in use in 2017; therefore, sampling stations associated with camp operations and fuel storage facility are not being used or monitored. Tables in Appendix D.2 of this report summarize the results of sampling undertaken as part of the monitoring program detailed in Part J of 2BE-HOP1222.

Water is obtained from Windy Lake (ST-7a) for use at Doris Camp under 2AM-DOH1323 and as allowed under 2BE-HOP1222. Water is taken up through a screened intake and sunken heat-traced line by a permanent pump house, which is used as needed to fill a water truck that transports the water to Doris Camp for use.

The camp water treatment and wastewater treatment facility (WWTF) permitted under this licence was not operational in 2017, therefore no sampling was conducted at monitoring stations HOP-1 (freshwater intake), HOP-2 (WWTF discharge), or HOP-3 (point of entry of WWTF discharge to Windy Lake). Water was utilized from Windy Lake for domestic consumption at Doris Camp and the monitoring station ST-7a (HOP-1) was sampled for the monitoring criteria under the Doris North Water Licence 2AM-DOH1323. For the ST-7a results see the 2AM-DOH1323 Appendix D.1 The Landfarm at Windy Camp (HOP-4) has been dismantled, so no sampling was conducted at this monitoring station.

The bulk fuel storage tanks at Windy Camp were moved to Doris Camp in winter 2009 for use there, and the bulk fuel storage berm (HOP-5) was dismantled in 2012. The bulk fuel storage berm at Patch Lake laydown (HOP-6) was also dismantled in 2012. No sampling was conducted at either of these monitoring stations.

No sampling occurred at monitoring stations HOP-7A HOP-7B, or HOP-7D (located in Quarries A, B, and D, respectively) during 2017 because there was no ponded water to sample.

On-ice exploration drilling did not occur in the licence area in 2017, therefore no samples were taken through lake ice (required by Part F Item 7 and Part J Item 7) to establish water quality prior to, and upon completion of, an on-ice drilling program.

Water used for drilling is taken from the closest lake to each drill in accordance with Part C Item 1 of the 2BE-HOP1212 Licence. For drill locations accessible by road or winter ice road, water is hauled by truck from Windy Lake or compliant berm effluent from the Doris Project is recycled through the drills to lessen freshwater lake use. Water is supplied to a water tank at the drill, and recirculation to cool equipment occurs through this tank.

No additional details on water use or waste disposal were requested by the Board in 2017 related to the Project. No artesian flow occurrences were encountered in 2017.

5.3 MADRID – 2BB-MAE1727

The Type B Water Licence No. 2BB-MAE1727 issued to TMAC by the NWB details the sampling and analysis requirements for the SNP program. There was no activity at Madrid in 2017. Water quality sampling was completed at proposed locations for monitoring stations MAE-14 (Windy Lake), MAE-15 (Patch Lake) and MAE-16 (Wolverine Lake), located downgradient of future Pollution Control Pond discharge locations. A summary of water monitoring for the Madrid Site is provide in Appendix D.3.

No additional details on water use or waste disposal were requested by the Board in 2017 related to the Project. No artesian flow occurrences were encountered in 2017.

5.4 BOSTON - 2BB-BOS1727

The Type B Water Licence No.2BB-BOS1727 details the sampling and analysis requirements for the SNP program. The Boston Camp was operational in 2017 and a summary of water monitoring for the Boston Site is provide in Appendix D.4.

The camp water treatment and wastewater treatment facility (WWTF) permitted under this licence was operational in 2017. Effluent discharge from the sewage disposal facility (BOS-3) commenced upon receiving compliant effluent quality results. Prior to receiving compliant results, effluent from the sewage disposal facility was stored in a temporary holding pond. Once effluent quality in the treatment plant was confirmed, effluent stored in the holding pond was slowly introduced into the treatment unit. A total of 194 m^3 of treated effluent was discharged to an approved location on the tundra.

No additional details on water use or waste disposal were requested by the Board in 2017 related to the Project. No artesian flow occurrences were encountered in 2017.

6. Solid Waste Disposal

At present Waste Management for the Hope Bay Project is currently divided into the following management areas which address:

- Non-hazardous Waste Management;
- Landfarm Management; and
- Hazardous Waste Management

6.1 SOLID NON-HAZARDOUS WASTE MANAGEMENT

TMAC has an existing Interim Non-hazardous Waste Management Plan (2016) which covers information pertaining to management of non-hazardous waste generated at the Doris, Boston and the regional exploration leases in the Hope Bay Greenstone Belt. The Interim Non-hazardous Waste Management Plan has been developed to ensure that proper documentation, tracking and handling strategies are in place to monitor compliance and take corrective actions as necessary. In general, non-hazardous waste is generated by the camp(s), the kitchen and various on-site facilities and contracting groups. Management of non-hazardous waste includes recycling, treatment, and disposal of waste streams based on their specific characteristics. Incineration is used as a volume reduction treatment on-site for most non-hazardous domestic waste streams.

In 2017, waste produced at site was collected and consolidated at the Doris Waste Management area by site services department (includes waste produced during activities at Boston). TMAC is authorized to dispose of all non-hazardous solid waste in a landfill on site under the existing Type A Water Licence 2AM-DOH1323 however to date a landfill has not been built. Therefore in 2017, all non-hazardous solid waste that could not be incinerated on site was stored on site for later landfilling or back haul to an approved facility off site. Incinerator and burn pan ash was packaged in drums for shipment and disposal off-site.

6.1.1 Camp Incinerators

TMAC's Type A Water Licence 2AM-DOH1323, Type B Water Licence 2BE-HOP1222 and Type B Water Licence No. 2BB-BOS1727 issued by the NWB allows for the incineration of approved waste streams.

Two incinerators for the Doris Project are currently located at the Roberts Bay laydown waste management facility; these provide contingency for maintenance or repair. Both incinerator units are CY-2050-A-FA models with a capacity of burning 75 kg of waste per hour. There was no incinerator operated at the Windy Camp and no domestic waste produced at Windy Camp in 2017.

The Boston Camp was closed for operations in 2011 and remained in Care and Maintenance until 2017 when it was reopened to support exploration and progressive reclamation activities. One incinerator is located at Boston Camp and is a CY-20-20-FA-D model with a capacity of burning 50 kg of waste per hour. This incinerator was recommissioned in June 2017 and was used to support seasonal exploration activities. Waste and burn pan ash generated during seasonal exploration activities conducted at Boston Camp is transported to Doris Camp and managed as part of the Doris Camp waste stream.

In the case of both Boston and Doris incinerators, food waste, paper and STP sewage cake is incinerated as per existing and approved Incinerator Management Plan (2016) for the Hope Bay Project. This plan

outlines TMAC's approach to domestic waste stream segregation and incinerator management as it pertains to all the Hope Bay Project developments. The objective of the plan is to enable the operation of domestic waste incinerators to be undertaken in a safe, efficient and environmentally compliant manner. The Incinerator Management Plan strives to ensure that:

- Only appropriate burnable material enters the incinerator waste stream;
- Animal attractants are promptly incinerated;
- The incinerator is operated in a manner that reduces harmful emissions;
- Residual ash is handled and disposed of properly; and
- Compliance monitoring and reporting associated with incinerator operations are undertaken.

As recommended by the Nunavut Environmental Guideline for the Burning and Incinerations of Solid Waste, written records are kept of date and volume of burnt waste.

As per Schedule B, Item 12 of Type A Water Licence 2AM-DOH1323, TMAC is required to report the results of Incinerator Stack Testing when available compared to the Canada-wide Standards (CWS) for Dioxins and Furans and the CWS for Mercury.

A stack test on the incinerators was performed in 2017 and results showed emissions were below limits for the CWS for mercury but greater than the CWS for PCDD/PCDF. Incinerator Stack Testing in 2016 also found emissions greater than the CWS for PCDD/PCDF although results in 2017 show the trend may be improving year over year. It is the aim of TMAC to continue implementing the practices that reduce the probability of formation of pollutant compounds during waste incineration. The results of the refuse incinerator stack testing are presented below in Table 6-1. Concentrations and flowrates are expressed at standard conditions of 25°C and 101.3 kPa (dry)

Table 6-1. Refuse Incinerator Stack Testing Results Summary

Parameter	Mean Result	CWS
Particulate (mg/Rm^3 @ 11% O_2)	197	n/a
Particulate (kg/hr.)	0.2	n/a
Mercury ($\mu g/Rm^3$ @ 11% O_2)	0.32	20
Mercury (g/hr.)	0.36	n/a
PCDD/PCDF (ng/Rm^3 TEQ @ 11% O_2)	4.23	0.080
Flowrate (Rm^3/min)	16.8 (16.2 for D/F tests)	n/a

Notes:
n/a = no emission limit (not applicable).

6.1.2 Open Burning

The disposal method for untreated wood, cardboard and paper products generated on-site is open burning. This method reduces the volume of inert waste dispose of in the landfill. Currently there is not built landfill at the Doris Site.

All other waste is sorted and stored in sea cans at Waste Management facility and is either backhauled for disposal or stored until the Landfill is constructed.

6.2 LANDFARM MANAGEMENT

TMAC operates a landfarm facility at Doris and the Boston sites to treat hydrocarbon contaminated materials. The Doris Landfarm Facility is located on previously disturbed area approximately 0.6 km north of the existing Doris Camp Area, at approximately 432,573 Easting and 7,559,542 Northing (UTM NAD 83, Zone 13). The Facility is located in a restricted area of the site and is situated between the existing all-weather road and Quarry 2. The Boston landfarm facility or Land Treatment Area (LTA), is located at the Boston Camp Site, south west of the tank farm.

Hydrocarbon contaminated water, snow and soils (including waste rock and ore) can be treated using on-site facilities at Doris or can be relocated off site to an appropriate treatment facility. The existing LTA at Boston is currently at capacity and undergoing reclamation. In case of hydrocarbon contaminated water and snow, it is either stored on-site for shipment off-site to an approved facility or treated with the use of an oil separation (absorbent) treatment system (if required) on site and then verified through laboratory analysis to meet discharge criteria prior to discharge the environment. In case of hydrocarbon contaminated soils (including waste rock and ore), they are relocated to the Doris mine where they are treated in the Doris Landfarm or placed in the Doris underground mine for permanent storage.

Only material containing the following hydrocarbons is farmed at the Doris Landfarm facility:

- Diesel fuel;
- Jet fuels (Jet A, Jet A-1); and
- Gasoline.

All other materials are deemed inappropriate for landfarming and will ultimately be placed in the Doris Mine for permanent storage in accordance with the approved Hope Bay Project Groundwater Management Plan or placed for offsite disposal at a licensed remediation/disposal facility. A copy of the Hope Bay Project Groundwater Management Plan can be found on the NWB ftp site.

TMAC's Landfarm Management and Monitoring Plan (2017) describes the Doris and Boston facility design as it relates to storage and management of hydrocarbon contaminated materials, including soils and water generated at the site and associated facilities. This plan presents the management and monitoring obligations for each facility as modules A and B, respectively. TMAC's Landfarm Management and Monitoring Plan can be found on the NIRB Public Registry for reference.

In 2017, TMAC commenced reclamation of the LTA at Boston with the excavation and stockpiling of contaminated materials from the site for future treatment or shipment offsite to an approved facility. Reclamation of the LTA at Boston is planned to continue into 2018 and no additional contaminated material is expected to be deposited for treatment prior to full decommissioning and reclamation.

6.3 HAZARDOUS MATERIAL MANAGEMENT

TMAC has a Hazardous Waste Management Plan (2016) aimed at ensuring that hazardous waste collection, segregation, handling, storage, transport and disposal procedures are promptly and efficiently carried out, thus minimizing the risk to the site workforce and the environment, as well as reducing the financial cost to the Project. A copy of this plan can be found on the NWB public registry.

The Hazardous Waste Management Plan requires in general that all hazardous materials will be shipped offsite for disposal at an approved site. The Hazardous Waste Management Plan describes the purpose-designed hazardous waste management facility. Based on the principles of reduction, reuse and

recycling, the plan addresses hazardous waste streams in terms of their risks, storage and labelling, transportation, and disposal, including:

- waste glycol (antifreeze);
- waste solvents;
- waste batteries;
- fluorescent tubes;
- penetrable wastes (sharps);
- waste lubricating oils;
- waste aerosols;
- medical wastes and sewage treatment plant sludge;
- applicable incinerator and wood ash;
- contaminated rags, absorbents and soil;
- residue last contained ammonium nitrate packaging; and
- explosives products and explosives residue containers.

6.3.1 Waste Back-haul

Waste materials back-hauled off site are regulated by the *Transportation of Dangerous Goods Act* (TDGA). In 2017, empty cargo aircraft were utilized for waste backhaul from the Doris Camp in April. Approximately 36 drums of hydrocarbon-contaminated plastic/rubber were transported to KBL Environmental in Yellowknife to arrange for final remediation/disposal.

6.4 LANDFILL

TMAC is authorized to dispose of all non-hazardous solid waste in a landfill on site as per Part G Item 9. To date, a landfill has not been built. All waste that cannot be incinerated on site is backhauled to an approved facility off site or stored on site for later landfilling. Because a landfill has not been constructed, no landfill management report has been prepared. TMAC will continue to manage solid waste produced in Hope Bay according to three waste management plans:

- Interim Non-Hazardous Waste Management Plan;
- Hazardous Waste Management Plan; and
- Incinerator Management Plan.

These plans describe how various streams of waste are managed.

7. Aquatic Effects Monitoring Program

The 2017 aquatic monitoring program was the first year of under the revised Hope Bay Project: Doris Aquatic Effects Monitoring Plan (AEMP, TMAC 2016), which replaced the original AEMP Plan for the Doris Project (Rescan 2010) In the original mine plan, the discharge of mine contact water and saline groundwater from the Tailings Impoundment Area (TIA) was to be directed to Doris Creek, a fish-bearing stream that flows from Doris Lake and eventually into Roberts Bay. However, under the terms of the current Project Certificate No. 003 and Water Licence 2AM-DOH1323, the planned discharge of TIA water has been redirected from the freshwater environment (Doris Creek) to the marine environment (Roberts Bay). Given that there is no longer anticipated to be point-source effluent discharge to the freshwater environment, the revised Plan was designed to detect effects to the freshwater environment from non-point source inputs of dust and runoff from Project-related activities. The Plan focuses on pathways of potential effects in Doris Lake, since most mine infrastructure is adjacent to Doris Lake and this waterbody has the greatest potential to be affected by the Project. Mining activities also have the potential to draw down the water level in Doris Lake due to permitted water withdrawal for Project use and water loss through the recharge of mine-intercepted groundwater.

Two lake sites were monitored as part of the 2017 AEMP in accordance with the Plan: Doris Lake North and Reference Lake B. The monitoring of Reference Lake B was retained from the original AEMP to help determine whether potential trends observed in Doris Lake are naturally occurring or Project-related. Aquatic components evaluated in 2017 included the following: under-ice water level; under-ice dissolved oxygen concentration; water temperature; water and sediment quality; phytoplankton biomass; and benthic invertebrate community density, taxa richness, diversity, and Bray-Curtis Index. Statistical and/or graphical analyses were performed in order to determine whether there were any apparent effects of Project activities on the aquatic monitoring components at the exposure site (Doris Lake North) in 2017. The analyses included comparisons of baseline data (pre-2010) to data collected during mine construction (2010 to 2016) and operations (starting in 2017) phases and comparisons between the reference site (Reference Lake B) and the potentially affected site (Doris Lake North) over time.

Table 7-1 presents a summary of the overall findings of the evaluation of effects for the 2017 AEMP, as well as the corresponding section of the AEMP in which to find the discussion of the evaluation of effects for each monitoring component The 2017 AEMP Report is filled with the Nunavut Water Board on March 31, 2018. Benthic invertebrate density increased over time in Doris Lake North, but a similar increase was not apparent at the reference site; therefore, the low action level was triggered for benthic invertebrate density according to the Plan. An Aquatic Response Plan for Benthos has been submitted as an Appendix to the AEMP report.

Table 7-1. Summary of Evaluation of Effects for 2017 Aquatic Effects Monitoring Program

Evaluated Variable	Doris Lake North (exposure site)	Low Action Level Triggered?	Report Section
Under-ice Water Level	no effect	No	3.1
Under-ice Dissolved Oxygen	no effect	No	3.2

(continued)

Table 7-1. Summary of Evaluation of Effects for 2017 Aquatic Effects Monitoring Program (completed)

Evaluated Variable	Doris Lake North (exposure site)	Low Action Level Triggered?	Report Section
Temperature	no effect	No	3.2
Water Quality	possible effect (total suspended solids and total molybdenum)	No	3.3
Sediment Quality	no effect	No	3.4
Phytoplankton Biomass	no effect	No	3.5
Benthic Invertebrates	possible effect (total density)	Yes	3.6

8. Geochemical Studies

8.1 DORIS MINE

This section summarizes the operational geochemical monitoring results for Doris Mine, including waste rock from the Doris Mine, flotation and detoxified tailings from the Doris Mill and quarry rock used for infrastructure and road construction.

8.1.1 Waste Rock

In 2017, a total of 146,977 tonnes of mineralized waste rock from Doris Mine was placed on Pad T. The total volume of waste rock on the surface as of the end of 2017 was 542,884 tonnes, all of which has been designated by TMAC as mineralized. In 2017, approximately 3,060 t of waste rock from surface was placed underground in the stopes of Doris Mine as structural backfill.

The 40 waste rock samples were collected from the Doris underground mine in 2017 were geologically logged as mafic metavolcanics (1a) except for two samples that were diabase (11c). All samples were geochemically characterized for acid-base accounting parameters with selected samples also analyzed for trace elements. Geological inspections were conducted by TMAC site geologists when monitoring samples were collected. Where possible, both the working face and the muck pile were inspected to identify the rock type, quantity of sulphide and carbonate minerals. The data were recorded in geological inspection logs. In addition, SRK completed an inspection of the waste rock stockpile on the east side of Pad T in August 2017 by walking the perimeter of the upper bench of the pile and examining rock types and the presence of sulphide content.

In 2017, mine development intersected waste rock geologically classified as mafic metavolcanics (1), diabase (11c) and late mafic dykes (10b). Late mafic dykes (10b) is a relatively minor rock unit comprising <1% of overall waste rock.

Sulfur concentrations for the mafic metavolcanics samples (1a) were uniformly low, ranging from 0.02 to 0.19% and with median levels of 0.13%. TIC ranged from 2.1 to 300 kg $CaCO_3$ eq/tonne, with 30% of samples having TIC levels less than 30 kg $CaCO_3$ eq/tonne. TIC levels are lower than expected given typical concentrations observed in basalt from the Doris area (P25 to P75 values between 167 to 339 kg $CaCO_3$ eq/tonne, SRK 2015b). Based on SRK's inspection of the waste rock stockpile, these samples are likely metavolcanics found along the contact with the diabase intrusion that has been altered (or hornfelsed) as a result of heat from the intrusion.

The majority of mafic metavolcanic samples (n=24) were classified as non-PAG. Four samples (13%) were classified as uncertain and two samples (7%) as PAG. The two samples classified as PAG had low levels of TIC (<5 kg $CaCO_3$ eq/tonne) and low levels of total sulphur contents of 0.14% and 0.16%. The diabase sample had a low sulphur (0.09%) and low TIC (14 kg CaCO3 eq/tonne) content. The diabase sample was classified as non-PAG.

Trace element analyses on the solids indicated that concentrations of trace elements in volcanics (1a) and diabase (11c) materials were less than ten times the average crustal abundance for basalt.

8.1.2 Tailings

8.1.2.1 Process Plant Tailings (TL-5)

Samples of effluent from the Process Plant (TL-5) were collected from February to December 2017 with the only exception being for the month of June. These results are presented in Appendix D of this report. Figures depicting time serious of constituent concentrations and loads form the process plant tailing water discharge (TL-5) to the TIA are presented in Appendix F - 2017 Waste Rock, Quarry and Tailings Monitoring Report, Doris Mine, Hope Bay Project (See Attachment 4 of the Appendix D - 2017 Geochemical Monitoring of Flotation Tailings Slurry and Detoxified Tailings, Doris Mill).

8.1.2.2 Flotation Tailings (TL-6)

Flotation tailings deposition in the Doris TIA commenced on January 20, 2017. A total of 199,488 t (dry weight) of flotation tailings were deposited in the TIA in 2017. Monitoring details are provided in Appendix D.1.

Total sulphur levels were higher during the initial months of process plant operation (0.21 to 1%) owing to higher sulphide ore that was processed during that period and low sulphide recoveries in the concentrate line. Starting in June, sulphide removal was optimized resulting in flotation tailings with lower sulphur concentrations (<0.05 to 0.07%). TIC* content in the flotation tailings ranged from 41 to 110 kg $CaCO_3$/t, which SRK expects are underestimated due the analytical method used to quantify reactive carbonate (SRK 2018a).

Nine of the flotation tailings samples are classified as non-PAG and two as uncertain. The two samples classified as uncertain were from the early part of the year when sulphide recoveries were poorer than expected. Additionally, as discussed in SRK (2018a), it is likely that the method used to measure TIC results is a underestimation of the carbonate content. Therefore, previous conclusions regarding the ARD potential of the flotation tailings remain unchanged.

Trace element content was compared to ten times the average crustal abundance for basalt (Price 1997) as an indicator of enrichment. The 95th percentile concentrations are above screening criteria for arsenic and total sulphur, however these samples were from the early part of the year when sulphide recoveries were poorer than expected. Trace element content for flotation tailings produced in May and after contained levels below the screening criteria, which is consistent with trace element content of Doris metallurgical flotation tailings samples (SRK 2015).

8.1.2.3 Detoxified Tailings (TL-7)

In 2017, a total of 8,333 t of detoxified tailings were placed as backfill in Doris Mine underground stopes. Details are provided in Appendix D.1 of this report.

Sulphur and TIC* content in the detoxified tailings ranged from 2.4 to 19% and 48 to 82 kg $CaCO_3$/t, respectively. Rinse pH ranged from 7.9 to 8.4. Ten of the detoxified tailings samples were classified as PAG and one as uncertain. Compared to ten times the average crustal abundance for basalt, 95th percentile concentrations are enriched in antimony, arsenic, bismuth, cadmium, copper, lead, selenium, silver, zinc and total sulphur. These results were generally consistent with the geochemical characterization of the metallurgical tailings (SRK, 2015).

8.1.3 Quarry Rock

8.1.3.1 Quarry Monitoring

There were no active quarries in 2017 therefore monitoring (geological mapping of quarry faces or geochemical characterization) was not required for run-of-quarry rock.

8.1.3.2 Construction Monitoring

SRK inspected Doris North infrastructure areas constructed between summer 2016 and summer 2017 including the tailings overflow catchment basins, the reagent pad, the explosive facility, the south apron at the airstrip and both of the edges of the TIA road. All construction rock was sourced from Quarry 2. A total of 10 samples, including a field duplicate, were collected from the infrastructure and pads. At each sampling site -1cm and -2 mm sieved splits were collected separately. Field contact rinse tests were conducted on the -2mm splits. All -1 cm samples were analyzed for ABA and trace element content. Four samples were also analyzed for shake flask extractions to assess the soluble component of the samples.

The majority of samples were described as grey-green mafic metavolcanics with trace to no visible sulphides and carbonate alteration/veins with some exceptions noted below.

Rock from all inspected areas were mafic metavolcanics containing K-feldspar associated with quartz-carbonate veins that were typically a few centimeters wide and between 5 and 15 cm long. Previous airstrip construction material also contained K-feldspar veining. Moreover, the cyanide reagent pad contained localized areas of metavolcanics with epidote veins (typically a few centimeters wide and around 10 cm long) and rare quartz veining (one fragment up to 10 cm thick wide). The extension of the TIA road contained occurrences of mafic metavolcanics containing disseminated pyrite and pyrite stringers (in <5% of the surveyed rock) in localized areas on the eastern edge of the road. Overall, visual sulphide estimates were negligible to low (<1%) in the rock along the TIA road.

Total sulphur ranged from 0.11 to 0.20% with sulphate detected at levels ranging from 0.02 to 0.05%. Modified NP and TIC levels ranged from 91 to 160 kg $CaCO_3$/t and 73 to 150 kg $CaCO_3$/t, respectively. Modified NP values were consistently greater than TIC, indicating the occurrence of silicates measured by the NP method. ABA results indicate that the samples are non-PAG according to NP/AP and TIC/AP ratios. Element analysis results were screened for anomalously high parameters by comparing data to ten times the average crustal abundances of basaltic rocks (Price 1997). The comparison indicated no appreciable enrichment for these samples.

Rinse and SFE tests results indicated alkaline pH values ranging from 8.0 to 9.5. All constituent concentrations were below the screening criteria.

All results indicate the risk of ML/ARD from construction rock is low.

8.2 BOSTON CAMP

This section summarizes monitoring in support of the Boston Camp closure plan.

8.2.1 Waste Rock and Ore

It is estimated that there are approximately 47,400 m^3 of ore stockpiled on site at Boston Camp based on digital models of the ore removed historically from the underground workings at Boston. There are no

projected changes to waste rock and ore stockpile volumes because there is no mining activity occurring or currently planned for Boston under the current water licence.

There were no requirements for geochemical monitoring of solid samples of waste rock or ore in 2017.

9. Geochemical Seepage Surveys

9.1 DORIS MINE

This section summarizes the seepage surveys conducted at Doris Mine as part of the geochemical operational monitoring programs.

9.1.1 Construction (Quarry) Rock and Waste Rock Seepage Survey

The seep survey was carried out between June 15 and June 18, 2017 by TMAC in the Doris North area. The construction seepage monitoring program included visual inspection and opportunistic sampling of seepage downstream of the areas constructed between summer 2016 and summer 2017 including the temporary explosives berm by the North dam, tailings impoundment area (TIA) access road and airstrip expansion. As par to the waste rock monitoring program, the toe of the waste rock stockpile and the downstream areas of the waste rock storage area were surveyed. This area is referred to the waste rock influenced area (WRIA).

A total of eight seepage sites were established downstream of all infrastructure areas except the temporary explosives berm and three within the WRIA. In addition, three references sites were sampled. Samples were collected from each site and submitted to ALS Environmental for geochemical analysis.

A summary of the field measurements is presented in Table 9-1. The pH at all sites was neutral to slightly alkaline (7 to 8.5). The samples collected within the Waste Rock Influenced Area (WRIA) (17-DC-01, 17-DC-02, 17-DC-03) had the highest levels of conductivity (3350 to 3860 µS/cm).

Table 9-1. Mean Values for Field Conductivity and pH Measurements

		Conductivity (µS/cm)	pH
Site Area	No. of Samples	Median	
Waste Rock Influenced Area	3	3600	7.8
TIA Access Road	7	86	7.7
Airstrip	1	230	8.2
Reference Points	3	93	7.7

The results of the 2017 sampling program indicate that there are no major issues with respect to metal leaching and acid rock drainage in seepage associated with infrastructure at Hope Bay. Compared with seeps from infrastructure areas, and consistent with previous years, seepage from areas impacted by waste rock had elevated levels of chloride, nitrate and ammonia. Chloride levels are attributed to flushing of drilling brines and nitrate and ammonia levels to blasting residues from the waste rock.

The waste rock toe seepage samples were elevated in arsenic, copper, iron, nickel and selenium concentrations compared to screening criteria and/or historical data. The elevated concentrations may be due to the sample type (undiluted contact water) and the presence of ore in the stockpile that historically contained waste rock only. Continued monitoring will establish trends in parameter concentrations. The majority of this seepage is captured in the water management system implemented at Doris and directed to the TIA.

9.1.2 Underground Backfilled Stopes (TL-11) Seepage Survey

Two opportunistic seepage samples were collected in 2017 from the bottom of the east limb of the South and North stopes on level 4932 (TL-11). Additional details of seepage monitoring can be found in Appendix D.1 of this report.

Seepage pH was circum-neutral for both samples. Major anion chemistry was dominated by chloride (~48,000 mg/L) and to a lesser degree sulphate (900 mg/L), while major cation chemistry was dominated by calcium (~15,000 mg/L) and to a lesser degree sodium (~8,000 mg/L) and magnesium (1,100 mg/L). Potential sources of the major ions include residues on waste rock from drilling brines (calcium and chloride), other sources of saline water (chloride, sulphate, calcium, sodium and magnesium), and sulphide oxidation with associated carbonate dissolution from waste rock and detoxified tailings (sulphate and calcium).

Total and WAD cyanide concentrations in the seepage were 0.08 mg/L and 0.028 mg/L, respectively. The source of ammonia (280 and 390 mg/L), nitrate (590 mg/L) and nitrite (6.8 mg/L) is attributable to blast residues from waste rock. Both seepage samples exhibited leaching of cadmium, copper, nickel, selenium, silver and zinc consistent with trends observed from the humidity cell test (HCT) program for metallurgical detoxified tailings (SRK 2015). Notably, arsenic concentrations were consistently below detection in the seepage given the elevated concentrations of arsenic in the detoxification tailings – this is consistent with trends observed from the HCT program for metallurgical detoxified tailings (SRK 2015).

9.2 BOSTON CAMP

This section summarizes the geochemical monitoring results at Boston. The seepage and ephemeral streams monitoring programs are conducted annually in the context of the waste rock and ore management and Boston closure plans. The objective of the seepage monitoring is to provide an indication of water quality from the waste rock (camp pad) and ore stockpiles. The seepage samples are collected at the toe of the camp pad. The two objectives of the ephemeral streams program are to monitor drainage from the Boston ore stockpiles and camp pad before entering Aimaokatalok Lake and the natural attenuation of the tundra.

9.2.1 Seepage Monitoring

There are two opportunistic seepage monitoring programs, seepage monitoring at station BOS8 as indicated by Boston water licence 2BB-BOS1727 (Nunavut Water Board 2017) and a freshet seepage survey along the north and east sides of the camp pad, and the southern end of the airstrip as specified in the Boston Water and Ore/Waste Rock Management Plan (SRK 2017). In 2017, seepage was observed, and samples collected from five sites along the east side of the camp pad. Samples were submitted to ALS Environmental for water quality analyses.

The five seepage samples were pH neutral to slightly alkaline with sulphate concentrations (310 to 620 mg/L) within the range of historic seepage monitoring samples. Arsenic and nickel concentrations (0.032 to 0.99 mg/L and 0.097 to 1.5 mg/L, respectively) were elevated for selected samples compared to the screening criteria, but were within the historical range of observed concentrations. In general, samples collected adjacent to the containment pond on the east side of the camp pad (17-BOS-02 and 17-BOS-03) had higher levels of sulphate, chloride, ammonia, nitrate, arsenic, selenium, and nickel than the other seepage samples.

9.2.2 Ephemeral Streams Monitoring

As outlined in the Water and Ore/Waste Rock Management Plan for the Boston Site, Hope Bay Project, Nunavut (2017), five ephemeral streams (A to E) within the catchments of the Boston camp pad are monitored during spring freshet. The objectives of the program are to monitor drainage from the Boston ore stockpiles and camp pad before entering Aimaokatalok Lake and the natural attenuation of the tundra. TMAC inspected ephemeral streams A2 to E2 for flow on June 17, 2017. Flow was observed in ephemeral streams A2 and C2 and samples collected for laboratory analysis.

The pH of ephemeral streams A2 and C2 were slightly alkaline. The analysis of the water quality data for ephemeral streams A2 and C2 indicated that concentrations of the potential contaminants of concern (nitrate, sulphate, arsenic, copper, iron, nickel and selenium) as identified by the water and load balance (SRK 2009), are either decreasing or stable. The stable concentrations indicate that the tundra continues to effectively attenuate contaminants of concern and the breakthrough of the effectiveness of the attenuation process has not occurred. Sulphate and chloride levels are not attenuated by the tundra and the concentrations measured in 2017 validate the 2009 water and load balance. Overall, the water quality of the ephemeral streams is stable and results validate the findings of the water and load balance and that there are therefore no projected impacts to the receiving environment.

10. Fuel Storage

Bulk fuel storage at the Hope Bay Project site is accomplished in compliance with relevant regulations and authorizations. Bulk fuel is stored in steel tanks which are housed in a "tank farm" that is lined with an impermeable membrane and surrounded with a berm with sufficient capacity to meet containment criteria (i.e.110% of the largest tank in the farm). This minimizes the potential of fuel entering the environment from a spill. Chemical storage at the Hope Bay Project site is accomplished in compliance with handling and storage instructions detailed in the respective manufactures Material Safety Data Sheets (MSDS).

TMAC has an approved Hope Bay Project Spill Contingency Plan (2017), which is utilized to safeguard against accidental spills of harmful substances that may negatively affect the environment. An update to this plan is being submitted to include current spill contingency measures adopted at the Hope Bay Project Site and is provided in Appendix H of this report. Implementation of spill prevention systems are critical to avoid such accidents, followed by a response system that is timely and efficient if spills do occur, and contains and mitigates the negative environmental consequences. The Hope Bay Project Spill Contingency Plan was developed in accordance with the Spill Contingency Planning and Reporting Regulations developed under Section 34 the Government of Nunavut's *Environmental Protection Act* (RSNWT Nu1988), and was developed specifically to address the requirements of Water Licences 2AM-DOH1323, 2BE-HOP1222 and 2BB-BOS1217, and Project Certificate Number 003. The Hope Bay Project Spill Contingency Plan provides a consistent spill response framework that is available to all site personnel so they can effectively and efficiently respond to a spill of petroleum products and/or hazardous materials regardless of where on the Hope Bay site they are encountered.

The Hope Bay Project Spill Contingency Plan contains detailed inventories and measurable quantities of all on-site hazardous materials and provides layouts indicating locations of all spill response equipment at site. A list of spill containment systems used are summarized below:

- Gravel/HDPE lined containment facilities (e.g., Roberts Bay and Doris Tank Farms);
- HDPE/wood containments (e.g., Jet-A storage at Heli-pad);
- Concrete berms (day-tanks at the Powerhouse);
- Double-walled steel tanks at location of use;
- Steel spill containment (e.g., beneath tanks at incinerator);
- Insta-berms; and
- Plastic spill pallets.

Spill response resources are also described in detail in the existing management plan together with their routine maintenance and inspection. The availability and organization of the human resources deemed required to respond to spill events is described in the Hope Bay Project Spill Contingency Plan, along with the responsibilities of specified personnel and response teams clearly defined. External notification and communication in the event of spill events are addressed and there is also a specified and comprehensive system of internal reporting. The Hope Bay Project Spill Contingency Plan considers, and will address where needed, the requirements of the Environmental Emergency Regulations (SOR/2003-307). The Plan is subject to annual review and is revised as necessary.

11. Spill Reports

During 2017, eleven spills were reported to the Nunavut Spill Line, Water Licence Inspector and KIA Major Projects. No spills were reported to Environment and Climate Change Canada. These eleven spills met the reporting threshold as outlined in the Nunavut Spill Contingency Planning and Reporting Regulations. In addition to the required Spill Line report, a more detailed follow-up report was filed within thirty days of each reported spill that included a description of the event together with the immediate cause, corrective and preventative action. The eleven reportable spill events are summarized in Table 11-1 below. The follow-up spill reports detail basic causes and short/long term corrective actions.

The remaining spills that occurred during 2017 were minor in nature, occurring on land, with quick response and clean up resulting in negligible impact to the receiving environment. TMAC keeps track of all minor spills (internal reporting and follow-up action) and Inspectors have the opportunity to review the information on demand or when at site conducting inspections. TMAC continues to work to identify root causes so that effective long term corrective actions can be implemented for all spills at site.

Table 11-1. Summary of Reportable Spills in 2017

Date of Occurrence	Spill Number	Date of Notification to an Inspector	Spilled Material and Volume	Details of Spill Event and Follow up Activities	Date Follow-up Report Provided to an Inspector
11-Feb-17	17-041	12-Feb-17	Ethylene Glycol (20 L)	A spill of approximately 20L of ethylene glycol coolant was discovered on the camp pad/concrete foundation of the west side of the Powerhouse (Generator 1 building). The coolant leaked from the Gen 1 jacket water-cooling pipe located on the roof of the building, flowed over the side of the building and onto the ground. Generator 1 was shut down and contaminated snow/crush was removed from the area and taken to waste management for offsite disposal. A small amount of coolant (<1L) was inaccessible to cleanup as it was located beneath some piping that runs beneath the powerhouse building. Attempts to remove this material could cause damage to the pipe or the pipe insulation.	17-Feb-17
04-Mar-17	17-069	04-Mar-17	Ethylene Glycol (20 L)	A spill of approximately 20L of ethylene glycol occurred on the Doris gravel airstrip from a damaged radiator line on a front-end loader. Vehicle stopped in place immediately upon discovery of the leak. Spill pads were placed beneath the vehicle at source of leak and on top of puddles to absorb fluids that had not soaked into the snow. A mechanic was sent out to replace the damaged line at the site of the spill. Contaminated snow, crush and spill pads were disposed of at the waste management area.	06-Mar-17
07-Apr-17	17-102	07-Apr-17	Sewage (20 L)	Operators were transferring sewage from the vac-truck to the STP Unit 1. When they began the transfer, sewage sprayed from the connection between the hose and the tank of the vac-truck. Approximately 20L of sewage was released from the connection onto the snow below before the operator was able to shut down the transfer. The operator discovered that the seal in the hose coupler was missing. He repaired the hose before completing the transfer. Contaminated snow was removed from the ground surface and put into the STP for treatment.	14-Apr-17
12-16-Jun-17	17-249	08-Jul-17	Non-compliant effluent ($246\ m^3$)	An effluent quality sample collected on June 12, 2017 during discharge from the Robert's Bay three 5ML Tank Farm facility (ST6B) exceeded the discharge criteria for toluene outlined in water licence 2AM-DOH1323. Discharge to tundra was stopped immediately and water was redirected to TIA.	02-Aug-17
05-Jul-17	17-250	10-Jul-17	Non-compliant effluent ($30\ m^3$)	An operator discharged effluent of unknown water quality to the tundra from the Containment Pond facility to the tundra at Boston Camp. Effluent was treated through an oil-water separator on discharge, but no water quality sample was collected prior to discharge to ensure the effluent met applicable discharge criteria.	02-Aug-17

(continued)

Table 11-1. Summary of Reportable Spills in 2017 (continued)

Date of Occurrence	Spill Number	Date of Notification to an Inspector	Spilled Material and Volume	Details of Spill Event and Follow up Activities	Date Follow-up Report Provided to an Inspector
12-Jul-17	17-252	12-Jul-17	Sewage (20 L)	A sewage distribution line running from the camp to the sewage treatment facility was discovered to be leaking. Clamps on the coupler were immediately tightened in order to stop the leak. Spilled material was absorbed by soil/vegetation and could not be recovered.	02-Aug-17
10-Aug-17	17-294	10-Aug-17	Sodium Cyanide - Barren Solution (20 L)	ESR personnel was notified by the Mill Superintendent that ~20L of barren solution was released from a man door while cleaning the floor in the refinery area of the mill. Contaminated materials were removed and brought back into the mill for disposal.	17-Aug-17
30-Sep-17	17-371	08-Jul-17	Effluent from Sedimentation Pond (2-3 m^3)	It was discovered that effluent from the 6" Sedimentation Pond discharge line was being released from the valve connection of the in-line flow meter located on the east side of Doris Creek. Site Services personnel had been in the process of removing the flow meter to winterize the line. The meter and water in the line had become frozen. Site Services personnel attempted to remove the meter but it was stuck, so they left the site to get a torch to heat the connection to allow them to remove the meter. A different worker conducting inspections on the tailings line observed the leak and called the Environmental Coordinator. Discharge was not actively occurring at the time; effluent released from the line was trapped in a low spot of the line (approximately 70m length of pipe line). Effluent pooled and froze around the valve (approximate area 50-60m2). No effluent entered Doris Creek. The meter was tightened back in the line to stop the spill of effluent. The vac-truck was used to empty the line and remove as much pooling effluent from the tundra as possible.	23-Oct-17
26-Oct-17	17-398	26-Oct-17	Tailings (50-60 L)	A leak was discovered from the final tailings pipe inside the mill building during nightshift. The leak occurred from the upper elbow on the pipe just before the line exits the building. Spray from the leak contacted the wall of the building, ran down the wall and onto the concrete footing below. Some tailings material was able to seep between the metal cladding of the wall and the concrete footing and flowed down the concrete onto the camp pad outside. Final estimate of volume was 50-60L of material in a 1mx4m area. The tailings line was shut down and repairs completed to the leak in the elbow of the pipeline. Tailings scraped from camp pad and disposed of in TIA.	02-Aug-17

(continued)

Table 11-1. Summary of Reportable Spills in 2017 (completed)

Date of Occurrence	Spill Number	Date of Notification to an Inspector	Spilled Material and Volume	Details of Spill Event and Follow up Activities	Date Follow-up Report Provided to an Inspector
26-Oct-17	17-401	30-Oct-17	Ethylene Glycol (18 L)	Spill of 18L of ethylene glycol based antifreeze from radiator hose of a pickup truck parked on the west side of the Heavy Equipment shop. Contaminated materials were scraped from the camp pad and taken to waste management for disposal.	22-Nov-17
04-Nov-17	17-405	05-Nov-17	TIA Effluent (200 L)	During a planned shut down, multiple flanges on a tailings line were being replaced as part of a preventative maintenance program. Prior to conducting the work, the line was flushed using reclaim waters from the TIA and then blown out with pressurized air. While unbolting a flange in a low spot on the line, residual water spilled from the line to the surrounding area. Contaminated materials were scraped up and disposed of into the TIA.	08-Nov-17

12. Management Plans

The Table 12-1 below provides and overview of all Management Plans for the Hope Bay Project

Table 12-1. Hope Bay Project Management Plans

Specific Plan Title/Author/Date	Version Date
Hope Bay Project Environmental Management System	Jan-17
Air Quality Management Plan, Hope Bay Project	Sep-16
Hope Bay Project Noise Abatement Plan	Dec-17
Doris North Project Wildlife Mitigation and Monitoring Plan	Dec-16
Hope Bay Project Doris Aquatic Effects Monitoring Plan	Sep-16
Waste Rock and Ore Management Plan, Hope Bay Project, Nunavut, TMAC Resources August 2016 and September 2016 Addendum	Sep-16
Hope Bay Project Doris Tailings Impoundment Area Operations, Maintenance, and Surveillance Manual Aug 2016 & Sept 2016 Addendum	Sep-16
Hope Bay Project Water Management Plan	Feb-17
Hope Bay Project Domestic Waste Water Treatment Plan Doris Project	Feb-17
Hope Bay Project Hazardous Waste Management Plan	Sep-16
The Hope Bay Project Interim Non-Hazardous Waste Management Plan	Nov-16
Hope Bay Landfarm Management and Monitoring Plan	Jan-17
Hope Bay Project Incinerator Management Plan	Apr-16
Hope Bay Project Quarry Management and Monitoring Plan	Feb-17
Hope Bay Project Spill Contingency Plan	Dec-17
Hope Bay Project Surface Emergency Response Plan	Dec-17
Hope Bay Project Underground Emergency Response Plan	Dec-17
Oil Pollution and Emergency Preparedness Plan	Aug-17
Hope Bay Project Quality Assurance Quality Control Plan	Jan-17
Doris North Mine interim Closure and Reclamation Plan and Sept 2016 Addendum	Sep-16
Hope Bay Health and safety management Plan	Dec-17
Hope Bay Project Human Resources Plan	Sep-16
Hope Bay Project Community Involvement Plan	Jan-17
Cultural Heritage and Natural Resources Management Plan	Nov-16
Hope Bay Project Groundwater Management Plan	Aug-16
Hope Bay Project Aircraft De-icing Management Plan	Nov-17
Hope Bay Project Water and Ore/Waste Rock Management Plan for Boston Site	Jan-17
Boston Sewage Treatment Operations and Maintenance Management Plan	Sep-17
Hope Bay Project Boston Camp Interim Closure Plan and Revised Boston Exploration Camp Closure Cost Estimate	Apr-17
Hope Bay Project Windy Camp and Patch Lake Facility Updated Closure Plan (SRK)	May-14
Water Management Plan: Madrid Advanced Exploration Program, North and South Bulk Samples (SRK)	Dec-14
Overview of Madrid North and Madrid South Bulk Sample ML/ARD Characterization Programs and Conceptual Waste Rock Management Plans (SRK)	Dec-14
Hope Bay Project: Madrid Advanced Exploration Program: Conceptual Closure and Reclamation Plan (SRK)	Oct-14

13. Closure and Reclamation

13.1 PROGRESSIVE RECLAMATION

In 2017, progressive reclamation work was focused on the LTA at Boston and legacy drill holes. Reclamation work at the LTA at Boston included the excavation and stockpiling of contaminated materials from the site for future treatment or shipment offsite to an approved facility. Progressive reclamation of the LTA at Boston is planned to continue into 2018 however no additional contaminated material is expected to be deposited for treatment prior to full decommissioning and reclamation.

On-going progressive reclamation of legacy drill holes in 2017 (Photo 13.1-1) focused on reclaiming sites built in late 2008 that comprise a series of 32 diamond drill holes with the identifiers 08BSD378 to 08BSD406.

A total of 10 megabags totaling approximately 3,000 lbs of drilling related refuse, primarily black plastic netting materials, were removed from the listed legacy drill sites and mobilized to Boston camp in 2017. Resources committed to the reclamation of legacy drill holes include approximately 156 hours of TMAC personnel time, 4 hours of helicopter time and 2 hours of heavy equipment time in additional to miscellaneous consumables (bags, knives, peat, etc.)

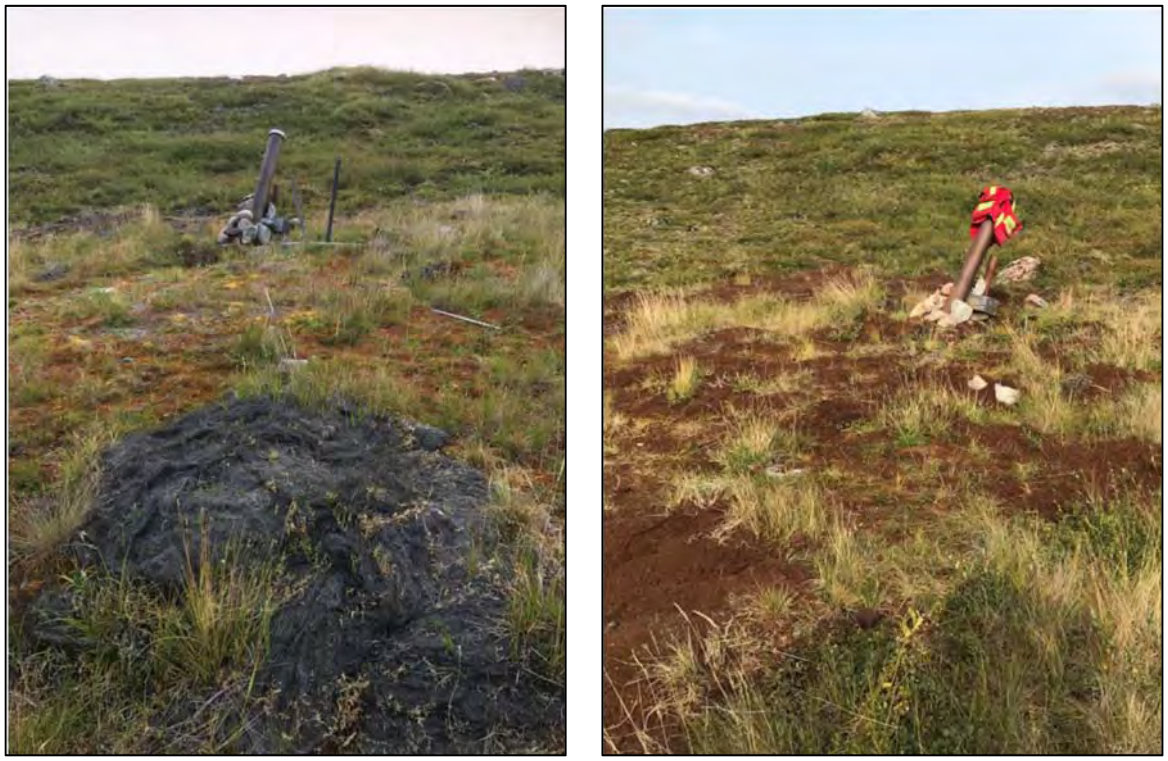


Photo 13.1-1. Legacy Drill Site, Pre- and Post-2017 Cleanup (Left and Right Respectively)

13.2 COST ESTIMATE

The reclamation work for the Hope Bay Belt will be done in accordance to approved Closure and Reclamation Plans for the Belt. Reclamation progress is monitored through site inspections and annual reporting to the KIA, INAC and NWB, and is documented in updates of the Project Closure and Reclamation Plan and financial security costs estimates. The Closure and Reclamation Plans and financial security costs estimate applicable to each site along the Belt are outlined in the subsections below.

13.2.1 Doris

TMAC has an approved Doris North Mine Interim Closure and Reclamation Plan, June 2015 and September 2016 Addendum. On September 23, 2016 TMAC provided to the NWB an updated and final Closure and Reclamation cost estimate, which constitutes an agreement between TMAC and INAC as stated during the Doris Project Water Licence Hearing held in Cambridge Bay on September 13, and 14, 2016. The revised estimate amounts to $31,289,321. Details of this report can be found on the NWB public registry.

13.2.2 Windy

TMAC has an approved Hope Bay Project, Windy Camp and Patch Lake Facility Updated Closure Plan (SRK 2014). This document presents the closure obligations and the plan for closing both facilities, and demonstrates how the closure obligations can be met. A copy of this plan can be found on the NWB public registry.

13.2.3 Boston

TMAC has an approved Boston Camp Interim Closure Plan (2014) which was submitted to the NWB May 26, 2014. The plan includes a current closure cost estimate of $5,988,000. This amount includes cost escalation, management of mineralized rock, reclaiming drill sites and other areas of permafrost degradation, remediation of hydrocarbon contaminated soils, indirect costs, and a contingency. A copy of this plan can be found on the NWB public registry.

13.2.4 Madrid

TMAC has an approved Conceptual Madrid Closure and Reclamation Plan (2017). In accordance with Water Licence No. 2BB-MAE1727 Amendment No.1, TMAC will maintain reclamation security in the amount of $7,131,000 for the work at Madrid. As per the amended licence, this amount is split between activities at Madrid North ($4,042,000), Madrid South ($3,072,000) and Madrid North to South All Weather Road (AWR) ($17,000). A copy of the Conceptual Madrid Closure and Reclamation Plan and associated financial security estimates can be found on the NWB public registry. To date, TMAC has not posted security for the Madrid Advanced Exploration Program. As required under Water Licence No. 2BB-MAE1727 Amendment No.1, TMAC will notify the NWB and post the respective security amount with landowners at least 60 days prior to the initiation of construction.

14. Community Consultation

TMAC is committed to engaging positively and effectively with local communities in a manner that emphasizes respect, integrity and demonstrates a willingness to learn from experience and embrace necessary change. TMAC recognizes that maintaining engagement and community involvement is necessary throughout the mining cycle, and critical to continuous improvement. TMAC bases its approach to community involvement on the following principles:

1. Identify all Stakeholders in our operations;
2. Effectively engage Stakeholders and establish a dialogue;
3. Provide Stakeholders with means to respond to us as well as generate responses; and
4. Report to Stakeholders and regulators on our Engagements.

TMAC operates within Nunavut, and on Inuit Owned Lands. The KIA, representing the Inuit of the Kitikmeot region, advised TMAC during the IIBA negotiation process that all Kitikmeot communities are considered affected by Hope Bay. As a result, TMAC considers every Kitikmeot Inuk, and their representative organizations including the KIA to be Stakeholders in the Belt. For the purposes of local community engagement, communities involved in the Belt include Kugaaruk, Taloyoak, Gjoa Haven, Cambridge Bay, Umingmaktok, Kingaok and Kugluktuk, comprising the Kitikmeot region of Nunavut.

In order to effectively engage, establish and maintain a dialogue with TMAC's various local communities, TMAC has implemented a number of steps and activities designed to support two-way communication. These efforts and activities are described in the subsections below.

14.1 CAMBRIDGE BAY OFFICE

TMAC maintains an office in Cambridge Bay, which is the closest, occupied, affected community to the Belt. The office is centrally located in the community, furnished with bilingual signage, and accessible by the public during regular business hours. The primary purpose of this office is to facilitate community engagement. The Hope Bay Project will be in a continual state of environmental assessment and permitting during the foreseeable future. The Cambridge Bay office supports TMAC's engagement of government, regulators, intervenors, interested members of the public, employees, those seeking employment at Hope Bay and other interested parties.

Staff of the Cambridge Bay office are available to communicate directly with local Stakeholders and participate in a number of regional and territorial events that regularly occur in Cambridge Bay, thereby informing communities of TMAC operations, and actively soliciting feedback. The Cambridge Bay office is staffed with a Director of External and Community Relations, a TMAC Liaison and an HR/SR Coordinator. They engage regularly with the public using two-way communications for a variety of activities including:

- Employee and public relations;
- Annual community awareness meetings;
- Regular meetings with individual Inuit job seekers;
- Recruiting and onboarding Inuit personnel;
- Regular communications with Community Liaison Officers in the Kitikmeot;

- Annual meetings between KIA and TMAC Presidents;
- Annual updating of KIA Board by TMAC Executive;
- Attendance at the KIA Annual General Meeting;
- Quarterly participation in the IIBA Implementation Committee;
- Presentation of the IIBA Annual Evaluation Report to the KIA Board;
- At a minimum, semi-annual meetings of the Inuit Environmental Advisory Committee ("IEAC") in order to review environmental management and monitoring plans, discuss project related environmental issues, and obtain advice from knowledgeable Inuit on these matters;
- Meetings between TMAC staff and Kitikmeot Qualified Businesses;
- Regular meetings with relevant KIA Lands, Employment and Training and Executive staff; and
- Annual visits of the KIA Board, IIBA Implementation Committee, IEAC, and individual harvesters at Hope Bay.

14.2 ENGAGEMENT WITH INUIT THROUGH THE IIBA

In accordance with the IIBA, TMAC regularly engages Inuit on a range of matters directly as well as through the KIA. The IIBA includes the following schedules which contain specific provisions of adaptive socio-economic effect mitigation measures aimed at Kitikmeot Inuit:

- Schedule D – Training and Education Opportunities: whereby Inuit are provided support and training for opportunities at the Hope Bay Project;
- Schedule E – Employment: whereby measures and supports are provided to maximize Inuit participation in the Hope Bay Project;
- Schedule F – Business and Contracting Opportunities: whereby Inuit are provided business and contracting opportunities; and
- Schedule I – Inuit Environmental Advisory Committee: whereby Inuit have the opportunity to receive and consider information, provide advice and attempt to resolve community concerns relative to the environment and wildlife for the Hope Bay Project.

14.3 COMMUNITY AWARENESS: KITIKMEOT COMMUNITY MEETINGS

TMAC undertakes regional consultation tours of the Kitikmeot region. The tours consist of visits to each Kitikmeot community by TMAC community relations staff and relevant subject matter experts. TMAC endeavours to schedule the tour for a time of year that promotes participation and provides at least two weeks advanced notice for each Kitikmeot community. During the public meeting, TMAC delivers a presentation that provides the public information on the socio-economic and environmental performance of the Company. TMAC supports public meeting proceedings with simultaneous translation consistent with the dialect of Inuktun used in each community. TMAC logs meeting participants for future reference. In the meetings, community members have an opportunity to make comments, ask questions, and raise any concerns they may have regarding TMAC operations. TMAC documents the proceedings of public meetings in order to track issues and follow up on any concerns.

During the regional consultation tours of the Kitikmeot region, TMAC also endeavours to schedule meetings in each community with specific Stakeholder groups such as Kitikmeot Hamlet Councils and/or

senior management, local Nunavut Arctic College and High School classes as specific Stakeholders that may have an interest in employment and training at TMAC.

In 2017, TMAC hosted community meetings in Kugluktuk, Cambridge Bay, Kugaaruk, Taloyoak, and Gjoa Haven from October 18 to November 2, 2017 with the purpose of sharing a Hope Bay Project update and seeking public input on the proposed Madrid-Boston Project.

14.4 COMMUNITY AWARENESS: KITIKMEOT CAREER AWARENESS SESSIONS

TMAC host community and information and career awareness sessions in all Kitikmeot communities regularly in order to maximize Inuit employment opportunities at Hope Bay. The purpose of these sessions is to provide information on:

- expected labour needs of Hope Bay;
- the skills, behaviours and qualifications required for employment and advancement at Hope Bay;
- the training opportunities and educational support programs available to prepare for employment at Hope Bay; and
- career opportunities in related fields such as science, technology, mathematics or professional services.

14.5 SOCIAL MEDIA

TMAC maintains a company Facebook ™ page to both share operational information with communities and increase awareness of mining. TMAC uses its Facebook ™ page to augment information distributed through TMAC's website. TMAC also makes use of Kitikmeot community Facebook ™ pages to advertise job postings, meeting notices, and any other news that may be of interest to Nunavut Stakeholders (http://www.facebook.com/tmacresources/).

Comments, questions or concerns received via social media are addressed promptly in a manner consistent with public meetings.

14.6 ELECTRONIC MAIL

TMAC maintains and periodically updates a listing of electronic mail addresses of Stakeholders, including select community members. This listing includes, but is not restricted to the following:

- Public elected officials;
- Inuit elected officials;
- Relevant federal and territorial regulator employees;
- Relevant Inuit Organization employees;
- Relevant municipal officials; and
- Relevant training and employment agency employees.

When necessary, TMAC distributes electronic mail messages to this listing to inform them of TMAC related events, news and happenings. This engagement activity is conducted to ensure that Stakeholders and communities are well informed and if willing, able to plan participation in any future TMAC engagement.

14.7 NUNAVUT EVENT PARTICIPATION

TMAC ensures it is well informed of key events that occur on an annual basis in Nunavut that represent opportunities for community involvement and dialogue. TMAC makes staff available to attend these events in order to foster communication. In 2017, these events included the following:

- Kitikmeot Mayor's Meeting;
- Kitikmeot Trade Show; and
- Nunavut Mining Symposium.

14.8 STAKEHOLDER REPRESENTATIVE ORGANIZATIONS

TMAC recognizes that one of the most effective means of engagement and dialogue with Stakeholders and communities is joining with them in an organization of mutual benefit. Towards this aim, TMAC is a member of established organizations involving numerous community members. TMAC's participation in these groups provides members with information on TMAC's activities and, allows them to discuss matters of mutual concern, and undertake initiatives of mutual benefit. These organizations include the following:

- NWT/Nunavut Chamber of Mines;
- Nunavut Mine Training Roundtable; and
- Kitikmeot ASETS Stakeholder Working Group.

14.9 COMMUNITY RELATIONS SUMMARY FOR 2017

As described in the subsections above, TMAC used a number or methods and avenues to ensure TMAC positively and effectively engages with local communities. A summary of community related engagement activities in 2017 is provided in Table 14.9-1 below.

Table 14.9-1. Community Engagement Summary for 2017

Date	Type	Description
2017-01-11	E-mail	Email distribution to key Nunavut and Northern Stakeholders to provide project update, copy of news release, notice of upcoming events and to inform and encourage application for TMAC employment opportunities
2017-01-19	E-mail	Email distribution to northern and Nunavut stakeholders to inform them of the contents of the latest TMAC news release.
2017-01-24	Meeting	KIA organized meeting of training and employment stakeholders to share information on current events and initiatives undertaken as part of ASETS program delivery. Attendees included Nunavut Arctic College, Polar Knowledge Canada, Service Canada, and KIA Employment and Training Staff. TMAC delivered project update, provided current employment and training statistics, and outlined progress towards recruiting Doris production staff.
2017-02-08	Conference/Seminar	Attended Kitikmeot Trade Show including delivery of presentation on Hope Bay project to delegates and operating a booth focussed on recruitment. Presented 2016 Inuit Employment Award to Kitikmeot Caterers to recognize performance.

(continued)

Table 14.9-1. Community Engagement Summary for 2017 (continued)

Date	Type	Description
2017-02-10	E-mail	Email distribution to northern and Nunavut stakeholders to inform them of the contents of latest TMAC news release and solicit comment, if any.
2017-02-27	Public Hearings	Attended NIRB Community Information Session and responded to questions from the public when prompted and allowed by NIRB staff.
2017-02-28	Public Hearings	Attended NIRB Community Information Session and responded to questions from the public when prompted and allowed by NIRB staff.
2017-03-01	Public Hearings	Attended NIRB Community Information Session and responded to questions from the public when prompted and allowed by NIRB staff.
2017-03-01	Public Hearings	Attended NIRB Community Information Session and responded to questions from the public when prompted and allowed by NIRB staff.
2017-03-07	Workshop	Delivered a presentation to the Environmental Technology Program class on spill response planning, equipment, and procedures as part of their spill response course. Highlighted differences between spill response at mine compared to community. Handed out free TMAC memory sticks.
2017-03-21	Meeting	Meeting between KIA and TMAC officials to ensure the implementation of the 2015 Hope Bay IIMA
2017-03-22	Public Hearings	Attended NIRB Community Information Session and responded to questions from the public when prompted and allowed by NIRB staff.
2017-04-05	Meeting	Meeting of Government of Nunavut working group aimed at coordinating and supporting mine training within the territory. Part of the proceedings of each annual meeting is to allocate the GN mine training fund amongst proposed training projects.
2017-04-06	Conference/Seminar	Attended conference and delivered two presentations to delegates; a Hope Bay project update including a Hope Bay Success Story, and an Exploration and Geology Update. TMAC also sponsored the Meet and Greet portion of the conference.
2017-04-12	Meeting	Teleconference call between TMAC staff and EHTO Directors and Management Consultant to discuss the opportunity for the EHTO to establish an environmental services company to serve the Hope Bay Project. TMAC encouraged EHTO to continue its business planning process and apply to the Hope Bay Kitikmeot Qualified Business Registry.
2017-04-13	Meeting	Met with Regional Geologist to provide him with a project update and also to hear about his plans for prospector training for the summer.
2017-04-14	Focus Group	Meeting with Toronto based philanthropic organization attempting to develop remote web-based employment opportunities for northerners. Described TMAC need to have a number of tasks undertaken by workers remote from mining operations. Jobs North group to continue business planning process.
2017-04-20	Workshop	Conducted a traditional knowledge and land user workshop focussed on Phase II caribou project interactions, management and mitigation with subject matter experts, TMAC Environment and SR staff.
2017-04-28	Meeting	Meeting between KIA and TMAC officials to ensure the implementation of the 2015 Hope Bay IIMA
2017-05-05	Meeting	Meeting between KIA and TMAC officials to ensure the implementation of the 2015 Hope Bay IIMA
2017-05-15	E-mail	Email distribution to northern and Nunavut stakeholders to share latest TMAC news release and solicit feedback on same.

(continued)

Table 14.9-1. Community Engagement Summary for 2017 (completed)

Date	Type	Description
2017-05-24	Meeting	KIA organized meeting of training and employment stakeholders to share information on current events and initiatives undertaken as part of ASETS program delivery. Attendees included Nunavut Arctic College, Polar Knowledge Canada, Service Canada, and KIA Employment and Training Staff. TMAC delivered project update, provided current employment and training statistics, and outlined progress towards recruiting Doris production staff.
2017-05-25	E-mail	Email distribution to northern and Nunavut stakeholders to share details of latest TMAC news releases and encourage the sharing of job opportunities with TMAC.
2017-06-07	Site Tour/Visit	Celebration at Doris Mine of start of gold production with representatives of Key stakeholder groups.
2017-06-09	Meeting	Luncheon to meet with federal and provincial officials involved in supporting commercial research and development. This was their first meeting in Nunavut and the luncheon was arranged by Polar Knowledge Canada. After the luncheon, the party visited the TMAC Cambridge Bay office to learn more about our operation.
2017-06-16	Public Hearings	NIRB deliberations on Phase II proposal.
2017-06-20	Community Event	Provided prospector course attendees with company and project information on invitation from GN Regional Geologist.
2017-06-22	Survey/Questionnaire	Conduct with KIA, a written survey of Inuit employees at Hope Bay, requesting feedback into employment conditions. Conducted by the Hope Bay IIBA Implementation Committee
2017-07-27	Meeting	Meeting in Toronto to discuss Hope Bay Project
2017-08-30	E-mail	Provided a copy of August 2017 corporate presentation to northern stakeholders.
2017-11-14	Meeting	Review of TMAC responses to Pre-Hearing Conference commitments for inclusion into the FEIS
2017-11-15	Meeting	Meeting with DFO Official in order to provide an update on 2017 environmental baseline studies at Hope Bay, and also to discuss TMAC approach to fish habitat offsetting.
2017-12-08	Meeting	Meeting to discuss Madrid and Boston development wildlife and raptor baseline data collection, impact assessment, mitigation and monitoring with regulators; primarily with GN-DOE.

15. Annual Inspection Activities

In 2017 TMAC hosted regulatory inspections for ECCC, INAC, NIRB, KIA and WSCC. Details of when those visits occurred and a summary of the reports and follow up from those visits are detailed in Table 15-1.

Table 15-1. Summary of Annual Inspection Activities

Date	Agency	Summary	Follow up	Response
March 14, 2017	WSCC	Inspection to verify compliance with Mines Health & Safety Regulations. The inspection focused on the Waste Management Area, road to Tailings Pond, reclaim pump house, vent raise, portal, mill crusher pad, airstrip, bulk plant and Quarry 2. The inspector issued 17 orders for action.	Order issues.	Compliance report was submitted from TMAC within 30 days.
April 26-27, 2017	Indigenous and Northern Affairs Canada	Inspection to verify compliance with the Type A water license, 2AM-DOH1323. The inspection focused on fuel and waste management areas as well as site infrastructure since entering into commercial production. Inspector noted that waste management practices are good and the waste management area is well-run.	-Containment and control of the detoxified tailings is required to ensure compliance with license conditions G.21 and G.27. Immediate cleanup of the area is required, with confirmation to the inspector. Provide a description of the solution within 30 days.	To ensure compliance with license conditions G.21 and G.27, TMAC undertook the task of cleaning up the existing detoxified tailings containment area and placing a crush rock pad within the area. Additionally, a working surface was constructed and placed in the containment area to capture the detoxified tailings from the mill. Prior to winter, doors and a roof will be added so that the area is fully enclosed.
June 21-22, 2017	Kitikmeot Inuit Association	On June 21-22 the KIA inspected the Doris Commercial Lease area and infrastructure including Roberts Bay, the Jetty, Doris Site and Area, the North Dam and Tailings Impoundment Area infrastructure, and the Doris Windy All-Weather Road. Windy Camp and Boston were also toured.	-Robert's Bay 20ML tank farm – water running down rock face with seepage under liner. Berm needs to be partially removed and additional liner installed, grouted and capped. Rock face needs to be scoured and sealed with a rubber sealant. -Doris Burn Pan – in good conditions, but ramps need to be rebuilt. -Boston Crusher enclosure – tarp cover shredded by wind. A new building tarp needs to be installed. The KIA stated that TMAC is generally in compliance with the terms and conditions of existing permits and a commercial lease issued by KIA to TMAC for the Project.	-TMAC has engaged with SRK to design water monitoring sumps through the tank farm liner to allow for monitoring and removal of water accumulation beneath the liner. -On-going maintenance will occur on this ramp as it is heavily utilized. -A new cover was installed in 2017.
July 8-9, 2017	Indigenous and Northern Affairs Canada	Inspection to verify compliance with the Type A water license, 2AM-DOH1323. The inspection focused on all site infrastructure, new construction, waste rock and ore storage, water management structures and the TIA. Several spills were also inspected and to be closed out with the Spill Line.	-Ensure that any usage of the single tank at Roberts Bay is consistent with CCME Code of Practice. -Ensure that the waste rock pile is wholly contained within the diversion berm and that no runoff from waste areas may flow over the north side of the berm. -Provide assurance that the equipment used to manage detoxified tailings is not used for any purposes that may contaminate non-contact materials or area. -Sampling methods for BTEX are to be reviewed to ensure all employees are following sampling protocol.	-TMAC will comply with the CCME Code of Practice as per Part D, Item 11a of the license. -Measures have been taken to ensure that waste rock will remain contained to the approved location. A formal inspection sheet has been created for the diversion berm inspection, which includes monitoring for waste rock. -TMAC believes that the cleanup, water and waste management strategies in place will provide the assurance needed to prevent contamination of non-cyanide materials and areas from the detoxified tailings. Strategies include cleanup and maintenance of the detoxified tailings area. Dedicated equipment will be used to load the detoxified tailings into underground haul trucks. -Protocols have been reviewed with all employees who are responsible for sampling to ensure appropriate sampling methods for BTEX are maintained.
July 10 and August 20, 2017	Indigenous and Northern Affairs Canada	Inspection to verify compliance with the Type B water license, 2BB-BOS1217/2BB-BOS1727. The inspection focused on the wastewater treatment facility, active drill site inspection and water management as well as fuel storage.	-An updated Operation and Maintenance Manual for the Boston Sewage Disposal Facility is to be provided with the Annual Report or 2 months prior to the next planned usage of the facility, whichever comes first. -Cuttings must be deposited to a "properly constructed sump or appropriate natural depression" where the cuttings cannot impact any adjacent water bodies, including wetlands. This location does not meet the definition of a sump. Mitigation measures are to be put in place prior to freezing.	-TMAC will be updating the existing Sewage Treatment Plant Operations and Maintenance Plan for The Boston Camp. This plan will be submitted to the Nunavut Water Board (NWB) by the end of September and a copy will be provided to the Inspector. It should be noted that in addition to this updated plan, the Doris Domestic Waste Water Management Plan (February 2017) is a site wide plan which is applicable to the entire Hope Bay Belt and its respective water licences. -As per a previous inspection request to investigate the issue of thermokarsts issued on July 18, 2015, TMAC intends to continue placing non-saline cuttings as backfill to these thermokarsts, where appropriate and safe, as a way of remediating these features. Direct discussions with site staff indicates that two silt fences were installed in the area to ensure that appropriate mitigation measures prior to any cuttings being placed. This was done to minimize any impacts to adjacent water bodies. TMAC will continue to monitor these sites, and also ensure drill cuttings are appropriately deposited.
August 4, 2017	WSCC	Inspection to verify compliance with Mines Health & Safety Regulations. The inspection focused on the underground workings and operating procedures. The inspector issued 8 orders for action.	Order issues.	Compliance report was submitted from TMAC within 30 days.

(continued)

Table 15-1. Summary of Annual Inspection Activities (completed)

Date	Agency	Summary	Follow up	Response
August 28, 2017	Nunavut Impact Review Board	On August 28, 2017 the NIRB Monitoring Officer visited the Doris North site. The site visit on the mill, the Doris North portal, vent raises, service road, Roberts Bay port facilities and tank farms, laydown areas, landfarm, main camp and administrative facilities and the tailings impoundment area.	TMAC has generally moved the Project towards overall compliance with requirements of the Project Certificate, and is in general compliance with the terms and conditions contained therein. Specific items require additional attention as noted in the Board's recommendations. On November 27, 2017 NIRB issued 5 recommendations along with the 2015-2016 Annual Monitoring Report for the Doris Project.	TMAC submitted a response to these recommendations on January 5, 2018. A copy of the NIRB Site visit report, and Board recommendations and TMAC's response can be found on the NIRB Public registry.
September 5-7, 2017	Kitikmeot Inuit Association	On September 5-7 the KIA inspected the Doris Commercial Lease area and infrastructure including Roberts Bay, the Jetty, Doris Site and Area, the North Dam and Tailings Impoundment Area road and infrastructure. Windy Camp and Boston were also toured.	- Robert's Bay 20ML tank farm berm has been repaired. Water is still running down the rock face. The rock face will be scoured and sealed with rubber sealant next year after TMAC first finds the water source. - Jetty has some damage to left front corner. The Jetty will be repaired. - Airstrip – water ponding, slumping and cracking occurring along the west side of the airstrip. Water needs to be pumped out and airstrip repaired. - Some core storage boxes by Windy Camp have toppled over and need to be restacked. - Boston Crusher enclosure has been repaired. The KIA stated that TMAC is generally in compliance with the terms and conditions of existing permits and a commercial lease issued by KIA to TMAC for the Project.	-TMAC has engaged with SRK to design water monitoring sumps through the tank farm liner to allow for monitoring and removal of water accumulation beneath the liner. - Jetty repair will be conducted prior to the 2018 sealift. - Dewatering of ponded water will occur regularly and routine maintenance of the airstrip conducted. - Core boxes will be removed from the area at Windy Camp during reclamation activities planned during 2018.
October 3, 2017	WSCC	Inspection to verify compliance with Mines Health & Safety Regulations. The inspection focused on the mill processing plant and emergency response procedures. The inspector issued 7 orders for action.	Order issues.	Compliance report was submitted from TMAC within 30 days.
October 10-11, 2017	Indigenous and Northern Affairs Canada	Inspection to verify compliance with the Type A water license, 2AM-DOH1323 and Type B water license 2BE-HOP1222. The inspection focused on waste management areas, fuel management areas, water intake, the TIA and site infrastructure.	-Please ensure that usage of the fuel farm berms is consistent with CCME Code of Practice as per Part D Item 11a. -The waste rock pile is to be wholly contained within the diversion berm, and all runoff from Pad T must report as intended to the Pollution Control Pond. -Hazardous waste is to be handled and stored in a manner that prevents any further contamination and is consistent with the HWMP. Removal from site in a timely fashion is required. -Implementation of the Landfarm Management Plan should be undertaken in 2018 -Please provide an alternate plan to demonstrate that the equipment used to manage detoxified tailings is not used for any purpose that may contaminate non-contact materials or areas.	-Products that had been stored in the Roberts Bay tank farm will be relocated to the single-5 million L tank farm berm for temporary storage. Before the 5 million L tank is placed back into fuel storage service a separate lined berm area will be constructed for the purpose of storing totes and drums of new hydrocarbon products to be used at site and waste products destined for backhaul. The plan has been developed to re-establish a clear division between the Diversion berm and the waste rock/ore storage piles. The barrier berm at the boundary of the waste rock pile will be re-established to prevent material from migrating towards the Diversion berm. Signage will be posted along this boundary to alert operators that no material is to extend beyond that point. Weekly inspections of this area will be conducted to ensure that this boundary remains in place and that no material encroaches onto the Diversion berm. -The contents of the open totes of contaminated oil/hazardous waste will be transferred to containers that will be sealed as per TMAC's Hazardous Waste Management Plan (HWMP). TMAC will utilize aircraft backhauls to transport material to Yellowknife where it will be disposed of with a registered waste disposal facility. -Staff will be assigned to actively manage the Doris landfarm in accordance with the Landfarm Management Plan prior to the backhaul of material from the Boston site. Material within the landfarm will be managed as per this plan as revised in the future. -A road has been constructed from the mill pad directly to the portal for the purpose of transporting detoxified tailings to the underground workings. Underground haul trucks carrying detoxified tailings will use this road to travel from the detoxified tailings collection pad on the south side of the mill to the portal. This route will ensure that this material does not leave the pollution control management area. A surface 980 front-end loader has been dedicated to the task of loading detoxified tailings into the underground haul trucks.

Reference

SRK Consulting (Canada) Inc., 2009. *Water and Ore/Waste Rock Management Plan for the Boston Site Hope Bay Project, Nunavut*. Report 1CH008.022 for Hope Bay Mining Ltd. July 2009.

SRK Consulting (Canada) Inc., 2017. *Water and Ore/Waste Rock Management Plan for the Boston Site Hope Bay Project, Nunavut*. Report 1CT022.009 for TMAC Resources Inc. January 2017.

Appendix A
Concordance Table

Type A Water Licence 2AM-DOH1323	
Condition	**Section**
Summary of monthly monitoring data	Section 5.1, Appendix D.1
Information with respect to Geochemical Monitoring and Waste Rock Storage Assessment	Section 8, Appendix F
Information with respect Quarry Rock Seepage Monitoring and management Program	Section 9, Appendix F
Summary of the results of monthly water balance and water quality model assessments	Section 5.1.1, Appendix E
Update on current capacity of the Tailings Impoundment Area	Section 5.1.2
Information on flows at monitoring stations TL-2 and measurements of Doris Lake Water level	Appendix D.1
Annual review and any revisions of management plans and Emergency Response and Contingency Plan	Section 12
A list and description of all unauthorized discharges including volumes, spill report line identification number and summaries of follow-up actions taken	Section 11
Results of the Aquatic Effects Monitoring Program	Section 7
Annual adjustments to reclamation security	Section 13
Annual incineration stack testing results	Section 6.1
Annual Landfill Management Report	Section 6.4
A summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and an outline of any work anticipated for the next year	Section 3 and Section 4
A summary of any closure and reclamation work undertaken and an outline of any work anticipated for next year, including changes to implementation and scheduling	Section 13
A summary report describing consultation and participation with local organizations and residents of nearby communities, including a schedule of upcoming events/information sessions	Section 14
GPS locations of monitoring stations	Appendix B
A summary of actions taken to address concerns or deficiencies listed in the inspection reports and/or compliance reports filed by an Inspector any other details on water use and waste disposal requested by the board	Section 15

Type A Water Licence 2BE-HOP1222	
Condition	**Section**
A summary report of water use and waste disposal activities	Section 5.2, Section 6, Appendix D.2
A summary of all information requested and results of the Monitoring Program	Section 5.2, Appendix D.2
A list of unauthorized discharges and a summary of follow-up actions taken	Section 11
A brief description of follow-up actions taken to address concerns detailed in inspection and compliance reports prepared by the Inspector	Section 15
An update to the Spill Contingency Plan, if required, including contact information in the form of an addendum	Section 10, Section 12
A description of all progressive and/or final reclamation work undertaken, including photographic records of site conditions before, during and after completion of operations	Section 13
A summary of modification and/or major maintenance work carried out on the water supply and waste disposal facilities, including all associated structures, and an outline of any work anticipated for the next year	Section 3, Section 4
A summary of any specific studies or reports requested by the board, and a brief description of future studies planned or proposed	Section 4
Any other details on water use or waste disposal requested by the board	Section 5.2

Type A Water Licence 2BB-MAE1727	
Condition	**Section**
The monthly and annual quantities in cubic metres of all freshwater obtained at Monitoring Stations No. MAE-01, No. MAE-02 and MAE-03, including all sources of water identified for domestic and industrial use under Part D, Item 1;	Section 5.3, Appendix D.3
The daily, monthly and annual quantities, in cubic metres, of mine water pumped from the underground mine;	Section 5.3, Appendix D.3
The monthly and annual quantities in cubic metres of Effluent discharged from the Pollution Control Ponds onto the tundra and/or transported to Doris to be discharged into the TIA, including the analysis result;	Section 5.3, Appendix D.3
The monthly and annual quantities in cubic metres of Sewage Effluent transported to the Doris North site;	Section 5.3, Appendix D.3
Report all artesian flow occurrences as identified under Part F, Item9;	Section 5.3
An estimate of the volume of waste rock and ore currently stockpiled at site, to date;	No waste rock and ore to date.
Tabular summaries of all data generated under the Monitoring Program, Part J;	Section 5.3, Appendix D.3
A summary of modifications and/or major maintenance work carried out on the Water Supply Facilities, Buk Fuel Storage Facility, Pollution Control Ponds and any wastewater related facility including all associated structures, and an outline of any work anticipated for the next year;	Section 3, Section 4
A list of unauthorized discharges and follow-up action taken;	Section 11
Updates or revisions to the Water Management Plan, Abandonment and Restoration Plan, QA/QC, Waste Rock and Ore Storage Plan, and Spill Contingency Plan and/ or any other management plan;	Section 12
An updated estimate of the current Madrid Advanced Exploration Project restoration and liability, as required under Part C, Item 5, based upon the results of the restoration research, project development monitoring, and any modifications to the site plan;	Section 13
A brief description of follow-up action taken to address concerns detailed in inspection and compliance reports prepared by the Inspector;	Section 15
A summary of drilling activities and reclamation of drilling sites;	Section 3.2, Section 13
A public consultation/participation report describing consultation with local organizations and residents of the nearby communities, conducted during the Report period;	Section 14
A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;	Section 13
A summary of any specific studies or reports requested by the Board, and a brief description of any future studies planned or proposed; and any other details on the use of Water or the deposit of Waste requested by the board Board by the 1st of November of year being reported.	Section 5.3

Type A Water Licence 2BB-BOS1727	
Condition	**Section**
The monthly and annual quantities in cubic metres of all freshwater obtained from Aimaokatalok (Spyder) Lake, Monitoring Stations No. BOS-1a and from Stickleback Lake, Monitoring Station No. BOS-1b and additional sources of water identified for domestic and other uses under Part C, Item 1;	Section 5.4, Appendix D.4
The monthly and annual quantities in cubic metres of Mine water pumped from the underground;	Section 5.4, Appendix D.4
The monthly and annual quantities in cubic metres of Effluent discharged at Monitoring Station Number BOS-2, BOS-2, BOS-4 and BOS-5, BOS-6 and BOS-7;	Section 5.4, Appendix D.4
The monthly and annual quantities in cubic metres of non-compliant effluent transported to Doris North's Tailings Impoundment Area;	Section 5.4, Appendix D.4
The monthly and annual quantities in cubic metres of Sludge removed from the Sewage Treatment Facility;	Appendix D. 4
The annual quantities in cubic metres of all soil and types of contaminants from all locations that are placed within the Landfarm facility and/or transported to Doris North Project;	Section 6.2
Report all artesian flow occurrences as identified under Part F, Item 3;	Section 5.4
Boston Ephemeral Stream Monitoring Report;	Section 9.2, Appendix G
Tabular summaries of all data generated under the Monitoring Program;	Appendix D.4
A summary of modification and/or major maintenance work carried out on the Water Supply and the Waste Disposal Facilities, including all associated structures, and an outline of any work anticipated for the next year;	Section 3, Section 4
A list of unauthorized discharges and follow-up action taken;	Section 11
Updates or revisions to the Closure Plan, QA/QC, Water and Ore/Waste Rock Management Plan, Spill Contingency Plan, and Landfarm Plan and/or any other plans;	Section 12
A brief description of follow-up action taken to address concerns detailed in inspection and compliance reports prepared by the Inspector;	Section 15
A summary of drilling activities and progressive reclamation of drill sites;	Section 3.2, 13.1
An estimate of the current volume of waste rock and ore stockpiled on site;	Section 8.2
A public consultation/participation report describing consultation with local organizations and residents of the nearby communities, if any were conducted;	Section 14
A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;	Section 13
A summary of any specific studies or reports requested by the Board, and a brief description of any future studies planned or proposed; and	Section 5.4
Any other details on Water use or Waste disposal requested by the Board by November 1st of the year being reported.	Section 5.4

Appendix B
NWB Forms

NWB Annual Report **Year being reported:** 2017

License No: 2AM-DOH1323 **Issued Date:** August 16, 2013
Expiry Date: August 15, 2023

Project Name: Doris North Project

Licensee: TMAC Resources Inc.

Mailing Address:
95 Wellington St. W.
Suite 1010, PO Box 44
Toronto, Ontario M5J 2N7

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

Licence 2AM-DOH0713 was assigned from Hope Bay Mining Ltd. to TMAC Resources Inc. on June 18, 2013. This licence was renewed on Aug. 16, 2013 and renamed 2AM-DOH1323. This license was subsequently amended in December, 2016.

General Background Information on the Project (*optional):

Doris North transitioned from a construction phase into commercial operations in early 2017. The mill was fully commissioned in April and efforts were concentrated on a progressive ramp up in order to increase ore throughput and optimize gold recovery. Civil construction activities continue to expand service facilities. TMAC concluded another successful sealift operation including the purchase and delivery of 12,000,000 L of diesel fuel as well as explosives and reagents to support mining and milling activities. The sealift also included additional heavy equipment to support mining and construction operations as well as the acquisition of a 100 person accommodations facility to house TMAC's expanding workforce.
Underground waste development continued in 2017 with further advancement of the BTD decline and necessary support infrastructure. TMAC continued to drive ore development above the dyke for long hole drilling and blasting in Doris North, with the first ore sill for future long hole stoping blocks in BTD commencing in late Q2. TMAC also initiated waste development of DCO for future mining horizons in early Q3. Long hole blasting continued throughout 2017, with all ore production trucked to surface and added to the stockpile. TMAC continued underground exploration diamond drilling below the dyke ("BTD") at Doris, focused on the BTD East limb in 2017.

Licence Requirements: the licensee must provide the following information in accordance with

Part B	Item 4

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Doris Lake/Windy Lake - Allowable Domestic 22995 cu.m

Water Quantity:

480000 cu.m/yr*	Quantity Allowable Domestic (cu.m)
10496 cu. m/yr	Actual Quantity Used Domestic (cu.m)
not specified	Quantity Allowable Drilling (cu.m)
1137 cu. m/yr	Total Quantity Used Drilling (cu.m)

**Part E, Item 1 total volume from "all sources and for all purposes"*

Waste Management and/or Disposal

- [x] Solid Waste Disposal
- [x] Sewage
- [x] Drill Waste
- [x] Greywater
- [x] Hazardous

- [x] Other: Containment Berm and Control Pond Effluent

Additional Details:

Water for domestic use at Doris Camp was obtained from Windy Lake. Water is drawn from the lake at the freshwater intake and trucked to Doris Camp. The Doris Lake pump house is not supplying domestic water to Doris Camp at this time.

Waste produced on site is treated according to Part G of the licence, and in accordance with the relevant Management Plans *(Incinerator Management Plan, Non-Hazardous Waste Management Plan, Hazardous Waste Management Plan, Ore and Waste Rock Management Plan, Landfarm Management Plan, Waste Water Treatment Management Plan, and Interim Water Management Plan*).

Some specifics are as follows:

-Food waste is incinerated as per Part G Item 5
-Paper products, paperboard packing, and untreated wood waste is open burned as per Part G Item 6.
-TMAC is authorized to dispose of all non-hazardous solid waste in a landfill on site as per Part G Item 8. To date, a landfill has not been built. All waste that cannot be incinerated on site is backhauled to an approved facility off site or will be held for deposit in a landfill once constructed.
-Sewage and greywater produced onsite is processed in the sewage treatment plant as per Part G Item 4. Sludge produced by the treatment plant is burned in the incinerator or disposed as outlined in the Waste Water Treatment Management Plan. The site transitioned to sludge disposal in the TIA in August 2017.
-Hazardous materials such as waste oil, glycol, and contaminated soil are shipped offsite for disposal at an approved site as per Part G Item 11.
-All containment berm water is sampled for water quality against the discharge criteria of the licence. Water that meets the standards for discharge is released in accordance with the licence following a notification to the Inspector; water that does not meet the licence criteria is treated onsite until it is remediated to acceptable levels for discharge to the tundra, and/or it is discharged to the TIA.
-Runoff and contact seepage at site is managed in accordance with the Quarry Management and Monitoring Plan and Water Management Plan.

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)
Date of Spill:
Date of Notification to an Inspector:
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc.)

Please see section 11. of the attached Annual Report Supplement for a summary of all unauthorized discharges that occurred in 2017 under license 2AM-DOH1323.

Revisions to the Spill Contingency Plan

Other: (see additional details)

Additional Details:

Please see section 12. of the attached Annual Report Supplement for details.

Revisions to the Abandonment and Restoration Plan

Other: (see additional details)

Additional Details:

Please see Item 13. of the attached Annual Report Supplement for details.

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Please see Item 13. of the attached Annual Report Supplement for details.

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Details attached

Additional Details:

N/A

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Details attached

Additional Details:

N/A

Results of any additional sampling and/or analysis that was requested by an Inspector

No additional sampling requested by an Inspector or the Board

Additional Details: (date of request, analysis of results, data attached, etc.)

N/A

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board

Additional Details: (Attached or provided below)

N/A

Any responses or follow-up actions on inspection/compliance reports

Inspection Report received by the Licensee (Date):

Additional Details: (Dates of Report, Follow-up by the Licensee)

See section 15. of attached Annual Report Supplement for details on inspection action items and how these were addressed.

Any additional comments or information for the Board to consider

Please see attached Annual Report Supplement for additional information requirements set out in Licence No. 2AM-DOH1323

Date Submitted:	March 31 2018	
Submitted/Prepared by:	Oliver Curran	
Contact Information:	**Tel:**	416.628.0216 ext. 124
	Fax:	
	email:	Oliver.Curran@tmacresources.com

GPS Coordinates for water sources utilized

Source Description	UTM Easting	UTM Northing
ST-7 Doris Freshwater Intake	433598	7558710
ST-7a Windy Freshwater Intake	432529	7550500
Unnamed Lake to support regional exploration efforts	433440	7561460
Unnamed Lake to support regional exploration efforts	434180	7562020

GPS Locations of areas of waste disposal

Location Description	UTM Easting	UTM Northing
TL-1 (temp during dewatering)	434401	7559099
TL-5	435539	7556285
TL-6	435539	7556285
TL-7	various underground stopes	
ST-4	432450	7559600
ST-5	432960	7559270
ST-6A	432910	7563340
ST-6B	432730	7563200
ST-8 STP Discharge	432933	7559057
ST-9 STP Tundra Discharge	430798	7559290

GPS Locations of Active Monitoring Stations not included above*

Monitoring Station	UTM Easting	UTM Northing
ST-1	433146	7558923
ST-2	432232	7558921
ST-10	various locations as required	
ST-11	435057	7558771
ST-12	various locations as required	
TL-2	434053	7559507
TL-9	433153	7559137
TL-10	434890	7558238
TL-11	various locations as required	

** Thermal monitoring locations are documented in the Annual Geotechnical Report*

NWB Annual Report **Year being reported:** 2017

License No: 2BE-HOP1222 **Issued Date:** June 30, 2012
Expiry Date: June 30, 2022

Project Name: Hope Bay Regional Exploration Project

Licensee: TMAC Resources

Mailing Address:
95 Wellington St. W.
Suite 1010, PO Box 44
TD Centre
Toronto, Ontario M5J 2N7

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

Licence 2BE-HOP1222 was issued June 30, 2012 to Hope Bay Mining Ltd. Effective June 18, 2013, the NWB authorized the assignment of Licence 2BE-HOP1222 from Hope Bay Mining Ltd. To TMAC Resources Inc.

General Background Information on the Project (*optional):

Licence 2BE-HOP1222 allows TMAC to carry out activities in support of exploration drilling at the Hope Bay Regional Exploration Project and the Windy Camp, which supports exploration activities.

Licence Requirements: the licensee must provide the following information in accordance with

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Domestic and dust suppression water sourced from Windy Lake.

Water Quantity:	
22995 cu.m	Quantity Allowable Domestic (cu.m)
10496 cu. m.	Actual Quantity Used Domestic (cu.m)
29200 cu.m	Quantity Allowable Drilling (cu.m)
0 cu. m.	Total Quantity Used Drilling (cu.m)
30600 cu.m	Quantity Allowable Dust Suppression (cu.m)
64 cu.m	Total Quantity Used Dust Suppression (cu.m)

Waste Management and/or Disposal

- [x] Solid Waste Disposal
- [ ] Sewage
- [ ] Drill Waste
- [ ] Greywater
- [ ] Hazardous
- [x] Other: Contaminated Soil

Additional Details:

The Hope Bay Project was placed into Care and Maintenance in October 2012. Occupancy of the Old Windy Camp ended October 23, 2008 and dismantling and reclamation of the area is on-going.

Water was used from Windy Lake to supply domestic water to Doris Camp in accordance with 2BE-HOP1222 Part C, Item 1. Water used for drilling is taken from the closest lake to each drill using a similar system to the domestic system, or for drill locations accessible by road or winter ice road, water is hauled by truck from Windy Lake, or compliant berm effluent from the Doris Project is recycled through the drills to lessen freshwater lake use. In the case of regional drilling, water is taken from the closest lake to the drill site in accordance with Part C Item 1. Non-saline drill cuttings produced under this licence are deposited in a depression at Quarry D along the Doris-Windy AWR. Saline cuttings are removed to the waste rock pile at the Doris Project where any runoff is captured through the site water management system. No drilling activities occurred in this license area during 2017.

The Landfarm at Windy Camp and Bulk Fuel Storage Facilities at Windy Camp and Patch Lake have been dismantled and are in the process of reclamation. No effluent is produced at these locations.

Water accumulated in Quarries A, B and D is managed in accordance with the approved *Quarry A, B, D Management and Monitoring Plan* and the relevant sections of Part D of the licence. No discharges of water occurred form these sites in 2017.

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)

Date of Spill:

Date of Notification to an Inspector:

Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

No unauthorized discharges occurred in 2017 under licence 2BE-HOP1222.

Revisions to the Spill Contingency Plan

Additional Details:

Please see section 12. of the attached Annual Report Supplement for details.

Revisions to the Abandonment and Restoration Plan

Additional Details:

Please see section 12. of the attached Annual Report Supplement for details.

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Please see Item 13. of the attached Annual Report Supplement for details.

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Additional Details:

Details attached.

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Additional Details:

N/A

Results of any additional sampling and/or analysis that was requested by an Inspector

Additional Details: (date of request, analysis of results, data attached, etc)

No additional sampling requested.

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

Additional Details: (Attached or provided below)

No additional sampling requested.

Any responses or follow-up actions on inspection/compliance reports

Additional Details: (Dates of Report, Follow-up by the Licensee)

See section 15. of attached Annual Report Supplement for details on inspection action items and how these were addressed.

Any additional comments or information for the Board to consider

Please see attached Annual Report Supplement for additional information requirements set out in Licence No. 2BE-HOP1222.

Date Submitted:	March 31 2018	
Submitted/Prepared by:	Oliver Curran	
Contact Information:	**Tel:**	416.628.0216 ext.
	Fax:	
	email:	oliver.curran@tmacresouces.com

GPS Coordinates for water sources utilized

Source Description	Latitude	Longitude
HOP-1 - Raw water supply intake at Windy Lake	432529	7550500
Raw water supply intake at Doris Lake	433598	7558710

GPS Locations of areas of waste disposal

Source Description	Latitude	Longitude

NWB Annual Report **Year being reported:** 2017

License No: 2BB-MAE1727 **Issued Date:** May 23, 2017
Expiry Date: May 22, 2027

Project Name: Madrid Advanced Exploration Program

Licensee: TMAC Resources Inc.

Mailing Address:
95 Wellington St. W.
Suite 1010, PO Box 44
Toronto, Ontario M5J 2N7

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

Licence 2BB-MAE1727 was assigned to TMAC Resources Inc. on May 23, 2017.

General Background Information on the Project (*optional):

No construction, exploration or mining activities occurred in the Madrid license area in 2017. Baseline sampling was conducted during the open water season at proposed monitoring stations.

Licence Requirements: the licensee must provide the following information in accordance with

Part B | Item 2

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Patch Lake/Windy Lake

Water Quantity:	
108000 cu.m/yr*	Quantity Allowable Domestic (cu.m)
0 cu. m/yr	Actual Quantity Used Domestic (cu.m)
not specified	Quantity Allowable Drilling (cu.m)
0 cu. m/yr	Total Quantity Used Drilling (cu.m)

**Part E, Item 1 total volume from "all sources and for all purposes"*

Waste Management and/or Disposal

- ☐ Solid Waste Disposal
- ☐ Sewage
- ☐ Drill Waste
- ☐ Greywater
- ☐ Hazardous
- ☐ Other:

Additional Details:

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: N/A (as reported to the Spill Hot-line)
Date of Spill: N/A
Date of Notification to an Inspector: N/A
Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc.)

No spills occurred in this license area during 2017.

Revisions to the Spill Contingency Plan

Other: (see additional details)

Additional Details:

See section 12. of attached Annual Report Supplement for details.

Revisions to the Abandonment and Restoration Plan

Other: (see additional details)

Additional Details:

Please see Item 12. of the attached Annual Report Supplement for details.

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Please see Item 13. of the attached Annual Report Supplement for details.

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Details attached

Additional Details:

N/A

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Not Applicable (N/A)

Additional Details:

N/A

Results of any additional sampling and/or analysis that was requested by an Inspector

No additional sampling requested by an Inspector or the Board

Additional Details: (date of request, analysis of results, data attached, etc.)

N/A

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board

Additional Details: (Attached or provided below)

N/A

Any responses or follow-up actions on inspection/compliance reports

No inspection and/or compliance report issued by INAC

Additional Details: (Dates of Report, Follow-up by the Licensee)

N/A

Any additional comments or information for the Board to consider

Please see attached Annual Report Supplement for additional information requirements set out in Licence No. 2BB-MAE1727.

Date Submitted:	March 31 2018	
Submitted/Prepared by:	Oliver Curran	
Contact Information:	**Tel:**	416.628.0216 ext. 124
	Fax:	
	email:	oliver.curran@tmacresouces.com

GPS Coordinates for water sources utilized

Source Description	UTM Easting	UTM Northing
MAE-01 Windy Freshwater Intake	432529	7550500

GPS Locations of areas of waste disposal

Location Description	UTM Easting	UTM Northing

GPS Locations of Active Monitoring Stations not included above*

Monitoring Station	UTM Easting	UTM Northing
MAE-14	7550317	432644
MAE-15	7550458	433578
MAE-16	7547060	434748

NWB Annual Report **Year being reported:** 2017

License No: 2BB-BOS1727 **Issued Date:** August 1, 2017
Expiry Date: July 31, 2027

Project Name: Boston Advanced Exploration Project

Licensee: TMAC Resources Inc.

Mailing Address:
95 Wellington St. W.
Suite 1010, PO Box 44
Toronto, Ontario M5J 2N7

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

Licence 2BB-BOS1217 was issued Aug 2, 2012 to Hope Bay Mining Ltd. Effective June 18, 2013, the NWB authorized the assignment of Licence 2BB-BOS1217 from Hope Bay Mining Ltd. to TMAC Resources Inc. The license was renewed on August 1, 2017 and renamed 2BB-BOS1727.

General Background Information on the Project (*optional):

The Boston site supports advanced mineral exploration in the south end of the Hope Bay Greenstone Belt. TMAC brought the Boston exploration camp out of care and maintenance to support a diamond-drilling exploration program between June and August. While the camp was occupied additional efforts were dedicated to the reclamation of legacy drill sites and to bring parts of the site back into a state of repair. At Boston, TMAC initiated surface exploration diamond drilling to provide further understanding of the geological controls on gold mineralization and results will be incorporated into the updated geological model and resource estimate. Regional gold in till sampling continued in 2017 and several anomalous sample results represent high priority targets for future exploration.

Licence Requirements: the licensee must provide the following information in accordance with

Part B	Item 9

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Aimaokatalok (Spyder) Lake for domestic use and drilling purposes. The total quantity of water allowable by the licence is 36,500 m3/yr or 100 m3/day. There is no differentiation between quantities to be used domestically or for drilling.

Water Quantity:

not specified	Quantity Allowable Domestic (cu.m)
300	Actual Quantity Used Domestic (cu.m)
not specified	Quantity Allowable Drilling (cu.m)
853	Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal

- [x] Solid Waste Disposal
- [x] Sewage
- [x] Drill Waste
- [x] Greywater
- [ ] Hazardous
- [x] Other: Fuel Farm Berm, Containment Pond and Mine Portal discharges

Additional Details:

The Boston camp was temporarily taken out of care and maintenance in June 2017 to support a regional exploration drilling program. The camp was closed again in September 2017.

Water for domestic use at Boston Camp is obtained from Aimaokatalok Lake via a 2 inch diameter submerged pipe with a DFO compliant fish screen. This intake pipe is linked to a pump house located approximately 30 metres from shore. In winter, the pump house is moved onto the ice to decrease the length of heat-traced line required to reach the location where the water is open under the ice.

Waste produced on site will be treated according to Part D of the licence, and in accordance with the relevant Management Plans *(Incineration Management Plan, Non-Hazardous Waste Management Plan, and Hazardous Waste Management Plan*). Some specifics are as follows:
-Food waste, paper waste and untreated wood waste is burned in the incinerator as per Part D Item 3.
-Solid waste that cannot be burned is transferred to the Roberts Bay waste management facility for packaging and is taken offsite for disposal.
-Drill cuttings produced under this licence are disposed of in depressions as per Part F Item 2.
-Sewage and greywater produced on site is processed in the sewage treatment plant as per Part D Item 11. Sludge is transported to Doris camp for disposal via winter track.
-Waste hazardous materials such as waste oil, glycol, and contaminated soil are shipped to Doris North either to be reclaimed or shipped offsite for disposal in an approved facility as per Part D Item 6.
-Fuel berm effluent is sampled for water quality against the discharge criteria of the licence. Effluent that meets the standards for discharge is released in accordance with the licence following a notification to the Inspector. Effluent that does not meet the licence criteria is treated onsite within the BOS-2 containment until it is remediated to acceptable levels for discharges from BOS-2 and BOS-5, or it is removed offsite for treatment/disposal.
-Effluent from the landfarm is sampled in accordance with the licence criteria for discharge when water is available - no discharges occurred from the facility in 2017.
- Effluent from the mine portal/decline is sampled in accordance with the criteria specified for Monitoring Station BOS-9.

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: (as reported to the Spill Hot-line)

Date of Spill:

Date of Notification to an Inspector:

Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

Please see section 11. of the attached Annual Report Supplement for a summary of all unauthorized discharges that occurred in 2017 under license 2BB-BOS1727.

Revisions to the Spill Contingency Plan

Additional Details:

See section 12. of attached Annual Report Supplement for details.

Revisions to the Abandonment and Restoration Plan

Additional Details:

Please see Item 12. of the attached Annual Report Supplement for details.

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

Please see Item 12. of the attached Annual Report Supplement for details.

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Additional Details:

Details attached.

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Additional Details:

N/A

Results of any additional sampling and/or analysis that was requested by an Inspector

Additional Details: (date of request, analysis of results, data attached, etc)

No additional sampling or analysis was requested.

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

Additional Details: (Attached or provided below)

N/A

Any responses or follow-up actions on inspection/compliance reports

Additional Details: (Dates of Report, Follow-up by the Licensee)

See section 15. of attached Annual Report Supplement for details on inspection action items and how these were addressed.

Any additional comments or information for the Board to consider

Please see attached Annual Report Supplement for additional information requirements set out in Licence No. 2BB-BOS1727.

Date Submitted: March 31 2018
Submitted/Prepared by: Oliver Curran
Contact Information:
Tel: 416.628.0216 ext.
Fax:
email: Oliver.curran@tmacresouces.com

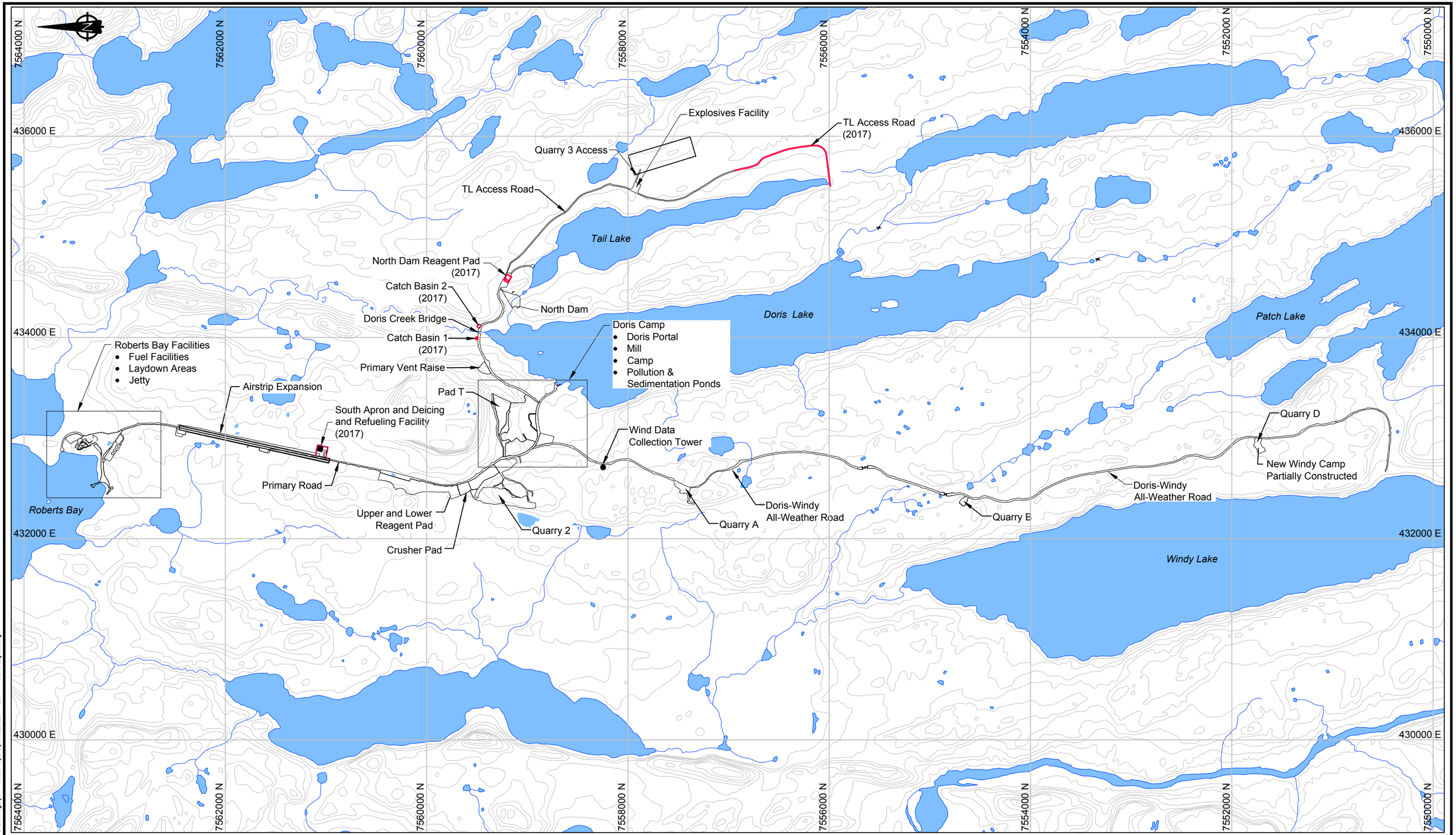
GPS Coordinates for water sources utilized

Source Description	Latitude			Longitude		
	Deg °	Min '	Sec "	Deg °	Min '	Sec "
BOS-1 - Raw water supply intake at Spyder Lake	67	39	34.7	106	23	39.9

GPS Locations of areas of waste disposal

Location Description (type)	Latitude			Longitude		
	Deg °	Min '	Sec "	Deg °	Min '	Sec "
BOS-2 - Containment Pond Discharge	67	39	29.3	106	22	58.2
BOS-3 - Sewage Disposal Facility Final Discharge	67	39	33.9	106	23	10.5
BOS-4 - Treated sewage effluent point prior to entry into Aimaokatuk (Spyder) Lake	67	39	41.2	106	23	10.1
BOS-5 - Effluent from the bulk fuel storage facility prior to release	67	39	27.5	106	23	1.2
BOS-6 - Effluent from the landfarm treatment facility prior to release	67	39	29.3	106	23	3.5

Appendix C
Site Layouts



LEGEND

- Asbuilt Crests / Toes
- 2017 Construction Items

NOTES

1. Coordinate system is UTM Zone 8, NAD83.

0m 350 700 1050 1400

srk consulting

SRK JOB NO.: 1CT022.026

FILE NAME: 1CT022.026 - 2017 - Doris Layout.dwg

TMAC RESOURCES

HOPE BAY PROJECT

2017 KIA Annual Report

Doris Area 2017 As-Built Summary

DATE:	APPROVED:	FIGURE:
February 2018	CH	1

P:\01_SITES\Hope Bay\ACAD\2018 Drawings\KIA Annual Report\1CT022.026 – 2017 – Doris Layout.dwg

srk consulting	MAC RESOURCES	2017 KIA Annual Report
		Doris Site Layout Looking North
Job No: 1CT022.022 Filename: Boston & Doris Figures for 2017 KIA AR.ppt	HOPE BAY PROJECT	Date: March 2018 / Approved: EMR / Figure: 2

srk consulting	TMAC RESOURCES	2017 KIA Annual Report
		Boston Site Layout Looking West
Job No: 1CT022.022 Filename: Boston & Doris Figures for 2017 KIA AR.ppt	HOPE BAY PROJECT	Date: March 2017 / Approved: EMR / Figure: 3

Appendix D

Water Licence(s) Monitoring Data

Appendix D.1. 2AM-DOH1323

Appendix D.2. 2BE-HOP1222

Appendix D.3. 2BB-MAE1727

Appendix D.4. 2BB-BOS1217

Appendix D.1. 2AM-DOH1323

The Type A Water Licence No. 2AM-DOH1323 details the sampling and analysis requirements for the Surveillance Network Program (SNP) program. Table D1-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2AM-DOH1323. The location of each sampling point is illustrated in Figure D1-1 below.

Table D1-1. 2AM-DOH1323 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
ST-1	Sedimentation Pond	Construction, Operation, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Annually
ST-2	Pollution Control Pond	Construction, Operation, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Annually
ST-3	Discharge from Non-hazardous Landfill pollution control sump	Construction, Care and Maintenance, Operation, Closure	G, MT and Total Ammonia-N, Total Sulphate, Total and Free CN, Total Oil and Grease	Annually. Once prior to every discharge onto the tundra
			D	Daily during periods of discharge
ST-4	Discharge from Landfarm sump	Construction, Operation, Care and Maintenance, Closure	G, HC, total Ammonium, total Lead	Annually. Once prior to every discharge onto the tundra
			D	Daily during periods of discharge
ST-5	Discharge from the Plant Site Fuel Storage and Containment Area Sump	Construction, Operation, Care and Maintenance, Closure	G, HC, Total Pb	Annually. Once prior to every discharge onto the tundra
			D	Daily during periods of discharge
ST-6a and ST-6b	Discharge from the Roberts Bay Fuel Storage and Containment Area Sumps	Construction, Operation, Care and Maintenance, Closure	G, HC, Total Pb	Annually. Once prior to every discharge onto the tundra
			D	Daily during periods of discharge
ST-7	Freshwater pumped from Doris Lake	Construction, Operation, Care and Maintenance, and Closure	G, N1, N2, MT and Free CN, Total CN, T-Ag, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl, and Total Oil and Grease, Cl	Monthly during periods of pumping
			D	Monthly during periods of pumping
			Cl-a	Annually

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
ST-7a	Freshwater pumped from the Windy Lake freshwater intake	Construction, Operation, Care and Maintenance, Closure	G, N1, N2, MT and, T-Ag, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, T-Tl, T-Ca, and Total Oil and Grease	Monthly during periods of pumping
			B	
			D	
ST-8	Discharge from Wastewater Treatment Plant bio-membrane	Construction, Operation, Care and Maintenance, Closure	G, B, and Total Oil and Grease	Monthly when discharge to the Tundra, Annually when discharge to the TIA
			Location of discharge	Monthly during periods of discharge
			D	Daily during periods of discharge
ST-9	Runoff from Wastewater Treatment Plant discharge - downstream of wastewater treatment plant discharge point and just prior to flow entering Doris Lake	Construction, Operation, Care and Maintenance, Closure	G, B, and Total Oil and Grease	Monthly when discharged to the tundra
ST-10	Site Runoff from Sediment Controls	Construction, Operations, Closure	TSS or Turbidity (following development and approval of a site-specific TSS-Turbidity)	Daily during periods of discharge
ST-11	Reagent and Cyanide Storage Facility Sumps	Construction, Operation, Care and Maintenance, Closure	G, HC , MT, Total Ammonia, Total and Free Cyanide, and D	Annually
ST-12	Doris Lake	Operation, Closure	Water Level	Monthly
			Ice Thickness	Annually in April
ST-13	Pollution Control Pond associated to Pad U	Construction, Operation, Care and Maintenance, Closure	G, N1, MT and Total Sulphate, Total CN, Total Oil and Grease, Alkalinity, Chloride, and Total Metals by ICP-MS	Annually
TL-1	TIA at the Reclaim Pipeline	Operation, Care and Maintenance, Closure, Post-Closure (for up to 9 years after cessation of mining)	G, N1, N2, MT and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr,T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, HC, FC	Monthly during Operations, Closure and Post-Closure Annually during Care and Maintenance
			Dissolved Oxygen and Redox Potential	Annually
			Acute Lethality	Annually during Post-Closure
			B	Annually

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
TL-2	Doris Outflow Creek - upstream (at the flow monitoring station adjacent to the bridge)	Closure, Post-Closure (for up to 9 years after cessation of mining)	G, N1, N2, MT and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, Oil and Grease	Annually during Care and Maintenance Annually for 2 years prior to Post-Closure, and during Post-Closure, Increase to three times per year (under ice, freshet, and pre-freeze up), two years prior to breach of the North Dam.
		Operation	D	Daily upon commencement of mining in or beneath the Doris Lake Talik.
TL-3	Doris Outflow Creek (~80m downstream of the base of the waterfall)	Care and Maintenance, prior to any deposit of tailings to the TIA	G, N1, N2, MT and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, Total Oil and Grease D	Inactive
TL-4	TIA Discharge End-of-Pipe	Care and Maintenance, prior to any deposit of tailings to the TIA	G, N1, N2, MT, and TDS, Cl, Free CN, Total CN, T-Ag, T-Ca, T-Cd, T-Cr, T-Hg, T-K, T-Mo, T-Mg, T-Na, T-Se, T-Tl, T-Radium 226 Acute Lethality B D	Inactive
TL-5	Effluent from Process Plant (tailings slurry/ water)	Operations	G, N1, MT, and Free CN, Total CN, WAD CN, Sulphate, T-Cd, T-Cr, T-Hg, T-Mo, T-Se, and Total Metals by ICP-MS Cyanate and Thiocyanate	Quarterly
TL-6	Tailings Discharged into TIA (Solid Component) taken from a valve in the mill at the discharge end of the mill tailings pumps	Operations	Tonnage of dry tailings solids	Monthly during periods of discharge
			MT and T-Cd, T-Cr, T-Hg, T-Mo, T-Se, Total Inorganic Carbon and Total Metals by ICP-MS (must include Sulphur)	Sampled on a weekly basis with analyses carried out monthly on a composite sample of the TL-6 weekly samples
TL-7	Detoxified tailings sent underground as backfill	Operations	Dry tonnage of detoxified tailings sent underground; WAD CN, Total Inorganic Carbon, Total Metals by ICP-MS (including Sulphur), Moisture content of backfill trucked underground	Monthly
			Cyanate and Thiocyanate	Quarterly
TL-8	Reclaim water pumped from TIA to Mill Process water tank taken from a valve at the discharge end of the reclaim water pump	Inactive		Inactive

SNP Station	Description	Phase	Monitoring Parameters	Frequency during Operations and Anytime after Initial Deposit of Tailings to the TIA
TL-9	Detox tailings reactor tank (650-TK-565)	Operations	Continuous automated monitoring. Should the automatic monitor used to carry out this measurement be out of service manual samples from the detox filter feed pumps (650-PU-567/568) will be used to verify process operations.	
TL-10	Water Column in deepest portion of Tail Lake and at a location away from the TIA Reclaim water floating pump house, sampled at surface, mid- depth and near bottom	Inactive		Inactive
TL-11	Seepage from underground backfilled stopes	Operations	Visual inspection for seepage. If seepage present parameters to be monitored include N1 and pH, EC, Trace metals by ICP-MS, Alkalinity, Acidity, Sulphate, Total and WAD CN	Survey Twice annually
TL-12	Mine Water Discharge Point	Operations during continuous pumping	Chloride, TDS and nitrate Total Ammonia, Nitrate, Nitrite, pH, EC, ICPMS Metals, alkalinity, sulphate, TSS, major ions and Total and WAD Cyanide D	Weekly Monthly Daily during periods of discharge

Figure D1-1. 2AM-DOH1323 Sample Stations Location

SUMMARY OF MONTHLY MONITORING REPORTING [SEE PART J ITEM 21]

The Project transitioned from a construction phase into commercial operations in early 2017. The mill was fully commissioned in April and efforts were concentrated on a progressive ramp up in order to increase ore throughput and optimize gold recovery. Construction activities in 2017 included; light duty mechanical shop, additional warehousing, an arctic corridor to connect the main camp and the mill building. Earthworks continued in order to expand the Doris Airstrip south apron to include a lined aircraft de-icing and refueling pad. This also included the completion of another Tailings Catchment Basin, the Reagents Storage berm and the South Dam access road.

Underground waste development continued in 2017 with further advancement of the BTD decline and necessary support infrastructure. TMAC continued to drive ore development above the dyke for long hole drilling and blasting in Doris North, with the first ore sill for future long hole stoping blocks in BTD commencing in late Q2. TMAC also initiated waste development of DCO for future mining horizons in early Q3. Long hole blasting continued throughout 2017, with all ore production trucked to surface and added to the stockpile. TMAC continued underground exploration diamond drilling below the dyke ("BTD") at Doris, focused on the BTD East limb in 2017.

During 2017, TMAC collected data from the following active or seasonally active monitoring stations: TL-1, TL-2, TL-5, TL-6, TL-7, TL-9, TL-11, ST-1, ST-2, ST-4, ST-5, ST-6a, ST-6b, ST-7, ST-7a, ST-8, ST-9, ST-10, and ST-12.Monitoring at station TL-12 (Mine Water Discharge Point) did not occur, as mine water was not discharged in 2017.

Monitoring at station ST-3 (Landfill Sump) and station ST-13 (Pollution Control Pond #2) did not occur, as these facilities were not constructed as of 2017.

Monitoring at station ST-11 (Reagent and Cyanide Storage Facility Sumps) did not occur, as construction of this facility was not completed until the end of 2017 during the winter season.

Monitoring of the TIA was undertaken at monitoring station TL-1. Construction of the processing plant was completed in 2017, and monitoring of the tailings deposited into the TIA was conducted at monitoring stations TL-5 and TL-6. Monitoring of detoxified tailings backfilled underground was completed at monitoring stations TL-7 and TL-11. As described in the Hope Bay Water Management Plan, the sedimentation pond (ST-1) was used as a collection pond for the water that accumulated in the pollution control pond (ST-2) and the two underflow sumps (ST2-S1 and ST2-S2). The water collected in ST-1 was then transferred to the TIA by pipeline. Dewatering of the TIA did not occur in 2017.

All monitoring was conducted in accordance with the Hope Bay Project Quality Assurance and Quality Control Plan (2017).

TMAC uses an external certified laboratory to carry out all analyses reported in the monthly and annual reports. The QA/QC data produced by ALS Canada Ltd. are used to determine the accuracy and precision of results in these reports.

Thermal monitoring was undertaken in 2017 at active ground temperature monitoring stations. Results of this monitoring are included in the annual Geotechnical Inspection report.

Conditions of the Doris North Diversion Berm's effectiveness during spring freshet, major rain events, and periods of sustained (non-frozen) precipitation were monitored and documented.

Details of all monitoring follows.

ST-1 Sedimentation Pond

This facility was constructed and first used in 2011. In 2017, during open water season, all discharges from the facility were made directly to the TIA via pipeline as per Part G Item 22. All discharges from the facility were metered. Water quality samples were collected from an outlet on the discharge pump with the intake on the pump submerged approximately 0.25m below the water surface in the Sedimentation Pond. If the pump was not running, samples were collected from the pond itself. Samples were taken prior to discharge and then monthly thereafter during periods of discharge for internal monitoring purposes.

Water was transferred from ST-1 to the TIA beginning in June and continued into September. The final day of discharge from the Sedimentation Pond was September 26, 2017.

Volumes transferred to the TIA from ST-1 are summarized in Table D1-2. This includes water transferred from ST-2, ST2-S1, and ST2-S2 to ST-1, as described above, and water transferred from fuel storage facility berms ST-5, ST-6a and ST-6b. Results of water quality samples, collected monthly from ST-1, are summarized in Table D1-3.

Table D1-2. Summary of Monthly Water Management Volumes for Monitoring Station ST-1, June to September 2017

Month	Monthly Volume (m^3)	Cumulative Volume (m^3)*
June	8,216	8,216
July	3,806	12,022
August	2,984	15,006
September	4,658	19,664
Total Volume of Water Transferred from ST-1 (includes water from ST-2, ST2-S1, and ST2-S2) to TIA in 2017		**19,664**

** Values rounded to nearest whole cubic metre.*

ST-2 Pollution Control Pond

This facility was constructed in 2011. In 2017, it was active between June and September. Samples from ST-2 were collected from a depth of 0.25 m below the water surface. All water from the Pollution Control Pond was directed to the Sedimentation Pond.

Water quality monitoring sampling at ST-2 occurred as per Schedule J of the water licence. Results of the sampling are presented in Table D1-4.

ST-4 Landfarm

A discharge notification for this facility was provided to the Inspector on May 21, 2017. Water from the Landfarm (ST-4) was sampled on July 5, 2017 and was compliant with criteria outlined in Part G Item 23(c) of the water licence. No discharge from this facility occurred in 2017, as all water was transferred to the Sedimentation Pond. Results of Landfarm water sampling are presented in Table D1-5.

Table D1-3. Water Quality Monitoring Program Results for ST-1, May to September 2017

Sample ID		ST1-22MAY17A	ST1-22MAY17B*	ST1-22JUN17	ST1-13JUL17	ST1-14AUG17	ST1-11SEP17
ALS ID		L1929856-1	L1929856-3	L1943901-1	L1958268-1	L1975708-1	L1989925-1
Date Sampled		5/22/2017 2:05:00 PM	5/22/2017 2:05:00 PM	6/15/2017 9:10:00 AM	7/13/2017 7:05:00 AM	8/14/2017 2:00:00 PM	9/11/2017 11:10:00 AM
Parameter	**Units**	**Results**					
Hardness (as $CaCO_3$)	mg/L	111 [A]	114 [A]	940 [A]	1,470 [A]	2,310 [A]	1,970 [A]
pH	pH	7.42	7.37	7.68	7.89	7.81	7.84
Total Suspended Solids	mg/L	9.8	<3.0	6.7	5	9.6	19
Alkalinity, Total (as $CaCO_3$)	mg/L	14.7	14.1	85.6	121	106	97.4
Ammonia, Total (as N)	mg/L	1.54	1.47	18.3	25.2	45.2	33
Bromide (Br)	mg/L	0.127	0.146	1.4	1.7	2.9	2.6
Chloride (Cl)	mg/L	85.5	95	997	1,320	2,560	2,030
Fluoride (F)	mg/L	<0.020	<0.020	<0.40 [B]	<0.40 [B]	<1.0 [B]	<1.0 [B]
Nitrate (as N)	mg/L	4.28	4.77	50	62.2	102	85.5
Nitrite (as N)	mg/L	0.044	0.0478	0.642	1.58	1.75	1.38
Sulfate (SO4)	mg/L	14.4	15.9	187	193	218	179
Cyanide, Total	mg/L	<0.0050	<0.0050	2.33	1.78	0.0343 [C]	0.258
Aluminum (Al)-Total	mg/L	0.253	0.258	0.113	0.0566	0.114	0.082
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	0.00113	0.00092	0.00074	0.00062
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	0.00322	0.0023	0.00152	0.00149
Barium (Ba)-Total	mg/L	<0.020	<0.020	0.068	0.104	0.16	0.127
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00020 [B]	<0.00020 [B]	<0.00050 [B]	<0.00050 [B]
Boron (B)-Total	mg/L	<0.10	<0.10	0.28	0.32	0.3	0.25
Cadmium (Cd)-Total	mg/L	0.0000275	0.0000313	0.00018	0.000155	0.000244	0.000281
Calcium (Ca)-Total	mg/L	35.1	36	300	473	752	621
Chromium (Cr)-Total	mg/L	0.0016	0.0018	0.0039	0.003	0.0026	0.0022
Cobalt (Co)-Total	mg/L	0.0005	0.00051	0.055	0.0776	0.0696	0.0439
Copper (Cu)-Total	mg/L	0.0032	0.0036	3.56	2.55	1.08	0.514
Iron (Fe)-Total	mg/L	0.479	0.488	0.915	0.466	0.305	0.259
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Sample ID		ST1-22MAY17A	ST1-22MAY17B*	ST1-22JUN17	ST1-13JUL17	ST1-14AUG17	ST1-11SEP17
ALS ID		L1929856-1	L1929856-3	L1943901-1	L1958268-1	L1975708-1	L1989925-1
Date Sampled		5/22/2017 2:05:00 PM	5/22/2017 2:05:00 PM	6/15/2017 9:10:00 AM	7/13/2017 7:05:00 AM	8/14/2017 2:00:00 PM	9/11/2017 11:10:00 AM
Parameter	**Units**	**Results**					
Lithium (Li)-Total	mg/L	0.0017	0.0019	0.0139	0.0156	0.0198	0.0219
Magnesium (Mg)-Total	mg/L	5.7	5.78	46.3	70.8	106	102
Manganese (Mn)-Total	mg/L	0.0781	0.0798	1.01	0.903	1.2	1.45
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	0.0000135	0.0000131	0.0000242	0.0000059
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	0.0107	0.0106	0.0083	0.0066
Nickel (Ni)-Total	mg/L	0.0012	0.0012	0.0979	0.1	0.0732	0.0469
Potassium (K)-Total	mg/L	2.2	2.2	33.1	39.2	51.3	40.8
Selenium (Se)-Total	mg/L	0.000155	0.00014	0.0044	0.00428	0.00382	0.00294
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	0.0413	0.0125	0.00433	0.00234
Sodium (Na)-Total	mg/L	26	26.1	346	398	556	546
Thallium (Tl)-Total	mg/L	<0.00020	<0.00020	<0.00020	0.000051	0.000063	<0.000050 [B]
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	0.017	0.015	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020	0.00118	0.00193	0.00212	0.00168
Vanadium (V)-Total	mg/L	0.00157	0.00165	0.0016	0.0012	<0.0025 [B]	<0.0025 [B]
Zinc (Zn)-Total	mg/L	0.0083	0.0087	0.0175	0.072	0.074	0.08
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	No	No	No	No

** Duplicate Sample*

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

[B] Detection Limit adjusted for required dilution.

[C] Test result for Total Cyanide may be biased high due to interference from high nitrite in this sample. Nitrite can cause false positives for T-CN at up to ~ 0.8% of the nitrite concentration. Interpret result as a maximum possible value.

Table D1-4. Water Quality Monitoring Program Results for ST-2, May to September 2017

Sample ID		ST2-22MAY17	ST2-22JUN17	ST2-14AUG17A	ST2-14AUG17B*	ST2-11SEP17
ALS ID		L1929856-2	L1943901-2	L1975708-2	L1975708-3	L1989925-2
Date Sampled		5/22/2017 1:40:00 PM	6/15/2017 8:40:00 AM	8/14/2017 2:20:00 PM	8/14/2017 2:20:00 PM	9/11/2017 11:25:00 AM
Parameter	**Units**	**Results**				
Hardness (as $CaCO_3$)	mg/L	418 [A]	922 [A]	2,600 [A]	2,640 [A]	1,810 [A]
pH	pH	7.93	7.51	7.56	7.54	7.86
Total Suspended Solids	mg/L	6	5.3	16.2	15	8.4
Alkalinity, Total (as $CaCO_3$)	mg/L	55	85.5	105	119	98.6
Ammonia, Total (as N)	mg/L	6.55	19.5	55.3	51.4	31.5
Bromide (Br)	mg/L	0.54	1.5	3.2	3.7	2.7
Chloride (Cl)	mg/L	398	1,080	2,670	3,000	1,940
Fluoride (F)	mg/L	<0.10 [B]	<0.40 [B]	<1.0 [B]	<1.0 [B]	<1.0 [B]
Nitrate (as N)	mg/L	18	52.7	102	115	82.7
Nitrite (as N)	mg/L	0.239	0.607	1.59	1.79	1.12
Sulfate (SO4)	mg/L	121	171	237	272	205
Cyanide, Total	mg/L	5.05	2.53	1.6	1.78	0.681
Aluminum (Al)-Total	mg/L	0.441	0.0171	0.046	0.0456	0.0478
Antimony (Sb)-Total	mg/L	0.00052	0.00112	0.00089	0.00092	0.00068
Arsenic (As)-Total	mg/L	0.00237	0.00255	0.00214	0.00206	0.00175
Barium (Ba)-Total	mg/L	0.031	0.066	0.182	0.175	0.099
Beryllium (Be)-Total	mg/L	<0.00010	<0.00020 [B]	<0.00050 [B]	<0.00020 [B]	<0.00020 [B]
Boron (B)-Total	mg/L	0.16	0.26	0.3	0.3	0.31
Cadmium (Cd)-Total	mg/L	0.000155	0.000175	0.000257	0.000252	0.000151
Calcium (Ca)-Total	mg/L	135	293	843	868	573
Chromium (Cr)-Total	mg/L	0.003	0.0031	0.0028	0.0028	0.0032
Cobalt (Co)-Total	mg/L	0.0373	0.0441	0.0865	0.08	0.0365
Copper (Cu)-Total	mg/L	3.24	2.4	1.64	1.48	0.478
Iron (Fe)-Total	mg/L	1.67	0.535	0.257	0.254	0.208
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Sample ID		ST2-22MAY17	ST2-22JUN17	ST2-14AUG17A	ST2-14AUG17B*	ST2-11SEP17
ALS ID		L1929856-2	L1943901-2	L1975708-2	L1975708-3	L1989925-2
Date Sampled		5/22/2017 1:40:00 PM	6/15/2017 8:40:00 AM	8/14/2017 2:20:00 PM	8/14/2017 2:20:00 PM	9/11/2017 11:25:00 AM
Parameter	**Units**	**Results**				
Lithium (Li)-Total	mg/L	0.0086	0.012	0.0234	0.0249	0.0162
Magnesium (Mg)-Total	mg/L	19.4	46	120	115	92.6
Manganese (Mn)-Total	mg/L	0.339	0.974	1.72	1.53	1.2
Mercury (Hg)-Total	mg/L	0.000014	0.000009	0.0000196	0.0000193	0.0000055
Molybdenum (Mo)-Total	mg/L	0.0048	0.0101	0.0099	0.0101	0.0087
Nickel (Ni)-Total	mg/L	0.0657	0.0803	0.0925	0.0852	0.0408
Potassium (K)-Total	mg/L	10.3	31.2	63	60.1	42.2
Selenium (Se)-Total	mg/L	0.00238	0.00421	0.00456	0.00459	0.0031
Silver (Ag)-Total	mg/L	0.0509	0.0218	0.0155	0.0149	0.0057
Sodium (Na)-Total	mg/L	152	312	645	621	473
Thallium (Tl)-Total	mg/L	<0.00020	<0.00020	0.000063	0.000069	0.000026
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	0.018	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	0.00066	0.00112	0.00198	0.00208	0.00155
Vanadium (V)-Total	mg/L	0.00296	<0.0010 [B]	<0.0025 [B]	<0.0010 [B]	<0.0010 [B]
Zinc (Zn)-Total	mg/L	0.042	<0.0060 [B]	<0.015 [B]	0.0076	<0.0060 [B]
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	No	No	No

** Duplicate Sample*

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

[B] Detection Limit adjusted for required dilution.

Note: There was insufficient water available in the Pollution Control (ST-2) collect a sample in July.

Table D1-5. Water Quality Monitoring Program Results for ST-4, July 2017

Sample ID		ST4-05JUL17A	ST4-05JUL17B*	Part G Item 23(e.)
ALS ID		L1955175-1	L1955175-2	
Date Sampled		7/5/2017 6:05:00 PM	7/5/2017 6:05:00 PM	
Parameter	**Units**	**Results**		**Maximum Allowable Concentration (mg/L)**
pH	pH	8.47	8.47	6.0-9.0
Total Suspended Solids	mg/L	7.3	6.5	15.0
Ammonia, Total (as N)	mg/L	0.0117	0.01	2.0
Lead (Pb)-Total	mg/L	0.000058	0.000065	0.01
Oil and Grease	mg/L	<5.0	<5.0	5
Oil And Grease (Visible Sheen)		No	No	-
Benzene	mg/L	<0.00050	<0.00050	0.37
Ethylbenzene	mg/L	<0.00050	<0.00050	0.09
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	<0.00050	
Styrene	mg/L	<0.00050	<0.00050	
Toluene	mg/L	<0.00045	<0.00045	0.002
ortho-Xylene	mg/L	<0.00050	<0.00050	
meta- & para-Xylene	mg/L	<0.00050	<0.00050	
Xylenes	mg/L	<0.00075	<0.00075	
4-Bromofluorobenzene (SS)	%	116.9	92.3	
1,4-Difluorobenzene (SS)	%	103.2	107.4	

** Duplicate sample.*

ST-5 Doris Plant Site Fuel Storage and Containment

Water from the Doris tank farm (ST-5) was sampled on May 22, 2017 prior to discharge events and was compliant with discharge criteria for all parameters outlined in Part G Item 23(e). Results of this sampling are presented in Table D1-6. A discharge notification was provided to the Inspector May 21, 2017.

A total of 45 m^3 of water was discharged during May and June to a location just north of the berm (13W 432966 7559268) as approved by the Inspector. 60 m^3 of water was transferred to the Sedimentation Control Pond for transfer to the TIA.

ST-6a Roberts Bay Bulk Fuel Storage Facility

Water from the Roberts Bay 5ML tank farm (ST-6a) was sampled on May 22, 2017 prior to discharge and was found to be compliant with discharge criteria for all parameters outlined in Part G Item 23(e). Results of this sampling are presented in Table D1-7. A discharge notification was provided to the Inspector May 21, 2017.

A total of 228 m^3 of water was discharged just north of the berm (13W 432973 7563440) in June as approved by the Inspector. 41 m^3 of water was transferred to the Sedimentation Control Pond for transfer to the TIA.

Table D1-6. Water Quality Monitoring Program Results for ST-5, May 2017

Sample ID	ST5-22MAY17	Part G Item 23(e.)
ALS ID	L1929891-1	
Date Sampled	5/22/2017 3:45:00 PM	
Parameter / **Units**	**Results**	**Maximum Allowable Concentration (mg/L)**
pH / pH	7.79	6.0-9.0
Total Suspended Solids / mg/L	<3.0	15.0
Lead (Pb)-Total / mg/L	0.000279	0.01
Oil and Grease / mg/L	<5.0	5
Oil And Grease (Visible Sheen)	No	-
Benzene / mg/L	<0.00050	0.37
Ethylbenzene / mg/L	<0.00050	0.09
Methyl t-butyl ether (MTBE) / mg/L	<0.00050	
Styrene / mg/L	<0.00050	
Toluene / mg/L	<0.00045	0.002
ortho-Xylene / mg/L	0.00051	
meta- & para-Xylene / mg/L	<0.00050	
Xylenes / mg/L	<0.00075	
4-Bromofluorobenzene (SS) / %	95.5	
1,4-Difluorobenzene (SS) / %	102.4	

Table D1-7. Water Quality Monitoring Program Results for ST-6a, May to July 2017

Sample ID	ST6A-22MAY17	ST6A-10JUL17[A]	Part G Item 23(e.)
ALS ID	L1929891-2	L1956506-1	
Date Sampled	5/22/2017 3:15:00 PM	7/10/2017 10:15:00 AM	
Parameter / **Units**	**Results**		**Maximum Allowable Concentration (mg/L)**
pH / pH	7.99	8.41	6.0-9.0
Total Suspended Solids / mg/L	8.8	<3.0	15.0
Lead (Pb)-Total / mg/L	0.000339	0.000056	0.01
Oil and Grease / mg/L	<5.0	<5.0	5
Oil And Grease (Visible Sheen)	NO	no	-
Benzene / mg/L	<0.00050	<0.00050	0.37
Ethylbenzene / mg/L	<0.00050	<0.00050	0.09
Methyl t-butyl ether (MTBE) / mg/L	<0.00050	<0.00050	
Styrene / mg/L	<0.00050	<0.00050	
Toluene / mg/L	0.00175	<0.00045	0.002
ortho-Xylene / mg/L	0.00085	<0.00050	
meta- & para-Xylene / mg/L	0.00164	<0.00050	
Xylenes / mg/L	0.00248	<0.00075	
4-Bromofluorobenzene (SS) / %	95.8	96.3	
1,4-Difluorobenzene (SS) / %	99.3	101	

[A] *Replicate sample collected during INAC inspection July 10, 2017. No discharge occurring at this time.*

ST-6b Roberts Bay Bulk Fuel Storage Facility

Water from the Roberts Bay 3x5 ML tank farm (ST-6b) was sampled on May 22, 2017 prior to discharge and results were found to be compliant with discharge criteria outlined in Part G Item 23(e). A discharge notification was provided to the Inspector May 21, 2017. Results of this monitoring are presented in Table D1-8.

Discharge from the facility occurred in May and June. A total of 402 m^3 of water was discharged southwest of the berm onto a rock outcrop (13W 432731 7563153). 94 m^3 of water was transferred to the Sedimentation Control Pond for transfer to the TIA.

On June 12, 2017, routine sampling was conducted at a fuel storage secondary containment berm (ST6B) located at Roberts Bay, in order to determine water quality compliance with the effluent quality limits established for this particular monitoring station. Results for this sample were received on June 26, 2017, and reported an exceedance of Toluene. All other parameters were in compliance with the effluent quality limits as per Part G, Item 23(3) of Water License 2AM-DOH1323. Environmental personnel immediately advised the Site Services department to discontinue discharge to the approved discharge location and to divert non-complaint water to the tailings impoundment area (TIA).

Pre-discharge sampling occurred on May 22, 2017, and all parameters were below the effluent quality limits for this monitoring station. Another round of samples were collected upon receipt of the non-compliant results, and all parameters were within compliance with the effluent quality limits for this monitoring station. Please refer to Table D1-8 for results of each sampling event for ST6B.

TMAC personnel discharge effluent to locations approved by the Inspector, upon the receipt of compliant results, as per the conditions of the Water Licence. Sampling activities are also conducted as per the frequencies identified in Schedule J, Table 2. For this occurrence, discharge from the berm was continuous upon receipt of complaint results, as a large amount of water had accumulated during spring melt. Voluntary samples were collected to confirm compliance while discharge continued, and discharged ceased immediately upon observing the exceedance of Toluene.

The exceedance was reported to the Nunavut Spill Line and the Inspector. An estimate of 246 m^3 of non-complaint effluent was released to the discharge location.

ST-7 and ST-7a Freshwater Usage from Doris and Windy Lakes

Table D1-9 provides the volumes of water usage at the Doris project area as required under Part E Item 1 of water licence 2AM-DOH1323. The water extraction pump for Doris operations is located off the northwest shoreline of Doris Lake and the sampling station ST-7 is located within the Doris Lake pump house. In 2017, water from Doris Lake was not used for domestic consumption; all water for domestic consumption was obtained from Windy Lake at ST-7a (equivalent to location HOP-1 of the Regional Exploration Licence 2BE-HOP1222). Water for dust suppression in 2017 was obtained from Doris Lake, as well as from containment berm effluent when found to be compliant for discharge to the environment under the criteria established in Part G of Licence 2AM-DOH1323 as approved by the Inspector. Surface drilling, underground development and construction occurred in support of the Doris mine; water was sourced from Doris Lake, and compliant berm water was also recycled for these purposes. Table D1-9 provides only water volumes used from lake sources and does not include water recycled from berms that would otherwise have been discharged to tundra as effluent.

Table D1-8. Water Quality Monitoring Program Results for ST-6b, May to July 2017

Sample ID		ST6B-22MAY17	ST6B-12JUN17A	ST6B-12JUN17B^	ST6B-26JUN17	ST6B-10JUL17	Part G Item 23(e.)
ALS ID		L1929891-3	L1942810-1	L1942810-2	L1949578-1	L1956506-2	
Date Sampled		5/22/2017 3:00:00 PM	6/12/2017 11:10:00 AM	6/12/2017 11:10:00 AM	6/26/2017 8:20:00 PM	7/10/2017 10:30:00 AM	Maximum Allowable Concentration (mg/L)
Parameter	**Units**	**Results**					
pH	pH	7.98	8.31	8.13	8.31	8.34	6.0-9.0
Total Suspended Solids	mg/L	10.8	3.1	3.7	<3.0	3.2	15.0
Lead (Pb)-Total	mg/L	0.000455	0.000101	0.000096	0.000079	0.000051	0.01
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	5
Oil And Grease (Visible Sheen)		No	No	No	No	No	-
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.37
Ethylbenzene	mg/L	0.00092	0.00203	0.00227	<0.00050	<0.00050	0.09
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Styrene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Toluene	mg/L	0.00071	**0.0033**	**0.00381**	<0.00045	<0.00045	0.002
ortho-Xylene	mg/L	0.00265	0.00478	0.00533	0.00215	0.00183	
meta- & para-Xylene	mg/L	0.00331	0.00487	0.00547	0.00096	0.00077	
Xylenes	mg/L	0.00596	0.00965	0.0108	0.0031	0.0026	
4-Bromofluorobenzene (SS)	%	103.7	111.6	107.5	95.9	99.8	
1,4-Difluorobenzene (SS)	%	100.6	95.1	96.2	104.4	100.6	

Note: Bold indicates exceedance of Part G Item 23(e) Maximum Allowable Concentration.

Table D1-9. Doris North Water Usage in 2017

Month	Windy Lake (ST-7A)	Doris Lake (ST-7)				Mine Inflow	
	Domestic Water*	Domestic Water*	Surface Exploration	Industrial Usage**	Dust Suppression	Industrial Usage^	Total Usage
January	864	0	0	0	0	0	864
February	801	0	0	0	0	0	801
March	925	0	0	32	0	0	957
April	873	0	0	608	0	0	1,481
May	892	0	0	512	32	0	1,436
June	946	0	0	26	982	0	1,954
July	844	0	0	0	1,308	0	2,152
August	849	0	0	34	1,736	0	2,619
September	814	0	0	1	287	0	1,102
October	889	0	0	16	0	0	905
November	849	0	0	9	0	436	1,294
December	950	0	0	0	0	667	1,617
Annual Total	**10,496**	**0**	**0**	**1,238**	**4,345**	**1,103**	**17,182**
Annual Allowance	**22,995**						**480,000**

**As permitted by water licences 2BE-HOP1222 and 2AM-DOH1323*

***Includes industrial uses such as underground drilling, core processing, mill commissioning, concrete batching, etc.*

^Mine inflow groundwater from development in the Doris Connector zone is currently being recycled into groundwater sumps for use in mining activities.

Note: All values rounded to nearest whole cubic metre.

Additionally, a total of 16 m^3 was used from Doris Lake for seasonal ice track construction in March of 2017.

Table D1-10 and Table D1-11 provide the results of water quality sampling for monitoring station ST-7a (HOP-1) at Windy Lake in compliance with the requirements set out in Schedule J of water licence 2AM-DOH1323. Results of sampling at ST-7 at Doris Lake are provided in Table D1-12 and Table D1-13.

ST-8 Discharge from Sewage Treatment Plant Bio-membrane

The Water Treatment Plant (WTP) at Doris Camp is made up of two sewage treatment plant modules. Each plant has the capacity to treat wastewater for up to 180 personnel. Both units were utilized throughout 2017 to treat all domestic wastewater generated by the site.

Treated effluent samples were collected from a sampling port inside each module (ST-8a and ST-8b) from January to July 2017 and from the combined effluent holding tank of these two modules (ST-8) from August to December 2017 to test the quality of the effluent to be discharged to the tundra, in accordance with Part G, Item 4(b) of the Licence. In-plant sampling facilitates year-round compliance evaluation of plant performance.

Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) were observed to be elevated at monitoring station ST8 in November and December, although results for these parameters were within the effluent quality limits outlined in Part G of the licence. As part of TMAC's adaptive management strategy, trouble shooting, additional monitoring and repairs were conducted on the wastewater treatment plant by the wastewater treatment operator and a subsequent improvement in treatment performance was later observed. The elevations can be attributed to degraded treatment performance in one of the two treatment units due to plugged filter membranes.

All effluent quality samples collected in 2017 were in compliance with the discharge criteria. All water quality monitoring results for ST-8a are provided in Table D1-14,results for ST-8b are provided in Table D1-15 and results for ST8 are provided in Table D1-16.

Treated effluent volumes released from ST-8 are metered daily and summary volumes reported in the monthly monitoring reports. In 2017 all treated effluent from ST-8 was discharged to the tundra west of the facility laydown areas (13W 432933 7559057) as approved by the Inspector. The monthly volumes of effluent discharged are presented in Table D1-17.

The sludge produced at the sewage treatment plant is pressed to remove processed solids and to allow for proper functioning of the plant. Each press produces approximately 0.11 m^3 of sludge, which was sent to the incinerator for disposal. In August, all sludge removed from the treatment plant was sent to the TIA for disposal in an effort to divert this waste stream from the incinerator. The volume of sludge produced in 2017 is presented in Table D1-18.

ST-9 Runoff from Sewage Treatment Plant Discharge

In consultation with the Inspector during the 2009 inspection tour, the ST-9 sampling location was established (13W 430807 7559282). This point is east of Glenn Lake and down slope from the ST-8 tundra discharge location. Monthly monitoring was conducted at ST-9 June through September in 2017 in accordance with Schedule J of 2AM-DOH1323. The station is frozen during the remainder of the year. There is no water quality criteria specified in the licence for this monitoring station. Table D1-19 provides results of the 2017 seasonal monitoring.

Table D1-10. Water Sampling Monitoring Program Results for January to June 2017 Taken from ST-7

Sample ID		ST7-16JAN17	ST7-13FEB17	ST7-13MAR17	ST7-10APR17B	ST7-08MAY17	ST7-12JUN17
ALS ID		L1880215-1	L1890430-1	L1900879-1	L1911948-2	L1923912-1	L1942472-1
Date Sampled		1/16/2017 4:15:00 PM	2/13/2017 4:00:00 PM	3/13/2017 2:35:00 PM	4/10/2017 4:00:00 PM	5/8/2017 4:55:00 PM	6/12/2017 3:30:00 PM
Parameter	**Units**	**Results**					
Hardness (as $CaCO_3$)	mg/L	53.5 [A]	51.0 [A]	54.5 [A]	55.2 [A]	57.7 [A]	53.8 [A]
pH	pH	7.56	7.55	7.36	7.69	7.36	7.67
Total Suspended Solids	mg/L	3.8	4.6	3.1	<3.0	<3.0	<3.0
Ammonia, Total (as N)	mg/L	0.0549	0.0699	0.0711	0.037	0.0093	<0.0050
Chloride (Cl)	mg/L	63.6	64.3	65.1	68.2	68.5	67
Nitrate (as N)	mg/L	0.0098	0.011	0.0206	0.0334	0.0346	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0289	0.0207	0.0272	0.0246	0.0188	0.0191
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aluminum (Al)-Total	mg/L	0.0263	0.0276	0.0273	<0.018 [B]	0.0169	0.0869
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	0.00055	<0.00050	<0.00050
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total	mg/L	<0.0010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	9.51	9.35	9.74	9.37	10	9.22
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	0.155	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper (Cu)-Total	mg/L	0.0017	0.0017	0.0103	0.0021	0.0019	0.0025
Iron (Fe)-Total	mg/L	0.11	0.121	1.39	0.171	0.244	0.266
Lead (Pb)-Total	mg/L	0.00121	0.0014	0.00124	0.00101	0.00136	0.00182
Lithium (Li)-Total	mg/L	0.0041	0.0039	0.0039	0.0041	0.0043	0.0044

Sample ID	ST7-16JAN17	ST7-13FEB17	ST7-13MAR17	ST7-10APR17B	ST7-08MAY17	ST7-12JUN17
ALS ID	L1880215-1	L1890430-1	L1900879-1	L1911948-2	L1923912-1	L1942472-1
Date Sampled	1/16/2017 4:15:00 PM	2/13/2017 4:00:00 PM	3/13/2017 2:35:00 PM	4/10/2017 4:00:00 PM	5/8/2017 4:55:00 PM	6/12/2017 3:30:00 PM
Parameter	**Units**	**Results**				
Magnesium (Mg)-Total	mg/L	7.22	6.7	7.34	7.72	7.93	7.47
Manganese (Mn)-Total	mg/L	0.00671	0.0155	0.0323	0.00568	0.00683	0.028
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	0.0037	<0.0010	<0.0010	<0.0010
Potassium (K)-Total	mg/L	2.4	2.2	2.5	2.6	2.5	2.5
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050	0.000052	<0.000050	0.000074
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	34.9	33.8	34.9	35.1	35.1	35.2
Thallium (Tl)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	<0.00050	<0.00050	0.00075	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.005	0.0483
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	No	No	No	No

** Results on Lab Work Order for Potable Water Station PDC10 (same location as ST7-a).*

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

[B] Detection Limit Raised. Analyte detected at comparable level in Method Blank.

Table D1-11. Water Sampling Monitoring Program Results for July to December 2017 Taken from ST-7

Sample ID	ST7-10JUL17	ST7-08AUG17	ST7-04SEP17	ST7-09OCT17	ST7-13NOV17	ST7-11DEC17A	ST7-11DEC17B*
ALS ID	L1956520-1	L1971592-1	L1986860-1	L2004604-1	L2022517-1	L2034907-1	L2034907-2
Date Sampled	7/10/2017 6:00:00 PM	8/8/2017 8:45:00 AM	9/4/2017 2:10:00 PM	10/9/2017 11:45:00 AM	11/13/2017 4:45:00 PM	12/11/2017 2:30:00 PM	12/11/2017 2:30:00 PM
Parameter / **Units**				**Results**			
Hardness (as $CaCO_3$) mg/L	130 [A]	114 [A]	74.3 [A]	51.7 [A]	46.0 [A]	49.1 [A]	50.3 [A]
pH pH	7.94	7.97	7.82	7.73	7.91	8.26	8.14
Total Suspended Solids mg/L	7.8	3.3	8.1	6.2	7.3	4.7	4.9
Ammonia, Total (as N) mg/L	0.0065	<0.0050	0.005	<0.0050	<0.0050	0.0118	0.0128
Chloride (Cl) mg/L	112	95.1	72.6	63	56.6	57.6	57.7
Nitrate (as N) mg/L	2.43	1.07	0.511	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N) mg/L	0.0203	0.0058	0.0049	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P) mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010 [C]	<0.0010	<0.0010
Phosphorus (P)-Total mg/L	0.0213	0.0335	0.0312	0.0326	0.0287	0.0367	0.0205
Cyanide, Total mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aluminum (Al)-Total mg/L	0.104	0.0883	0.0632	0.0394	0.022	0.0133	0.0123
Antimony (Sb)-Total mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)-Total mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total mg/L	0.0000054	0.0000054	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total mg/L	36.6	29.5	16.8	8.79	8.11	8.81	9.05
Chromium (Cr)-Total mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper (Cu)-Total mg/L	0.0019	0.0018	0.0022	0.0017	0.0016	0.0015	0.0015
Iron (Fe)-Total mg/L	0.236	0.187	0.149	0.066	0.073	0.056	0.055
Lead (Pb)-Total mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00155	0.00181	0.00183
Lithium (Li)-Total mg/L	0.004	0.0036	0.0037	0.0035	0.0037	0.0036	0.0037

Sample ID		ST7-10JUL17	ST7-08AUG17	ST7-04SEP17	ST7-09OCT17	ST7-13NOV17	ST7-11DEC17A	ST7-11DEC17B*
ALS ID		L1956520-1	L1971592-1	L1986860-1	L2004604-1	L2022517-1	L2034907-1	L2034907-2
Date Sampled		7/10/2017 6:00:00 PM	8/8/2017 8:45:00 AM	9/4/2017 2:10:00 PM	10/9/2017 11:45:00 AM	11/13/2017 4:45:00 PM	12/11/2017 2:30:00 PM	12/11/2017 2:30:00 PM
Parameter	**Units**	**Results**						
Magnesium (Mg)-Total	mg/L	9.31	9.86	7.85	7.22	6.26	6.59	6.72
Manganese (Mn)-Total	mg/L	0.0304	0.0428	0.0369	0.00986	0.0077	0.00531	0.00532
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0015 [B]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Potassium (K)-Total	mg/L	3.1	3	2.6	2.5	2.1	2.2	2.3
Selenium (Se)-Total	mg/L	0.000099	0.000086	0.00006	0.000064	<0.000050	0.000052	0.00006
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	41.4	41.6	35.1	32	29.3	31.1	31.6
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.006	<0.0050
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	No	No	No	No	No

** Duplicate sample.*

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

[B] Detection Limit Raised. Analyte detected at comparable level in Method Blank.

[C] Parameter Exceeded Recommended Holding Time Prior to Analysis.

Table D1-12. Water Sampling Monitoring Program Results for January to June 2017 Taken from ST-7a (HOP-1)

	Sample ID	ST7A-03JAN17	ST7A-07FEB17A	ST7A-07FEB17B*	ST7A-07MAR17	ST7A-04APR17	ST7A-02MAY17	ST7A-06JUN17
	ALS ID	L1875238-1	L1887677-1	L1887677-2	L1898240-1	L1908760-1	L1920105-1	L1937671-1
	Date Sampled	1/3/2017 8:00:00 AM	2/7/2017 8:50:00 AM	2/7/2017 8:50:00 AM	3/7/2017 7:50:00 AM	4/4/2017 8:15:00 AM	5/2/2017 8:10:00 AM	6/6/2017 8:10:00 AM
Parameter	**Units**	**Results**						
Hardness (as $CaCO_3$)	mg/L	77.2 [A]	82.7 [A]	83.1 [A]	85.8 [A]	87.6 [A]	87.6 [A]	84.1 [A]
pH	pH	7.76	7.94	7.95	7.78	7.93	7.82	7.83
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Ammonia, Total (as N)	mg/L	0.0082	0.0102	0.0108	0.0115	0.0117	0.0066	<0.0050
Nitrate (as N)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0038	0.004	0.0047	0.0034	0.0029	0.0031	0.0057
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aluminum (Al)-Total	mg/L	0.0106	0.0082	0.0097	0.0081	0.0076	0.0115	0.0898
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	0.0000126	<0.0000050	0.0000076	0.0000111	0.0000079	0.0000147	<0.0000050
Calcium (Ca)-Total	mg/L	13.8	14.4	14.6	13.8	15.1	15.1	14.7
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper (Cu)-Total	mg/L	0.0011	0.0011	0.0014	0.0011	0.0012	0.0012	0.0012
Iron (Fe)-Total	mg/L	<0.030	0.062	0.052	0.051	0.037	0.041	0.126
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Lithium (Li)-Total	mg/L	0.0028	0.0031	0.0034	0.0033	0.0041	0.0034	0.0028

	Sample ID	ST7A-03JAN17	ST7A-07FEB17A	ST7A-07FEB17B*	ST7A-07MAR17	ST7A-04APR17	ST7A-02MAY17	ST7A-06JUN17
	ALS ID	L1875238-1	L1887677-1	L1887677-2	L1898240-1	L1908760-1	L1920105-1	L1937671-1
	Date Sampled	1/3/2017 8:00:00 AM	2/7/2017 8:50:00 AM	2/7/2017 8:50:00 AM	3/7/2017 7:50:00 AM	4/4/2017 8:15:00 AM	5/2/2017 8:10:00 AM	6/6/2017 8:10:00 AM
Parameter	**Units**	**Results**						
Magnesium (Mg)-Total	mg/L	10.4	11.3	11.3	12.5	12.1	12.1	11.5
Manganese (Mn)-Total	mg/L	0.00114	0.00145	0.00149	0.00156	0.00125	0.00135	0.00467
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000057	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Potassium (K)-Total	mg/L	4.5	4.7	4.6	4.6	4.8	4.7	4.5
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	60.3	63.7	63.6	66.2	65.6	65.4	58.3
Thallium (Tl)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	0.0002	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Biochemical Oxygen Demand	mg/L	<2.0	3	2	<2.0	<2.0	<2.0	<2.0
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	No	No	No	No	No
Fecal Coliform	MPN/100mL	<1	<1	<1	<1	<1	<1	<1

** Duplicate sample.*

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

Table D1-13. Water Sampling Monitoring Program Results for July to December 2017 Taken from ST-7a (HOP-1)

Sample ID		ST7A-04JUL17	ST7A-01AUG17	ST7A-05SEP17	ST7A-03OCT17	ST7A-07NOV17	ST7A-05DEC17
ALS ID		L1953037-1	L1968387-1	L1986631-1	L2001937-1	L2019319-1	L2031049-1
Date Sampled		7/4/2017 8:45:00 AM	8/1/2017 8:40:00 AM	9/5/2017 8:00:00 AM	10/3/2017 6:45:00 AM	11/7/2017 7:45:00 AM	12/5/2017 8:00:00 AM
Parameter	**Units**	**Results**					
Hardness (as $CaCO_3$)	mg/L	74.9 [A]	76.0 [A]	69.9 [A]	74.5 [A]	73.6 [A]	82.5 [A]
pH	pH	7.9	7.97	7.86	7.91	7.97	7.84
Total Suspended Solids	mg/L	8,420	4	<3.0	10	3.2	<3.0
Ammonia, Total (as N)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0077
Nitrate (as N)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010 [B]	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0057	0.0046	0.0053	0.011	0.005	0.0039
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aluminum (Al)-Total	mg/L	0.0382	0.0466	0.0329	0.0976	0.0498	0.0194
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000121	<0.0000050
Calcium (Ca)-Total	mg/L	12.7	13	12.5	12.9	12.9	13.7
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper (Cu)-Total	mg/L	<0.0010	0.001	<0.0010	0.0014	0.0015	0.0012
Iron (Fe)-Total	mg/L	0.041	0.039	<0.030	0.144	0.098	<0.030
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Lithium (Li)-Total	mg/L	0.0029	0.0027	0.003	0.003	0.0031	0.003
Magnesium (Mg)-Total	mg/L	10.5	10.6	9.38	10.3	10	11.7

Sample ID		ST7A-04JUL17	ST7A-01AUG17	ST7A-05SEP17	ST7A-03OCT17	ST7A-07NOV17	ST7A-05DEC17
ALS ID		L1953037-1	L1968387-1	L1986631-1	L2001937-1	L2019319-1	L2031049-1
Date Sampled		7/4/2017 8:45:00 AM	8/1/2017 8:40:00 AM	9/5/2017 8:00:00 AM	10/3/2017 6:45:00 AM	11/7/2017 7:45:00 AM	12/5/2017 8:00:00 AM
Parameter	**Units**	**Results**					
Manganese (Mn)-Total	mg/L	0.00236	0.00207	0.00184	0.00678	0.00338	0.00163
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.0010
Nickel (Ni)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Potassium (K)-Total	mg/L	4.2	3.9	3.8	4.2	4.2	4.8
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	57.7	56.4	51.4	54.7	58	61.2
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Biochemical Oxygen Demand	mg/L	-	<2.0	<2.0	<2.0	<2.0	<2.0
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	no	No	NO	no
Fecal Coliform	MPN/100mL	<1	<1	<1	<1	<1	<1

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

[B] Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.

Note: Analytical results for chlorophyll-a are provided in the Aquatic Effects Monitoring Program report.

Table D1-14. Water Quality Monitoring Program Results for ST-8a (Sewage Treatment Plant ST-8), January to July 2017

	Sample ID	ST8A-10JAN17A	ST8A-14FEB17	ST8A-14MAR17	ST8A-11APR17	ST8A-18APR17	ST8A-09MAY17	ST8A-14JUN17	ST8A-11JUL17	Part G Item 4(b)
	ALS ID	L1877934-1	L1890433-1	L1900865-1	L1911945-1	L1914111-1	L1923828-1	L1942447-1	L1956542-1	
	Date Sampled	1/10/2017 7:45:00 AM	2/14/2017 6:40:00 AM	3/14/2017 8:20:00 AM	4/11/2017 8:05:00 AM	4/18/2017 7:55:00 AM	5/9/2017 8:15:00 AM	6/14/2017 7:20:00 AM	7/11/2017 7:45:00 AM	Maximum Allowable Concentration (mg/L)
Parameter	**Units**	**Results**								
pH	pH units	7.86	7.38	7.74	7.85	8.18	7.5	7.89	8.16	6-9
Total Suspended Solids	mg/L	3.9	30	70	30.3	17.5	3.2	89.6	8	100
Fecal Coliforms	MPN/100mL	43	2	141	110	291	<1	159	<1	10,000
Biochemical Oxygen Demand (BOD5)	mg/L	3	8	4	4	5	3	13	<2.0	80
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5
Oil And Grease (Visible Sheen)		No	No	No	No	No	No	No	No	No Visible Sheen

Table D1-15. Water Quality Monitoring Program Results for ST-8b (Sewage Treatment Plant ST-8), January to July 2017

	Sample ID	ST8B-10JAN17	ST8B-14FEB17	ST8B-14MAR17	ST8B-11APR17	ST8B-18APR17	ST8B-09MAY17	ST8B-14JUN17	ST8B-11JUL17	Part G Item 4(b)
	ALS ID	L1877934-2	L1890433-2	L1900865-2	L1911945-2	L1914111-2	L1923828-2	L1942447-2	L1956542-2	
	Date Sampled	1/10/2017 8:00:00 AM	2/14/2017 6:25:00 AM	3/14/2017 8:10:00 AM	4/11/2017 7:50:00 AM	4/18/2017 7:45:00 AM	5/9/2017 7:55:00 AM	6/14/2017 6:35:00 AM	7/11/2017 7:45:00 AM	Maximum Allowable Concentration (mg/L)
Parameter	**Units**	**Results**								
pH	pH units	8.28	7.9	7.93	7.77	8.22	7.77	8.03	8.32	6-9
Total Suspended Solids	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	3	<3.0	<3.0	100
Fecal Coliforms	MPN/100mL	3	<1	<1	<1	<1	<1	<1	<1	10,000
Biochemical Oxygen Demand (BOD5)	mg/L	2	3	3	6	3	<2.0	2	<2.0	80
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5
Oil And Grease (Visible Sheen)		No	No	No	No	No	No	No	No	No Visible Sheen

Table D1-16. Water Quality Monitoring Program Results for ST-8, August to December 2017

	Sample ID	ST8-08AUG17	ST8-12SEP17	ST8-10OCT17	ST8-14NOV17	ST8-12DEC17A	ST8-12DEC17B*	Part G Item 4(b)
	ALS ID	L1971613-1	L1989941-1	L2004600-1	L2022136-1	L2034921-1	L2034921-2	
	Date Sampled	8/8/2017 9:10:00 AM	9/12/2017 7:30:00 AM	10/10/2017 7:30:00 AM	11/14/2017 7:30:00 AM	12/12/2017 7:30:00 AM	12/12/2017 7:30:00 AM	Maximum Allowable Concentration (mg/L)
Parameter	**Units**	**Results**						
pH	pH units	7.63	7.19	7.56	8.09	7.19	7.22	6-9
Total Suspended Solids	mg/L	6.5	11.9	19.7	23.5	47	51	100
Fecal Coliforms	MPN/100mL	25	2,420	11	10	12	6	10,000
Biochemical Oxygen Demand (BOD5)	mg/L	12	10	14	20	18	16	80
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5
Oil And Grease (Visible Sheen)		No	No	No	No	No	No	No Visible Sheen

** Duplicate sample.*

Table D1-17. Treated Effluent Released from the Doris Sewage Treatment Plant (ST-8), 2017

Month	Monthly Volume (m^3)*	Cumulative Volume (m^3)*
January	834	834
February	753	1,587
March	839	2,426
April	822	3,248
May	879	4,127
June	849	4,976
July	879	5,855
August	828	6,683
September	786	7,469
October	871	8,340
November	853	9,193
December	917	10,110
Total Volume of Treated Effluent Released 2017 (m^3)		**10,110**

** Values rounded to nearest whole cubic metre.*

Table D1-18. Volume of Sludge Removed from the Doris Sewage Treatment Plant, 2017

Month	Monthly Volume (m^3)*	Cumulative Volume (m^3)*
January	2.27	2.27
February	1.58	3.85
March	1.59	5.44
April	2.72	8.16
May	2.72	10.88
June	2.27	13.15
July	1.70	14.85
August*	7.56	22.41
September	26.4	48.81
October	20.1	68.91
November	21.2	90.11
December	20.0	110.11
Total Volume of Sludge Produced in 2017 (m^3)		**110.11**

** Commencing in August 2017, all sewage sludge reported to the TIA for disposal.*

Table D1-19. Water Quality Monitoring Program Results for ST-9, June to September 2017

	Sample ID	ST9-14JUN17	ST9-10JUL17	ST9-07AUG17A	ST9-07AUG17B^	ST9-12SEP17
	ALS ID	L1942447-3	L1956542-3	L1971613-3	L1971613-4	L1989941-2
	Date Sampled	6/14/2017 9:55:00 AM	7/10/2017 5:45:00 PM	8/7/2017 6:55:00 PM	8/7/2017 6:55:00 PM	9/12/2017 7:45:00 AM
Parameter	**Units**	**Results**				
pH	pH units	7.91	8.04	7.9	7.87	7.62
Total Suspended Solids	mg/L	<3.0	10.6	3.1	5.1	<3.0
Fecal Coliforms	MPN/100mL	2	20	411 [A]	276 [A]	115
Biochemical Oxygen Demand (BOD5)	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	No	No	No

^ Duplicate sample.
[A] Analytical hold time was exceeded.

ST-10 Site Runoff from Sediment Controls

In 2017, construction activities were limited to the expansion of the South Apron De-icing and Refuelling Facility, a second Tailings Catchment Basin and the extension of the TIA access road to the South Dam. These areas were routinely monitored during active construction, freshet and after heavy or sustained precipitation events. No turbid runoff was encountered from these sites; as such, no water quality samples were collected under monitoring station ST-10.

Hydrology Monitoring – Doris Lake Water Level and Ice Thickness (ST-12) and Doris Creek Flow (TL-2)

The 2017 compliance program consisted of three lake level monitoring stations and two stream flow monitoring stations (Table D1-20). Stations were visited throughout the open water season to perform water level surveys and manual discharge measurements. Water level surveys are performed using an engineer's level and stadia rod using a minimum of three local bench marks at each station. All bench marks are tied to geodetic elevation, with the exception of those at Roberts Lake Outflow which use a local datum. Manual discharge measurements were performed using the velocity area method with a Hach FH950 electromagnetic current meter. Details regarding the standard methods used for installation of hydrometric stations, development of stage-discharge rating equations, and daily flow hydrographs can be found in the Doris North Project 2013 Hydrology Compliance Monitoring Report (ERM 2014).

Table D1-20. Station Type and Locations

Station	Station Type	Easting*	Northing*
Doris Creek TL-2	Stream Flow	434059	7559504
Robert's Outflow-2	Stream Flow	435231	7562674
Windy Lake	Water Level	432636	7550371
Doris Lake	Water Level	433512	7558452
TIA-2	Water Level	434905	7558709

**UTM Zone 13W*

Doris Lake Station

Doris Lake level monitoring station collected data from January 1st through to December 31st, 2017 and continues to collect data. From January 1st to June 11th, Doris Lake level was monitored by a satellite telemetry station equipped with a vented INW PS9800 pressure transducer providing near real time access to lake level data, as well as a secondary Solinst Levelogger pressure transducer to provide redundancy. The telemetry station was moved to the Tailings Impoundment Area (TIA) on June 11th, and replaced with an INW PT2X vented pressure transducer deployed for the open water season. The Doris Lake secondary pressure transducer was damaged by ice in June, and was replaced by two Solinst Leveloggers installed nearby in September at depths of approximately 7 metres to monitor lake level year round. The Leveloggers are coupled with a Solinst Barologger to compensate for changes in atmospheric pressure. The PT2X, Leveloggers and Barologger record a pressure reading every 15 minutes. A total of six water level surveys between April 27th and October 8th were performed to confirm the proper functioning of the pressure transducer. Doris Lake level was reported monthly as mean daily water level in metres above sea level (masl). Table D1-21 provides the results of this monitoring. Ice thickness measurements of Doris Lake were completed in April 2017. Ice thickness data is presented in Table D1-22.

Table D1-21. Summary of Doris Lake Mean Daily Water Levels, in Metres above Sea Level (masl), 2017

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	21.795	21.809	21.851	21.827	21.845	22.385	22.067	21.756	21.716	21.767	21.706	21.676
2	21.792	21.804	21.834	21.834	21.846	22.396	22.055	21.752	21.711	21.764	21.704	21.676
3	21.785	21.805	21.832	21.835	21.847	22.407	22.044	21.749	21.708	21.758	21.702	21.675
4	21.783	21.815	21.839	21.837	21.845	22.400	22.030	21.746	21.706	21.747	21.703	21.674
5	21.795	21.818	21.851	21.841	21.846	22.379	22.016	21.757	21.706	21.747	21.705	21.674
6	21.803	21.812	21.852	21.851	21.847	22.355	22.002	21.756	21.708	21.748	21.703	21.676
7	21.806	21.816	21.853	21.856	21.850	22.338	21.989	21.753	21.711	21.745	21.701	21.677
8	21.811	21.821	21.869	21.851	21.856	*22.323*	21.976	21.750	21.728	21.744	21.699	21.679
9	21.818	21.819	21.849	21.840	21.859	*22.308*	21.963	21.747	21.744	21.743	21.692	21.678
10	21.810	21.832	21.832	21.844	21.860	*22.293*	21.950	21.745	21.753	21.742	21.684	21.678
11	21.826	21.845	21.822	21.845	21.858	22.278	21.935	21.742	21.756	21.744	21.687	21.678
12	21.832	21.862	21.819	21.843	21.857	22.266	21.922	21.739	21.758	21.742	21.687	21.677
13	21.825	21.859	21.814	21.846	21.857	22.250	21.903	21.738	21.760	21.740	21.685	21.678
14	21.828	21.839	21.820	21.851	21.858	22.238	21.890	21.736	21.760	21.739	21.684	21.677
15	21.833	21.816	21.825	21.857	21.858	22.224	21.877	21.733	21.763	21.738	21.683	21.676
16	21.797	21.821	21.839	21.858	21.857	22.211	21.863	21.728	21.764	21.738	21.681	21.676
17	21.819	21.823	21.833	21.853	21.857	22.201	21.849	21.724	21.766	21.735	21.678	21.676
18	21.814	21.828	21.828	21.847	21.858	22.194	21.839	21.723	21.768	21.733	21.677	21.676
19	21.819	21.837	21.841	21.852	21.858	22.187	21.826	21.721	21.773	21.728	21.675	21.676
20	21.802	21.845	21.837	21.862	21.857	22.177	21.821	21.719	21.773	21.727	21.674	21.676
21	21.800	21.844	21.836	21.860	21.857	22.167	21.814	21.715	21.773	21.725	21.676	21.675
22	21.803	21.832	21.835	21.859	21.863	22.157	21.808	21.712	21.772	21.725	21.676	21.675
23	21.803	21.828	21.838	21.864	21.887	22.147	21.803	21.711	21.770	21.724	21.672	21.674
24	21.801	21.838	21.836	21.859	21.922	22.138	21.799	21.709	21.769	21.723	21.671	21.674
25	21.799	21.848	21.836	21.847	21.948	22.131	21.794	21.708	21.769	21.720	21.673	21.677
26	21.803	21.853	21.832	21.853	21.980	22.123	21.786	21.715	21.769	21.717	21.673	21.677
27	21.810	21.856	21.835	21.857	22.051	22.114	21.779	21.723	21.767	21.716	21.674	21.677
28	21.819	21.850	21.837	21.861	22.186	22.103	21.774	21.723	21.772	21.714	21.675	21.678
29	21.829		21.847	21.860	22.307	22.092	21.769	21.722	21.770	21.712	21.676	21.676

Date	January	February	March	April	May	June	July	August	September	October	November	December
30	21.821		21.851	21.856	*22.362*	22.080	21.765	21.721	21.772	21.710	21.676	21.675
31	21.815		21.834		*22.375*		21.761	21.720		21.708		21.676
Minimum	21.783	21.804	21.814	21.827	21.845	22.114	21.761	21.708	21.706	21.708	21.671	21.674
Maximum	21.833	21.862	21.869	21.864	22.375	22.407	22.067	21.757	21.773	21.767	21.706	21.679
Mean	21.810	21.831	21.837	21.850	21.929	22.235	21.886	21.732	21.751	21.734	21.685	21.676
Level Change	0.049	0.058	0.055	0.037	0.530	0.293	0.306	0.049	0.067	0.059	0.035	0.005
Low Action Level Trigger *	21.425	21.425	21.425	21.425	21.425	21.425	21.425	21.425	21.425	21.346	21.346	21.346

** Low action level trigger is relative to the average water level value (September 10-30, 2016-17) measured in Doris Lake. Low action level trigger (-0.42 m) outlined in Section 5.4 of the Doris Aquatic Effects Monitoring Plan, August 2016.*
Note: Estimated and modelled values are italicized.

Table D1-22. Summary of Doris Lake Ice Thickness, April 2017

Location	Ice Thickness (cm)
Doris Lake North	133
Doris Lake Mid	130
Doris Lake South	185
Minimum	130
Maximum	185
Mean	149

TL-2 Station

The Doris Creek stream flow monitoring station TL-2 was reactivated on June 7th after being deactivated during the winter. The station uses an INW PT2X vented pressure transducer. Water level readings were recorded every 15 minutes. The station operated throughout the open water season until September 28th, when the station was deactivated for winter. During the 2017 open water season, seven visits to the station were completed for a total of seven manual discharge measurements and six water level surveys. Water level (stage) measured by the pressure transducer every 15 minutes was converted to discharge using a stage-discharge curve, also known as a rating curve. The rating curve at TL-2 is well established, with small changes from year to year due to aggradation and scour of the channel. A small adjustment for the 2017 rating curve was made to account for minor scour around the station, which was consistent with the annual variability observed at TL-2. Flow during periods that were not observed during the 2017 open water season was estimated using a logarithmic growth curve from May 16th to May 21st, a linear regression between Doris Lake water level and monitored flow at TL-2 from May 22nd to June 6th and September 29th to October 31st, and a logarithmic decay from November 1st to 30st. It is estimated that there is no flow in Doris Creek prior to May 16th or after December 1st. Discharge at the TL-2 hydrometric monitoring station is reported as mean daily discharge in cubic meters per second (m^3/s). Table D1-23 provides the results of this monitoring.

Windy Lake Station

Windy Lake water level monitoring station was reactivated on June 26th after being deactivated during the winter. Reactivation was delayed due to lake ice being present too close to shore. The station uses an INW PT2X vented pressure transducer with water level readings recorded every 15 minutes. The station operated throughout the open water season until September 19th, when the station was deactivated for winter. During the 2017 open water season, five water level surveys were completed. In addition, TMAC surveyors tracked the changes in local bench mark elevations, which are known to vary due to changes in the permafrost, using a total station, and a stable bench mark was installed in bedrock several hundred meters to the north. Data were analysed and mean daily water level in meters above sea level developed for the period of record, and are available upon request.

TIA-2 Station

The TIA water level was monitored year round from January 1st to December 31st, 2017. In addition to a Solinst Levelogger active year round, a satellite telemetry station was installed temporarily on June 11th. The satellite telemetry station and Levelogger pressure transducer were installed more permanently on September 28th with the intention of remaining installed throughout the operations of the mine. Water levels data collected from the TIA is used in the assessment of the Water and Load Balance model.

Roberts Lake Outflow Station

The Roberts Lake Outflow station monitors lake level year round with an unvented Solinst Levelogger pressure transducer with readings taken every 15 minutes. Manual discharge measurements and water level surveys are performed opportunistically to help maintain data continuity in support of future fish habitat compensation studies. One discharge measurement and water level survey were performed on June 7th, 2017. Data were downloaded from the station in June and September. Stage data were saved and the manual measurement added to the rating curve, however mean daily discharge was not developed.

Table D1-23. Summary of Doris Creek (TL-2) Daily Flow Rate, in Cubic Metres per Second (m^3/s), 2017

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	0.00	0.00	0.00	0.00	0.00	*4.34*	1.25	0.16	0.09	*0.22*	*0.05*	0^
2	0.00	0.00	0.00	0.00	0.00	*4.47*	1.20	0.15	0.09	*0.21*	*0.05*	0.00
3	0.00	0.00	0.00	0.00	0.00	*4.61*	1.14	0.14	0.09	*0.20*	*0.04*	0.00
4	0.00	0.00	0.00	0.00	0.00	*4.52*	1.07	0.13	0.09	*0.17*	*0.04*	0.00
5	0.00	0.00	0.00	0.00	0.00	*4.27*	1.02	0.15	0.09	*0.17*	*0.03*	0.00
6	0.00	0.00	0.00	0.00	0.00	*4.16*	0.96	0.15	0.09	*0.17*	*0.03*	0.00
7	0.00	0.00	0.00	0.00	0.00	4.05	0.90	0.15	0.10	*0.16*	*0.02*	0.00
8	0.00	0.00	0.00	0.00	0.00	3.82	0.86	0.15	0.12	*0.16*	*0.02*	0.00
9	0.00	0.00	0.00	0.00	0.00	3.57	0.80	0.13	0.17	*0.15*	*0.02*	0.00
10	0.00	0.00	0.00	0.00	0.00	3.35	0.75	0.13	0.20	*0.15*	*0.02*	0.00
11	0.00	0.00	0.00	0.00	0.00	3.21	0.70	0.13	0.20	*0.16*	*0.01*	0.00
12	0.00	0.00	0.00	0.00	0.00	3.00	0.65	0.12	0.21	*0.15*	*0.01*	0.00
13	0.00	0.00	0.00	0.00	0.00	2.72	0.60	0.12	0.21	*0.15*	*0.01*	0.00
14	0.00	0.00	0.00	0.00	0.00	2.53	0.55	0.11	0.22	*0.14*	*0.01*	0.00
15	0.00	0.00	0.00	0.00	*0.01**	2.39	0.51	0.11	0.23	*0.14*	*0.01*	0.00
16	0.00	0.00	0.00	0.00	*0.02*	2.23	0.46	0.11	0.24	*0.14*	*0.01*	0.00
17	0.00	0.00	0.00	0.00	*0.03*	2.12	0.41	0.10	0.24	*0.13*	*0.01*	0.00
18	0.00	0.00	0.00	0.00	*0.06*	2.04	0.39	0.10	0.25	*0.13*	*0.01*	0.00
19	0.00	0.00	0.00	0.00	*0.10*	1.98	0.35	0.10	0.26	*0.11*	0.00	0.00
20	0.00	0.00	0.00	0.00	*0.19*	1.90	0.34	0.09	0.26	*0.11*	0.00	0.00
21	0.00	0.00	0.00	0.00	*0.34*	1.81	0.32	0.09	0.27	*0.10*	0.00	0.00
22	0.00	0.00	0.00	0.00	*0.43*	1.73	0.30	0.09	0.27	*0.10*	0.00	0.00
23	0.00	0.00	0.00	0.00	*0.50*	1.65	0.28	0.08	0.27	*0.10*	0.00	0.00
24	0.00	0.00	0.00	0.00	*0.61*	1.59	0.27	0.08	0.27	*0.10*	0.00	0.00
25	0.00	0.00	0.00	0.00	*0.71*	1.52	0.26	0.07	0.27	*0.09*	0.00	0.00
26	0.00	0.00	0.00	0.00	*0.86*	1.48	0.23	0.09	0.27	*0.08*	0.00	0.00
27	0.00	0.00	0.00	0.00	*1.25*	1.44	0.22	0.11	*0.26*	*0.08*	0.00	0.00
28	0.00	0.00	0.00	0.00	*2.25*	1.41	0.20	0.11	*0.27*	*0.07*	0.00	0.00
29	0.00		0.00	0.00	*3.43*	1.35	0.19	0.11	*0.23*	*0.07*	0.00	0.00

Date	January	February	March	April	May	June	July	August	September	October	November	December
30	0.00		0.00	0.00	*4.06*	1.30	0.18	0.11	*0.24*	*0.06*	0.00	0.00
31	0.00		0.00		*4.21*		0.17	0.10		*0.05*		0.00
Minimum	0.00	0.00	0.00	0.00	0.00	1.30	0.17	0.07	0.09	0.05	0.00	0.00
Maximum	0.00	0.00	0.00	0.00	4.21	4.61	1.25	0.16	0.27	0.22	0.05	0.00
Mean	0.00	0.00	0.00	0.00	0.61	2.31	0.46	0.11	0.23	0.14	0.01	0.00
Total	0.00	0.00	0.00	0.00	19.06	80.57	17.52	3.57	6.05	4.01	0.39	0.00

Note: Estimated and modelled values are italicized.
**Assumed start of flow.*
^Assumed end of flow.

TL-1 TIA Monitoring

This section presents the results of monitoring of the Tailings Impoundment Area (TIA) as per the applicable sections of Part G (Conditions Applying to Waste Management and Waste Management Plans) and Part J (Conditions Applying to General and Aquatic Effects Monitoring) of the water licence.

Dewatering of the TIA was not conducted in 2017. Tailings deposition into the TIA started in January and continued throughout the year. Reclaim water was also utilized to support the milling process.

Water quality samples were collected at the TIA Reclaim Pipeline monitoring station TL-1 from February to December from a sample port on the reclaim pump. Sampling results are provided in Table D1-24 and Table D1-25.

TL-5, TL6 and TL7 Tailings Monitoring

This section presents the results of monitoring of the Tailings as per the applicable sections of Part J (Conditions Applying to General and Aquatic Effects Monitoring) of the water licence.

Samples of effluent from the Process Plant (TL-5) were collected from February to December 2017 with the only exception being for the month of June. These samples were collected monthly from the tailings thickener tank inside the process plant prior to discharge to the Tailings Impoundment Area. A clean container was used to collect a representative sample of tailings material from the tailings thickener tank and the solid material allowed to settle. The remaining supernatant (the liquid effluent of the discharged tailings) was collected and submitted for laboratory analysis. Results of monitoring conducted at TL-5 are presented in Table D1-26 and Table D1-27.

Samples of the tailings solids (TL-6) were collected weekly from the tailings thickener tank inside the Process Plant from February to December 2017. A clean container was used to collect a representative sample of tailings material from the tailings thickener tank and the solid material allowed to settle in the container. The supernatant was then discarded and the solid materials transferred into a clean Ziploc bag and refrigerated until the end of each month. These weekly samples were then combined at the end of each month to create a composite sample which was submitted laboratory analysis. Table D1-28 and Table D1-29 provide results for monitoring conducted at TL-6.

Detoxified tailings (TL-7) were collected monthly from February to December 2017 from the discharge compartment of the detox filter press inside the process plant(Table D1-30 and Table D1-31).

TL-11 Underground Seepage Monitoring

Visual inspections were conducted of all safely accessible backfilled underground stopes in August and December 2017 to identify seepage from the stopes. Four stopes were surveyed during each inspection; one seep was identified during each inspection. Water quality samples were collected from the seeps at these locations (TL-11) and submitted for laboratory analysis. Flow measurements could not be completed due to the flow low volume of the seeps. Results of this sampling is provided in Table D1-32.

Table D1-24. Water Quality in the Tailings Impoundment Area (TL-1), February to June 2017

	Sample ID	TL1-13FEB17	TL1-13MAR17A	TL1-13MAR17B^	TL1-10APR17	TL1-08MAY17	TL1-12JUN17	TL1-16JUL17
	ALS ID	L1890438-1	L1900907-1	L1900907-2	L1911942-1	L1923930-1	L1942801-1	L1956566-1
	Date Sampled	2/13/2017 2:50:00 PM	3/13/2017 3:25:00 PM	3/13/2017 3:25:00 PM	4/10/2017 4:50:00 PM	5/8/2017 5:20:00 PM	6/12/2017 2:40:00 PM	7/10/2017 11:00:00 AM
Parameter	**Units**	**Results**						
Hardness (as $CaCO_3$)	mg/L	88.0 [A]	105 [A]	103 [A]	119 [A]	137 [A]	133 [A]	97.1 [A]
pH	pH	7.63	7.41	7.4	7.74	7.68	8.06	8.02
Reduction Potential	mV	-	-	-	-	-	-	-
Total Suspended Solids	mg/L	<3.0	4.4	5.3	12.2	9.8	15.5	10.4
Total Dissolved Solids	mg/L	199	252	255	299 [B]	355	360	278
Ammonia, Total (as N)	mg/L	0.206	0.41	0.404	0.736	1.15	1.56	1.02
Chloride (Cl)	mg/L	65.1	70.2	70	73.2	87.6	84.1	60.2
Nitrate (as N)	mg/L	0.0849	0.172	0.174	0.288	0.588	0.921	0.637
Nitrite (as N)	mg/L	0.0019	0.0018	0.0017	0.0063	0.0113	0.0226	0.02
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	-	2.19	1.76
Total Nitrogen	mg/L	-	-	-	-	-	3.17	2.37
Orthophosphate-Dissolved (as P)	mg/L	0.0018	0.0013	0.0015	0.0016	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0207	0.029	0.0292	0.0343	0.038	0.0623	0.0566
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0121	0.0229	0.0096
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0062	0.0162	0.0068
Escherichia Coli	MPN/100mL	-	-	-	-	-	-	-
MPN-Fecal Coliform	MPN/100mL	-	-	-	-	-	-	-
Total Coliforms	MPN/100mL	-	-	-	-	-	-	-
Aluminum (Al)-Total	mg/L	0.0195	0.142	0.14	0.434	0.551	0.473	0.263
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	<0.00050	0.00052	0.00051	0.00066	0.00062	0.00058	<0.00050
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total	mg/L	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	<0.0000050	0.0000055	<0.0000050	<0.0000050	<0.0000050	0.0000061	<0.0000050

	Sample ID	TL1-13FEB17	TL1-13MAR17A	TL1-13MAR17B^	TL1-10APR17	TL1-08MAY17	TL1-12JUN17	TL1-16JUL17
	ALS ID	L1890438-1	L1900907-1	L1900907-2	L1911942-1	L1923930-1	L1942801-1	L1956566-1
	Date Sampled	2/13/2017 2:50:00 PM	3/13/2017 3:25:00 PM	3/13/2017 3:25:00 PM	4/10/2017 4:50:00 PM	5/8/2017 5:20:00 PM	6/12/2017 2:40:00 PM	7/10/2017 11:00:00 AM
Parameter	**Units**	**Results**						
Calcium (Ca)-Total	mg/L	20.6	25.3	25.2	29.2	34.6	34.8	26.3
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	0.002	<0.0010	0.0012	0.001	<0.0010
Cobalt (Co)-Total	mg/L	<0.00030	0.00035	0.00035	0.00065	0.00076	0.00116	0.00085
Copper (Cu)-Total	mg/L	0.002	0.0299	0.0303	0.0294	0.0219	0.0284	0.0247
Iron (Fe)-Total	mg/L	4.05	0.921	0.833	1.86	1.52	1.37	0.685
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	0.00059	<0.00050	0.00052	<0.00050
Lithium (Li)-Total	mg/L	0.0057	0.0061	0.0061	0.0076	0.01	0.0095	0.0069
Magnesium (Mg)-Total	mg/L	8.91	10.1	9.72	11.3	12.3	11.1	7.65
Manganese (Mn)-Total	mg/L	0.155	0.239	0.229	0.346	0.333	0.332	0.182
Mercury (Hg)-Total	mg/L	0.0000064	<0.0000050	0.0000051	0.0000078	<0.0000050	<0.0000050	0.0000065
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	0.0015	0.0017	0.0017	0.0025	0.0032	0.004	0.0027
Potassium (K)-Total	mg/L	2.6	3.3	3.2	4	4.8	4.9	3.7
Selenium (Se)-Total	mg/L	0.000067	0.000091	0.000087	0.000078	0.000094	0.000128	0.000097
Silver (Ag)-Total	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000139	0.000081
Sodium (Na)-Total	mg/L	29.4	40.6	38.8	52.6	67.4	68.6	54.1
Thallium (Tl)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.000010
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	0.012	0.011	<0.010
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	<0.00050	0.00069	0.00063	0.0016	0.00182	0.00157	0.00093
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Biochemical Oxygen Demand	mg/L	-	-	-	-	-	-	-
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No	No	No	No	No	No
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

	Sample ID	TL1-13FEB17	TL1-13MAR17A	TL1-13MAR17B^	TL1-10APR17	TL1-08MAY17	TL1-12JUN17	TL1-16JUL17
	ALS ID	L1890438-1	L1900907-1	L1900907-2	L1911942-1	L1923930-1	L1942801-1	L1956566-1
	Date Sampled	2/13/2017 2:50:00 PM	3/13/2017 3:25:00 PM	3/13/2017 3:25:00 PM	4/10/2017 4:50:00 PM	5/8/2017 5:20:00 PM	6/12/2017 2:40:00 PM	7/10/2017 11:00:00 AM
Parameter	**Units**	**Results**						
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
ortho-Xylene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes	mg/L	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
4-Bromofluorobenzene (SS)	%	89.1	89.2	92	111.6	98.1	110.9	98
1,4-Difluorobenzene (SS)	%	97.5	96.8	96.6	103.2	102.3	97.5	101.2

^ *Duplicate sample.*
[A] *Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).*
[B] *Reported Result Verified By Repeat Analysis.*

Table D1-25. Water Quality in the Tailings Impoundment Area (TL-1), July to December 2017

	Sample ID	TL1-08AUG17	TL1-14AUG17	TL1-05SEP17	TL1-10OCT17	TL1-06NOV17	TL1-04DEC17
	ALS ID	L1971615-1	L1975526-1	L1986055-1	L2004585-1	L2019285-1	L2031055-1
	Date Sampled	8/8/2017 8:25:00 AM	8/14/2017 3:30:00 PM	9/5/2017 7:40:00 AM	10/10/2017 6:15:00 AM	11/6/2017 6:00:00 PM	12/4/2017 6:00:00 PM
Parameter	**Units**	**Results**					
Hardness (as $CaCO_3$)	mg/L	110 [A]	109 [A]	117 [A]	122 [A]	127 [A]	134 [A]
pH	pH	8.06	7.93	8.03	8.06	7.86	7.89
Reduction Potential	mV	266	-	-	-	-	-
Total Suspended Solids	mg/L	8.1	12	8.1	5.2	6.2	21.7
Total Dissolved Solids	mg/L	331	350	386	472	508	580
Ammonia, Total (as N)	mg/L	1.1	1.18	0.865	0.723	1.37	1.74
Chloride (Cl)	mg/L	69.2	69.4	71.7	80.3	85.8	87
Nitrate (as N)	mg/L	0.685	0.634	0.68	0.991	0.985	1.04

	Sample ID	TL1-08AUG17	TL1-14AUG17	TL1-05SEP17	TL1-10OCT17	TL1-06NOV17	TL1-04DEC17
	ALS ID	L1971615-1	L1975526-1	L1986055-1	L2004585-1	L2019285-1	L2031055-1
	Date Sampled	8/8/2017 8:25:00 AM	8/14/2017 3:30:00 PM	9/5/2017 7:40:00 AM	10/10/2017 6:15:00 AM	11/6/2017 6:00:00 PM	12/4/2017 6:00:00 PM
Parameter	**Units**	**Results**					
Nitrite (as N)	mg/L	0.05	0.0569	0.0793	0.0786	0.117	0.11
Total Kjeldahl Nitrogen	mg/L	1.81	1.97	1.86	1.82	2.42	2.81
Total Nitrogen	mg/L	2.39	2.46	2.38	2.84	3.48	3.53
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010 [B]	<0.0010
Phosphorus (P)-Total	mg/L	0.072	0.0685	0.0743	0.0785	0.151	0.151
Cyanide, Total	mg/L	<0.0050	<0.0050	<0.0050	0.0055	0.038	0.0589
Cyanide, Free	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Escherichia Coli	MPN/100mL	-	-	-	-	-	-
MPN-Fecal Coliform	MPN/100mL	<1 [B]	-	<1	<1	<1	<1
Total Coliforms	MPN/100mL	-	-	-	-	-	-
Aluminum (Al)-Total	mg/L	0.267	0.291	0.162	0.15	0.172	0.641
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	0.00055	0.00059	0.0006	0.00059	0.00063	0.0008
Barium (Ba)-Total	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Boron (B)-Total	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000073
Calcium (Ca)-Total	mg/L	29.5	28.6	30.8	32.3	34	34.1
Chromium (Cr)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
Cobalt (Co)-Total	mg/L	0.00095	0.001	0.001	0.00114	0.0014	0.00168
Copper (Cu)-Total	mg/L	0.0154	0.0153	0.0131	0.0177	0.0275	0.0245
Iron (Fe)-Total	mg/L	0.6	0.699	0.403	0.419	0.716	1.49
Lead (Pb)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Lithium (Li)-Total	mg/L	0.0073	0.0071	0.0081	0.0088	0.0107	0.0113
Magnesium (Mg)-Total	mg/L	8.9	9.17	9.69	10.1	10.2	11.7
Manganese (Mn)-Total	mg/L	0.105	0.118	0.0879	0.0873	0.419	0.437

	Sample ID	TL1-08AUG17	TL1-14AUG17	TL1-05SEP17	TL1-10OCT17	TL1-06NOV17	TL1-04DEC17
	ALS ID	L1971615-1	L1975526-1	L1986055-1	L2004585-1	L2019285-1	L2031055-1
	Date Sampled	8/8/2017 8:25:00 AM	8/14/2017 3:30:00 PM	9/5/2017 7:40:00 AM	10/10/2017 6:15:00 AM	11/6/2017 6:00:00 PM	12/4/2017 6:00:00 PM
Parameter	**Units**	**Results**					
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050	0.0000125	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	0.0026	0.0024	0.0021	0.0024	0.0035	0.0042
Potassium (K)-Total	mg/L	4.7	4.5	5.2	6.2	8.8	9.9
Selenium (Se)-Total	mg/L	0.00007	0.000095	0.000094	0.000111	0.000146	0.000146
Silver (Ag)-Total	mg/L	0.000028	0.000025	0.000022	<0.000020	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	66.8	72.8	78.9	99.8	119	150
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.014
Uranium (U)-Total	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	0.00101	0.00116	0.00068	0.00062	0.00067	0.00244
Zinc (Zn)-Total	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Biochemical Oxygen Demand	mg/L	2	-	-	-	-	-
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Oil And Grease (Visible Sheen)		absent	no	no	no	no	no
Benzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
ortho-Xylene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

	Sample ID	TL1-08AUG17	TL1-14AUG17	TL1-05SEP17	TL1-10OCT17	TL1-06NOV17	TL1-04DEC17
	ALS ID	L1971615-1	L1975526-1	L1986055-1	L2004585-1	L2019285-1	L2031055-1
	Date Sampled	8/8/2017 8:25:00 AM	8/14/2017 3:30:00 PM	9/5/2017 7:40:00 AM	10/10/2017 6:15:00 AM	11/6/2017 6:00:00 PM	12/4/2017 6:00:00 PM
Parameter	**Units**	**Results**					
Xylenes	mg/L	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
4-Bromofluorobenzene (SS)	%	74.9	101.5	88.6	85.7	93	85.8
1,4-Difluorobenzene (SS)	%	98.6	101.6	98.9	99.7	96.5	98.3

[A] *Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).*
[B] *Analytical holding time was exceeded.*

Table D1-26. Effluent from Process Plant Tailings Slurry Water (TL-5), February to July 2017

	Sample ID	TL5-20FEB17	TL5-20MAR17	TL5-17APR17	TL5-15MAY17A	TL5-15MAY17B ^	TL5-24JUL17
	ALS ID	L1892817-1	L1903527-1	L1914099-1	L1927005-1	L1927005-2	L1964314-1
	Date Sampled	2/20/2017 2:40:00 PM	3/20/2017 1:20:00 PM	4/17/2017 7:30:00 AM	5/15/2017 5:35:00 PM	5/15/2017 5:35:00 PM	7/24/2017 6:00:00 AM
Parameter	**Units**	**Results**					
Hardness (as $CaCO_3$)	mg/L	598 [A]	248 [A]	787 [A]	703 [A]	820 [A]	429 [A]
pH	pH	8.21	8.16	8	8.16	-	8.25
Total Suspended Solids	mg/L	1,580	11.4	181	2,710	-	26.5
Ammonia, Total (as N)	mg/L	20	10.7	43.7	35.8	34.7	24.3
Nitrate (as N)	mg/L	17.8	10.5	40.4	32.2	-	<0.10 [D]
Nitrite (as N)	mg/L	0.438	0.241	1.2	0.973	-	<0.020 [D]
Sulfate (SO4)	mg/L	2,090	928	2,410	2,200	-	<6.0 [D]
Cyanide, Weak Acid Diss	mg/L	0.134	0.0972	0.526	0.347	0.335	0.0133
Cyanide, Total	mg/L	0.144	0.193	0.613	0.499	0.496	0.233
Cyanate	mg/L	19.8 [B]	6.0 [B]	38.4 [B]	29.4 [B]	32.4 [B]	25.5 [C]
Thiocyanate (SCN)	mg/L	<0.50	3.68	8.05	19.3	19	14.8
Cyanide, Free	mg/L	0.0774	0.0276	0.313	0.228	0.213	<0.0050
Aluminum (Al)-Total	mg/L	3.38	0.438	0.197	0.248	0.249	1.16
Antimony (Sb)-Total	mg/L	0.00108	0.00081	<0.0010 [E]	0.00117	0.00175	0.00098

Sample ID		TL5-20FEB17	TL5-20MAR17	TL5-17APR17	TL5-15MAY17A	TL5-15MAY17B ^	TL5-24JUL17
ALS ID		L1892817-1	L1903527-1	L1914099-1	L1927005-1	L1927005-2	L1964314-1
Date Sampled		2/20/2017 2:40:00 PM	3/20/2017 1:20:00 PM	4/17/2017 7:30:00 AM	5/15/2017 5:35:00 PM	5/15/2017 5:35:00 PM	7/24/2017 6:00:00 AM
Parameter	**Units**	**Results**					
Arsenic (As)-Total	mg/L	0.0111	0.00136	0.0015	0.00088	0.00127	0.0136
Barium (Ba)-Total	mg/L	0.0278	0.0265	0.0486	0.0536	0.0504	0.0418
Beryllium (Be)-Total	mg/L	<0.00050 E	<0.00050 E	<0.0010 E	<0.00050 E	<0.00050 E	<0.00050 E
Bismuth (Bi)-Total	mg/L	<0.00025 E	<0.00025 E	<0.00050 E	<0.00025 E	<0.00025 E	<0.00025 E
Boron (B)-Total	mg/L	0.262	0.283	0.43	0.449	0.56	0.544
Cadmium (Cd)-Total	mg/L	0.000093	0.000052	<0.000050 E	<0.000025 E	<0.000025 E	0.000079
Calcium (Ca)-Total	mg/L	175	56.9	213	179	222	107
Cesium (Cs)-Total	mg/L	0.000676	0.000368	0.00119	0.000335	0.000684	0.000776
Chromium (Cr)-Total	mg/L	0.0116	0.00095	<0.0010 E	0.00129	0.00136	0.00539
Cobalt (Co)-Total	mg/L	0.0106	0.00747	0.0105	0.0293	0.0303	0.0194
Copper (Cu)-Total	mg/L	0.0787	0.0315	0.118	0.0929	0.186	0.0709
Iron (Fe)-Total	mg/L	17	1.14	0.74	1.23	1.12	3.99
Lead (Pb)-Total	mg/L	0.00472	0.00099	0.00055	0.0005	0.00046	0.00789
Lithium (Li)-Total	mg/L	0.0501	0.0714	0.101	0.0763	0.0944	0.0966
Magnesium (Mg)-Total	mg/L	38.9	25.8	62.2	62.5	64.7	39.5
Manganese (Mn)-Total	mg/L	0.566	0.0633	0.173	0.24	0.227	0.143
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	0.0000093 F	<0.000025 F	<0.000025 F	<0.00010 F
Molybdenum (Mo)-Total	mg/L	0.00619	0.00685	0.0106	0.00317	0.00434	0.0102
Nickel (Ni)-Total	mg/L	0.0611	0.0421	0.122	0.13	0.139	0.044
Phosphorus (P)-Total	mg/L	<0.25 E	<0.25 E	<0.50 E	<0.25 E	<0.25 E	1.09
Potassium (K)-Total	mg/L	36.3	39	75.1	72.8	70.5	75.1
Rubidium (Rb)-Total	mg/L	0.0417	0.0406	0.0871	0.0782	0.0746	0.0738
Selenium (Se)-Total	mg/L	0.00077	0.00108	0.00209	0.00155	0.00156	0.00324
Silicon (Si)-Total	mg/L	5.86	2.72	1.7	2.41	2.27	4.24
Silver (Ag)-Total	mg/L	0.000102	<0.000050 E	<0.00010 E	<0.000050 E	0.000085	0.000192
Sodium (Na)-Total	mg/L	1,040	608	1,370	1,420	1,330	1,190

Sample ID		TL5-20FEB17	TL5-20MAR17	TL5-17APR17	TL5-15MAY17A	TL5-15MAY17B ^	TL5-24JUL17
ALS ID		L1892817-1	L1903527-1	L1914099-1	L1927005-1	L1927005-2	L1964314-1
Date Sampled		2/20/2017 2:40:00 PM	3/20/2017 1:20:00 PM	4/17/2017 7:30:00 AM	5/15/2017 5:35:00 PM	5/15/2017 5:35:00 PM	7/24/2017 6:00:00 AM
Parameter	**Units**	**Results**					
Strontium (Sr)-Total	mg/L	0.574	0.244	0.762	0.684	0.956	0.463
Sulfur (S)-Total	mg/L	715	346	781	828	728	723
Tellurium (Te)-Total	mg/L	<0.0010 [E]	<0.0010 [E]	<0.0020 [E]	<0.0010 [E]	<0.0010 [E]	<0.0010 [E]
Thallium (Tl)-Total	mg/L	<0.000050 [E]	<0.000050 [E]	<0.00010 [E]	<0.000050 [E]	<0.000050 [E]	<0.000050 [E]
Thorium (Th)-Total	mg/L	<0.00050 [E]	<0.00050 [E]	<0.0010 [E]	<0.00050 [E]	<0.00050 [E]	<0.00050 [E]
Tin (Sn)-Total	mg/L	<0.00050 [E]	<0.00050 [E]	<0.0010 [E]	<0.00050 [E]	<0.00050 [E]	<0.00050 [E]
Titanium (Ti)-Total	mg/L	0.0815	0.0199	<0.0054 [E]	0.0076	0.0086	0.0395
Tungsten (W)-Total	mg/L	0.00165	0.00108	<0.0010 [E]	0.00084	0.0012	0.00173
Uranium (U)-Total	mg/L	0.00034	0.000129	0.00015	0.000129	0.000173	0.000115
Vanadium (V)-Total	mg/L	0.014	<0.0025 [E]	<0.0050 [E]	<0.0025 [E]	<0.0025 [E]	0.0045
Zinc (Zn)-Total	mg/L	0.057	0.041	<0.030 [E]	<0.015 [E]	<0.015 [E]	0.042
Zirconium (Zr)-Total	mg/L	<0.0015 [E]	<0.0015 [E]	<0.00060 [E]	<0.00030 [E]	<0.00030 [E]	<0.00030 [E]

^ Duplicate sample.
[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
[B] Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
[C] Detection Limit Adjusted: Insufficient Sample.
[D] Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
[E] Detection Limit adjusted for required dilution.
[F] Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Table D1-27. Effluent from Process Plant Tailings Slurry Water (TL-5), August to December 2017

Sample ID		TL5-20AUG17	TL5-18SEP17	TL5-16OCT17	TL5-12NOV17	TL5-10-DEC-17
ALS ID		L1979018-1	L1993719-1	L2008559-1	L2022518-1	L2034802-1
Date Sampled		8/20/2017 11:15:00 AM	9/18/2017 8:45:00 AM	10/16/2017 9:00:00 AM	11/12/2017 2:30:00 PM	12/10/2017 8:35:00 AM
Parameter	**Units**	**Results**				
Hardness (as $CaCO_3$)	mg/L	315 [A]	335 [A]	321 [A]	189 [A]	220 [A]
pH	pH	8.23	8.09	8.53	8.42	8.42
Total Suspended Solids	mg/L	11.5	57.5	152	64.6	150
Ammonia, Total (as N)	mg/L	14.2	61.4	18	14.2	20.8
Nitrate (as N)	mg/L	10.1	15.4	13	5.93	12
Nitrite (as N)	mg/L	0.291	0.345	0.355	0.217	0.323
Sulfate (SO4)	mg/L	857	2,490	1,980	1,640	1,060
Cyanide, Weak Acid Diss	mg/L	0.039	0.41	0.0206	0.0504	0.011
Cyanide, Total	mg/L	0.118	3.72	0.601	2.06	4.07
Cyanate	mg/L	21.0 [B]	133 [B]	24.9 [C]	16.2 [C]	13.5 [C]
Thiocyanate (SCN)	mg/L	9.04	47.5	13.4	18.3	27.8
Cyanide, Free	mg/L	0.0226	0.44	0.0082	0.0318	<0.010
Aluminum (Al)-Total	mg/L	0.263	2.53	11.9	1.45	2.29
Antimony (Sb)-Total	mg/L	0.00098	0.00174	0.00075	0.00087	0.00139
Arsenic (As)-Total	mg/L	0.00119	0.0141	0.0182	0.00368	0.108
Barium (Ba)-Total	mg/L	0.0166	0.0354	0.0515	0.0255	0.0199
Beryllium (Be)-Total	mg/L	<0.00020	<0.00050 [D]	<0.00050 [D]	<0.00050	<0.00050 [D]
Bismuth (Bi)-Total	mg/L	<0.00010	<0.00025 [D]	<0.00025 [D]	<0.00025	0.00043
Boron (B)-Total	mg/L	0.324	0.317	0.31	0.212	0.269
Cadmium (Cd)-Total	mg/L	<0.000010	0.000157	0.000431	0.000202	0.00154
Calcium (Ca)-Total	mg/L	76.5	85.9	53.2	40.2	47.5
Cesium (Cs)-Total	mg/L	0.000533	0.000461	0.000513	0.0003	0.000184
Chromium (Cr)-Total	mg/L	0.00061	0.00548	0.0285	0.0024	0.00715
Cobalt (Co)-Total	mg/L	0.0054	0.0323	0.0265	0.0128	0.0887
Copper (Cu)-Total	mg/L	0.0057	0.901	0.084	0.316	0.652

Sample ID		TL5-20AUG17	TL5-18SEP17	TL5-16OCT17	TL5-12NOV17	TL5-10-DEC-17
ALS ID		L1979018-1	L1993719-1	L2008559-1	L2022518-1	L2034802-1
Date Sampled		8/20/2017 11:15:00 AM	9/18/2017 8:45:00 AM	10/16/2017 9:00:00 AM	11/12/2017 2:30:00 PM	12/10/2017 8:35:00 AM
Parameter	**Units**	**Results**				
Iron (Fe)-Total	mg/L	0.741	9.3	39	4.76	29.2
Lead (Pb)-Total	mg/L	0.00032	0.0154	0.0201	0.00984	0.0732
Lithium (Li)-Total	mg/L	0.0343	0.0489	0.0726	0.0373	0.0381
Magnesium (Mg)-Total	mg/L	30.2	29.2	45.8	21.5	24.7
Manganese (Mn)-Total	mg/L	0.0812	0.199	0.769	0.0975	0.182
Mercury (Hg)-Total	mg/L	<0.0000050	<0.00050 [C]	<0.00050 [C]	<0.00050 [C]	<0.00010 [C]
Molybdenum (Mo)-Total	mg/L	0.0068	0.0085	0.00497	0.00575	0.00515
Nickel (Ni)-Total	mg/L	0.0111	0.0989	0.108	0.0323	0.0868
Phosphorus (P)-Total	mg/L	0.66	0.54	1.2	0.4	0.65
Potassium (K)-Total	mg/L	49.2	60.3	130	61.9	67.1
Rubidium (Rb)-Total	mg/L	0.0432	0.0366	0.0663	0.0292	0.0253
Selenium (Se)-Total	mg/L	0.00112	0.00135	0.002	0.00081	0.00368
Silicon (Si)-Total	mg/L	2.31	5.72	21.6	3.23	4.94
Silver (Ag)-Total	mg/L	0.000026	0.000425	0.000219	0.000201	0.00143
Sodium (Na)-Total	mg/L	593	1,370	1,070	741	661
Strontium (Sr)-Total	mg/L	0.285	0.451	0.268	0.211	0.201
Sulfur (S)-Total	mg/L	373	957	723	544	425
Tellurium (Te)-Total	mg/L	<0.00040 [D]	<0.0010 [D]	<0.0010 [D]	<0.0010	<0.0010 [D]
Thallium (Tl)-Total	mg/L	<0.000020 [D]	<0.000050 [D]	<0.000050 [D]	0.000072	0.000257
Thorium (Th)-Total	mg/L	<0.00020 [D]	<0.00050 [D]	<0.00050 [D]	<0.00050	<0.00050 [D]
Tin (Sn)-Total	mg/L	<0.00020 [D]	<0.00050 [D]	<0.00050 [D]	<0.00050	<0.00050 [D]
Titanium (Ti)-Total	mg/L	0.00789	<0.065 [C]	0.488	0.0434	0.0969
Tungsten (W)-Total	mg/L	0.00087	0.00494	0.00347	0.00312	0.00308
Uranium (U)-Total	mg/L	0.000089	0.000812	0.000272	0.000358	0.000372

Sample ID		TL5-20AUG17	TL5-18SEP17	TL5-16OCT17	TL5-12NOV17	TL5-10-DEC-17
ALS ID		L1979018-1	L1993719-1	L2008559-1	L2022518-1	L2034802-1
Date Sampled		8/20/2017 11:15:00 AM	9/18/2017 8:45:00 AM	10/16/2017 9:00:00 AM	11/12/2017 2:30:00 PM	12/10/2017 8:35:00 AM
Parameter	**Units**	**Results**				
Vanadium (V)-Total	mg/L	<0.0010 [D]	0.0093	0.0445	0.0048	0.0098
Zinc (Zn)-Total	mg/L	<0.0060 [D]	0.072	0.201	0.083	0.869
Zirconium (Zr)-Total	mg/L	<0.00012 [D]	<0.00059 [E]	0.00156	<0.00030	0.00052

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
[B] Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
[C] Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
[D] Detection Limit adjusted for required dilution.
[E] Detection Limit Raised. Analyte detected at comparable level in Method Blank.

Table D1-28. Effluent from Process Plant Tailings Slurry Solids (TL-6), February to July 2017

Sample ID		TL6-27FEB17	TL6-27MAR17	TL6-24APR17	TL6-30MAY17	TL6-26JUN17	TL6-31JUL17A
ALS ID		L1895621-1	L1906046-1	L1917005-1	L1933582-1	L1949570-1	L1968371-1
Date Sampled		2/27/2017 3:00:00 PM	3/27/2017 3:00:00 PM	4/24/2017 6:30:00 AM	5/30/2017 11:00:00 AM	6/26/2017 4:00:00 PM	7/31/2017 6:45:00 PM
Parameter	**Units**	**Results**					
Moisture	%	24.1	24.7	27.4	24.1	20.5	22.9
pH (1:2 soil:water)	pH	8.79	8.84	8.88	8.84	9.05	9.26
Sulfate (SO4)	mg/kg	489	363	589	349	370	643
Inorganic Carbon	%	1.3	0.568	0.486	0.816	0.543	0.659
Inorganic Carbon (as $CaCO_3$ Equivalent)	%	10.8	4.73	4.05	6.8	4.52	5.49
Aluminum (Al)	mg/kg	8,210	10,400	13,800	10,100	8,800	13,800
Antimony (Sb)	mg/kg	0.24	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	mg/kg	82.6	10.4	7.88	8.25	7.23	9.21
Barium (Ba)	mg/kg	6.27	15.9	16.9	14.3	10.7	17.3
Beryllium (Be)	mg/kg	<0.10	0.13	0.13	0.11	<0.10	0.12
Bismuth (Bi)	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	mg/kg	6.5	14.1	28	12.6	12.2	40.7

Sample ID	TL6-27FEB17	TL6-27MAR17	TL6-24APR17	TL6-30MAY17	TL6-26JUN17	TL6-31JUL17A
ALS ID	L1895621-1	L1906046-1	L1917005-1	L1933582-1	L1949570-1	L1968371-1
Date Sampled	2/27/2017 3:00:00 PM	3/27/2017 3:00:00 PM	4/24/2017 6:30:00 AM	5/30/2017 11:00:00 AM	6/26/2017 4:00:00 PM	7/31/2017 6:45:00 PM
Parameter	**Units**	**Results**				
Cadmium (Cd)	mg/kg	0.255	0.217	0.106	0.154	0.088	0.064
Calcium (Ca)	mg/kg	38,600	24,100	30,200	25,200	20,600	29,000
Chromium (Cr)	mg/kg	21.8	27.5	29.9	25.7	21.5	33
Cobalt (Co)	mg/kg	48.3	13.9	15.1	12.7	11	15.7
Copper (Cu)	mg/kg	197	24.7	22.9	20.1	24.7	52.4
Iron (Fe)	mg/kg	48,700	37,700	48,800	38,900	33,500	43,400
Lead (Pb)	mg/kg	21.8	8.13	6.34	4.26	5.43	9.13
Lithium (Li)	mg/kg	12.7	29	31	23.8	13.7	31.2
Magnesium (Mg)	mg/kg	14,600	14,100	17,500	14,700	11,300	14,600
Manganese (Mn)	mg/kg	1,030	880	1,080	909	779	945
Mercury (Hg)	mg/kg	0.0134	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Molybdenum (Mo)	mg/kg	0.29	0.27	0.25	0.24	0.17	0.22
Nickel (Ni)	mg/kg	55.3	22.8	25.7	22.1	19.2	26.5
Phosphorus (P)	mg/kg	263	275	387	342	275	348
Potassium (K)	mg/kg	560	1,490	1,470	1,170	860	1,420
Selenium (Se)	mg/kg	0.82	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	mg/kg	2.1	0.38	0.33	0.19	0.28	0.21
Sodium (Na)	mg/kg	417	587	832	610	462	899
Strontium (Sr)	mg/kg	16.9	11.8	15.1	13.3	10.4	17.8
Sulfur (S)	mg/kg	-	-	1,100	-	<1,000	1,100
Sulfur (S)-Total	mg/kg	3,000	6,800	10,400	2,100	700	700
Thallium (Tl)	mg/kg	0.094	<0.050	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	mg/kg	327	927	873	620	607	1,130
Tungsten (W)	mg/kg	-	-	0.64	<0.50	<0.50	0.56
Uranium (U)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Sample ID		TL6-27FEB17	TL6-27MAR17	TL6-24APR17	TL6-30MAY17	TL6-26JUN17	TL6-31JUL17A
ALS ID		L1895621-1	L1906046-1	L1917005-1	L1933582-1	L1949570-1	L1968371-1
Date Sampled		2/27/2017 3:00:00 PM	3/27/2017 3:00:00 PM	4/24/2017 6:30:00 AM	5/30/2017 11:00:00 AM	6/26/2017 4:00:00 PM	7/31/2017 6:45:00 PM
Parameter	**Units**	**Results**					
Vanadium (V)	mg/kg	38.4	47.6	58.9	43.5	44.7	69.6
Zinc (Zn)	mg/kg	126	128	72.7	82.4	46.8	48.2
Zirconium (Zr)	mg/kg	1.1	2.1	2.5	1.8	1.3	2.2

Table D1-29. Effluent from Process Plant Tailings Slurry Solids (TL-6), July to December 2017

Sample ID		TL6-31JUL17B^	TL6-29AUG17	TL6-25SEP17	TL6-29OCT17	TL6-27NOV17	TL6-31DEC17
ALS ID		L1968371-2	L1982926-1	L1997619-1	L2016924-1	L2031040-1	L2040730-1
Date Sampled		7/31/2017 6:45:00 PM	8/29/2017 8:35:00 AM	9/25/2017 6:50:00 PM	10/29/2017 4:30:00 PM	11/27/2017 5:40:00 PM	12/31/2017 5:30:00 PM
Parameter	**Units**	**Results**					
Moisture	%	21	24.3	24.6	23.3	22	24.3
pH (1:2 soil:water)	pH	9.22	8.88	9.19	9.08	9.24	9
Sulfate (SO4)	mg/kg	541	533	656	476	636	387
Inorganic Carbon	%	0.631	0.901	0.883	0.758	0.627	0.796
Inorganic Carbon (as $CaCO_3$ Equivalent)	%	5.26	7.51	7.35	6.32	5.22	6.63
Aluminum (Al)	mg/kg	14,000	13,400	9,010	10,700	12,600	9,840
Antimony (Sb)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	mg/kg	7.38	9.11	7.56	7.49	5.98	10.6
Barium (Ba)	mg/kg	17.2	12.9	7.67	15.2	16.6	10.4
Beryllium (Be)	mg/kg	0.13	0.12	<0.10	0.12	0.14	0.1
Bismuth (Bi)	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	mg/kg	38.3	15.9	8	16.1	11.3	18.1
Cadmium (Cd)	mg/kg	0.057	0.061	0.083	0.12	0.122	0.071
Calcium (Ca)	mg/kg	29,100	36,900	27,400	25,000	28,000	32,400
Chromium (Cr)	mg/kg	33.9	33.3	21	31.1	27.4	20.8

Sample ID	TL6-31JUL17B^	TL6-29AUG17	TL6-25SEP17	TL6-29OCT17	TL6-27NOV17	TL6-31DEC17
ALS ID	L1968371-2	L1982926-1	L1997619-1	L2016924-1	L2031040-1	L2040730-1
Date Sampled	7/31/2017 6:45:00 PM	8/29/2017 8:35:00 AM	9/25/2017 6:50:00 PM	10/29/2017 4:30:00 PM	11/27/2017 5:40:00 PM	12/31/2017 5:30:00 PM
Parameter	**Units**	**Results**				
Cobalt (Co)	mg/kg	14.9	15	9.77	10.6	11.4	13.3
Copper (Cu)	mg/kg	51.5	28.4	33.3	26.5	24.7	78.2
Iron (Fe)	mg/kg	44,700	50,300	33,400	38,600	42,500	40,400
Lead (Pb)	mg/kg	6.03	9	4.1	5.62	6.17	7.9
Lithium (Li)	mg/kg	31.4	23.4	16.8	24.5	26.9	20.3
Magnesium (Mg)	mg/kg	14,900	17,200	12,400	13,400	13,900	13,900
Manganese (Mn)	mg/kg	978	1,200	805	827	930	999
Mercury (Hg)	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Molybdenum (Mo)	mg/kg	0.37	0.23	0.2	0.21	0.26	0.28
Nickel (Ni)	mg/kg	26.3	29.5	17.8	20.9	19	21.1
Phosphorus (P)	mg/kg	354	356	293	247	353	300
Potassium (K)	mg/kg	1,430	1,130	580	1,270	1,350	940
Selenium (Se)	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	mg/kg	0.25	0.2	0.17	0.24	0.31	0.63
Sodium (Na)	mg/kg	1,030	716	633	643	733	479
Strontium (Sr)	mg/kg	17.5	18.4	12.8	14	14.7	15.5
Sulfur (S)	mg/kg	1,300	1,100	<1,000	<1,000	1,000	1,500
Sulfur (S)-Total	mg/kg	600	<500	500	<500	600	600
Thallium (Tl)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	mg/kg	902	821	434	699	852	617
Tungsten (W)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.56	0.52
Uranium (U)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

	Sample ID	TL6-31JUL17B^	TL6-29AUG17	TL6-25SEP17	TL6-29OCT17	TL6-27NOV17	TL6-31DEC17
	ALS ID	L1968371-2	L1982926-1	L1997619-1	L2016924-1	L2031040-1	L2040730-1
	Date Sampled	7/31/2017 6:45:00 PM	8/29/2017 8:35:00 AM	9/25/2017 6:50:00 PM	10/29/2017 4:30:00 PM	11/27/2017 5:40:00 PM	12/31/2017 5:30:00 PM
Parameter	**Units**	**Results**					
Vanadium (V)	mg/kg	68.9	60.5	35.8	49.6	54.3	44.8
Zinc (Zn)	mg/kg	47.4	48.5	46.5	63.2	60.5	49.8
Zirconium (Zr)	mg/kg	2.1	2	1.5	1.6	2.3	1.7

^ *Duplicate sample.*

Table D1-30. Detoxified Tailings Solids (TL-7), February to July 2017

	Sample ID	TL7-19FEB17	TL7-20MAR17	TL7-23APR17	TL7-15MAY17	TL7-19JUN17	TL7-23JUL17
	ALS ID	L1892828-1	L1903520-1	L1917001-1	L1926981-1	L1945625-1	L1964325-1
	Date Sampled	2/19/2017 1:00:00 PM	3/20/2017 1:10:00 PM	4/23/2017 4:30:00 PM	5/15/2017 5:05:00 PM	6/19/2017 9:25:00 AM	7/23/2017 1:50:00 PM
Parameter	**Units**	**Results**					
Moisture	%	27.4	20.1	20.6	24.7	22.6	24.1
pH (1:2 soil:water)	pH	8.95	8.35	8.31	7.89	8.33	8.4
Sulfate (SO4)	mg/kg	1,660	1,770	2,460	2,820	2,870	2,940
Cyanide, Weak Acid Diss	mg/kg	<10 [A]	0.106	<2.0 [A]	<2.0 [A]	<10 [A]	<2.0 [A]
Cyanide, Total	mg/kg	234	632	392	853	523	1,090
Cyanide, Free	mg/kg	<10 [A]	<0.050	<2.0 [A]	<2.0 [A]	<10 [A]	<2.0 [A]
Inorganic Carbon	%	0.929	0.915	0.578	0.644	0.899	0.946
Inorganic Carbon (as $CaCO_3$ Equivalent)	%	7.74	7.62	4.82	5.37	7.49	7.88
Aluminum (Al)	mg/kg	9,590	9,200	11,200	9,310	9,280	11,800
Antimony (Sb)	mg/kg	0.64	1.44	2.55	1.64	1.81	2
Arsenic (As)	mg/kg	244	645	729	684	537	597
Barium (Ba)	mg/kg	14.1	14.1	21.2	17	17.5	19.9
Beryllium (Be)	mg/kg	0.11	0.11	0.14	0.13	0.13	0.15
Bismuth (Bi)	mg/kg	0.79	1.72	4.42	2.81	2.25	2.74
Boron (B)	mg/kg	8.7	7.8	24.4	21.2	12.5	23.6

Sample ID	TL7-19FEB17	TL7-20MAR17	TL7-23APR17	TL7-15MAY17	TL7-19JUN17	TL7-23JUL17
ALS ID	L1892828-1	L1903520-1	L1917001-1	L1926981-1	L1945625-1	L1964325-1
Date Sampled	2/19/2017 1:00:00 PM	3/20/2017 1:10:00 PM	4/23/2017 4:30:00 PM	5/15/2017 5:05:00 PM	6/19/2017 9:25:00 AM	7/23/2017 1:50:00 PM
Parameter	**Units**	**Results**				
Cadmium (Cd)	mg/kg	0.739	3.16	12.5	6.56	5.74	6.83
Calcium (Ca)	mg/kg	47,800	38,900	30,500	22,900	28,800	30,700
Chromium (Cr)	mg/kg	61	54.4	71.3	59.1	55.5	88.8
Cobalt (Co)	mg/kg	128	335	513	406	336	401
Copper (Cu)	mg/kg	2,930	3,520	5,410	4,990	9,570 [B]	19,700
Iron (Fe)	mg/kg	84,200	142,000	200,000	222,000	169,000 [B]	193,000
Lead (Pb)	mg/kg	76	384	1,540	601	632	645
Lithium (Li)	mg/kg	15.4	17	23.6	18.5	18.1	22.1
Magnesium (Mg)	mg/kg	16,200	14,600	14,600	12,600	13,300	13,000
Manganese (Mn)	mg/kg	1,200	1,170	1,120	947	1,050	1,050
Mercury (Hg)	mg/kg	0.053	0.0802	0.112	0.1	0.0987	0.188
Molybdenum (Mo)	mg/kg	0.91	1.46	3.13	3.38	2.14	2.78
Nickel (Ni)	mg/kg	119	277	348	301	270	291
Phosphorus (P)	mg/kg	275	294	304	319	273	346
Potassium (K)	mg/kg	770	850	1,250	980	1,010	1,220
Selenium (Se)	mg/kg	3.52	9.15	17.7	15.6	11.9	13.8
Silver (Ag)	mg/kg	0.88	22.4	48.7	20.7	33.3	51.2
Sodium (Na)	mg/kg	1,170	1,360	2,040	1,880	2,040	2,400
Strontium (Sr)	mg/kg	23	19.7	16.7	15.6	15.7	19.5
Sulfur (S)	mg/kg	-	-	183,000	225,000	150,000	169,000
Sulfur (S)-Total	mg/kg	24,200	60,500	147,000	194,000	86,800	135,000
Thallium (Tl)	mg/kg	0.556	1.31	2.8	1.57	1.28	1.91
Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	mg/kg	430	393	726	551	624	1,230
Tungsten (W)	mg/kg	-	-	1.31	1.67	2.75	3.05
Uranium (U)	mg/kg	<0.050	<0.050	<0.050	0.079	0.212	0.087

	Sample ID	TL7-19FEB17	TL7-20MAR17	TL7-23APR17	TL7-15MAY17	TL7-19JUN17	TL7-23JUL17
	ALS ID	L1892828-1	L1903520-1	L1917001-1	L1926981-1	L1945625-1	L1964325-1
	Date Sampled	2/19/2017 1:00:00 PM	3/20/2017 1:10:00 PM	4/23/2017 4:30:00 PM	5/15/2017 5:05:00 PM	6/19/2017 9:25:00 AM	7/23/2017 1:50:00 PM
Parameter	**Units**	**Results**					
Vanadium (V)	mg/kg	47.5	45.9	63.2	49.7	61.8	110
Zinc (Zn)	mg/kg	334	1,360	6,060	2,950	3,060	3,490
Zirconium (Zr)	mg/kg	2.2	2.4	4.1	5.3	3.7	5

[A] *Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
[B] *Reported Result Verified By Repeat Analysis*

Table D1-31. Detoxified Tailings Solids (TL-7), August to December 2017

	Sample ID	TL7-20AUG17	TL7-18SEP17A	TL7-18SEP17B^	TL7-16OCT17	TL7-13NOV17	TL7-10DEC17
	ALS ID	L1979029-1	L1993856-1	L1993856-2	L2008550-1	L2022531-1	L2034814-1
	Date Sampled	8/20/2017 11:20:00 AM	9/19/2017 4:45:00 AM	9/19/2017 4:45:00 AM	10/16/2017 5:30:00 PM	11/13/2017 1:10:00 PM	12/10/2017 9:00:00 AM
Parameter	**Units**	**Results**					
Moisture	%	24.9	24.1	23.6	23.9	21.8	21.6
pH (1:2 soil:water)	pH	8.31	9.36	9.33	8.7	9.04	8.73
Sulfate (SO4)	mg/kg	2,020	3,590	3,130	4,260	3,600	1,440
Cyanide, Weak Acid Diss	mg/kg	<4.0 [A]	<20	<20	<20 [B]	<20	<20 [A]
Cyanide, Total	mg/kg	681	6,230	5,940	2,240	3,060	1,120
Cyanide, Free	mg/kg	<4.0 [A]	<20	<20	<20 [B]	<20	<20 [A]
Inorganic Carbon	%	0.917	0.989	0.924	0.828	0.781	0.813
Inorganic Carbon (as $CaCO_3$ Equivalent)	%	7.64	8.24	7.69	6.9	6.5	6.77
Aluminum (Al)	mg/kg	11,700	13,700	12,600	11,800	11,600	12,500
Antimony (Sb)	mg/kg	1.14	1.28	1.2	1.81	1.25	1.26
Arsenic (As)	mg/kg	412	386	354	386	274	343
Barium (Ba)	mg/kg	15	16.2	15.1	18	14.9	17.9
Beryllium (Be)	mg/kg	0.12	0.15	0.15	0.15	0.13	0.14
Bismuth (Bi)	mg/kg	1.3	1.7	1.66	2.19	1.42	2.27

	Sample ID	TL7-20AUG17	TL7-18SEP17A	TL7-18SEP17B^	TL7-16OCT17	TL7-13NOV17	TL7-10DEC17
	ALS ID	L1979029-1	L1993856-1	L1993856-2	L2008550-1	L2022531-1	L2034814-1
	Date Sampled	8/20/2017 11:20:00 AM	9/19/2017 4:45:00 AM	9/19/2017 4:45:00 AM	10/16/2017 5:30:00 PM	11/13/2017 1:10:00 PM	12/10/2017 9:00:00 AM
Parameter	**Units**	**Results**					
Boron (B)	mg/kg	16.8	9	9	11.7	9.9	17.1
Cadmium (Cd)	mg/kg	2.99	4.42	4.1	11.6	7.32	3.81
Calcium (Ca)	mg/kg	38,400	35,800	36,500	29,000	32,300	31,800
Chromium (Cr)	mg/kg	50.3	59.7	53.8	65.5	47.2	51.1
Cobalt (Co)	mg/kg	255	196	189	275	163	215
Copper (Cu)	mg/kg	8,160	9,010	7,840	11,900	4,370	2,770
Iron (Fe)	mg/kg	132,000	142,000	124,000	129,000	109,000	128,000
Lead (Pb)	mg/kg	348	312	330	550	290	360
Lithium (Li)	mg/kg	18.9	20.3	23.9	27.1	23.5	19.8
Magnesium (Mg)	mg/kg	15,200	16,500	14,500	14,000	14,600	14,800
Manganese (Mn)	mg/kg	1,190	1,220	1,100	931	1,040	1,110
Mercury (Hg)	mg/kg	0.0878	0.0305	0.0311	0.0684	0.0762	0.0532
Molybdenum (Mo)	mg/kg	1.81	1.85	2.03	1.85	1.33	1.82
Nickel (Ni)	mg/kg	191	131	124	223	137	172
Phosphorus (P)	mg/kg	360	421	381	295	314	325
Potassium (K)	mg/kg	950	950	840	1,160	1,070	1,350
Selenium (Se)	mg/kg	8.19	8.12	7.81	8.23	5.93	8.17
Silver (Ag)	mg/kg	21.8	20.6	20.7	15.4	12.1	14.9
Sodium (Na)	mg/kg	1,530	3,100	3,290	3,080	2,470	1,770
Strontium (Sr)	mg/kg	21.4	19.7	20.1	16.2	17.2	16.7
Sulfur (S)	mg/kg	99,100	95,500	97,600	99,500	76,600	89,400
Sulfur (S)-Total	mg/kg	66,900	78,600	88,400	81,800	34,500	68,600
Thallium (Tl)	mg/kg	0.891	0.946	0.889	1.81	1.16	0.939
Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	mg/kg	783	583	480	634	540	914
Tungsten (W)	mg/kg	1.44	1.41	1.47	3.16	1.63	1.71

	Sample ID	TL7-20AUG17	TL7-18SEP17A	TL7-18SEP17B^	TL7-16OCT17	TL7-13NOV17	TL7-10DEC17
	ALS ID	L1979029-1	L1993856-1	L1993856-2	L2008550-1	L2022531-1	L2034814-1
	Date Sampled	8/20/2017 11:20:00 AM	9/19/2017 4:45:00 AM	9/19/2017 4:45:00 AM	10/16/2017 5:30:00 PM	11/13/2017 1:10:00 PM	12/10/2017 9:00:00 AM
Parameter	**Units**	**Results**					
Uranium (U)	mg/kg	0.076	0.123	0.105	0.05	0.073	0.05
Vanadium (V)	mg/kg	75.3	66.3	56.7	63	58.1	69.5
Zinc (Zn)	mg/kg	1,500	1,880	1,690	4,220	2,750	2,000
Zirconium (Zr)	mg/kg	3.1	4.7	4.5	3.1	2.5	3.5

^ *Duplicate sample.*
[A] Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).[B] Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Table D1-32. Seepage from Underground Backfilled Stopes (TL-11), August and December 2017

	Sample ID	TL11-06AUG17	TL11-17DEC7A	TL11-17DEC7B^
	ALS ID	L1971638-1	L2037226-1	L2037226-2
	Date Sampled	8/6/2017 3:15:00 PM	12/17/2017 1:30:00 PM	12/17/2017 1:30:00 PM
Parameter	**Units**		**Results**	
Conductivity	uS/cm	-	104,000	105,000
Hardness (as $CaCO_3$)	mg/L	42,200	45,900	49,700
pH	pH	6.71	6.7	6.7
Total Suspended Solids	mg/L	623	1,090	271
Total Dissolved Solids	mg/L	117,000	54,700	60,000
Acidity (as $CaCO_3$)	mg/L	-	114	118
Alkalinity, Total (as $CaCO_3$)	mg/L	-	49.3	45.4
Ammonia, Total (as N)	mg/L	392	280	286
Chloride (Cl)	mg/L	42,200	48,200	47,700
Nitrate (as N)	mg/L	-	594	588
Nitrite (as N)	mg/L	-	6.79	6.74
Sulfate (SO4)	mg/L	-	904	894
Cyanide, Weak Acid Diss	mg/L	-	0.0282	0.0228
Cyanide, Total	mg/L	0.0798	0.0811 [A]	0.0588 [A]
Cyanide, Free	mg/L	0.0261	0.0236	0.0215
Aluminum (Al)-Total	mg/L	7.48	6.73	0.43
Antimony (Sb)-Total	mg/L	<0.010 [B]	<0.010 [B]	<0.010 [B]
Arsenic (As)-Total	mg/L	<0.010 [B]	0.025	<0.010 [B]
Barium (Ba)-Total	mg/L	0.437	0.579	0.572
Beryllium (Be)-Total	mg/L	<0.010 [B]	<0.010 [B]	<0.010 [B]
Bismuth (Bi)-Total	mg/L	-	<0.0050 [B]	<0.0050 [B]
Boron (B)-Total	mg/L	1.8	2.3	2.4
Cadmium (Cd)-Total	mg/L	0.0259	0.0265	0.0268
Calcium (Ca)-Total	mg/L	13,800	16,300	16,800
Cesium (Cs)-Total	mg/L	-	0.0056	0.005
Chromium (Cr)-Total	mg/L	0.021	<0.010 [B]	<0.010 [B]
Cobalt (Co)-Total	mg/L	0.154	0.209	0.198
Copper (Cu)-Total	mg/L	0.345	1.33	0.61
Iron (Fe)-Total	mg/L	17.2	21.5	1.1
Lead (Pb)-Total	mg/L	0.0427	0.263	0.131
Lithium (Li)-Total	mg/L	0.42	0.36	0.38
Magnesium (Mg)-Total	mg/L	1,000	1,090	1,110
Manganese (Mn)-Total	mg/L	7.37	6.74	6.54
Molybdenum (Mo)-Total	mg/L	0.023	0.0269	0.0285
Nickel (Ni)-Total	mg/L	0.419	0.387	0.364
Phosphorus (P)-Total	mg/L	-	<5.0 [B]	<5.0 [B]
Potassium (K)-Total	mg/L	450	487	497

Sample ID		TL11-06AUG17	TL11-17DEC7A	TL11-17DEC7B^
ALS ID		L1971638-1	L2037226-1	L2037226-2
Date Sampled		8/6/2017 3:15:00 PM	12/17/2017 1:30:00 PM	12/17/2017 1:30:00 PM
Parameter	**Units**	**Results**		
Rubidium (Rb)-Total	mg/L	-	0.378	0.381
Selenium (Se)-Total	mg/L	0.014	0.0107	0.0112
Silicon (Si)-Total	mg/L	-	14	<10 B
Silver (Ag)-Total	mg/L	0.0377	0.0534	0.0538
Sodium (Na)-Total	mg/L	6,570	7,820	8,180
Strontium (Sr)-Total	mg/L	-	31.9	32.1
Sulfur (S)-Total	mg/L	-	416	443
Tellurium (Te)-Total	mg/L	-	<0.020 B	<0.020 B
Thallium (Tl)-Total	mg/L	0.0012	0.0013	0.0012
Thorium (Th)-Total	mg/L	-	<0.010 B	<0.010 B
Tin (Sn)-Total	mg/L	<0.010 B	<0.010 B	<0.010 B
Titanium (Ti)-Total	mg/L	0.341	<0.30 B	<0.030 B
Tungsten (W)-Total	mg/L	-	<0.010 B	<0.010 B
Uranium (U)-Total	mg/L	0.0022	0.0028	0.0026
Vanadium (V)-Total	mg/L	<0.050 B	<0.050 B	<0.050 B
Zinc (Zn)-Total	mg/L	0.71	1.81	1.63
Zirconium (Zr)-Total	mg/L	-	<0.0060 B	<0.0060 B
Dissolved Metals Filtration Location		FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	<0.10 B	<0.10 B	<0.10 B
Antimony (Sb)-Dissolved	mg/L	<0.010 B	<0.010 B	<0.010 B
Arsenic (As)-Dissolved	mg/L	<0.010 B	<0.010 B	<0.010 B
Barium (Ba)-Dissolved	mg/L	0.461	0.557	0.623
Beryllium (Be)-Dissolved	mg/L	<0.010 B	<0.010 B	<0.010 B
Bismuth (Bi)-Dissolved	mg/L	<0.0050 B	<0.0050 B	<0.0050 B
Boron (B)-Dissolved	mg/L	1.9	2.4	2.7
Cadmium (Cd)-Dissolved	mg/L	0.0296	0.0263	0.0281
Calcium (Ca)-Dissolved	mg/L	15,100	16,700	18,000
Cesium (Cs)-Dissolved	mg/L	0.0072	0.0049	0.0054
Chromium (Cr)-Dissolved	mg/L	<0.010 B	<0.010 B	<0.010 B
Cobalt (Co)-Dissolved	mg/L	0.154	0.189	0.211
Copper (Cu)-Dissolved	mg/L	0.187	0.563	0.639
Iron (Fe)-Dissolved	mg/L	<1.0 B	<1.0 B	<1.0 B
Lead (Pb)-Dissolved	mg/L	0.0071	0.129	0.14
Lithium (Li)-Dissolved	mg/L	0.46	0.39	0.43
Magnesium (Mg)-Dissolved	mg/L	1,110	1,050	1,180
Manganese (Mn)-Dissolved	mg/L	7.83	6.45	7.29
Molybdenum (Mo)-Dissolved	mg/L	0.0264	0.0269	0.0317
Nickel (Ni)-Dissolved	mg/L	0.437	0.361	0.397

	Sample ID	TL11-06AUG17	TL11-17DEC7A	TL11-17DEC7B^
	ALS ID	L1971638-1	L2037226-1	L2037226-2
	Date Sampled	8/6/2017 3:15:00 PM	12/17/2017 1:30:00 PM	12/17/2017 1:30:00 PM
Parameter	**Units**	**Results**		
Phosphorus (P)-Dissolved	mg/L	<5.0 [B]	<5.0 [B]	<5.0 [B]
Potassium (K)-Dissolved	mg/L	492	492	542
Rubidium (Rb)-Dissolved	mg/L	0.422	0.384	0.433
Selenium (Se)-Dissolved	mg/L	0.0139	0.014	0.0131
Silicon (Si)-Dissolved	mg/L	<5.0 [B]	<5.0 [B]	<5.0 [B]
Silver (Ag)-Dissolved	mg/L	0.0407	0.0521	0.0592
Sodium (Na)-Dissolved	mg/L	7,230	7,750	8,880
Strontium (Sr)-Dissolved	mg/L	28.8	29.2	32.3
Sulfur (S)-Dissolved	mg/L	583	393	451
Tellurium (Te)-Dissolved	mg/L	<0.020 [B]	<0.020 [B]	<0.020 [B]
Thallium (Tl)-Dissolved	mg/L	0.0014	0.0015	0.0014
Thorium (Th)-Dissolved	mg/L	<0.010 [B]	<0.010 [B]	<0.010 [B]
Tin (Sn)-Dissolved	mg/L	<0.010 [B]	<0.010 [B]	<0.010 [B]
Titanium (Ti)-Dissolved	mg/L	<0.030 [B]	<0.030 [B]	<0.030 [B]
Tungsten (W)-Dissolved	mg/L	<0.010 [B]	<0.010 [B]	<0.010 [B]
Uranium (U)-Dissolved	mg/L	0.0023	0.003	0.0032
Vanadium (V)-Dissolved	mg/L	<0.050 [B]	<0.050 [B]	<0.050 [B]
Zinc (Zn)-Dissolved	mg/L	0.56	1.59	1.75
Zirconium (Zr)-Dissolved	mg/L	<0.0060 [B]	<0.0060 [B]	<0.0060 [B]

^ Duplicate Sample
[A] Test result for Total Cyanide may be biased high due to interference from high nitrite in this sample. Nitrite can cause false positives for T-CN at up to ~ 0.8% of the nitrite concentration. Interpret result as a maximum possible value.
[B] Detection Limit adjusted for required dilution.

Appendix D.2. 2BE-HOP1222

Table D2-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2BE-HOP1222. The location of each sampling point is illustrated in Figure D2-1 below.

Table D2-1. 2BE-HOP1222 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Monitoring Parameters	Frequency
HOP-1	Raw water supply intake at Windy Lake	B, G, Oil and Grease	Monthly (when in use for Doris)
		D	Daily during periods of pumping
HOP-2*	WWTF effluent discharge at the surge tank prior to being pumped over the ridge east of the Windy Camp Facilities	G, B, MT, Oil and Grease	Monthly
		D	Daily during periods of discharge
HOP-3*	WWTF effluent at a point of entry into Windy lake	G, B, Oil and Grease	Monthly
		Acute Lethality	Annually
		D	Daily during periods of discharge
HOP-4*	Effluent from the Landfarm Treatment Facility pumped to the WWTF surge tank	B, G, Oil and Grease	Once before any discharge, daily when discharging onto the tundra
		D	Daily during periods of discharge
HOP-5*	Effluent from the Bulk Fuel Storage Facility located at the Windy Camp, prior to release	G, MT, HC, TPH, PAH, Nitrate, Nitrite, Total Phenols, Total Hardness, Total Alkalinity, Calcium, Potassium, Sulphate, Sodium, Magnesium	Once before any discharge, monthly when discharging onto the tundra
		D	Daily during periods of discharge
HOP-6*	Effluent from the Bulk Fuel Storage Facility located at the Patch Lake location, prior to release to a location approved by an Inspector	G, MT, HC, Oil and Grease Total Hardness, Total Alkalinity, Calcium, Potassium, Sulphate, Sodium, Magnesium	Once before any discharge, monthly when discharging onto the tundra
		D	Daily during periods of discharge
HOP-7A, B, and D	Discharge from Quarries A, B, and D respectively	G, N1, MT, Total Sulphate, Alkalinity, Oil and Grease, Electrical Conductivity and Reduction potential (Eh)	Once before any discharge, monthly when discharging onto the tundra
		D	Daily during periods of discharge
HOP-8*	Effluent from the Bulk Fuel Storage Facility located at the new Windy Camp location, prior to release to a location approved by an Inspector	G, MT, HC, Total Hardness, Total Alkalinity, Calcium, Potassium, Sulphate, Sodium, Magnesium	Once before any discharge, monthly when discharging onto the tundra
		D	Daily during periods of discharge
Drill Sites	Under-ice sampling before and after drilling	G, MT, Electrical Conductivity, Oil and Grease	Before and after on-ice drilling
	Water intake from all sources	D	Daily during periods of discharge

** Station not in use at this time.*

Figure D2-1. 2BE-HOP1222 Sample Stations Locations

SUMMARY OF MONITORING INFORMATION

The following tables summarize the results of sampling undertaken as part of the monitoring program detailed in Part J of 2BE-HOP1222.

The camp water treatment and wastewater treatment facility (WWTF) permitted under this licence was not operational in 2017, therefore no sampling was conducted at monitoring stations HOP-1 (freshwater intake), HOP-2 (WWTF discharge), or HOP-3 (point of entry of WWTF discharge to Windy Lake). Water was utilized from Windy Lake for domestic consumption at Doris Camp and the monitoring station ST-7a (HOP-1) was sampled for the monitoring criteria under the Doris North Water Licence 2AM-DOH1323. For the ST-7a results see Table D1-12 and Table D1-13 in Appendix D.1 of this report. The Landfarm at Windy Camp (HOP-4) was dismantled in 2008, so no sampling was conducted at this monitoring station.

The bulk fuel storage tanks at Windy Camp were moved to Doris Camp in winter 2009 for use there, and the bulk fuel storage berm (HOP-5) was dismantled in 2012. The bulk fuel storage berm at Patch Lake laydown (HOP-6) was also dismantled in 2012. No sampling was conducted at either of these monitoring stations.

No sampling occurred at monitoring stations HOP-7A HOP-7B, or HOP-7D (located in Quarries A, B, and D, respectively) during 2017 because there was no ponded water to sample.

On-ice exploration drilling did not occur in the licence area in 2017, therefore no samples were taken through lake ice (required by Part F Item 7 and Part J Item 7) to establish water quality prior to, and upon completion of, an on-ice drilling program.

Quantities of Water Utilized for Camp, Drilling and Other Purposes

During 2017, a total of 10,496 m^3 of water was used from Windy Lake for domestic purposes at Doris Camp. This included consumption for drinking water, all camp domestic water supply, some ancillary domestic use for provisioning of portable wash cars, and filling site mobile fire suppression units. No water was used domestically at Windy Camp. A total of 64 m^3 of water was used from Windy Lake in 2017 for dust suppression on the Doris-Windy All-Weather Road. A total of 14 m^3 of water from Windy Lake was used to support exploration in 2017. Daily water utilization is provided in Table D2-2. No withdrawals exceeded water licence allotments.

No water was applied for the development of winter tracks in the licence area in 2017.

Table D2-2. Volume of Water Utilized for Camp, Drilling and Dust Suppression Purposes, 2017

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
January				
01	0	0	20	20
02	0	0	20	20
03	0	0	20	20
04	0	0	20	20
05	0	0	20	20
06	0	0	20	20
07	0	0	20	20
08	0	0	20	20

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
09	0	0	20	20
10	0	0	20	20
11	0	0	28	28
12	0	0	22	22
13	0	0	20	20
14	0	0	30	30
15	0	0	20	20
16	0	0	40	40
17	0	0	20	20
18	0	0	30	30
19	0	0	30	30
20	0	0	28	28
21	0	0	30	30
22	0	0	30	30
23	0	0	26	26
24	0	0	28	28
25	0	0	20	20
26	0	0	51	51
27	0	0	25	25
28	0	0	31	31
29	0	0	36	36
30	0	0	30	30
31	0	0	38	38
February				
01	0	0	20	20
02	0	0	40	40
03	0	0	25	25
04	0	0	20	20
05	0	0	30	30
06	0	0	26	26
07	0	0	40	40
08	0	0	30	30
09	0	0	30	30
10	0	0	20	20
11	0	0	40	40
12	0	0	30	30
13	0	0	30	30
14	0	0	30	30
15	0	0	40	40
16	0	0	20	20
17	0	0	25	25

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
18	0	0	25	25
19	0	0	20	20
20	0	0	35	35
21	0	0	35	35
22	0	0	35	35
23	0	0	30	30
24	0	0	20	20
25	0	0	25	25
26	0	0	25	25
27	0	0	30	30
28	0	0	25	25
March				
01	0	0	20	20
02	0	0	30	30
03	0	0	20	20
04	0	0	20	20
05	0	0	30	30
06	0	0	30	30
07	0	0	30	30
08	0	0	30	30
09	0	0	30	30
10	0	0	30	30
11	0	0	20	20
12	0	0	30	30
13	0	0	20	20
14	0	0	30	30
15	0	0	30	30
16	0	0	10	10
17	0	0	50	50
18	0	0	40	40
19	0	0	45	45
20	0	0	30	30
21	0	0	30	30
22	0	0	40	40
23	0	0	30	30
24	0	0	35	35
25	0	0	40	40
26	0	0	40	40
27	0	0	25	25
28	0	0	30	30
29	0	0	22	22

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
30	0	0	33	33
31	0	0	25	25
April				
01	0	0	21	21
02	0	0	28	28
03	0	0	30	30
04	0	0	30	30
05	0	0	20	20
06	0	0	30	30
07	0	0	20	20
08	0	0	30	30
09	0	0	20	20
10	0	0	30	30
11	0	0	25	25
12	0	0	28	28
13	0	0	40	40
14	0	0	35	35
15	0	0	28	28
16	0	0	28	28
17	0	0	28	28
18	0	0	48	48
19	0	0	29	29
20	0	0	28	28
21	0	0	33	33
22	0	0	28	28
23	0	0	37	37
24	0	0	33	33
25	0	0	42	42
26	0	0	20	20
27	0	0	31	31
28	0	0	23	23
29	0	0	26	26
30	0	0	25	25
May				
01	0	0	25	25
02	0	0	22	22
03	0	0	23	23
04	0	0	22	22
05	0	0	27	27
06	0	0	23	23
07	0	0	27	27

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
08	0	0	24	24
09	0	0	35	35
10	0	0	35	35
11	0	0	30	30
12	0	0	30	30
13	0	0	20	20
14	0	0	30	30
15	0	0	25	25
16	0	0	25	25
17	0	0	60	60
18	0	0	10	10
19	0	0	40	40
20	0	0	20	20
21	0	0	40	40
22	0	0	20	20
23	0	0	30	30
24	0	0	30	30
25	0	0	35	35
26	0	0	29	29
27	0	0	30	30
28	0	0	20	20
29	0	0	34	34
30	0	0	35	35
31	0	0	35	35
June				
01	0	0	30	30
02	0	0	35	35
03	0	0	40	40
04	0	0	30	30
05	0	0	40	40
06	0	0	30	30
07	0	0	42	42
08	0	0	51	51
09	0	0	25	25
10	0	0	50	50
11	0	0	30	30
12	0	0	40	40
13	0	0	31	31
14	0	0	30	30
15	0	0	30	30
16	0	0	30	30

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
17	0	0	30	30
18	0	0	30	30
19	0	0	20	20
20	0	0	40	40
21	0	0	30	30
22	0	0	30	30
23	0	0	23	23
24	0	0	27	27
25	0	0	30	30
26	0	0	24	24
27	0	0	30	30
28	0	0	24	24
29	0	0	26	26
30	0	0	20	20
July				
01	0	0	25	25
02	0	0	17	17
03	0	0	28	28
04	0	0	30	30
05	0	0	40	40
06	0	0	20	20
07	0	0	40	40
08	0	0	30	30
09	0	0	22	22
10	0	0	18	18
11	0	0	30	30
12	0	0	35	35
13	0	0	26	26
14	0	0	24	24
15	0	0	30	30
16	0	0	30	30
17	0	0	30	30
18	0	0	30	30
19	0	0	30	30
20	0	0	30	30
21	0	0	20	20
22	0	0	35	35
23	0	0	25	25
24	0	0	30	30
25	0	0	30	30
26	0	0	20	20

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
27	0	0	30	30
28	0	0	30	30
29	0	0	16	16
30	0	0	25	25
31	0	0	20	20
August				
01	0	0	35	35
02	0	0	25	25
03	0	0	15	15
04	0	0	42	42
05	0	0	24	24
06	0	0	25	25
07	0	0	30	30
08	0	0	20	20
09	0	0	34	34
10	0	0	17	17
11	0	0	30	30
12	0	0	20	20
13	0	0	40	40
14	0	0	20	20
15	0	0	40	40
16	0	0	20	20
17	0	0	30	30
18	0	0	30	30
19	0	0	24	24
20	0	0	26	26
21	0	0	30	30
22	0	0	28	28
23	0	0	30	30
24	0	0	20	20
25	64	0	30	94
26	0	0	30	30
27	0	0	30	30
28	0	0	35	35
29	0	0	30	30
30	0	0	25	25
31	0	0	15	15
September				
01	0	0	30	30
02	0	0	30	30
03	0	0	20	20

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
04	0	0	30	30
05	0	0	40	40
06	0	0	20	20
07	0	0	25	25
08	0	0	25	25
09	0	0	30	30
10	0	0	28	28
11	0	0	33	33
12	0	0	23	23
13	0	0	34	34
14	0	0	20	20
15	0	0	26	26
16	0	0	20	20
17	0	0	30	30
18	0	0	20	20
19	0	0	30	30
20	0	0	20	20
21	0	0	25	25
22	0	0	25	25
23	0	0	25	25
24	0	0	30	30
25	0	0	25	25
26	0	0	30	30
27	0	0	30	30
28	0	0	30	30
29	0	0	30	30
30	0	0	30	30
October				
01	0	0	20	20
02	0	0	30	30
03	0	0	30	30
04	0	0	30	30
05	0	0	30	30
06	0	0	22	22
07	0	0	30	30
08	0	0	30	30
09	0	0	30	30
10	0	0	35	35
11	0	0	20	20
12	0	0	34	34
13	0	0	30	30

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
14	0	0	30	30
15	0	0	30	30
16	0	0	28	28
17	0	0	20	20
18	0	0	30	30
19	0	0	30	30
20	0	0	35	35
21	0	0	22	22
22	0	0	28	28
23	0	0	25	25
24	0	0	30	30
25	0	0	40	40
26	0	0	30	30
27	0	0	30	30
28	0	0	20	20
29	0	0	35	35
30	0	0	25	25
31	0	0	30	30
November				
01	0	0	29	29
02	0	0	20	20
03	0	0	30	30
04	0	0	30	30
05	0	0	20	20
06	0	0	37	37
07	0	0	10	10
08	0	0	30	30
09	0	0	20	20
10	0	0	30	30
11	0	0	30	30
12	0	0	25	25
13	0	0	25	25
14	0	0	30	30
15	0	0	30	30
16	0	0	25	25
17	0	0	30	30
18	0	0	30	30
19	0	0	20	20
20	0	0	30	30
21	0	0	30	30
22	0	0	40	40

Date	Dust Suppression (m^3)	Regional Drill Water Usage Total (m^3)	Domestic Water Consumption at Doris (m^3)	Total Daily Usage (m^3)
23	0	0	30	30
24	0	0	30	30
25	0	0	30	30
26	0	0	30	30
27	0	0	30	30
28	0	0	40	40
29	0	0	30	30
30	0	0	30	30
December				
01	0	0	28	28
02	0	0	27	27
03	0	0	25	25
04	0	0	25	25
05	0	0	30	30
06	0	0	30	30
07	0	0	40	40
08	0	0	30	30
09	0	0	40	40
10	0	0	30	30
11	0	0	50	50
12	0	0	30	30
13	0	0	30	30
14	0	0	30	30
15	0	0	30	30
16	0	0	35	35
17	0	0	20	20
18	0	0	25	25
19	0	0	35	35
20	0	0	30	30
21	0	0	30	30
22	0	0	30	30
23	0	0	30	30
24	0	0	30	30
25	0	0	35	35
26	0	0	25	25
27	0	0	25	25
28	0	0	35	35
29	0	0	30	30
30	0	0	20	20
31	0	0	40	40

Note: Values rounded to nearest whole cubic metre.

Quantity of Effluent Discharged

Windy Camp was closed throughout 2017 therefore no discharges occurred related to the waste water treatment facility (WWTF) at monitoring station HOP-2.

No discharges occurred at the Windy Camp bulk fuel storage facility (HOP-5) in 2017 as this facility was decommissioned in 2012 and the containment berm removed.

No discharges occurred at the Patch Lake bulk fuel storage facility (HOP-6) in 2017 as this facility was decommissioned and the berm removed in 2012.

Volume of Sludge Removed from Sewage Disposal Facility

No sludge was removed from the Windy Camp WWTF in 2017 because this facility was not operational and the camp was closed.

Results of Toxicity Testing

TMAC did not perform toxicity testing to demonstrate the non-acute toxicity of the effluent discharged from the WWTF at HOP-3 (at a point of entry to Windy Lake), as the camp is closed and no effluent was discharged (this facility has been removed). The testing is normally conducted in accordance with the following test procedures:

1. Acute lethality to Rainbow Trout, Oncorhynchus mykiss (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13); and
2. Acute lethality to the crustacean, Daphnia magna (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/14).

Appendix D.3. 2BB-MAE1727

Table D3-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2BB-MAE1217. Sample station locations have not yet been established time as work has not commenced on the Madrid sites. Sample points and discharge locations for SNP stations under this licence will be established in consultation with the Inspector. The proposed sample point locations for SNP Stations MAE-14, MAE-15 and MAE-16 are illustrated in Figure D3-1 below. A Summary of Water Sampling conducted in 2017 is provided below.

Table D3-1. 2BB-MAE1217 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Monitoring Parameters	Frequency
MAE-01*	Madrid North, Freshwater intake at Windy Lake	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
MAE-02*	Madrid South, Freshwater intake at Patch Lake	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
MAE-03*	Freshwater intake at other Lakes	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
MAE-04*	Madrid North Pollution Control Pond (PCP) Water at the point of discharge	pH, TSS, Electrical Conductivity, Oil and Grease, Total Ammonia, Nitrate-Nitrite, Total Phenols, Total Alkalinity, Total Hardness, Chloride, Sulphate, Magnesium, Sodium, Calcium, Potassium, Total As, Cd, Cu, Cr, Fe, Pb, Hg, and Ni	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-05*	Madrid South Pollution Control Pond No.1 Water at the point of discharge	pH, TSS, Electrical Conductivity, Oil and Grease, Total Ammonia, Nitrate-Nitrite, Total Phenols, Total Alkalinity, Total Hardness, Chloride, Sulphate, Magnesium, Sodium, Calcium, Potassium, Total As, Cd, Cu, Cr, Fe, Pb, Hg, and Ni	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-06*	Madrid South Pollution Control Pond No.2 Water at the point of discharge	pH, TSS, Electrical Conductivity, Oil and Grease, Total Ammonia, Nitrate-Nitrite, Total Phenols, Total Alkalinity, Total Hardness, Chloride, Sulphate, Magnesium, Sodium, Calcium, Potassium, Total As, Cd, Cu, Cr, Fe, Pb, Hg, and Ni	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge

SNP Station	Description	Monitoring Parameters	Frequency
MAE-07*	Madrid North Fuel Storage Area Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-08*	Madrid North Fuel Transfer Station Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-09*	Madrid South Fuel Storage Area Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-10*	Madrid South Fuel Transfer Station Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-11*	Quarry G Contact Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge

SNP Station	Description	Monitoring Parameters	Frequency
MAE-12*	Quarry H Contact Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-13*	Quarry I Contact Water Sump	pH, TSS, Sulphate, Chloride, Electrical Conductivity, Oil and Grease, Total Ammonia, BTEX, Total Arsenic, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Once, prior to every discharge onto the tundra
		D	Daily during periods of discharge
MAE-14*	Windy Lake immediately downgradient of the Pollution Control Pond Discharge	Chloride, Electrical Conductivity, Total Dissolved Solids (TDS)	Once prior to each discharge; and a maximum of two weeks post discharge
MAE-15*	Patch Lake immediately downgradient of the Pollution Control Pond Discharge	Chloride, Electrical Conductivity, Total Dissolved Solids (TDS)	Once prior to each discharge; and a maximum of two weeks post discharge
MAE-16*	Wolverine Lake immediately downgradient of the Pollution Control Pond Discharge	Chloride, Electrical Conductivity, Total Dissolved Solids (TDS)	Once prior to each discharge; and a maximum of two weeks post discharge
Drill Sites	Under-ice sampling before and after drilling	pH, TSS, Electrical Conductivity, Total Trace Metals for a minimum of the following elements: As, Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Hg, Pb, Li, Mn, Mo, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Before and after on-ice drilling
	Water intake from all sources	D	Daily during periods of pumping
Mine Sumps*	Water from Madrid South Underground Mine Water Sumps during periods of Water inflow	Total Dissolved Solids, pH, Electrical Conductivity, Chloride, Total Ammonia and Nitrate, Alkalinity, Sulfate, Trace Metals for a minimum of the following elements: As, Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn	Three times per year

** Station not in use at this time.*

Figure D3-1. 2BB-MAE1727 Sample Stations Locations

SUMMARY OF MONITORING INFORMATION

The following tables summarize the results of sampling undertaken as part of the monitoring program detailed in Part J of 2BB-MAE1727.

No activity occurred at the Madrid North or Madrid South sites in 2017. Monitoring was not undertaken at monitoring stations MAE-01 (Madrid North Windy Lake Freshwater intake), MAE-02 (Madrid South Patch Lake Freshwater intake) or MAE-03 (Freshwater intake at other lakes) as no water obtained from these locations for use under this licence. No water was used for domestic, drilling or all other purposes and no waste was deposited under this licence in 2017. Location coordinates of all water sources and locations of waste deposit will be reported as required.

No discharge occurred and no monitoring was conducted at MAE-04 (Madrid North Pollution Control Pond), MAE-05 (Madrid South Pollution Control Pond No.1) or MAE-06 (Madrid South Pollution Control Pond No.2) as these facilities have not yet been constructed.

The Fuel Storage Areas and Transfer Stations at Madrid North (MAE-07 and MAE-08) and Madrid South (MAE-09 and MAE-10) have not yet been constructed. No water quality monitoring was conducted and no discharge occurred at these sampling locations.

Quarrying activities were not undertaken at Quarry G (MAE-11), Quarry H (MAE-12) or Quarry I (MAE-13) in 2017. No sampling or discharge was required for these monitoring locations.

Sampling was conducted between July and September 2017 at lakes located immediately downgradient of future Madrid North and Madrid South Pollution Control Pond discharge locations (MAE-14, Windy Lake; MAE-15, Patch Lake; MAE-16, Wolverine Lake) to collect additional information regarding baseline conditions within these lakes. Results of this monitoring is present in Table D3-2, Table D3-3 and Table D3-4 below.

Underground mining has not yet commenced at Madrid North or Madrid South. No water was discharged from underground sumps and no water quality monitoring was conducted.

On-ice surface exploration was not conducted in the licence area in 2017, therefore under-ice water quality sampling was not required.

Table D3-2. Windy Lake Downgradient of Future Pollution Control Pond Discharge, July to September 2017

Sample ID		MAH14-23JUL17	MAE14-20AUG17	MAE14-18SEP17
ALS ID		L1964301-1	L1979034-1	L1993844-1
Date Sampled		7/23/2017 10:50:00 AM	8/20/2017 1:15:00 PM	9/18/2017 2:05:00 PM
Parameter	**Units**	**Results**		
Conductivity	uS/cm	426	433	437
Total Dissolved Solids	mg/L	232	235	254
Chloride (Cl)	mg/L	98	93.4	93.8
Aluminum (Al)-Total	mg/L	0.419	0.0493	0.0499
Antimony (Sb)-Total	mg/L	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	mg/L	0.00035	0.00026	0.00024
Barium (Ba)-Total	mg/L	0.00582	0.00275	0.00561
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010

Sample ID		MAH14-23JUL17	MAE14-20AUG17	MAE14-18SEP17
ALS ID		L1964301-1	L1979034-1	L1993844-1
Date Sampled		7/23/2017 10:50:00 AM	8/20/2017 1:15:00 PM	9/18/2017 2:05:00 PM
Parameter	**Units**	**Results**		
Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050
Boron (B)-Total	mg/L	0.043	0.045	0.04
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	11.7	12.5	21.4
Cesium (Cs)-Total	mg/L	0.000025	<0.000010	<0.000010
Chromium (Cr)-Total	mg/L	0.00097	0.00021	0.00027
Cobalt (Co)-Total	mg/L	0.00015	<0.00010	<0.00010
Copper (Cu)-Total	mg/L	0.00156	0.001	0.00135
Iron (Fe)-Total	mg/L	0.316	0.035	0.048
Lead (Pb)-Total	mg/L	0.000147	<0.000050	<0.000050
Lithium (Li)-Total	mg/L	0.003	0.003	0.0044
Magnesium (Mg)-Total	mg/L	10.4	10.5	9.98
Manganese (Mn)-Total	mg/L	0.00488	0.00219	0.00181
Molybdenum (Mo)-Total	mg/L	0.000614	0.000651	0.00051
Nickel (Ni)-Total	mg/L	0.00067	<0.00050	0.00078
Phosphorus (P)-Total	mg/L	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	4.19	4.05	3.29
Rubidium (Rb)-Total	mg/L	0.00287	0.00217	0.00195
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total	mg/L	1.37	0.45	1.68
Silver (Ag)-Total	mg/L	<0.000010	0.000124	<0.000010
Sodium (Na)-Total	mg/L	54	55.3	43.6
Strontium (Sr)-Total	mg/L	0.0562	0.0574	0.0753
Sulfur (S)-Total	mg/L	3.02	3.05	5.47
Tellurium (Te)-Total	mg/L	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010
Thorium (Th)-Total	mg/L	0.00012	<0.00010	<0.00010
Tin (Sn)-Total	mg/L	<0.00010	<0.00010	0.00015
Titanium (Ti)-Total	mg/L	0.0195	<0.0010 [A]	<0.0018 [A]
Tungsten (W)-Total	mg/L	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L	0.000203	0.000191	0.000143
Vanadium (V)-Total	mg/L	0.00099	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	0.0045
Zirconium (Zr)-Total	mg/L	0.000207	<0.000060	0.000096

[A] *Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Table D3-3. Patch Lake Downgradient of Future Pollution Control Pond Discharge, July to September 2017

Sample ID		MAH15-23JUL17	MAE15-20AUG17	MAE15-17SEP17
ALS ID		L1964301-2	L1979034-2	L1993844-2
Date Sampled		7/23/2017 11:00:00 AM	8/20/2017 8:50:00 AM	9/17/2017 2:00:00 PM
Parameter	**Units**	**Results**		
Conductivity	uS/cm	286	303	263
Total Dissolved Solids	mg/L	173	177	202
Chloride (Cl)	mg/L	66.7	66	61.3
Aluminum (Al)-Total	mg/L	0.143	0.372	0.0992
Antimony (Sb)-Total	mg/L	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	mg/L	0.00027	0.00037	0.00028
Barium (Ba)-Total	mg/L	0.00339	0.00588	0.00572
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050
Boron (B)-Total	mg/L	0.022	0.025	0.017
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	8.71	9.92	14.1
Cesium (Cs)-Total	mg/L	<0.000010	0.00002	<0.000010
Chromium (Cr)-Total	mg/L	0.0003	0.00081	0.00045
Cobalt (Co)-Total	mg/L	<0.00010	0.00018	0.00011
Copper (Cu)-Total	mg/L	0.00127	0.00187	0.0021
Iron (Fe)-Total	mg/L	0.112	0.382	0.187
Lead (Pb)-Total	mg/L	0.000052	0.000141	0.000051
Lithium (Li)-Total	mg/L	0.0041	0.005	0.0058
Magnesium (Mg)-Total	mg/L	7.01	8.26	7.02
Manganese (Mn)-Total	mg/L	0.0076	0.0137	0.0122
Molybdenum (Mo)-Total	mg/L	0.000193	0.000217	0.000181
Nickel (Ni)-Total	mg/L	0.00074	0.00099	0.00125
Phosphorus (P)-Total	mg/L	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	2.48	2.74	2.05
Rubidium (Rb)-Total	mg/L	0.00167	0.00222	0.00135
Selenium (Se)-Total	mg/L	<0.000050	0.000051	<0.000050
Silicon (Si)-Total	mg/L	0.59	0.91	2.34
Silver (Ag)-Total	mg/L	<0.000010	0.00004	<0.000010
Sodium (Na)-Total	mg/L	30.4	35.8	24.3
Strontium (Sr)-Total	mg/L	0.0464	0.0514	0.0725
Sulfur (S)-Total	mg/L	0.81	1.07	1.55
Tellurium (Te)-Total	mg/L	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010
Thorium (Th)-Total	mg/L	<0.00010	0.00011	<0.00010
Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	0.00388	0.0148	0.00379

Sample ID		MAH15-23JUL17	MAE15-20AUG17	MAE15-17SEP17
ALS ID		L1964301-2	L1979034-2	L1993844-2
Date Sampled		7/23/2017 11:00:00 AM	8/20/2017 8:50:00 AM	9/17/2017 2:00:00 PM
Parameter	**Units**	**Results**		
Tungsten (W)-Total	mg/L	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L	0.000053	0.000074	0.000043
Vanadium (V)-Total	mg/L	<0.00050	0.00091	<0.00050
Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030
Zirconium (Zr)-Total	mg/L	0.000065	0.00013	0.000186

Table D3-4. Wolverine Lake Downgradient of Future Pollution Control Pond Discharge, July to September 2017

Sample ID		MAH16-23JUL17	MAE16-20AUG17	MAE16-17SEP17
ALS ID		L1964301-3	L1979034-3	L1993844-3
Date Sampled		7/23/2017 2:40:00 PM	8/20/2017 8:40:00 AM	9/17/2017 1:45:00 PM
Parameter	**Units**	**Results**		
Conductivity	uS/cm	341	366	339
Total Dissolved Solids	mg/L	203	214	204
Chloride (Cl)	mg/L	83.4	83.7	85.1
Aluminum (Al)-Total	mg/L	0.117	0.141	0.239
Antimony (Sb)-Total	mg/L	<0.00010	<0.00010	<0.00010
Arsenic (As)-Total	mg/L	0.00037	0.00039	0.00036
Barium (Ba)-Total	mg/L	0.00528	0.00564	0.00649
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050
Boron (B)-Total	mg/L	0.018	0.019	0.018
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	8.21	9.33	9.18
Cesium (Cs)-Total	mg/L	<0.000010	<0.000010	0.000012
Chromium (Cr)-Total	mg/L	0.00024	0.00029	0.00042
Cobalt (Co)-Total	mg/L	<0.00010	0.00011	0.00011
Copper (Cu)-Total	mg/L	0.00067	0.00079	0.00093
Iron (Fe)-Total	mg/L	0.224	0.282	0.264
Lead (Pb)-Total	mg/L	0.000052	0.000066	0.000085
Lithium (Li)-Total	mg/L	0.004	0.0047	0.0046
Magnesium (Mg)-Total	mg/L	8.68	9.9	8.9
Manganese (Mn)-Total	mg/L	0.0172	0.038	0.02
Molybdenum (Mo)-Total	mg/L	0.000108	0.000111	0.000105
Nickel (Ni)-Total	mg/L	0.00058	0.00067	0.00071
Phosphorus (P)-Total	mg/L	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	2.18	2.24	2.05
Rubidium (Rb)-Total	mg/L	0.00104	0.00122	0.00106

	Sample ID	MAH16-23JUL17	MAE16-20AUG17	MAE16-17SEP17
	ALS ID	L1964301-3	L1979034-3	L1993844-3
	Date Sampled	7/23/2017 2:40:00 PM	8/20/2017 8:40:00 AM	9/17/2017 1:45:00 PM
Parameter	**Units**	**Results**		
Selenium (Se)-Total	mg/L	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total	mg/L	0.41	0.39	0.76
Silver (Ag)-Total	mg/L	<0.000010	0.000011	<0.000010
Sodium (Na)-Total	mg/L	38.6	44.5	42.1
Strontium (Sr)-Total	mg/L	0.0412	0.0457	0.0443
Sulfur (S)-Total	mg/L	<0.50	<0.50	<0.50
Tellurium (Te)-Total	mg/L	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010
Thorium (Th)-Total	mg/L	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	mg/L	<0.0030 [A]	0.00463	0.00776
Tungsten (W)-Total	mg/L	<0.00010	<0.00010	<0.00010
Uranium (U)-Total	mg/L	0.000034	0.000045	0.000048
Vanadium (V)-Total	mg/L	<0.00050	<0.00050	0.00061
Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	0.0039
Zirconium (Zr)-Total	mg/L	<0.000060	0.000067	0.000102

[A] *Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Appendix D.4. 2BB-BOS1727

Table D4-1 summarizes the sampling stations, sampling frequency and monitoring parameters required as part of the SNP for water licence 2BB-BOS1727. The location of each sampling point is illustrated in Figure D4-1 below.

Table D4-1. 2BB-BOS1727 Sample Stations, Sample Frequency and Analytical Parameters

SNP Station	Description	Monitoring Parameters	Frequency
BOS-1a	Raw water supply intake at Aimaokatalok (Spyder) Lake	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
BOS-1b	Raw water supply intake at Stickleback Lake	B, G, Oil and Grease	Monthly
		D	Daily during periods of pumping
BOS-2	Containment Pond discharge	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se.	Prior to discharge, weekly during periods of discharge
		D	Daily during periods of discharge
BOS-3	Sewage Disposal Facility final discharge	BOD_5, TSS, Oil and Grease, Fecal Coliforms, pH	Monthly
		D	Daily during periods of discharge
BOS-4	Treated sewage effluent point prior to entry into Aimaokatalok (Spyder) Lake	BOD5, TSS, Oil and Grease, Fecal Coliforms, pH	Once before any discharge, daily when discharging onto the tundra
		Acute Lethality	Annually
BOS-5	Effluent from the Bulk Fuel Storage Facility prior to release to a location approved by an Inspector	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se. TTPH	Once before any discharge, monthly when discharging onto the tundra
		D	Daily during periods of discharge
BOS-6	Effluent from the Landfarm Treatment Facility prior to release	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se.	Once before any discharge, monthly when discharging onto the tundra
		D	Daily during periods of discharge

SNP Station	Description	Monitoring Parameters	Frequency
BOS-7*	Runoff from the temporary storage of hydrocarbon contaminated soils prior to discharge onto the tundra	TPH, PAH, BTEX, pH, Electrical Conductivity, Nitrate-Nitrite, Oil and Grease, Total Phenols, Total Alkalinity, Total Hardness, Calcium, Magnesium, Potassium, Sodium, Sulphate & Chloride, Total As, Cd, Cu, Cr, Fe, Pb, Hg, Ni and Se.	During periods of observed flow
		D	Daily during periods of discharge
BOS-8	Waste Rock and Ore Storage Pad	pH, Sulphate & Chloride, Electrical Conductivity, TSS, Total Ammonia, Total As, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn	Initially during spring thaw and monthly during periods of observed flow
BOS-9	Portal decline, surface water runoff discharged to onto the tundra	pH, Sulphate & Chloride, Electrical Conductivity, TSS, Total Ammonia, Total As, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn	Once before any discharge
		D	Daily during periods of discharge
BOS-10*	Underground Mine Water Sumps pumped from Underground	pH, Sulphate & Chloride, Electrical Conductivity, TSS, Total Ammonia, Total As, Total Trace Metals for a minimum of the following elements: Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn	Three times a year, during periods of water inflow
		D	Daily during periods of discharge
Drill Sites	Under-ice sampling before and after drilling	pH, TSS, Electrical Conductivity, Total Trace Metals for a minimum of the following elements: As, Al, Sb, Ba, Cd, Cr, Co, Cu, Fe, Hg, Pb, Li, Mn, Mo, Ni, Se, Sr, Tl, Ti, U, V, Zn	Before and after on-ice drilling
	Water intake from all sources	D	Daily during periods of discharge

** Station not in use at this time.*

Figure D4-1. 2BB-BOS1727 Sample Stations Locations

TABULAR SUMMARY OF MONITORING INFORMATION

The following section summarizes the results of sampling undertaken in 2017 as part of the monitoring program detailed in Part J of licence 2BB-BOS1727.

Boston Camp was reopened on June 15 to support a seasonal surface exploration program. This program concluded August 6 and Boston Camp was shutdown for the winter season on September 12.

In 2017, a total of 400 m^3 of water was used from Aimaokatalok (Spyder) Lake (BOS-1a) for domestic camp purposes. A total of 853 m^3 was used from Aimaokatalok (Spyder) Lake to support surface drilling. No other water sources were used in 2017. Water usage was metered at the source or measured by Bambi bucket haul load. Daily water usage is presented in Table D4-2 below. Water quality samples were collected at the raw water supply intake at Aimaokatalok (Spyder) Lake (BOS-1a) in July and August 2017. Results of this monitoring are presented in Table D4-3.

No water was taken from Stickleback Lake (BOS-1b) and no water quality samples were collected from this location in 2017.

The Sewage Treatment Facility (BOS-3) was reactivated in 2017. Pre-discharge samples were collected in July to confirm compliant effluent quality results prior to discharge. Effluent discharge from the Sewage Treatment Facility began on July 30 up receiving compliant results. Prior to receiving compliant results, effluent from this facility was stored in a temporary lined holding pond that was constructed on the camp pad. Once effluent quality in the treatment facility was confirmed, the effluent stored in the temporary holding pond was slowly introduced into the treatment unit. Results of monitoring at BOS-3 are presented in Table D4-4 and Table D4-5 below. A total of 194 m^3 of compliant effluent was discharged from the Sewage Treatment Facility to the tundra at a location approved by the Inspector. Monthly and annual volumes of effluent discharge from BOS-3 are provided in Table D4-6 below. Sewage sludge produced in the Sewage Treatment Facility was removed and stored in plastic totes. This material will be transported to Doris Camp for disposal in the Tailings Impoundment Area. A total of 21 m^3 of sewage sludge was removed from the Sewage Treatment Facility in 2017. Monthly and annual volume of sewage sludge removed from this facility is presented in Table D4-7.

Monitoring was conducted monthly of the treated sewage effluent discharge at the point prior to entry into Aimaokatalok (Spyder) Lake (BOS-4) during periods of discharge. No observable flow was identified at this station in 2017 and no water quality samples were collected.

TThe Containment Pond (BOS-2) has been used to consolidate water from the smaller fuel containment berms and from the Bulk Fuel Storage Facility (BOS-5), to facilitate testing and treatment while allowing the fuel berms to be promptly vacated of water. As in previous years, water from the Containment Pond (BOS-2) is sampled for and screened against, both BOS-2 and BOS-5 criteria. Pre-discharge water quality samples were collected from BOS-2 and BOS-5 on June 4, 2017. Results of this sampling are presented in Table D4-8 and Table D4-9 below. Water from the Containment Pond met the discharge criteria for BOS-2 and BOS-5, however the water in the Bulk Fuel Storage Facility exceeded the discharge criteria for lead (0.01 mg/L). Water from the Bulk Fuel Storage Facility was transferred to the Containment Pond and treated with an oil-water separator with activated carbon to promptly vacate the water from the berm and allow for additional treatment and analytical sampling to be conducted prior to discharge.

On July 5, an operator discharged approximately 30m^3 of water of unknown water quality from the Containment Pond to the tundra prior to additional pre-discharge samples being collected. The results of the pre-discharge sample collected on June 4 from BOS-2 and BOS-5 had been forwarded to the camp manager and the individual was advised that the water could not be discharged until it was treated

through an oil-water separator and then resampled to confirm compliance with the effluent quality standards for BOS-2 and BOS-5. The non-compliant water was treated through an oil-water separator and discharged directly to tundra without post-treatment samples being collected to confirm water quality. A NT-NU Spill report (Spill #17-250) was submitted for this non-compliant discharge on July 10.

No additional water was discharged from the Containment Pond or the Bulk Fuel Storage Facility in 2017.

Water was not discharged from BOS-6 (Landfarm) in 2017 because there was no water to sample at this location. Existing material at the Boston LTA will be handled as per the existing Hope Bay Project Landfarm Management Plan (2017).

No landfill exists at Boston and the status of monitoring station BOS-7 is inactive.

During 2017, TMAC opportunistically sampled at locations where seepage was observed during periods of runoff near the waste rock and ore storage pad (BOS-8). Table D4-10 shows the results of this sampling. These monitoring results were compared with previously reported kinetic testing results from the ARD Characterization Data base for the Boston Deposit.

The Portal Decline (BOS-9) was sampled on July 6 prior to discharge. Results of this sample were compliant with the discharge criteria for BOS-9 and are presented in Table D4-11. Upon receiving compliant results, 48m^3 of water was discharged directly to the tundra at UTM 7505316 N, 441197 E as approved by the Inspector.

Underground mining activities were not conducted in 2017. Mine water was not pumped from underground and no water quality monitoring was conducted of the underground mine water sumps (BOS-10).

On-ice exploration drilling did not occur in the licence area in 2017, therefore no samples were taken through lake ice (required by Part F Item 6 and Part J Item 15) to establish water quality prior to, and upon completion of, an on-ice drilling program.

Table D4-2. Volume of Water Utilized for Camp, Drilling and Dust Suppression Purposes, 2017

Date	Dust Suppression (m^3)	Drill Water Usage Total (m^3)	Domestic Water Consumption (m^3)	Total Daily Usage (m^3)
June				
01	0	0	0	0
02	0	0	0	0
03	0	0	0	0
04	0	0	0	0
05	0	0	0	0
06	0	0	0	0
07	0	0	0	0
08	0	0	0	0
09	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0

Date	Dust Suppression (m^3)	Drill Water Usage Total (m^3)	Domestic Water Consumption (m^3)	Total Daily Usage (m^3)
15	0	0	0	0
16	0	0	0	0
17	0	0	7	7
18	0	0	7	7
19	0	0	7	7
20	0	0	9	9
21	0	0	8	8
22	0	0	9	9
23	0	0	7	7
24	0	0	6	6
25	0	25	9	34
26	0	5	8	13
27	0	28	8	36
28	0	19	9	28
29	0	36	10	46
30	0	31	8	39
July				
01	0	25	9	35
02	0	25	8	33
03	0	38	10	48
04	0	49	8	57
05	0	13	10	23
06	0	14	9	24
07	0	33	10	42
08	0	24	10	34
09	0	25	10	35
10	0	23	0	23
11	0	10	0	10
12	0	11	0	11
13	0	12	11	23
14	0	16	0	16
15	0	52	0	52
16	0	23	11	34
17	0	6	9	15
18	0	32	0	32
19	0	51	10	61
20	0	13	10	23
21	0	6	7	13
22	0	9	0	9
23	0	9	8	17
24	0	33	0	33

Date	Dust Suppression (m^3)	Drill Water Usage Total (m^3)	Domestic Water Consumption (m^3)	Total Daily Usage (m^3)
25	0	10	10	20
26	0	6	0	6
27	0	13	8	21
28	0	3	0	3
29	0	7	10	17
30	0	36	0	36
31	0	13	9	22
August				
01	0	19	9	28
02	0	24	0	24
03	0	12	9	21
04	0	4	0	4
05	0	10	0	10
06	0	0	7	7
07	0	0	15	15
08	0	0	0	0
09	0	0	1	1
10	0	0	0	0
11	0	0	8	8
12	0	0	6	6
13	0	0	0	0
14	0	0	10	10
15	0	0	0	0
16	0	0	0	0
17	0	0	8	8
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	8	8
22	0	0	0	0
23	0	0	10	10
24	0	0	0	0
25	0	0	3	3
26	0	0	0	0
27	0	0	7	7
28	0	0	0	0

Date	Dust Suppression (m^3)	Drill Water Usage Total (m^3)	Domestic Water Consumption (m^3)	Total Daily Usage (m^3)
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0

Note: Values rounded to nearest whole cubic metre.
** In September 2017, staff preparing the camp for seasonal shutdown over the winter period were based out of Doris Camp.*
No water was used at Boston Camp in September.

Table D4-3. Results of 2017 Water Quality Sampling from Fresh water intake at Aimaokatalok (Spyder) Lake Monitoring Station BOS-1a

	Sample ID	BOS1-10JUL17	BOS1-07AUG17
	ALS ID	L1956600-1	L1971629-1
	Date Sampled	7/10/2017 2:50:00 PM	8/7/2017 3:50:00 PM
Parameter	**Units**	**Results**	
Hardness (as $CaCO_3$)	mg/L	13.2 [A]	-
pH	pH	7.24	7.34
Total Suspended Solids	mg/L	<3.0	<3.0
Ammonia, Total (as N)	mg/L	<0.0050	<0.0050
Chloride (Cl)	mg/L	9.07	11.2
Nitrate (as N)	mg/L	<0.0050	<0.0050
Nitrite (as N)	mg/L	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.0061	0.0087
Cyanide, Total	mg/L	<0.0050	<0.0050
Cyanide, Free	mg/L	<0.0050	<0.0050
Aluminum (Al)-Total	mg/L	0.0407	0.0659
Antimony (Sb)-Total	mg/L	<0.00050	<0.00010
Arsenic (As)-Total	mg/L	<0.00050	0.0002
Barium (Ba)-Total	mg/L	<0.020	0.002
Beryllium (Be)-Total	mg/L	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	-	<0.000050
Boron (B)-Total	mg/L	<0.10	<0.010
Cadmium (Cd)-Total	mg/L	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	2.71	2.92
Cesium (Cs)-Total	mg/L	-	<0.000010
Chromium (Cr)-Total	mg/L	<0.0010	0.00019
Cobalt (Co)-Total	mg/L	<0.00030	<0.00010
Copper (Cu)-Total	mg/L	<0.0010	0.00113
Iron (Fe)-Total	mg/L	0.195	0.139
Lead (Pb)-Total	mg/L	<0.00050	<0.000050
Lithium (Li)-Total	mg/L	<0.0010	0.001
Magnesium (Mg)-Total	mg/L	1.57	1.88

Sample ID		BOS1-10JUL17	BOS1-07AUG17
ALS ID		L1956600-1	L1971629-1
Date Sampled		7/10/2017 2:50:00 PM	8/7/2017 3:50:00 PM
Parameter	**Units**	**Results**	
Manganese (Mn)-Total	mg/L	0.0114	0.00468
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	mg/L	<0.0010	0.000062
Nickel (Ni)-Total	mg/L	<0.0010	0.0005
Phosphorus (P)-Total	mg/L	-	<0.050
Potassium (K)-Total	mg/L	<2.0	0.747
Rubidium (Rb)-Total	mg/L	-	0.00149
Selenium (Se)-Total	mg/L	<0.000050	<0.000050
Silicon (Si)-Total	mg/L	-	0.3
Silver (Ag)-Total	mg/L	<0.000020	<0.000010
Sodium (Na)-Total	mg/L	4.7	5.04
Strontium (Sr)-Total	mg/L	-	0.0132
Sulfur (S)-Total	mg/L	-	0.99
Tellurium (Te)-Total	mg/L	-	<0.00020
Thallium (Tl)-Total	mg/L	<0.000010	<0.000010
Thorium (Th)-Total	mg/L	-	<0.00010
Tin (Sn)-Total	mg/L	<0.00050	<0.00010
Titanium (Ti)-Total	mg/L	<0.010	0.00149
Tungsten (W)-Total	mg/L	-	<0.00010
Uranium (U)-Total	mg/L	<0.00020	0.000032
Vanadium (V)-Total	mg/L	<0.00050	0.00066
Zinc (Zn)-Total	mg/L	<0.0050	<0.0030
Zirconium (Zr)-Total	mg/L	-	0.000062
Oil and Grease	mg/L	<5.0	<5.0
Oil And Grease (Visible Sheen)		No	No
Benzene	mg/L	<0.00050	-
Ethylbenzene	mg/L	<0.00050	-
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	-
Styrene	mg/L	<0.00050	-
Toluene	mg/L	<0.00045	-
ortho-Xylene	mg/L	<0.00050	-
meta- & para-Xylene	mg/L	<0.00050	-

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

Table D4-4. Results of 2017 Water Quality Sampling from Sewage Treatment Facility Monitoring Station BOS-3, Pre-discharge

	Sample ID	BOS3-06JUL17	BOS3-10JUL17	BOS3-17JUL17	BOS3-25JUL17	Part D Item 14
	ALS ID	L1955138-1	L1956585-1	L1959974-1	L1964211-1	
	Date Sampled	7/6/2017 4:20:00 PM	7/10/2017 3:55:00 PM	7/17/2017 12:30:00 PM	7/25/2017 7:30:00 AM	Maximum Average Concentration (mg/L)
Parameter	**Units**	**Results**				
pH	pH units	7.58	6.75	6.16	6.12	6.0-9.5
Total Suspended Solids	mg/L	18.3	19.4	21.4	8.5	100
Fecal Coliforms	MPN/100mL	2,420	2,420	**20,000** [A]	40	10,000
Biochemical Oxygen Demand (BOD5)	mg/L	24.0 [B]	24	9	6	80
Oil and Grease	mg/L	<5.0	<5.0	<5.0	<5.0	
Oil And Grease (Visible Sheen)		No	No	No	No	No Visible Sheen

Bold/shading indicates exceedance of Part D Item 14 Maximum Average Concentration
[A] *Detection Limit adjusted for required dilution.*
[B] *Estimated Result; semi-quantitative only.*

Table D4-5. Results of 2017 Water Quality Sampling from Sewage Treatment Facility Monitoring Station BOS-3, During Discharge

	Sample ID	BOS3-31JUL17	BOS3-22AUG17	BOS3-04SEP17	Part D Item 14
	ALS ID	L1967439-1	L1979035-1	L1985653-1	
	Date Sampled	7/31/2017 11:00:00 AM	8/22/2017 7:30:00 AM	9/4/2017 10:00:00 AM	Maximum Average Concentration (mg/L)
Parameter	**Units**	**Results**			
pH	pH units	6.56	7.2	6.9	6.0-9.5
Total Suspended Solids	mg/L	10.3	17.9	29.5	100
Fecal Coliforms	MPN/100mL	548	2,420	5,170 [A]	10,000
Biochemical Oxygen Demand (BOD5)	mg/L	<2.0	8	46	80
Oil and Grease	mg/L	<5.0	<5.0	<5.0	
Oil And Grease (Visible Sheen)		No	No	No	No Visible Sheen

[A] *Detection Limit adjusted for required dilution.*

Table D4-6. Treated Effluent Released from the Boston Sewage Treatment Facility, 2017

Month	Monthly Volume (m^3)*	Cumulative Volume (m^3)*
June	0	0
July	7	7
August	187	194
September	0	194
Total Volume of Treated Effluent Released 2017 (m^3)		**194**

** Values rounded to nearest whole cubic metre.*

Table D4-7. Volume of Sludge Removed from the Boston Sewage Treatment Facility, 2017

Month	Monthly Volume (m^3)*	Cumulative Volume (m^3)*
June	4	4
July	0	4
August	0	4
September	17	21
Total Volume of Sludge Produced in 2017 (m^3)		**21**

Table D4-8. Results of 2017 Water Quality Sampling from Containment Pond Monitoring Station BOS-2

	Sample ID	BOS2C-04JUN17	Part D Item 6	
	ALS ID	L1937651-1	Maximum Average Concentration (mg/L)	Maximum Concentration in any Grab Sample (mg/L)
	Date Sampled	6/4/2017 12:05:00 PM		
Parameter	**Units**	**Results**		
Conductivity	uS/cm	336		
Hardness (as $CaCO_3$)	mg/L	161 [A]		
pH	pH	7.64	6.0 - 9.5	6.0 - 9.5
Total Suspended Solids	mg/L	<3.0	15	30
Alkalinity, Total (as $CaCO_3$)	mg/L	34.6		
Nitrate (as N)	mg/L	<0.0050	130	260
Nitrite (as N)	mg/L	<0.0010		
Sulfate (SO4)	mg/L	124		
Aluminum (Al)-Total	mg/L	0.0243		
Antimony (Sb)-Total	mg/L	0.00061		
Arsenic (As)-Total	mg/L	0.0224	0.05	0.10
Barium (Ba)-Total	mg/L	<0.020		
Beryllium (Be)-Total	mg/L	<0.00010		
Boron (B)-Total	mg/L	<0.10		
Cadmium (Cd)-Total	mg/L	0.0000075		
Calcium (Ca)-Total	mg/L	38.5		

Sample ID		BOS2C-04JUN17	Part D Item 6	
ALS ID		L1937651-1		
Date Sampled		6/4/2017 12:05:00 PM	Maximum Average Concentration (mg/L)	Maximum Concentration in any Grab Sample (mg/L)
Parameter	**Units**	**Results**		
Chromium (Cr)-Total	mg/L	<0.0010		
Cobalt (Co)-Total	mg/L	0.00499		
Copper (Cu)-Total	mg/L	0.0035	0.02	0.04
Iron (Fe)-Total	mg/L	0.052		
Lead (Pb)-Total	mg/L	<0.00050	0.01	0.02
Lithium (Li)-Total	mg/L	0.003		
Magnesium (Mg)-Total	mg/L	15.7		
Manganese (Mn)-Total	mg/L	0.0321		
Mercury (Hg)-Total	mg/L	<0.0000050		
Molybdenum (Mo)-Total	mg/L	<0.0010		
Nickel (Ni)-Total	mg/L	0.0294	0.25	0.50
Potassium (K)-Total	mg/L	3.1		
Selenium (Se)-Total	mg/L	0.00009		
Silver (Ag)-Total	mg/L	<0.000020		
Sodium (Na)-Total	mg/L	2.6		
Thallium (Tl)-Total	mg/L	<0.00020		
Tin (Sn)-Total	mg/L	<0.00050		
Titanium (Ti)-Total	mg/L	<0.010		
Uranium (U)-Total	mg/L	<0.00020		
Vanadium (V)-Total	mg/L	<0.00050		
Zinc (Zn)-Total	mg/L	<0.0050	0.30	0.60
Oil and Grease	mg/L	<5.0	5	10
Oil And Grease (Visible Sheen)		no	No visible sheen	No visible sheen
Phenols (4AAP)	mg/L	0.0019		
Benzene	mg/L	<0.00050		
Ethylbenzene	mg/L	<0.00050		
Methyl t-butyl ether (MTBE)	mg/L	<0.00050		
Styrene	mg/L	<0.00050		
Toluene	mg/L	<0.00045		
ortho-Xylene	mg/L	<0.00050		
meta- & para-Xylene	mg/L	<0.00050		
Xylenes	mg/L	<0.00075		
4-Bromofluorobenzene (SS)	%	99.9		
1,4-Difluorobenzene (SS)	%	99.5		
TPH10-32	mg/L	<1.0		
2-Bromobenzotrifluoride, EPH-sg	%	45.8 [B]		
Acenaphthene	mg/L	<0.000010		
Acenaphthylene	mg/L	<0.000010		
Acridine	mg/L	<0.000010		

	Sample ID	BOS2C-04JUN17	Part D Item 6	
	ALS ID	L1937651-1	Maximum Average Concentration (mg/L)	Maximum Concentration in any Grab Sample (mg/L)
	Date Sampled	6/4/2017 12:05:00 PM		
Parameter	Units	Results		
Anthracene	mg/L	<0.000010		
Benz(a)anthracene	mg/L	<0.000010		
Benzo(a)pyrene	mg/L	<0.0000050		
Benzo(b)fluoranthene	mg/L	<0.000010		
Benzo(g,h,i)perylene	mg/L	<0.000010		
Benzo(k)fluoranthene	mg/L	<0.000010		
Chrysene	mg/L	<0.000010		
Dibenz(a,h)anthracene	mg/L	<0.0000050		
Fluoranthene	mg/L	<0.000010		
Fluorene	mg/L	<0.000010		
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000010		
Naphthalene	mg/L	<0.000050		
Phenanthrene	mg/L	<0.000020		
Pyrene	mg/L	<0.000010		
Quinoline	mg/L	<0.000050		
Acridine d9	%	111.1		
Chrysene d12	%	83.8		
Naphthalene d8	%	69.6		
Phenanthrene d10	%	98.1		

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
[B] Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Table D4-9. Results of 2017 Water Quality Sampling from Bulk Fuel Storage Berm Station BOS-5

	Sample ID	BOS5-04JUN17	Part D Item 19
	ALS ID	L1937692-1	
	Date Sampled	6/4/2017 1:10:00 PM	Maximum Concentration in any Grab Sample (mg/L)
Parameter	Units	Results	
Conductivity	uS/cm	931	
Hardness (as $CaCO_3$)	mg/L	543 [A]	
pH	pH	7.99	
Alkalinity, Total (as $CaCO_3$)	mg/L	60.5	6.5-9.0
Nitrate (as N)	mg/L	<0.025 [B]	
Nitrite (as N)	mg/L	<0.0050 [B]	
Sulfate (SO4)	mg/L	457	
Aluminum (Al)-Total	mg/L	0.0165	
Antimony (Sb)-Total	mg/L	0.00476	
Arsenic (As)-Total	mg/L	0.263	0.050

	Sample ID	BOS5-04JUN17	Part D Item 19
	ALS ID	L1937692-1	
	Date Sampled	6/4/2017 1:10:00 PM	Maximum Concentration in any Grab Sample (mg/L)
Parameter	**Units**	**Results**	
Barium (Ba)-Total	mg/L	<0.020	
Beryllium (Be)-Total	mg/L	<0.00010	
Boron (B)-Total	mg/L	0.16	
Cadmium (Cd)-Total	mg/L	0.000349	
Calcium (Ca)-Total	mg/L	132	
Chromium (Cr)-Total	mg/L	<0.0010	
Cobalt (Co)-Total	mg/L	0.0259	
Copper (Cu)-Total	mg/L	0.0083	0.040
Iron (Fe)-Total	mg/L	0.491	
Lead (Pb)-Total	mg/L	**0.0218**	0.010
Lithium (Li)-Total	mg/L	0.0074	
Magnesium (Mg)-Total	mg/L	52	
Manganese (Mn)-Total	mg/L	0.0219	
Mercury (Hg)-Total	mg/L	<0.0000050	
Molybdenum (Mo)-Total	mg/L	0.0024	
Nickel (Ni)-Total	mg/L	0.17	0.500
Potassium (K)-Total	mg/L	6.3	
Selenium (Se)-Total	mg/L	0.000297	
Silver (Ag)-Total	mg/L	<0.000020	
Sodium (Na)-Total	mg/L	6.4	
Thallium (Tl)-Total	mg/L	<0.00020	
Tin (Sn)-Total	mg/L	<0.00050	
Titanium (Ti)-Total	mg/L	<0.010	
Uranium (U)-Total	mg/L	<0.00020	
Vanadium (V)-Total	mg/L	<0.00050	
Zinc (Zn)-Total	mg/L	0.0067	0.600
Oil and Grease	mg/L	<5.0	15
Oil And Grease (Visible Sheen)		no	No visible sheen
Phenols (4AAP)	mg/L	0.0028	
Benzene	mg/L	<0.00050	0.370
Ethylbenzene	mg/L	<0.00050	0.910
Methyl t-butyl ether (MTBE)	mg/L	<0.00050	
Styrene	mg/L	<0.00050	
Toluene	mg/L	<0.00045	0.002
ortho-Xylene	mg/L	<0.00050	
meta- & para-Xylene	mg/L	<0.00050	
Xylenes	mg/L	<0.00075	
4-Bromofluorobenzene (SS)	%	97.1	

	Sample ID	BOS5-04JUN17	Part D Item 19
	ALS ID	L1937692-1	Maximum Concentration in any Grab Sample (mg/L)
	Date Sampled	6/4/2017 1:10:00 PM	
Parameter	**Units**	**Results**	
1,4-Difluorobenzene (SS)	%	104.7	
TPH10-32	mg/L	<1.0	
2-Bromobenzotrifluoride, EPH-sg	%	90.6	
Acenaphthene	mg/L	<0.000010	
Acenaphthylene	mg/L	<0.000010	
Acridine	mg/L	<0.000010	
Anthracene	mg/L	<0.000010	
Benz(a)anthracene	mg/L	<0.000010	
Benzo(a)pyrene	mg/L	<0.0000050	
Benzo(b)fluoranthene	mg/L	<0.000010	
Benzo(g,h,i)perylene	mg/L	<0.000010	
Benzo(k)fluoranthene	mg/L	<0.000010	
Chrysene	mg/L	<0.000010	
Dibenz(a,h)anthracene	mg/L	<0.0000050	
Fluoranthene	mg/L	<0.000010	
Fluorene	mg/L	<0.000010	
Indeno(1,2,3-c,d)pyrene	mg/L	<0.000010	
Naphthalene	mg/L	<0.000050	
Phenanthrene	mg/L	<0.000020	
Pyrene	mg/L	<0.000010	
Quinoline	mg/L	<0.000050	
Acridine d9	%	97.4	
Chrysene d12	%	71.1	
Naphthalene d8	%	84	
Phenanthrene d10	%	92.1	

Bold/shading indicates exceedance of Part D Item 19 Maximum Average Concentration

[A] *Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).*

[B] *Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*

Table D4-10. Results of Opportunistic Sampling at the Boston Waste Rock and Ore Storage Pad Monitoring Station BOS-8, where Flow Was Observed in 2017

Sample ID		BOS8A-04JUN	BOS8D-06JUL17
ALS ID		L1937709-1	L1955162-1
Date Sampled		6/4/2017 2:15:00 PM	7/6/2017 3:15:00 PM
Parameter	**Units**	**Results**	
Conductivity	uS/cm	811	1,620
Hardness (as $CaCO_3$)	mg/L	-	736 [B]
pH	pH	7.61	7.8
Total Suspended Solids	mg/L	<3.0	4.6
Total Dissolved Solids	mg/L	611	-
Acidity (as $CaCO_3$)	mg/L	5.5	-
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	91.2	-
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	<1.0	-
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<1.0	-
Alkalinity, Total (as $CaCO_3$)	mg/L	91.2	-
Ammonia, Total (as N)	mg/L	0.0145	0.0056
Bromide (Br)	mg/L	<0.25 [A]	-
Chloride (Cl)	mg/L	26.1	-
Fluoride (F)	mg/L	<0.10 [A]	-
Nitrate (as N)	mg/L	1.48	-
Nitrite (as N)	mg/L	<0.0050 [A]	-
Phosphorus (P)-Total	mg/L	0.0275	-
Sulfate (SO4)	mg/L	305	441
Aluminum (Al)-Total	mg/L	-	0.0421
Antimony (Sb)-Total	mg/L	-	0.0296
Arsenic (As)-Total	mg/L	-	0.302
Barium (Ba)-Total	mg/L	-	<0.020
Beryllium (Be)-Total	mg/L	-	<0.00010
Boron (B)-Total	mg/L	-	0.21
Cadmium (Cd)-Total	mg/L	-	0.0000364
Calcium (Ca)-Total	mg/L	-	212
Chromium (Cr)-Total	mg/L	-	<0.0010
Cobalt (Co)-Total	mg/L	-	0.601
Copper (Cu)-Total	mg/L	-	0.0034
Iron (Fe)-Total	mg/L	-	0.067
Lead (Pb)-Total	mg/L	-	<0.00050
Lithium (Li)-Total	mg/L	-	0.0403
Magnesium (Mg)-Total	mg/L	-	50.3
Manganese (Mn)-Total	mg/L	-	0.296
Molybdenum (Mo)-Total	mg/L	-	0.0039
Nickel (Ni)-Total	mg/L	-	0.805
Potassium (K)-Total	mg/L	-	12.3

	Sample ID	BOS8A-04JUN	BOS8D-06JUL17
	ALS ID	L1937709-1	L1955162-1
	Date Sampled	6/4/2017 2:15:00 PM	7/6/2017 3:15:00 PM
Parameter	**Units**	**Results**	
Selenium (Se)-Total	mg/L	-	0.00294
Silver (Ag)-Total	mg/L	-	0.000078
Sodium (Na)-Total	mg/L	-	32.1
Thallium (Tl)-Total	mg/L	-	<0.000010
Tin (Sn)-Total	mg/L	-	<0.00050
Titanium (Ti)-Total	mg/L	-	<0.010
Uranium (U)-Total	mg/L	-	0.00021
Vanadium (V)-Total	mg/L	-	0.00065
Zinc (Zn)-Total	mg/L	-	0.0064
Aluminum (Al)-Dissolved	mg/L	0.0047	-
Antimony (Sb)-Dissolved	mg/L	0.00691	-
Arsenic (As)-Dissolved	mg/L	0.105	-
Barium (Ba)-Dissolved	mg/L	0.0127	-
Beryllium (Be)-Dissolved	mg/L	<0.00010	-
Bismuth (Bi)-Dissolved	mg/L	<0.000050	-
Boron (B)-Dissolved	mg/L	0.065	-
Cadmium (Cd)-Dissolved	mg/L	0.0000138	-
Calcium (Ca)-Dissolved	mg/L	94.2	-
Cesium (Cs)-Dissolved	mg/L	0.00006	-
Chromium (Cr)-Dissolved	mg/L	0.00014	-
Cobalt (Co)-Dissolved	mg/L	0.141	-
Copper (Cu)-Dissolved	mg/L	0.00505	-
Iron (Fe)-Dissolved	mg/L	<0.010	-
Lead (Pb)-Dissolved	mg/L	<0.000050	-
Lithium (Li)-Dissolved	mg/L	0.005	-
Magnesium (Mg)-Dissolved	mg/L	40.3	-
Manganese (Mn)-Dissolved	mg/L	0.112	-
Mercury (Hg)-Dissolved	mg/L	<0.0000050	-
Molybdenum (Mo)-Dissolved	mg/L	0.000868	-
Nickel (Ni)-Dissolved	mg/L	0.326	-
Phosphorus (P)-Dissolved	mg/L	<0.050	-
Potassium (K)-Dissolved	mg/L	4.5	-
Rubidium (Rb)-Dissolved	mg/L	0.00177	-
Selenium (Se)-Dissolved	mg/L	0.000781	-
Silicon (Si)-Dissolved	mg/L	1.36	-
Silver (Ag)-Dissolved	mg/L	<0.000010	-
Sodium (Na)-Dissolved	mg/L	14	-
Strontium (Sr)-Dissolved	mg/L	0.25	-
Sulfur (S)-Dissolved	mg/L	111	-

	Sample ID	BOS8A-04JUN	BOS8D-06JUL17
	ALS ID	L1937709-1	L1955162-1
	Date Sampled	6/4/2017 2:15:00 PM	7/6/2017 3:15:00 PM
Parameter	**Units**	**Results**	
Tellurium (Te)-Dissolved	mg/L	<0.00020	-
Thallium (Tl)-Dissolved	mg/L	<0.000010	-
Thorium (Th)-Dissolved	mg/L	<0.00010	-
Tin (Sn)-Dissolved	mg/L	<0.00010	-
Titanium (Ti)-Dissolved	mg/L	<0.00030	-
Tungsten (W)-Dissolved	mg/L	0.00016	-
Uranium (U)-Dissolved	mg/L	0.000145	-
Vanadium (V)-Dissolved	mg/L	<0.00050	-
Zinc (Zn)-Dissolved	mg/L	0.0044	-
Zirconium (Zr)-Dissolved	mg/L	<0.000060	-

[A] Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
[B] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

Table D4-11. Results of 2017 Water Quality Sampling from Portal Station BOS-9

	Sample ID	BOS2P-06JUL17	Part D Item 6	
	ALS ID	L1955211-1		
	Date Sampled	7/6/2017 2:50:00 PM	Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
Parameter	**Units**	**Water**		
Conductivity	uS/cm	533		
Hardness (as $CaCO_3$)	mg/L	165 [A]		
pH	pH	7.76	6.5 - 9.0	6.5 - 9.0
Total Suspended Solids	mg/L	<3.0	15	30
Ammonia, Total (as N)	mg/L	0.0312		
Chloride (Cl)	mg/L	82.6		
Nitrate (as N)	mg/L	0.832		
Nitrate (as NO_3^-)	mg/L	3.67744 [B]	130	260
Nitrite (as N)	mg/L	0.0117		
Sulfate (SO4)	mg/L	73.5		
Aluminum (Al)-Total	mg/L	0.0311		
Antimony (Sb)-Total	mg/L	0.00114		
Arsenic (As)-Total	mg/L	0.0488	0.050	0.100
Barium (Ba)-Total	mg/L	<0.020		
Beryllium (Be)-Total	mg/L	<0.00010		
Boron (B)-Total	mg/L	<0.10		
Cadmium (Cd)-Total	mg/L	0.0000226		
Calcium (Ca)-Total	mg/L	41.6		
Chromium (Cr)-Total	mg/L	<0.0010		
Cobalt (Co)-Total	mg/L	0.0243		

	Sample ID	BOS2P-06JUL17	Part D Item 6	
	ALS ID	L1955211-1		
	Date Sampled	7/6/2017 2:50:00 PM	Maximum Average Concentration (mg/L)	Maximum Concentration in Any Grab Sample (mg/L)
Parameter	**Units**	**Water**		
Copper (Cu)-Total	mg/L	0.0032	0.020	0.040
Iron (Fe)-Total	mg/L	0.108		
Lead (Pb)-Total	mg/L	<0.00050	0.010	0.020
Lithium (Li)-Total	mg/L	0.0072		
Magnesium (Mg)-Total	mg/L	14.8		
Manganese (Mn)-Total	mg/L	0.0442		
Molybdenum (Mo)-Total	mg/L	<0.0010		
Nickel (Ni)-Total	mg/L	0.0902	0.250	0.500
Potassium (K)-Total	mg/L	2.6		
Selenium (Se)-Total	mg/L	0.000426		
Silver (Ag)-Total	mg/L	<0.000020		
Sodium (Na)-Total	mg/L	22.2		
Thallium (Tl)-Total	mg/L	<0.000010		
Tin (Sn)-Total	mg/L	<0.00050		
Titanium (Ti)-Total	mg/L	<0.010		
Uranium (U)-Total	mg/L	0.0007		
Vanadium (V)-Total	mg/L	<0.00050		
Zinc (Zn)-Total	mg/L	0.0062	0.30	0.60
Oil and Grease	mg/L	<5.0	5	10
Oil And Grease (Visible Sheen)		no	No Visible Sheen	No Visible Sheen

[A] Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).

[B] Result from lab provided in Nitrate (as N). Value for Nitrate (as NO_3-) determined by converting NO_3-N to NO_3 (multiply NO_3-N by 4.42) as per ALS Environmental Laboratories.

Appendix E

Doris Mine Annual Water and Load Balance Assessment

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Memo

To:	Oliver Curran, MSc, VP Environmental Affairs	**Client:**	TMAC Resources Inc.
From:	Andrea Bowie, PEng	**Project No:**	1CT022.022
Reviewed By:	Maritz Rykaart, PhD, PEng	**Date:**	February 28, 2018
Subject:	Doris Mine Annual Water and Load Balance Assessment – 2017 Calendar Year		

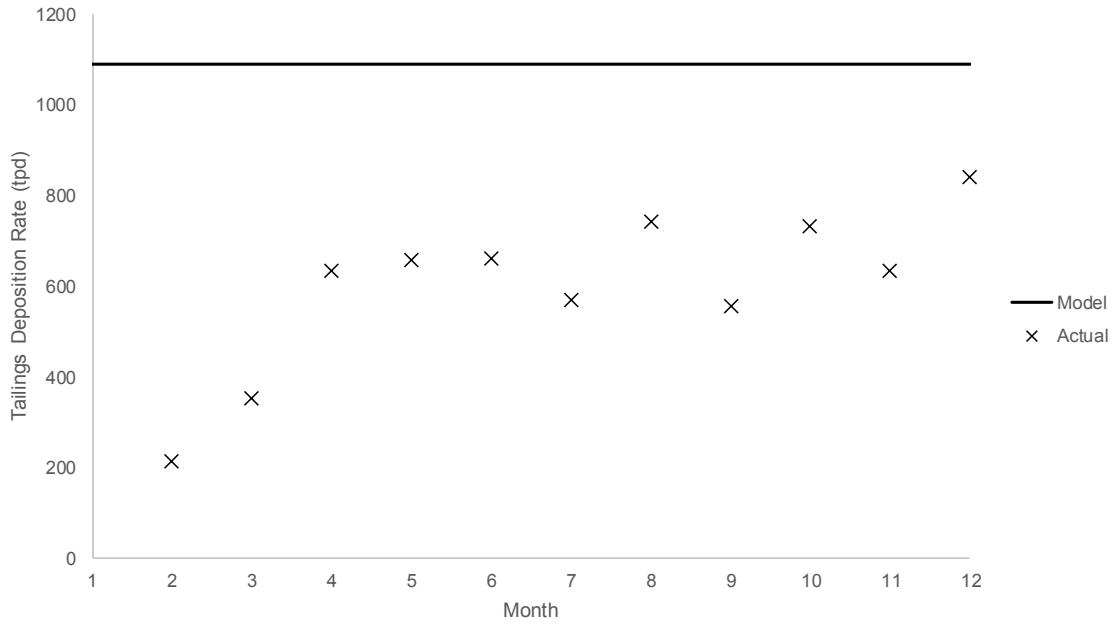
1 Introduction

Monthly monitoring of the Doris Mine water and load balance is a requirement during operations under the Hope Bay Water Licence No: 2AM-DOH1323 – Amendment No.1 (NWB 2016). Under Part G Item 34, the measured water quality and water elevation in the Doris Tailings Impoundment Area (TIA) are to be compared to the predicted water quality and water elevation in the TIA. Should the difference in predicted and measured water quality in the TIA be greater than 20%, the source should be identified and the model re-calibrated. Should the difference in predicted and measured water levels be greater than 0.1 m then the volume rating curve should be recalibrated.

This memo discusses the comparison of predicted results to measured data using the water and load balance submitted as part of the Hope Bay Project Final Environmental Statement (FEIS) (SRK 2017).

2 Doris TIA Water Level

The Doris Process Plant was commissioned in January 2017 and has experienced start-up challenges throughout 2017. A comparison of the modeled and actual tailings deposition rates is presented in Figure 2-1.



Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.026_2018 General Compliance\Water and Load Balance review for 2017\[HopeBay_WLBReview_1CT022.026_R01_ajb.xlsm[

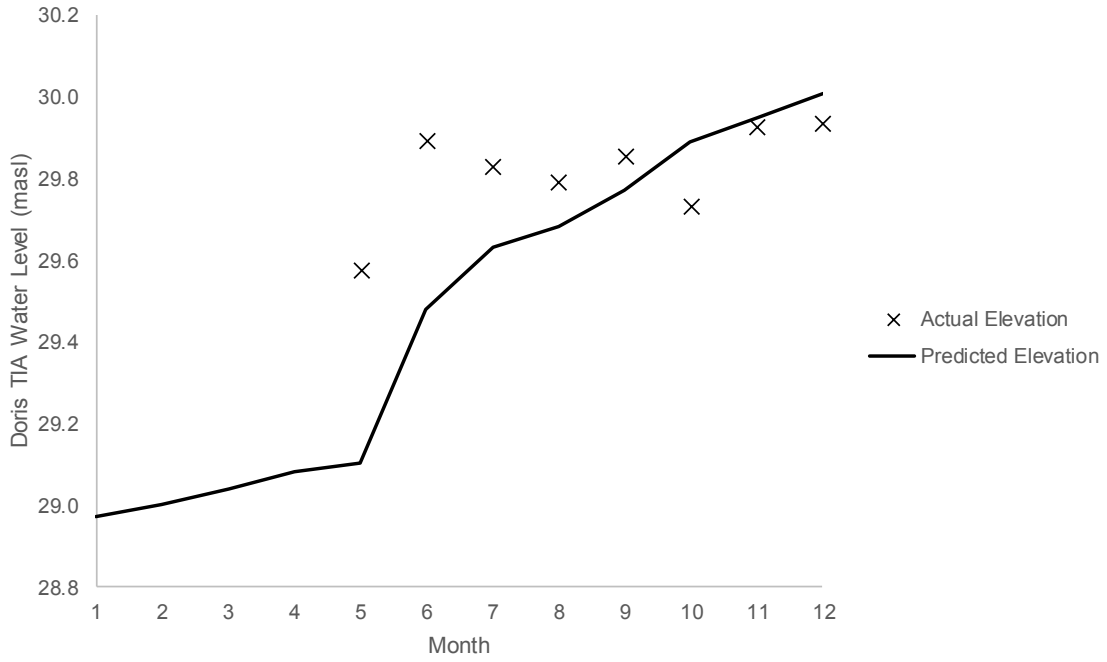
Figure 2-1: Doris Process Plant 2017 Process Rate

The predicted and measured elevations in the Doris TIA are greater than 0.1 m and presented in Figure 2-2. The mechanisms used to predict TIA pond elevations in the W&L balance model are based on taking the volume obtained in the following equation for any given timestep and using the Doris TIA stage storage curve to predict elevation.

$$Doris\ TIA\ Voluem_t = Doris\ TIA\ Volume_{t-1} + Flows\ to\ Doris\ TIA_t - Flows\ out\ of\ Doris\ TIA_t$$

The runoff values applied in the model are based on a calibration period of 2010 to 2015 in the Doris TIA catchment. A comparison of predicted and measured elevations in the Doris TIA from 2010 to 2017 is presented in Figure 2-3. By considering both the 2017 data set in isolation and the overall calibration fit for the period from 2010 to 2017, the data suggests that the model is capturing the underlying mechanisms of water movement within the Doris TIA catchment.

Re-calibration of the stage storage curve is not recommended based on detailed analysis of the data even though the predicted and measured elevations differ by greater than 0.1 m.



Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.026_2018 General Compliance\Water and Load Balance review for 2017\[HopeBay_WLBReview_1CT022.026_R01_ajb.xlsm[

Figure 2-2: Predicted and Measured 2017 Water Levels in the Doris TIA

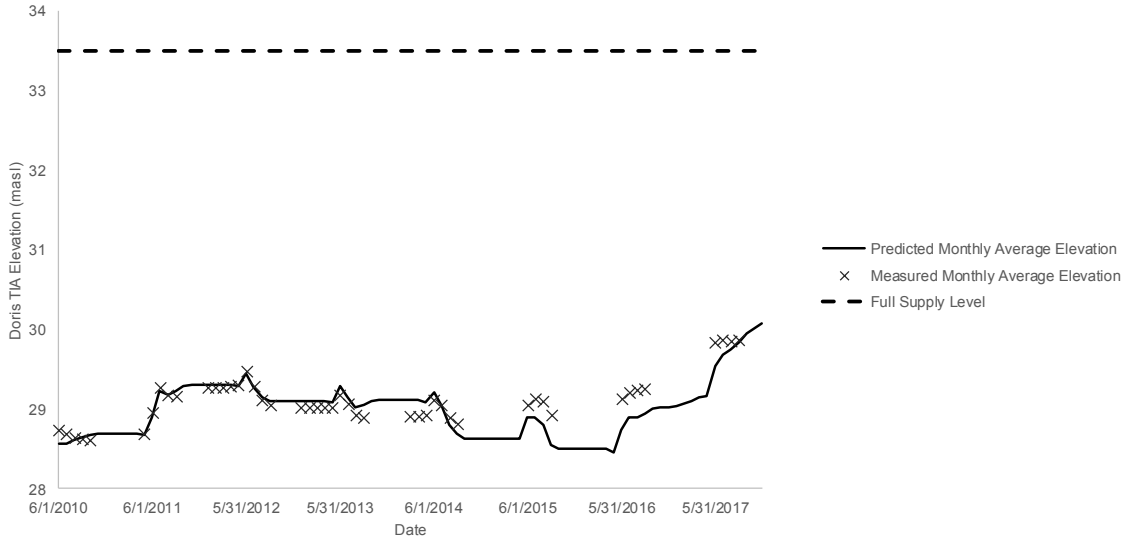


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Figure 2-3: Predicted and Measured Water Levels in the Doris TIA from 2010 to 2017

3 Water Quality Predictions

The measured water quality in the Doris TIA was compared to the model predictions and are presented in Attachment 1. The general observations were divided into four categories presented in Table 3-1.

Table 3-1: Comparison Summary of Measured Water Quality to Model Predictions

Classification Type	Parameters Included	Comparison to Model Prediction
Conservative	Cl, NO_3, NO_2, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Li, Mn, Hg, Mo, Se, Ag, Zn	Measured values are below the model predictions. The modeled values are reflective of conservative assumptions.
Trending Well	TSS, CN_T, CN_F, Fe, Mg, Ni, V	Measured values are tracking well with the model predictions.
Under Predicted	TDS, NH_4, P, Al, Cu, Na	Model predictions are lower than measured values.
Detection Limit greater than Prediction	Ag, B, Cd, Hg, Pb, Sb, Tl, U, Zn	All measured data is at or close to the method detection limit and above the model prediction.

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.026_2018 General Compliance\Water and Load Balance review for 2017\[HopeBay_WLBReview_1CT022.026_R01_ajb.xlsm[

For parameters with a classification of conservative, trending well or detection limit greater than prediction no re-calibration of the model is required. The parameters will continue to be monitored and should they increase above the model predictions, re-calibration efforts would be considered at that time.

For under predicted parameters, the major source of loading to the Doris TIA in 2017 was the Doris process plant effluent. Since the plant was experiencing challenges during start-up, the plant effluent chemistry is not reflective of steady state conditions. To re-calibrate the model to the observed Doris Process Plant effluent water quality would not be applicable for future predictions when steady state operation is expected.

Once the Doris process plant reaches steady state the Doris process water quality source term will be re-evaluated. After the process term is updated the ammonia degradation rate will also be re-evaluated.

Should water need to be discharged from the Doris TIA, the median 2017 values for all parameters are less than the applicable Metal Mining Effluent Regulations (MMER) maximum authorized monthly mean concentrations (MMER 2016). Further, the median 2017 values for all parameters are less than 10% of the applicable MMER maximum authorized monthly mean concentrations except for Total Suspended Solids (TSS) which is approximately 50% of the MMER maximum authorized monthly mean concentration, (MMER 2016) as shown in Table 3-2.

Table 3-2: Comparison of Doris TIA Median Concentrations to MMER Limits

Parameter	Units	MMER Maximum Authorized Monthly Mean Concentration	Median 2017 Doris TIA Concentrations	Percent of MMER
TSS	mg/L	15	8.1	54%
Arsenic	mg/L	0.5	0.00057	0.1%
Copper	mg/L	0.3	0.022	7%
Cyanide	mg/L	1	<0.005	0.5%
Lead	mg/L	0.2	<0.0005	0.3%
Nickel	mg/L	0.5	0.0024	0.5%
Zinc	mg/L	0.5	<0.005	1%

Source: \\srk.ad\dfs\na\van\Projects\01_SITES\Hope.Bay\1CT022.026_2018 General Compliance\Water and Load Balance review for 2017\[HopeBay_WLBReview_1CT022.026_R01_ajb.xlsm[

4 Conclusions

The water and load balance model TIA water elevation predictions are tracking well with measured data. Measured water elevations suggest that no mechanisms of water movement from or to the Doris TIA are missing in the model. Continued monitoring of the Doris TIA water is required. Once the Doris Process Plant reaches steady state, the Doris process water quality source term and ammonia degradation rates in the TIA should be re-evaluated.

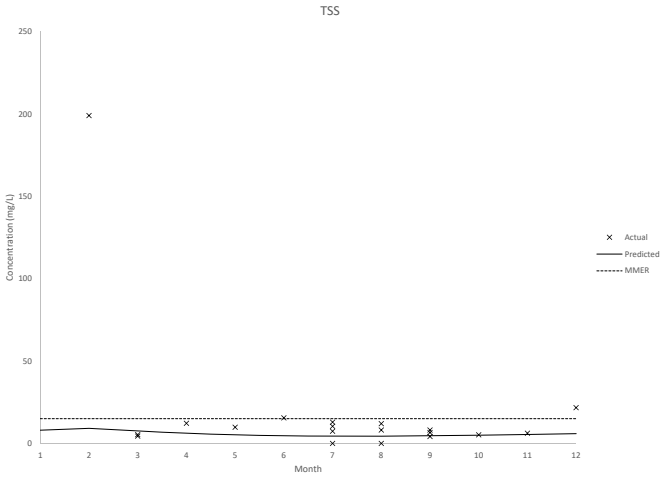
5 References

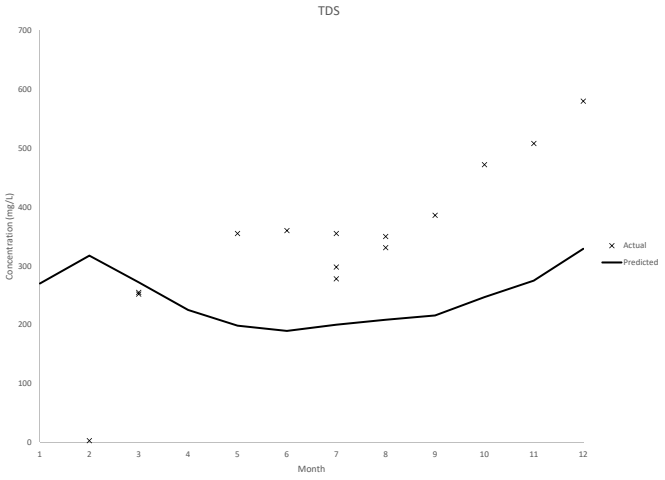
[MMER] Mining Metal Effluent Regulations. 2016. Authorized Limits of Deleterious Substances – Schedule 4. Ottawa (ON): Government of Canada. Last amended February 20, 2015. Accessed on February 2018 from http://laws-lois.justice.gc.ca/eng/regulations/SOR-2002-222/.

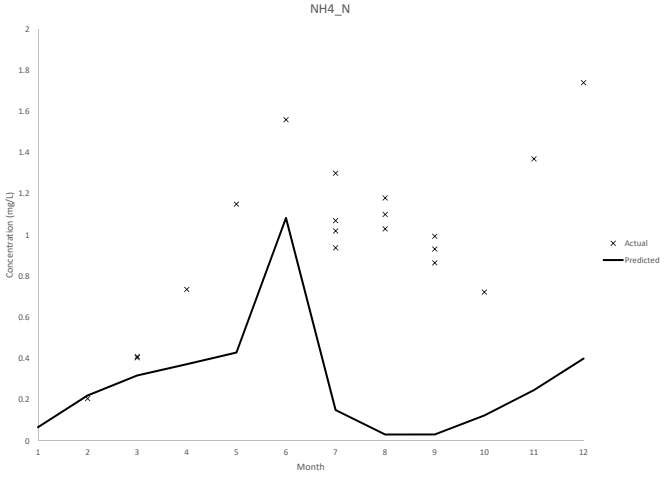
[NWB] Nunavut Water Board. 2016. Water Licence 2AM-DOH1323 Amendment No.1. Issued to TMAC Resources Inc. November 2016.

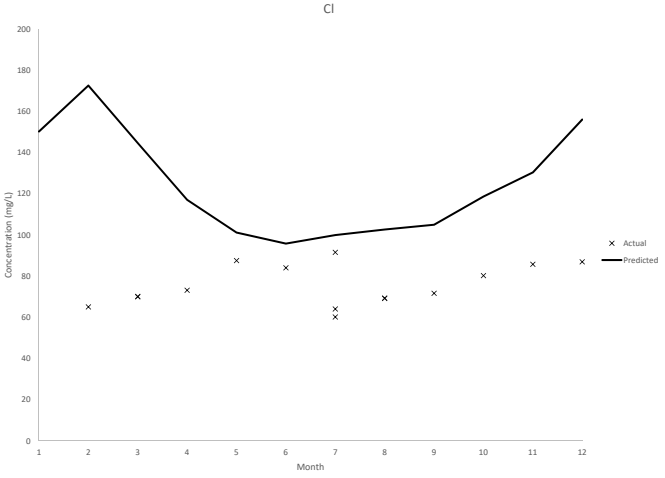
SRK Consulting (Canada) Inc., 2018. Madrid-Boston Project Water and Load Balance, Hope Bay Project. Report Prepared for TMAC Resources Inc. 1CT022.013. November 2017.

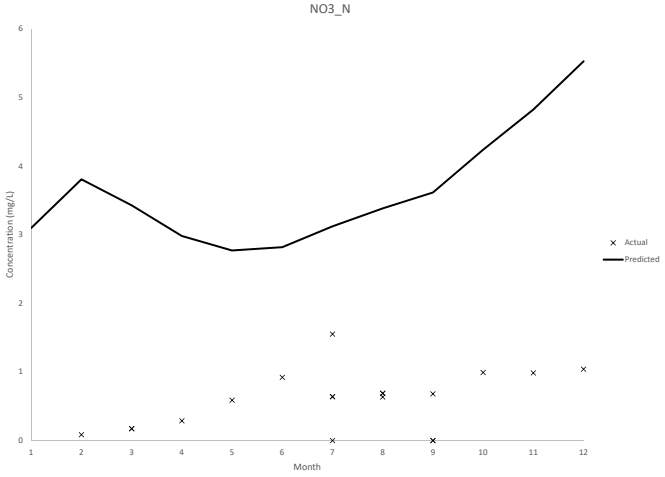
Attachment 1
Comparison of Measured Water Quality to Model Predictions

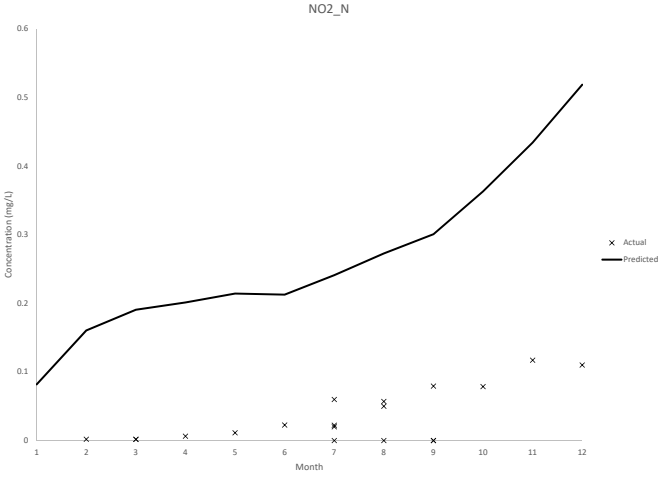

TSS
Concentration (mg/L)
Month
Actual
Predicted
MMER

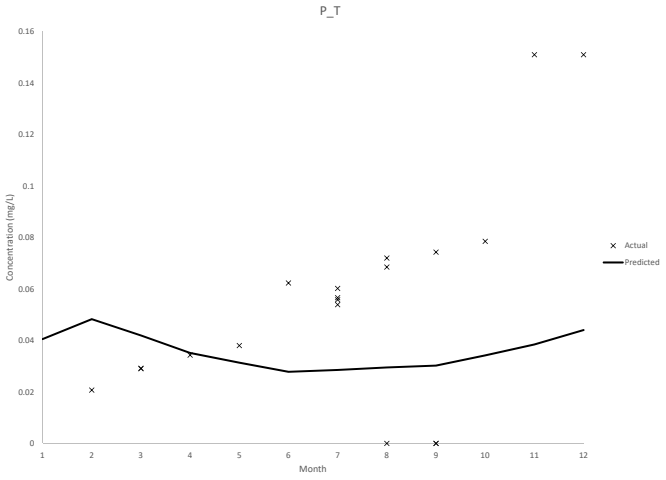

TDS
Concentration (mg/L)
Month
Actual
Predicted

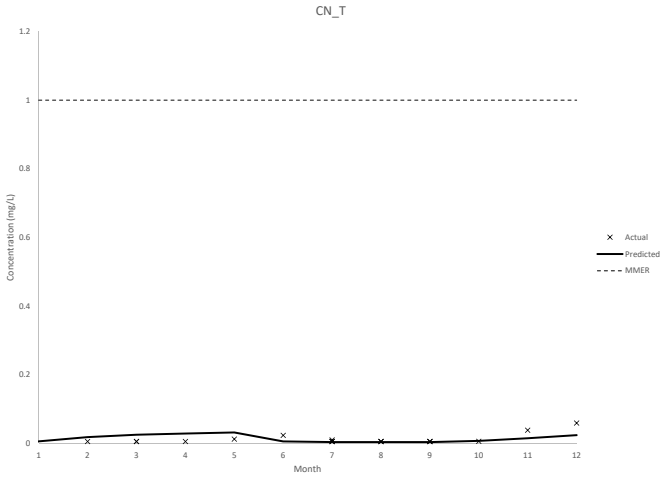

NH4_N
Concentration (mg/L)
Month
Actual
Predicted

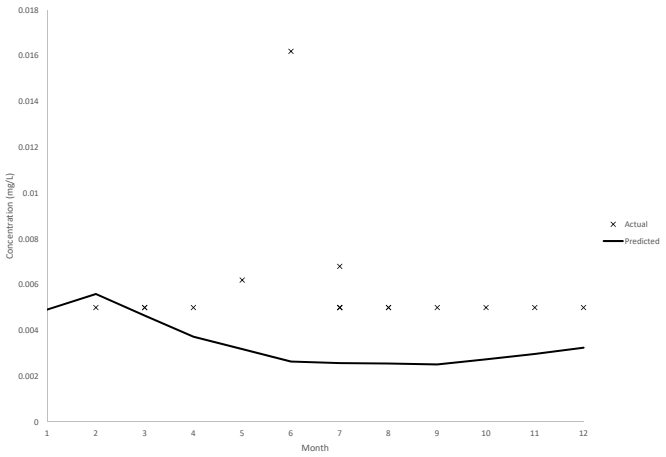

Cl
Concentration (mg/L)
Month
Actual
Predicted

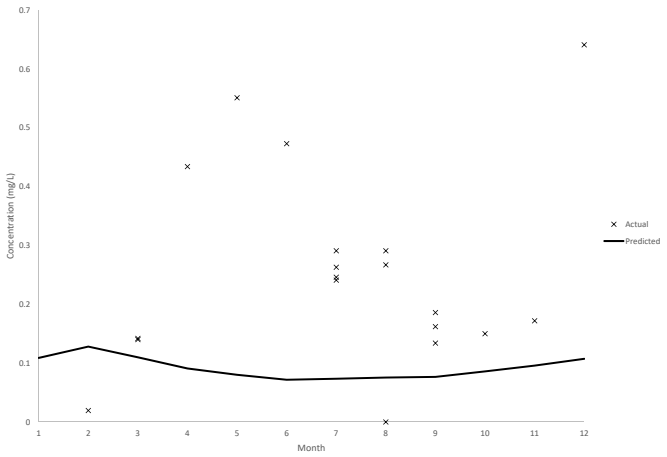

NO3_N
Concentration (mg/L)
Month
Actual
Predicted

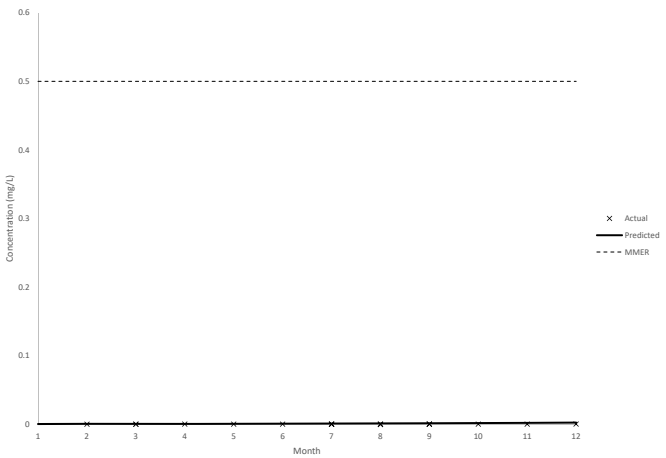

NO2_N
Concentration (mg/L)
Month
Actual
Predicted

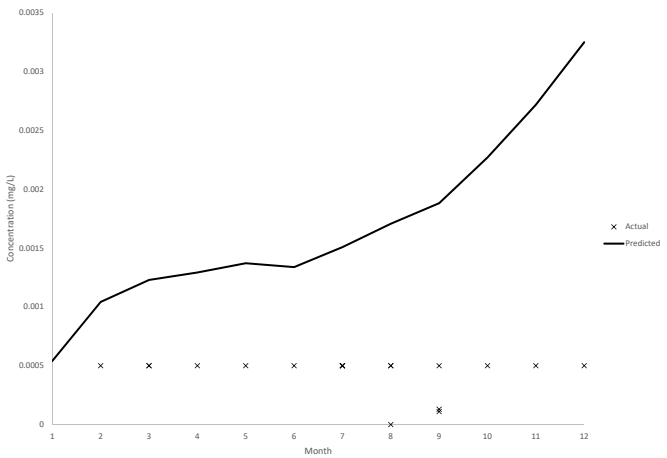

P_T
Concentration (mg/L)
Month
Actual
Predicted

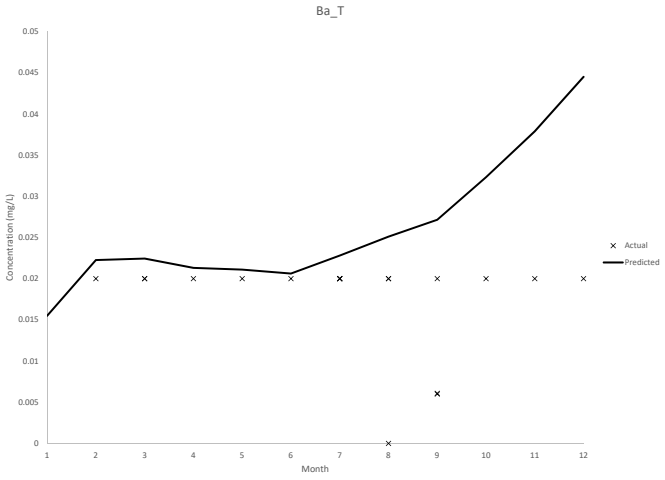

CN_T
Concentration (mg/L)
Month
Actual
Predicted
MMER

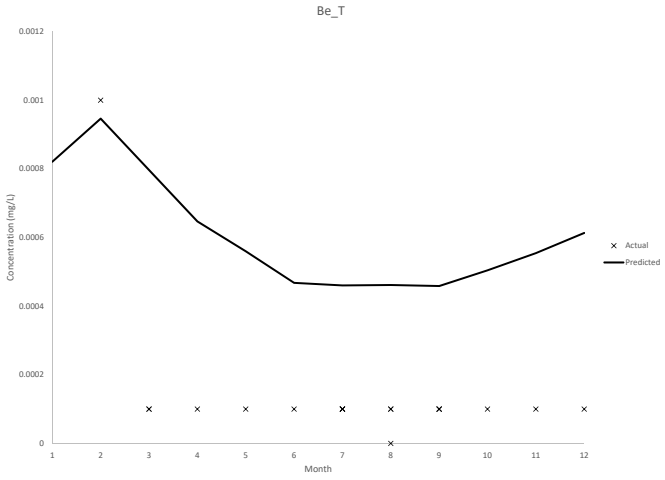

CN_F
Concentration (mg/L)
Month
Actual
Predicted

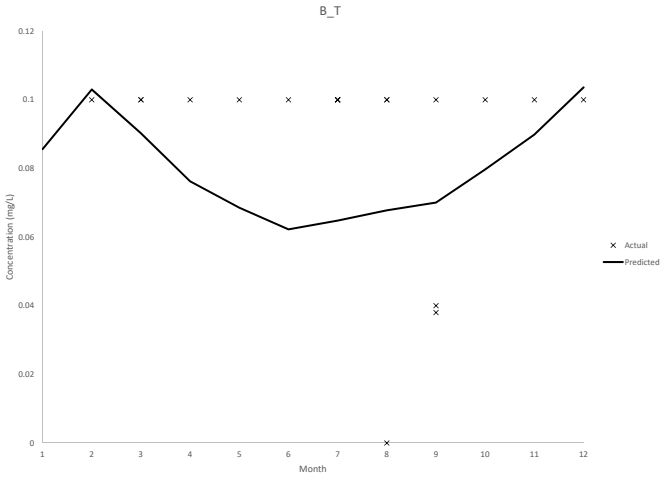

Al_T
Concentration (mg/L)
Month
Actual
Predicted

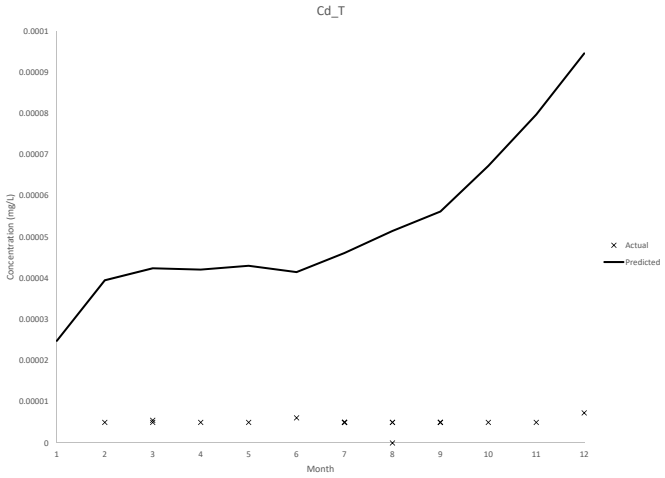

As_T
Concentration (mg/L)
Month
Actual
Predicted
MMER

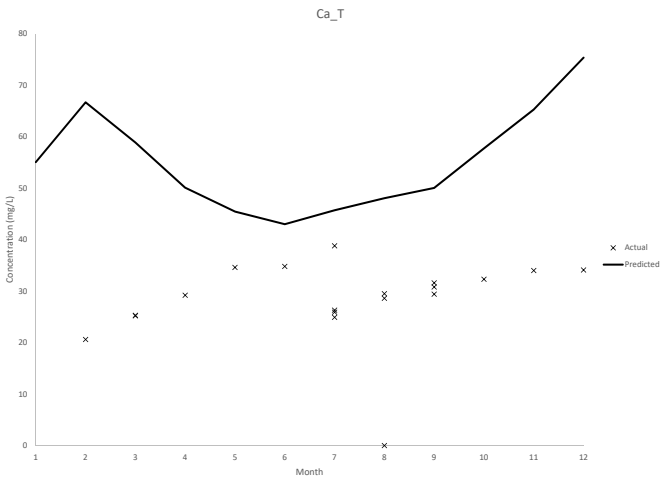

Sb_T
Concentration (mg/L)
Month
Actual
Predicted

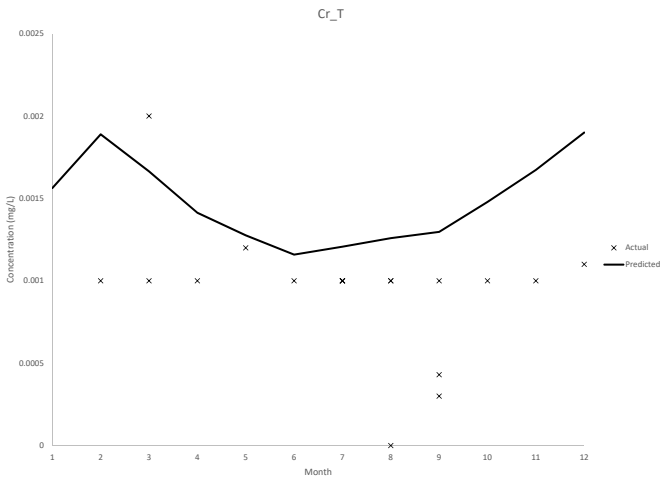

Ba_T
Concentration (mg/L)
Month
Actual
Predicted

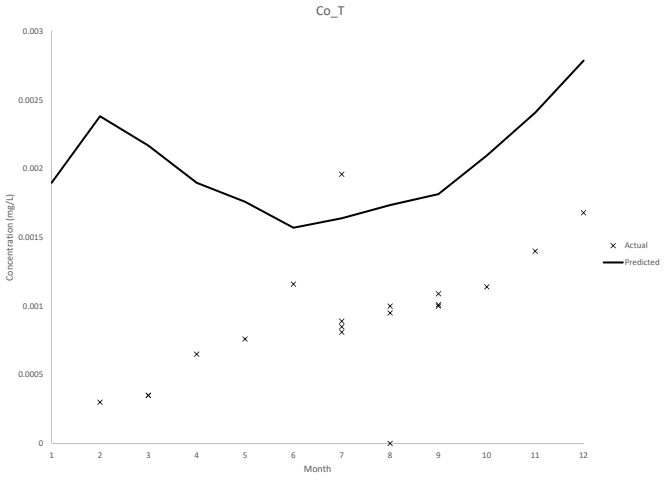

Be_T
Concentration (mg/L)
Month
Actual
Predicted


B_T
Concentration (mg/L)
Month
Actual
Predicted


Cd_T
Concentration (mg/L)
Month
Actual
Predicted


Ca_T
Concentration (mg/L)
Month
Actual
Predicted


Cr_T
Concentration (mg/L)
Month
Actual
Predicted


Co_T
Concentration (mg/L)
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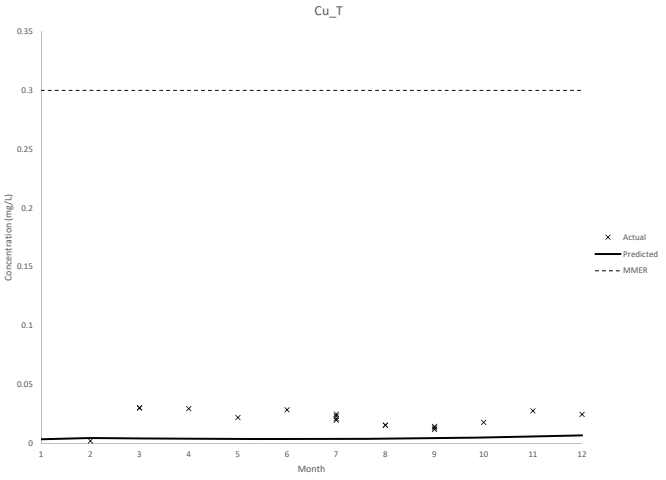
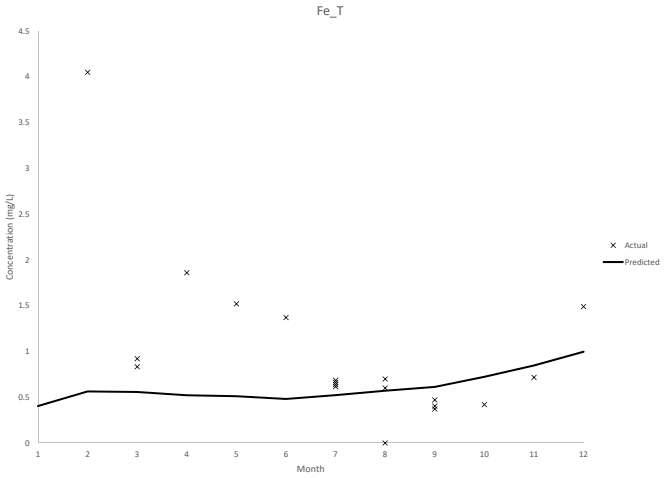
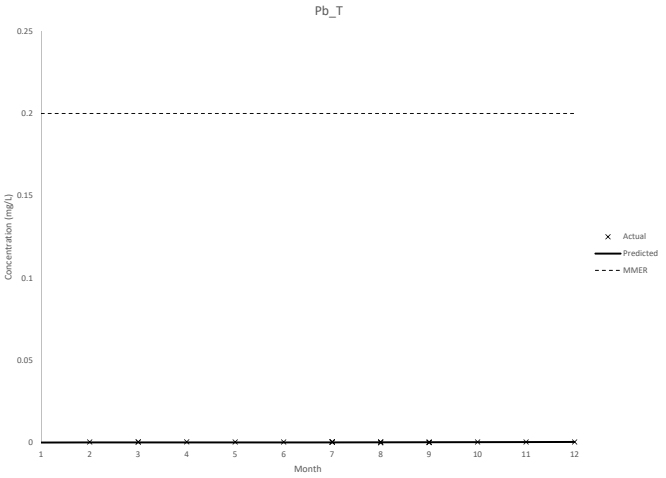
0.0025
0.002
0.0015
0.001
0.0005
0
1 2 3 4 5 6 7 8 9 10 11 12
Month
Actual
Predicted


Cu_T
Concentration (mg/L)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1 2 3 4 5 6 7 8 9 10 11 12
Month
Actual
Predicted
MMER


Fe_T
Concentration (mg/L)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12
Month
Actual
Predicted


Pb_T
Concentration (mg/L)
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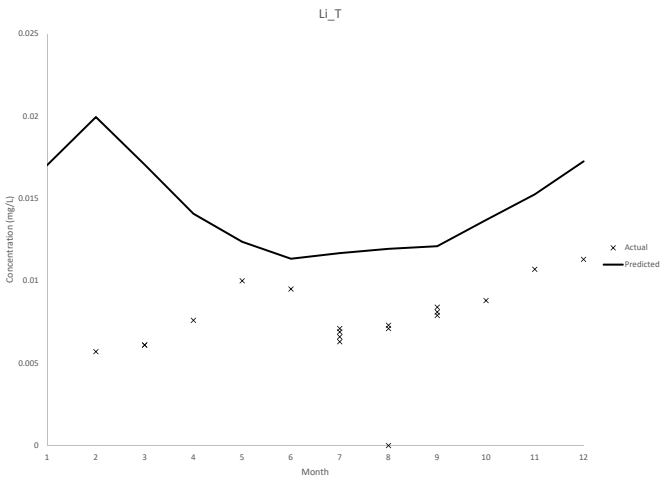
0.2
0.15
0.1
0.05
0
1 2 3 4 5 6 7 8 9 10 11 12
Month
Actual
Predicted
MMER


Li_T
Concentration (mg/L)
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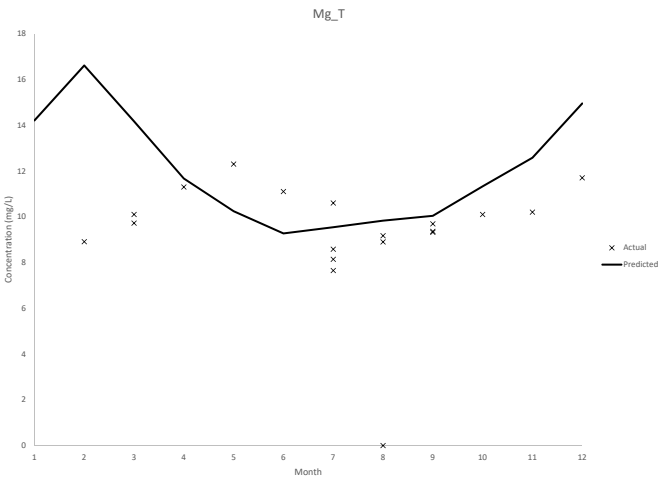
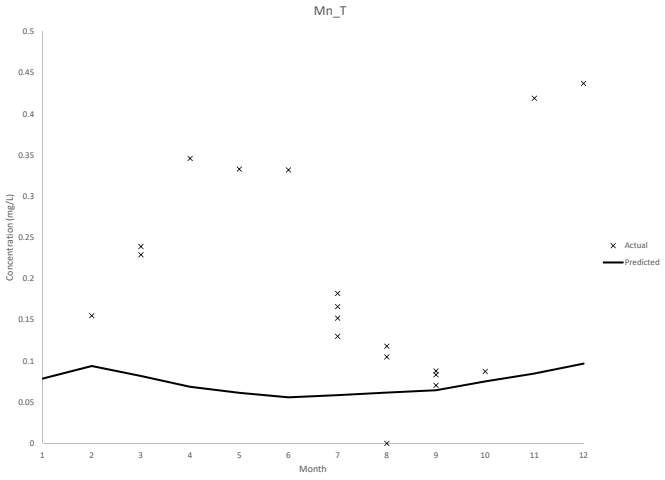
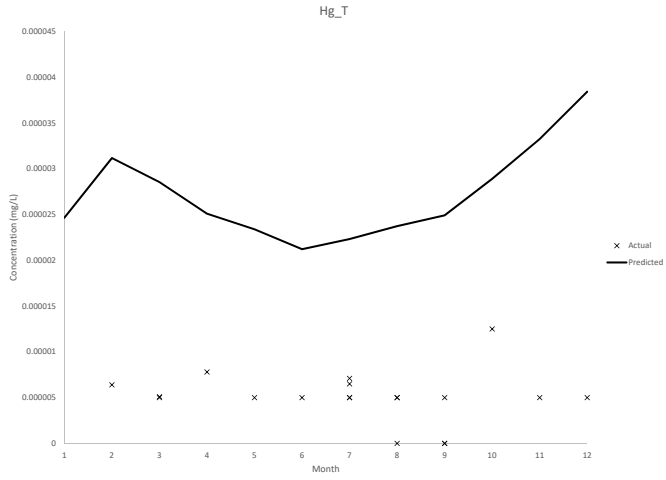
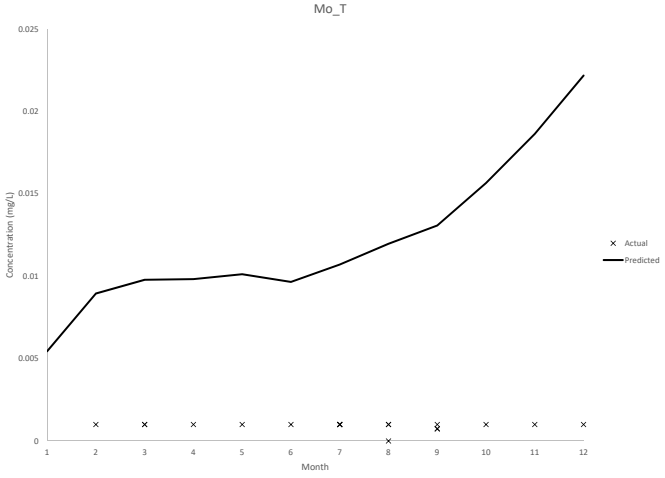
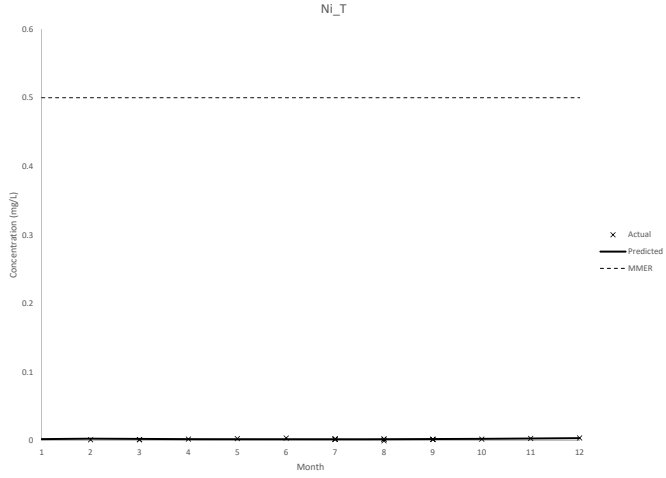
0.02
0.015
0.01
0.005
0
1 2 3 4 5 6 7 8 9 10 11 12
Month
Actual
Predicted

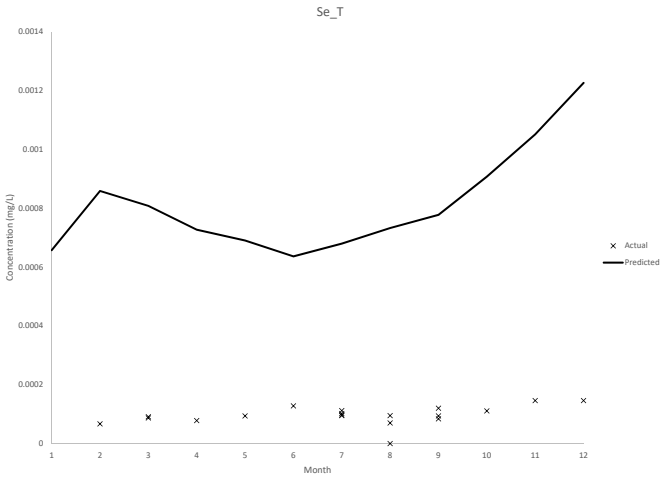

Mg_T
Concentration (mg/L)
18
16
14
12
10
8
6
4
2
0
1 2 3 4 5 6 7 8 9 10 11 12
Month
Actual
Predicted

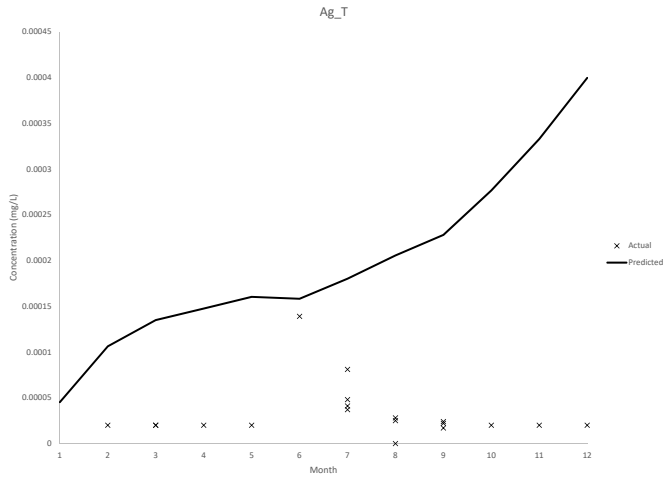

Mn_T
Concentration (mg/L)
Month
Actual
Predicted

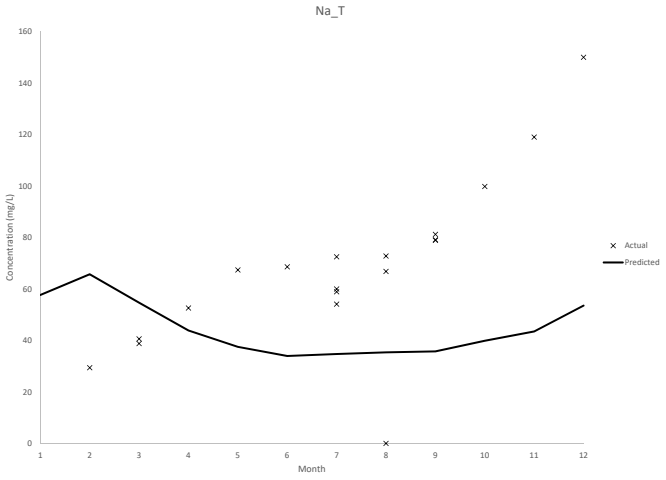

Hg_T
Concentration (mg/L)
Month
Actual
Predicted

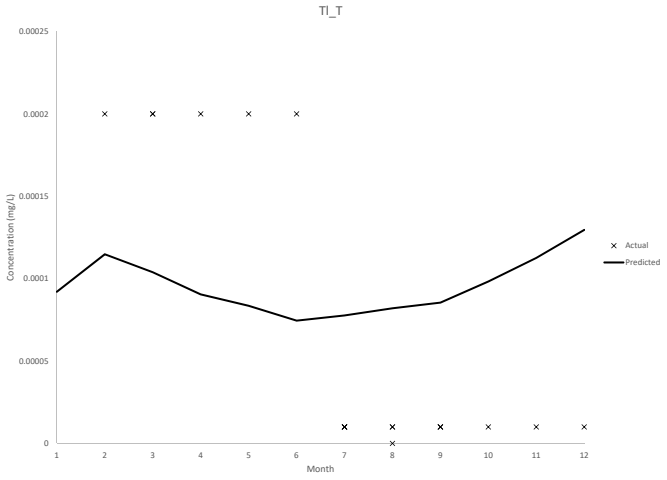

Mo_T
Concentration (mg/L)
Month
Actual
Predicted

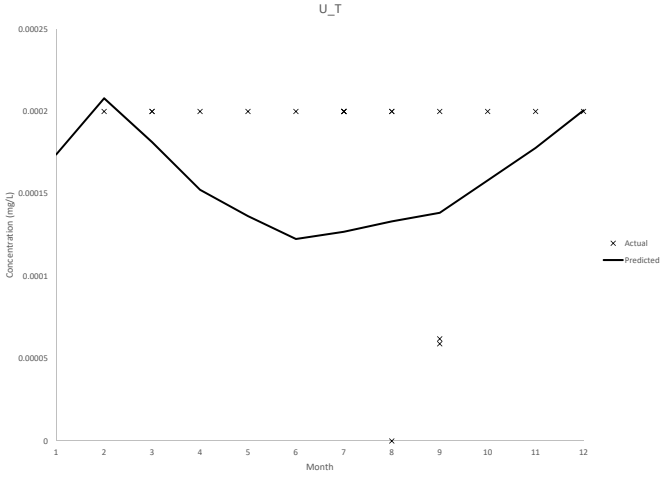

Ni_T
Concentration (mg/L)
Month
Actual
Predicted
MMER

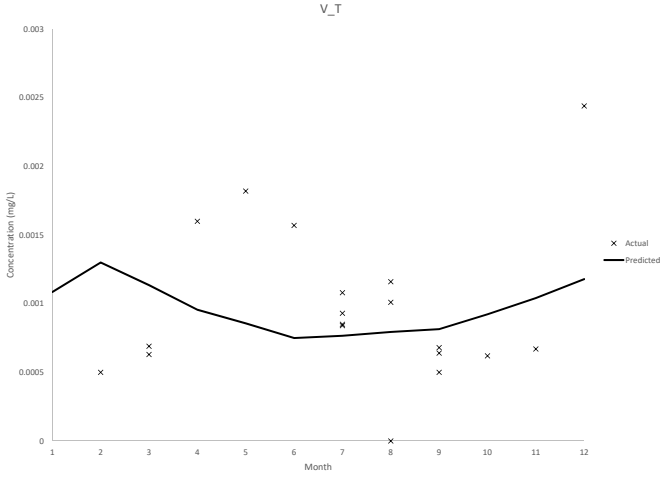

Se_T
Concentration (mg/L)
Month
Actual
Predicted

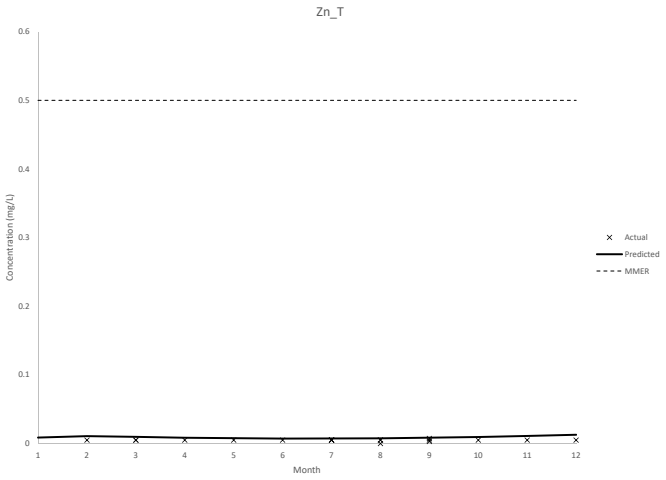

Ag_T
Concentration (mg/L)
Month
Actual
Predicted


Na_T
Concentration (mg/L)
Month
Actual
Predicted


Tl_T
Concentration (mg/L)
Month
Actual
Predicted


U_T
Concentration (mg/L)
Month
Actual
Predicted


V_T
Concentration (mg/L)
Month
Actual
Predicted


Zn_T
Concentration (mg/L)
Month
Actual
Predicted
MMER

Appendix F

2017 Waste Rock, Quarry and Tailings Monitoring Report, Doris Mine, Hope Bay Project

2017 Waste Rock, Quarry and Tailings Monitoring Report, Doris Mine, Hope Bay Project

Prepared for

TMAC Resources Inc.

Prepared by

SRK Consulting (Canada) Inc.
1CT022.016
March 2018

2017 Waste Rock, Quarry and Tailings Monitoring Report, Doris Mine, Hope Bay Project

March 2018

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Project No: 1CT022.016

File Name:
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srk consulting

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Appendices

1 Introduction

Development of the Doris mine has resulted in the development of quarries, use of quarry rock for construction of roads, pads and other infrastructure, production of waste rock from the underground mine and processing of ore resulting in flotation tailings slurry and detoxified tailings. Monitoring plans are in place to confirm acid rock drainage and metal leaching (ARD/ML) potential for quarry rock, waste rock and tailings (flotation and detoxified) is consistent with geochemical characterization studies conducted at the environmental assessment and/or water licence applications for Doris, and to monitor the chemistry of seepage and runoff associated with these materials.

This report presents results from the 2017 quarry, waste rock and tailings geochemical monitoring programs. The report is organized as follows:

- A summary of the monitoring requirements is provided in Section 2.
- Results of the geochemical inspections and monitoring of quarry rock solids are summarized in Section 3.
- Results of the geological inspections and monitoring of underground waste rock are summarized in Section 4.
- Results of the seepage surveys around infrastructure areas and downgradient of the waste rock pile are provided in Section 5.
- Results of geochemical monitoring of flotation tailings slurry and detoxified tailings solids are summarized in Section 6.
- Detailed technical memorandum on each of these subjects are provided in Appendices A, B, C and D.

2 Monitoring Requirements and Conformity Assessment

2.1 Quarry Rock

Details on the monitoring program used for quarries and quarry rock along the Doris Windy Road are provided in "*Quarry Management and Monitoring Plan*" (TMAC 2017). A summary of the requirements is provided in Table 2.1.

Table 2.1: Quarry Monitoring Requirements and 2017 Monitoring Summary

Monitoring Item	2017 Monitoring Summary
Visual inspections and sampling at the quarry face by site geologist when the quarries are in active use;	There were no active quarries in 2017 therefore no monitoring was required.
Collection and testing of two samples per year from each active quarry for total sulphur analysis, and, if the sulphur content exceeds 0.1%, the samples would be subjected to full acid base accounting (ABA) tests. A subset of samples will be subjected to shake flask extraction tests. The ABA tests would be done on the whole sample and on the -2mm size fraction to determine whether there is any concentration of sulphides in the fine component of the rock;	There were no active quarries in 2017 therefore no monitoring was required.
Quarry sumps will be monitored as described under the routine site water quality monitoring program;	Quarry sump monitoring was not required in 2017.
After construction any roads and other infrastructure components that were constructed using the quarry or waste rock since the previous inspection will be inspected by a qualified geologist or geochemist to verify that the rock used in construction was suitable for that purpose. During the inspection, samples will be collected for total sulphur analysis. If the sulphur content exceeds 0.1%, the samples will be subjected to full ABA tests. A subset of samples will be subjected to shake flask extraction tests. Where possible, the testing would be done on the whole sample and on the -2 mm size fraction to determine whether there is any concentration of sulphides in the fine component of the rock;	Completed. Refer to Section 3 and Appendix C.
A seep survey will be conducted around all infrastructure components that have been constructed of modified within the previous year. Field pH, electrical conductivity (EC), Eh, and temperature readings will be collected. A minimum of 10% of the samples will be submitted for laboratory analyses, as detailed in Quarry Management and Monitoring Plan (TMAC 2017). Established reference stations will also be monitored to provide basis for comparing this to waters that are not influenced by the development activities; and	Completed. Refer to Section 5 and Appendix B.
An annual quarry monitoring report, including the results and an interpretation of the geochemical data will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e. within 6 months of collecting the final quarry samples).	Completed. Refer to Section 5 and Appendices B and C.

2.2 Underground Waste Rock

Monitoring plans for the waste rock are provided in the "*Waste Rock and Ore Management Plan, Hope Bay Project, Nunavut"* (TMAC 2016a and 2016b). The program includes inspection and geochemical monitoring of the waste rock solids and routine monitoring of the pollution collection pond. A summary of the requirements of TMAC (2016a) is summarized in Table 2.2.

Table 2.2: Waste Rock Monitoring Requirements and 2017 Monitoring Summary

Monitoring Item	2017 Monitoring Summary
Inspection of the working face and muck pile by a field geologist to confirm rock types, mineralogical characteristics, and to classify the rock as mineralized or non-mineralized. All of the waste rock will be classified and managed as "mineralized" waste rock and be used as backfill.	Completed. Refer to Section 4 and Appendix A.
Sampling and testing of the underground waste rock, including ABA on a minimum of one sample per 10,000 tonnes of rock;	Completed. Refer to Section 4 and Appendix A. Sampling frequency was approximately 1 sample for every 4,000 t of waste rock placed on Pad T.
Monitoring and recording the volumes of waste rock mined and placed in the mineralized and non-mineralized areas of the waste rock stockpile, and any non-mineralized waste rock that is removed for use in construction (pending confirmatory test work and approval from NWB);	Completed. Refer to Section 4 and Appendix A. No waste rock was used for construction.
Regular water quality monitoring will be carried out at a surveillance monitoring station ST-2 located in the pollution control pond;	Completed. Refer to Appendix D of the Hope Bay Belt Project 2017 Nunavut Water Board Annual Report.
Annual inspections by a qualified geochemist of the designated non-mineralized areas of the waste rock pile to confirm that there are no areas with elevated amounts of sulphide mineralization, and inspections of the designated mineralized areas of the pile to look for signs of weathering and oxidation of the sulphides;	Completed. Refer to Appendix A.
Seep surveys along the down-gradient toe of the waste rock pile and below the pollution control ponds and access road throughout operations and for at least 2 years following mining and backfilling activities. The seep survey will be completed at the same time and will follow the same procedures as used for the seep survey around other infrastructure areas. However, given the increased importance of obtaining samples from this area, all distinct seeps in the immediate vicinity of the waste rock pile (i.e. any seeps spaced more than 50 metres apart) will be tested for a full suite of laboratory parameters; and	Completed. Refer to Section 5 and Appendix B..
An annual waste rock monitoring report, including the results and an interpretation of the geochemical data will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e. within 6 months of collecting the final quarry samples).	Completed. Refer to Section 5 and Appendices A and B.

2.3 Tailings

Geochemical monitoring program for flotation and detoxified tailings as specified in Schedule J, Tables 1 and 2 of NWB Type "A" Water Licence 2AM-DOH1323 Amendment No. 1 (the "Water Licence", Nunavut Water Board 2016) and includes the following monitoring stations: TL-5 (process plant tailings water discharge), TL-6 (flotation tailings solids), TL-7 (detoxified tailings solids[1]), and TL-11 (seepage from underground backfilled stopes). A summary of the monitoring requirements is summarized in Table 2.3.

Table 2.3: Tailings Monitoring Requirements and 2017 Monitoring Summary

Monitoring Item	2017 Monitoring Summary
Sampling of the supernatant from flotation tailings slurry discharge (TL-5) once per month for the analysis of pH, TSS, ammonia, nitrate, nitrite, sulphate, cyanide (WAD, free and total), cyanate, thiocyanate, and total metals.	Completed. Refer to Appendix D.
Maintain monthly records of tonnages and locations of disposal for flotation tailings (TL-6) discharged into the TIA and detoxified tailings (TL-7) placed in the underground mine in stopes as backfill.	Completed. Refer to Section 6 and Appendix D.
Monthly geochemical monitoring of a homogenized monthly composite sample of flotation tailings solids (TL-6), from equal amounts of weekly samples, for analysis of total sulphur, sulphate sulphur, TIC and trace element content.	Completed. Refer to Section 6 and Appendix D.
Monthly geochemical monitoring of detoxified tailings (TL-7) for analysis of WAD cyanide, TIC, total metals (including sulphur) and moisture content. Quarterly analysis of cyanate and thiocyanate is also required.	Completed except for quarterly analysis of cyanate and thiocyanate. Cyanate and thiocyanate were not analyzed as there is no analytical procedure for these parameters in tailings solids. Refer to Section 6 and Appendix D.
Bi-annual seepage surveys of underground backfilled stopes with opportunistic sampling of seepage (TL-11) for the analysis of pH, EC, trace metals by ICP-MS, alkalinity, acidity, sulphate, total and WAD cyanide, total ammonia, nitrate and nitrite.	Completed. Refer to Section 6 and Appendix D.
Preparation of an annual tailings monitoring report to be submitted to the NWB by March 31 of the year following sample collection and including the results and interpretation of the geochemical data for tailings solids (TL-6 and TL-7), geochemical data and figures depicting time series of constituent concentration and loads for tailings supernatant (TL-5) and results and interpretation of seepage data from the bi-annual underground seepage survey of backfilled stopes (TL-11).	Completed. Refer to Section 6 and Appendix D.

[1] Detoxified tailings are referred to as cyanide leach residue in the Water Licence

3 Monitoring of Quarry Rock Geochemistry

Details of the 2017 quarry and construction rock monitoring program are presented in Appendix C. As there were no active quarries in 2017, monitoring (geological mapping of quarry faces or geochemical characterization) was not required for run-of-quarry rock. This summarizes the 2017 construction rock monitoring program.

3.1 Sampling and Testing Program

SRK inspected Doris North infrastructure areas constructed between summer 2016 and summer 2017 including the tailings overflow catchment basins, the reagent pad, the explosive facility, the south apron at the airstrip and both of the edges of the TIA road. All construction rock was sourced from Quarry 2. A total of 10 samples, including a field duplicate, were collected from the infrastructure and pads. At each sampling site -1cm and -2 mm sieved splits were collected separately. Field contact rinse tests were conducted on the -2mm splits. Geochemical analyses were coordinated by SRK.

The samples were shipped to Maxxam Analytics for preparation and analysis. All -1 cm samples were analyzed for total sulphur. All samples contained concentrations >0.1% and were submitted for full ABA and trace element content, including paste pH, sulphate sulphur by hydrochloric acid leach, Modified Sobek NP (MEND 1991) and total inorganic carbon (TIC). Trace element content was determined by aqua regia digestion followed by an ICP-MS scan. TIC was determined by using a Leco furnace to directly measure CO_2 gas evolved from HCl treatment of the sample.

Four samples were selected by SRK for SFE testing based on rinse EC data. SRK selected samples with the highest rinse EC values from each area inspected. The SFEs were carried out on the -2 mm samples as per the MEND (2009) method with a 3:1 solid to solution ratio and a 24 hour shaking period. The SFE leachate was analyzed for pH, EC, total dissolved solids (TDS), SO_4, alkalinity, acidity, chloride, ammonia, NO_3, NO_2 and trace elements by ICP-MS (including Hg by ICP-MS).

3.2 Results

The majority of samples were described as grey-green mafic metavolcanics with trace to no visible sulphides and carbonate alteration/veins with some exceptions noted below.

Rock from all inspected areas were mafic metavolcanics containing K-feldspar associated with quartz-carbonate veins that were typically a few centimeters wide and between 5 and 15 cm long. Previous airstrip construction material also contained K-feldspar veining. Moreover, the cyanide reagent pad contained localized areas of metavolcanics with epidote veins (typically a few centimeters wide and around 10 cm long) and rare quartz veining (one fragment up to 10 cm thick wide). The extension of the TIA road contained occurrences of mafic metavolcanics containing disseminated pyrite and pyrite stringers (in <5% of the surveyed rock) in localized areas on the eastern edge of the road. Overall, visual sulphide estimates were negligible to low (<1%) in the rock along the TIA road.

Total sulphur ranged from 0.11 to 0.20% with sulphate detected at levels ranging from 0.02 to 0.05%. Modified NP and TIC levels ranged from 91 to 160 kg $CaCO_3$/t and 73 to 150 kg $CaCO_3$/t, respectively. Modified NP values were consistently greater than TIC, indicating the occurrence of silicates measured by the NP method. ABA results indicate that the samples are non-PAG according to NP/AP and TIC/AP ratios. Element analysis results were screened for anomalously high parameters by comparing data to ten times the average crustal abundances of basaltic rocks (Price 1997). The comparison indicated no appreciable enrichment for these samples.

Rinse and SFE tests results indicated alkaline pH values ranging from 8.0 to 9.5. The highest pH value was observed for the sample taken at the south apron of the airstrip. Conductivity was comparable for all samples and consistently lower than the rinse EC values, ranging from 150 to 180 µS/cm. All constituent concentrations were below the screening criteria.

All results indicate the risk of ML/ARD from construction rock is low.

4 Monitoring of Waste Rock Geochemistry

Details of the 2017 waste rock monitoring program are presented in Appendix A.

4.1 Sampling and Testing Program

In 2017, a total of 40 waste rock samples were collected from the underground of which 31 samples were analyzed for total sulphur and total inorganic carbon and nine for extended ABA and element analysis. All samples were geologically logged as mafic metavolcanics (1a) except for two samples that were diabase (11c). Samples were primarily a representative mixture of fine and coarse rock fragments of blasted rock (muck) from the underground, however selected samples were collected from the blast face. Q1 and Q2 analyses were conducted at Bureau Veritax (Maxxam Analytics), Q3 and Q4 analyses were conducted at SGS Laboratories.

Geological inspections were conducted by TMAC site geologists when monitoring samples were collected. Where possible, both the working face and the muck pile were inspected to identify the rock type, quantity of sulphide and carbonate minerals. The data were recorded in geological inspection logs.

In addition, SRK completed an inspection of the waste rock stockpile on the east side of Pad T in August 2017 by walking the perimeter of the upper bench of the pile and examining rock types and the presence of sulphide content. The lower benches were not inspected as they either contained waste rock deposited prior to last inspection or were not accessible.

4.2 Results

Mining activities in 2017 resulted in the placement of approximately 146,977 tonnes of waste rock on Pad T, all of which was managed as mineralized waste rock. Approximately 3,060 t of waste rock from surface was placed as structural backfill in stopes of the Doris Mine in 2017. Throughout the mine life, waste rock will be placed underground as backfill with no waste rock remaining on surface at closure. In 2017, mine development intersected waste rock geologically

classified as mafic metavolcanics (1), diabase (11c) and late mafic dykes (10b). Late mafic dykes (10b) is a relatively minor rock unit comprising <1% of overall waste rock.

Sulfur concentrations for the mafic metavolcanics samples (1a) were uniformly low, ranging from 0.02 to 0.19% and with median levels of 0.13%. TIC ranged from 2.1 to 300 kg $CaCO_3$ eq/tonne, with 30% of samples having TIC levels less than 30 kg $CaCO_3$ eq/tonne. TIC levels are lower than expected given typical concentrations observed in basalt from the Doris area (P25 to P75 values between 167 to 339 kg $CaCO_3$ eq/tonne, SRK 2015b). Based on SRK's inspection of the waste rock stockpile, these samples are likely metavolcanics found along the contact with the diabase intrusion that has been altered (or hornfelsed) as a result of heat from the intrusion.

The majority of mafic metavolcanic samples (n=24) were classified as non-PAG. Four samples (13%) were classified as uncertain and two samples (7%) as PAG. The two samples classified as PAG had low levels of TIC (<5 kg $CaCO_3$ eq/tonne) and low levels of total sulphur contents of 0.14% and 0.16%. The diabase sample had a low sulphur (0.09%) and low TIC (14 kg $CaCO_3$ eq/tonne) content. The diabase sample was classified as non-PAG.

Trace element analyses on the solids indicated that concentrations of trace elements in volcanics (1a) and diabase (11c) materials were less than ten times the average crustal abundance for basalt.

5 Seepage Survey

Details of the 2017 seep survey are provided in Appendix B.

5.1 Sampling and Testing Program

The seep survey was carried out between June 15 and June 18, 2017 by TMAC in the Doris North area. The construction seepage monitoring program included visual inspection and opportunistic sampling of seepage downstream of the areas constructed between summer 2016 and summer 2017 including the temporary explosives berm by the North dam, tailings impoundment area (TIA) access road and airstrip expansion. For the waste rock monitoring program, the toe of the waste rock stockpile and the downstream areas of the waste rock storage area were surveyed (referred to as the waste rock impacted area or WRIA).

Nine seepage sites were established downstream of all infrastructure areas except the temporary explosives berm and three within the WRIA. In addition, three references sites were sampled. Samples were collected from each site and submitted to ALS Environmental for analysis of pH, conductivity, sulphate, acidity, alkalinity, chloride, fluoride, nitrate, nitrite, phosphorus, ammonia, total dissolved solids (TDS), total suspended solids (TSS) and low level dissolved metals including mercury and selenium.

5.2 Results

A summary of the field measurements is presented in Table 5.1. The pH at all sites was neutral to slightly alkaline (7 to 8.5). The samples collected within the Waste Rock Influenced Area (WRIA) (17-DC-01, 17-DC-02, 17-DC-03) had the highest levels of conductivity (3350 to 3860 µS/cm).

The results of the 2017 sampling program indicate that there are no major issues with respect to metal leaching and acid rock drainage in seepage associated with infrastructure at Hope Bay. Compared with seeps from infrastructure areas, and consistent with previous years, seepage from areas impacted by waste rock had elevated levels of chloride, nitrate and ammonia. Chloride levels are attributed to flushing of drilling brines and nitrate and ammonia levels to blasting residues from the waste rock.

The waste rock toe seepage samples were elevated in arsenic, copper, iron, nickel and selenium concentrations compared to screening criteria and/or historical data. The elevated concentrations may be due to the sample type (undiluted contact water) and the presence of ore in the stockpile that historically contained waste rock only. Continued monitoring will establish trends in parameter concentrations. The majority of this seepage is captured in the water management system implemented at Doris and directed to the TIA.

Table 5.1: Mean Values for Field Conductivity and pH Measurements

Site Area	No. of Samples	Conductivity (µS/cm)	pH
		Median	
Waste Rock Influenced Area	3	3600	7.8
TLA Access Road	7	86	7.7
Airstrip	2	390	790
Reference Points	3	93	7.7

Source: file:///\\van-svr0\projects\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\C_Seep_Surveys\June2017%20Seepage%20Survey\4.%20Working%20file\2017_DorisSeep_CompiledData_Rev00_AMD.xlsx

6 Monitoring on Tailings

The geochemical monitoring program for flotation tailings slurry and detoxified tailings includes the following monitoring stations: TL-5 (process plant tailings water discharge), TL-6 (flotation tailings solids), TL-7 (detoxified tailings solids[2]), and TL-11 (seepage from underground backfilled stopes).

6.1 Sampling and Testing Program

6.1.1 Flotation Tailings (TL-6) and Process Plant Water Discharge (TL-5)

The filtrate from the detox filter press (where detoxified tailings are dewatered) is pumped to the flotation tailings thickener tank prior to discharge to the TIA. Each week, TMAC collected flotation tailings slurry from the tailings thickener tank in a clean 5-gallon bucket. The sample is left in the bucket to allow gravitational settling and separation of the tailings solids from the liquid. After settling, samples are collected for TL-5 and TL-6.

The supernatant is sampled according to SNP monitoring requirements for TL-5 using a sterile 60mL syringe and submitted to ALS Environmental in Vancouver, BC once per month for the analysis of pH, TSS, ammonia, nitrate, nitrite, sulphate, cyanide (WAD, free and total), cyanate, thiocyanate, and total metals. The 2017 monitoring program included geochemical characterization of 10 monthly samples of tailings process water collected from February to December with a duplicate sample collected in May. There was no sample collected in June.

After sampling is completed for TL-5, the remaining supernatant is discarded and a clean stainless-steel spoon used to transfer the solid tailings into a plastic Ziploc bag. TMAC creates a monthly composite sample for TL-6 using equal parts of each weekly sample for a combined mass of approximately 500 g. The 2017 monitoring program included geochemical characterization of 11 monthly composites of flotation tailings collected from February to December with a duplicate sample collected in July.

Monthly TL-6 composite samples were submitted in glass jars to ALS Environmental Labs in Vancouver, BC for analysis of total sulphur, sulphate sulphur, TIC and trace element content.

6.1.2 Detoxified Tailings (TL-7)

Each month and at the end of the detoxification cycle, TMAC collects one discrete sample of detoxified tailings from the discharge compartment of the detox filter press. The 2017 monitoring program included geochemical characterization of 11 monthly samples of detoxified tailings collected from February to December. One duplicate sample was collected in September. Samples were submitted to ALS Environmental in North Vancouver, BC for analysis of total sulphur, sulphate sulphur, TIC and trace element content. WAD cyanide was also determined by distillation and extraction procedures. There is no analytical method for cyanate and thiocyanate in solids therefore it is not possible to satisfy this monitoring requirement.

[2] Detoxified tailings are referred to as cyanide leach residue in the Water Licence

6.1.3 Seepage Survey of Underground Backfilled Stopes (TL-11)

TMAC completed underground seepage inspections of backfilled stopes in August and December 2017. Visual surveys were conducted of all backfilled stopes that could be accessed safely at the time of the survey. In December, not all backfilled levels could be safely accessed. Four stopes were surveyed in August (3 dry, 1 with identified seep) and four stopes were surveyed in December (3 dry, 1 with identified seep).

In August, TMAC collected one sample from the seep flowing from the bottom of the east limb South stope at level 4932, location E433877, N7559782. In December, TMAC collected duplicate samples from the seep flowing from the bottom of the east limb North stope seep at level 4932, location E433877, N7559809. Both stopes were previously mined out in the Doris North area, and were later backfilled with a blend of unconsolidated waste rock and detoxified tailings. Seepage samples were collected using a syringe and field measurements of pH, EC, ORP and temperature recorded. Seepage flow rates could not be measured due to the low volume of the seeps.

TMAC submitted samples to ALS Environmental in Burnaby, BC for analysis of pH, EC, TSS, TDS, alkalinity, chloride, sulphate, total and WAD cyanide, and dissolved and total metals.

6.2 Results

TMAC initiated ore processing on January 20, 2017 with commencement of tailings monitoring in February 2017 in accordance to the water licence.

The results of the geochemical monitoring program of flotation tailings solids (TL-6) is consistent with the geochemical characterization studies of metallurgical tailings (SRK 2015) and is summarized as follows:

- Flotation tailings deposition in the Doris TIA commenced on January 20, 2017. A total of 199,488 t (dry weight) of flotation tailings were deposited in the TIA in 2017.
- Total sulphur levels were higher during the initial months of process plant operation (0.21 to 1%) owing to higher sulphide ore that was processed during that period and low sulphide recoveries in the concentrate line. Starting in June, sulphide removal was optimized resulting in flotation tailings with lower sulphur concentrations (<0.05 to 0.07%).
- TIC* content in the flotation tailings ranged from 41 to 110 kg $CaCO_3$/t, which SRK expects are underestimated due the analytical method used to quantify reactive carbonate content (Section 3.2).
- Nine of the flotation tailings samples are classified as non-PAG and two as uncertain. The two samples classified as uncertain were from the early part of the year when sulphide recoveries were poorer than expected. Therefore, previous conclusions regarding the ARD potential of the flotation tailings remain unchanged.

- Trace element content was compared to ten times the average crustal abundance for basalt (Price 1997) as an indicator of enrichment. Trace element content at 95th percentile concentrations are above screening criteria for arsenic and total sulphur, however samples above screening criteria were from the early part of the year when sulphide recoveries were poorer than expected. Trace element content for flotation tailings produced in May and after contained levels below the screening criteria, which is consistent with trace element content of Doris metallurgical flotation tailings samples (SRK 2015).

The results of the geochemical monitoring program of detoxified tailings solids (TL-7) is consistent with the geochemical characterization studies of metallurgical tailings (SRK 2015) and is summarized as follows:

- In 2017, a total of 8,333 t of detoxified tailings were placed as backfill in Doris Mine underground stopes.
- Sulphur and TIC* content in the detoxified tailings ranged from 2.4 to 19% and 48 to 82 kg $CaCO_3$/t, respectively. Rinse pH ranged from 7.9 to 8.4 indicating all samples were not acidic.
- Ten of the detoxified tailings samples were classified as PAG and one as uncertain.
- Compared to ten times the average crustal abundance for basalt, 95th percentile concentrations are enriched in antimony, arsenic, bismuth, cadmium, copper, lead, selenium, silver, zinc and total sulphur.
- There is no analytical method for cyanate and thiocyanate for solid-phase samples, as specified in the monitoring program for TL-7 in Schedule J (Table 2) of the Water Licence. WAD cyanide was also specified for TL-7 with levels below analytical detection with the exception of the samples in April (0.11 ppm). There is no regulatory limit for WAD cyanide in tailings. SRK suspects that the inclusion of cyanate, thiocyanate and WAD cyanide monitoring for the detoxified tailings solids (TL-7) may be a typographical error.

The results of the opportunistic seepage sampling from underground backfilled stopes (TL-11) is summarized as follows:

- Seepage from the east limb of the South and North stopes on level 4932 containing waste rock and detoxified tailings backfill was observed and sampled in August and December.
- Seepage pH was circum-neutral in both sampling events.
- Major anion chemistry was dominated by chloride (~48,000 mg/L) and to a lesser degree sulphate (900 mg/L), while major cation chemistry was dominated by calcium (~15,000 mg/L) and to a lesser degree sodium (~8,000 mg/L) and magnesium (1,100 mg/L). Potential sources of the major ions include residues on waste rock from drilling brines (calcium and chloride), other sources of saline water (chloride, sulphate, calcium, sodium and magnesium), and sulphide oxidation with associated carbonate dissolution from waste rock and detoxified tailings (sulphate and calcium).

- Total and WAD cyanide concentrations in the seepage were 0.08 mg/L and 0.028 mg/L, respectively.
- The source of ammonia (280 and 390 mg/L), nitrate (590 mg/L) and nitrite (6.8 mg/L) is attributable to blast residues from waste rock.
- Both seepage samples exhibited leaching of cadmium, copper, nickel, selenium, silver and zinc consistent with trends observed from the humidity cell test (HCT) program for metallurgical detoxified tailings (SRK 2015).
- The following dissolved parameters were consistently reported at concentrations less than analytical detection limits in the seeps sampled in both sampling events: aluminium, antimony, arsenic, beryllium, bismuth, chromium, iron, phosphorous, silicon, tellurium, thorium, tin, titanium, tungsten, vanadium and zirconium. The low arsenic concentrations in the seepage is notable given the elevated concentrations of arsenic in the detoxification tailings and is consistent with trends observed from the HCT program for metallurgical detoxified tailings (SRK 2015).

Figures depicting time series of constituent concentrations and loads from the process plant tailings water discharge (TL-5) to the TIA are presented in Attachment 4 of Appendix D.

7 Conclusions

7.1 Quarry and Construction Rock

There were no active quarries in 2017 therefore there was no monitoring run-of-quarry rock in 2017. All quarry rock sourced for construction in 2017 was sourced from Quarry 2 and blasted in 2016.

The construction characterization program included samples collected from the tailings overflow catchment basins, the reagent pad, the explosive facility, the south apron at the airstrip and both of the edges of the TIA road. All construction rock was sourced from Quarry 2. The results of the quarry rock geochemistry investigation indicated that all of the samples collected for testing are non-PAG with low sulphur content (maximum 0.20%), appreciable TIC (73 to 150 kg $CaCO_3$/t) and elemental content below the screening criteria (less than 10 times the average crustal abundance for basaltic rocks). All results indicate the risk of ML/ARD from construction rock is low.

7.2 Waste Rock

Mining activities in 2017 resulted in the placement of approximately 146,977 tonnes of waste rock on Pad T, all of which was managed as mineralized waste rock. Approximately 3,060 t of waste rock from surface was placed as structural backfill in stopes of the Doris Mine in 2017. In 2017, mine development intersected waste rock geologically classified as mafic metavolcanics (1), diabase (11c) and late mafic dykes (10b). Late mafic dykes (10b) is a relatively minor rock unit comprising <1% of overall waste rock.

Sulfur concentrations for the mafic metavolcanics samples (1a) were uniformly low, ranging from 0.02 to 0.19% and with median levels of 0.13%. TIC ranged from 2.1 to 300 kg $CaCO_3$ eq/tonne, with 30% of samples having TIC levels less than 30 kg $CaCO_3$ eq/tonne. TIC levels are lower than expected given typical concentrations observed in basalt from the Doris area (P25 to P75 values between 167 to 339 kg $CaCO_3$ eq/tonne, SRK 2015b). Based on SRK's inspection of the waste rock stockpile, these samples are likely metavolcanics found along the contact with the diabase intrusion that has been altered (or hornfelsed) as a result of heat from the intrusion.

The majority of mafic metavolcanic samples (n=24) were classified as non-PAG. Four samples (13%) were classified as uncertain and two samples (7%) as PAG. The two samples classified as PAG had low levels of TIC (<5 kg $CaCO_3$ eq/tonne) and low levels of total sulphur contents of 0.14% and 0.16%. The diabase sample had a low sulphur (0.09%) and low TIC (14 kg $CaCO_3$ eq/tonne) content. The diabase sample was classified as non-PAG.

Trace element analyses on the solids indicated that concentrations of trace elements in volcanics (1a) and diabase (11c) materials were less than ten times the average crustal abundance for basalt.

7.3 Infrastructure and Waste Rock Seepage Monitoring

The results of the 2017 seep survey of the tailings overflow catchment basins, the reagent pad, the explosive facility, the south apron at the airstrip and both of the edges of the TIA road indicated that there are no major issues with respect to metal leaching and acid rock drainage in seepage associated with infrastructure at Hope Bay. Compared with seeps from infrastructure areas, and consistent with previous years, seepage from areas impacted by waste rock had elevated levels of chloride, nitrate and ammonia. The waste rock toe seepage samples were elevated in arsenic, copper, iron, nickel and selenium concentrations compared to screening criteria and/or historical data. The elevated concentrations may be due to the sample type (undiluted contact water) and the presence of ore in the stockpile that historically contained waste rock only. Continued monitoring will establish trends in parameter concentrations.

7.4 Flotation Tailings Slurry and Detoxified Tailings

TMAC initiated ore processing on January 20, 2017 with commencement of tailings monitoring in February 2017 in accordance to the water licence. Flotation tailings deposition in the Doris TIA commenced on January 20, 2017. In 2017, 199,488 t (dry weight) of flotation tailings were deposited in the TIA and 8,333 t of detoxified tailings were placed as backfill in Doris Mine underground stopes. The results of the geochemical monitoring program of flotation tailings solids (TL-6) and detoxified tailings (TL-7) are consistent with the geochemical characterization studies of metallurgical tailings (SRK 2015).

For flotation tailings, total sulphur levels were higher during the initial months of process plant operation (0.21 to 1%) owing to higher sulphide ore that was processed during that period and low sulphide recoveries in the concentrate line. Starting in June, sulphide removal was optimized resulting in flotation tailings with lower sulphur concentrations (<0.05 to 0.07%). Nine of the flotation tailings samples were classified as non-PAG and two as uncertain. The two samples classified as uncertain were from the early part of the year when sulphide recoveries were poorer

than expected. Furthermore, selected high sulphide samples had trace element content were above screening criteria (ten times the average crustal abundance for basalt) for arsenic and total sulphur. Trace element content for flotation tailings produced in May and after contained levels below the screening criteria. Therefore, previous conclusions regarding the ML/ARD potential of the flotation tailings remain unchanged.

For detoxified tailings, all samples were classified as PAG except for one that was classified as having an uncertain potential for ARD. Sulphur and TIC* content in the detoxified tailings ranged from 2.4 to 19% and 48 to 82 kg CaCO3/t, respectively. Rinse pH ranged from 7.9 to 8.4 indicating all samples were not acidic. Compared to ten times the average crustal abundance for basalt, 95th percentile concentrations are enriched in antimony, arsenic, bismuth, cadmium, copper, lead, selenium, silver, zinc and total sulphur.

There is no analytical method for cyanate and thiocyanate for solid-phase samples, as specified in the monitoring program for TL-7 in Schedule J (Table 2) of the Water Licence. WAD cyanide was also specified for TL-7 with levels below analytical detection with the exception of the samples in April (0.11 ppm). There is no regulatory limit for WAD cyanide in tailings. SRK suspects that the inclusion of cyanate, thiocyanate and WAD cyanide monitoring for the detoxified tailings solids (TL-7) may be a typographical error.

7.5 Seepage Monitoring of Backfilled Stopes

Two opportunistic seepage samples were collected in 2017 from the bottom of the east limb of the South and North stopes on level 4932 (TL-11).

Seepage pH was circum-neutral for both samples. Major anion chemistry was dominated by chloride (~48,000 mg/L) and to a lesser degree sulphate (900 mg/L), while major cation chemistry was dominated by calcium (~15,000 mg/L) and to a lesser degree sodium (~8,000 mg/L) and magnesium (1,100 mg/L). Potential sources of the major ions include residues on waste rock from drilling brines (calcium and chloride), other sources of saline water (chloride, sulphate, calcium, sodium and magnesium), and sulphide oxidation with associated carbonate dissolution from waste rock and detoxified tailings (sulphate and calcium).

Total and WAD cyanide concentrations in the seepage were 0.08 mg/L and 0.028 mg/L, respectively. The source of ammonia (280 and 390 mg/L), nitrate (590 mg/L) and nitrite (6.8 mg/L) is attributable to blast residues from waste rock. Both seepage samples exhibited leaching of cadmium, copper, nickel, selenium, silver and zinc consistent with trends observed from the humidity cell test (HCT) program for metallurgical detoxified tailings (SRK 2015). Notably, arsenic concentrations were consistently below detection in the seepage given the elevated concentrations of arsenic in the detoxification tailings – this is consistent with trends observed from the HCT program for metallurgical detoxified tailings (SRK 2015).

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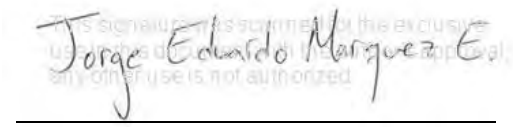

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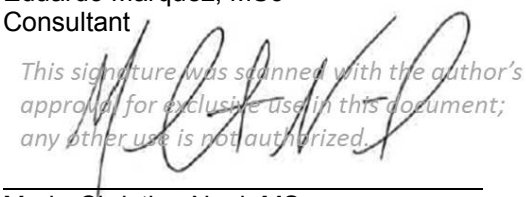

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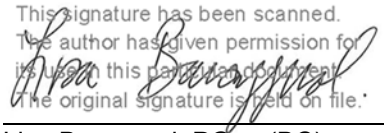

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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Appendix A – 2017 Geochemical Monitoring of Waste Rock, Doris Mine

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Memo

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From:	Eduardo Marquez, MSc Lisa Barazzuol, PGeo	**Project No:**	1CT022.016
Cc:	Oliver Curran, TMAC	**Date:**	March 21, 2018
Subject:	2017 Hope Bay Construction Rock Monitoring		

1 Introduction

Between mid-2016 and mid-2017, TMAC Resources Inc. constructed the following infrastructure at Doris: two tailings overflow catchments, a cyanide reagent pad and containment berm, extension of the tailings impoundment area (TIA) road towards the south, an apron at the airstrip southern expansion. There were no active quarries at Hope Bay in 2017 -- all construction rock used for these infrastructures was run-of-quarry (ROQ) rock blasted from Quarry 2 in 2016.

Prior to development, the rock from Quarry 2 was characterized geochemically (SRK 2008) and classified as not potentially acid generating with low potential for metal leaching. Subsequent characterization was carried out to confirm these results and assess the ARD potential of the fine fraction produced when this material is blasted during quarrying activities and post-construction.

Monitoring requirements for quarries and quarry rock associated with the Doris Mine and Doris-Windy Road are specified in Water Licence 2AM-DOH1323 Amendment No. 1 (Nunavut Water Board 2016), Water Licence 2BE-HOP1222 (Nunavut Water Board 2012), and Framework Agreement signed between TMAC and the Kitikmeot Inuit Association (KIA) for belt wide land tenure. Details on how the requirements are implemented for quarries and quarry rock associated with the Doris-Windy Road are provided in the Quarry Management and Monitoring Plan (TMAC 2017). This Plan is structured in a manner such that one document pertaining to quarrying is approved and implemented across all TMAC Hope Bay Project sites, while still addressing site and licence-specific needs.

This memo documents the results of the 2017 quarry rock characterization and monitoring program. As there were no active quarries in 2017, monitoring (geological mapping of quarry faces or geochemical characterization) was not required for ROQ rock. Accordingly, this memo presents the results of the construction monitoring program.

2 Methods

2.1 Construction Monitoring, Sampling and Analysis

Between mid-2016 and mid-2017, TMAC used 2016 ROQ rock from Quarry 2 to extend the TIA road and construct infrastructure around the TIA and the airstrip. These areas were visually inspected by an SRK geochemist in August 2017 by walking the perimeter of the overflow catchment basins, the reagent pad, the explosive facility and the south apron at the airstrip as well as walking along both of the edges of the TIA road. Nine surface rock samples and one field duplicate (17-QR-09) were collected from the surface material in the areas inspected (see Attachment A). Sample 17-QR-10 was taken from the explosives facility pad, which was previously referred to as the Quarry 3 pad, surveyed in 2016 and documented in SRK (2017). The data for 17-QR-10 have been included for completeness. Photos of the inspected areas and sampling locations are included in Attachment B.

The samples collected from pre-determined locations with at a minimum, one sample was taken from each facility inspected or every 500m along the TIA road. SRK visually described the samples, including lithology, visible sulphide content and veining (see Attachment C). At each sampling site a bulk sample and sieved split (-2 mm) were collected separately. SRK also conducted contact tests with a 1 to 1 distilled water to solids ratio and using a split of the -2 mm sieved portion of each sample. The pH and EC of the contact test leachates were recorded.

All samples were shipped to Maxxam Analytics for preparation and analysis. The bulk samples were sieved to -1 cm by the lab and submitted for total sulphur by Leco. All -1 cm samples contained total sulphur concentrations >0.1% and were submitted for full ABA and trace element content, including paste pH, sulphate-sulphur by hydrochloric acid leach, Modified Sobek NP (MEND 1991) and total inorganic carbon (TIC). Trace element content was determined by aqua regia digestion followed by an ICP-MS scan. TIC was determined by using a Leco furnace to directly measure CO_2 gas evolved from HCl treatment of the sample.

Four samples were selected by SRK for SFE testing based on rinse EC data. SRK selected samples with the highest rinse EC values from each area inspected. The SFEs were carried out on the -2 mm samples as per the MEND (2009) method with a 3:1 solid to solution ratio and a 24 hour shaking period. The SFE leachate was analyzed for pH, EC, total dissolved solids (TDS), SO_4, alkalinity, acidity, chloride, ammonia, NO_3, NO_2 and trace elements by ICP-MS (including Hg by ICP-MS). Geochemical analyses were coordinated by SRK.

2.2 Quality Assurance and Control

All hand-held meters (EC, pH) were calibrated prior to taking measurements. The rinse tests were carried out using deionized water. Rinse test results for the field duplicates had an RPD ranging from 0 to 6.7%, indicating good reproducibility.

All laboratory results passed Maxxam's QA/QC criteria including the use of duplicate measurements and reference material. All results were reviewed by SRK for quality assurance. Standards were checked and were within tolerance ranges. Ion balances were calculated and were within an acceptable range. All results were deemed acceptable.

QA/QC samples for the ABA and element analysis data included one set of field duplicates sampled by SRK (17-QR-08 and 17-QR-09) and two pulp duplicates were generated by the lab (17-QR-05 and 17-QR-07). Relative percent differences (RPD) were calculated to assess reproducibility of results. RPDs for the ABA results of the lab and field duplicates ranged from 0 to 9.5% and from 0 to 17%, respectively, indicating good reproducibility of sampling and analytical methods. For the duplicate element concentrations, less than 10% of the parameters with concentrations above analytical uncertainty (10 times the detection limit) had RPD values greater than 30%, also indicating good reproducibility.

One split duplicate of 17-QR-07 was generated by the lab for QA/QC of shake flask extraction results. For this sample, less than 10% of the trace metal concentrations that were above analytical uncertainty (10 times the detection limit) had RPD percentages greater than 30%, indicating good reproducibility of results for most parameters. In addition, replicate analysis on the leachate was carried out on a select number of parameters. The replicate results indicated good reproducibility of analytical measurements.

3 Results

3.1 Visual Inspection

Typical rock from Quarry 2 is grey-green mafic metavolcanics with trace to no visible sulphides and carbonate alteration/veins. The majority of inspected areas met these expectations. Other observed geological features are described as follows:

- Rock from all inspected areas contained K-feldspar associated with quartz-carbonate veins that were typically a few centimeters wide and between 5 and 15 cm long. This rock was also observed in the airstrip during the 2016 inspection (SRK 2017). Hematite was also observed on rock from all areas.
- The cyanide reagent pad contained localized areas of metavolcanics with epidote veins (typically a few centimeters wide and around 10 cm long) and rare quartz veining (one fragment up to 10 cm wide).
- The extension of the TIA road contained occurrences of metavolcanics containing disseminated pyrite and pyrite stringers (in <5% of the surveyed rock) in localized areas on the eastern edge between 17-QR-06 and 17-QR-07, as well as on the western edge close to 17-QR-05. Visual estimates of sulphide content in these localized areas reached up to a few percent sulphide. Moreover, epidote veins were encountered on both sides of the road (up to a few cm thick and 20 cm long). Overall, visual sulphide estimates were low to non-visible in the rock along the TIA road.

Consistent with the inspection conducted in 2016 (SRK 2017), the explosives facility pad (referred to as Quarry 3 pad in 2016) contained metavolcanics with rare epidote veins (a few centimeters thick and around 10 cm long) and/or rare vein quartz (5 to 10 cm thick) with minor occurrences (<5%) of pale cream metavolcanics which SRK understands are altered metavolcanics.

3.2 Static Testing

The ABA results for the -1 cm fraction are presented in Table 1 and Attachment C. Total sulphur ranged from 0.11 to 0.20%. Low sulphate content was detected for all samples (0.02 to 0.05% as S) indicating sulphide-sulphur was the dominant sulphur species (Figure 1). Given the low sulphate-sulphur values in these samples, AP was calculated from total sulphur rather than sulphide-sulphur for the interpretation of the results.

Modified NP and TIC levels ranged from 91 to 160 kg $CaCO_3$/t and 73 to 150 kg $CaCO_3$/t, respectively. Modified NP values were consistently greater than TIC, indicating the occurrence of silicates measured by the NP method. All samples were classified as non-PAG on the basis of both TIC/AP and NP/AP (Table 1, Figure 3, Figure 4).

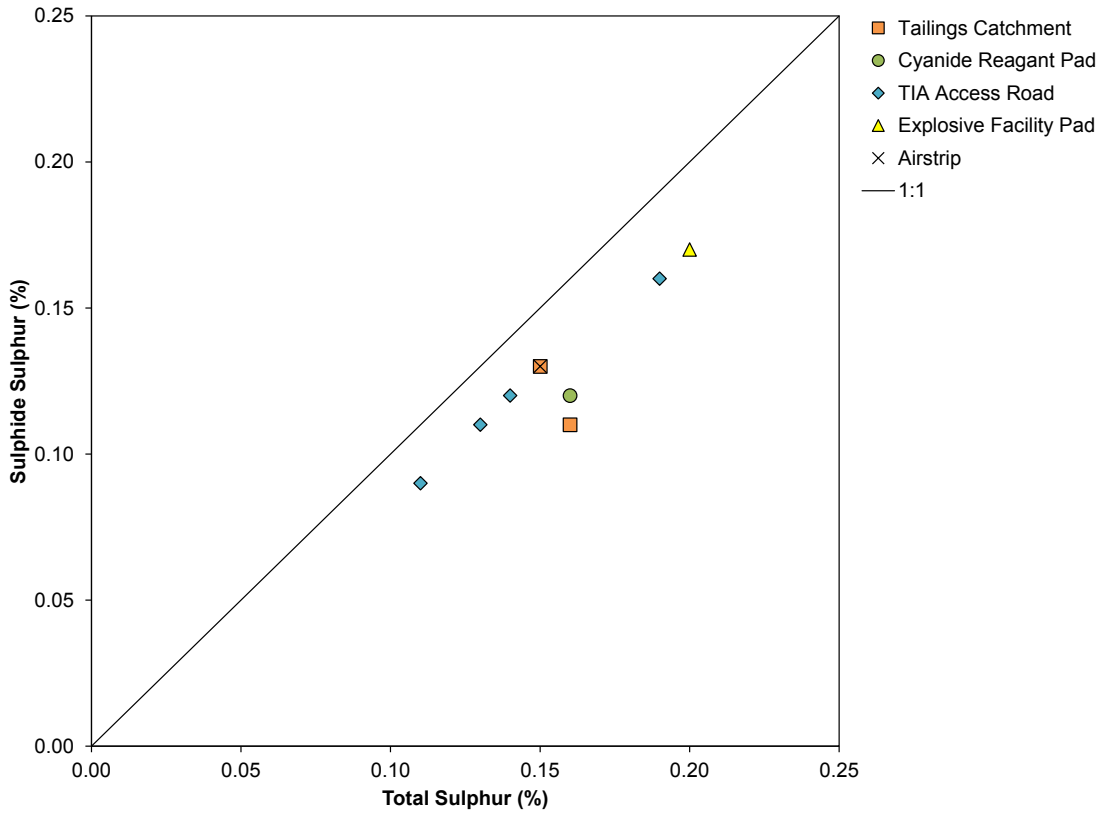


Figure 1: Total Sulphur vs. Calculated Sulphide Sulphur

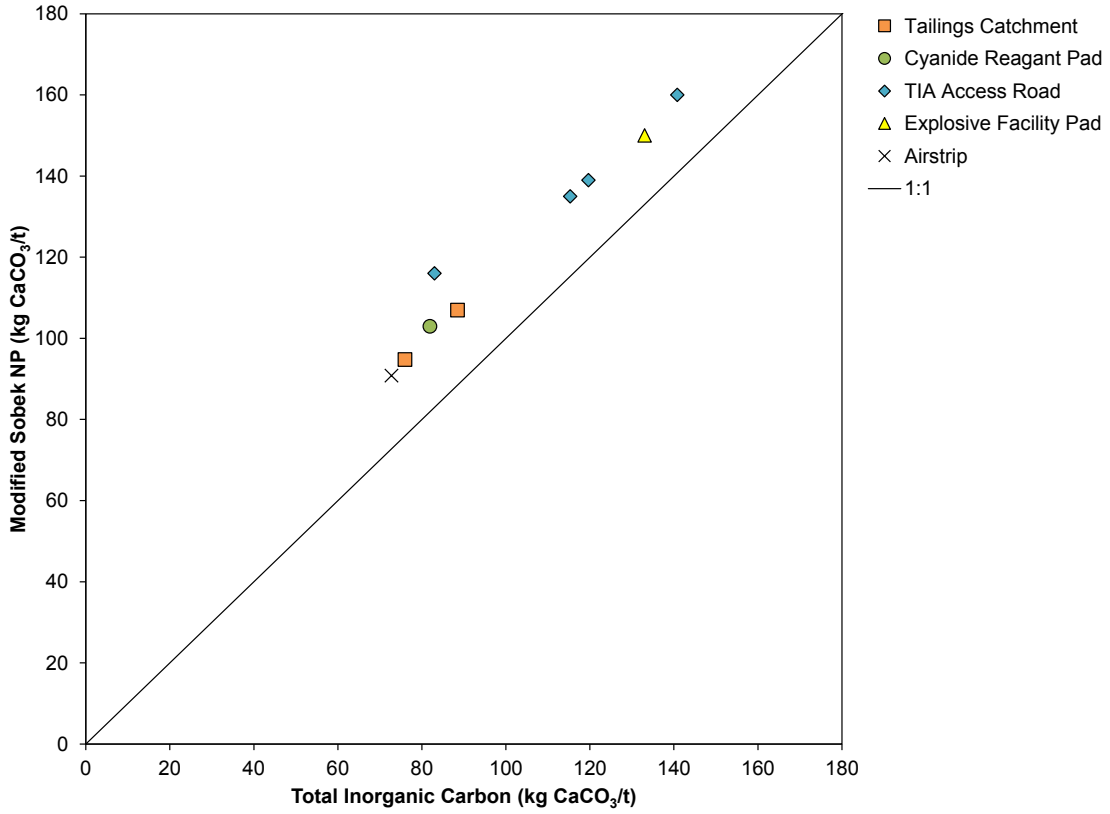


Figure 2: Total Inorganic Carbon vs. Modified Sobek NP

Table 1: Acid Base Accounting Results for the 2017 Construction Rock Samples (-1 cm fraction)

Area	SRK ID	Paste pH	Total S	Sulphate Sulphur	AP	TIC	Mod. Sobek NP	TIC/AP	NP/AP
		pH Units	wt%	wt%	Kg CaCO3/T	Kg CaCO3/T	Kg CaCO3/T		
Airstrip	17-QR-01	8.5	0.15	0.020	4.7	73	91	16	19
Tailings Catchment	17-QR-02	8.5	0.15	0.020	4.7	88	110	19	23
	17-QR-03	8.7	0.16	0.050	5	76	95	15	19
Cyanide Reagant Pad	17-QR-04	8.7	0.16	0.040	5	82	100	16	21
TIA Road	17-QR-05	8.5	0.19	0.030	5.9	140	160	24	27
	17-QR-06	8.6	0.11	0.020	3.4	120	140	35	40
	17-QR-07	8.6	0.14	0.020	4.4	83	120	19	27
	17-QR-08	8.6	0.13	0.020	4.1	120	140	28	33
Explosive Facility Pad	17-QR-10	8.7	0.20	0.030	6.3	130	150	21	24

Source \\van-svr0\projects\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\A_Quarry&Road_Monitoring\25_2016 Road_Pad_Monitoring\4. Working file\[2016_HB_SolidSampling_1CT022.009_JEM_Rev01.xlsx]

Notes:

AP is acid generation potential, calculated from Total Sulphur

NP is neutralization potential

Sulphide Sulphur calculated from the difference of Total Sulphur and Sulphate Sulphur

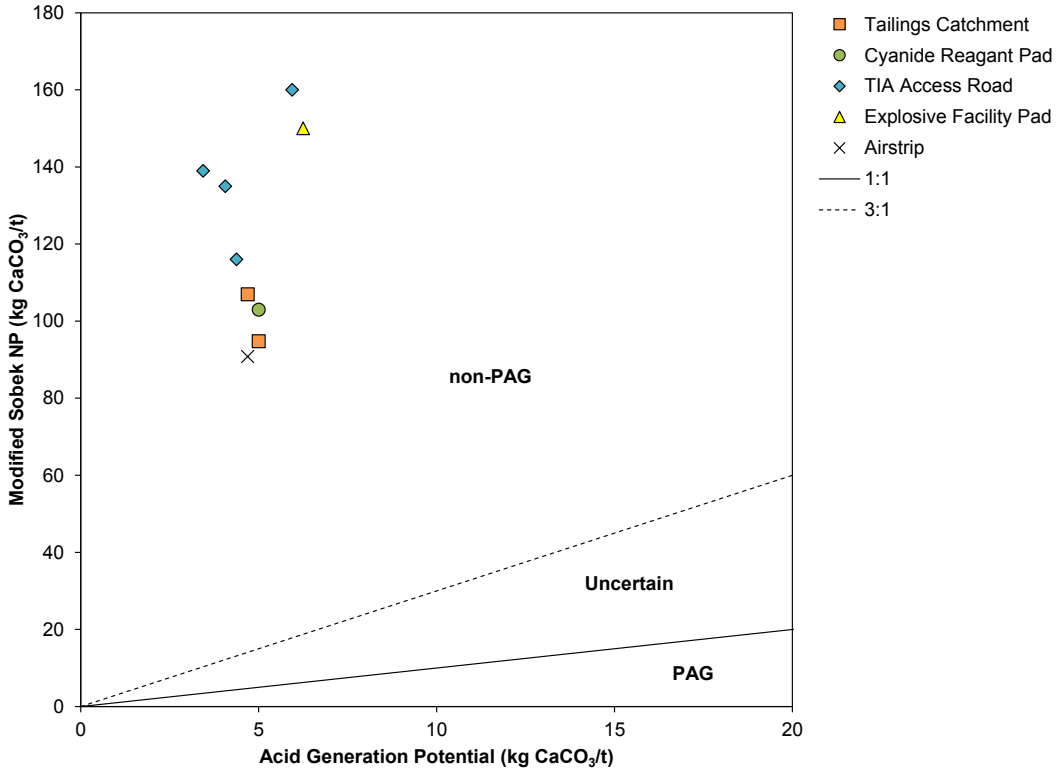


Figure 3: ARD Classification by NP/AP

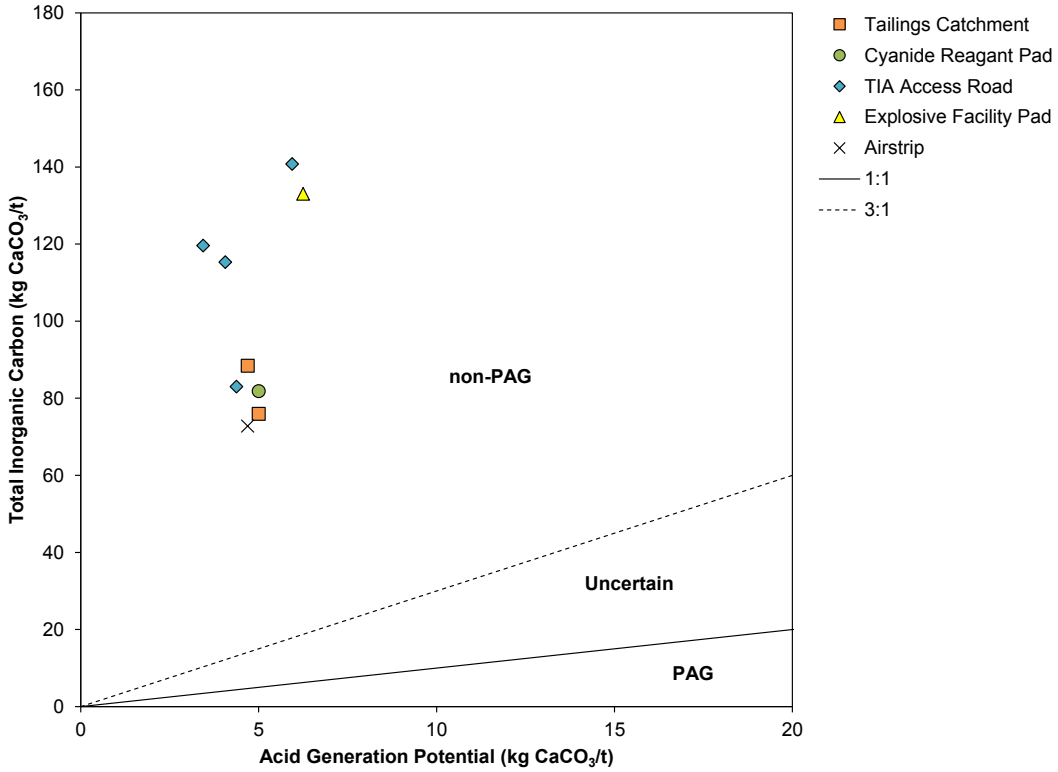


Figure 4: ARD Classification by TIC/AP

3.3 Elemental Analysis

Results of the elemental analysis are provided in Attachment C. Selected results are provided in Table 2.

The data were compared to ten times the average crustal abundance for basaltic rocks (Price 1997) as a method of screening samples with elevated trace element content. Selenium could not be adequately assessed because the detection limits were high in comparison to these screening criteria. All parameters were not elevated compared to these screening criteria indicating no appreciable enrichment.

Table 2: Summary of Element Analysis for the 2017 Construction Rock Samples (-1 cm fraction)

Parameter	Unit	*Screening Criteria**	Airstrip	Tailings Catchment		Cyanide Reagant Pad	TIA Road				Explosive Facility Pad
			17-QR-01	17-QR-02	17-QR-03	17-QR-04	17-QR-05	17-QR-06	17-QR-07	17-QR-08	17-QR-10
Mo	ppm	*15*	0.6	0.4	0.3	0.4	0.3	0.3	0.4	0.3	0.3
Cu	ppm	*870*	180	140	150	140	150	160	140	140	140
Pb	ppm	*60*	1.8	2.2	1.9	1.6	3.4	3.6	2.4	2.2	3.3
Zn	ppm	*1100*	63	87	84	92	87	83	72	72	91
Ni	ppm	*1300*	56	62	59	53	62	67	58	75	72
Fe	%	*87*	5	5.5	5.6	6.7	5.9	5.6	5.3	5.8	6.1
As	ppm	*20*	6.6	4.2	4.8	4.2	4.1	3.9	3.9	6.2	6.1
Au	ppb	*40*	5.8	5.1	16	27	4.8	7.8	5.2	4.6	6.7
Cd	ppm	*2.2*	<0.1	0.2	0.1	<0.1	0.2	0.1	0.2	0.1	0.2
B	ppm	*50*	<20	<20	<20	<20	<20	<20	<20	<20	<20
Al	%	*78*	2.6	3	2.8	3.2	3.3	3.1	2.8	3.3	3.4
Hg	ppm	*0.9*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tl	ppm	*2.1*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Se	ppm	*0.5*	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	0.7	<0.5	0.7

Notes:

* Screening criteria corresponds to 10 times the average crustal abundance for basaltic rocks as per Price (1997)

All values have been rounded to two significant figures

Indicates that value exceeds the screening criteria

3.4 Contact Test Results

Rinse EC for the -2 mm fraction ranged from 150 to 560 µS/cm while pH values ranged from 8.8 to 9.2 (Table 3). The pH ranged from 8.8 to 9.2 indicating alkaline pH.

Table 3: Rinse Test Results for 2017 Construction Rock Samples (-2 mm fraction)

Area	Sample ID	Rinse pH s.u.	Rinse EC µS/cm
Airstrip	17-QR-01	9.2	460
Tailings Catchment	17-QR-02	9	560
	17-QR-03	8.9	410
Cyanide Reagant Pad	17-QR-04	9	410
TIA Road	17-QR-05	8.9	390
	17-QR-06	8.8	230
	17-QR-07	8.8	390
	17-QR-08	9	280
Explosive Facility Pad	17-QR-10	9.1	150

Source: \\van-svr0\projects\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\A_Quarry&Road_Monitoring\25_2016 Road_Pad_Monitoring\4. Working file\[2016_HB_SolidSampling_1CT022.009_JEM_Rev01.xlsx]

3.5 Shake Flask Extraction Tests

Shake flask extraction tests were conducted on the -2 mm fraction for four samples. The SFE results are summarized in Table 4.

All SFE tests had alkaline pH values ranging from 8.0 to 9.5. The highest pH value was observed for the sample taken at the south apron of the airstrip. Conductivity was comparable for all samples and consistently lower than the rinse EC values, ranging from 150 to 180 µS/cm. Major cation chemistry was dominated by sodium and calcium, while major anion chemistry was dominated by alkalinity and chloride. Nitrate, which is a residue of ammonia-based explosives, ranged from 0.8 to 2.0 mg/L.

SFE results were compared to ten times the CCME guidelines for the protection of aquatic life (CCME 2014) as screening criteria to evaluate parameters that were elevated in the test leachate. The pH from sample 17-QR-01, taken at the airstrip, exceeded the maximum guideline values. All other parameters were below their respective screening criteria.

Due to the high water to rock ratio, SFE tests are considered dilute and concentrations of contact water may be higher than those in the test leachates. However, results indicate that the potential for metal leaching from these samples is low.

Table 4: Shake Flask Extraction results for 2017 Construction Rock Samples (-2 mm fraction)

°Parameter	Unit	*Screening Criteria	17-QR-01	17-QR-02	17-QR-04	17-QR-07
			Airstrip	Tailings Catchment	Cyanide Reagant Pad	TIA Road
pH	pH Units	6.5-9	**9.5**	9.1	8	8.5
EC	µS/cm	-	150	150	180	180
TDS	mg/L	-	74	82	100	96
Total Hardness	mg $CaCO_3$/L	-	19	22	32	41
Total Alkalinity	mg/L	-	30	26	25	32
SO_4	mg/L	-	16	20	29	26
Cl	mg/L	1200	14	10	12	11
Nitrate-N	mg/L	30	0.8	0.9	2	1.7
Total Ammonia**	mg/L	1.4	0.16	0.12	0.01	<0.005
Al	mg/L	1.0	0.32	0.25	0.28	0.26
As	mg/L	0.05	0.0011	0.0014	0.0013	0.00094
Cd***	mg/L	0.60	0.000038	<0.000005	<0.000005	<0.000005
Cu***	mg/L	0.02	0.0041	0.00086	0.0015	0.002
Fe	mg/L	3.0	0.025	0.0031	0.066	0.0039
Hg	mg/L	0.00026	<0.00005	<0.00005	<0.00005	<0.00005
Mo	mg/L	0.07	0.0034	0.0035	0.0045	0.003
Ni***	mg/L	0.25	0.00014	0.0001	0.000079	0.000079
Pb	mg/L	0.01	0.000063	0.000014	0.00006	0.000038
Sb	mg/L	-	0.00026	0.00022	0.00007	0.00016
Se	mg/L	0.01	0.0007	0.00066	0.00056	0.00052
Tl	mg/L	0.008	0.000003	0.000004	0.000003	0.000003
Zn	mg/L	0.30	0.00025	<0.0001	0.00019	<0.0001

Source: \\van-svr0\projects\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\A_Quarry&Road_Monitoring\25_2016 Road_Pad_Monitoring\4. Working file\[2016_HB_SolidSampling_1CT022.009_JEM_Rev01.xlsx]

Notes:

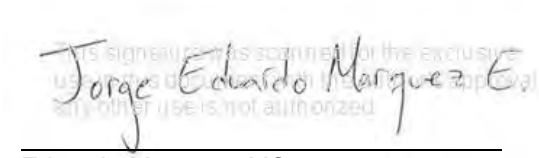
°All element concentrations are given as dissolved
*Comparisons to ten times the CCME water quality guidelines for the protection of aquatic life (freshwater; long term) are intended for screening purposes and are not directly applicable because SFE tests do not represent natural waters.
Values in bold indicates value exceeds respective water quality guideline for the parameter.
**Guideline for ammonia is pH and temperature dependent. Standard room temperature (20ºC) was used given laboratory conditions and average pH of 8.8 for all SFE samples. This guideline value is approximate.
***Guideline calculated based on the average hardness of the SFE samples of 29 mg CaCO3 mg/L

4 Conclusions

There were no active quarries in 2017 therefore only construction rock monitoring was required and conducted in 2017. The results of the construction rock monitoring program indicate that all the samples collected and submitted for testing are non-PAG and non-acidic. Elemental analyses indicates no appreciable enrichment compared to average crustal abundance for basaltic rocks. Shake flask extraction results were consistent for all samples with dissolved constituents being low and within the screening criteria. All results indicate the risk of ML/ARD from construction rock is low.

SRK Consulting (Canada) Inc.

Prepared by:



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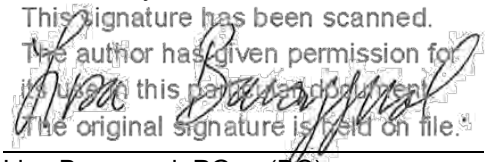

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Attachment A – Maps of 2017 Construction Rock Sampling Locations