Appendix 11

Tailings Impoundment Area — Excess Water Transfer System (Hatch, September 2011)

Project Memo

20 September, 2011

TO:	Chris Hanks, Director, Environment and Social Responsibility	FROM:	Bruce Rustad, Project Manager, Hatch
cc:	Deborah Muggli, Bill Patterson, Christine Kowbel,		Kevin Mather Bob Prince-Wright

Newmont Mining Corporation
Hope Bay Project

Tailings Impoundment Area - Excess Water Transfer System

Uyagaktaqnikut Kuvugaqvia Hiamaktailivik – Imaq Amiakuq Nuktigautai Havagutit – Nainaqhimayut

Tamna uyagakhiuvik imaqtai halumailtut tallimanik ilalgit:

1. Havikhaliuqvikmit Uyagaktaqnikut halumaqtipagiktauvaktut ahivaqtiqninut zinc (ilagiya tahaphuma hannaviup pityuhia);
2. Huplu apqutigiya tahaphuma halumaqtiqhimayuq uyagaktaqnikuq pakpagauyuq talvangat hanaviuyumit talvunga TIA-nganut;
3. Huplu apqutauyuq imaq amiakuq pakpagauyuq talvanga TIA-nga talvunga kinguliqpamut kuvipkagauvianut halumaqtiqvikmut (inilik haniani taphuma hannaviup);
4. Kinguliqpamik kuvipkagaunia halumaqtiqvikmut ahivaqtigauyut puktalaqtut naptuni talvanga amiakut TIA-nga imaqtanit; tamnalu
5. Huplu apqutauyuq halumaqtiqhimayuq TIA-nga imaq kuvipkagauyuq tahamunga tagiup natqanut akuttigakhaunia inilik talvani Roberts Bay-mi.

Tapkuat uyagakhiuqvikmi havakvikmit imaq aulataunia havagutit hanatyuhikhaliuqhimayuq atuqpiaquplugu tapkuat piniagahugiyauni qanugitni tahapkuat amiakut imait talvanga TIA-nga kuvipkagaunianut tahamunga avatigiyauyumut tahamani Roberts Bay-mi, atuqtai tamaita maligaqnut kiklikhat taimaittumiklu pilaittut angipyaktumik aktuani tahaphuma tagiuqmi uumayuvaluit uumatyutai.

ᐊᒃᑕᑯᑕᓕᒃ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓂᐅᑉ ᐃᓂᖓ – ᐃᒪᖅᑲᓗᐊᕇᒃᑯᑖ – ᑐᓴᒐᒃᓴᑦ ᓇᐃᓈᖅᓯᒪᔪᑦ

ᐅᔭᕋᒃᓴᖅᓯᐅᖅᕕᒥ ᐊᒃᑕᑯᖅᑲᐅᑎᐅᑉ ᐃᓂᖓ ᑕᑦᓕᒪᓂᒃ ᐃᓗᓕᓕᒃ:

1. ᓴᓇᕕᐅᖅᑲᑦᑕᖅᑐᒥ ᐅᔭᖅᑲᓂᒃ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓂᖅᑲᐅᑦ ᐊᒃᑕᑯᑕᓕᒃ ᓯᕗᖅᖓᒍᑦ ᑕᒡᕗᖕᖔᔭᐅᓚᐅᖕᖏᓐᓂᖕᖏᓐᓂ ᓴᓗᒻᒪᒃᓴᖅᑕᐅᓃᑦ ᐋᔭᖅᑕᐅᓃᖕᒍᒻᒪᑕ ᓴᕕᕋᔭᒃᓴᔭᐃᑦ (ᑕᒪᒃᑯᐊ ᐃᓚᖏᔭᐅᒻᒪᑕ ᐅᔭᖅᑭᓇᕕᖕᒥ ᐱᓕᕆᔾᔪᑎᖏᑦ);

2. ᓱᑦᑐᓖᑦ ᐊᖅᑯᑎᖕᒋᑦ ᓴᓗᒻᒪᒃᓴᖅᑕᐅᕙᒃᑐᑦ ᐊᒃᑕᑯᑦ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓃᑦ ᒥᑦᑐᐊᖅᑕᐅᕙᒃᑐᑦ ᐊᒃᑕᑯᖅᑲᐅᒻᒨᖅᑕᐅᓃᑦ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓂᖅᑕᓕᐅᑉ ᐃᓂᖓᓅᖅᑲᖅᑕᐅᓪᓗᑎᒃ;

3. ᓱᑦᑐᓖᑦ ᐊᖅᑯᑎᖕᒋᑦᑎᒍᑦ ᐃᒪᖅᑲᓗᐊᖅᓂᐊᖕᒋᒻᒪᑦ ᒥᑦᑐᐊᖅᑕᐅᕙᒃᑐᖅ ᐅᕙᖕᖓᑦ ᐊᒃᑕᑯᖅᑲᐅᒻᒥᒃ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓂᖅᑕᓕᖕᒥᒃ ᑎᑭᐅᑎᓲᑦ ᑭᖑᓪᓕᖅᐹᓗᑦ ᑰᒃᑐᒃᑯᑦ ᓴᓗᒻᒪᓴᖅᑕᑦ (ᓴᓂᐊᓃᑦᑐᓗᑦ ᐅᔭᕋᒃᓴᓕᕕᐅᑉ);

4. ᑭᖑᓪᓕᖅᐹᖅ ᑰᒃᑎᑦᓯᕕᐅᓪᓗᓂ ᓴᓗᒻᒪᒃᓴᐃᒍᑦ ᐋᔭᐃᓲᖅ ᐃᓚᒍᑕᖅᓂᖅ ᑭᕕᒪᖕᒋᑦᑐᓂᒃ ᓯᑎᕚᑎᓂᒃ ᐃᒪᖅᑲᓗᐊᖅᑎᑦᑐᒍ ᐊᒃᑕᑯᖅᑲᐅᑦ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓂᖅᑕᓕᐅᑉ ᐃᒪᖓ;

5. ᓱᑦᑐᓕᒃᑯᑦ ᓴᓗᒻᒪᓴᖅᓯᒪᔭᖅ ᐊᒃᑕᑯᖅᑲᐅᑦ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓂᖅᑕᓕᐅᑉ ᐃᒪᖓ ᑰᓲᖅ ᐃᒪᐅᑉ ᐃᖅᑲᖓᒍᑦ ᓴᓇᒦᒃᑎᓕᖕᒍᑦ ᑲᕙᓯᓕᖅᑰᑉ ᐃᒪᖓᓄᑦ.

ᐅᔭᕋᓐᓂᐊᖅᕕᖕᒥ ᐃᒪᖅᑲᕈᑦ ᓴᓇᔭᐅᓯᒪᕗᖅ ᑕᑕᓗᐊᕇᒃᑯᑎᖅᑲᒻᒪᑦ ᐃᒥᖅᒥᒃ ᐃᑲᖕᖔᖕᖓᔪᒥᒃ ᐊᒃᑕᑯᖅᑲᐅᒻᒥᒃ ᐅᔭᕋᒃᓴᓕᕆᔾᔪᑎᒥᓂᖅᑕᓕᖕᒥᒃ ᑰᒃᑐᒥᒃ ᑐᕌᑦᑐᒥᒃ ᑰᓪᕕᐅᔫᒫᖅᓂᐊᖅᑐᒍᑦ ᑲᕙᓯᓕᖅᑰᑉ ᐃᒪᖓᓄᑦ, ᑕᒪᒃᑯᐊ ᐃᓘᓐᓇᑎᒃ ᒪᓕᖅᑲᑦᑕᖅᑐᑦ ᒪᓕᒃᑕᐅᒋᐊᓕᒃᑎᒍᑦ ᐱᖅᑯᔭᓕᕆᔾᔪᑎᒃᑯᑦ ᑭᓪᓕᖅᑲᓇᐊᖅᑲᒻᒪᑕ ᐊᑑᑕᐅᔪᑦ ᐊᒻᒪᓗ ᓱᖅᑲᐃᒋᐊᖅᑲᖕᒋᒻᒪᑕ ᐊᒃᑐᐃᒍᑎᒃ ᐃᒪᖅᒥᐅᑕᖅᑕᓕᖕᓂᒃ.

1. Introduction

This memo is written to advise of the preferred engineering solution for the Tailings Impoundment Area (TIA) excess water management transfer system. This system has five components:

1. Mill processing plant Tailings pre-treatment to remove zinc (part of the plant process);
2. A pipeline through which treated tailings are pumped from the process plant to the TIA;
3. A pipeline through which excess water is pumped from the TIA to a final discharge treatment plant (located beside the process plant);
4. A final treatment plant that removes suspended solids from the excess TIA water; and
5. A pipeline through which treated TIA water is discharged to a subsea diffuser located in Roberts Bay.

The minesite water management system was designed to ensure that the predicted quality of the excess water from the TIA discharging into the receiving environment of Roberts Bay, meets all regulatory limits and hence will not significantly impact the marine aquatic ecosystem.

This memo provides a technical summary of the five components. The diffuser system to be installed in Roberts Bay is described in detail in two separate reports prepared by Rescan (*"Roberts Bay Report: A Supporting Document for the Water Licence Amendment Package No. 3"* and *"No Net Loss Plan for the Roberts Bay Subsea Pipeline and Diffuser"*). This memo only summarizes the characteristics of the outfall pipeline.

The TIA water management system was designed to ensure that the treated TIA water that is discharged to the receiving environment of Roberts Bay meets all regulatory limits and hence will not significantly impact any component of the marine aquatic ecosystem. The discharge criteria for the treated TIA water are listed in Tables 4-1 and 4-2 of the water balance modelling report prepared by SRK Consultants ("*Water Quality Model, Hope Bay Project, Nunavut, Canada*").

This memo describes Newmont's preliminary design for TIA water management. Newmont will periodically monitor the water quality in the TIA during the first few years and revise as appropriate any treatment scheme implemented during the initial construction phase.

2. Tailings Water Management Planning

These five components were based on a site water management plan that has taken into consideration all aspects of site water management. The plan incorporates water recycle, fresh water make up, proper effluent disposal, and energy conservation to minimize the impact to the local environment. The plan is supported by a water balance model that predicts TIA discharge water quality.

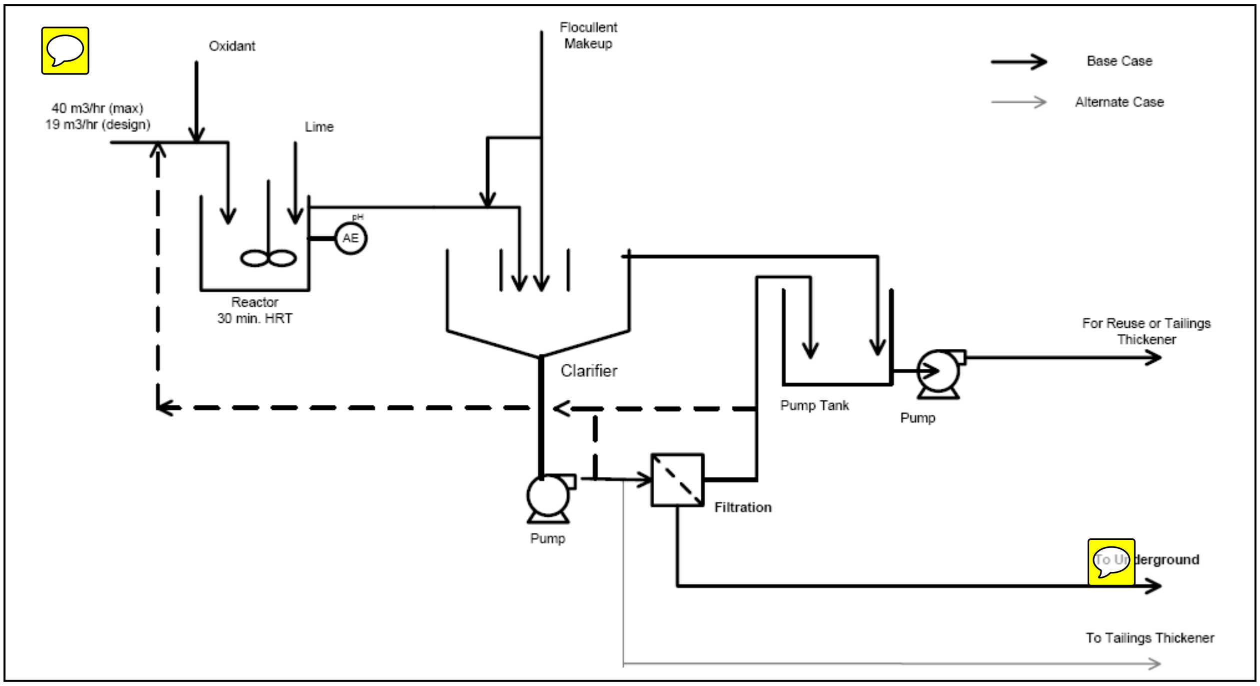
Although all efforts will be made to recycle as much of the process water from inside the milling/grinding and gold recovery areas of the plant as possible, a portion of the process water will leave with the tailings as a slurry to be deposited in the TIA.

The water and overall mass balance will be managed inside the process facility using recycle water through the use of thickeners etc. to reduce the amount of water being pumped from the mill to the TIA. All efforts will be made to select the optimum balance between recycle, process effluent treatment and fresh water make up to balance metals and other contaminants within the plant. Make up water from Doris Lake will continue to be used to offset the water consumed in the process.

Excess water from the TIA will need to start being pumped out of the TIA within two years of mill operation. This excess water will be pumped from the impoundment via pumps to a treatment plant, located at the Doris Camp site, where the water will be treated to meet the discharge standards. The line pressure will then be boosted inside the water treatment facility, via centrifugal pump, to allow the treated water to transfer the 5 km to Roberts Bay for discharge via the subsea outfall and diffuser system.

3. Tailings Pre-treatment

The expected water quality in the TIA, based on modeling by SRK, indicates that treatment to remove one or more metals is required prior to discharge of process water to the TIA. Zinc is the main metal of concern because it is used as a dosing agent in the Merrill-Crowe process, but copper and cadmium are also metals of concern. The following flow sheet and process description provides the details for an effluent treatment plant (ETP) for removal of zinc from the mill effluent. The process for zinc removal will also remove other metals such as copper, if required.



Summary of the mill effluent water quality suggests that only zinc will require treatment prior to discharging the tailings to the TIA. The water quality model assumed a zinc concentration of 0.5 mg/L following lime pre-treatment and that is the target for the ETP. The following is a description of the process and includes a secondary process that is necessary until it can be determined that the zinc hydroxide precipitate produced does not re-solubilise back into solution as the pH drops to near neutral during initial plant operation.

A portion of the mill effluent, specifically the cyanide detoxified barren (so-called because the cyanide has been destroyed and the gold has been extracted), will be directed to the primary pH adjustment tank and potassium permanganate will be injected with an in-line mixer in order that any complexes formed between the cyanide and zinc are eliminated. Provision will be made to inject additional reagents prior to the lime tank if other metals besides zinc need to be controlled, such as cadmium or copper introduced through Merrill-Crowe and cyanide detoxification. The pH of the reactor is critical to the precipitation of the zinc hydroxide as it is amphoteric in nature. This means it will readily dissolve in a dilute solution of a strong acid, and also in a solution of an alkali such as sodium hydroxide. To minimize the zinc in solution the optimal pH must be adjusted in the field, however, it is anticipated based on test work to be around 10 – 10.5. A lime solution will be fed to the agitated primary pH adjustment tank to increase the pH of the solution. The reactor will be sized for a 30 minute retention and will then be directed by gravity to a clarifier where flocculent will be added to enhance liquid-solid separation. The settled solids will be periodically pumped through a bag filter or a recessed plate filter to collect the precipitate, while the filtrate will be recycled back to the primary pH adjustment tank, if necessary. Provisions will be in place to recycle the underflow solids as required to the primary pH adjustment tank to aid in producing denser floc. Tailings will be transported from the plant site to the TIA and deposited during both summer and winter months.

If future investigation reveals that the zinc will not become soluble again at the pH anticipated in the tailings thickener, then the clarifier underflow filtration process could be eliminated. The clarifier underflow will then report to the tailings thickener for final solids liquid separation prior to TIA disposal.

4. Mill Tailings Pipeline to the TIA

The mill processing plant waste streams will be combined into a tailing thickener where the overflow water will be reused in the process and the underflow will be transferred to a tails box and pumped to the TIA through a double-walled pipeline. The pipeline will be equipped with heat tracing, insulation and low point drains to HDPE containment and recovery tanks.

The pressure required to overcome the friction and head requires that the initial 1.1 km section of the line be rubber lined carbon steel. After 1.1 km, the piping material will be changed to HDPE.

The piping will be routed the most convenient way across the plant-site and then follow the tailings road to the TIA. The pipeline route has been designed to minimize low points. Two low point drainage points have been designed to accommodate the pipeline contents in the event of an emergency. The low point drains will transfer the pipeline contents into a HDPE containment / recovery tanks. The tailing will be discharged into the TIA in accordance with the SRK tailings deposition plan.

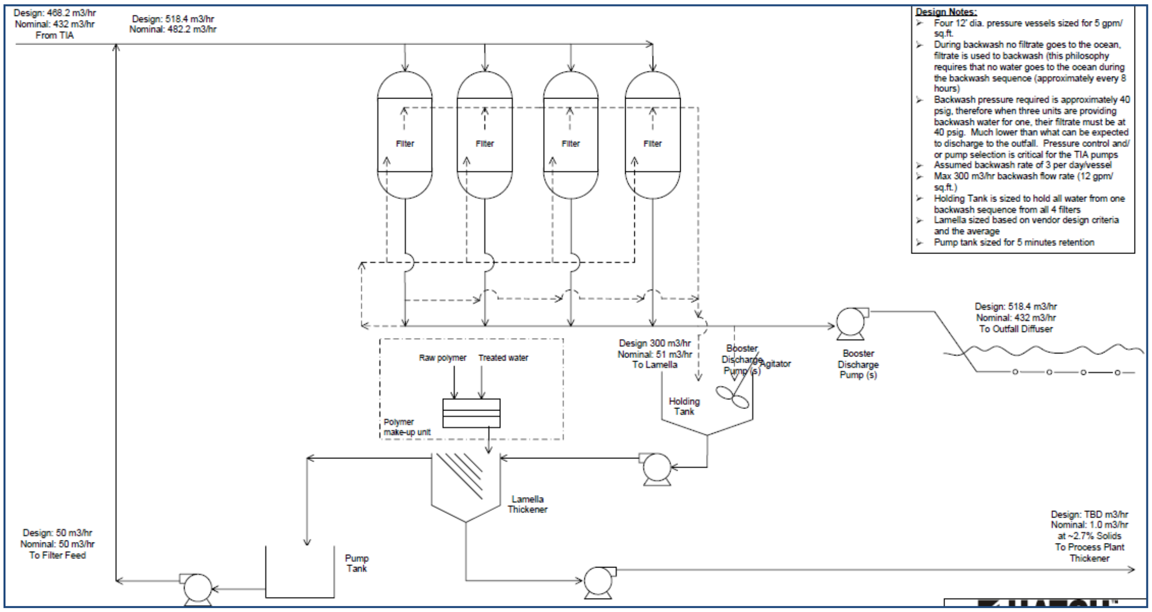
For pipeline plan and elevation please refer to Hatch drawings D2000-10-035-0001 and D2000-10-035-0002.

5. Pipeline from the TIA to the Water Treatment Facility

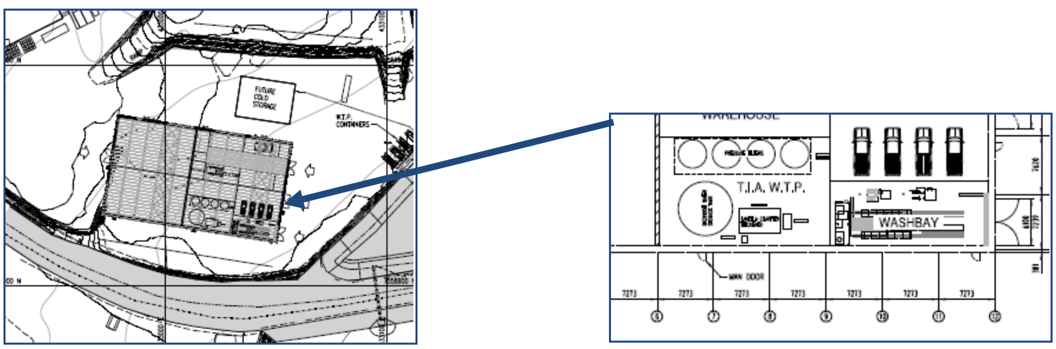
Excess water cover will be removed from the TIA through a single point of discharge. Based on modelling, it is expected that a nominal flow rate of 120 L/s will be discharged from the TIA to the ocean. To ensure that the effluent treatment plant is sized adequately for the operation, the maximum rate is designed to operate throughout the year. In years requiring lower volumes of discharge the discharge pumps may simply be shut down for periods of time. The HDPE pipeline from the TIA to the discharge treatment plant will also be double-walled, heat-traced and insulated.

6. TIA Discharge Treatment

The expected water quality in the TIA, based on modeling by SRK suggests that a final filtration stage for the discharge of the TIA will be required to meet an acceptable discharge standard. Since effluent discharge from the TIA is not expected for the first two years of mill operation, it will be possible to closely monitor the water cover quality over that time to determine if any additional treatment is required. It is, however, predicted from water balance modelling that effluent to be discharged from the TIA will require only filtration with the backwash solids recycled back into the tailings thickener underflow in the process plant. This is required to ensure that saline water does not enter the process plant. If deemed required, additional equipment may be added to the treatment facility, such as mixed media filtration and pH adjustment. All thickened backwash underflow would be returned to the mill tails thickener underflow.



Based on the initial test work and modelling, direct filtration is expected to be sufficient to remove TSS to below the MMER limits. It is expected that the equipment will be installed at the Doris Camp Site in a new multi-purpose building.



7. Subsea Outfall System

The subsea outfall system consists in general of an overland pipe made of HDPE pipe from the effluent filter plant to Roberts Bay then connecting to a subsea pipeline and diffuser installed on the sea floor within Roberts Bay. The pipeline will be heat-traced and insulated. A critical component of the outfall, both in terms of environmental impacts and constructability, is the shoreline crossing traversing the riparian zone adjacent to Roberts Bay to a point below the expected depth of freezing (approximately the 3 m isobath).

Hatch considers that the transition from the overland pipe to the subsea pipe could be achieved within the jetty footprint and should be installed during the planned sheetpile work (currently scheduled for winter of 2011/2012). The plan would be to install a pipe spool during the sheetpile work incorporating the pipe protection into the sheet pile design. The pipe drop structure would be installed to penetrate the edge of the jetty below the lowest ice level. This early work would be installed and the piping would be blind flanged until approval is received for the subsea outfall. This work would be performed as part of the existing planned sheet pile work.