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MEMORANDUM

TO: File (133-77355-12001, Task 2)

FROM: Bruce Marshall

SUBJECT: Summary of KCA Agglomeration Test Results

DATE: April 25, 2012

The Project Proposal (Stantec 2011) and the subsequent refinements as described in the Technical Report-Feasibility Study (Tetra Tech 2012) have built upon earlier assessments and project designs that were completed in the mid- to late-1990s for the Dublin Gulch Project advanced by New Millennium Mining Ltd. The mid- to late-1990s planning included pre-feasibility studies and a suite of engineering test work, as well as initial assessment and regulatory review under the *Canadian Environmental Assessment Act* (CEAA) as required at the time in 1995. In the mid-1990s and again in 2009, 2010 and 2011, agglomeration testing was conducted on the various ores that comprise the Eagle Gold deposit to assess the ores' behaviour in a heap setting. The physical properties of the ore and the results of the tests are summarized below.

BACKGROUND AND ORE PHYSICAL PROPERTIES

The first generation of tests was performed by Kappes, Cassiday & Associates (KCA) (KCA, 1996, and KCA, 1997) on samples either composed of individual ore types or sample composites of two or more ore types. The samples tested were developed from both surficial and core material from the project site. Victoria Gold Corporation (VIT) evaluated these historical testing results and directed KCA to perform additional testing on new samples in 2009, 2010 and 2011 to model the ore's behaviour to support the Project Proposal and advance Project engineering design (KCA, 2010; 2012).

The Eagle Gold deposit ore types upon which tests were performed are identified in Table 1.

Table 1: Eagle Gold Project – Ore Type Description

Ore Type Designation	Rock Type Description
A	Weathered granodiorite
B	Fresh to weakly altered granodiorite (<20% moderately or strongly altered)
C	Sericite, chlorite, carbonate altered granodiorite
D	Fine grained granodiorite
E	Weathered and fresh metasediments

Source: Modified from KCA, 2010.

As the heap is constructed over time, it will be comprised of various proportions of the five ore types. Although final ore type proportions are more of a function of optimizing the operation during mining, in general, based on likely pit shells, pit geology and other factors, the heap will be comprised of primarily (~80%) Types A and B ore, with minor amounts of Type C and E ore. Thus the heap properties and its response to various stresses will be reflected primarily by the agglomeration testing results of ore Types A and B.

Agglomeration Tests and Results

The agglomeration test work examined the permeability of various ore composites under varying conditions. Test variables included crush type, crush size, cement levels, and percolation rates at different simulated heap heights to simulate percolation under load. The agglomeration cement levels utilized for the series of tests were 0 (no cement addition) to 12 kilograms of cement per metric tonne of material. Tests were conducted on composites crushed to sizes ranging from 2 to 12.5 millimeters by High Pressure Grinding Rolls (HPGR) or by conventional cone crushing methods. The tests were intended to simulate the heap percolation rate near the base of a heap under the compressive load at the respective total heap height. Tests were conducted at simulated heap heights varying from 30 to 150 meters, which are representative of the range of proposed heap levels. The maximum heap height proposed for Eagle Gold will be approximately 150 meters. The overall results of the tests were then examined to determine Pass or Failure. The flow rate and percent slump were monitored to provide meaningful indications and to help judge what represents a "Pass," "Marginal," or "Fail" result. KCA's agglomeration testing procedure is provided in Appendix A. The criteria for evaluating the tests are described below. The agglomeration test results are summarized in Table 2.

Most of the testing was conducted on samples crushed by HPGRs as this was the crushing method selected in a pre-feasibility study completed in 2009 and in a feasibility study completed in 1997. Based on an engineering and economic trade-off study, however, the current plan is to use conventional crushing only. Crushing material with an HPGR crusher tends to create more fines than conventionally crushing the same material to the same 80% passing (P80) size. As a result, conventionally crushed material tends to have more consistent grain size and, therefore, to yield higher percolation rates than HPGR crushed material, when all other factors are the same. Thus, the permeability and agglomeration test results presented in Table 2 for the HPGR samples should be considered to be conservatively low for an equivalent grain size.

Maintaining consistent flow through the heap is key to the success of both the leaching and rinsing processes. Therefore, laboratory testing is performed to demonstrate that the ore is capable of transmitting adequate flows in a heap environment, including under loading anticipated under full heap build-out. The test results on most of the HPGR crushed composites and on all of the conventionally crushed composites show excellent percolation rates (>100 L/hr/m^2) and minimal settling (% slump) at low or no cement addition levels and at simulated heap heights up 150 meters (Table 2). A heap design solution application rate of 10 to 12 L/hr/m^2 of column surface was utilized to examine compaction data. As stated above, when examining results from compacted permeability tests, KCA considered two parameters: flow (the most important factor) and percent slump. A measured flow of ten times the heap design rate (or > 100 L/hr/m^2) was scored a "Pass". The percent slump examined was the Wet-Dry Slump. This represents the slump from the dry compacted ore height to that in the wet compacted ore height. KCA generally considered a slump of over 10% as high and an indication of a potential "Fail". However, in cases where percent slump was greater than 10% but the flow rate was high (>100 L/hr/m^2), then KCA considered these results as "Marginal."

In cases where measured flow of less than ten times the heap design flow was modeled, then the number of tests, the consistency among the tests, and the percent slump were considered in determining a score of "Pass", "Marginal", or "Fail." If there were a sufficient number of tests with enough consistency among tests and all percent slumps indicated a "Pass", then a test would "Pass" with less than ten times the flow.

Of the thirty-seven tests shown on Table 2, four of the tests were graded “Marginal”. These “Marginal” test results were on HPGR crushed composites that showed slumps of just over 10%, but had acceptable flow rates of over 100 $L/hr/m^2$. Two of the thirty-seven tests were graded as “Fail” due to low percolation rates (89 $L/hr/m^2$). None of the tests graded as “Fail” or “Marginal” were due to a combination of low flow and high slump. The two failures (on HPGR crushed composite samples) are the only tests that showed less than 100 $L/hr/m^2$, while four of the thirteen Type A core composites (HPGR crushed) showed higher than 10% slump.

The two 2009 HPGR crushed composites (2009 Comp, A, B, C) without agglomeration (no cement added) did not pass the tests at simulated heap heights of 60 and 90 meters. Subsequently, samples of the individual rock types A and C that made up the composites were conventionally crushed to approximately 7 millimeters and tested at 70-meter or 150-meter simulated heap heights; the samples tested at the 70-meter heap simulation all passed without any cement addition and the samples tested at the 150-meter simulation passed with the addition of 2.5 kg/t cement. Flow rates through the core samples were generally significantly higher than the flows through the samples of surficial material. This indicates that the surficial ore material may require a minor amount of agglomeration with cement.

The tests on the samples conventionally crushed all indicate passing results. However, to be conservative, cement at an addition rate of 2.5 to 3 kg/t was selected to minimize potential percolation issues. This cement addition rate also gives the required alkalinity, without any excess, to maintain pH during leaching. Nevertheless, based on current optimized engineering and designs, HPGR crushing is no longer being considered for the project, so no further testing on HPGR is being conducted.

Table 2 Summary of Agglomeration and Compacted Permeability Tests

Sample Description and Year Sample Collected	Crush Type	Estimated P_{80} Crush Size (mm)	Cement (kg/t)	Simulated Heap Height (m)	Flow at the Simulated Height ($L/h/m^2$)	Initial Bulk Density (t/m^3)	Final Compacted Bulk Density (t/m^3)	Slump (%)	Pass/Fail
Type A Pit Comp -Surface 2009	Conventional	7*	2.5	150	128	2.2	2.20	0	Pass
Type A Pit Comp -Surface 2009	Conventional	7*	2.5	150	106	2.25	2.25	0	Pass
Type A Pit 1, Surface, 2009	Conventional	7	0	70	355	1.84	1.88	2	Pass
Type A Pit 2, Surface, 2009	Conventional	7	0	70	5,153	1.74	1.78	2	Pass
Type A Pit 3, Surface, 2009	Conventional	7	0	70	998	1.76	1.82	3	Pass
Type A Core Comp, 2009	Conventional	7	0	70	9,385	1.69	1.74	3	Pass
Type C1 Core, 2009	Conventional	7	0	70	4,144	1.78	1.86	4	Pass
Type C2 Core, 2009	Conventional	7	0	70	2,335	1.82	1.84	1	Pass
Type A, Core Comp, 1996	Conventional	12.5	0	30	15,400	1.56	1.59	2	Pass
Type A, Core Comp, 1996	Conventional	12.5	0	50	16,300	1.56	1.57	1	Pass
Type A, Core Comp, 1996	Conventional	12.5	0	100	10,700	1.65	1.68	2	Pass
2009 Comp, A, B, C	HPGR	7	0	60	89	1.94	1.96	1	Fail
2009 Comp, A, B, C	HPGR	7	0	90	89	2.19	2.21	1	Fail
2009 Comp, A, B, C	HPGR	7	12	60	3,004	1.86	1.86	0	Pass
2009 Comp, A, B, C	HPGR	7	2.5	60	597	2.06	2.08	1	Pass
2009 Comp, A, B, C	HPGR	7	2.5	90	231	2.14	2.16	1	Pass
Type A, Core Comp, 1997	HPGR	2	0	60	1,645	1.50	1.57	4	Pass
Type A, Core Comp, 1997	HPGR	2	0	100	987	1.57	1.64	4	Pass
Type A, Core Comp, 1997	HPGR	2	3.75	60	2,632	1.38	1.44	4	Pass
Type A, Core Comp, 1997	HPGR	2	3.75	100	1,645	1.38	1.57	12	Marginal
Type A, Core Comp, 1997	HPGR	12.5	0	60	263	1.85	2.07	11	Marginal
Type A, Core Comp, 1997	HPGR	12.5	0	100	263	1.85	2.07	11	Marginal
Type A, Core Comp, 1997	HPGR	12.5	3.75	0	3,355	1.85	1.99	7	Pass
Type A, Core Comp, 1997	HPGR	12.5	3.75	60	1,875	1.85	2.03	9	Pass

table continues…

Sample Description and Year Sample Collected	Crush Type	Estimated P_{80} Crush Size (mm)	Cement (kg/t)	Simulated Heap Height (m)	Flow at the Simulated Height ($L/h/m^2$)	Initial Bulk Density (t/m^3)	Final Compacted Bulk Density (t/m^3)	Slump (%)	Pass/Fail
Type A, Core Comp, 1997	HPGR	12.5	3.75	100	987	1.85	2.07	11	Marginal
Type A, B, C Core, 1997	HPGR	12.5	0	60	165	1.92	1.92	0	Pass
Type A, B, C Core, 1997	HPGR	12.5	0	60	1,050	1.80	1.80	0	Pass
Type A, B, C Core, 1997	HPGR	12.5	0**	60	1,710	1.73	1.73	0	Pass
Type A, B, C Core, 1997	HPGR	12.5	2**	60	2,895	1.66	1.69	2	Pass
Type A, B, C Core, 1997	HPGR	12.5	3**	60	2,500	1.66	1.66	0	Pass
Type A, Core Comp, 1997	HPGR	12.5	0	80	658	1.92	1.92	0	Pass
Type A, Core Comp, 1997	HPGR	12.5	0**	80	1,150	1.80	1.80	0	Pass
Type A, Core Comp, 1997	HPGR	12.5	2**	80	1,315	1.73	1.73	0	Pass
Type A, Core Comp, 1997	HPGR	12.5	3**	80	1,120	1.76	1.76	0	Pass
Type A, Core Comp, 1997	HPGR	12.5	3.75	80	2,430	1.66	1.66	0	Pass
Type A High Grade, 1997	HPGR	12.5	1***	80	1,700	1.66	1.80	8	Pass
Type A, B, C Core, 1997	HPGR	12.5	1***	80	2,800	1.63	1.73	6	Pass

Note *Approximately P_{100} 9.5 mm

**Includes 2 kg/t hydrated lime in agglomeration step

***Includes 1 kg/t hydrated lime in agglomeration step

Considering the results from the agglomeration testing, although there is not a stability concern, it is recommended that heap design and development allow for adding 2.5 to 3 kg/t of Portland Type II or equivalent cement in the first few lifts to ensure that there will not be any permeability issues at the base of the heap, especially when leaching upper lifts. The exact number of lifts requiring cement will be dependent on the total heap height. Lime at approximately 1.04 kg/t will be required for alkalinity purposes in material not agglomerated with cement. The recommended cement addition rate will add sufficient, but not an excessive amount of alkalinity to the system. Alkalinity is required to prevent volatilization of HCN gas from NaCN. Although not the case for this project, cement addition in some heaps is high enough that pregnant solution pH is high (>11.5), which can cause scaling issues and hinder heap neutralization.

Future Agglomeration Testing and Conclusions

Based on available data, Eagle Gold ore crushed to 5 millimeters or larger has no permeability issues at heap heights up to 150 meters, if irrigated at a 10 L/hr/m^2 rate and properly agglomerated with 2.5 to 3 kg/t cement. Cement addition will also add to heap stability. Additional agglomeration testing is planned for surface and core composites to confirm past test results and to simulate optimized heap design parameters, such as final crush size and composite type, cement addition rate, and ultimate heap height. The cumulative ore testing results will provide information to optimize the flow of fluids through the heap, which will both enhance the recovery of gold and increase the efficiency of the detoxification and rinsing phases of the heap life cycle. In addition, ore will not be placed on the heap during the winter months as cold temperatures could potentially affect the ore stacking process and result in non-uniform fluid flow during the subsequent leaching, detoxification, and rinsing phases. The combined ore preparation and stacking plan will promote homogeneity and isotropy in the heap, thereby minimizing the potential for development of layers with lower permeability.

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APPENDIX A

KAPPES, CASSIDAY & ASSOCIATES AGGLOMERATION TESTING PROCEDURE

Kappes, Cassiday & Associates Agglomeration Testing Procedure

The agglomeration testing procedure used by Kappes, Cassiday & Associaties (KCA) for the Eagle Gold Project is KCA's standard method used for assessing ore characteristics and providing input to heap leach facility designs. The procedure involves a series of steps including cement agglomeration, vertical loading (testing under various stress conditions), column flooding and drainage, and slump assessment. Some of the testing protocols used in the mid-1990s have been improved and modified slightly for tests conducted in 2009. Noted variations from the 2009 test procedure with the historical procedure are indicated in parenthesis.

- In the tests where composites were agglomerated with cement, the material was placed into a drum and a specified amount of cement was added. The drum was rotated for several minutes to mix the ore and cement thoroughly. The material was sprayed with tap water to form the agglomerates. These agglomerates were then allowed to cure for 24 hours prior to being used in the compacted permeability tests.
- The test cell utilized for modeling the permeability of stacked ore at various heap heights was a steel column. Vertical loading of the test material was utilized to simulate the pressures at the bottom of a heap at various heights.
- The test apparatus consisted of a column with a cross sectional surface area equivalent to 0.018 square meters and 0.15 meters in diameter (0.15 and 0.075 meter diameter columns in earlier tests). A hydraulic H-frame press was utilized to apply the loads to the material in the column. A hydraulic ram outfitted with a pressure gauge was utilized to accurately measure the actual load applied. The applied load was also checked by use of a load cell located underneath the column.
- At the top and at the base of the ore column were drainage layers. The load was applied to the charge of material utilizing a perforated steel plate of a known diameter. The diameter of the plate was such that the plate moved freely within the walls of the column. A test charge of 10 kilograms, dry weight, was utilized for each compacted permeability test (earlier work tested 2-kg samples in the 0.075 m diameter columns and 10 to 20-kg samples in the 0.15 m diameter columns). The test charge was loaded in lifts and each lift was compacted prior to adding additional material.
- Solution was allowed to flow into the base of the column by a constant head tank at a pressure equal to 3,200 millimeters of water, or 4.5 psig. The column was allowed to flood and the resulting solution in the column was allowed to build up until a solution head of 25 to 50 millimeters above the sample was obtained.
- The solution was then allowed to drain from the column while the solution head on the test sample was maintained. The rate at which solution drained from the column was then measured multiple times. Overall slump of material in the column was measured.

The agglomeration tests were intended to simulate the heap percolation rate at the bottom of a heap under the compressive load at the respective total heap height. The flow rate and percent slump test results are examined to determine sample performance.