September 26, 2012 Project No. 110173

Lidstone and Associates, Inc.
Chris Lidstone, P.G.
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RE: Risk Evaluation of Mill Platform and Heap Leach Liner System
Cresson Project, Teller County, Colorado

Dear Mr. Lidstone,

1.0 INTRODUCTION

This report was prepared by Engineering Analytics, Inc. (EA) for Lidstone and Associates, Inc. (Lidstone) and summarizes our review of geotechnical designs related to Permit Amendment 10 submitted to the Colorado Division of Reclamation, Mining, and Safety (DRMS) for the Cresson Project, Teller County, Colorado. We were requested to review two facilities with respect to settlement. Specifically, the questions to be addressed in our review are:

1. Is there a significant risk that vibration from the new (proposed) mill could threaten the structural stability of the mill platform (building pad)?
2. Is there a significant risk that settlement in pregnant solution storage area or in the Squaw Gulch Valley Leach Facility Foundation (SGVLF), could reduce the function of the new heap leach liner system?

A review of the mill foundation design with respect to the structural stability of the mill building and building pad was performed. The term "structural stability" is interpreted to refer to the structural integrity of the mill building pad and foundation in response to dynamic loading from the rod mill and ball mill crushing facilities that are part of the design of the proposed mill. The scope of work also includes reviewing the foundation design with respect to any effects of mill vibrations on the geomembrane liner, and on slope stability of the mill platform.

Additionally a review of the SGVLF was performed that was focused on areas that will be particularly sensitive to settlement; specifically the Squaw Gulch Overburden Storage Area (SGOSA), and the mine openings that will be covered by the SGVLF. The review of settlement potential for the Pregnant Solution Storage Area (PSSA) is specifically focused on the containment embankment, because the base of the PSSA will be founded on bedrock (CC&V, 2012). Please refer to the list of references provided to EA to facilitate this review.

2.0 STRUCTURAL STABILITY OF THE PROPOSED MILL IN RESPONSE TO VIBRATION

The platform for the proposed mill will be constructed on the Squaw Gulch Overburden Storage Area (SGOSA). The platform will be constructed with overburden material sources from the open pit. A test fill was conducted to develop a method specification for placement of the fill. The grain size analysis presented in the test fill documentation (AMEC, 2012c), indicates that the material is poorly graded with a very low percentage of fines (less than 1% passing the #200 sieve) and a high percentage of large rock particles. The fill material was classified as non-plastic. The material appears to be suitable for the mill foundation application.

According to the mill foundation recommendations (AMEC, 2012b), the material will be placed 3 ft thick lifts. The lift thickness and compaction were designed by a test fill (AMEC, 2012c). Each lift will be compacted by haul truck traffic as well as a minimum of four passes of a 10-ton vibratory smooth drum compactor, per results of the test fill. Vertical deflection, per the test fill data, is expected to be on the order of a 0.05 ft or less following the last pass of the vibratory compactor, which will follow truck traffic compaction. This method specification is expected to result in placement of suitable foundation fill for the mill.

The input data used for the evaluation of mill machine vibration on the mill platform foundation (AMEC, 2012d) appear to be reasonably conservative. The results of the vibration analyses indicate that elastic displacement on the order of 0.25 in may result. It should be verified with the mill designer/constructor that this value of elastic displacement is within machine tolerances.

The letter by AMEC (AMEC, 2012d) also addresses the potential for liner damage due to mill vibration. The geomembrane liner will be placed 15 ft below the vibration source. The puncture resistance testing for both stress and strain on the liner, as referenced in AMEC (2012d) appears to be adequately rigorous to dismiss concerns for liner puncture due to machine vibration at the mill.

The evaluation of slope stability in response to machine vibration from the mill (AMEC, 2012d) also appears to be sufficiently rigorous. The conclusions of these analyses indicate that shallow surface sloughing may be possible, but that deep seated slope failure of the sort that would have deleterious consequences on mill operations or the integrity of the geomembrane liner should not be expected.

3.0 SETTLEMENT POTENTIAL – SQUAW GULCH VALLEY LEACH FACILITY

3.1 General

The Squaw Gulch Valley Leach Facility (SGVLF) foundation will be located in an area where historic mine shafts exist. The heap leach facility will also overlie the Squaw Gulch Overburden Storage Area (SGOSA). Settlement and potential impacts to the function of the SGVLF and specifically to geomembrane liner integrity are discussed in this section. The AMEC (2011) report, *Cripple Creek Victor Gold Mining Company, Squaw Gulch Valley Leach Facility Design* was the basis for review of the SGVLF foundation issues.

Structural fill will be placed in areas where the slope gradient requires adjusting, in areas that are below design grade, and in areas where unsuitable material exists. Structural fill compaction

specifications are expected to meet previous heap leach facility standards used at CC&V, and are therefore expected to be adequate, by design, to limit settlement to acceptable levels. Areas that are above design grade will be excavated to grade. Either the material will be excavated to low compressible material, or the area will be over-excavated and a sufficient thickness of structural fill will be placed. In either case, settlement is expected to be adequately controlled.

Gradients at the base of the proposed SGVLF are not expected to be compromised such that flow of pregnant solution to the PSSA will be inhibited. Excavation of compressible materials, placement of structural fill at areas where weak foundation conditions exist, and sufficient base gradients are expected to assure that ore recovery will not be compromised by settlement in response to ore loading.

3.2 Shafts

The plan for filling shafts within the Squaw Gulch Valley Leach Facility (SGVLF) footprint involves excavating loose material at the shaft collars, backfilling the shaft from the surface, placing a concrete plug in competent material in the shaft, and overlaying the concrete plug with cemented backfill. This is a rigorous approach to shaft closure. Settlement is expected to be adequately controlled by these methods.

3.3 Squaw Gulch Overburden Storage Area

The Squaw Gulch Overburden Storage Area (SGOSA) will become the foundation for part of the Squaw Gulch Valley Leach Facility (SGVLF). The slopes of the SGOSA will be re-graded from 2.5H:1V to 2.0H:1V as part of the SGVLF construction. Particle sizes of material placed in the SGOSA range from boulder to sand sized. Considering a design unit weight of 110 pcf for the ore, and an ultimate maximum ore depth of 300 ft, a maximum load of 230 psi will be imparted to the SGOSA foundation material. The purpose of this review is to assure that the design adequately addresses concerns that the function of the proposed SGVLF will not be compromised by settlement in terms of leakage due to geomembrane liner breach, or by post-settlement gradients that would inhibit the flow of pregnant solution to the PSSA.

Settlement of the SGOSA materials was modeled, in the design, using the finite element code, Plaxis (V8.2). The SGOSA material was modeled as strain-hardening, coarse rockfill. The Plaxis modeling results predicted maximum horizontal deformation of 16.8 in, and maximum vertical deformation of (-24.0) in. The results of the settlement modeling predicted minimum total deformation of 2.4 in and maximum total deformation of 29.3 in (resolution of vertical and horizontal deformation). The reported maximum strain is 4%. This is measured along the entire SGOSA surface.

As shown on the Plaxis output graphics presented in Appendix C.6, of AMEC (2011), SGOSA Settlement Calculations, the maximum modeled settlement deformation is concentrated at and below the bench that traverses the SGOSA, but settlement is predicted for the entire SGOSA. The bench clearly represents an area of stress concentration.

As mentioned earlier, the design specifies that the SGOSA will be graded from a 2.5H:1V slope to a 2H:1V slope. Drawing A230 of AMEC (2011) is a cross-section through the re-graded SGOSA. These sections are not the same as the sections analyzed for settlement in Plaxis, which models the existing SGOSA slopes.

The section presented in A230 of AMEC (2011) shows that the re-grade design for the SGOSA does not include benches. A continuous, non-benched slope is expected to limit concentrated settlement, according to the settlement analyses.

Drawing A230 of AMEC (2011) also shows that material cut from the upper part of the SGOSA slopes that will be used as fill to bring the slope from a 2.5H:1V slope to a 2H:1V slope, will be placed as structural fill (compacted in lifts with moisture and density control).

Structural fill will have a specified maximum particle size of 3 ft, according to the design. Particles of this size range (boulders) could present localized settlement issues if they are in sufficiently close proximity, and there is a sufficient "span" of fine-grained, compressible particles between boulders, when considering axi-symmetric strain, as would be represented by ASTM D5617. The reported maximum expected strain is, again, based on deformation along the full distance of SGOSA surface.

If, for example, the maximum modeled settlement of 2 ft occurred between boulders at a separation distance of 3 ft, axi-symmetric strain of approximately 28% could occur. This is near the recommended maximum strain of 30% (axi-symmetric) for the LLDPE material (example, Poly-Flex 80 mil LLDPE).

The design has provisions for this sort of situation. Structural fill will be placed at a depth of 30 in (2.5 ft) over the re-graded SGOSA surface. In addition, the use of geo-grid and geotextiles is mentioned to mitigate localized settlement issues. Re-positioning of large particles could also be a solution. However, after final grading is approved, the use of the synthetic materials would be preferred and acceptable.

Overall strain resulting from settlement as a consequence of loading the SGOSA with stacked ore for the purpose of heap leaching is expected to be 4%, based on settlement modeling conducted for the design. Localized settlement has been adequately addressed in the design.

3.4 Pregnant Solution Storage Area

The base of the Pregnant Solution Storage Area (PSSA) will be founded on bedrock. Therefore, settlement is expected to be limited to the containment embankment. Settlement analysis conducted for the design, using Plaxis (V8.2) indicates that expected total settlement will range from 0.6 in (0.05 ft) to 9 in (0.75 ft). According to the Plaxis total settlement output plot (Figure 6, Appendix C.7) of AMEC (2011) settlement will be distributed over the entire PSSA model, including the embankment face and a flat surface at the top. The greatest magnitude of settlement (4.2 in to 9.0 in) is predicted by the settlement modeling to be limited to the northeast side of the embankment, which will be under load from the heap.

Highway 67 will be relocated on the PSSA containment embankment. Design drawings indicate that Highway 67 will be as close as 35 ft to 40 ft from the edge of the PSSA containment embankment, as scaled from the drawings. There is no scale on the Plaxis model output figure (Figure 6, Appendix C.7) of AMEC (2011). Therefore, it is not possible to determine if settlement indicated by the Plaxis model output will intersect Highway 67, as relocated.

The embankment fill was modeled as "fine-grained rockfill". Therefore, localized axi-symmetric settlement is not anticipated. The gradient of the northeast side of the PSSA

embankment is sufficiently steep, such that any settlement will not impede pregnant solution flow or containment.

4.0 SUMMARY

4.1 Structural Stability of the Proposed Mill in Response to Vibration

- Potential compromise of the mill building pad foundation, the mill building pad slopes, and the underlying geomembrane were examined as part of this review. Machine vibrations from the mill are not expected to impact the mill foundation, with respect to settlement, because characteristics of the material selected for the mill building pad and the method specification for placement appear to be adequately rigorous.
- The likelihood of geomembrane liner compromise under the mill was reviewed. The depth of the liner, at 15 ft below the top of the mill building pad, and the results of vibration analyses indicate that the geomembrane liner will not be at risk with respect to liner puncture or excessive strain, in response to machine vibrations from the mill.
- Reviow of slope stability analyses and slope model considerations indicates that deep seated slope failure is not likely in response to machine vibrations, and that the worst case impact to the mill platform slopes is likely to be limited to minor surficial sloughing.

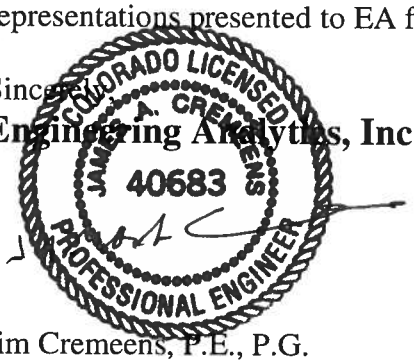
4.2 Settlement Potential - Squaw Gulch Valley Leach Facility

- The risks to the function of the Squaw Gulch Valley Leach Facility (SGVLF) were evaluated and were found to include mine openings (shafts), settlement of the non-compacted Squaw Gulch Overburden Storage Area (SGOSA), and settlement at the PSSA.
- The remediation design for shafts was evaluated and determined to be sufficiently rigorous to eliminate any reasonable risk for settlement and compromise of liner function. The PSSA will be founded on bedrock, and no settlement is expected.
- The containment embankment was modeled as fine-grained rockfill, so axi-symmetric settlement is not anticipated. The gradient of the embankment is sufficient that modeled settlement magnitude would not be expected to compromise liner function.
- The SGOSA was evaluated, including review of the settlement analysis conducted in Plaxis. Overall settlement is not be expected to compromise liner function, given results of the settlement analyses. Reasonable risk was determined to be limited to axi-symmetric settlement. The design provides for mitigation of axi-symmetric settlement by placement of 30 (2.5 ft) of structural fill over the SGOSA, and by the local application of geo-grid and geotextiles as determined during construction.

5.0 LIMITATIONS

The opinions expressed in this report are based solely on review of the documents listed in the references of this report. EA did not conduct any analyses or engineering evaluations for this review. Rather, this review relies upon the assumption that standard engineering care and practice were met and strictly adhered to for all of the analyses and design work that was reviewed. EA did not visit the CC&V site and as such, this review relies solely upon the referenced documents for an accurate, truthful, and complete representation of site conditions. Any non-conformation with the designs, analyses, site conditions, and any and all representations presented to EA for review will serve to invalidate this review in its entirety.

Sincerely,
Engineering Analytics, Inc.



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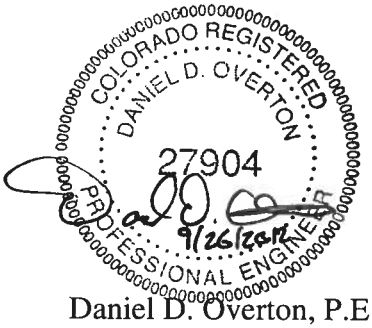

Daniel D. Overton, P.E
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AMEC (2012a). *"Cripple Creek & Victor Gold Mining Company Squaw Gulch Overburden Storage Area Including Mill Platform Stability Evaluation"* Prepared for Cripple Creek and Victor Gold Mining Company, January 5.

AMEC (2012b). *"Mill Foundation Recommendations – Cripple Creek & Victor Gold Mine, Teller County, Colorado*"; letter to Ron Roberts (CC&V) from David Weidinger, P.E. and Kimberly Morrison P.E., R.G (AMEC). February 29.

AMEC (2012c). *"Overburden/Structural Fill – Test Fill Summary*;" memorandum to Ron Roberts and Jim Smith (CC&V) from Joseph D. Hickey and Jay Janney-Moore, P.E. (AMEC), April, 12.

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