Cripple Creek & Victor Gold Mining Company
Squaw Gulch VLF Pregnant Solution Storage Area Project
Final Report Addendum
Quality Assurance Monitoring & Test Results
January 2015

Prepared For:

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January 12, 2015

Mr. Timothy A. Cazier, PE
Environmental Protection Specialist
Colorado Division of Reclamation Mining and Safety
1313 Sherman Street, Room 215
Denver, Colorado 80203

Re: Cripple Creek & Victor Mining, Co. Cresson Project M-1980-244;
Review Comments for Quality Assurance Monitoring & Test Results Final Report for Squaw Gulch VLF Pregnant Solution Storage Area Project

Dear Mr. Cazier,

AMEC Environment and Infrastructure (AMEC) has prepared this letter on behalf of Cripple Creek & Victor Mining Company (CC&V) in response to comments by the Colorado Division of Reclamation Mining and Safety (DRMS) in their letter dated December 10, 2014. Hard and electronic copies of the design and construction reports referenced in this response are submitted as part of this response. Revised portions of the Record of Construction (ROC) Report addressed in this letter are provided as an attachment, while the original report was previously submitted to DRMS. DRMS comments appear in italics followed by AMEC's responses.

1. *General Comments:*
   a. *Paper vs. electronic copies of subject report – the Division has utilized both the paper and electronic copies of the subject report for this review and observed some inconsistencies between the hard and electronic copies. Specific discrepancies include:*
      i. *The electronic/pdf version of the Division downloaded from your ftp site contains duplicate Record Drawing No. 3 of 9 Underdrain As-builts and no Record Drawing No. 4 of 9 Top of Low Volume Solution Collection Fill.*

         Response:

         AMEC has replaced the duplicate Record Drawing No. 3 with Record Drawing No. 4 Top of Low Volume Solution Collection Fill within the electronic submittal. Please note that Record Drawing No. 4 has been revised to add additional information for the addendum as also discussed in comment 3a.

      ii. *Appendix J.7 in file "14.Appendix J-SSMS Install Observation.pdf" should be for the secondary geomembrane. However, this particular electronic sub-appendix is K.7 and addresses the primary geomembrane.*

         Response:

         AMEC has replaced the primary geomembrane acceptance forms duplicated from Appendix K.7 in Appendix J.7. The geomembrane acceptance forms are presented in Appendix J.7 of this document. When comparing the correct .pdf to the hard copy that was delivered, it was noticed the acceptance form for the

SSMS dated September 6, 2014 was not included. Both a hard and electronic copy have been added to Appendix J.7 of this document.

iii. *Please double check the pdf files on your ftp site to be sure they are consistent with the submitted hard copy and make available to the Division all necessary corrected electronic/pdf files.*

Response:

AMEC included an USB flash drive with the submittal of the hard copies that have the corrected electronic/pdf files with this response letter for DRMS' use. The hard copy and the electronic version of the report have been double checked for consistency.

b. *Record of Construction Drawings – the Division highly recommends future record drawings be labeled "Record Drawings" vs. "As-built" drawing as is the industry standard. The industry has adopted "Record Drawing" for legal/liability reasons that registered professional engineers and surveyors should become familiar. It is not necessary for the Division's purposes to revise these drawings to indicate "Record Drawing":*

Response:

All future drawings will be labeled as "Record Drawing", and not "As-built".

2. *Drawings – The issued for construction (IFC) drawings presented immediately after the report Figures section all have "Issued for Record of Construction" above the title block. These drawings do not meet the criteria for Record Drawings. The dates on several drawings precede the beginning of construction, and almost all of them precede the completion of the PSSA construction. Industry practice for Record Drawings involves assigning a new revision number with the designation "ISSUED FOR RECORD OF CONSTRUCTION" or "RECORD DRAWINGS" on the revision title block. The reason for this is to demonstrate that the engineer of record has reviewed changes tracked by the engineer and/or the contractor during the construction period. Telephone conversations with CC&V suggest the "Issued for Record of Construction" will be removed from all these drawings and would an accepted response to this comment. If a different response is selected by CC&V, please contact the Division prior to submitting a response.*

Response:

All "Issued for Record of Construction" stamps were removed from the IFC drawings and have been resubmitted both as part of the hard copy and electronic submittal. The IFC drawings are presented in the Drawings section of this document.

3. *Appendix A, Record of Construction Drawings – Record Drawings 1 and 3 through 7 of the nine drawings submitted as hard copies are adequate as submitted.*

a. *Record Drawing 2 of 9 – Specification 01050, Section 1.05.B, fourth bullet requires Record Drawings include the elevations (i.e., toe of slope, crest of slope and breaks in grade) and locations for Soil Liner Fill. Only five-foot contours are provided, thereby making actual elevations discernible only to ± 2.5 feet. Please provide Record Drawings depicting the required elevations.*

Response:

Ames Construction has revised Record Drawing 2 of 9 to include the toe of slope, crest of slope, breaks in grade, and spot elevations for clarity. This revised drawing is provided in Appendix A of the electronic and hard copy report submittal.

b. *Record Drawing 8 of 9 – Please specify what surface is depicted by the contours: top of subgrade, top of soil liner fill, etc.*

Response:

AMEC has added the surface call out to the Legend on Record Drawing 8 stating the depicted surface of top of soil liner fill. The revised Record Drawing 8 is presented in Appendix A of this document.

c. *Record Drawing 9 of 9 – Please specify what surface is depicted by the contours: top of subgrade, top of soil liner fill, etc.*

Response:

AMEC has added the surface call out to the Legend on Record Drawing 9 of 9 stating the depicted surface of top of low volume solution collection fill. The revised Record Drawing 9 is presented in Appendix A of this document.

d. *Omitted or Misplaced Record Drawings – Sumps and HVSCS Riser base plates:*

   i. *Three PSSA Sumps (Closure Drain Sump, Low Volume Solutions Collection System Sump and High Volume Solution Collections Solution Sump) – are critical environmental protection facilities (EPFs) and their relative locations (horizontal and vertical) are critical to the proposed VLF closure plan. The Division required record drawing(s) depicting the horizontal extents (preferably base/toe and crest/top) of each sump as well as the vertical relationship (including elevations of subgrade, soil liner fill, drain rock tops of closure drains, primary and secondary geomembrane). This information may be critical in implementing the proposed VLF closure following reclamation.*

   Response:

   AMEC has developed two additional record drawings (1 of 2 and 2 of 2) that have been added to both the hard copy and the electronic copy of the report to depict the closure drains, low volume solution collection sump, and high volume solution collection sump to clarify their locations and proximity to one another. These drawings are presented in Appendix A of this document. In addition, Ames has added information to Record Drawings 2, 4, and 7 of 9 detailing the toe of slope, crest of slope, breaks in grade and additional elevations. These Record Drawings are presented in Appendix A of this document.

   ii. *Riser Base Plates and Top of Upper Geosynthetics – Specification 01050, Section 1.05.B, seventh bullet requires Record Drawings include the elevations (i.e., toe of slope, crest of slope and breaks in grade) and locations of Top of Upper geosynthetics in the PSSA and the Vertical Riser Sump and base plates. Record Drawing 4 of 9 presents contours of the top of the Low Volume Solution Collection Fill which is for all intents and purposes the top of the "upper geosynthetics" but no elevations are specified, only the five foot contours, thereby making actual elevations discernible only to ± 2.5 feet. Record Drawing*

7 of 9 depicts the riser base plates, but does not specify base plate dimensions, elevations, or horizontal locations. Please provide the required elevations.

Response:

Ames has revised Record Drawing 7 of 9 to include 1-foot contours in the High Volume Solution Collection Riser Manifold detail, and dimensions of the riser. Ames has also added elevations of the toe of slope, crest of slope and breaks in grade to Record Drawing No. 4 of 9. Revised Record Drawings No. 5 and 7 are presented in Appendix A of this document. Additional information, including the horizontal location of the riser base plates is also shown on two additional Record Drawings (1 of 2 and 2 of 2) in Appendix A.

4. *Appendix J, Secondary Geomembrane Installation Observations – Specification 02776, Section 3.02.B, requires geomembrane be accepted by CC&V. Appendix J.7 contains several LLDPE Geomembrane Liner Acceptance Forms unsigned by CC&V. The Division was unable to locate any documentation that confirms CC&V acceptance of these panel sets designated on acceptance forms unsigned by CC&V. Please provide documentation of all secondary geomembrane installation acceptance by CC&V.*

   Response:

   All secondary geomembrane acceptance forms now include a signature from CC&V. The hard copy as well as the electronic copy (included with this document) has been updated to include these signed acceptance forms. These forms are presented in Appendix J.7 of this document.

5. *Appendix K, Primary Geomembrane Installation Observations – Specification 02776, Section 3.02.B, requires geomembrane be accepted by CC&V. Appendix K.7 contains several LLDPE Geomembrane Liner Acceptance Forms unsigned by CC&V. The Division was unable to locate any documentation that confirms CC&V acceptance of these panel sets designated on acceptance forms unsigned by CC&V. Please provide documentation of all primary geomembrane installation acceptance by CC&V.*

   Response:

   All primary geomembrane acceptance forms now include a signature from CC&V. The hard copy as well as the electronic copy has been updated to include these signed acceptance forms. These forms are presented in Appendix K.7 of this document.

6. *Appendix O, Underground Working Observations – As there is no narrative accompanying Appendix O, the Division required clarification on the following:*

   a. *The Division concurs a record drawing is relevant and necessary. Figure 1 is not designated a drawing, but a figure, and is not signed and stamped by the registered professional engineer overseeing the underground working remediation efforts. Please provide this figure as a record drawing (see Comment 1b above) and include notes on the drawing indicating:*

      i. *All underground working remediated as part of the PSSA construction are located and identified on this drawing (if that is factually correct), and*

      ii. *Specific underground working locations and elevations of each working identified are presented in Appendix O.1.*

Response:

Figure 1 has been changed to a record drawing and is signed and stamped by a registered professional engineer. The drawing includes the notes in the DRMS comment above and is located in Appendix O.2 of this document.

b. *Specification 03300, Section 2.02.B, requires 1) Placement slump between 2 inches and 5 inches, and 2) air entrainment of 5% to 8%. The slump did not meet the specifications for specifications W-11, W-12 and W-13 and was not field tested for specimen W-8. Air content was only field tested for specimen W-2. Please explain why concrete not meeting and/or not field tested for compliant with specifications was used for underground working remediation.*

Response:

The specification referenced above is incorrect for the concrete used in the underground workings. Please refer to Specification 03320 Concrete Plug, Section 2.02, B. Air entrainment testing is not required for concrete plugs. Air is added to concrete to increase durability of exposed concrete subjected to freezing and thawing conditions. The concrete in the underground workings will not be exposed.

It was acknowledged in the field during the time of the concrete pour that the slump was lower than specified. Due to the unique and challenging situation of potentially having to remove the concrete from a working, it was agreed upon to wait for compressive strength test results. If the concrete compressive strength was achieved, the concrete was to remain in place. Having a lower slump is not necessarily indicative of bad concrete, it either had a lower water to cement ratio or the concrete had began curing. Slump is estimated to decrease 2 inches per hour. A statement pertaining to the acceptance of the underground working concrete slump tests being low has been added to Section 7.2 Project Technical Specification Deviations of the report body as shown following the comment/response section of this document.

7. *Appendix Q, Closure Drain Installation Summary – the Division requires a response to the following:*

a. *The Division concurs a record drawing is essential for the closure drains. Figure 001 is not designated a drawing, but a figure, and is not signed and stamped by the registered professional engineer overseeing the installation efforts. Please provide this figure as a record drawing (see Comment 1b above) and clarify what is meant by "final grade" in Note 8 (i.e., top of DCF, top of SLF, etc.).*

Response:

The Figure has been changed to a record drawing and is signed and stamped by the registered professional engineer. Note 8 has been revised to clarify that "final grade" refers to top of soil liner fill. This record drawing is presented in Appendix Q of this document.

b. *The seven "Squaw Gulch Valley Leach Field Closure Drain As-built" borehole lithology and drain construction drawings should also be signed and stamped by the registered professional engineer overseeing the installation efforts. Please provide these "as-builts" as signed and stamped record drawings (see Comment 1b above).*

Response:

The borehole lithology record drawings in Appendix Q of this document have been signed and stamped by the professional engineer overseeing the installation efforts.

c. *Appendix Q.1, Summary of Closure Drain Concrete Test Results – Both Specification 03300, Section 3.06D and IFC drawings A362 (Note 5) require a minimum 28 day compressive strength of 4,000 psi for the closure drain concrete collars. The cylinder test result for the closure drain concrete collars cited a 28-day strength of only 3,350 (or 84% of the minimum design strength). These collars stand to have a lot of material stockpiled on top of them and a compressive failure has the potential to collapse the closure drains that are critical to the reclamation/closure design. The Division cannot find any discussion on this deficiency in the QA Monitoring & Test Results Report. The Division requires some detailed discussion on this issue prior to granting any possible conditional or other approval.*

Response:

AMEC responded to the above comment via a letter dated December 12, 2014 which was emailed to Mr. Cazier at DRMS from CC&V on December 12, 2014. The letter is included in Appendix Q.1 of this document. A bullet item has been added to Section 7.2 Project Technical Specification Deviations immediately following the comment/response section of this document, referencing the location of the letter in Appendix Q.1 and its acceptance.

d. *Appendix Q.5, Closure Drain As-Built Drawings – Sheet No. 2-2 limits of underdrain fill associated with the closure drains. Based on IFC Drawing A362 in Appendix Q.4 no underdrain fill is placed with respect to the closure drains. Please clarify what is meant by underdrain fill as it relates to the IFC Drawing A362.*

Response:

On IFC Drawing A362, Section 1, there is a minimum of 3 feet of underdrain fill placed over the top of the closure drain area; the label for the underdrain fill is located on the right side of the detail. Also, please refer to Record of Construction Drawing 2 of 2 in Appendix A.

8. *Appendix R, Underdrain Pond – There are discrepancies between test results summarized in Appendix R.1 and the individual concrete test report in Appendix R.2 that call into question whether or not the concrete used in the underdrain pond construction met specifications. Specification 03300, Section 2.02.B. requires 1) Placement slump between 2 inches and 5 inches, and 2) air entrainment of 5% to 8%. The slump and air content for all six mix batch samples summarized in App. R.1 are 3.75 inches and 7.5%, respectively. However, the results presented in App. R.2 reports 2 through 6 do NOT match the summary table in App. R.1. Furthermore, according to the cylinder test reports in App. R.2, the slump did not meet the specification in Report Nos. 2 and 5; and air content specifications were not met in Report Nos. 2, 5 and 6. Please explain:*

   a. *The discrepancies between Appendices R.1 and R.2, and*

   Response:

   The concrete summary table in Appendix R.1 was incorrect. The table has been revised to reflect the test results in Appendix R.2 and is presented in Appendix R.1 of this document. It has also been updated in the hard and electronic copies.

b. Why concrete not meeting specifications was used for underdrain pond construction.

Response:

The concrete for the underdrain ponds was tested to ensure that it met the required strength. The slump was low on two samples and air entrainment low on three samples during testing. Having a lower slump is not necessarily indicative of concrete that will not obtain strength. Air is added to concrete to increase durability during freezing and thawing conditions. The Underdrain Ponds are easily accessible and are regularly inspected; part of the inspection includes a visual assessment of the concrete. Should the concrete begin showing signs of failure it will be repaired or replaced.

This explanation pertaining to the acceptance of the Underdrain Pond concrete slump tests and air entrainment being low has been added to Section 7.2 Project Technical Specification Deviations of the report body immediately following the comment/response section of this document.

Please do not hesitate to contact us at your earliest convenience if there are further questions or concerns.

Sincerely,

AMEC Environment & Infrastructure, Inc.

Andrea L. Meduna, PE
Project Engineer

ALM/alm

Attachments:

PSSA ROC Addendum Binders (Vol I and II) and USB Flash Drive

Cc: Mr. Ron Roberts, Project Manager, CC&V
Ms. Katie Holybee, Document Control, CC&V
Mr. Ron DiDonato, Project Superintendent, CC&V
Mr. Scott Redabaugh, Project Superintendent, CC&V
Mr. Jeff Gaul, Project Superintendent, CC&V
Mr. Marc Tidquist, Sr. Environmental Coordinator, CC&V.
Mr. Tim Burkhard, Project Resident, AMEC

LIST OF APPENDICES

7.2 Project Technical Specification Deviations

During construction, requests were made by the contractor (Ames) to deviate from the project technical specifications, below is a summary of the project technical specification deviations.

- AMEC allowed the use of LVSCF material in place of LDF.

- The project technical specifications calls for all tensiometers used at the project to be calibrated within 60 days prior to the tensiometer arriving on-site for testing field samples. AMEC contacted Demtech regarding the self-calibrating machines and the industry standard of calibrations. AMEC accepted the calibration certificates from within the year the project started.

- The project technical specification states “The rolls (of liner) shall be stored on a prepared surface (not wooden pallets) and should not be stacked more than two rolls high”. AMEC allowed the rolls of liner to be stacked three rolls high provided safety measure were in place to prevent rolls from shifting at any time and personnel refrain from climbing on the rolls to access the lifting straps.

- The resin certificates provided for the welding rod do not match the resin lots used during production of the 100-mil SSMS and smooth LLDPE geomembrane; however, the resin lots that were used are acceptable per project technical specifications.

- During construction of the Closure Drain portion of the PSSA, AMEC sampled the concrete used to construct the collars around the closure drain pipes. A section of the concrete collars is shown in Detail 6 on Drawing A362 (located in Appendix Q.4) of the Issued for Construction Drawings. The concrete is specified to have a 28-day unconfined compressive strength (UCS) of 4,000 psi. The one concrete sample tested for the 28-day UCS had a result of 3,190 psi, which is about 20 percent less than the required strength. AMEC considers that although the concrete in the closure drain collars did not meet the specification for UCS, the concrete still will adequately perform according to the design intent. A copy of the letter that was issued to DRMS demonstrating why the concrete will perform as intended is included in Appendix Q.1.

- Concrete tests W11 and W13 (summary of testing located in Appendix O.3) as part of the underground workings had a slump outside of the project technical specifications. Due to the unique nature of underground remediation and the challenge of removing concrete from a working, AMEC determined the concrete was acceptable based on the compressive strength tests results.

- The concrete for the underdrain ponds was tested to ensure that it met the required strength. The slump was low on two samples and air entrainment low on

three samples during testing. Having a lower slump is not necessarily indicative of concrete that will not obtain strength. Air is added to concrete to increase durability during freezing and thawing conditions. The Underdrain Ponds are easily accessible and the ponds are regularly inspected; part of the inspection includes a visual assessment of the concrete. Should the concrete begin showing signs of failure it will be repaired or replaced.