GCC Energy

"Safety as a Value"

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GCC Energy, LLC
6473 County Road 120
Hesperus, CO 81326

September 10, 2019

State of Colorado
Division of Reclamation, Mining & Safety
1313 Sherman St., Room 215
Denver, CO 80203

Attn: Janet Binns, Environmental Protection Specialist

Re: GCC Energy, LLC, King II Mine
CDRMS Permit # C-1981-035
Technical Revision No. 27 (TR-27)
- Reconfigure Parts of the Existing, Permitted Refuse Pile
Second Adequacy Review Response

Ms. Binns:

In repsonse to the Division's letter of July 17, 2019, please find responses below to each item of concern (*shown in italics*) as listed in your letter. **GCC Energy responses are show in bold text.**

Section 2.05

1. *DRMS July 17, 2019: No additional response required.*

2. *DRMS July 17, 2019: In the discussion of fill material (Section 2.05.4), GCC has added volume calculations.* ***The Division recommends further discussion on the source (or sources) for this material.*** *Even if GCC chooses to not put this information in the PAP, it will be necessary for the Division to produce an accurate Reclamation Cost Estimate.*

   GCCE September 10, 2019: A further discussion of the sources of fill material has been added to Section 2.05.4 page 5, and new Section 2.05.4 page 5A is also included.

3. *DRMS July 17, 2019: No additional response required.*

Appendix 10

4. *DRMS July 17, 2019: No additional response required.*
5. *DRMS July 17, 2019: No additional response required.*

6. *DRMS July 17, 2019: The Division has the following follow-up comments.*
   a. *In the adequacy response, GCC states that the currently proposed underdrain sizing is based upon the original refuse pile underdrain analysis in Appendix 10(1) and the July 2014 Trautner Geotech report.* ***This Trautner report needs to be submitted as part of TR-27. Also, as applicable, please edit the Trautner report (an addendum would suffice) to agree with the alternative design for TR-27.***

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GCCE September 6, 2019: The referenced Trautner report is included with this submittal as Appendix 10(4A). Please note that the final date of that report was actually June 29, 2015. Also included as Appendix 10(4B) is an addendum to that report that addresses the alternative design for TR-27.

b. *The waste bank proposed in TR-20 is considerably smaller than the Lower Refuse Pile proposed in TR-27. To address the difference in size, it appears that GCC used a linear relation between the recommended underdrain size (from Trautner report) and the pile footprint area to size the proposed underdrain in TR-27. While this approach may be acceptable,* ***this needs to be clearly described in a submittal for the Division's review****.*

GCCE September 10, 2019: The underdrain for TR-27 was initially sized utilizing a linear relationship from the waste bank originally proposed in TR-20. This preliminary drain sizing was based upon the conservative values outlined in the original 2014 Trautner report. The preliminary drain size for TR-27 was then checked against the drain size recommendations made by Don May, P.E. in the design of the existing waste pile (1998) to verify comparable results were achieved.

c. *Additionally, it appears that the underdrain in the Trautner report is designed as an independent underdrain. In TR-27, the underdrain proposed is an extension to the existing underdrain of the Refuse Pile.* ***Please explain if the design in TR-27 takes into account the addition of potential groundwater flow from the current underdrain of the Refuse Pile into the Lower Refuse Pile.***

GCCE September 10, 2019: The proposed 5x4 drain section is designed to account for the flows from the existing waste embankment pile. Per the 9/4/19 Addendum from Trautner Geotech, the proposed drain is capable of providing a flow rate of 3.5 [gal/min] per 1,000 [ft] of trench length. A saturated state condition for the waste pile is unlikely to develop but, theoretically results in a flow rate of roughly half the available flow rate of the proposed underdrain. The existing underdrain from the original waste pile that is to be tied into the proposed underdrain is slightly less than half the size which corresponds to slightly less than half the available flow.

Appendix 11

7. *DRMS July 17, 2019: No additional response required.*

8. *DRMS July 17, 2019:* ***In "Revision 5," please add a discussion on the ponds, including the comment on how the contributing area will be decreased with the new plan in TR-27, and explain how no other changes caused by the TR-27 proposal to the watershed would impact the volume of water and sediment flowing into the two ponds. In particular, the new design for the refuse pile is very steep at the north end of the pile; how will this impact the sediment load to the ponds and the frequency of cleaning the ponds?***

GCCE September 10, 2019: A discussion of contributing area, volume of water & sediment flowing into the two ponds, and pond cleaning frequency has been added to "Revision 5". The west detention pond currently receives surface runoff from the undisturbed sloped area located west of the King I Mine property. With the

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construction of TR-27, a "clear water" ditch will be constructed from what is currently the beginning of Reach 3. This clear water ditch will be routed along the west edge of the property and will now capture the surface runoff from the sloped area west of the mine property before it is routed via culvert to Reach 5, which Reach 3 currently discharges into. While the construction of TR-27 will increase the overall footprint of the waste embankment pile, the overall sedimentation load to the ponds should not be significantly impacted. The area of the proposed TR-27 expansion has been used as a staging area for waste materials to be installed in the existing pile. In addition, there is no existing vegetative cover in the proposed expansion area and surface runoff currently carries sediment to the west pond. The detention ponds have sedimentation gages installed that are marked to indicate when the sediment removal is required in order to ensure that the required storage volume for runoff is available. In the event the rate of sedimentation increases, the frequency of the sediment removal would also increase to ensure the integrity/capacity of the ponds. The ponds were last cleared of excess sediment roughly 5-6 years ago and historically require sediment be removed every 8-10 years.

9. *DRMS July 17, 2019: No additional response required.*
10. *DRMS July 17, 2019: No additional response required.*
11. *DRMS July 17, 2019: No additional response required.*

12. *DRMS July 17, 2019: The Division has the following follow-up comments.*
    a. ***In Section 2.05.6 (page 1), GCC says that a vegetated channel will hold up to a 10-year storm (will not erode). Where does "10-year" come from? The channels are designed for 100-year storm. Can GCC site an applicable rule?***

       GCCE September 10, 2019: Section 2.05.6 page 1 has been revised to clarify that the vegetated channels are designed for the 100-year storm event.

    b. ***In the "Revision 5" document, GCC should provide a discussion of Reach 1, namely how the newly configured channel will be armored sufficiently for the reach where the new channel slopes down to the existing channel (slope of approximately 30%).***

       GCCE September 10, 2019: A discussion of Reach 1 has been added to the "Revision 5" document. The steep slope section connecting the newly configured Reach 1 will be armored in accordance with section 5.4 Channel Armor Design of appendix 11(1).

    c. ***In the "Revision 5" document, Item #2 mentions an armored stilling basin. This should be shown on the Drainage Plan Schematic.***

       GCCE September 10, 2019: The stilling basin mentioned in the "Revision 5" document has been added to Drainage Plan Schematic.

    d. ***In the "Revision 5" document, GCC should discuss how erosion control and sediment control practices will be used on the steep slopes of the lower Refuse Pile.***

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GCCE September 10, 2019: A discussion of erosion and sediment control practices on the steep slopes of the lower Refuse pile has been added to the "Revision 5" document. The face of the lower Refuse Pile will be maintained in a similar fashion to the main Refuse Pile. The slope of the pile shall be to the south and west to direct surface runoff away from the sloped face of the lower Refuse Pile. As an additional precaution, there shall be a small berm maintained during construction along the front edge of the lower Refuse Pile to ensure runoff will not be allowed to sheet flow over the face of the pile. As the finished face of the waste pile is constructed, small mounds shall be installed along the sloped surface so that precipitation falling on the slope of the waste pile is forced to flow in a zigzag manner. This will result in slower flow velocities and reduce the potential for erosion. The surface shall also be seeded to establish a vegetative cover which will also help to prevent erosion and limit runoff flow velocities.

e. *In the "Revision 5" document, Item #4 should discuss the sizes and materials (CMP, RCP, or other) of the culverts.*

GCCE September 10, 2019: A statement addressing pipe sizing of Reach 7 has been added to the "Revision 5" document. "Reach 7 has been shortened to begin at the area inlet located east of the remaining building (old bath house). The existing pipe located to the south of the area inlet has been removed. All remaining pipe for Reach 7 shall remain as originally constructed."

f. *In the "Revision 5" document, the last item (#6) should indicate that flows from both Reach 7 and Reach 10 flow into Reach 8.*

GCCE September 10, 2019: A statement clarifying that Reach 7 and Reach 10 flow into Reach 8 has been added to the "Revision 5" document. "A 36-inch culvert has been added to the portion of Reach 8 that is covered by the installation of the new haul road. The 36-inch diameter pipe will convey Reach 10 and Reach 7 flows under the new haul road and into the channel section of Reach 8 which directs the treated water flows into the west detention pond."

g. *The Drainage Plan Schematic legend should include all features on the map. For example, GCC should add a legend item for the curved line with triangles that is southwest of the Burnwell structures.*

GCCE September 10, 2019: The feature described by the curved line with triangles no longer exists. It has been deleted from the Drainage Plan Schematic.

h. *SEDCAD model for Clear Water*
   i. *In "Revision 5," please add a map showing SWS areas.*

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GCCE September 10, 2019: A map showing the SWS areas for the SEDCAD Clear Water model has been added to the Revision 5 document and to Appendix 11(1).

ii. *Please check the design and calculations for Structure 1 of the West Clear Water Ditch model. For the discharge (23.19 cfs) and area (0.83 sq ft) in the SEDCAD run, the average velocity would be approximately 28 feet per second, which is very high and could lead to instability of the riprap.*

GCCE September 10, 2019: The design has been checked in SEDCAD and the issues may come from how SEDCAD calculates the area for OSM/Simons method. The program transfers the routine to the steep slope method if the Froude number found by the mild slope method is greater than 0.8. As reported by SEDCAD documentation the steep slope method "is based on the relationship developed by Bathrust, 1979 as reported by Simons, et.al., 1982.... Water was nonuniform – cascading around the rocks rather than flowing over them." It appears that there would be a considerable amount of space between the rocks that would not be accounted for in the Q=AV equation. This would be especially true for the triangular channel with a D18 riprap. This may be why SEDCAD does not calculate a manning number or a velocity for this scenario. By changing just the riprap method to PADER, SEDCAD gives supercritical flow with velocity of 6.02fps using the same design parameters.

Because a better answer than the above for the high calculated velocity was not found, changes were made to the SEDCAD model to reduce the calculated velocity. Re-designing the ditch also simplifies the riprap, reducing it to a D50 of 9 inches.

During review of the SEDCAD modeling, two of the SWS that should have been set to "medium" hydrograph response, were set to "fast". These SWS were changed to "medium" in the current model.

iii. *For Structure 2 of the West Clear Water Ditch model, larger riprap than in the SEDCAD model (D50 = 9 inches) is advised, given the channel steepness and average flow velocity of approximately 13 ft/s.*

GCCE September 10, 2019: Again, after researching SEDCAD documentation, it appears a significant amount of area may not be accounted for (the area between the rocks). Calculating the velocity using the SEDCAD area could result in an artificially high velocity if this is the case. However, the changes to the models hydrograph response result in a reduced calculated velocity. SEDCAD documentation describes the OSM/Simons Method as "conservative" and states 15fps is considered the maximum stable flow.

i. ***SEDCAD model for Treated Water***

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i. ***In "Revision 5," please add a map showing SWS areas.***

GCCE September 10, 2019: A map showing the SWS areas for the SEDCAD Clear Water model has been added to the Revision 5 document and to Appendix 11(1).

ii. ***Does Basin F drain to Reach 13 or to the East Clear Water Ditch? The SEDCAD model implies that it drains to Reach 13 (Structure #10 in the model), but Map King I-007 suggests that it drains to the CWD.***

GCCE September 10, 2019: The SEDCAD model has been changed. Basin F has been removed from the treated water flow and will drain into the East Clearwater ditch.

iii. ***Please explain why bare ground with soil group D has a curve number of 77.6. Perhaps the number should be higher.***

GCCE September 10, 2019: The 77.6 was used as a curve number because it is the number for the waste pile in the currently approved drainage study. We have increased the curve number to 80 for all of the mine waste SWS in the treated water model.

13. *DRMS July 17, 2019: No additional response required.*

Maps

14. *DRMS July 17, 2019: GCC has shown the location of the Topsoil Borrow Area on Map King I-007. Also on this map, near the Topsoil Borrow Area, GCC has extended the polygon for approved Areal Extent of Surface Disturbance beyond the Affected Area Boundary. This is not appropriate.* ***Please extend the Affected Area or reduce the size of the Surface Disturbance polygon. Also, please explain if this is the 0.7 acre increase noted on the application form for TR-27.***

GCCE September 10, 2019: The Affected Area and Surface Disturbance polygons have been revised on Map King I-007 and Map King I-011 to depict the actual historic location of the Topsoil Borrow Area. This change added 0.65 acres to the Areal Extent of Surface Disturbance and 4.58 acres to the Affected Area. A revised application form is included with this submittal. Also, King I 2.03.8 page 1 and King II 2.03.8 page 1 have been updated and are included with this submittal.

15. *DRMS July 17, 2019: No additional response required.*
16. *DRMS July 17, 2019: No additional response required.*
17. *DRMS July 17, 2019: No additional response required.*
18. *DRMS July 17, 2019: No additional response required.*
19. *DRMS July 17, 2019: No additional response required.*

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Please find enclosed 2 copies each of:

- Revised TR-27 Application Form
- King I PAP Cover Page (TR-27 2nd Adequacy Review)
- King I Table of Contents page ii
- King I Table of Contents page iii
- King I 2.03.8 page 1
- King I 2.05.4 page 5
- King I 2.05.4 page 5A
- King I 2.05.6 page 1
- King II PAP Cover Page (TR-27 2nd Adequacy Review)
- King II 2.03.8 page 1
- Appendix 10(4) Stoner Engineering Report
- Appendix 10(4A) Trautner Geotech Engineering Study
- Appendix 10(4B) Trautner Geotech Report Addendum
- Appendix 11(1A) Stoner Engineering Revision 5
- Appendix 11(1B) SedCad Modeling Results
- Appendix 12(1A) Huntinton Ranches Agreement – Fill Material
- Map King I-007 (TR-27) Operation Plan & Surface Features
- Map King I-007B Haul Road Detail
- Map King I-011 (TR-27), Final Contour Map

Please contact Tom Bird at 970.385.4528 x 6503 or Joel Riggins at x 6540 with questions or comments.

Sincerely,

Tom Bird
Manager of Coal Services
GCC Energy, LLC
tbird@gcc.com

COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY
1313 Sherman Street, Room 215, Denver, Colorado 80203, (303) 866-3567

APPLICATION FORM FOR A REVISION TO A COAL MINING AND RECLAMATION PERMIT

This form must be completed and submitted with all requests for minor revisions, as defined in Rule 1.04(73), technical revisions, as defined in Rule 1.04(136), and permit revisions, as defined in Rule 1.04(90). All revisions are to address the requirements of Rule 2.08.4. Three (3) copies of the revision, including maps, must be submitted in order for it to be complete.

All revisions are to be formatted so they can be inserted into the permit to replace the revised sections, maps, tables and/or figures, with a revised table of contents, if necessary. The revision submittal date should be printed in the lower right corner of each revision page. A cover letter to the revision should explain the nature of the revision and reference the specific permit sections being revised.

For federal mines, a copy of the revision application must be submitted to all agencies on the federal mailing list (except OSM) at the same time the application is submitted to the Division, and proof of distribution must be submitted to the Division along with the application. Copies of revision pages modified during the review process must be distributed in the same manner, along with proof of distribution. Proof of distribution must be submitted prior to implementation of the revision.

Permit No.: C - 1981 - 035 Date: 11 / 28 / 2018

Permittee: GCC Energy, LLC
King Coal Mine

Street: 6473 County Road 120

City: Hesperus

State: CO Zip Code: 81326 -

Brief Description of Revision: Technical Revision 27 (TR-27): Reconfigure parts of the existing, permitted refuse pile area at King I mine site.

Public Notice Attached: Yes ☑ No ☐ *(Required for PRs and TRs)*

Bond Increase: Yes ☑ No ☐ **Federal** ☑ **Non-Federal** ☐ **Mine**

Proposed Change in:

Permit Area -

Disturbed	(+/-) 0.65	Acres
Permit	(+/-) 0.00	Acres
Affected	(+/-) 4.58	Acres

Surface Ownership -

Private Land	(+/-) 0.0	Acres
Federal Land	(+/-) 0.0	Acres
State Land	(+/-) 0.0	Acres

Mineral Ownership -

Mineral Private	(+/-) 0.0	Acres
Mineral Federal	(+/-) 0.0	Acres
Mineral State	(+/-) 0.0	Acres