DEQ comments on Crevice Mining Group (CMG) Exploration License Application

1) Page 1, Section 1, paragraph 3: The text references "approval of the exploration permit." DEQ issues exploration licenses, not permits. Please correct this here and throughout the application.

2) Page 1, Section 1, paragraph 4: Use cardinal directions, azimuth or bearings along with a distance, to describe how the decline would reach the 8056 elevation. Would the decline ramp spiral down through the ore body from the 8056 elevation? Please include details (in text and associated figures) for a secondary escapeway, as well as the ventilation raises? How many would be constructed and where would they be located? Please provide MSHA ID number.

3) Page 2, paragraph 2: The application states that CMG anticipates that little if any underground water would be encountered during decline development, based upon observation of historic workings. However, documents in DEQ files indicate that the First Chance Portal had a water discharge varying seasonally between 1 – 10 gpm, with an arsenic concentration varying between 0.156 mg/L and 0.359 mg/L (1994 – 1995 sampling results). The historic First Chance Adit is reported to have a length of 795 feet. In comparison, CMG proposes (text on page 4) 25,900 feet of underground development under this exploration program. [Note that the proposed underground workings depicted on Figures 2 and 3 do not appear to be this extensive, having approximately 10,000 feet of total length]. Given the substantially greater length of the proposed decline compared to the historic First Chance Adit, and the much greater depths to which the proposed adit would extend, using inflows to the First Chance Adit as an analogue does not appear appropriate.

   Hydrogeologic testing should be conducted to estimate realistic inflow rates. Simply applying the ratio of lengths of the historic versus proposed workings to the recorded discharge rates from the historic workings would suggest that the proposed project would generate at least 33 times greater inflows, i.e. 33 to 326 gallons per minute. Given the greater depths to which the decline is proposed to extend, actual inflow rates could be substantially more than that. DEQ suggests that this exploration program be revised and approached in phases, with the first phase limited to only drilling of exploration holes plus installation of monitoring / aquifer testing wells in order to characterize ore grades, as well as geochemical conditions and hydrogeologic conditions, within the region surrounding the proposed decline. Collection and evaluation of these data would allow CMG and DEQ to more accurately predict environmental conditions that would be encountered by the proposed decline and associated potential environmental impacts of its development.

4) Page 2, paragraph 2: The application states that all runoff from disturbed areas would be routed to a sediment collection pond. Please clarify how this water, and sediment, would be managed after it is collected in the pond. Would the pond be lined? If so, please provide details including subgrade preparation and liner type. If not, please estimate the rate of percolation from the pond, as well as its anticipated water quality. This discharge to groundwater would need to be authorized by DEQ, and adjacent monitoring wells may be required. If the pond is to be lined, please discuss how water collecting in the pond would be managed to prevent overflow and to maintain adequate freeboard to contain runoff from additional storm events and snowmelt. If the pond is to be lined, would it be fenced to prevent access by wildlife? If so, please describe how it would be fenced.

5) Page 2, paragraph 3: The text states that all waste rock storage areas would be graded and reclaimed concurrently with exploration operations. This is not consistent with Figure 14 (which depicts simultaneous re-sloping of a 40' high angle of repose waste rock slope) or the text in Section 10, page 24, which states "the waste rock dumps will be reclaimed when capacity is reached." In contrast, page 26 states that waste rock would be placed in 20-foot lifts, and that the face of each lift would be regraded and reclaimed prior to placement of the next lift. Please consistently describe the waste rock reclamation plan. Would slopes be reclaimed concurrently, as described on pages 2 and 26, or after each dump reaches capacity, as stated on page 24?

6) Page 3, paragraph 1: This is the first mention of the "Conrad Zone." The text here refers to its surface expression. The document should describe and explain what the Conrad Zone is when it is first mentioned, or else cite where that information is included in the document elsewhere. The application should include a geologic map covering the project area and extending between Jardine to the north and the Yellowstone River to the south. If more detailed geologic data are available for the immediate project area, a localized structural geologic map should also be provided.

7) Page 3, paragraph 2, project description: This section states that "all development will be…in the mineralized Conrad Zone of the Crevice deposit. Inert waste rock will be placed in a temporary waste rock storage area(s) and/or used as road material…" What criteria would be used to classify waste rock derived from the mineralized zone as "inert"? Please identify the location(s) of temporary waste rock storage area(s) on the appropriate maps. Also, please identify all sections of access road where inert waste rock would be placed.

   Approval of waste rock placement on NFS roads would be contingent on acid generation and metal leaching potential of the waste material. The DEQ believes that the USFS would not approve waste rock placement on NFS roads until the acid based accounting has been

undertaken, analysis conducted, and results accepted by the appropriate FS official. Waste rock testing should also determine the amount of clay minerals versus quartz that could potentially be in waste rock generated from schist areas - high clay content may make waste rock unsuitable for use as road surfacing from both a durability and user safety standpoint.

8) Page 3, paragraph 2, project description: Please describe what mitigating measures would be employed to ensure that seepage and runoff from "non-inert" waste rock storage areas would be properly contained and treated prior to discharge.

9) Page 3, paragraph 2: Please consider lining waste rock dumps as was approved at Stillwater's Benbow Project to limit nitrates from ANFO reaching surface or groundwater. Using waste rock with nitrates on roads would only be approved in areas where nitrates could not get to surface water.

10) Page 3, paragraph 3, 1st sentence: Text such as "project, project area" or something similar should be inserted after the word "exploration" in this section.

11) Page 3, paragraph 3 and subsequent bullet points: The plan cites 14 acres of new disturbance associated with the following :
    - Exploration roads - 1.6 acres
    - WSRAs - 3.5 + 1.6 + 4.0 = 9.1 acres
    - Surface drill pads - 0.3 acres
    - Topsoil stockpile - 0.6 acres
    - LAD (if required and yes, it would be required) - 4.5 acres
    - Sum of the above: 1.6 + 9.1 + 0.3 + 0.6 + 4.5 = 16.1 acres

    These listed disturbances total more than the stated total for the project, yet they don't include additional disturbances such as the area covered by the support facilities, diversions and runoff collection ditches that are described elsewhere in the text, collection pond(s), new access roads to waste rock storage areas, and proposed widening of existing access roads. Please re-assess the total disturbance required for the proposed exploration project and update the application.

12) Page 3, bottom, first bullet point: An approximately 15.5 foot-wide road would be the product of a 2800 foot long road that results in 1.6 acres of disturbance. That may be the running surface, not the width from top of cut to toe of slope, which is the actual disturbed acreage. CMG needs to clarify what the exact acreage/disturbance would be.

13) Page 3, bottom, second bullet: All waste rock storage areas would need seepage collection systems to control runoff and collect seepage. Please show all necessary ponds, ditches,

and any other water conveyance structures on appropriate maps, and describe all associated disturbance acreages in the text and tables.

14) Page 3, bottom of page: The last bullet on this page indicates that surface runoff from waste rock storage areas would be managed to limit discharges of nitrate. Would the waste rock storage areas, ditches, and collection pond(s) be lined? During reclamation, would liners be included within the waste rock capping system to eliminate the potential need for long term water treatment of waste rock dump seepage? Please provide detailed design drawings for these features. Other than nitrate, what other contaminants are anticipated to be present in the runoff? Please provide geochemical test results of representative waste rock samples obtained from the proposed decline trace in order to estimate the water chemistry of leachate from the waste rock.

    Evaporation and land application are mentioned as possible management strategies for the disposal of collected runoff. In section 12 (page 32) of the application, it is stated that all irrigated water would meet groundwater quality standards prior to irrigation. Through geochemical testing of rock samples from the proposed decline trace, please identify which elements, if any, may be leached from waste rock and be present in runoff at concentrations greater than groundwater quality standards. If appropriate, propose water treatment methods to remove these contaminants from the water prior to land application. Indicate the duration of the growing season at this location, during which land application may occur.

    To address the potential effectiveness of evaporation, please provide data addressing expected precipitation and evaporation rates at the location of the proposed collection pond (approximate elevation of 8340'). During which months of the year would evaporation be effective at this location? Please verify that the collection pond(s) are adequately sized to contain runoff during the season when neither land application nor evaporation is feasible.

15) Page 4, Section 4, Project Description: Please further explain how "nitrates should not be a problem," within the context of groundwater and/or surface water quality standard violations. Describe the "non-nitrate blasting compounds" that would be used and the economic feasibility of using those compounds. Waste from stick vs. bulk emulsion can result in different residual nitrate contents, but neither method is "non-nitrate."

16) Page 4, ninth bullet under "tasks": The text states that the decline would descend to an elevation of 8056', but Figure 6 shows the decline extending to 7443'; please consistently describe the proposed action.

17) Page 4, tenth bullet under "tasks": Drilling details do not match Figure 6 [See #s 3 and 4 under the "NOTES" section in the lower right of Figure 6]. Please consistently describe details throughout.

18) Page 5: Please move the "Figure List Table" included on Figure #1 into the text of the plan under Section #5 "Site Figures." Page 5 is currently blank.

19) Pages 6 - 19, General comment on figures: The notes embedded in the figures should also be included in the relevant text sections of the document, if practicable.

20) Page 7, Figure 2: The figure should identify all symbols used on the map (e.g. the green line shown to the south of the primary waste rock storage area is not explained; is this intended to represent a ventilation raise or secondary escapeway?). Also, all disturbances required for the project need to be shown on the maps, including: roads to all stockpiles, waste rock storage areas, drill pads, and monitoring wells, upgradient storm water diversion ditches and outfalls, and downgradient runoff collection ditches and associated collection pond(s).

21) Page 7, Figure 2: The LAD area on this figure appears to include NFS lands. If this is the case, please contact USFS to determine what information USFS would require prior to authorizing development of an irrigation area on these lands. In order to approve LAD on NFS lands, a Plan of Operations would need to be submitted, reviewed, and evaluated by USFS. CMG should consider relocating LAD off NFS lands; alternately, CMG would submit a Plan of Operations to the CGNF showing all surface use needs to the Gardiner Ranger District for NFS managed lands.

22) Page 7, Figure 2: The section corners are not labeled correctly. Please change them to read clockwise from top left 15, 14, 23, and 22. Please make the similar changes to the quarter section corners in the same figure.

23) Page 7, Figure 2: The facility (North Waste Rock Storage Area?) in the upper right is not labeled like the others are. Please identify all proposed disturbances on the map.

24) Pages 8 and 11, Figures 3 and 6: Review of these two figures indicates that the southern extent of the decline would approach within 1000' of the Yellowstone National Park boundary, at a depth of approximately 500' below surface. DEQ notes that there is a potential for the decline to flood post-closure, possibly resulting in hydraulic head conditions that would force seepage out of the lower decline via bedrock fractures toward the Park. Assuming horizontal flow, any seepage from the mine void would surface approximately 1000' inside the Park boundary. The USGS Ash Mountain quadrangle map

shows two creeks in this area which both drain southward into the Yellowstone River. Surface water quality / quantity monitoring stations should be established on these streams below the lower elevation of the proposed decline (sites near the 7400' and 6800' elevations on each stream are recommended) in addition to conducting a baseline spring and seep inventory within this area from the southern patented claims, extending south to the river.

DEQ notes that TVX Mineral Hill's June 1996 "Plan of Operations – Upper Crevice Project- Exploration and Development Program" included baseline monitoring data from the easterly tributary (site UNT-500) near elevation 7800' collected on five occasions between November 1992 and September 1993. The data indicate that this creek has perennial flow at this location, implying that the groundwater table within the project area rises to near the surface in the southern portion of the project area and sustains surface water flow near the Park boundary. Extension of the proposed exploration decline into this area would likely involve mining several hundred feet below the water table, resulting in sustained inflows to the exploration workings. Please address these concerns.

25) Pages 8 and 11, Figures 3 and 6: As noted above, there is the potential for groundwater to collect within the decline, then to migrate southward toward Yellowstone National Park. Montana water quality law (75-5-103 (25) and 75-5-316 MCA) prohibits any activity that would result in degradation of State Waters within national parks (a.k.a. Outstanding Resource Waters). DEQ advises that, prior to the initiation of underground development, CMG develop a water monitoring program including installation of both shallow and deep (up to the maximum depth of the proposed decline) monitoring wells, as well as surface water quality / quantity monitoring in order to investigate the potential for migration of contaminants from the proposed decline into State Waters located between the project area and the Yellowstone River. From review of Figure 3, it appears that the location of necessary monitoring / aquifer test wells can be limited to within the patented claims beneath which the proposed decline would be located. [See: 82-4-355 (2)(b) MCA].

26) Page 8, Figure 3: Sections 22 and 23 are labeled incorrectly and have the wrong designations at the section and quarter corners.

27) Page 8, Figure 3: Large gap(s) in the patented claims are covered by unpatented claims, like the 'Star.' Surface-disturbing activity or LAD systems proposed on these claims may trigger USFS involvement. Would there be a need to cross the NFS managed inholdings within the boundaries of the private parcels? If so, please describe these crossings / disturbances in sufficient detail for analysis. Specifically, address access to the Secondary waste rock storage area.

28) Page 9, Figure 4: Does this figure add to the discussion? If not, consider eliminating it.

29) Pages 9 - 11, Figures 4, 5, and 6: The scale bar in these figures is incomplete, with the only distance labeled being "0" at the left end of the scale bar. Please include a complete scale bar.

30) Page 10, Figure 5: This is a very busy drawing. If this figure is supposed to show the Exploration Facilities Layout and is labeled as such, then just show them without anything else.

31) Pages 10 - 18, Figures 5, 7, 11, 12, and 13: General comment on topographic contour lines. Are the white spaces shown on the map flat areas? What Digital Elevation Model (DEM) was used to produce the contour lines? Contour lines appear to cross (p. 12, Figure 7 below the South WRSA) and form an X.

32) Page 10, Figure 5: No topographic detail is presented for the Exploration Support Facilities layout. Please add this information.

33) Page 10, Figure 5: Primary Waste Rock Storage Area - Figure 2 shows this facility as 3.3 acres while Figure 5 shows 3.5 acres. Please correct.

34) Page 10, Figure 5, Primary Waste Rock Storage Area: The figure shows the proposed waste rock dump very close to the property boundary. Please propose a modified dump with a buffer area to prevent trespass. Sufficient space should be left between the dump toe and the property boundary to allow for recontouring, soil placement, vehicular access, storm water management structures, etc.

35) Page 11, Figure 6: Even though the decline plan view is not to scale, using the stationing on the road segment (approximately 1" = 400') the decline length is about 9350 feet total and given a 15% grade (1400') this only totals to a little over 10,750 feet. Where does the 25,700 feet of underground decline described on Page 4, Bullet Point 9 under Exploration Program Tasks, come from? Please address this discrepancy.

36) Page 11, Figure 6: Multiple surface drilling pads are shown. This figure and others (e.g. Figures 2 & 5) do not show any roads required for access to these drill pads. Please include all road locations and disturbance areas on the appropriate maps.

37) Page 11, Figure 6, Exploration Decline Isometric View: This figure shows an extension of the exploration decline reaching down to the 7443' elevation. Elsewhere in the document, the text (e.g. Page 4) states that the decline would extend down only to the 8056' elevation.

Please describe the project consistently. DEQ assumes that increasing rates of groundwater inflow would be encountered with greater depths beneath the surface. Hydrogeologic studies should be conducted in order to more precisely estimate mine inflows prior to licensing of an exploration decline.

38) Page 12, Figure 7: The figure shows "low impact access roads" accessing the proposed drill pads. Please describe the level of disturbance associated with these roads. What level of road building would be required if a track-mounted drill rig was used to reduce impact, and what would be the resulting road width/acreage?

Existing roads are shown as single dashed lines. Please show (and describe) their actual current widths and also any widening and other improvements necessary to access waste rock storage areas, soil stockpiles, etc., with heavy equipment. It appears that portions of the proposed roads and associated core drilling stations may be located on USFS land. A Plan of Operations would need to be submitted to USFS, reviewed, evaluated and approved to proceed.

39) Page 12, Figure 7: Looking at the grade of some of the "low impact" roads shown, it does not appear to be a low-impact road. Please show actual cuts and fills needed to construct the road.

40) Page 12, Figure 7: The conceptual "low impact" roads as presented on the map don't accurately portray cuts and fills needed to construct the road. Please present cuts and fills, soil stockpiles, ditches, cleared buffer areas, berms, and any other disturbances required to properly construct or upgrade all roads associated with the project.

41) Pages 13 - 15, Figures 8, 9, and 10: Is this much detail necessary for a temporary road that is built to be reclaimed? Also, the vertical exaggeration is 5:1, not 5' as noted on Figure 8.

42) Page 17, Figure 12: Please show all access roads required for construction of the North and South waste rock storage areas and associated soil stockpiles. Please show up-gradient storm water diversion structures and down-gradient mine drainage collection ditches. If waste rock storage areas are to be constructed in lifts, with dump faces graded and reclaimed concurrently, indicate how runoff from active areas of the dump, including compacted surfaces, would be routed into interception ditches without flowing over reclaimed areas.

43) Page 18, Figure 13: No access roads are shown to the secondary waste rock pile, east topsoil pile, monitoring wells, etc. Therefore, the amount of disturbance is underestimated.

Please show all disturbances that would be associated with the proposed project. Also, please identify the NFS lands on this figure.

44) Page 19, Figure 14: Exploration Road Typical Detail – If the road disturbance profile is over 30' wide, what would be the total area of disturbance?

45) Page 19, Figure 14, Dump Reduction Typical Detail: There does not appear to be capacity for the rock. The green cross-hatched pattern crosses over the rock-roll berm. The fill slope configuration/capacity needs to be adjusted.

46) Page 20, Section 6, Public Roads: Please specify that road improvement and sign plans would require approval by the USFS prior to implementation of any road improvements on USFS controlled sections of the road system. Please commit to maintaining access roads commensurate with the amount of use. This should include blading, surfacing, dust abatement, storm water BMP installation/ maintenance, etc. Please specify the types of chemicals to be used for dust abatement, if anything other than water is to be used. (i.e. magnesium chloride, oil, etc.).

What is the expected schedule and sequencing of waste rock incorporation into road bed on NFS lands and what measures would be taken to avoid conflicts with other users? Please define who would approve whether waste rock is acceptable road surfacing for USFS, County, and private road sections. Please also specify final reclamation measures for the Palmer and Sin Ombre road.

47) Page 20, Section 6, Public Roads: Please define "significant analytical testing" and commit to providing a testing plan for agency approval prior to implementation or as part of a revised plan of operations. Waste rock testing should focus on acid generation and contaminant leachability. Based on the geology information in Appendix A-2, there are numerous rock types from which waste rock could be produced for utilization as road surfacing.

Please define the frequency of waste rock testing based on the predicted homogeneity or heterogeneity of waste rock to be produced. Based on test results, there may be certain rock units more or less suitable for use as road surfacing materials and certain rock units that may need to be stored in lined waste rock facilities. Is there any available analytical data from TVX's use of waste rock regarding ABA, leachability, etc. that could be used for comparison with new test data?

48) Page 20, first paragraph, fifth sentence: Show on a map or figure where the road over private property on patented mining claims is planned for improvement.

49) Page 20, first paragraph, last sentence: New roads would be needed to access monitoring wells, soil and waste rock piles and sediment and erosion control features. Please accurately depict all necessary access roads associated with the project.

50) Page 20, third paragraph, last sentence: Turnouts are not listed in total disturbance figures.

51) Page 20, second Bullet: Berms have not been included in disturbance totals.

52) Page 20, third Bullet: Slopes of 1.5:1 are hard to revegetate. Please consider 2:1 slopes except in bedrock. Please present a section on geologic stability to identity if cutting any roads in would destabilize the geologic formations and cause landslides, slumps, etc.

53) Page 20, fifth Bullet: Where would snow be stored?

54) Page 21, top of page, third Bullet: Please discuss use of gravel to maintain access in icy conditions.

55) Page 21, Section 7 (Exploration Roads): This section should include discussion of other roads necessary for the completion of the exploration project, including: roads to waste rock storage areas, roads to topsoil stockpiles, and roads to monitoring wells.

56) Page 21, first full paragraph, second sentence: Staging of materials upslope may be limited depending on the slope of the native ground. Please discuss the limits of the equipment and feasibility of construction. Staging material upslope during construction of the exploration road would most likely involve pioneering the road with an excavator and finishing with a dozer. Please clarify what equipment would be used in construction of roads.

57) Page 21, Section 8.2, last paragraph, third and fourth sentences: The length appears to be 350 + 365 = 715, not 795, as the length of the First Chance Adit. Please clarify.

58) Page 21, Section 8.2, Water: DEQ questions the assertion that very little water would be encountered during exploration operations. Although this section of the application states that the First Chance Adit encountered no water, documents in DEQ's files indicate that during the 1990s, the First Chance Portal discharged about 5 gpm, with a seasonal variation of about 1 to 10 gpm. Furthermore, Figure 6 of CMG's application indicates that the exploration decline would extend from a portal elevation of 8350' down to a lowest elevation of 7443,' which is similar to the elevation of the TVX Crevice Tunnel, which encountered significant groundwater inflows near the Palmer fault. The lower portion of the decline would be over 900' below the portal elevation, and nearly 500' below land

surface. DEQ believes that none of the referenced historic workings extend to similar depths. DEQ advises that CMG apply to install monitoring wells extending to the planned depth of the decline for purposes of baseline groundwater quality and elevation monitoring, aquifer testing, and groundwater flow modeling.

Please provide a conceptual hydrogeologic model to better demonstrate how groundwater moves through the project area and how groundwater and surface water interact in the project area, both at a regional and local scale. This model should include locations of existing and proposed adits, tunnels, and wells and illustrate connections (or lack thereof) between such features and proposed mineral exploration (inclusive of adits, LAD area, evaporation ponds, drill locations, waste rock piles, etc.).

59) Page 22, Table 1: The table combines the proposed Crevice adit portal and the proposed exploration decline together. Although the portal elevation is proposed to be located at the 8350' elevation, it should be noted that the exploration decline is proposed to extend down to an elevation of 7443.' The table should be revised and should note that little is currently known about potential groundwater conditions near the lower portions of the proposed decline.

Also, with regard to the First Chance Adit, records from the 1990's indicate a discharge of several gallons per minute from its portal. Water quality data were obtained from this discharge, and indicate substantially elevated arsenic concentrations. Table 1 also states that the TVX Crevice Tunnel encountered water "650 feet below base of the planned decline"; however, Figure 6 indicates that the base of the planned decline would be at 7443' elevation, slightly lower than the stated elevation of the TVX Crevice Tunnel. Please correct the table.

60) Page 22, Table 1, second row: Is the total feet driven on the First Chance Adit 795 or 715 feet (350 + 365) as identified above?

61) Page 22, Table 1: There is a discrepancy in the elevation between proposed crevice adit and TVX's crevice tunnel project. Please clarify (8350 - 7500 = 850 not 650).

62) Page 22, first paragraph below Table 1, first sentence: Please clarify what "104 degrees" represents.

63) Page 22, first paragraph below Table 1, third sentence: Please clarify the statement "nearly intersecting direction."

64) Page 23, Section 8.3, Sewage: Would there be waste water associated with the 'Dry' and if so, how would it be disposed?

65) Page 23, Section 8.6, Fuel and Lubricants: The containment sump of 44,800 gallons is more than 1.5 times the capacity of the 26,700 gallons to be placed within. Should the volume of the tanks be 26,800 gallons based on the list of tanks and their capacities given on the next page? Please clarify.

66) Page 23, Section 9: The section states that the "secondary" and "north" waste rock storage areas would be accessed by existing roads. What are the current widths of these roads, and would they require widening or other modifications to accommodate haul trucks and other heavy equipment traffic? If road improvements are necessary, associated acres of disturbance need to be disclosed.

67) Page 24, first full paragraph: This section describes collection ditches that would be constructed to route runoff from disturbed areas to the proposed sediment collection pond. DEQ assumes the referenced "disturbed areas" would include all haul roads and waste rock storage areas. The proposed location of the sediment collection pond does not appear appropriate to receive runoff from all of these sources. Runoff from these sources would be classified as "mine drainage" and may not be considered as storm water or discharged without appropriate permits. Please discuss.

Also, this section of the application describes up-slope diversions to route clean runoff away from disturbed areas. Please show all proposed diversion structures on a map, and include figures detailing their dimensions and capacities, as well as the associated "design storm event." Confirm that the proposed pond size is adequate to contain runoff from the design storm event, plus subsequent events (assuming the pond cannot immediately be drained via water disposal through evaporation or LAD).

68) Page 24, first full paragraph, second to last sentence: Please add drilling a well to the plan to be conservative. The Crevice project is within the Yellowstone National Park Controlled Groundwater Area, and any well drilling would require permits from DNRC.

69) Page 24, first full paragraph last sentence: What course of action would be taken if the surface water rights are not sufficient for make-up water requirements? Please provide details.

70) Page 24, List of facilities: What is the acreage associated with these facilities? The tank capacities add up to 26,800 gallons and 1.5 times this amount (or 50% surplus capacity) is 40,200, not 44,800 as stated previously. Please clarify.

71) Page 24, Section 10, first sentence: Please provide the 332,600 tons in LCY as it is more important to have volumes rather than weight. A decline 12 feet square by 25,700 feet long (taken the text, which is not the same length as scaled from the figures) produces 3,700,800 cubic feet of rock, not including the swell factor, which can be estimated at 35% or 4, 996,080 cubic feet, or 185,040 LCY (or 1.80 ton/LCY). Please clarify and correct.

72) Page 24, Section 10: This section states that approximately 332,600 tons of waste rock would be produced by the project. Figures 11 & 12 show storage for approximately 260,000 tons of waste rock in the three proposed surface storage areas. Of the remaining 72,000 tons of waste rock, how much would be left underground, and how much would be used for road surfacing?

73) Pages 24-25: The text states that waste rock "from outside the limits of the mineralized zone" would be tested for acid generation to prove that the material is inert, before being used for road construction. DEQ notes that acid generation potential testing is not sufficient to prove that waste rock is inert. Rock without acid generation potential may still leach some metals (such as arsenic) when exposed to water.

74) Page 25, first full paragraph, first sentence: Testing should not only include acid generation, but also metal solubility under neutral conditions, to prove the waste rock material is inert. Rock potentially suitable for road mix, after blasting would also be infused with nitrates and may not have a beneficial use. Also see comments in Public Roads and Acid Mine Drainage sections.

75) Page 26, Section 10: The text states that Crevice does not intend to haul the allowable 10,000-ton bulk ore sample (the limit allowable under an exploration license) off the site. Would any ore be hauled offsite during the exploration project? If not, would any ore be hauled to the surface and stockpiled during the exploration project?

76) Page 26, second paragraph: If CMG is not hauling off the 10,000 ton bulk sample, where is it going to be stored? Also, on page 10, first paragraph, there is a reference to "stopes" which implies mining. Please clarify.

77) Page 27, Section 11.1: The section states that the Crevice Mountain area is a "recharge area." If so, then where does precipitation that infiltrates into this area discharge? Note that TVX Mineral Hill's June 1996 "Plan of Operations – Upper Crevice Project-Exploration and Development Program" indicated perennial stream flow in an unnamed tributary to the Yellowstone River within the southern portion of the project area. This

implies that recharge within higher elevation portions of the project area may begin to discharge back to surface at lower elevations within the project area.

78) Page 28, top of page: The two local domestic wells (the Laubach well and the Johnson well) discussed in this section have static water levels of 65' and 83' below surface. This indicates that saturated conditions may be encountered at more shallow depths than assumed by CMG. Also, please note that review of DEQ files for the TVX Crevice Project indicates that the Morris (a.k.a. Standish) well is also located near the project area. Discussion of that well should also be included.

79) Page 28, middle of page (also, Page 22, bottom of page): CMG states "To provide makeup water at startup for the operation, Crevice will use existing surface water rights and all groundwater encountered." Please note that water encountered in the exploration decline and used for beneficial uses (such as drilling or dust control) may require a water right from DNRC.

Also, please note that the Crevice Project lies within the Yellowstone National Park Controlled Groundwater Area, and installation of any wells within that area may require review and permitting by Montana DNRC. Furthermore, please note that the decline itself may fit the definition of a well under DNRC's rules for management of the Yellowstone National Park Controlled Groundwater Area, and therefore construction of the decline itself may also require a permit from DNRC.

DEQ advises that CMG contact DNRC to discuss permitting requirements for the project. Please review the following references:
http://dnrc.mt.gov/divisions/water/water-rights/docs/cgwa/yellowstone_rules_procedures.pdf
http://dnrc.mt.gov/divisions/water/water-rights/controlled-ground-water-areas/usnps-montana-compact-yellowstone

80) Page 28, bottom of page: The text states "Groundwater encountered in the course of underground development will be managed as follows:", then lists 8 bulleted items. Note that the contingency plans to store excess water in the 200,500 gallon sediment collection pond would compromise the pond's ability to also store required volumes of runoff and sediment.

81) Page 29, top of page: The two bullet items on page 29 do not appear to be related to the subject header under which they were included (from page 28), i.e. management of water encountered during underground development. They address make-up water from surface or outside sources. Please delete.

82) Page 29, Section 11.2: Please show all diversion ditches and collection ditches on a map. Indicate all acreage that would contribute to these ditches and to water storage ponds. Provide the calculations to document that the pond(s) is adequately sized for a 25-year, 24-hour event. Discuss whether this sizing would be sufficient to contain rain-on-snow runoff events. What minimum freeboard would be maintained in the pond to ensure that the pond retains capacity to contain the design runoff event, even when partially filled with sediment and with water stored from previous storm events, water pumped from the decline, or water from other sources stored as make-up water?

In addition to ditches and other BMPs, please include details (in text and associated figures) for any storm water discharge features, and a plan to acquire the necessary permits from DEQ.

83) Page 29, Section 11.2: This section is described as addressing management of surface water runoff, but also includes discussion of groundwater (underground mine water) management. Please discuss these two topics in separate sections, or revise the section title and description.

84) Page 29, Section 11.2, Surface Water, fourth Bullet: What does "regularly" imply? Please clarify the time schedule.

85) Page 29, Section 11.2, Surface Water, fifth Bullet: Please provide details on how the water would be pumped from underground sumps to the proposed LAD sites (which may not be possible in winter months).

86) Page 29, Section 11.3.1, Baseline Water Quality Sampling: The spatial and temporal coverages of existing, available water chemistry data are limited and these data are not adequate to define baseline conditions. Appendix B-2 only includes the data from one grab sample of runoff collected during the spring of 2015. Past water sampling conducted by TVX (1992-1996) shows elevated concentrations of arsenic and other metals (e.g. Fe, Mn, Cr, Ni), particularly with respect to samples collected from historic or modern adit discharges. Sampling conducted during the 1990s often did not achieve currently required detection limits, nor did that sampling include analyses for all metals that may be a concern at that site.

Additional baseline water quality sampling in the project area would be required for surface and groundwater. Please submit a baseline data collection plan to DEQ for review and approval, ensure that a broad suite of trace metals and metalloids are included, and that currently required detection limits are achieved during analysis (see DEQ-7 (DEQ, 2012)).

Baseline data collection sites should be summarized on a spring and seep inventory / hydrologic features inventory map. Hydrothermal features, if any, within the inventoried area should be identified.

87) Page 30, first full paragraph, first sentence: Note that water that exceeds standards for arsenic (as described here with regard to the Crevice Adit) cannot be land applied without first treating the water to comply with standards. In Section 12 (Page 32, 1st bullet point), CMG does commit to only irrigating water that complies with standards; however, no treatment methods have been proposed in this application. Given that the limited baseline data available indicate that exceedance of arsenic criteria, and possibly other metals or nutrients, is a likely possibility, CMG should include plans for active treatment of water prior to discharge.

88) Pages 30 and 31, Section 11.3.2, Acid Mine Drainage: Although the 1300-level portal and the First Chance portal do not produce acidic drainage, they do contain elevated concentrations of arsenic that would require water treatment prior to discharge. Also, it should be noted that the TVX tailings impoundment continues to produce seepage that requires water treatment prior to discharge. Other trace elements, especially those that may be mobile in pH-neutral/alkaline conditions, should be added to the baseline sampling suite (e.g. Be, Sb, Se, Tl, U).

This section also states that the "sulfide content of ore averages 6-10% and 5%, respectively, and only a small percentage (approximately 5%) of total sulfides in each deposit is comprised of reactive species such as pyrite…" The other sulfide minerals are identified in Geology Appendix A-2 (Branham 2015), and include: arsenopyrite, pyrrhotite, marcasite, chalcopyrite, galena, and sphalerite. Even though the pyrite content may be comparatively low, all of the other sulfide minerals are known to oxidize to at least some degree in the presence of oxygen and/or ferric iron (Plumlee, 1999). Although this oxidation may not be sufficient to cause acidic portal discharge, the reaction products and any associated trace elements are still mobilized.

89) Page 31, Section 11.3.2, Acid Mine Drainage: DEQ recommends conducting additional testing of various rock types from the project area, including all waste rock and ore (3 vein types listed in Appendix A-2), following modern geochemical characterization guidance (e.g. the Global Acid Rock Drainage guide, www.gardguide.com). This should include static and kinetic tests, while utilizing the same analytical suite, laboratory methods (e.g. ICP-MS), and detection limits used for baseline water sampling. These tests could include whole-rock elemental analysis (acidic digestion of refractory minerals), acid-base accounting, precipitation leach tests (TCLP or SPLP), sulfur analysis (as % and speciation), and humidity cell testing. It is recommended that geochemical analyses are conducted on

exploration drill core to better determine whether ARD or contaminant leaching concerns need to be mitigated during exploration or mining phases.

90) Page 31, Section 11.3.3 first sentence: Change "needed" to "needing."

91) Page 31, Section 11.3.3, Water Quality Monitoring: The section states that water monitoring data obtained during exploration would be compared against "available baseline water quality." DEQ notes that sampling conducted during the 1990s did not occur at either the appropriate locations or at currently required detection limits or for sufficient parameters, and cannot be relied upon as sufficient baseline data for the proposed project. Please submit a baseline data acquisition plan to DEQ that outlines how adequate baseline data would be obtained prior to the initiation of development of the exploration decline.

92) Page 31, Section 11.3.3, first sentence: LAD Area needs baseline established to see if LAD would mobilize arsenic, nitrate, or other contaminants.

93) Page 32, first paragraph, fourth sentence: Full-scale characterization is needed now.

94) Page 32, Section 12, Land Application Discharge Area: Please note that monitoring wells would need to be installed adjacent to the LAD area, and sufficient baseline data obtained, prior to the initiation of development of the exploration decline.

95) Page 32, second paragraph, first sentence: Where would water be stored in the colder months when application at agronomic rates is not possible?

96) Page 32, Section 12: CMG states that the LAD area would be used only during the growing season and only at agronomic rates during dry conditions. Please provide a LAD operations and monitoring plan that addresses the length of the growing season at this location, irrigation water requirements by month that are appropriate for the type of vegetation in the LAD area, and a water balance that addresses anticipated runoff volumes from the disturbed area, water from underground, and anticipated water storage requirements to ensure adequate capacity of storage during seasons when LAD or evaporation are not appropriate.

    Also, please discuss water treatment processes that may be necessary to achieve discharge criteria, either to surface LAD or underground injection (drainfields). Excess water generated from this mineral exploration project could flow into surface streams or recharge the groundwater system, even with the LAD system. Both the groundwater and surface streams within the project area are likely connected to USFS water resources.

97) Page 32, Section 12, LAD Area: Within Section 11.1, the bedrock is described as low-permeability. Please clarify the use of a UIC well to dispose of water properly in such conditions.

98) Page 32, Section 12, LAD Area: Would there be a separate storage pond associated with the LAD area? If so, provide more details about its design, capacity, seasonal use, etc. How would water be applied on the LAD area (i.e. applied to vegetation with sprinklers, sprayers to promote evaporation, snowmaking, etc.)? Winter weather and high elevations create operational concerns for LAD systems and sediment detention ponds. What operational considerations would be made for that situation?

99) Page 32, Last paragraph, first sentence: Please note that it would be difficult to apply or install a drainfield on these steep slopes without run-off. Please address this concern.

100) Page 32, second Bullet: Change "Montanan" to "Montana."

101) Page 33, Section 13, Site Reclamation, first paragraph, second sentence: Please change "restoration" to "reclamation." It is unlikely that the site would be restored to its original condition after all activity ceases.

102) Page 33, Section 13, Site Reclamation: There is no mention of removing the buildings. Are they all considered temporary structures? Would any of them remain after closure for post-mined land use?

103) Page 33, Site Reclamation: More specific final reclamation design is recommended, including disposal plans for solid wastes from structures/facilities, waste rock pile slope ratios, topsoil depths, revegetation seed mix, and noxious weeds monitoring/ treatment. Please specify interim and/or concurrent reclamation measures to be utilized for topsoil stockpiles, road cut/fill slopes, drill pads, waste rock facilities, etc. Any NFS lands disturbed by project implementation would require a Forest Service approved seed mix for disturbed areas.

104) Pages 33-34, Section 13.1, Bonding Calculations: The DEQ did not review the provided bond calculation for deficiencies as DEQ would calculate a bond on this project if and when the exploration license is to be issued.

105) Page 36, Mitigating Measures: There is no discussion regarding site security measures. Would there be a security guard or security fence around surface facilities? How would CMG keep non-authorized visitors out and safe?

106) Page 36, Section 14.1, Air Quality, second paragraph, second sentence: The exploration area may not fall within a Class I airshed, but emissions from the project might enter Class I airshed, so it is recommended that CMG be very proactive with regard to minimizing emissions.

107) Page 36, Section 14.1, Air Quality, second paragraph, last sentence: "Crevice intends to develop and use three-phase grid power as soon as practicable." Would this require utility access across NFS managed lands? If so, a special use application and any clearing and maintenance needs should be submitted to USFS for permitting prior to the anticipated need.

108) Page 36, Section 14.4, Fish and Wildlife: The section lists Malin Creek as the nearest perennial stream to the Crevice site. DEQ notes that the USGS Ash Mountain quadrangle shows two other streams a similar distance from the site, draining the southeastern and southwestern portions of the project area southward toward the Yellowstone River.

Please provide a topographic map of the proposed project area that shows all proposed disturbances, including water diversion structures and that also delineates the watershed divides between these three watersheds within the project area.

109) Page 36, Section 14.4, Fish and Wildlife: It is recommended that CMG commit to implementing the USFS Grizzly Bear Food Storage Special Order.

110) Page 37, Section 14.5 Cultural Resources: The statement provided may be too inclusive. CMG should consider having a cultural survey conducted. In the very least, the application should include the results of a SHPO file search and a minimal description of the Mining History for the area.

111) Page 37, Hazardous substances: Please provide copies of MSDS to DEQ. This would assist in better management of any materials inadvertently released into the environment, both onsite and during transport to the site.

112) Page 37, Section 14.8, Water Management: DEQ does not concur that permitting of the LAD site can be deferred until after approval of the exploration plan. The proposal identifies a LAD area and UIC well as potential waste water disposal options (also in Sec. 12), but these options are not proposed with sufficient detail. A water management plan has not been provided, nor adequate geochemical test results or baseline water quality data, that would support a conclusion that mine drainage and runoff can be managed via evaporation or consumptive use, or could be discharged without treatment.

113) Page 37, 14.8, Water Management, first paragraph, fourth sentence: The LAD has to be part of the application, and not submitted at a later date, if and when, the exploration license is approved.

114) Page 37, Section 14.8, Water Management, last paragraph, last sentence: How would water quality be monitored regularly? Please be more specific, and provide details for a monitoring plan.

115) Page 38, Section 14.10, Fuel Storage, second paragraph, second sentence: DEQ suggests keeping the oil/fuel absorbing materials outside near the fuel bay rather than in the office for ready access. Include wording about spill reporting (> 25 gallons). In this section, please commit to fuel and lubricant and petroleum storage with secondary containment 150% of the stored substance. Currently this is only mentioned once in a single sentence (on page 24, after bullets).

116) Page 38, Section 14.11, Noxious Weed Control: Treatment of weeds before exploration activities begin, or else certainly before the flowering and seed setting times for noxious weed communities is recommended. Are there existing noxious weeds in the project area? If so, additional weed monitoring and treatment should be completed both during and after operations. Three years of control efforts may not fully address a situation with existing noxious weeds and multiple acres of exploration disturbance.

117) Page 38, Section 14.12, Transportation: Information pertaining to exploration traffic volumes (daily and annually), the types of vehicles, the frequency of deliveries, and the volume of workers commuting to and from the property during the various seasons of the year should be included in this section.

118) Page 39, Section 15, Project Schedule: DEQ suggests revising the Phase I schedule to include only the surface drilling and associated roads because to start development without adequate drilling information is pre-decisional. Phase II should include all the aspects of developing the exploration decline and in-fill/secondary drilling from the surface, if needed. Baseline and operational water quality monitoring should also be included in the Project Schedule.

119) Page 39, Project Schedule: DEQ recommends including final reclamation/closure as part of the schedule in the event that exploration and modelling results are not favorable. Also, noxious weed monitoring/ treatment should be included.

120) Page 39, last paragraph second sentence: Please replace “restoration” with “reclamation” as restoring the site to pre-disturbance conditions would be impossible.