Montana Department of
ENVIRONMENTAL QUALITY

Steve Bullock, Governor
Tracy Stone-Manning, Director

P. O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • Website: www.deq.mt.gov

December 9, 2014

Mr. Eric Detmer
Spring Creek Coal, LLC
Spring Creek Coal Mine
67 Lakeshore Drive
Decker, MT 59025

Permit ID: C1979012
Revision Type: Major Revision
Permitting Action: Deficiency
Subject: TR1; Second Round Acceptability Deficiency

Dear Eric:

The Department of Environmental Quality (DEQ) has completed its acceptability review regarding Spring Creek Coal, LLC's deficiency response for Major Revision (TR1) application. The following deficiencies must be adequately addressed before DEQ can determine the application acceptable:

ARM 17.24.302(1): There are typos in the narrative for the OB6 stockpiles. The final pit is not P6E8, stockpiling of spoil will not begin in 2027, and stockpile OB4-5 is not properly identified.

ARM 17.24.305 MAPS: Volume 3, 313 Addendum D – Plates 1 & 3 (Premine) needs to be included in the submittal.

Volume 3, Plate 5, Mine Plan – There is a typo in the text near P2E62 that reports a mining timeline of 2025 – 3030.

ARM 17.24.313(1)(b): Regarding Plates 5 and 6, there appears to be a timing problem in Pit 6 between Plates 5 and 6. The mining and reclamation are scheduled for the same end date: year 2024.

ARM 17.24.314: Appendix L, PHC

While a great deal of work has been done on the PHC, the document still lacks the quantified assessment of probable hydrologic consequences that is needed to fully assess the impacts of mining on the hydrologic balance. The following list includes typos that require fixing and suggestions for how to improve the document.

Page L-2, last paragraph. Pit 6 is omitted from the list of mining pits.

Page L-5, Section 3.2. It appears an outdated 30-yr average is cited for average annual precipitation. Please use the new 30-yr average available from the WRCC's website.

Page L-5. Section 3.2. The maximum precipitation is noted to have happened in 2005. From the data presented in Figure 3.2-2, 2011 clearly received more precipitation that year. Please adjust accordingly.

Page L-5. Section 3.2. The average precipitation of 9.9 inches seems low, especially when looking at Figure 3.2-2. DEQ calculates an average annual precipitation around 10.6 inches per water year (10.67 for the calendar year) from 1980 to 2012.

Page L-10. Table 4.1.2-1. This table may be misleading. Some stations are a mixture of premining and during mining flows, such as the CS and RS stations. Therefore, the mean annual flow is a mixture of 'natural' and mine impacted flows which does not meaningfully represent the characteristics of the 'natural' surface water system. This table also compares different time ranges and climates which can also be confusing. For instance, the Pearson Creek stations all experienced very large flows from events in 2011 which greatly increased their mean annual flow, but the RS stations, on a much larger drainage area, were not recording in 2011. Therefore, the table shows a misleading conclusion that the Pearson Creek drainage has more water move through it on average than the Spring Creek drainage. Please rethink how these data are presented and how they are used in the PHC.

Page L-10, first paragraph. It is stated that flows ranged from 0 ac-ft to 48 ac-ft per year, but the table shows that the range should be from 0 ac-ft to 89 ac-ft per year.

Page L-12, Section 4.1.3. Statements are made about a correlation between low TDS and large discharge events. Please elaborate by demonstrating the relationship via a graph and also exploring the seasonal variation of TDS and TSS. For instance, is it all large events that have low TDS or is it large events in the spring?

Page L-12, Section 4.1.3. The time concentration plots would be more useful if somehow the seasonality was shown on them or in the data.

Page L-28, Section 4.2.1.3. Please include or reference a map showing the faults in relation to the features discussed.

Page L-29, second paragraph. The hydrologic conductivity of 0.1 to 0.5 gpd/ft^2 does not agree with the numbers presented in Attachment 6, Table 5. Also, please be consistent with units in this document. Both gpd/ft^2 and ft/day are used for hydrologic conductivity.

Page L-29, second paragraph. Do the pit inflows vary by pit? It seems like there might be great variation in inflow because of the faults and the relative location of clinker.

Page L-30, first paragraph. The hydrologic conductivity of 0.025 ft/day to 0.553 ft/day does not agree with the numbers presented in Attachment 6, Table 5.

Page L-30, last paragraph. Please note the spatial relationship between AD-5 and CN-3 with respect to the Spring Creek fault.

Page L-30 and L-31. It is stated that the Canyon and A/D coals are in contact in short sections across the Carbone fault. According to the cross section in Appendix I, the groundwater model, and well logs, it appears they are only in contact across the Spring Creek fault.

Page L-31, last paragraph. The units for the hydrologic conductivities should be checked. These values seem more indicative of ft/day and not gpd/ft^2. Also, the groundwater model uses an overall larger hydrologic conductivity for the overburden.

Page L-33, Section 4.2.3. The groundwater quality section doesn't provide a quantitative description of water quality as should be included in a comprehensive PHC.

Page L-33, Section 4.2.3. The classifications of groundwater are not actually the standards.

Page L-34, last paragraph. If TDS is going to be used as in indicator of changes in water quality, some explanation must be provided as to why it is a good indicator. A graph showing changes in major cations and anions with respect to TDS would be helpful. Also, does the ratio of analytes stay the same as TDS increases or is it one analyte that dominates the increase. This is important because some analytes may pose more of a risk to certain water uses (e.g. cattle are more sensitive to increases in sulfate vs increases in cations).

Page L-35. The reasoning given for the choice of wells to include in Attachment 2 is fairly weak. It would be better to have up gradient and down gradient wells that show impacts from mining and wells that are removed from mining that show climatic variations. If use of the system presented in the PHC uses is continued, then the lack of wells for certain strata in certain zones must be thoroughly explained. As it currently is written, it appears that there is inadequate monitoring for certain geologic units.

Page L-35. Zone 3 is characterized as southeast of the Carbone fault. This should be the Spring Creek fault.

Page L-41. "Most of the monitoring wells at both SCM and Decker Coal have not been included on the plate." Please explain why some are included or excluded.

Page L-49, Section 5.0. The last sentence is a fragment.

Page L-52, Section 5.1.2.1. Quantify the statements "The Spring Creek drainage comprises a very small portion of the Tongue River drainage..." and "the loss of water to that system is not significant".

Page L-53, second paragraph. Quantify "relatively small drainage areas".

Page L-53, second paragraph. State the year "measuring began on Pearson Creek".

Page L-55, Table 5.1.2.3-1. Explain what U/S and D/S means.

Page L-55, Table 5.1.2.3-1. There appears to be a typo in the table where South Fork Pearson Creek has a -90% change in runoff volume due to a reduction from 331.6 ac-ft to 31.6 ac-ft of runoff volume.

Page L-59, third sentence. The statement "Porous rock outcrops may tend to increase unit runoff rates" does not appear to be consistent with what occurs, please revise this statement.

Page L-61, Table 5.1.3.3-1. The average water quality from all spoil wells may not be the best comparison because TDS tends to climb through time. Therefore, the average is not representative of the maximum spoils concentration. It may be better to only use data from the current year.

Page L-65, last paragraph. It would be beneficial to show a hydrograph that illustrates that "Mining in Pits 1, 2, and 3 appears to have had little if any effect on water levels within the Pit 4 area".

Page L-65 to L-66. Wells 502, 505, and 506 are not shown on Plate. Please add these to the plate and reference the plate name and number when talking about them. Also, are these known to be Anderson-Dietz wells and were these wells used by the mine?

Page L-65, first paragraph. Is there any thought on why the water levels were 50 ft higher in WD349W and WD349W4? Is there any evidence of resurveying the measuring point or of gas in the well artificially raising the level?

Page L-71, first paragraph. Explain why the water levels in the spoil wells are all above the final predicted level and appear to still be climbing. Is there something wrong with the model that leads to under prediction or is there an artificial source of recharge, such as leaking ponds that are creating higher levels in some of the spoil wells?

Page L-71, second paragraph. The water level recovery is stated to be exponential, but so far it doesn't look exponential. Please explain why the recovery is not as predicted.

Page L-72. "...this pit is located between two faults". Are these faults going to be destroyed by mining, and if so, what are the implications to groundwater flow and recovery. The groundwater model assumes the faults remain.

Page L-72. "In addition, the water level comparisons ... for the spoil wells show that the current spoil groundwater elevations ..." This sentence implies that there are spoil wells between the two faults, but there are none.

Page L-73. Please give a reason why "The rate and direction of flow should eventually equilibrate to near pre-mine water table conditions" (is this believed because of results from the groundwater model, from observations of spoil wells on the mine, etc.).

Page L-73, last paragraph. If the statement that "TDS concentrations in backfill aquifers are generally greater than in the coal aquifers they replaced" is going to be used, then provide an example from spoils, from any mine that has reached equilibrium which shows this to be true.

Page L-75. It is stated that TDS will decrease to an equilibrium level after one or more pore volumes of water pass through the backfill. Is there any idea of approximately how long it would take to reach equilibrium based on the aquifer properties of spoil and the average recharge rate of the spoils?

Page L-75. The Clark paper is used to suggest that TDS decreases as water moves from the backfill into unmined coal. Please attempt to quantify the distance needed to create an immeasurable change in water quality.

Page L-75, first paragraph. "...reclassification of the groundwater to a lower usage class". This should probably read "...reclassification of some of the groundwater to a lower usage class".

Page L-75, first paragraph. Explain further why "No current groundwater users are expected to be affected".

Page L-75, second paragraph. The reference to Van Voast and Thompson needs a citation.

Page L-76, first paragraph. Please state which wells are being discussed in the sentence "...data from wells discussed above".

Page L-76, first paragraph. The statement about graphs showing increasing and decreasing TDS trends would make more sense if they were discussed in relation to the spoils and to mining – up gradient and down gradient wells in various aquifers. Also, the statement about TDS in relation to active mine pits should give an explanation for the affect. Is it drawdown, spoils, or something else?

Page L-77, first paragraph. Please provide a reason for the increase in TDS at well 504AQW.

Page L-77, first paragraph. The Van Voast and Thompson paper that is used predicted an increase in TDS from 2290 mg/L to 4230 mg/L. This is an 84% increase. How is the 34% increase an approximation to the values predicted by Van Voast?

Page L-77, last paragraph. There are contradictory statements in the paragraph regarding the relationship between water quality and water level. At one point, no correlation is assumed while at another point a correlation is assumed.

Page L-77, last paragraph. State the premine value that TDS is trending towards in well 81-115-IBW. It is not clear from the graph.

Page L-78. State which aquifer well WD326WP is completed in.

Page L-79, second sentence. Was the word significant or insignificant meant in the sentence that "leaching soluble salts from mine backfill with high TDS groundwater is significant". If it is a

significant effect, much more discussion will be needed on impacts. If it is insignificant, then some quantification is needed.

Page L-79, first paragraph. How were the premine overburden samples prepared? Is EC determined from paste extract?

Page L-79, first paragraph. The truncated numbers of 7 and 7.6 umhos/cm should be fully written out to 7,000 and 7,600.

Page L-79 to L-81. The arsenic discussion includes a history of the timeline when arsenic standards changed. While this is relevant to understanding why arsenic was not considered a high priority concern in the past, it does not change the analysis for potential future arsenic problems. There needs to be a discussion as to the source of the arsenic and the reason why arsenic occasionally appears in various wells. What is the mechanism that makes arsenic occasionally mobile, and is the mechanism caused by mining activities? Is there any reason to believe that arsenic will occur less frequently or more frequently on the mine in the future?

Page L-80, first paragraph. Why would improper well construction affect arsenic concentrations?

Page L-81, first paragraph. Why is arsenic in the area around well 504AQW? Is there a potential for other areas of the mine to experience similar problems with arsenic?

Page L-81, first paragraph. There is no mention of well SP-1 which also has had high arsenic concentrations.

Page L-81, first paragraph. The statement that arsenic is not a significant concern in the A/D coal is a bold statement that needs to be backed up by geochemical data and analysis.

Page L-81, first paragraph. Why are concentrations highest in new wells and then decrease?

Page L-81, first paragraph. List the wells that are discussed in the sentence "...some wells with confirmed arsenic presence are located hydrologically up gradient...".

Page L-85, first paragraph. The use of AD-14, 2110-80, and 79100WCP may not be appropriate for demonstrating the attenuation of high TDS. From the potentiometric maps in the Annual Hydrology Report, it is not clear that water from 79100WCP would move to AD-14. Also there is no evidence given that there has been enough time for water from spoils to move to the farthest well.

Table 5.2.1-1. What is this table really trying to show? There are several different start and end dates so drawdown at one well cannot be compared to drawdown at another. This data may be better presented as a series of potentiometric maps or hydrographs.

<u>Appendix L, Attachment 2</u>
Pages L-2-54 through L-2-60 are duplicates of other graphs in the attachment.

Appendix J

Page J-5, Section 3.1.1. The size of the drainage basin (8.7 sq. mi.) does not agree with the size calculated by DEQ, which is ~37.7 sq. mi. The same size is also used in Appendix I.

Table J-5. The 10-yr, 24-hr volume for structure 1 should be 19.24 and not 9.24.

Table J-6. The numbers in the table do not appear to match the numbers in Attachment J-2.

Appendix I

The figures and tables are missing, but DEQ presumes these will be included in the final copy.

The SEDCAD structures were changed from the last submittal, but a revised Plate I-4 was not submitted.

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Page 313-10. Please update the acres of wetlands disturbed from 2.6 acres to 3 acres as shown in Table 313-3.

82-4-231(1), MCA and ARM 17.24.601(1), 631(1) and 638(2)(a): The operator must reclaim as rapidly, completely, and effectively as the most modern technology allow. In addition roads must not delay reclamation and the amount of disturbance must be minimized. In regard to these standards, there are a number of issues that must be addressed.

- Stockpile OB6-2 must be relocated if at all possible. The stockpile is proposed to be located in the middle of South Fork and would disturb some hard to replace steep topography and drainage bottoms. It is proposed to overlap Pond #48 without any other planned sediment control. DEQ suggests storing more material in OB6-1 and OB2-1: larger foot prints would need to be shown. In addition, if Pit 6 could be mined with only one ramp, more out-of-pit material could be stored in the adjacent pit or in the areas identified as Soil Pile 4 and the Equipment Storage Area. Additional material in OB6-1 may be left permanently with revisions to the PMT plan. Additionally, it appears that the footprint for OB6-2 overlaps with Pond 48. This needs to be resolved and additional sediment control provided.

- OB1-1 foot print is depicted on the map at ~75 acres instead of the 25 acres as specified in the narrative. OB1-1 would be only about 27' tall with the proposed 3.3 million yards of storage. The excess spoil capacity in OB1-1 could be filled with OB2-1 leaving more room for OB6-2 material.

- Stockpile OB2-2 must be relocated if at all possible. This pile is proposed in an unmined area. Ramps 22 and 23 are located under part of a large postmine hill. These ramps create large voids in the spoil during operations where the pmt hill could be built and, therefore, may limit timely final deposition of spoil and increase the amount of out-of-pit spoil. Ramps

20 and 25 could be used instead. Deleting Ramps 22 and 23 may speed up reclamation. Note: Plate 6 would need to be changed.

- Another replacement area for OB2-2 could include a shallow pile on top of coal in the advance of mining in the low cover areas within Pearson Creek and within the highwall borrow areas south of the final pits. If worked into the mining plan, stockpiles on top of coal could be rehandled a little at a time and, as most stockpiles are destined to the final pit, it seems the borrow areas would be ideal unless mining is to be extended south.

- Spring Creek should consider one ramp instead of Ramps 18 and 19.

- MR 199 changed plans for mining in Pit 3. If this affects the proposed plan for stockpile OB3-1, the application must be changed. It seems the PMT could be changed and OB3-1 could be left in-place and part of OB4-4 could be used to fill the final pass in Pit 3. This will speed up the reclamation schedule in this area but would require a change to Plate 4, PMT map.

Upon receipt of satisfactory responses to these deficiencies, DEQ will determine the application to be acceptable.

Please feel free to contact Robert D. Smith at 406-444-7444 with questions regarding this letter.

Sincerely,

Chris Yde, Supervisor
Coal and Uranium Program
Industrial and Energy Minerals Bureau
Phone: 406-444-4967
Fax: 406-444-4988
Email: CYde@mt.gov

C: Jeff Fleischman, Office of Surface Mining
Lauren Mitchell, Office of Surface Mining

FC: 620.403 (TR1)