March 11, 2015

Mr. Chris Yde, Supervisor
Coal and Uranium Program
Industrial and Energy Minerals Bureau
Montana Department of Environmental Quality
PO Box 200901
Helena, MT 59620-0901

Permit ID: C1979012
Revision Type: Major Revision 2nd Round Response Submittal
Permitting Action: Application
Subject: TR1; 2nd Round Acceptability Deficiency Response

Dear Chris:

The purpose of this letter is to respond and address the second round deficiency comments on Spring Creek Mine's (SCM) major revision permitting action known as TR1.

**Background**

SCM submitted minor revision (MR) 168 on March 2nd, 2012 which included adding recently leased coal reserves in tracts known as LBM I and LUL in Pit 2. SCM received the 1st round deficiency comments on June 1st, 2012 which primarily consisted of post-mine topography (PMT) and overburden stockpile comments. After several PMT revisions and meetings with Department staff, SCM responded to the 1st round deficiency comments with a revised PMT on November 7th, 2012.

SCM met with Department staff to discuss the PMT concerns and major/minor revision categorization on January 9th, 2013. During that meeting, the primary concern raised by the Department involved methods used for defining minor tributary drainages.

SCM received the 2nd round deficiency comments on February 5th, 2013 which focused only on methods used for defining minor tributary drainages. SCM meet and reviewed the comments with Department staff on February 28th and on April 3rd. SCM responded to the 2nd round deficiency comments on May 4th, 2013.

SCM received the 3rd round deficiency comments for MR 168 on June 12th, 2013. These deficiency comments focused primarily on comparing pre and post minor tributary numbers. SCM received a determination letter on July 30th, 2013 stating MR 168 must be resubmitted as a major permit revision because the projected bond increase is 9.3% and the projected disturbance increase is 17%. SCM responded to the 3rd round deficiency comments on September 30th, 2013 as the initial TR1 Major Permit revision submittal. SCM received completeness determination on December 6th, 2013.

On April 1st, 2014 SCM received the 1st round deficiency response as a major revision containing 67 comments primarily related to the premine (Appendix I) and postmine hydrology (Appendix J) and the Probable Hydrologic Consequence (PHC) (Appendix L). SCM meet with



FC: 620.403 (TR1)

Department staff to review the draft deficiency responses on May 15th and on August 6th 2014. SCM responded to the 1st round deficiency comments on August 14th, 2014.

**Current Submittal**

SCM received the 2nd round deficiency comments on December 8th, 2014 containing 78 deficiency comments primarily related to the PHC and overburden stockpile locations. SCM met with Department staff on December 11th 2014, and in February 2015 on the 13th, 20th, and on the 24th to review draft deficiency responses. SCM also meet with Department staff on March 3rd 2015 to review the Phase I Arsenic study and discuss planned revisions. During the March meeting it was discussed and agreed upon SCM will address deficiency comments 57 through 63 related to arsenic with a submittal of Attachment 9 (Arsenic study) to the PHC. SCM appreciated the opportunity to review the draft deficiency responses over the past few months with department staff.

**Submittal Contents**

As discussed with MDEQ personnel, this response also includes a *PDF version showing only the changes since the last revision* to aid in the review of the proposed changes. The live Word files show all changes made compared to the current permit if viewed with tracked changes. All file dates for documents revised for this submittal include the reference "20141231_TR1". The submittal maintains the permit electronic file structure with the live and PDF files in each folder. All AutoCAD drawing files are complete and contain a major revision filter so all layers changed can be easily viewed.

Table 1 below is the index of changes for this submittal which includes, what was revised for each deficiency comment, a brief description of the change, and a list showing which comment responses have changed since the draft reviews.

The pages following the index of changes list the deficiency and responses to all comments received except for comments 57 through 63 which relate to arsenic as discussed above. SCM will address these comments in a future response through the submittal of the new Appendix 9 "Arsenic Study" of the PHC.

We look forward to working with the Department on this permit revision. Please call me at (406) 757-4236 if you have any questions.

Sincerely,

Gabe Johnson
Environmental Engineer

Enclosures – none
cc: CF 5.2.4 (SCM-15)

## Gilbert, Sharona

**From:** File Transfer Service <no-reply@mt.gov>
**Sent:** Wednesday, March 11, 2015 3:36 PM
**Subject:** State of Montana File Transfer Service

# State of Montana File Transfer Service

The following file has been sent to you through the State of Montana File Transfer Service:

**File Name:** SCM TR1 2nd Rnd Res 3-11-15.zip
**Sent From:** Gabe Johnson
**Message:** Hello, Please see the 2nd Round deficiency response for major permit revision TR1. Please let me know if things don't download properly. Sincerely, Gabe

To download this file, login to the State of Montana File Transfer Service.

The Transfer Service uses the ePass Montana sign-on to state online services. First-time public ePass users should click the "**Create an Account**" button when taken to the login page. First-time state employee ePass users should click the "**Montana State Employees**" link.

*Replies to this email are not monitored.*

**transfer.mt.gov**

**Table 1. Index of Changes**

| Comment # | Permit Section/ Plate | Revision Summary | Changes Done Since Draft Review? |
|---|---|---|---|
| 1 | 313 & Plate 5 | Revised typo, update Pit #6 timing from MR 199 | No |
| 2 | Vol 1B Plates 1 & 3 | No changes, resubmitted for review | No |
| 3 | Plate 5 | Revised year range | No |
| 4 | Plate 6 | No changes | No |
| 5 | App L Text | Added Pit 6 to text | No |
| 6 | App L Text | Revised 30 year average | No |
| 7 | App L Text | Max precipitation revised for 2011 | No |
| 8 | App L Text | Revised average precipitation | No |
| 9 | App L Tbl | Table 4.1.2-1 revised | Only to text |
| 10 | App L Tbl | Table 4.1.2-1 revised | No |
| 11 | App L Text | No seasonal correlation for TDS or TSS | Yes |
| 12 | App L Attach 2 | Added seasonality to plots | No |
| 13 | App L Figure | Added new figure 4.2.1.3-1 | No |
| 14 | App L Text | Revised hydraulic conductivity to match | No |
| 15 | App L Text | Removed text | No |
| 16 | App L Text | Revised hydraulic conductivity to match | No |
| 17 | App L Figure | Text & added new figure 4.2.1.3-1 | No |
| 18 | App L Text | Revised text to show Spring Creek | No |
| 19 | App L Text | Referenced App I hydraulic conductivity | No |
| 20 | App L Tbl | Table 4.2.3-1 shows Class for each well | Yes, removed (WD-378-OBW & WD-398-A) locations unknown |
| 21 | App L Text | Revised text to say “values” | No |
| 22 | App L Figure & Text | Text & Figure 4.2.3-1 TDS analyte comparison | No |
| 23 | App L Attach 3 & Text | Text & Attachment 3 | Yes added Plate 8 (alluvial wells); plates match tbl 4.2.3-1 |

**Table 1. Index of Changes Continued**

| Comment # | Permit Section/ Plate | Revision Summary | Changes Done Since Draft Review? |
|---|---|---|---|
| 24 | App L Text | Zone 3 reference removed | No |
| 25 | App L Text & Tbl | Known monitoring wells have been removed from the tbl and Plate L-1; all SCM owned wells shown as one layer type on Plate L-1 | Yes |
| 26 | App L Text | Text revised | No |
| 27 | App L Text | Drainage area quantified | No |
| 28 | App L Text | Drainage area quantified | No |
| 29 | App L Text | year stated | No |
| 30 | App L Text | Abbreviations written out | No |
| 31 | App L Tbl | Typo in table revised | No |
| 32 | App L Text | Text revised to say “decrease” | No |
| 33 | App L Tbl | Avg removed, min/max & sulfate added | No |
| 34 | App L Attach 3 | Plates show GW levels related to faults | No |
| 35 | App L Plate & Text | Wells added to Plate L-1 and text; only well 506 was completed in A/D coal | Yes |
| 36 | App L Text | 500 series wells possibly influenced 50’ drop, but can’t know for certain | Yes |
| 37 | App L Text | text revised to provide explanation | No |
| 38 | App L Text | Text revised to discuss general trends | Yes |
| 39 | App L Text | Fault impeding flow will remain after mining | Yes |
| 40 | App L Text | New paragraph started to provide clarity | No |
| 41 | App L Text | Text revised to provide clarity | Yes |
| 42 | App L Text | Text revised to remove this statement | No |
| 43 | App L Text | TDS level changes text revised | Yes |
| 44 | App L Text | Current monitoring data does not support statement, statement revised | No |
| 45 | App L Text | Revised text to state “some” | No |
| 46 | App L Text | Distance to nearest user added | No |
| 47 | App L Text | Text reference added | No |
| 48 | App L Text | Text removed for clarity | No |
| 49 | App L Text | Section 5.2.2 text revised & Attach 3 | No |

**Table 1. Index of Changes Continued**

| Comment # | Permit Section/ Plate | Revision Summary | Changes Done Since Draft Review? |
|---|---|---|---|
| 50 | App L Text | Text revised referencing Attach 3 | No |
| 51 | App L Text | Study not applicable to SCM, text removed | No |
| 52A | App L Text | Well WD326WP discussion lengthened | No |
| 52B | App L Text | Premine value added to text | No |
| 53 | App L Text | Well WD326WP was completed in A/D | No |
| 54 | App L Text | Text revised to state “insignificant” | No |
| 55 | App L Text | Text revised after reviewing baseline docs | No |
| 56 | App L Text | Numbers written out | No |
| 57-63 | App L Text | Will be addressed with Arsenic Study (Attachment 9) | No |
| 64 | App L Text | Comparison wells changed and discussion revised | No |
| 65 | App L Tbl | Table 5.2.1-1 replaced with Attach 3 | No |
| 66 | App L Attach 2 & 3 & Text | Attachment 3 replaced pages in Attachment 2 | No |
| 67 | App L Text | Spring Creek drainage area revised | No |
| 68 | App J Tbl | Table J-5 number revised | No |
| 69 | App J Tbl | Table J-6 numbers revised to match HEC-RAS in Attachment J-2 | No |
| 70 | App I Text | Tables and figures will be provided in final copy | No |
| 71 | App I Plate I-4 | Submitted for review | No |
| 72 | Vol 1 313 | Acreage rounded as requested | No |
| 73 | Vol 1 313 | OB6-2 narrative revised | No |
| 74 | Vol 1 313 | OB1-1 narrative revised | No |
| 75 | 313, Plate 18 | Dragline corridor roads labeled | No |
| 76 | Plate 18 | No changes | No |
| 77 | Plate 18 | No changes | No |
| 78 | Vol 1 313 | OB3-1 narrative revised | No |

# Response to 2nd Round MDEQ Deficiency Comments to Major Revision TR-1

*Spring Creek Mine (SCM)*

SMP #79012

Comment #1

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.

*Response #1*

*The Pit #6 alignment has been revised to incorporate the changes from recently approved MR199. The text has been revised as well as shown below.*

**Overburden Stockpiles OB6-1:**

Mining in Pit 6 at the end of mine life includes a final pit to be reclaimed on the north side. The topography in this area includes two large hill features. Stockpile OB6-1 will be constructed to reclaim these hill features to meet AOC requirements. The stockpile is located immediately north of the Pit 6 area. Approximately 4.5 million LCY will be placed in this stockpile beginning in approximately 2016. The stockpile footprint is approximately 63 acres and will not delay reclamation, but will slightly accelerate otherwise planned disturbance, because it will be constructed on native ground, and will not be reclaimed until the end of mining in Pit 6.

*Overburden stockpile OB4-5 is the renamed currently approved OB-A stockpile and is discussed in narrative in Section 313. The narrative for this pile has been updated and revised for simplicity as shown below.*

**Overburden Stockpile OB4-5:**

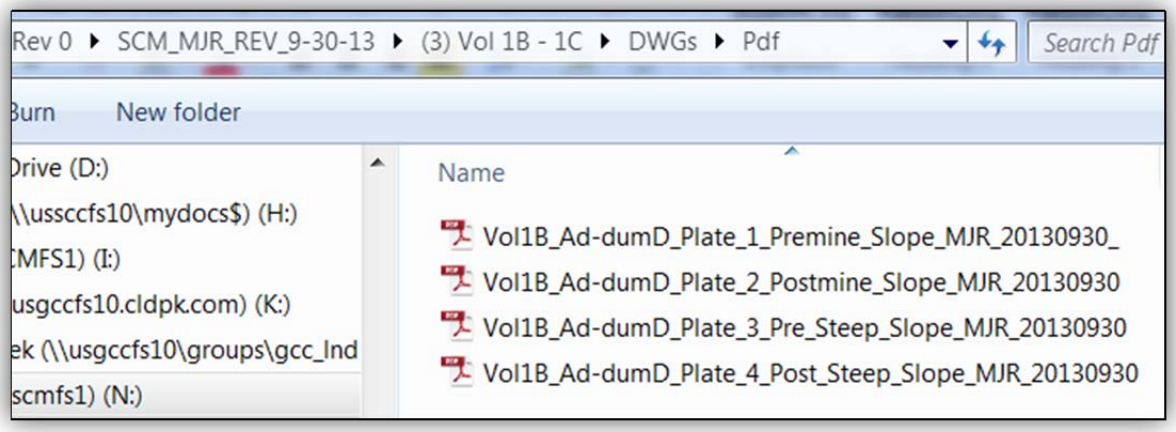
Sodium levels in Pit 4 require a divided mining sequence. As a result, coal mining is advanced in three separate pit areas (Pit 4 N and two areas in Pit 4 SE). For example, the SW portion of Pit 4 will advance before the SE portion. Pit 4 mining began in the Spring Creek drainage and has progressed north and south away from the drainage. In general truck/shovel prestripping increases as mining progresses north and south away from the drainage. Because of this and the divided mining sequence, nearby backfill areas are not always available to accept the prestrip material. Therefore, to avoid waiting for backfill room to become available (and conflict with contemporaneous reclamation requirements) the prestrip material from in Pit 4 South will be hauled north east past the final pit to an out of pit overburden stockpile "known as OB4-5". The stockpile footprint is approximately 37 acres and will not delay reclamation, but will slightly accelerate otherwise planned disturbance, because it will be constructed on native ground, north of the final pit, inside the borrow area.

Comment #2

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

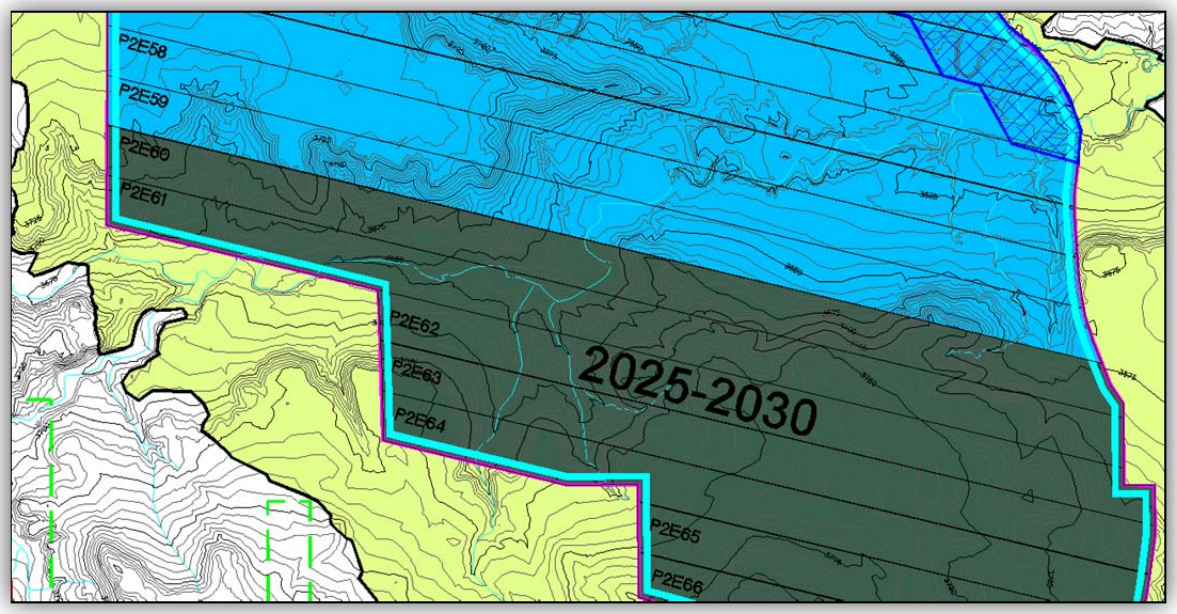
*Response #2*

*Those maps were submitted with the initial submittal of TR1 on October 31, 2013. Please see the image below.*




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

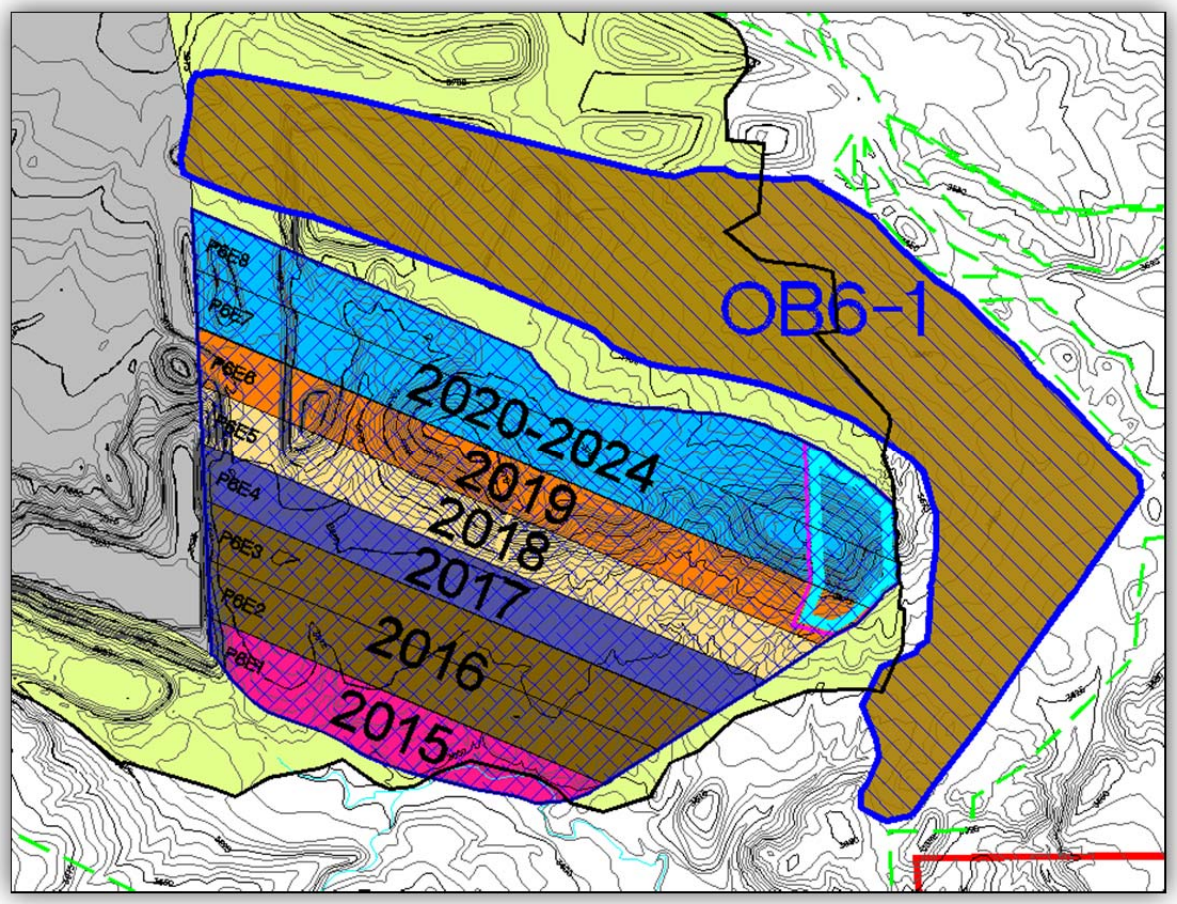
*Response #3*
*This text has been revised in the modified Plate 5 as shown in the image below.*




Comment #4
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.

*Response #4*
*The date range is five years 2020 through 2024. Because Pit #6 has a short pit length, backfill to PMT will be accomplished in a short time period for the final pit allowing subsequent reclamation to occur. As mentioned above, the coal blocks and mining sequence have been updated from MR199,*

*however the last (most northern) blocks are still estimated to be in the 2020-2024 time period as shown in the figure below.*




Comment #5
Page L-2, last paragraph. Pit 6 is omitted from the list of mining pits.

*Response #5*
*Pit 6 has been added to the list as requested. See the text changes below.*

Mining in the permit area includes ~~four~~ five distinct pits, Pit 1 (west), Pit 2 (east), Pit 3 (middle), ~~and~~ Pit 4 (north), and Pit 6 (east) all of which are located within the valley floors of

Comment #6
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.

*Response #6*
*An updated 30-year average has been taken from WRCC data and incorporated into the text as requested. See the text changes below.*

spring months of May and June. The lowest precipitation month is February. ~~Since 1971,~~ ~~t~~The average annual precipitation was ~~13.57~~12.77 inches (1970-1999), ~~14.53~~14.68 inches (1984-2013), and ~~12.05~~11.21 inches (1975-2004) for the Birney, Busby, and Decker stations, respectively.

Comment #7
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 is clearly a higher precipitation year. Please adjust accordingly.

*Response #7*
*The text has been revised to show that the maximum precipitation of 22.3 inches occurred in 2011. See the text changes below.*

Figure 3.2-2 shows annual precipitation data measured at SCM. Since precipitation measurements began in 1980, the annual precipitation at the mine has had a maximum of ~~18~~ 22.3 inches in ~~2005~~2011, and a minimum of 5.4 inches in 1988. Based on the

Comment #8
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 around 10.6 inches per water year (10.67 for the calendar year) from 1980 to 2012.

*Response #8*
*The most recent values for annual precipitation have been added to the average annual precipitation calculation. The text has been revised to state that the average annual precipitation is approximately 10.75 inches per year. See the text changes below.*

~~18~~ 22.3 inches in ~~2005~~2011, and a minimum of 5.4 inches in 1988. Based on the precipitation measurements at the mine, the average annual precipitation is approximately ~~9.9~~10.75 inches per year.

Comment #9
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 this data is presented and how it is used in the PHC.

*Response #9*
*Table 4.1.2-1 has been revised and renamed "Surface Water Flows Upstream of Mining." Information for the minimum flow value and the mean annual flow has been removed. Also, stations which have been impacted upstream by mining have been removed from this table. An additional table (Table 4.1.2-2) has been created to show the impacted flow monitoring stations. This table shows only the period of record and the number of flow events. As a result of this comment, the text has also been revised to reference the Annual Hydrology Report. See the new tables and the revised text below.*

A continuous monitoring station of the Pearson Creek upstream drainage, station PC-2, is planned for installation and data from the new monitoring station will be used in future updates of Table 4.1.2-1. The locations of these sites are shown on Plate 1 in the SCM Annual Report of Hydrologic Monitoring.

Table 4.1.2-1. ~~Surface Water Flow Summary (Through '12-13 SCM Annual Hydro Report)Premine Surface Water Flows~~Surface Water Flow Upstream of Mining

| Station | Drainage Area (acre) | Max Flow (cfs) | Period of Record | Number of Flow Events |
|---|---|---|---|---|
| CB-2 | 5,331 | 1380.7 | 08/26/96-9/20/13 | 153 |
| SF-1[1] | 3,859 | 16.7 | 01/12/99-9/20/13 | 30 |
| SF-2 | 576 | 13.0 | 01/12/99-9/20/13 | 20 |

[1] SF-1 replaced with SF-1R in 2011

~~The mean annual flows in Table 4.1.2-1 were determined by extrapolating the mean flows over an entire year. It is shown above that the drainages measured have flows that range from 0 acre-ft per year to nearly 48 acre-ft per year.~~ Monitoring stations which have mining disturbance upstream are listed in Table 4.1.2-2. Continuous monitoring stations of the Pearson Creek downstream drainage, station PC-1 and PC-1ST, are planned for installation and data from the new monitoring stations will be used in future updates of Table 4.1.2-2. The disturbance area upstream of these stations is constantly changing as mining progresses, which affects the amount of flow measured. Current monitoring results for these stations can be found in the most recent SCM Annual Report of Hydrologic Monitoring.

Table 4.1.2-2. Monitoring Stations Affected by Mining

| Station | Period of Record | Number of Flow Events |
|---|---|---|
| RS-2[1] | 05/09/75-12/31/06 | 147 |
| RS-5 | 03/10/76-12/31/12 | 148 |
| RS-7 | 06/01/79-12/11/08 | 231 |
| CB-1 | 08/16/96-11/15/01 | 165 |
| CS-1 | 05/25/79-12/17/01 | 57 |
| CS-2 | 10/01/90-12/31/12 | 26 |
| CS-3[2] | 10/01/90-12/31/12 | 21 |

[1] Decker Coal Company operates and maintains this station
[2] CS-3 replaced with CS-3A in 2002

Comment #10
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.

*Response #10*
*Since the minimum flow and the average annual flow have been removed from Table 4.1.2-1, this sentence has been removed from the text. See the text changes in the response to Comment #9.*

Comment #11
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?

*Response #11*
*While evaluating the correlation of large discharge events to low TDS and TSS, it was determined that a conclusive correlation could not be established. Station RS-5 showed some correlation between summer events and high TSS, however, other stations did not verify this correlation. Therefore, the statement on page L-12 has been removed from the text. The TDS/TSS analysis was performed as an internal evaluation, therefore a new figure has not been created. See the text changes below.*

Although the surface water quality is variable, the water is typically a calcium/magnesium/sodium sulfate type. Total suspended solid (TSS) concentrations show the greatest variation. ~~The best chemical quality (lowest total dissolved solids (TDS) concentration) is associated with larger discharge events, which also have higher TSS concentrations.~~ Table 4.1.3-1 provides a summary of surface water quality.

monitoring time. Station CS-1 was monitored from 1979 through 2001; ~~however~~ it provides water quality data from before mining and during mining. These plots are ~~shown~~presented in Attachment 2 and will be used to show future trending of surface water quality~~.~~, and currently do not show TDS trending with seasonal variation.

Comment #12
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.

*Response #12*
*As requested, the time concentration plots for monitoring stations RS-5, RS-8, CS-1, and PC-1 have been modified to delineate the season of measurement. The delineation was broken into two time frames, December-March and April-November. Each season has a unique symbol to expedite review. See the revised figures in Attachment 2.*

Comment #13
Page L-28, Section 4.2.1.3. Please include or reference a map showing the faults in relation to the features discussed.

*Response #13*
*As requested, a new figure has been created. The new figure (Figure 4.2.1.3-1) shows the location of the wells and the faults at SCM. A reference to the new figure has also been added to Section 4.2.1.3. See the text changes below.*

The Spring Creek Fault, downthrown on the north, offsets the A/D coal seam by 170 to 220 feet in the local area. This places the A/D coal within the Pit 4 area (north of the Spring Creek Fault) adjacent to the Canyon coal bed south of the fault. Figure 4.2.1.3-1 shows the location of the faults and the wells at SCM.

Comment #14
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.

*Response #14*
*The hydrologic conductivity of the AD coal has been changed to 0.4 to 1.0 ft/day to match the numbers shown in Attachment 6, Table 5. See the text changes below.*

fracturing, controls secondary permeability of the coal. This area's depositional stability is likely the primary reason the coal in the SCM area is typically low (~~0.1 to 0.5 gpd/ft²~~0.4 to 1 ft/day) in hydraulic conductivity~~, which results in relatively minor pit inflows (80,000 to 100,000 gallons per day or about 55 to 70 gpm)~~.

Comment #15
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.

*Response #15*
*Due to difficulty of accurately measuring pit inflow, the sentence estimating the pit inflows has been removed from the text. See the text changes in response to comment #14.*

Comment #16
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.

*Response #16*
*As requested, the k values for the Canyon coal have been changed to 1.1 ft/day to 1.5 ft/day in order to agree with values presented in Attachment 6, Table 5. See the text changes below.*

in the mine area. Although much thinner, the Canyon coal has a hydraulic conductivity (k) similar to the A/D bed, with k values calculated between ~~0.025 and 0.553~~1.1 to 1.5 ft/day. At wells CN-4 (since mined through), 406W, and 402W south of the Spring Creek

Comment #17
Page L-30, last paragraph. Please note the spatial relationship between AD-5 and CN-3 with respect to the Spring Creek fault.

*Response #17*
*The spatial relationship of the referenced wells can be seen on the new Figure 4.2.1.3-1. The text on Page L-30 has also been revised to state that the distance from Well AD-5 and Well CN-3 to the Spring Creek Fault is approximately 1,480 feet and 400 feet, respectively. See the text changes below.*

Fault is in contact with the Canyon seam on the south, upthrown side of the fault. The ~~time- concentration- plots- contained~~hydrographs shown on Plates 1 through 7 in Attachment ~~2 can be used to~~3 illustrate ~~-~~ the difference in hydrostatic head between the two seams. This comparison can be made between A/D coal seam well AD-5 (~3,649') and Canyon coal seam well CN-3 (~3523') in 2002. Wells AD-5 and CN-3 are located approximately 1480 feet northwest and 400 feet southeast of the Spring Creek Fault, respectively. Inspection of the plots shows that the A/D seam water levels have declined

Comment #18
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.

*Response #18*
*The text on Page L-30 has been revised to show that the Canyon and A/D coal layers are in contact across the Spring Creek Fault not the Carbone Fault. See the text changes below.*

(~5'). This indicates they are not in direct hydraulic communication. The two seams are also in contact in short sections across the ~~Carbone~~Spring Creek Fault as shown by the geologic cross sections in Appendix I. A determination of hydraulic continuity can be

Comment #19
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.

*Response #19*
*The hydraulic conductivities of the siltstone and claystone overburden units could not be verified through the baseline documents. The text has been revised to discuss the hydraulic conductivities of the overburden and interburden units. As reference to Attachment I-15 of Appendix I has also been added to the text. See the text changes below.*

The ~~siltstone and claystone~~overburden and interburden aquifer ~~overburden~~ units have ~~very low horizontal and vertical~~ hydraulic conductivities~~, generally about 0.05 gpd/ft²~~ ~~ft/day and to 0.005 gpd/ft²1.5 ft/day, respectively~~ between approximately 0.010 ft/day (Well OB-4) and 0.027 ft/day (Well UB-2) as shown in Attachment I-15 of Appendix I.

Comment #20
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.

*Response #20*
*In response to this comment, Table 4.2.3-1 has been revised to now show the Class designation for the maximum measurement for each well monitored. The revised text is shown below under the response to Comment #21.*

Comment #21
Page L-33, Section 4.2.3. The classifications of groundwater are not actually the standards.

*Response #21*
*The word "standards" has been replaced with the word "values." See the text changes below.*

4.2.3 Groundwater Quality

The Administrative Rules of Montana (ARM), Section 17.30.1006 outlines classification ~~standards~~values for groundwater in Montana. The classification ~~standards~~values are ~~as follows:~~shown below.

- Class I → Electrical Conductivity (EC) ≤ 1,000 µmhos/cm at 25° C
- Class II →1000 < EC ≤ 2,500 µmhos/cm at 25° C
- Class III → 2,500 < EC ≤ 15,000 µmhos/cm at 25° C
- Class IV → EC > 15,000 µmhos/cm at 25° C

The groundwater at SCM is generally a sodium sulfate-bicarbonate type with very high sodium absorption ratios (SAR). This groundwater generally exceeds ARM guidelines for Class ~~I~~II groundwater and in most cases exceeds ~~standards~~values for Class ~~II~~III groundwater. Table 4.2.3-1 presents a summary of ~~means and~~min/max ranges for Total Dissolvable Solids (TDS) and EC, as well as the groundwater classification for each well at SCM. Additional discussion related to arsenic in local groundwater is in Attachment 9.

Comment #22
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 may 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).

*Response #22*
*Graphs which illustrate TDS vs. HCO3, TDS vs. SO4, and TDS vs. Na, have been created and included as Figure 4.2.3-1. The graphs include data sets from wells currently being monitored at SCM. Overburden, Clinker, Canyon, and Anderson-Dietz wells are identified separately using different symbols and a linear best fit line has been added to show data trends. See the text changes below.*

TDS has been identified by SCM as a good indicator of changes in water quality. Generally, analytes that affect the groundwater quality vary linearly as the TDS increases or decreases. Figure 4.2.3-1 shows the quantity of bicarbonate, sulfate and sodium versus the quantity of TDS. A best fit line is also shown on the figure in order to illustrate increasing analyte trends as TDS increases. The data represented on Figure 4.2.3-1 was taken from the 2013 Annual Hydrology Report, and represents life-of-well data for the wells monitored at the time of that report. Wells OB-9, AD-14, and 407WA have been omitted from the figures because the values were considered outliers for this analysis. The spoil wells are shown separately to allow comparisons of the rate of increase/decrease of all analytes as TDS increases.

Comment #23
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.

*Response #23*
*Seven new plates have been created to show all up-gradient and down-gradient hydrographs for each aquifer analyzed. These plates have been included as Appendix L, Attachment 3, Plates 1 through 8. The plates are as follows:*

- *Plate 1 – Spoil Well Hydrographs*
- *Plate 2 – Overburden Well Hydrographs*
- *Plate 3 – Up-gradient Anderson Dietz Well Hydrographs*
- *Plate 4 – Mine Area Anderson-Dietz Well Hydrographs*
- *Plate 5 – Down-gradient Anderson-Dietz Well Hydrographs*

- *Plate 6 – Interburden/Underburden Well Hydrographs*
- *Plate 7 – Canyon Well Hydrographs*
- *Plate 8 – Alluvial Well Hydrographs*

*The plates show the location and hydrograph for all wells historically monitored at SCM. For ease of review, the hydrograph have been developed with matching vertical scales. The historical mining areas have also been included to aid in comparison of well impacts to mining progression.*

*The text on Page L-35 has been revised by removing the discussion about Attachment 2 well selection, and replacing it with discussion about the new plates. The discussion highlights that all wells at SCM have been included on the new plates. As a result of this response, all groundwater well hydrographs have been removed from Attachment 2. See the text changes below.*

~~In addition to the data presented in Table 4.2.3-1, time concentration plots have been prepared showing select groundwater quality characteristics over time in monitoring wells in Attachment 2. The monitoring wells were selected based on the following criteria: one well per geologic model zone, one well per hydrostratigraphic unit and length of monitoring time. The groundwater model identified three major geologic zones for the SCM area which are: the area northwest of the Carbone Fault (Zone 1), the area between the Carbone and Spring Creek Faults (Zone 2) and the area southeast of the Carbone fault (Zone 3). Mining northwest of the Carbone Fault is not proposed at this time; however, the monitor wells in this area are shown. The wells listed below provide a representation of hydraulic connection across the Carbone Fault. The hydrostratigraphic units identified by the groundwater model are the alluvium, overburden, Anderson Dietz coal, interburden, Canyon Coal and underburden. The time concentration plots, shown in Attachment 2, provide a visual representation of the changes in water quality over time with respect to mining. However, water level impacts due to mining are not consistently apparent (e.g. well SCAL-3 or CL-3). The monitoring wells shown are as follows:~~

- ~~Alluvium: None (Zone 1), SCAL-3 (Zone 2), 79100WAP (Zone 3);~~
- ~~Overburden: CL-3 (Zone 1), OB-5 (Zone 2), and 79100WOBO (Zone 3);~~
- ~~Spoils: None (Zones 1 and 2) SP-1 (Zone 3);~~
- ~~Anderson Dietz Coal: None (Zone 1) AD-2 (Zone 2), and 405W & 79100WCP (Zone 3);~~

- ~~Interburden: None (Zones 1 and 2) and 81-115 IBW (Zone 3);~~
- ~~Canyon Coal: CN 1A (Zone 1), CN 2 (Zone 2), and 406W (Zone 3); and~~
- ~~Underburden: None (Zones 1 and 3) and UB 2 (Zone 2).~~

~~Further discussion of the time-concentration plots is contained in Section 5.2.1 (Groundwater Quantity), Section 5.2.2 (Groundwater Quality) and Section 5.2.3 (Groundwater Wells and Springs).~~

In addition to the data presented in Table 4.2.3-1, Attachment 3 contains plates which show hydrographs from all wells historically monitored at SCM. The plates are separated into the Spoil aquifer, Overburden aquifer, Anderson-Dietz aquifer (up-gradient), Anderson-Dietz aquifer (mine area), Anderson-Dietz aquifer (down-gradient), Interburden/Underburden aquifer, and Canyon aquifer. The plates also show historical mining areas to allow the viewer to make comparison between well impacts and mining activity.

<u>Comment #24</u>
Page L-35. Zone 3 is characterized as southeast of the Carbone fault. This should be the Spring Creek fault.

*<u>Response #24</u>*
*The text reference to the location of Zone 3 has been removed as a result of Comment #23. See the text changes in the response to Comment #23.*

<u>Comment #25</u>
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.

*<u>Response #25</u>*
*The text has been revised to state that monitor wells have not been included on Plate L-1 because they have no consumptive use and therefore do not impact the water rights of downstream users. See the text changes below.*

~~Appendix Table A-2~~Montana Board of Oil & Gas Conservation (MBOGC). ~~Most of the~~ Known monitoring wells at both SCM and Decker Coal have not been included on the plate because these wells have no consumptive use and therefore will not impact the water rights of downstream users. Maps exhibiting the location of wells comprising the monitoring

Comment #26
Page L-49, Section 5.0. The last sentence is a fragment.

*Response #26*
*As requested, the text has been revised to correct the fragment. See the text changes below.*

permit boundary. Each section summarizes potential short-term impacts(those that occur during and shortly after mining) and long-term impacts(those that persist long after mining and reclamation operations are completed).

Comment #27
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".

*Response #27*
*The text has been revised to quantify the drainage areas of the Spring Creek drainage and the Tongue River drainage at the Tongue River Reservoir. A comparison of the Spring Creek drainage to the Tongue River drainage (on a percentage basis) has also been added to the text. See the text changes below.*

for dust control. Impacts from the storage of this water are minimal. The Spring Creek drainage (37.7 square miles) comprises a very small portion (~2.1%) of the Tongue River drainage~~,~~ (1,770 square miles at Tongue River Reservoir), so the loss of water to that system is not significant. Flood control impoundments have been constructed on South

Comment #28
Page L-53, second paragraph. Quantify "relatively small drainage areas".

*Response #28*
*As requested, the statement "relatively small drainages" has been quantified by comparing the drainage areas of the flood control and sediments control structures at SCM to the overall drainage*

*area of the Tongue River as measured at the Tongue River Reservoir. A comparison of the average annual streamflows has also been included in this text revision. See the text changes below.*

In addition to sediment control structures, upstream flood control impoundments ~~capture~~divert Spring Creek, North Fork Spring Creek, South Fork Spring Creek and Pearson Creek ~~(potentially)~~ flows in order to prevent flows from entering the pits. ~~These~~ The flood control dams and sediment control structures have minimal impact on the Tongue River drainage, due to their relatively small drainage areas. Currently, flood control and sediment control structures at SCM impound flows from a total drainage area of 25.5 square miles, which is approximately 1.4% of the 1,770 square miles of the Tongue River drainage as measured at the Tongue River Reservoir dam. As stated in Appendix I, average annual streamflows from Spring Creek and South Fork Spring Creek are 142 acre-ft and 260 acre-ft, respectively. Since streamflow measuring began on Pearson Creek in 2006, it has shown that the drainage has contributed only 2.2 acre-ft of water per year to the Tongue River. The average annual streamflow for the Tongue River drainage is ~~315~~approximately 319,000 acre-feet at the ~~Montana-Wyoming state line~~Tongue River Reservoir dam (Hydro-Solutions Inc., 2011). Based on these values, the combined streamflows from Spring Creek, South Fork Spring Creek, and Pearson Creek attribute only 0.13% of the annual streamflow of the Tongue River at the Tongue River Reservoir dam.

<u>Comment #29</u>
Page L-53, second paragraph. State the year "measuring began on Pearson Creek".

*<u>Response #29</u>*
*As requested, the year 2006 has been added to the text in order to state the year measuring began on Pearson Creek. See the text changes in the response to Comment #28.*

<u>Comment #30</u>
Page L-55, Table 5.1.2.3-1. Explain what U/S and D/S means.

*<u>Response #30</u>*
*U/S and D/S was intended to mean Upstream and Downstream, respectively. A sentence stating that the comparison for SEDCAD results are shown upstream and downstream of the mine disturbance area has been added to the text. Also, Table 5.1.2.3-1 has been revised so that U/S is spelled out as Upstream and D/S is spelled out as Downstream. See the text changes below.*

configurations. Table 5.1.2.3-1 provides a comparison of the SEDCAD results for the premine and postmine drainages~~.~~ upstream and downstream of the mine disturbance area. Postmining divides are shown on Plate J-3 and premining divides are shown on

Comment #31
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.

*Response #31*
*As requested, Table 5.1.2.3-1 has been revised to correct the typographical error. The runoff volume was corrected by changing the value from 331.6 ac-ft to 31.6 ac-ft resulting in a 0% change in runoff volume.*

Comment #32
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.

*Response #32*
*The text has been revised to change the word "increase" to "decrease" to more accurately reflect what occurs at SCM. See the text revisions below.*

replaced completely. Porous rock outcrops may tend to ~~increase~~decrease unit runoff rates. This will be offset by providing somewhat gentler slopes, less topographic relief

Comment #33
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 the most data from the current year.

*Response #33*
*Table 5.1.3.3-1 has been revised to replace the average spoil water quality values with minimum and maximum water quality for the monitoring year 2013. Also, $SO_4$ has been added to the table. See the revised table below.*

Table 5.1.3.3 -1 Spoils Water Quality Comparison

| Water Quality Measurement | Van Voast (1982) | ALL SPOIL WELLS (2013) | |
|---|---|---|---|
| | | ~~Avg.~~Minimum | Maximum |
| TDS (mg/L) | 4230 | ~~4526~~3220 | 6030 |
| Ca (mg/L) | 73 | ~~193~~64 | 406 |
| Mg (mg/L) | 94 | ~~169~~26 | 398 |
| Na (mg/l) | 1352 | ~~1028~~730 | 1510 |
| $SO_4$ (mg/l) | 1610 | 1160 | 3170 |
| SAR | 24.7 | ~~13.1~~6.4 | 37.9 |

Comment #34
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".

*Response #34*
*To better show a more complete picture of the water quality at SCM, a series of hydrograph plates have been created. The plates include mine blocks for completed mining so that the reader can compare hydrograph responses to mining activities. These plates are located in Attachment 3. Please refer to the response to Comment #23 for more discussion about these new plates.*

Comment #35
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?

*Response #35*
*Wells 502, 505, and 506 have been added to Plate L-1 and have been referenced in the text. Also, well completion logs for these wells have also been referenced in Appendix I, Attachment I-10. These wells have multiple completion zones, in order to obtain the highest discharge rate possible. See the text changes below.*

supply wells (502, 505 and 506) rather than a direct result of mining. Former SCM water supply wells 502, 505, and 506 are shown on Plate L-1. These wells were previously used for domestic and industrial uses at the mine facilities. As shown by the well completion logs for these wells (see Appendix I, Attachment I-10) each of these water wells was completed in multiple coal and non-coal aquifers.

Comment #36
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?

*Response #36*
*An archive search for well logs has revealed that drill hole WD349W was actually drilled into the Anderson-Dietz coal (coal from 281 to 362 feet below ground surface [bgs]). The well was completed as a conventional 4-inch diameter well screened from 302 to 362 feet bgs. A second 1-inch diameter casing was also placed into the well annulus and extended to 279 feet bgs, which was above the top of coal and above the 4-inch well's bentonite seal.*

*When the wells were initially installed in 1976, the 1-inch diameter overburden well had SWLs about 25 feet higher than the Anderson-Dietz coal well; probably reflecting the head of an overburden aquifer. However, after less than two years, the wells began to reflect virtually the same SWL; it is possible the overburden aquifer(s) may have been a temporary occurrence and the subsequent water level suggests the Anderson-Dietz aquifer was confined and was probably affecting both wells.*

*The approximately 50-foot drop that occurred in 1978 in both wells is probably related to the nearby mine supply groundwater wells that were completed in multiple locations. Wells 500, 502, 503, 504 and 505 were drilled starting in 1977 and 1978 located in a well field approximately 2000 feet to the northeast on the Spring Creek fault. Although none of the wells were screened in the Anderson-Dietz aquifer (wells were screened in aquifers below, but many aquifers were confined), it is plausible that operation of these wells caused the early variation and sudden drop by 50 feet seen in 1978. However, because they weren't screened into the A/D coal, it is uncertain. The text has been revised to include this information as shown below.*

1984. An archive search for well logs revealed drill hole WD249W was actually drilled into A/D supporting why the two wells have identical hydrographs since 1984. However, early records between 1976 and 1984 indicate water levels in both of the wells up to 50 feet higher in 1978 ~~prior to any mining operations that could be expected to influence these aquifers~~. When the wells were installed in 1976, the 1-inch diameter overburden well had surface water levels about 25 feet higher than the A/D coal well; probably reflecting the head of an overburden aquifer. This head of an overburden aquifer may have been partially dewatered by the 500 series wells in 1977 and 1978 located approximately 2,000 feet to the northeast causing the 50 feet drop in elevation. However, none of the 500 series wells were completed in the A/D coal (except for well 506 installed in 1988). Thus, the actual reason for the 50 foot drop in water table elevation is uncertain.

<u>Comment #37</u>
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?

*<u>Response #37</u>*
*The spoils wells water levels are above the estimated 50-year groundwater surface in 5 of the 7 wells. This suggests that the groundwater model is conservative and under predicts recharge. It is our belief that the model is conservative for the following reasons discussed below.*

*At SCM, the clinker and coal strata typically lie above a low permeability "under-clay." It was assumed for the current model that the "under-clay" impeded vertical recharge to underlying stratum in all areas of the mine (i.e. clinker vs. coal areas). Current monitoring, however, indicates that the "under-clay" beneath the clinker transmits more recharge water than had been assumed in the initial groundwater modeling effort. In effect, even though the underclay does possess very low permeability, it does not preclude infiltration of recharge water from the underlying strata. As a result, the model is very conservative. In particular, the model appears to be under estimating the recharge from clinker sources. In addition, future drilling of wells at SCM is planned in the clinker located north of the railroad corridor. Information from these wells will enhance the conceptual model, setting forth modeling representation of the mining and water level recoveries over time.*

*The present response, as manifested in the existing hydrographs, indicates that the recharge rates in mine spoil is greater than what was assumed in the initial modeling effort.*

*Consideration will also be given to applying greater recharge rates along modeled alluvial deposits/streams. Ongoing monitoring will be used to improve modeling accuracy.*

*Another factor that may cause discrepancies between observed and modeled water levels are issues associated with mine area faults. These faults pose serious simulation difficulties as they can act either as impervious boundaries, or, as vertical fracture conduits. If they act as impervious boundaries, this can reduce the rate of recovery in the mine spoil. It they act as vertical fracture conduits this can increase the rate of recovery.*

*See the text changes below.*

Spoil water levels, as shown on Plate 1 in Attachment 3 indicate the current spoil groundwater elevations are typically above the estimated groundwater elevations 50 years from end of mining. ~~Also, the current~~Current water levels in the spoils wells further from the active pits (SP-1, SP-2, SP-4, SP-5 and SP-6) are above the estimated 50 year groundwater elevations, while the current water levels in the wells near the active pits (SP-3 and SP-7) are below the estimated 50 year groundwater elevations. This shows that the groundwater model is conservative with respect to recovery times, since the spoils wells are recovering faster than the groundwater model estimates. Due to reclamation activities and the progression of the mine, not all areas have spoil wells. It is anticipated the first spoil well will be installed in Pit 4 around year 2018. Ongoing monitoring of existing wells and the addition of future monitoring wells will be used to improve modeling accuracy.

<u>Comment #38</u>
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.

*<u>Response #38</u>*
*After researching typical interpretations for different algebraic curve descriptions, it was decided to revise the text referencing the general recovery progression as shown below. A reference to the hydrographs for well SP-1 on Plate 1, Attachment 3 has also been added to the text. See the revised text below.*

Water level recovery is expected to ~~follow an exponential curve, with most of the recovery occurring~~occur relatively soon after mining ceases but full recovery ~~taking~~is expected to take much longer. The hydrograph for SP-1 shown on Plate 1, Attachment 3 is an example of rapid recovery following mining. The majority of the recovery is expected to occur in the first 50 years following mining (see Attachment 6, Attachment 7 and Attachment 8). The groundwater model also ~~shows~~predicts that recovery in Pit 4 ~~is~~will be slower than the other areas of the mine. This is due to the fact that this pit is located between the two faults~~. In addition, the water level comparisons (See Attachment 2) for the spoil wells show that~~, which causes the coal to be removed to a lower elevation in Pit 4 than in Pit 1. However, the strata upgradient and downgradient of the removed Pit 4 coal will largely be unaffected by mining and the faults will continue to function as they did in the pre-mine times. The locations of the faults are shown on Figure 4.2.1.3-1.

<u>Comment #39</u>
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.

*<u>Response #39</u>*
*As indicated by the model, the coal adjacent to the faults will be removed, but the faults will remain in place. This is due to the fact that the coal in the Pit 4 area is on the downthrown side of the fault causing the coal to be removed to a lower elevation. After spoil placement in Pit 4 a fault spoil contact will be in place. A new figure (Figure 4.2.1.3-1) has been created to show the location of the faults in relation to the groundwater wells. The text has been revised to state that the coal will be removed to a lower elevation in Pit 4 compared to Pit 1. A reference to Figure 4.2.1.3-1 was also added. See the text changes below.*

and Attachment 8). The groundwater model also ~~shows~~predicts that recovery in Pit 4 ~~is~~will be slower than the other areas of the mine. This is due to the fact that this pit is located between the two faults~~. In addition, the water level comparisons (See Attachment 2) for the spoil wells show that~~, which causes the coal to be removed to a lower elevation in Pit 4 than in Pit 1. However, the strata upgradient and downgradient of the removed Pit 4 coal will largely be unaffected by mining and the faults will continue to function as they did in the pre-mine times. The locations of the faults are shown on Figure 4.2.1.3-1.

Comment #40
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.

*Response #40*
*This sentence was not intended to be a continuation of the discussion about Pit #4. A new paragraph was started for this discussion to avoid confusion. Also, the sentence has been modified to reference Plate 1, Attachment 3. See the text changes below.*

> Spoil water ~~level comparisons (See~~levels, as shown on Plate 1 in Attachment ~~2) for the spoil wells show that~~3 indicate the current spoil groundwater elevations are typically above the estimated groundwater elevations 50 years from end of mining. ~~Also, the current~~Current water levels in the spoils wells further from the active pits (SP-1, SP-2, SP-4, SP-5 and SP-6) are above the estimated 50 year groundwater elevations, while the current water levels in the wells near the active pits (SP-3 and SP-7) are below the estimated 50 year groundwater elevations. This shows that the groundwater model is

Comment #41
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.).

*Response #41*
*Observations of spoil wells SWL agree with the current groundwater model at SCM, which indicates that the groundwater flow direction and rate will return to near premine conditions. The text has been revised to include this statement. See the text changes below.*

> flow should eventually equilibrate to near pre-mine water table conditions. Evidence of this prediction can be seen in the groundwater model (Attachment 6) as well as actual recovery data shown by the spoil well groundwater level measurements shown on Attachment 3, Plate 1.

Comment #42
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.

*Response #42*
*At this time, SCM does not have sufficient data available to justify this statement. The text has been revised by removing this statement. See the text changes below.*

> Groundwater quality within, and potentially downgradient of the mine area, will be impacted. This has been the subject of considerable study throughout the Powder River Basin and elsewhere (Van Voast and others 1975, 1977, 1978, 1982 and 1988). ~~TDS concentrations in backfill aquifers generally are greater than in the coal aquifers they replaced.~~ Resaturation of backfill, primarily by lateral groundwater flow from the

Comment #43
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?

*Response #43*
*Based on the surface water quality data available at SCM, it cannot be estimated how long it take for a TDS level to be reached. Currently no downward trend can be observed. Reference to the other mine studies has been removed to avoid confusion. The text section has been revised below.*

> Generally, it is estimated the dissolved-solids concentrations in the backfill water will reach a maximum during initial saturation and then decrease to an equilibrium level after one or more pore volumes of water pass through the backfill (Van Voast and Reiten, 1988). Dissolved-solids concentrations are expected to recover after backfill water level recovers. The rate of water level recovery will vary by pit location and annual precipitation, but is estimated to mostly recover 50 years after mining as discussed above. Plate 1 in Attachment 3 shows the limited dissolved-solids and water level date available for the spoil wells located in backfill which currently show no apparent downward trends. ~~Recent sStudies in the Colstrip and West Decker areas suggest that dissolved solids concentrations decrease as water moves from the backfill into the unmined, down gradient coal (Clark 1995).~~

Comment #44
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.

*Response #44*
*The text has been revised to state that it cannot be determined if spoil water has moved down-gradient of the mine. Also, text has been added to address water quality down-gradient of the mine if spoil water begins to move beyond the mine site. See text changes below.*

more pore volumes of water pass through the backfill. ~~Studies in the Colstrip and West Decker areas suggest that dissolved solids concentrations decrease as water moves from the backfill into the unmined, down gradient coal (Clark 1995).~~To date, monitoring of down-gradient wells cannot conclusively determine whether or not higher TDS spoil water has moved outside of the mine area. For example, while well SP-1 shows a slight increase in TDS since being installed in 2010, down-gradient wells SC504AQW and SC507AQW show only small change in TDS, which may be attributed to natural variability. Downgradient wells further south from mining in Pit #2 show natural variability in TDS values ranging from 700 mg/l for well 2107-08 to 1,500 mg/l in well AD-14 with very minor changes in water elevation as shown on Plate 5 in Attachment 3. Upgradient wells also indicate natural variability in TDS levels ranging from 300 mg/l for AD-4 to 500 mg/l for well AD-6 as shown on Plate 3 of Attachment 3. If spoil water moves down-gradient of the mine, SCM anticipates that the unmined Anderson-Dietz coal will act to attenuate the high TDS, while lower TDS water from the clinker above will act to flush the aquifer.

Comment #45
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".

*Response #45*
*The referenced text has been revised as requested. See the text changes below.*

flushed by one or more pore volumes of groundwater. The impacts of mining will likely result in deterioration of groundwater quality within some areas of the mine backfill to a degree that will require at least temporary reclassification of some of the groundwater to a lower usage class. ~~No current~~The groundwater ~~users are expected~~well usage nearest

Comment #46
Page L-75, first paragraph. Explain further why "No current groundwater users are expected to be affected".

*Response #46*
*The sentence stating that "No current groundwater users are expected to be affected" has been revised to state the distance to the nearest current groundwater user, including the nearest down-gradient groundwater user. See the text changes below.*

a lower usage class. ~~No current~~The groundwater ~~users are expected~~well usage nearest to ~~be affected~~mining is located approximately 3800 feet northeast of Pit 4, but this well is up-gradient of the mine. The nearest down-gradient well is a stockwater well that is located approximately 5300 feet southeast of Pit 6. The backfill water, as measured and

Comment #47
Page L-75, second paragraph. The reference to Van Voast and Thompson needs a citation.

*Response #47*
*The citation has been added to the text, as requested. See the text changes below.*

of ~1,700 mg/l when it was last sampled in 2000. This change of ~700 mg/l is ~~within~~well under the temporary TDS increase of 2,000 mg/L as predicted in an earlier study on a select area at SCM by Van Voast and Thompson~~.~~ (1982). Future monitoring of A/D wells

Comment #48
Page L-76, first paragraph. Please state which wells are being discussed in the sentence "…data from wells discussed above".

*Response #48*
*In order to reduce redundancies and discrepancies in the text and in combination with Comment #49, this sentence has been deleted. See Comment #49 for more information dealing with this deletion. See the text changes below.*

~~The data from the wells discussed above, from late 1998 through 2013 (see Attachment 2), show different trends. Over 40% of the graphs show no distinguishable~~

Comment #49
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?

*Response #49*
*The discussion regarding TDS changes has been revised to be consistent with other comments related to TDS movement/trending. Due to the large text change as a result of this comment, please refer to the permit documents to see all changes made to Section 5.2.2-Groundwater Quality.*

Comment #50
Page L-77, first paragraph. Please provide a reason for the increase in TDS at well 504AQW.

*Response #50*
*As requested, the text has been revised to address possible reasons for a moderate increase in TDS at well 504AQW. See the text changes below.*

~~Since 2000 the~~The TDS concentration in well 504AQW has ~~steadily~~ increased from ~580 mg/L TDS to ~780 mg/L ~~TDS measured on July 31,~~from 2000 to 2012~~: an~~. While it is possible that the TDS increase is due to down-gradient movement of ~~≈200 mg/L TDS in twelve years. This increase (34%) approximates~~spoil water, it could also result from the ~~estimates by Van Voast and Thompson.~~ natural variability in groundwater quality, as discussed above.

Comment #51
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 the 34% is increase an approximation to the values predicted by Van Voast?

*Response #51*
*By stating that the increase in TDS approximates Van Voast predictions may have been a misrepresentation of the Van Voast study. After further review of the study, it was determined that the intent of the study was to develop an idea of how water quality changes due to mining above Tongue River Reservoir. As a result, the sentence was deleted from the text. Please see the text changes shown in the response to Comment #50.*

Comment #52A
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.

*Response #52A*
*The text regarding Well WD326WP has been modified to state the changes in TDS and SWL without making statements regarding a correlation between the two. This revision corrects the contradictory statements made about the possible correlation of data for the TDS and SWL for Well WD326WP and Well 81-115-IBW. See the text changes below.*

Well WD326WP was an Anderson-Dietz well which was located west of future Pit 6 and monitored from 1975 through 2000 when it was abandoned due to ~~pit advancement.~~Pit #2 advancement. The time concentration plot as shown ~~in~~on Plate 4, Attachment ~~2~~3 shows ~~potential correlation between water quality and local~~an increase in TDS from ~1,700 mg/l to ~2,400 mg/l with a groundwater level drawdown of fifteen feet from ~~mining~~1996, when the ~~adjacent Pit 2.~~active pit was 600 feet away, to when the well was mined through in 2000. However, the water level dropped forty feet between 1981 and 1996 with no change in quality. Additionally, the well also dropped back to the steady state TDS level of ~1,700 mg/l when it was last sampled in 2000. This change of ~700 mg/l is ~~within~~well under the temporary TDS increase of 2,000 mg/L as predicted in an earlier study on a select area at SCM by Van Voast and Thompson~~.~~ (1982). Future monitoring of A/D wells downgradient will continue in order to identify if correlations exist between water quality and groundwater level.

Comment #52B
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.

*Response #52B*
*As requested, the approximate premine TDS value of ~1,500 mg/l for Well 81-115-IBW was added to the text. The most current TDS for Well SP-1 of ~3,500 mg/l was also added to the text. See the text changes below.*

> in groundwater in mine backfill is estimated at 1,940 mg/l. This prediction is consistent with the groundwater quality data comparison between wells 81-115-IBW (premine TDS of ~1,500 mg/l) and SP-1 (TDS of ~3,500 mg/l in 2013) in Table 4.2.3-1 ~~and Attachment 2~~. This increase would be due largely to addition of soluble sodium, sulfate, and

Comment #53
Page L-78. State which aquifer well WD326WP is completed in.

*Response #53*
*As requested, the text has been revised to state that WD326WP is an Anderson/Dietz well. See the text change below.*

> Well WD326WP was an Anderson-Dietz well which was located west of future Pit 6 and monitored from 1975 through 2000 when it was abandoned due to ~~pit advancement.~~Pit #2 advancement. The time concentration plot as shown ~~in~~on Plate 4,

Comment #54
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.

*Response #54*
*The text has been corrected to state "insignificant" instead of "significant". See the text change below.*

> bicarbonate ions in the backfill. With baseline groundwater quality in the A/D coal at SCM already relatively poor, Class II and III, the cumulative effects of leaching soluble salts from mine backfill with high TDS groundwater is ~~significant.~~insignificant. Although TDS

Comment #55

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

*Response #55*

*The environmental baseline studies documents were reviewed and it was determined that the samples were created from saturation extract. This statement has been added to the text as requested. See the text changes below.*

> A general comparison of expected postmine spoils water quality throughout the minesite can be made by comparing the premine overburden sample electrical conductivity~~.~~, which was tested on saturation extract. The weighted average overburden

Comment #56

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.

*Response #56*

*The text has been revised as requested. See the text changes below.*

> 3,030 µmhos/cm (See Appendix A2). This data suggests that spoil water quality will be similar throughout the minesite, however review of the premine overburden water quality shows that local poor quality groundwater exist throughout the minesite (e.g. AD-14 ~7,000-8,600 µmhos/cm and OB-9 ~7~~.6~~,600-7,900 µmhos/cm). ~~As a result, it is expected~~

Comment #57

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?

*Response #57*

*As discussed by MDEQ and SCM, a stand-alone arsenic study will be created for the mine. After completed, this document will be inserted into Appendix L as Attachment 9 and is referenced in the Appendix L text. Text referring to arsenic has been removed from the main Appendix L text. Due to the large amount of text deleted as a result of this response, please see the Appendix L text in Section 5.2.2 for changes.*

Comment #58

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

*Response #58*
*Arsenic discussion will be included in the stand-alone arsenic document when it is completed. See the response to Comment #57.*

Comment #59
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?

*Response #59*
*Arsenic discussion will be included in the stand-alone arsenic document when it is completed. See the response to Comment #57.*

Comment #60
Page L-81, first paragraph. There is no mention of well SP-1 which also has had high arsenic concentrations.

*Response #60*
*Arsenic discussion will be included in the stand-alone arsenic document when it is completed. See the response to Comment #57.*

Comment #61
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.

*Response #61*
*Arsenic discussion will be included in the stand-alone arsenic document when it is completed. See the response to Comment #57.*

Comment #62
Page L-81, first paragraph. Why are concentrations highest in new wells and then decrease?

*Response #62*
*Arsenic discussion will be included in the stand-alone arsenic document when it is completed. See the response to Comment #57.*

Comment #63
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…".

*Response #63*
*Arsenic discussion will be included in the stand-alone arsenic document when it is completed. See the response to Comment #57.*

Comment #64
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.

*Response #64*
*The reference to wells AD-14, 2110-80, and 79100WCP has been removed from the text. A comparison of wells SP-1, 504AQW, and 507AQW has been added to show that higher TDS spoil water has, to date, had little or no effect on down-gradient well water quality. A new figure (Figure 5.2.3-1) has been created to show the comparisons of SWL and TDS for wells SP-1, 504AQW, and 507AQW. See the text changes below.*

~~Several A/D wells are included in the time concentration plots in Attachment 2. These wells (79100WCP, 405W, 2110-80, 2107-80, 2057, 504AQW, 507AQW, AD-2, and AD-14) show that comparisons of TDS concentrations near the mine pits to those off mine site or far from the mine pits, do not show a deteriorating water quality trend. For example, a comparison of well 79100WCP (near pit) to wells AD-14 (far from pit) and 2110-80 (off site) for the year 2009, shows that the groundwater gradient was away from 79100WCP to the other wells (towards Tongue River), which matches that of premine. Also, the TDS concentrations were higher at wells AD-14 (approximately 8,000 mg/L) and 2110-80~~

~~(approximately 2,000 mg/L) than at well 79100WCP (approximately 1,750 mg/L). This data suggests the following. Because of the extent of the A/D clinker east and downgradient of the SCM~~ Because of the extent of the A/D clinker, east and down-gradient of SCM, and its capacity to absorb significant quantities of precipitation and snowmelt, it is expected that dilution from surface recharge into the clinker east of the mine will minimize the potential deterioration of water quality ~~downgradient~~down-gradient of SCM. Attenuation of solutes with distance traveled from mine backfills in undisturbed

measures at nearby stock and domestic wells should be implemented. Attachment 3, Plates 1 through 7 show the historical hydrographs for the wells monitored by SCM. As discussed in Section 4.2.3 and shown on Figure 5.2.3-1 (which provides a comparison of higher TDS spoil water quality versus down-gradient Anderson-Dietz aquifer wells in the Pit #2 area), from the available data, it cannot be determined if higher TDS spoil water has begun to migrate down-gradient of the mine site. Currently, only small changes in TDS have been shown in down-gradient wells SC504AQW (installed in October, 1978, with water quality measurements starting in 2000) and SC507AQW (installed in August, 2010) as compared to up-gradient spoil well SP-1, which has had increasing TDS since it was installed in 2010. If the higher TDS spoil water is moving down-gradient, the TDS is either decreasing as it moves through the unmined A/D coal, or lower TDS water, entering through the clinker above, is flushing the aquifer and lowering the overall TDS of the water in the down-gradient wells. SCM will continue to monitor down-gradient wells

to determine if the placement of the spoil has any effect on down-gradient water quality. As shown in Figure 5.2.3-1, wells SC504AQW and SC507AQW show small changes in water quality as well SP-1 water quality changed. A comparison of water quality in February, 2013 shows that while well SP-1 had a TDS of ~3,200 mg/l, wells SC504AQW and SC507AQW had TDS levels of 720 mg/l and 700 mg/l, respectively.

<u>Comment #65</u>
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>Response #65</u>*
*See response to Comment #23. A series of plates have been created to show the spatial and time relationships between wells at SCM. As a result, Table 5.2.1-1 has been removed from Appendix L. All*

*data associated with this table is contained in Appendix L, Attachment 3, Plates 1 through 8. See the text changes below.*

~~Table 5.2.1-1 shows~~Attachment 3 contains plates which show the drawdown measurements at respective monitoring well locations. Some of the monitoring wells

**Appendix L, Attachment 2**

Comment #66
Pages L-2-54 through L-2-60 are duplicates of other graphs in the attachment.

*Response #66*
*Newly created Plates 1 through 8 in Attachment 3 have been developed to replace the hydrographs represented in Appendix L, Attachment 2. Only four figures (former pages L-2-54 through L-2-57) will remain in Attachment 2. These figures are the hydrographs for four of the surface water monitoring stations. Their new pages numbers will be L-2-1 through L-2-4. Various references to Appendix L, Attachment 2 have been deleted from the text as a result of this response. Please refer to the Appendix L text for all of these deletions.*

**Appendix J**

Comment #67
Page J-5, Section 3.1.1. The size of the drainage basin does not agree with the size calculated by DEQ, which is ~37.7 sq. mi. The same size is also used in Appendix I.

*Response #67*
*As requested, the drainage areas for Spring Creek have been corrected to 37.7 square miles in Appendix J and Appendix I. See the text changes below for Appendix J and Appendix I, respectively.*

drainage area with the postmining topography. Spring Creek has a drainage area of ~~41.69~~37.7 square miles from its headwaters to its confluence with the Tongue River. Disturbance to the Spring Creek Drainage (8.87 square miles) will affect approximately ~~21.3~~23.5% percent of the Spring Creek Drainage area. Comparison of geomorphic

length of 11.1 miles, and a width/length ratio of 0.29. The Spring Creek drainage basin has a basin relief of 1,460 feet from its headwaters to its outfall into Tongue River Reservoir and a total premine drainage area of ~~41.69~~37.7 square miles. Figure I-1

Comment #68
Table J-5. The 10-yr, 24-hr volume for structure 1 should be 19.24 and not 9.24.

*Response #68*
*Table J-5 of Appendix J has been revised as requested. See the modified table below.*

Table J-5. Postmine Pearson Creek SEDCAD® Results

| SEDCAD Structure Designation | Precipitation Distribution | | Recurrence Interval | | |
|---|---|---|---|---|---|
| | | | 2-yr, 24-hr | 10-yr, 24-hr | 100-yr, 6-hr |
| 1 | SCS Type II | Peak (cfs) | 5.88 | 54.30 | 108.98 |
| | | Vol (ac-ft) | 3.80 | 19.24 | 24.10 |
| 2 | SCS Type II | Peak (cfs) | 10.03 | 73.72 | 144.93 |
| | | Vol (ac-ft) | 6.53 | 29.61 | 36.72 |
| 3 | SCS Type II | Peak (cfs) | 14.33 | 89.50 | 174.56 |
| | | Vol (ac-ft) | 9.23 | 40.54 | 50.11 |
| 4 | SCS Type II | Peak (cfs) | 17.80 | 103.66 | 193.51 |
| | | Vol (ac-ft) | 11.85 | 51.12 | 63.08 |
| 5 | SCS Type II | Peak (cfs) | 54.95 | 288.25 | 527.67 |
| | | Vol (ac-ft) | 29.52 | 117.74 | 144.11 |
| 6 | SCS Type II | Peak (cfs) | 55.06 | 286.92 | 523.58 |
| | | Vol (ac-ft) | 30.20 | 120.90 | 148.04 |
| 7 | SCS Type II | Peak (cfs) | 59.65 | 301.76 | 545.31 |
| | | Vol (ac-ft) | 34.57 | 137.50 | 168.24 |
| 8 | SCS Type II | Peak (cfs) | 12.76 | 79.62 | 143.51 |
| | | Vol (ac-ft) | 4.37 | 16.60 | 20.20 |
| 9 | SCS Type II | Peak (cfs) | 25.77 | 146.64 | 261.08 |
| | | Vol (ac-ft) | 8.58 | 31.60 | 38.34 |
| 10 | SCS Type II | Peak (cfs) | 31.14 | 165.49 | 296.19 |
| | | Vol (ac-ft) | 12.37 | 45.97 | 55.84 |
| 11 | SCS Type II | Peak (cfs) | 10.52 | 68.26 | 122.71 |
| | | Vol (ac-ft) | 3.26 | 12.37 | 15.06 |
| 12 | SCS Type II | Peak (cfs) | 36.83 | 188.64 | 339.37 |
| | | Vol (ac-ft) | 15.62 | 58.35 | 70.90 |
| 13 | SCS Type II | Peak (cfs) | 38.08 | 189.26 | 341.22 |
| | | Vol (ac-ft) | 17.67 | 66.61 | 81.03 |

Comment #69
Table J-6. The numbers in the table do not appear to match the numbers in Attachment J-2.

*Response #69*
*Table J-6 has been reviewed and revised to reflect the correct HEC-RAS numbers shown in Attachment J-2. See the revised Table J-6 below.*

| Stream Channel | Recurrence Interval | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # In Channel |
|---|---|---|---|---|---|---|---|---|---|---|---|
| North Fork Spring Creek | 2-yr, 24-hr | 40.4 | 3829.8 | 3830.9 | 3829.5 | 3831.0 | 0.012 | 3.3 | 19.4 | 56.4 | 0.7 |
| North Fork Spring Creek | 10-yr, 24-hr | 236.5 | 3829.8 | 3831.5 | 3832.3 | 3831.7 | 0.009 | 4.5 | 85.2 | 117.8 | 0.7 |
| North Fork Spring Creek | 100-yr, 6-hr | 434.1 | 3829.8 | 3831.9 | 3832.6 | 3832.1 | 0.009 | 5.3 | 128.2 | 126.7 | 0.7 |
| Spring Creek | 2-yr, 24-hr | 82.8 | 3791.8 | 3793.3 | 3784.9 | 3793.5 | 0.008 | 3.4 | 43.6 | 166.5 | 0.6 |
| Spring Creek | 10-yr, 24-hr | 411.8 | 3791.8 | 3794.0 | 3792.6 | 3794.2 | 0.007 | 4.6 | 162.4 | 212.7 | 0.6 |
| Spring Creek | 100-yr, 6-hr | 727.3 | 3791.8 | 3794.4 | 3800.7 | 3794.7 | 0.007 | 5.4 | 238.9 | 227.4 | 0.7 |
| South Fork Spring Creek | 2-yr, 24-hr | 75.0 | 3702.8 | 3704.5 | 3697.7 | 3704.7 | 0.009 | 3.5 | 31.2 | 75.4 | 0.6 |
| South Fork Spring Creek | 10-yr, 24-hr | 291.5 | 3702.8 | 3705.3 | 3719.7 | 3705.6 | 0.008 | 4.9 | 96.8 | 108.0 | 0.7 |
| South Fork Spring Creek | 100-yr, 6-hr | 440.1 | 3702.8 | 3705.6 | 3722.5 | 3706.0 | 0.009 | 5.6 | 127.9 | 113.9 | 0.7 |
| Pearson Creek | 2-yr, 24-hr | 12.7 | 3680.8 | 3681.3 | 3766.0 | 3681.3 | 0.019 | 2.3 | 5.3 | 14.2 | 0.7 |
| Pearson Creek | 10-yr, 24-hr | 84.6 | 3680.8 | 3682.1 | 3719.3 | 3682.3 | 0.016 | 4.1 | 22.6 | 28.5 | 0.8 |
| Pearson Creek | 100-yr, 6-hr | 164.5 | 3680.8 | 3682.5 | 3682.4 | 3682.8 | 0.015 | 4.9 | 44.1 | 75.1 | 0.8 |
| South Fork Pearson Creek | 2-yr, 24-hr | 36.1 | 3626.7 | 3627.6 | 3601.1 | 3627.7 | 0.014 | 3.2 | 11.7 | 16.9 | 0.7 |
| South Fork Pearson Creek | 10-yr, 24-hr | 185.6 | 3626.7 | 3628.5 | 3628.5 | 3628.8 | 0.010 | 4.6 | 60.4 | 113.6 | 0.7 |
| South Fork Pearson Creek | 100-yr, 6-hr | 333.6 | 3626.7 | 3628.8 | 3628.8 | 3629.2 | 0.011 | 5.5 | 96.3 | 125.6 | 0.7 |

**Appendix I**

Comment #70
The figures and tables are missing, but DEQ presumes these will be included in the final copy.

*Response #70*
*SCM commits to including these figures and tables in the final copy.*

Comment #71
The SEDCAD structures were changed from the last submittal, but a revised Plate I-4 was not submitted.

*Response #71*
*Plate I-4 was inadvertently omitted from the last response. Plate I-4 has been included with this response package.*

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Comment #72
Page 313-10. Please update the acres of wetlands disturbed from 2.6 acres to 3 acres as shown in Table 313-3.

*Response #72*
*Page 313-10 has been rounded up to 3 for consistency with Table 313-3 as requested. See the text change below.*

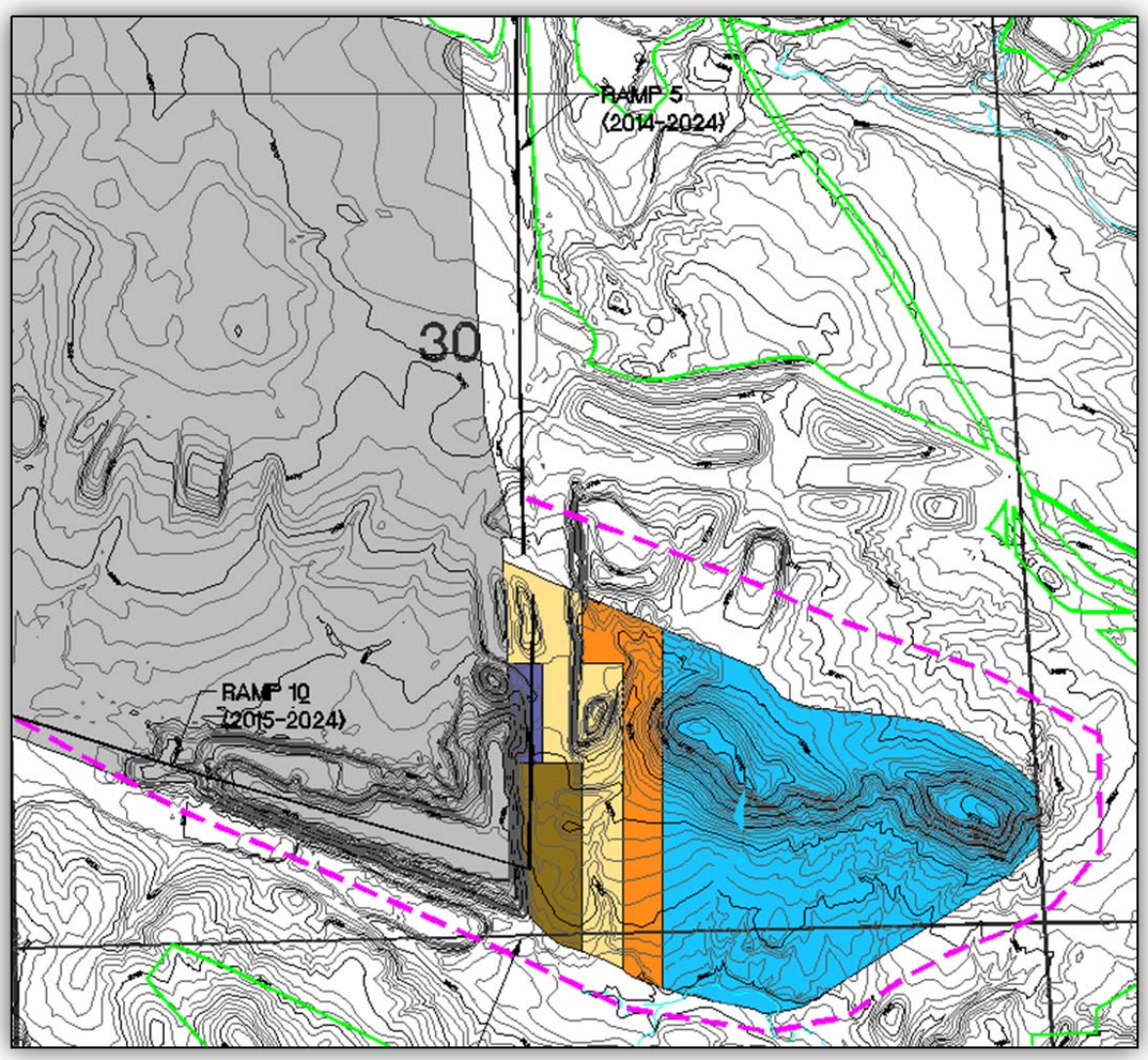
- Wetlands – During the rough grading process opportunities for constructing wetlands may arise. Table 313-3 below indicates ~~2.6~~3 acres of aquatic habitat will be disturbed during mine life. Spring Creek Mine will work with the MDEQ to permit wetland features more than one acre-foot and two feet deep. The wetland enhancement features will improve revegetation diversity.

**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.

Comment #73
Stockpiles 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 and it is proposed within Pond #48 without any other planned sediment control. The Department 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.

*Response #73*
*As shown on Plate 18, the only ramp into Pit #6 floor is the previously used ramp 10 which was used to access the most eastern reserves in Pit #2. Ramp #5 is an existing ramp/road shown north of Pit #6 which is the "Neco" two track road and is at PMT and won't be used for accessing coal in Pit #6.*

*Plate 18 showing Pit #6*




*Since the March 2012 submittal of MR 168, SCM has conducted and made improvements to the material handling plans for Pit #6. SCM revised the footprint of OB6-1 to the west on previously disturbed ground and thus eliminates the need for construction of OB6-2 as shown on the image below. Actual disturbance in the area south of Pit #6 will be limited as much as possible. Construction of a final MPDES discharge structure will be needed and details of the plans/disturbance for that pond will be submitted to MDEQ for review/approval prior to disturbance. The revised text for OB6-1 is shown in Comment #1 above. The revised footprint for OB6-1 is shown in Comment #4 above.*

<u>Comment #74</u>
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.

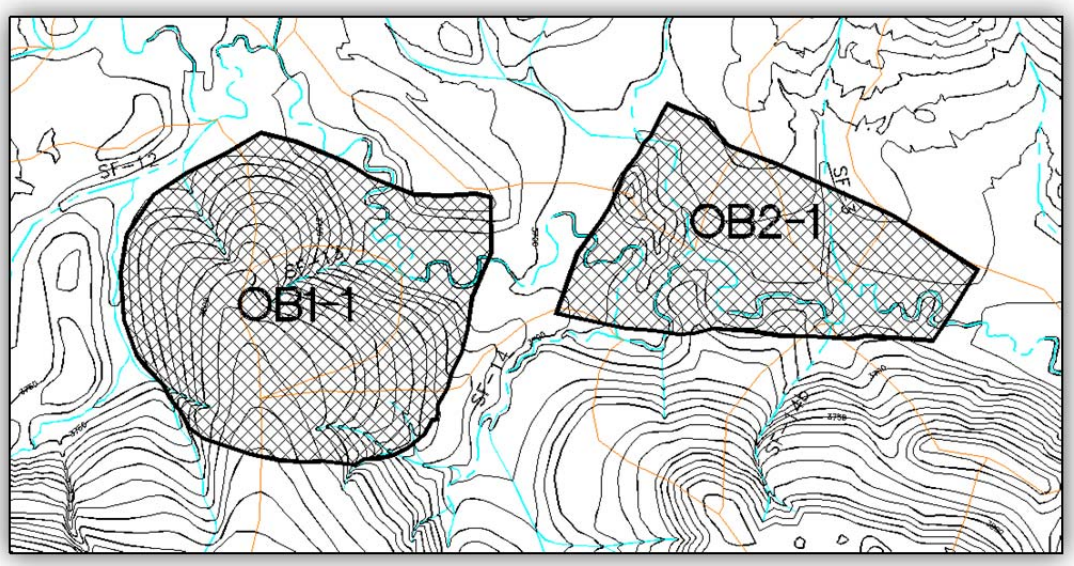
*Response #74*

*Stockpile OB1-1 (currently approved as OB-D) will on-top of a post mine feature as shown on the PMT map Plate #4 and in the figure below. However because of the hill feature in this area, the stockpile is limited in storage volume to approximately 3.3 million LCY above PMT covering approximately 75 acres. This is the reason for the larger footprint of 75 acres with a corresponding small storage volume of 3.3 million LCY. The text in 313 has been updated to show the footprint at 75 acres. The footprint for OB2-1 (currently approved as OB-E) is maximizing the limited space of "flat" area north of Spring Creek. The priority will be to construct OB1-1 and OB2-1 before OB6-1 is constructed.*

*Revised narrative for OB1-1 from Section 313.*

**Overburden Stockpile OB1-1:**
Because there is limited projected backfill area available in Pit 1, a temporary overburden stockpile is necessary. To avoid disturbing native ground an in pit overburden stockpile "known as OB1-1" will be located south of the South Fork Spring Creek in the Pit 2 area on backfill. The stockpile is necessary to meet AOC requirements during reclamation of the highwall feature that will remain at the end of mining in Pit 1. Approximately 3.3 million loose cubic yards (LCY) will be removed during prestripping in the western portion of Pit 1 and placed in this stockpile which is above PMT. The stockpile footprint is approximately 75 acres and prestrip will begin being placed in it in approximately 2016. The stockpile will result in a postponement of reclamation, within and surrounding the stockpile footprint, until the end of mining in Pit 1.

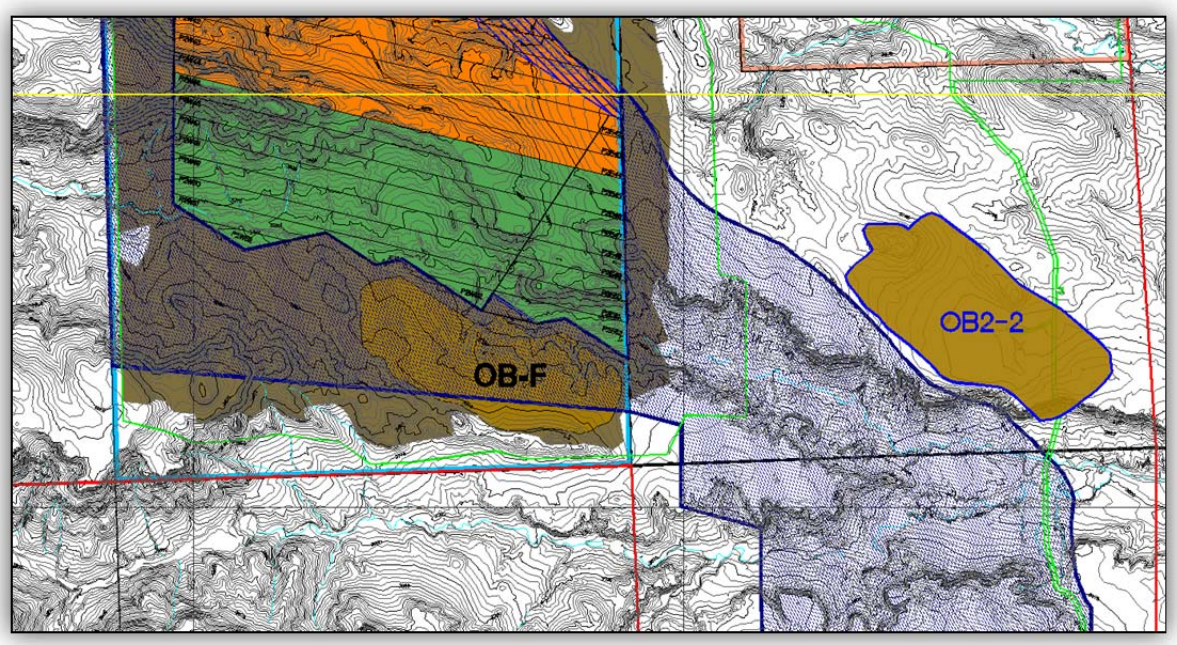
*Stockpiles OB1-1 and OB2-1 in relation to PMT*




Comment #75

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 post mine 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.

*Response #75*
*The currently approved permit Plate 5 includes the out of pit overburden stockpile OB-F located south of Pit #2 in Section 36. This stockpile was strategically positioned to be used to reduce overall disturbance and borrow to fill in the final pit void. However, the additional pit advancement in the TR1 revision requires this pile to be relocated north of the advancing pit and is now called OB2-2 as shown in the figure below.*

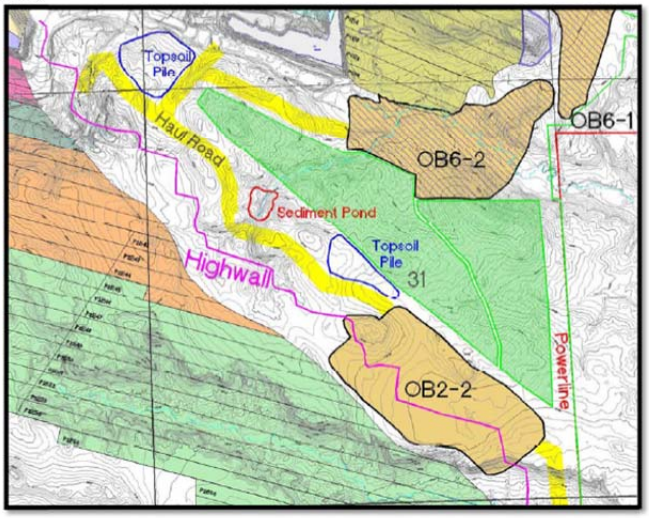



*Stockpile OB2-2 is the relocated OB-F stockpile. It is relocated to the north side of Pit #2 reserves as close to the final pit void as possible on the only relatively flat ground available. It is also located as close to the pit highwall as possible given the setback distances specificed in the SCM ground control plan. The pile will be used to fill in the final pit void and reduce overall disturbance.*

*The 2nd Round deficiency response sent November 7, 2012 included Figure #3 for comment #6 as shown below. As shown in the figure, the area on the north side of Pit #2 must be disturbed anyhow for construction of a haul road, topsoil stockpiles, ponds, and the layback necessary for mining the reserves. Additionally, based on the topography in the area surrounding Pit #2, the area chosen for OB2-2 is the only relatively flat area available.*

| # | Deficiency Comment | Response |
|---|---|---|
| 6 | 17.24.308(l)(b)(ii): There is a large amount of disturbance adjacent to the NE edge of the mining passes in Section 31 (Pearson Creek). Part of the disturbance is associated with OB2-2. DEQ needs an explanation for the placement of this temporary storage pile and why it could not be placed within the borrow area along the SW edge of the final cuts. In addition, there is a large amount of area along the NE edge in which there appears to be no reason at all for disturbance and some justification must be made for this area. If the reason for this additional area of disturbance is merely buffer and therefore the area might not ever be disturbed, the operator should explain this fact and estimate a quantity so DEQ can make a finding in the EA, or the disturbance line should be adjusted. | The currently approved mine plan (Plate 5) shows an overburden stockpile OB-F located south of the final pit in Section 36 which is on leased coal. This revision relocates this pile (now called OB2-2) to the north side of Pit #2 off of coal. The projected disturbance on the north side of Pit #2 will be necessary to maintain access around the pit and also to access OB2-2. Additionally, an MPDES pond will be required as shown. Adequate room for topsoil stockpile construction is a continuous challenge as mining progresses south. SCM will likely seek Department approval for multiple topsoil stockpile locations in this area as mining progresses. As a result, the majority of the disturbance projected in the area will likely be necessary; however, disturbance will be minimized to the area necessary to provide an adequate buffer. |

**Figure 3.** Pit #2 Facilities (Section 31)

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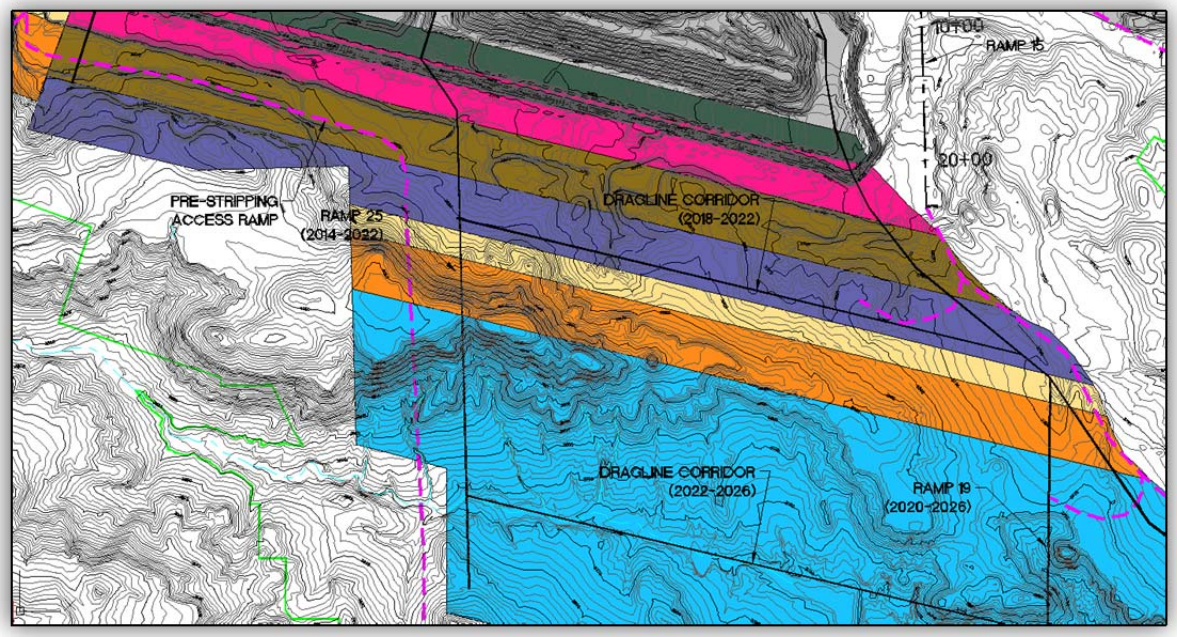
*The southwestern portion of OB2-2 will be constructed temporarily as Pit #2 advances through the hills as this portion of the pile is within the highwall layback area. The southwestern portion of OB2-2 will be placed in backfill before mining progress adjacent to the stockpile. The AOC PMT requirements require construction of OB2-2 before an area is available in backfill for construction of an overburden stockpile. Thus the only relatively flat area available when OB2-2 construction is needed is the area shown in these figures.*

*The Ramps 22 and 23 were misrepresented on the Plate 18. Ramp 22 is a relocated dragline corridor as the pit advances south near PMT elevation. These future dragline walk back roads are currently shown as Ramps 21 and 22 and have been renamed as shown below. Ramp 23 was shown as a projected-moved end ramp 25; however Plate 18 has been revised as shown below to simply show Ramp 25 advancing further south to avoid confusion for the reviewer. Plate 6 does not require updating since Ramps 22 and 23 are at PMT and won't delay regrade.*

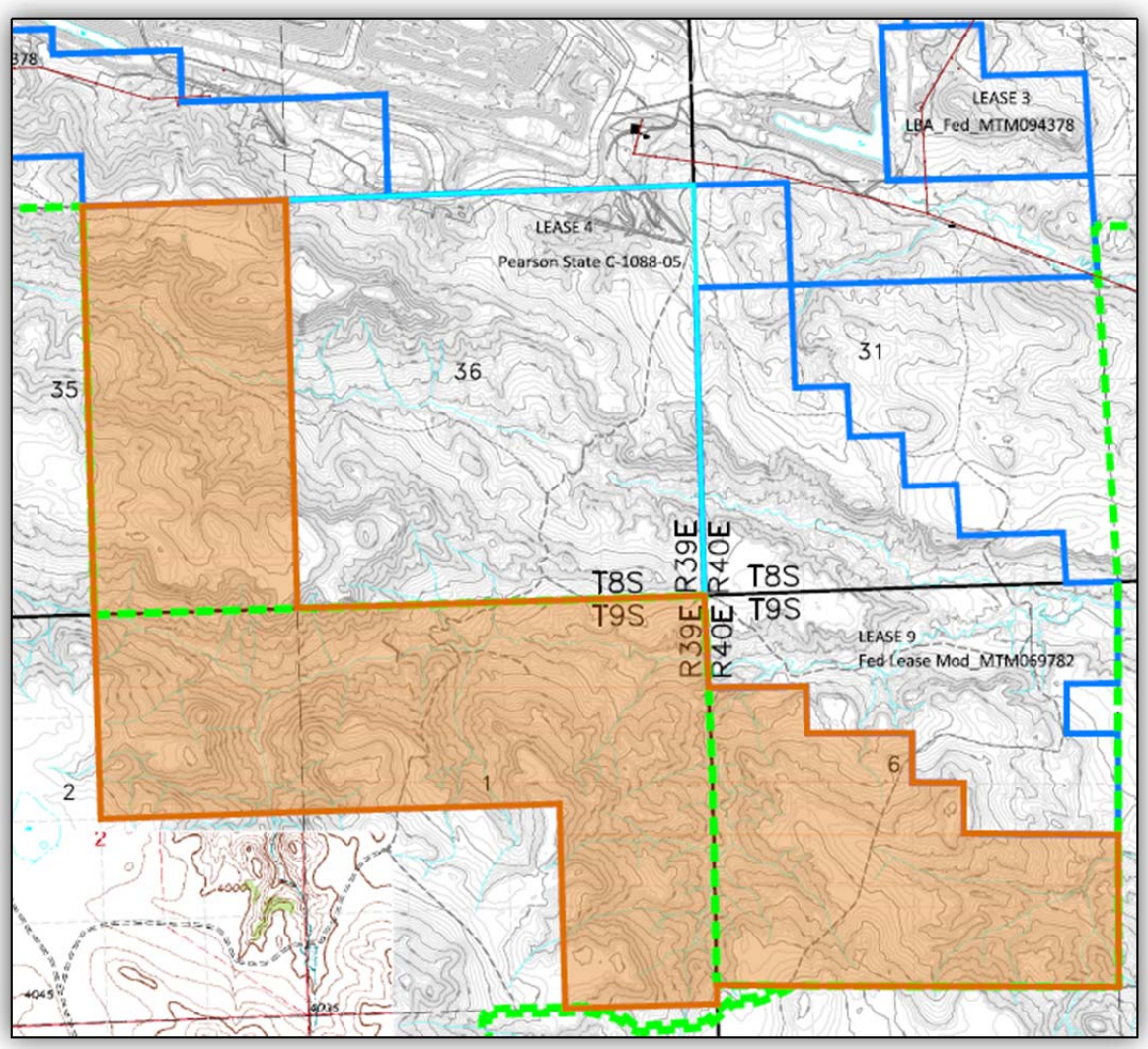



Comment #76

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.

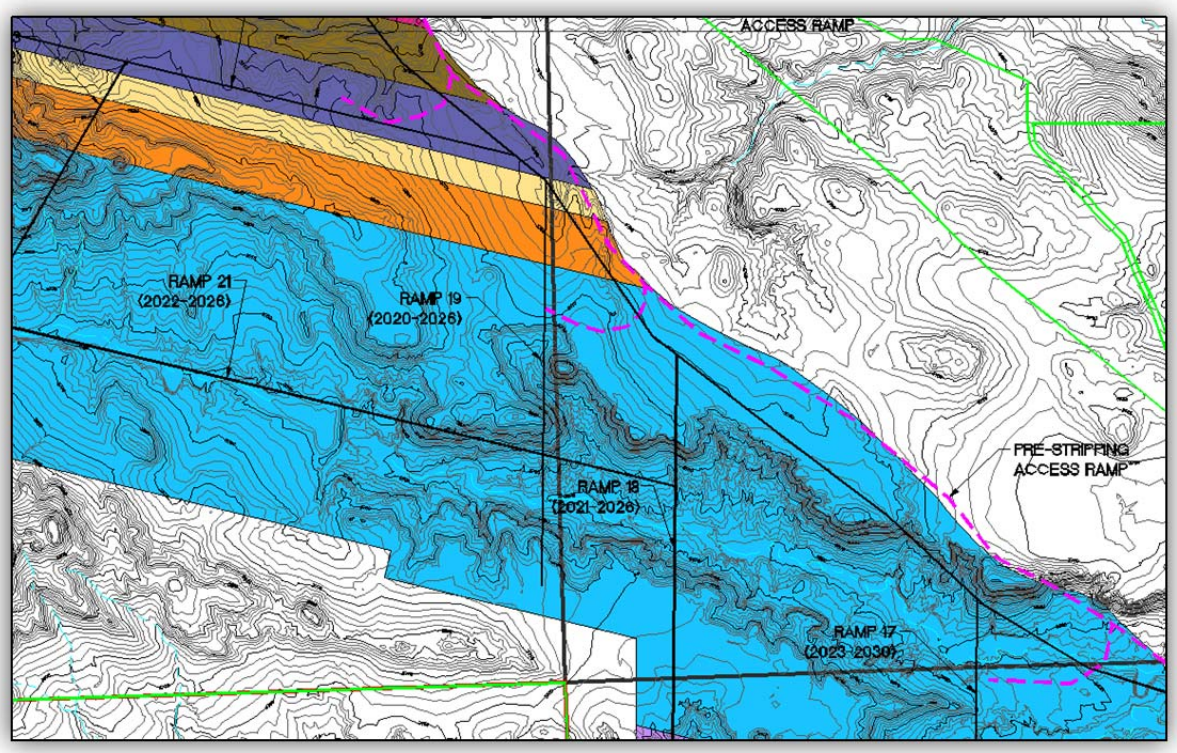
*Response #76*

*The figure shown below is from Plate 1 of the LBA II application submitted to the BLM February 8, 2013 which adds coal reserves west and south of Pit #2 shown as brown hatch. As can been from the figure below, all of Section 36 is currently leased and SCM has applied to lease the east half of Section 35 and the north half of Section 1. As discussed in comment #75 above, the currently permitted OB-F is located on leased coal south of Pearson Creek in Section 36 and must be relocated off of coal reserves to allow mining to progress to the south. Thus the location of the relocated OBF which is now called "OB2-2" must be on the north side the Pit #2 cuts as mining will continue towards the south. The goal of OBF (now called OB2-2) remains to construct a near pit stockpile to reduce overall pit area disturbance and allow for contemporaneous construction and AOC topography.*




<u>Comment #77</u>
Spring Creek should consider one ramp instead of Ramps 18 and 19.

*<u>Response #77</u>*
*The mid-pit ramps shown on Plate 18 are essential as they is required for the dragline sequence of mining. The use of a mid-pit ramp can be seen in Pit #1, #2, and #4. Plate 18 shows projected ramps 18 and 19 which will have some overlap but will mostly be constructed in sequence as the pit length shortens. The location of these mid-pit ramps will be adjusted (moved east) as pit length shortens as topography and the pit advances through the drainage. It is the economic advantage of SCM to reduce the number of pit ramps as much as possible so backfill of the areas to PMT can occur as soon as possible; thus the number and length of ramps constructed will be minimized as much as possible.*




Comment #78
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.

*Response #78*
*The overburden stockpile OB3-1 is a renamed version of the approved overburden stockpile OB-C in the same location. The MR199 advanced the mining of the final Pit #3 cut from the end of mine life to current mining. This low cover area will be mined and backfilled to PMT in early 2015. The old Carbone Y area will be backfilled and used as a long term haul road intersection after the area has been backfilled to PMT. OB3-1 will be used partially to backfill the SE portion of Pit #4. The narrative in 313 for OB3-1 has been revised to reflect these changes as shown below.*

**Overburden Stockpile OB3-1:**
An existing stockpile "known as OB3-1" will be used for reclaiming the ridge feature located between the South Fork Spring Creek and Spring Creek in Section 23 on backfill. Approximately 0.8 million LCY are currently in this stockpile which has a footprint of approximately 40 acres. The stockpile will result in a postponement of reclamation, within and surrounding the stockpile footprint, until the end of mining in Pit 4 cut P4E26.