

COAL CONSERVATION PLAN

(2)(a)(i) Narrative Interpretation of Borings and Coal Samplings Conducted on Area

The lithologic logs for all core samples used to evaluate the coal reserve are contained in Volume 5, EBS. Additional logs for the Pit 4 area are available for review at the mine site.

Geology

Physiography

The Spring Creek mine site is located within the Missouri Plateau Division of the Great Plains physiographic province. The mine site is dissected by three southeast flowing tributaries to the Tongue River. Spring Creek cuts through the northeast portion of the mine site while the center of the mine is occupied by South Fork Spring Creek and the southwest part of the mine is occupied by Pearson Creek. South Fork Spring Creek and Spring Creek are separated from each other by a set of low relief (less than 200 feet) southeast trending hills known as the Central Bluffs. Maximum surface relief within the permit area is about 635 feet, the highest point being northwestern-most Central Bluffs at about 4,210 feet. The lowest elevation is in South Fork Spring Creek at about 3,575 feet.

The Pearson Creek area comprises the southern portion of the mine permit boundary. Maximum surface relief within this area is approximately 485 feet, the highest point being along the west central permit boundary at 4,070 feet. The lowest elevation within this area at 3,775 feet occurs on Pearson Creek.

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Stratigraphy

Strata exposed at the Spring Creek Mine belong to the Tongue River Member of the Fort Union Formation of Paleocene age. The uppermost stratum consists of reddish, clinkered sediments overlying the burned 7 to 15 foot thick Smith coal seam which caps portions of the Central Bluffs and higher topographic areas of the site. The bluffs directly south of the South Fork Spring Creek either have outcrops of the Smith seam or show clinker resulting from Smith seam burn, depending on location.

The 80-foot Anderson-Dietz (A/D) seam is the only presently economic coal seam at SCM. Within the Pits 1, 2 and 3 portions of the mine permit area the A/D seam lies approximately 140 feet below the Smith seam. Within Pit 4 the A/D seam lies approximately 220 feet below the Smith seam. Clinker zones are evident along the outcrop of the Smith seam within the Pit 4 area where natural burning of Smith coal has occurred. A bedrock clinker and partial burn zone for the A/D seam exists near the northeastern and eastern boundaries of the Pit 4 area. Rock units between the Smith and A/D coal seams consist principally of interbeds of gray to dark gray shale/claystone, gray to yellowish gray sandstone and siltstone, and carbonaceous shale. With the exception of the coal seams, the lithologic units are typically lenticular with limited areal extent and change character over short distances.

Two coal seams (Roland and Smith) lie above the Anderson/Dietz (A/D) seam but are limited to areas of higher topography. The upper most seam, the Roland, is very discontinuous and largely oxidized due to its position in the stratigraphy. Where it is present, the seam is thin with ash banding. No quality has been obtained for the Roland. Due to overall thickness and very limited areas where it is found in the current leases, it is not an economic resource. The Smith seam, though a bit lower in the stratigraphic column is also discontinuous and largely oxidized. The limited quality information available for the Smith seam obtained and analyzed by the SCM indicates high sulfur and low BTU content. As such, the Smith seam is not a marketable product. As a component of a combined SCM product, analysis indicates acceptable blending rates would greatly hinder recovery of the primary resource. Therefore, the Smith seam is not an economically recoverable resource. For these reasons this coal seam is not included in the coal recovery Table 322-1 shown below.

There are also three other coal seams (Canyon, Wall, and Carney) below the Anderson/Dietz (A/D) seam. These coal seams are considered to be uneconomical for mining due to their high stripping ratios. SCM has a limited number of drill holes that penetrate these lower coal seams within the Pit 4 area. Four of the six holes that penetrate these lower seams are water supply wells. These holes are concentrated in the area of the federal lease (southeastern area of the Pit 4 area). Table 322-0 provides general information for these other lower seams.

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Table 322-0.

	Avg. Seam Thickness	Avg. Interburden/ Overburden Thickness	Avg. Stripping Ratio (By Each Seam)	In-Place Tonnage (million tons) ²	% Moisture	% Ash	BTU	% Sulfur	% Volatile	% FC
Roland ¹	6	60	10:1 ⁴	0.0 ³	ND	ND	ND	ND	ND	ND
Smith	14	126	9:1 ⁴	10.4	27.87	5.10	8,699	0.66	29.97	36.8
Canyon	17	120	7:1	18.9	23.8	4.65	9,440	0.37	30.04	41.4
Wall ¹	12	60	5:1	13.4	ND	ND	ND	ND	ND	ND
Carney ¹	20	150	7.5:1	22.3	ND	ND	ND	ND	ND	ND
Notes: 1) SCM has not collected coal quality data for the Roland, Wall or Carney seams. 2) In-place tonnage was calculated by multiplying the average thickness by the area of the leased areas. 3) In-Place tonnage within current leases was < 1000 tons. This tonnage is economically unrecoverable. 4) The strip ratio was calculated with respect to each coal seam. The Roland and Smith seams are located above the Anderson/Dietz Seams; thus they will be removed to recover the Anderson/Dietz seam.										

Structure

SCM is located within the northwest portion of the Powder River structural basin. In the mine area the sediments dip at about 2 degrees to the southeast. There are two significant northeast-southwest trending normal faults within the Pit 4 area. The Spring Creek Fault is located near the south boundary of the Pit 4 area and has a displacement of about 175 feet, with the north side down relative to the south side. The Carbone Fault is located near the north boundary of the Pit 4 area and has a displacement of about 80 feet with the north side displaced upward. North of the Carbone Fault the A/D seam has been burned and extensive clinker deposits are present. South of the Carbone Fault the A/D is mostly unburned. Local variations in dip occur because of depositional features, structural distortion, or northeastward-trending faults of generally low displacement.

(2)(a)(ii) Reserve Calculation

Coal reserves within the SCM coal lease boundaries were calculated using grid files in SurvCADD®/AutoCADD®. This process yields a volume of coal to which an in situ density of 1.1 tons/cubic yard is applied to determine available reserves. Due to factors such as poor quality coal, high stripping ratios, equipment maneuverability, 95% coal recovery rate, and coal not in the current mine plan, not all coal within the lease boundaries will be mined. The following page contains a table that shows the breakdown of the coal tonnage for each coal lease.

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Section 17.24.322(2)(b) contains a description of the coal reserves within each coal lease. Areas containing mineable reserves and areas to be left unmined are shown on Plate 22.

Table 322-1. Spring Creek Mine Coal Reserves as of 10/31/12

		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H) ²
Coal	Lease Area	(In Place) Total Coal Within Lease Area	Coal Not Recoverable ¹	(In Place) Coal Not in Current Mine Plan	(In Place) Coal Not Included Due to Pit Crop Limits	(In Place) Coal Not Included Due to Equipment Maneuverability	(In Place) Coal Not Included Due to High Stripping Ratio	(In Place) Previously Mined Coal	Proposed Mine Plan Recoverable Coal Reserve (As of 10/31/12)
Lease	(acres)	(tons)	(tons)	(tons)	(tons)	(tons)	(tons)	(tons)	(tons) ³
State Coal Lease C-1099-00, C-1100-00 & C-1101-00	480	63,540,000	3,170,000	0	380,000	0	0	39,346,000	20,644,000
C-1088-05	641	84,532,600	4,227,000	23,966,000	480,000	0	0	0	55,860,000
MTM 069782	3,005	350,834,000	17,541,000	4,636,000	4,533,000	0	5,620,000	249,599,000	68,906,000
MTM 88405	150	19,170,000	960,000	0	0	0	140,000	11,600,100	6,469,900
MTM 94378	1,118	140,119,000	6,920,000	13,577,434	1,080,000	6,510,000	280,000	224,400	111,527,166
Scrutchfield	200	9,320,000	470,000	4,071,000	0	0	0	0	4,779,000
Total	5,094	667,515,600	33,288,000	46,250,434	6,473,000	6,510,000	6,040,000	300,769,500	268,186,066

¹ Coal not recoverable based on 95% recovery rate. See Section 17.24.322(2)(b).

² (H) = (A) - (B) - (C) - (D) - (E) - (F) - (G).

³ The current mine plan recoverable reserve is exclusive to this application (as of 10/31/12).

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As of October 2012, SCM has approximately 196,045,000 recoverable tons remaining in the approved mine plan. The Major Revision adds approximately 72,141,000 recoverable tons to the mine plan. The added tons are located in two different federal coal leases (MTM 069782 and MTM 94378) and one state coal lease (C-1088-05); see Table 322-2 for the tonnage breakdown. The total remaining recoverable reserves is approximately 268,186,000 tons as shown in Table 322-1 above.

Coal added in existing leases MTM-94378 and C-1088-05 consists of additional mine cuts facilitated by additional surface control to allow for mining disturbance. A modification to federal lease MTM069782 included adding an additional coal tract. As a result, federal Lease Modification Application (LMA) MTM-069782 Resource Recovery and Protection Plan (R2P2) approved June 17, 2017 includes 53.6 million recoverable tons. Federal lease modifications are also sometimes referenced as a Lease By Modification (LBM). The TR-1 Major Revision only includes 44.6 million tons of the 53.6 million total recoverable tons of this lease because of mine permit boundary constraints in the southwest portion of the lease. Recovering coal from the additional mining cuts requires a permit boundary revision. SCM will seek MDEQ approval prior to mining the additional reserves listed in the R2P2. Areas added by this Major Revision are included on Plate 22, Historic and Proposed Progression. The following table shows the amount of recoverable coal added by the Major Revision.

Table 322-2. Recoverable Reserves Added by the Major Revision¹

Coal Lease	Recoverable Coal Reserves Added by a New Coal Lease (tons)	Recoverable Coal Reserves Added by Additional Mine Passes (tons)	Total Recoverable Coal Reserves Added (tons)
C-1099-00			
C-1100-00			
C-1101-00			
C-1088-05		15,725,000	15,725,000
MTM 069782	44,558,000		44,558,000
MTM 88405			
MTM 94378		11,858,000	11,858,000
Scrutchfield			

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Total	72,141,000
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¹Recoverable reserves based on 95% recovery rate.

(2)(a)(iii) Geologic Cross-Sections

Geologic cross-sections of the Pits 1, 2 and 3 portions of the mine permit area developed from core data are shown in Volume 3, EBS. Geologic cross-sections of the Carbone and Pearson Creek Amendment areas developed from geophysical logs and core data are shown in Appendix I. The core data is shown in Attachment I-10 and the cross sections are shown on Plates I-7 through I-10.

(2)(a)(iv) Map of Test Boring Locations

Locations and elevations of all test borings in the approved and proposed permit areas are shown on Plates 9 and 10, Volume 4.

(2)(a)(v) Isopach Maps

Upon request, SCM will furnish isopach maps.

(2)(a)(vi) Chemical Properties of the Coal

The typical quality of the remaining coal reserves is shown below:

<u>Parameter</u>	<u>Typical</u>
% moisture	25
% ash	4
Btu/lb	9350
% sulfur	0.33
% SO ₂ /MMBTU	0.71

The short proximate data are based on data from 50 coreholes. The trace element content of coal is anticipated to be similar to that of the original permit area which is summarized below:

As	<2	Mn	17
Be	<0.2	Ag	<0.07
Cr	2.4	Ni	1.4
Cd	<0.2	Se	<1
Pb	<3	F	41

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These units are in micrograms per gram, dry basis. The values are based on 30 production samples collected between January 1994 and January 1998.

The coal reserves added by the Major Revision are similar in quality as the coal currently being mined by SCM. With the addition of this coal, the average chemical and physical properties of the recoverable reserves remain unchanged

(2)(a)(vii) Coal Crop Lines and Dip and Strike

The A/D coal seam within the permit area dips approximately 2° to the southwest. This seam does not crop out within the Pits 1, 2 and 3 portion of the permit area. Within Pit 4 north of the Carbone Fault the extensive A/D burn indicates that the coal was exposed at or near the surface in order to have adequate oxygen to initiate and support spontaneous combustion. No areas of active burn are currently known in the vicinity.

(2)(a)(viii) Location and Extent of All Underground Mines

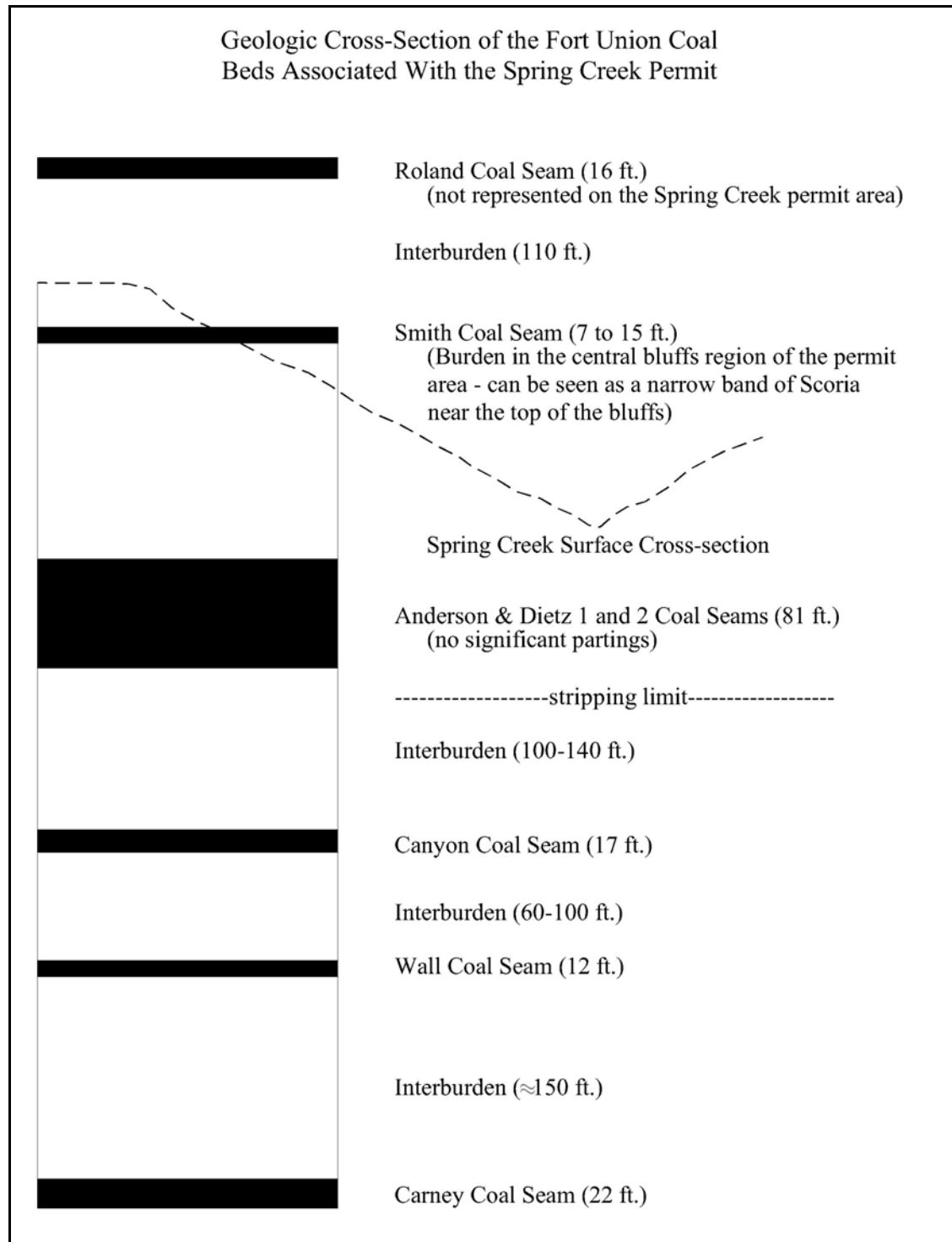
There are no underground mines, either active, inactive or abandoned, within the mine plan or adjacent area.

Coal and other rocks composing the Tongue River Member were deposited in a continental environment at elevations of probably a few tens of feet above sea level in an expansive area of shifting rivers, flood plains, sloughs, swamps and lakes that occupied the area of the Northern Great Plains in Paleocene time. Because of their depositional history, these deposited clastic sediments tend to be of lenticular shape, of a limited areal extent, and of a lithology and character that can change rapidly over short lateral distances.

The largest geologic structure at the mine site is the Spring Creek Fault. The fault is indicated to be about 6 miles long and trends from southwest to northeast. This is a normal type fault with the north side down about 175 feet relative to the south side of the fault line. The Carbone Fault marks the northern limit of mineable A/D coal within Pit 4. A northeast trending normal fault, subparallel to the Spring Creek Fault to the south, with the north side up thrown, the Carbone Fault has a stratigraphic offset from 40 to 80 feet. This fault has elevated the A/D

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Figure
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coal seam up enough to expose the coal at the surface and initiate extensive burning of the 80 foot thick A/D seam on the north side of the fault.

(2)(a)(ix) Location and Extent of All Previous Strip Mines

There are no existing or previous strip mined areas within the mine plan area.

2)(b) Location, Quantity and Quality of all Coal to be Left Unmined, Plus Explanation for Not Mining

Under the proposed life-of-mine plan shown on Plate 22, Volume 3, SCM will not recover 98,561,000 tons of the total remaining A/D reserves (as of 10/12). The unrecoverable reserves were determined by subtracting the recoverable reserves and the previously mined reserves from the total leased reserves (see Table 322-1).

- 1) All unrecoverable tons of coal within federal lease MTM 069782 (See Plate 22) are described as follows:
 - i) South of Pit 1 in the South Fork of Spring Creek drainage, there are 110,000 leased tons, which have not been included in the current mine plan. These tons lie in land Section 27 Township 8 South Range 39 East. South of Pit 2 in the Pearson Creek drainage, there are 4,526,000 leased tons, which have not been included in the current mine plan. These tons lie in land Section 31 Township 8 South Range 40 East and Section 6 Township 9 South Range 40 East.
 - ii) North of the Spring Creek fault, yet inside the MTM-069782 lease boundary, are 5,620,000 tons of coal that have a very high stripping ratio. This coal is on the downthrown side of the fault, and too deep to allow economical access. The area lies in Section 23 Township 8 South Range 39 East and Section 22 Township 8 South Range 39 East.
 - iii) Along the crop line at the dig-in point for Pits 2 and 3, and southeast of Pit 2 there are an estimated 4,533,000 tons of coal not included due to pit crop limits.
 - iv) Based on a 95% coal recovery rate, approximately 17,541,000 leased tons will not be recovered.

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- 2) All unrecoverable tons of coal within federal lease MTM 94378 (See Plate 22) are listed as follows:
 - i) Approximately 13,577,000 leased tons of coal have not been included in the current mine plan. These areas occur south of Pit 1 (Section 26 Township 8 South Range 39 East and Section 27 Township 8 South Range 39 East) and south of Pit 4 (Section 22 Township 8 South Range 39 East and Section 23 Township 8 South Range 39 East).
 - ii) Approximately 280,000 leased tons of coal will not be recovered due to a high stripping ratio. This coal is on the downthrown side of the fault and too deep to allow economical access. These areas occur southeast of Pit 4 (Section 13 Township 8 South Range 39 East and Section 24 Township 8 South Range 39 East).
 - iii) Approximately 1,080,000 leased tons of coal will not be recovered due pit crop limits. These tons are located east of Pit 2 (Section 30 Township 8 South Range 40 East) and north of Pit 4 (Section 13 Township 8 South Range 39 East and Section 14 Township 8 South Range 39 East).
 - iv) Approximately 6,510,000 leased tons of coal will not be recovered due to limited equipment maneuverability. These tons are located northeast of Pit 4 in Section 13 Township 8 South Range 39 East and Section 14 Township 8 South Range 39 East.
 - v) Based on a 95% coal recovery rate, approximately 6,920,000 leased tons will not be recovered.
- 3) All unrecoverable tons of coal within federal lease MTM 88405 (See Plate 22) are listed as follows:
 - i) Approximately 140,000 leased tons of coal will not be recovered due to a high stripping ratio. This coal is on the downthrown side of the fault and too deep to allow economical access. This coal is located in Section 23 Township 8 South Range 39 East and Section 24 Township South Range 39 East.
 - ii) Based on a 95% coal recovery rate, approximately 960,000 leased tons will not be recovered.

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- 4) All unrecoverable tons of coal within state coal leases C-1099-00, C-1100-00, C-1101-00 (See Plate 22) are listed as follows:
 - i) Approximately 120,000 leased tons of coal will not be recovered due to pit crop limits. This coal is located in Section 14 Township 8 South Range 39 East. Approximately 260,000 leased tons of coal will not be recovered due to pit crop limits. This coal is located in Section 15 Township 8 South Range 39 East.
 - ii) Based on a 95% coal recovery rate, approximately 3,170,000 leased tons will not be recovered.

- 5) All unrecoverable tons of coal within state coal lease C-1088-05 (See Plate 22) are listed as follows:
 - i) Approximately 23,966,000 leased tons of coal have not been included in the current mine plan. This area is located in Section 36 Township 8 South Range 39 East.
 - ii) Approximately 480,000 leased tons of coal will not be recovered due to pit crop limits. This area is located in Section 36 Township 8 South Range 39 East.
 - iii) Based on a 95% coal recovery rate, approximately 4,227,000 leased tons will not be recovered.

- 6) All unrecoverable tons of coal within the Scrutchfield fee lease (See Plate 22) are listed as follows:
 - i) Approximately 4,071,000 leased tons of coal have not been included in the current mine plan. These tons are located in Section 15 Township 8 South Range 39 East and Section 22 Township 8 South Range 39 East.
 - ii) Based on a 95% coal recovery rate, approximately 470,000 leased tons will not be recovered.

The two upper coal seams (Roland and Smith) will not be mined due to poor seam quality as discussed in Section 322(2)(a)(i).

The three lower coal seams (Canyon, Wall, and Carney) will not be mined due to their high stripping ratios as discussed in Section 322(2)(a)(i).

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Mining Losses

During surface mining operations, 2-5% of recoverable coal reserves will be lost as a result of coal loading, blasting, cleaning of coal, and coal fenders left for spoil retention. To maintain desired coal quality, it is necessary to clean the upper coal surface of overburden, which results in the loss of a small quantity of loose coal at the coal-overburden interface. Blasting is necessary to fragment coal to facilitate loading. Some coal along the spoil side of the pit will be displaced during these operations and will be mixed with overburden, thus diluting it to an unacceptable quality. However some earthen material may be blended with coal to provide boiler efficiencies and quality characteristics. During coal loading operations, some spillage results. Spillage losses will be controlled by cleaning the pit areas following coal loading.

The coal conservation plan is designed to maximize recovery of the A/D coal seam. To ensure safety during coal recovery, a certain amount of coal will be left in place to act as spoil retention fenders. Upon completion of primary coal loading, secondary coal recovery will be attempted in areas having fenders. Overall, minimum coal recovery will average 95%, as has been evidenced over the past ten years of mining.

Coal recovery will be further maximized to the extent possible where coal crops and burn lines are expected to be encountered at endwalls and projected final highwalls based on the geologic model. As described in 17.24.308(1), the geologic model is based on data from drillholes with variable spacing. Actual coal recovery may vary as much as 500 feet from projected endwalls and 100 feet from the projected final highwall (notable exceptions to this are perimeter lease boundaries which will be the final endwall or final highwall even if recoverable [i.e., unleased] coal extends beyond those lease boundaries), as depicted on Plate 5, without requiring a minor permit revision. Modifications to the mine plan that significantly affect coal recovery or the recontouring plan will be addressed through the minor revision process in consultation with the Department.

(2)(c) Range Diagram and Recovery of Coal Fenders

To recover the entire coal fender currently being retained to prevent spoil slippage, it would be necessary to alter the current dragline stripping technique

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dramatically. The present single pass method with no extended bench would necessarily have to be modified to a fully extended bench technique for the machine to rehandle spoil material being retained by the fender. The rehandle percentage to build the extended bench would approximate 100% for our operation and cannot be economically justified for a recovery increase of less than 1.8% (which the fender represents). The differences in the two techniques are illustrated in Vol. 4, Plates 17A and 17B.

(3) MDEQ Request for Additional Information

SCM will discuss with the MDEQ any future requests for information under this rule.

(4) Department Review of Resource Recovery and Protection Plan

No response required.

(5) Provisions for Grievance Petitions

No response required.