WRITTEN FINDINGS

Prepared by:

Montana Department of Environmental Quality
Industrial and Energy Minerals Bureau
Coal and Uranium Program

for

Pearson Creek Amendment, Application 00183
Spring Creek Coal Mine

Spring Creek Coal Company
Permit No. 79012

Big Horn County, Montana

June 21, 2011

Table of Contents

I. INTRODUCTION

Spring Creek Coal Company (SCCC) has applied to the Montana Department of Environmental Quality (MDEQ) and the Office of Surface Mining, Reclamation and Enforcement (OSMRE) for a permit amendment for its Spring Creek Mine, Surface Mine Permit 79012, in Big Horn County, Montana (see Exhibit 1.) The Pearson Creek Area (PCA) would add 2,042 acres, 1,224 acres of which would be affected by mining, and an estimated 170 million tons of recoverable reserves. Upon approval of this amendment and considering the current annual coal production, coal recovery would take place at least through the year 2022. This action would extend the life of coal mining for Federal coal leases MTM 069782, MTM 088405, and MTM 094378.

As mining activities would extend into the Pearson Creek drainage, an alluvial valley floor (AVF) study was performed for Pearson Creek. Upon review, the Montana Department of Environmental Quality (MDEQ) determined that Pearson Creek did not have the essential hydrologic functions, including support of agricultural fields used for crop production, necessary for an alluvial valley floor.

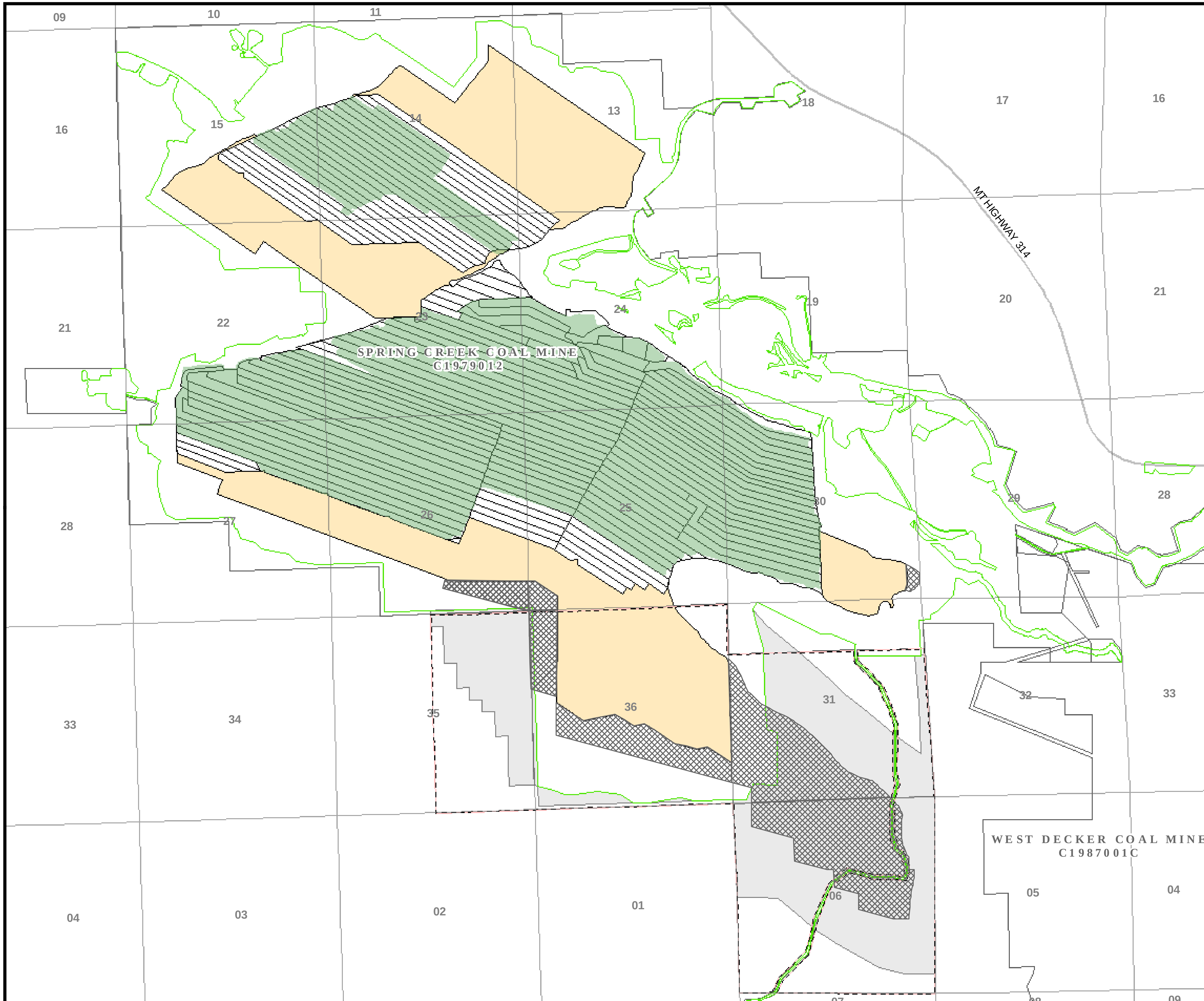
Spring Creek Coal Company commits to a reclamation plan designed to restore the natural function and utility of the land affected by mining activities, including reclamation of Pearson Creek, an ephemeral drainage. The reclamation plan is located in section 17.24.313 of the permit (Surface Mine Permit C1979012).

Table I - Introductory Table

Applicant	Spring Creek Coal Company
Name of Mine	Spring Creek Coal Mine
MSHA Number	2401457
Type of Mine..	Strip
Type of Application	Amendment
Area within existing permit boundary (acres)	6,944.72
Proposed Increase in Permit Area (Acres)................	2,042
Total proposed permit area (acres)	8,986.72
Anticipated Annual Production	20 million tons

Table II - Chronology of Events

April 11, 1979	Surface Mine Permit 79012 is issued; original acreage is 2933 acres.
January 23, 2008	Various permitting actions April 1979 to January 2008.
January 23, 2008	Application 00183, Pearson Creek Amendment, is originally submitted to the Department by Spring Creek.



Montana Department of Environmental Quality

ENVIRONMENTAL ASSESSMENT MAP

Application 00183

Spring Creek Mine
Spring Creek Coal Company
Permit # C19790012

- Proposed Additional Mining
- Proposed LOM Disturbance Boundary
- Proposed Permit Boundary Extension
- Approved Mine Plan
- Mined Out Area
- Future Coal
- Future Disturbance
- Approved Permit Boundary

0 0.2 0.4 0.8 Mile

N

Date: 05/13/2011
File Path: L:\PCD\IEM\COAL\SPCR\MAP\EA_App183.mxd

Projection: NAD 83 Montana State Plan Meters

D-000124

EXHIBIT #1

March 19, 2008	The Department rejects Spring Creek's original submittal for a variety of administrative reasons.
November 24, 2008	Revised Application 00183 received by the Department.
January 20, 2009	Original Applicant/Violator System check conducted by the Department.
February 20, 2009	Department sent Spring Creek a letter detailing administrative completeness deficiencies that needed to be addressed.
June 3, 2009	The Department received Spring Creek's response to the first round of completeness deficiencies.
August 6, 2009	The Department determines that Application 00183 is administratively complete and that an environmental impact statement is not necessary.
August 11, 2009	The Department notifies the appropriate agencies of the receipt of a complete application.
August 20 and 27 September 3, and 10, 2009	Notice of Application published in The Sheridan Press, Sheridan, Wyoming.
October 14, 2009	The Department issues first round technical deficiencies.
October 22, 2009	A coordination meeting between Spring Creek and the Department is held to discuss the First Round of Technical Deficiencies.
December 11, 2009	The Department sent Spring Creek deficiencies related to the proposed Post-Mine Topography (PMT).
January 8, 2010	Spring Creek submitted a revision to Application 00183 for the proposed PMT.
January 12, 2010	The Department denies a request from Clark Minerals for an informal conference.
April 19, 2010	The Department receives Spring Creek's responses to First Round Technical Deficiencies.
May 6, 2010	The Department receives PDF files for responses for First Round Technical Deficiencies.
August 17, 2010	The Department issues Second Round Technical Deficiencies for Application 00183.

December 1, 2010	Spring Creek submits a revision to Application 00183 for a soils language change.
January 24, 2011	The Department receives confirmation from Department of Natural Resources and Conservation that Section 36 (state ownership) should be reclaimed back to sage grouse habitat.
January 24, 2011	Spring Creek submits Appendix M-Application 00183 (Bond) for informal review.
January 31, 2011	An informal review of changes to section 17.24.313, Application 00183 is conducted by the Department.
February 10, 2011	BLM submits a memo stating "This office has no objection to this revision and hereby recommends approval" regarding Application 00183 Federal Coal Lease MTM94387.
February 14, 2011	Department receives Spring Creek's responses to Second Round Deficiency Comments for Application 00183.
March 1, 2011	Montana Fish, Wildlife and Parks completed their review of the proposed Technical Standards for revegetation (Addendum 17.24.313(B) – Technical Standards) and endorsed the proposed standards.
March 28, 2011	Department submits archaeological information to SHPO.
April 5, 2011	The Department receives concurrence of our findings and recommendations from SHPO.
April 8, 2011	Department provides Spring Creek with Third Round Technical Deficiency comments.
April 26, 2011	Spring Creek responds to Third Round Technical Deficiency comments.
May 17, 2011	Department completes the Environmental Assessment for Application 00183.
May 17, 2011	Spring Creek submits the affidavit of Public Notice for the publication of the Notice of Application.
May 19, 2011	Department determines Application 00183 acceptable.
June 6, 2011	Comment period for the Notice of Acceptability (published in The Sheridan Press, Sheridan, Wyoming, on May 19 and 26, 2011)

ended. No comments were received.

June 10, 2011 Final Applicant/Violator report obtained from OSM.

II. EVALUATION OF COMPLIANCE

Various portions of the text in the environmental assessment of application 00183 (MDEQ, May, 2011) have been liberally utilized in the preparation of this section of the written finding.

A. Coal Reserves and Coal Conservation

The Spring Creek Coal Mine 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. The mine is dissected by three southeast flowing tributaries to the Tongue River. Spring Creek cuts through the northwest to northeast portions of the mine site while the southwest part of the mine is occupied by South Fork Spring Creek. The Central Bluffs separate these two drainages. Pearson Creek drainage is located in the southern portion of the proposed permit amendment and flows in an easterly direction to the Tongue River Reservoir. Maximum surface relief from the highest point in the Central Bluffs (3,991 feet) to the lowest point where the South Fork Spring Creek exits the permit area (3,575 feet) is 416 feet.

Five coal seams are located within the area covered by the surface mine permit. The 80-foot Anderson-Dietz (A/D) seam is the only seam that is presently economical to mine. The Smith, Canyon, Wall and Carney seams are not currently economical to mine. The proposed amendment would increase coal recovery within the mine area by an estimated 171 million tons. Coal recovery from the mine operations has averaged 95 percent for a number of years.

Spring Creek Coal Company has been averaging 10-20 million tons of coal production for a number of years.

B. Overburden, Soils, and Engineering

Overburden would undergo pulverization and mixing during the excavating process, followed by backfilling and grading to post-mine topography; thereby, homogenizing the overburden strata's physical-chemical characteristics. Undesirable characteristics such as high salinity and sodicity would be diluted.

Overburden quality in the mine area varies among the strata. Where overburden is deemed "unsuitable" as defined by the Department's Soil, Overburden, and Regraded Spoil Guidelines (MDEQ, 1998), elevated SAR, salinity, and silty clay or clay texture are often the culprits. Overburden quality is generally good for use as plant root zone media. Suitable materials would be handled by truck/shovel operation and direct-placed upon a graded surface. Where unsuitable overburden is encountered above the dragline bench, it would also be handled by truck/shovel and placed in the backfill with a minimum of four feet of suitable cover. SCCC has determined that sufficient quantity of suitable overburden exists for reclamation.

Most soils within the proposed mine area were previously impacted by livestock grazing. Soils would be tested for suitability parameters of texture, pH, electrical conductivity (EC), sodium adsorption ratio (SAR), saturation percentage, and Boron when EC exceeds 4.0. The test results would be submitted to the Department for verification of suitability and salvage depth approvals.

The soil resource would be salvaged using a two-lift salvage method. The first lift of soil material ("A" lift), containing A and B soil horizons, would typically consist of the top six inches of the soil resource. The second lift of soil material ("B" lift), containing B and C soil horizons, may include material down to approximately 100 inches. The "A" and "B" lift soils would be distributed on regraded spoils that would be tested for suitability parameters (below) where the post-mining topography (PMT) has been met. If there are no regraded spoils available, surplus "A" and "B" lift soil would be stockpiled separately in designated stockpile footprint zones. Each stockpile would be marked with a sign identifying the soil type; additionally, soil stockpiles would be protected from wind and water erosion.

SCCC would regrade spoils to the approved PMT following mining. The regraded spoils would be tested for suitability parameters of pH, EC, SAR, saturation percentage, texture, and molybdenum prior to soil laydown. Test results would be submitted to the Department for verification. Once the PMT is achieved and the spoils are determined suitable, the "B" lift soil followed by the "A" lift soil would be redistributed. The depth of redistributed soil is designated by the target vegetation type as described in section <u>17.24.313 Reclamation Plan</u> of SCCC's Surface Mining Permit (SMP C1979012). Following redistribution, an approved seed mix would be applied during the next suitable planting period. Any areas where the soil appears unproductive would be evaluated and an appropriate treatment would be implemented.

SCCC has developed a soil redistribution plan which, contrary to uniform soil depth replacement, would link reclamation substrate type and depth to reclamation types and topography. Data from the Sodic Overburden Test Plots study provided the basis for shrub and forb establishment strategy.

C. Vegetation

A baseline vegetation inventory of the study area was conducted by Bighorn Environmental, as reported in "Appendix B3: Vegetation and Range Analysis," October, 2007. The study area includes the amendment area and potential future mining area. One plant species of concern was found in the study area. *Astragalus barrii* is ranked as potentially at risk for Montana and its global distribution (G3, S3). This species is common in the study area and the surrounding Spring Creek permit area, but the population could be affected by mining disturbance. This plant has been noted to establish in reclamation when the proper conditions are created. One other species of concern, *Physaria didymocarpa var. lanata* (G5T2, S1), has been identified in the mining plan area, and could be impacted by mining. SCCC's reclamation plans are designed to incorporate soil substrates, landscape, and topographic diversity as mitigation measures. For example, *A. barrii* prefers shallow, sparsely vegetated soils. SCCC would attempt to recreate this vegetative community by using spoil and scoria as soil substitution materials when available and appropriate. Vegetation communities would be removed by mining, and vegetation resources would be impacted in the short term. Long term, however, reclamation measures incorporated into the permits are designed to mitigate the community loss, and provide for the approved post-mine land uses of grazing, pastureland, and wildlife habitat.

D. Wildlife

Prior to applying for the original permit, baseline wildlife data were collected for 16 months. After the mining permit was issued in 1979, SCCC collected wildlife monitoring data annually. Originally, the data were collected within the permit area and a 2-mile buffer. Threatened and endangered species were monitored within the wildlife survey area and a 10-mile buffer zone around the permit. In 1995, the wildlife monitoring area was revised to discontinue the 2-mile buffer for threatened and endangered species and to redefine the boundary to include a 2-mile buffer around the Carbone Amendment Area (CAA). The increased survey area included the Pearson Creek Amendment Area (PCAA) as well. The survey area was further revised in 1998 to reduce the amount of overlap with the adjacent wildlife monitoring area for the Decker Coal Mine. The CAA and PCAA were included in the original area for baseline wildlife studies, and have subsequently been included in the survey area for the annual wildlife monitoring.

Potential impacts to the wildlife community were outlined in the original EIS (USGS and MDSL, 1979). The loss of structurally diverse habitats (grass-shrublands, deciduous tree/shrub, mixed shrub, and conifer woodlands) would have long-term impacts to a large number of songbirds, raptors, and small mammals. As the reclaimed habitats gradually mature, and more structural diversity is realized, use by an increased number of wildlife species is anticipated. It would take from several years for the less structurally diverse habitats up to decades for the more structurally diverse deciduous tree and conifer habitats to come back.

Wildlife surveys have been conducted each year since the mine was permitted and since 1994 by Thunderbird Wildlife Consultants, as reported in "Wildlife Monitoring, Spring Creek Mine, 2009." Mining would affect existing terrestrial and avian species and their habitats; however, these resources are expected to reestablish following reclamation. Spring Creek annual wildlife reports from 1994-2009 have documented twenty-three species of special concern. These species were observed within a much larger wildlife study area, not necessarily within this EA application area. Impacts are expected to be marginal as the majority of these species are transient individuals or do not reside within this application area. Species of special concern that have been documented in the area include: Black-tailed Prairie Dog, American White Pelican, Great Blue Heron, Bald Eagle, Golden Eagle, Ferruginous Hawk, Peregrine Falcon, Northern Goshawk, Greater Sage Grouse, Long-billed Curlew, Franklin's Gull, Burrowing Owl, Lewis's Woodpecker, Red-headed Woodpecker, Pinyon Jay, Blue-gray Gnatcatcher, Sage Thrasher, Loggerhead Shrike, Brewer's Sparrow, Plains Spadefoot Toad, Great Plains Toad, Short-horned Lizard, and Northern Sagebrush Lizard.

Reclamation plans are designed to incorporate soil substrates, landscape and topographic diversity as mitigation measures. Vegetative, terrestrial and avian resources would be affected for the short term; however, reclamation measures are incorporated in the permits for long term mitigation. The loss of structurally diverse habitats (grass-shrublands, deciduous tree/shrub, mixed shrub, and conifer woodlands) would have long-term impacts to a large number of songbirds, raptors, and small mammals. As the reclaimed habitats gradually mature, and more structural diversity is realized, use by an increased number of wildlife species is anticipated. It would take from several years for the less structurally diverse habitats up to decades for the more structurally diverse deciduous tree and conifer habitats to come back.

The OSMRE is required to initiate conferencing for the proposed listing of the threatened or endangered species, as well as, species currently listed by the U.S. Fish and Wildlife Service (USFWS). The USFWS has determined that this has been previously addressed in a September 24, 1996 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation operations under the Surface Mining and Control and Reclamation Act of 1977 (as referenced in the November 13, 2001 letter from the USFWS to MDEQ). This non-jeopardy opinion covers all surface coal-mining activities, for all listed species; as long as the required terms and conditions in the incidental take statements are implemented. The USFWS had developed species-specific protective measures that have been or will be (when available) added to MDEQ's Fish and Wildlife Guidelines (MDEQ, 2001b). Spring Creek Coal Company has committed to implementing these protective measures if a threatened or endangered species is determined to be present in the vicinity of the mine.

E. Hydrology

Detailed assessments of the cumulative hydrologic impacts of the proposed revision are found in Attachments 1 (Surface Water) and 2 (Groundwater).

1. Surface water

SCCC's proposed revision plan includes expansion of mining in existing pits in the mainstem and South Fork of Spring Creek drainages, and extension of mining to the south into the Pearson Creek drainage. If approved, the permit disturbance would increase by 1,224 acres (1.91 square miles), for a total Life of Mine (LOM) disturbance of 6022 acres (9.41 square miles), with mining to be extended through year 2022.

Impacts to surface water resources from the proposed SCC mining amendment application would result from increased mining disturbance and related changes to topography, drainage geomorphology, soils and vegetation. Operational and post-reclamation impacts to surface water resources would include changes to surface runoff characteristics, sediment loads and water chemistry.

Existing and proposed mining would primarily disturb ephemeral mainstem and tributary drainages of Spring Creek (including the lower portion of North Fork Spring Creek), South Fork Spring Creek, and Pearson Creek. A relatively small portion of LOM disturbance would include road and rail disturbance NE and SE of the mine in adjacent Tongue River interbasin areas and Monument Creek. Disturbance also includes limited disturbance/reclamation associated with a coal bed methane water-supply line and access road in upper Pond Creek and Squirrel Creek drainages, south of the mine.

LOM disturbance to the mainstem Spring Creek drainage (~4.53 square miles; above South Fork, including North Fork disturbance) would affect approximately 20 % of the Spring Creek drainage (23.1 square miles above the South Fork confluence). LOM Disturbance to the South Fork Spring Creek drainage (~3.88 square miles) would affect approximately 28 % of the South Fork Spring Creek drainage basin (13.9 square miles above its confluence with the mainstem of

Spring Creek).

Combined LOM disturbance of the mainstem Spring Creek, South Fork Spring Creek, and lower Spring Creek (below South Fork) would total ~8.42 square miles, or ~22 % of the total Spring Creek drainage basin (37.4 square miles from its headwaters to its confluence with the Tongue River Reservoir).

LOM disturbance to the Pearson Creek drainage (~0.69 square miles) would affect approximately 8% of the Pearson Creek drainage basin area (8.8 square miles above its confluence with the Tongue River Reservoir).

Approximately 0.28 square miles of additional LOM disturbance would occur in adjacent Tongue River interbasin areas.

Reclamation proposed for the amendment would generally approximate pre-mine topography and drainage basin morphology, but post-mining topography would have changes in drainage basin size, channel location, and upland topography. The proposed mine plan would include additional mining in the South Fork and Pearson Creek valley bottoms and in steeper, more diverse upland and ridge topography. Some steeper areas would be reclaimed to less steep terrain, with fewer headwater tributaries and reduced topographic diversity. The operator has committed to ongoing reevaluation of post-mine topography (e.g. spoil placement, rough and final grading) to better approximate pre-mine topography and related hydrologic characteristics and functions.

Surface runoff (and water chemistry) would be similar to pre-mine conditions where post-mine topography (vegetation and soil) most closely approximate pre-mine characteristics (e.g. basin size, tributary patterns, slope diversity). Surface runoff could be reduced in areas where drainage density and topographic diversity are reduced (subject to more potential overland flow and infiltration), with potentially fewer runoff events from smaller storms.

Sediment in runoff from initial reclamation would generally be increased over natural background levels, but should recover to levels similar to pre-mine with vegetative recovery. Water chemistry in the predominantly ephemeral drainages of the mine area should be similar overall to pre-mine characteristics. Any spoil aquifer discharges that develop (e.g. springs or intermittent/perennial channel reaches) are expected to have increased dissolved ions as discussed for groundwater systems in the following section.

2. Ground water

Additional mining associated with the amendment application would expand the impacts to groundwater at the mine. The additional pit areas would increase the area of the Anderson-Dietz coal aquifer removed during mining; therefore, increasing the extent and depth of drawdown, as well as, increasing the volume of spoil contributing to water quality declines in and downgradient of the pit areas.

Based on transient groundwater flow models, drawdown depth in the Anderson-Dietz coal seam aquifer would increase approximately 20 feet in the Pit 4 area by the end of mining. Drawdown extent in the permit area would be expected to increase between a half-mile to a mile. Drawdown associated with mining has the potential to affect a small number of domestic and stock wells within the anticipated drawdown area but is not expected to interrupt supply. If needed, replacement water sources, similar to the Anderson-Dietz coal aquifer in supply and quality, can be found in the Canyon coal or deeper coal seam aquifers. If uses are interrupted by changes in water quality or diminishment of supply attributable to mining, the mine is required to replace the water resource.

Water quality declines are attributable in large part due to increased sulfate, sodium and calcium ions dissolved from minerals in broken overburden rock backfilled into the pits as spoil. The proposed additional mine cuts will increase the total mine pit area, and therefore the backfilled spoil area, by between a quarter and a third more than the existing and approved mine pit area. This would likely increase the extent of water quality impacts to the down gradient aquifer and the length of time needed to return water quality to background concentrations. Once groundwater levels have recovered in the pit area, adequate flushing of the spoils over a period of decades is expected to return spoil water quality to near pre-mine quality. There are no down gradient users that would be affected by the change in water quality.

F. Cultural and Historic Resources

The proposed amendment area was subjected to a Class III cultural resources inventory: 42 cultural sites and 28 isolated finds (Ifs) or Minimal Activity Loci (MALs) were identified. Thirty-nine of the sites and all of the Ifs/MALs are prehistoric in origin. None of the historic sites have potential to yield additional important information, nor are they associated with significant historical persons or events. There are no standing structures in the project area. All of the 28 IFs/MALs are prehistoric lithics. None of the IFs/MAL is considered temporally/culturally diagnostic and none are significant in terms of the National Register of Historic Places (NRHP).

Two of the documented sites were recommended as eligible for inclusion to the NRHP. One of these, 24BH3392, has clear archaeological research value under Criterion D. Site 24BH1589 was recommended eligible under Criterion C and D because of an unusual rock structure. Its archaeological research potential may be in comparison with other structures of this type in the area. If either of these sites is to be disturbed, additional work in the form of mitigation through data recovery is recommended. None of the other prehistoric sites or isolated finds found in the Pearson Creek Amendment Area has realistic potential to provide information important to understanding prehistory. No further work is recommended for all other sites in the study area.

In addition, Spring Creek Coal’s life-of-mine Memorandum of Agreement for cultural resources contains provisions for incidental cultural discoveries. Spring Creek is fully compliant with the requirements of Section 106 of the National Historic Preservation Act for the proposed actions.

In addition, Spring Creek Coal’s life-of-mine Memorandum of Agreement for cultural resources contains provisions for incidental cultural discoveries. Spring Creek is fully compliant with the requirements of Section 106 of the National Historic Preservation Act for the proposed actions.

G. Bond

The current bond for the Spring Creek Mine is $109,631,925. This amount was determined by the Department to adequately cover the estimated cost of reclamation. As part of the Pearson Creek Amendment (Application 00183) the bond was recalculated, and the Department determined that a bond in the amount of $114,967,071 would be required. On June 16, 2011, Spring Creek Coal Company submitted a bond rider for the appropriate additional amount; the bond rider was subsequently approved by the Department on June 16, 2011.

III. FINDINGS

A. The MDEQ has determined that the Spring Creek Coal Company, Pearson Creek Amendment original submitted on January 23, 2008, rejected by MDEQ on March 19, 2008 and resubmitted by Sprig Creek Coal Company on November 24, 2008 and revised through May 13, 2011 is complete and accurate, subject to stipulation, and the applicant has complied with Montana's permanent regulatory program 82-4-222, MCA.

B. The applicant has demonstrated that reclamation, as required by the Montana Strip and Underground Mine Reclamation Act and regulations, can be accomplished under the proposed reclamation plan (82-4-227(1), MCA), subject to stipulation.

C. The Department has determined that the Pearson Creek Amendment Area of the Spring Creek Mine is:

1. Not within an area under study or administrative proceedings under a petition to have an area designated as unsuitable for strip or underground coal mining operations (82-4-227(9), MCA).
2. Not included in an area designated unsuitable for strip or underground coal mining operations pursuant to 82-4-227(9), MCA.
3. Not on any lands subject to the prohibitions or limitations of 82-4-227, MCA, to include national parks, refuges, forests, etc.; nor where adverse impacts to publicly owned parks or places included in the National Register of Historic Places, and buildings, occupied dwellings and cemeteries would occur (subject to a stipulation (see Chapter IV)).
4. Not proposing disturbance within 100 feet, horizontally, of the outside right-of-way line of a public road.
5. Not mining within 300 feet, horizontally, of any occupied dwelling.
6. Not mining within 300 feet, horizontally, of any public building, church, school, community or institutional building, or public park.
7. Not mining within 100 feet, horizontally, of a cemetery where human bodies are interred.

D. SCCC has obtained all surface and mineral rights to conduct mining and reclamation operations as proposed within the proposed amendment area.

E. The Department has made an assessment of the probable cumulative impacts of all anticipated coal mining on the hydrologic balance of the cumulative impact area. See Attachments 1 (Surface Water) and 2 (Ground Water) for detailed assessments.

The Department has determined that this amendment would not result in material damage to the hydrologic balance outside the permit area.

F. No existing structures in the proposed revision area will be disturbed. All existing and proposed mine facilities are located in the Spring Creek Mine permit area and are in compliance with 82-4-222(2)(i), MCA and ARM 17.24.1302.

G. SCCC has paid all reclamation fees from previous and existing operations as required by 30 CFR Chapter VII, Subchapter R, as per information received on Applicant Violator System (AVS check of 6/10/11**).**

H. There are no special categories of mining applicable to the proposed amendment.

I. There is no proposal for an intensive agricultural post-mining land use within the amendment area.

J. The proposed amendment would not affect the continued existence of threatened or endangered species or result in the destruction or adverse modification of their critical habitats, as determined under the Endangered Species Act of 1973 (16 U.S.C. 1531 <u>et seq.)</u> (letter of 11/13/01 from USFWS).

K. There are no private family burial grounds within the amendment area (82-4-227(7), MCA).

L. SCCC has obtained all required air and water quality permits.

M. There are no pending violations for SCCC at the Spring Creek Mine.

No strip or underground coal mining and reclamation operations owned or controlled by SCCC or related entities currently has a violation of Public Law 95-87, as amended, any state law required by Public Law 95-87, as amended, or any law, rule or regulation in the United States pertaining to air or water environmental protection that has not been or is not in the process of being resolved (82-4-227(11), MCA) **(**AVS check of 6/10/11**).**

N. Records of the MDEQ and OSMRE show that the applicant does not control and has not controlled strip or underground coal mining and reclamation operations with a demonstrated pattern of willful violations of Public Law 95-87, as amended, or any state law required by Public Law 95-87, as amended, of such nature, duration, and with such resulting irreparable damage to the environment that would indicate an intent not to comply with these laws (82-4-227(12), MCA) **(**AVS check of 6/10/11**).**

O. SCCC is in compliance with all applicable federal and state cultural resource requirements, including ARM 26.4.304(2), 318, 1131 and 1137 (subject to a stipulation; see Chapter II, Section F and Chapter IV).

P. No remining is included in the amendment application.

IV. STIPULATION

17.24.302, 318, 1131: Treatment of cultural resources within SMP 79012 and the Pearson Creek amendment area is covered by an MOA developed under the provisions of Section 106 of the National Historic Preservation Act and pursuant regulations (36 CFR 800). Treatment of all cultural resources, including incidental discoveries during the course of mining, must be handled according to the provisions of this MOA.

V. PRIVATE PROPERTY TAKINGS

The 1995 Montana state legislature passed House Bill (HB) 311, which requires a state agency to prepare an impact assessment of a proposed agency action that has private property taking or damaging implications. Part (2) of Section 5 of the Private Property Assessment Act (2-10-101, et seq. MCA) states that the assessment must include the following:

"(a) the likelihood that a state or federal court would hold that the action is a taking or damaging; and

"(b) alternatives to the action that would fulfill the agency's statutory obligations and at the same time reduce the risk for a taking or damaging; and

"(c) the estimated cost of any financial compensation by the state agency to one or more persons that might be caused by the action and the source for payment of the compensation."

Part (3) of Section 5 states:

"A copy of the impact assessment for a proposed action with taking or damaging implications must be given to the governor before the action is taken, except that an action to avoid an immediate threat to public health and safety may be taken before the impact assessment is completed and the assessment may be reported to the governor after the action is taken."

Pursuant to Section 4 of the Private Property Assessment Act, the state Attorney General has developed guidelines for agency use in evaluating agency actions with respect to the above requirements. Accordingly, the Department prepared the responses evident in the attached narrative and checklist (Attachment 3), as they relate to the SCCC amendment application. A review of the attached checklist indicates that the Department is not required to prepare a private property takings impact assessment.

VI. REFERENCES CITED

Environmental Assessment of Application 00183 (MDEQ, May 2011)

Spring Creek Coal Company Surface Mining Permit (SMP C1973012)

Bighorn Environmental, Vegetation and Range Analysis, October, 2007

Thunderbird Wildlife Consultants, Wildlife Monitoring, Spring Creek Mine, 2009.

U.S. Fish and Wildlife Service, Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations under the Surface Mining and Control and Reclamation Act of 1977, September 24, 1996.

GCM Services, Inc. June 2007. Class III Cultural Resources Inventory

Montana Department of Environmental Quality. 1998. Soil, Overburden, and Regraded Spoil Guidelines. Industrial and Energy Minerals Bureau.

Montana Department of Environmental Quality. 2001b. Fish and Wildlife Guidelines. Industrial and Energy Minerals Bureau.

Spring Creek Coal Company. 2011. Pearson Creek Amendment Permit application and subsequent revisions.

ATTACHMENT 1

Surface Water Cumulative Hydrologic Impact Assessment
Spring Creek Mine, Application 00183

Cloud Peak Energy proposed a mine plan amendment with revised mining and reclamation plans for the Spring Creek Mine (SCM) near Decker, MT that would result in increased mining disturbance and related revisions to postmine topography (PMT), reclamation and drainage control plans (see Application 00183 submittal package). Details of the proposed changes are discussed below.

Existing and Proposed Mining Disturbance in the Spring Creek/Decker Mine Area

Existing mining disturbance in the Spring Creek/Decker mine area totals approximately 11,313 acres (17.7 $mi.^2$; see Table 1 - data from 2010 Annual Mine Reports), including disturbance from:

- West Decker mine, ~ 5,523 acres (both SCCC and West Decker are west of the Tongue River Reservoir);
- East Decker mine, ~ 2,089 acres (east of the Tongue River Reservoir); and
- Spring Creek mine, ~ 3,702 acres

Proposed life of mine (LOM) surface disturbance from permitted mining in the Spring Creek/Decker mine area totals about 15,740 acres (24.6 $mi.^2$; see Table 2 - approximate LOM disturbance boundaries from permits), including disturbance from:

- West Decker mine, ~ 6,828 acres in the Spring Creek , Pearson Creek and Pond Creek drainages, and adjacent tributaries;
- East Decker mine, ~ 2,898 acres in Coal Creek, Middle Creek and Deer Creek drainages, and adjacent tributaries; and
- Spring Creek mine, ~ 6,022 acres in the Spring Creek drainage.

Proposed Spring Creek Mine Plan Amendment

Spring Creek Mine's (SCM's) proposed mine and reclamation plan revision includes expansion of mining in existing pits in the mainstem and South Fork of Spring Creek and extension of mining to the south into Pearson Creek. If approved, permit disturbance would increase by 1,224 acres (1.91 square miles), for a total Life of Mine (LOM) disturbance of 6022 acres (9.41 square miles) with mining to be extended through year 2022.

Impacts to surface water resources from the proposed SCM mining amendment application would result from increased mining disturbance and related changes to topography, drainage geomorphology, soils and vegetation. Operational and post-reclamation impacts to surface water resources would include changes to surface runoff characteristics, sediment loads and water chemistry.

LOM disturbance to the mainstem Spring Creek drainage (~4.53 square miles; above South Fork, including North Fork disturbance) would affect approximately 20 % of the Spring Creek drainage (23.1 square miles above the South Fork confluence; see Table 2). LOM Disturbance to the South Fork Spring Creek drainage (~3.88 square miles) would affect approximately 28 % of the South Fork Spring Creek drainage basin (13.9 square miles above its confluence with the mainstem of Spring Creek).

Combined LOM disturbance of the mainstem Spring Creek, South Fork Spring Creek, and lower Spring Creek (below South Fork) would total ~8.42 square miles, or ~22 % of the total Spring Creek drainage basin (37.4 square miles from its headwaters to its confluence with the Tongue River Reservoir).

LOM disturbance to the Pearson Creek drainage (~0.69 square miles) would affect approximately 8% of the Pearson Creek drainage basin area (8.8 square miles above its confluence with the Tongue River Reservoir).

Approximately 0.28 square miles of additional LOM disturbance would occur in adjacent Tongue River interbasin areas.

Cumulative Impact Area

The Cumulative Impact Area for potential surface water impacts includes proposed life of mine (LOM) disturbance areas for the Spring Creek and Decker mines within local drainage basins, and the adjacent Tongue River Reservoir area (see Map 1). Note that Wyoming's reclaimed Big Horn Coal Mine, about fifteen miles up the Tongue River from the West Decker Mine, is not include in this assessment; further discussion can be found in the previous 2006 Written Findings for West Decker Major Revision (Application 00175).

Further information on cumulative hydrologic impacts related to coal mining in the Decker/Spring Creek mine area is discussed in previous MDEQ documents, including:

- 2008 Written Findings for West Decker Mine (Application 00182)
- 2007 Written Findings for Spring Creek Mine (Application 000174),
- 2006 Written Findings for West Decker Major Revision (Application 00175),
- 2001 Written Findings for Spring Creek Mine - Carbone amendment (Application 00164),
- 1999 Written Findings for East Decker Major Revision (Application 00152);

and Wyoming DEQ's:

- 1996 Probable Hydrologic Consequences for Big Horn Coal Mine (permit number 213-T4; WDEQ, 1996).

Proposed Spring Creek Mining and Reclamation Plan Revision (Application 183)

Proposed mining and reclamation revisions for the Spring Creek mine include changes in mining, postmine topography (PMT), and surface drainage control.

Existing and proposed mining would primarily disturb ephemeral mainstem and tributary drainages of Spring Creek (including the lower portion of North Fork Spring Creek), South Fork Spring Creek, and Pearson Creek. A relatively small portion of LOM disturbance would include road and rail disturbance NE and SE of the mine in adjacent Tongue River interbasin areas and

Monument Creek. SCM disturbance also includes limited disturbance/reclamation associated with a coalbed methane water-supply line and access road in upper Pond Creek and Squirrel Creek drainages, SE of the mine.

The proposed Application 00183 amendment and mine plan revisions would result in an increase in mine pit area from the currently approved mine plan. The primary mining changes would be additional mining in the mainstem Spring Creek drainage (NW portion of the mine in Pit 4), and in South Fork Spring Creek and Pearson Creek drainages (SE portion of the mine in Pit 2), where mining would be extended further south. A portion of additional mining would occur within previously approved life of mine (LOM) disturbance limit for the SCM (see Map 2).

Note that LOM surface disturbance limits are generally mapped approximately (and with differing disturbance assumptions for each mine). Because of these mining disturbance assumptions, proposed LOM disturbance limits are generally overestimates of eventual LOM surface disturbance (for the proposed mine plan), often broadly delineated and including outlying surface disturbances (e.g. soil stockpiles, access roads).

Related postmine topography (PMT) changes would adjust for the revised mining plan, with additional surface disturbance in the NW and SE portions of the SCM in mainstem and South Fork Spring Creek and Pearson Creek drainages.

Proposed Spring Creek Mine PMT would generally approximate the premine landscape. Topographic differences in premine and postmine topography within LOM disturbance areas include changes in drainage basin divides (including ridge areas and upland tributaries), drainage channels and valley bottom topography (including channel, floodplain, terraces and side slope features), and a general loss of slope complexity. Some locally extensive elevation changes would occur along with shifts in premine ridge and valley locations. These changes are often related to spoil material placement (by dragline and truck/shovel operations) during mining, and in some cases are associated with excessive displacement of material near boxcut and final pit areas.

In addition to the approximate PMT proposed on Spring Creek's maps, SCM's reclamation plan includes commitments to approximate premine slopes, including a variety of terrain and habitat features (e.g. knobs, scarps, snow catchment areas, and rock ledges; e.g. permit Sections 17.24.313 and 501).

Mining-Related Hydrologic Impacts and Reclamation

During mining, a variety of sediment control measures such as sediment ponds, traps, ditches and silt fences are employed to treat disturbed area runoff and retain excess sediment and suspended solids within disturbance limits. Some runoff is also intercepted and/or redirected by active pits, mine spoils, roads and soil stripping edges. Where any excess groundwater is encountered during mining, it is pumped from the pits and treated as needed in the sediment control system. Because sediment ponds are generally designed and managed to contain runoff from 10-year, 24-hour precipitation events (approximately 2.4 inches in the Spring Creek mine area), direct discharges of runoff are uncommon except during larger snowmelt or back-to-back storm events. The ponding can significantly alter the rate and timing of normal surface runoff to undisturbed drainages below the mine, particularly during smaller storm or snowmelt runoff events. While much of the ponded runoff infiltrates or is later discharged to undisturbed drainages below (at much lower rates), some of the treated waters caught by perimeter ponds and traps is applied to haul roads for dust control where most is lost to evaporation.

Once regrading is completed in disturbed basins (just prior to resoiling and revegetation), new Western Alkaline MPDES effluent guidelines will require that 'Best Technology Currently Available' (BTCA) sediment control measures and practices, with reduced or minimal pond storage volume, be put in place. Western Alkaline sediment control practices are intended to replace operational sediment control ponds (e.g. with large, 10-year, 24-hour storm runoff volumes) and to allow natural streamflow discharges and sediment loads from reclaimed areas. The new Western Alkaline sediment control requirements will apply to regraded and reclaimed drainages throughout Spring Creek and Decker mine reclamation, and will complement reclamation goals to approximate premine hydrologic characteristics, and facilitate bond release requirements.

During the first few years after reclaimed areas have been resoiled and seeded, discharge and sediment loads from storm and snowmelt runoff events are usually much higher than similar events in undisturbed drainages. As vegetative cover is established in reclaimed areas, interception, infiltration and plant water consumption increase, resulting in less runoff and lower sediment loads. Where postmining topography landscapes are less diverse than premining (e.g. with flatter slopes and fewer tributaries) there would be greater potential for infiltration and increased evaporation, resulting in less runoff reaching tributaries, lowland areas and stock ponds, particularly during the more frequent smaller storm and snowmelt runoff events. Where shrub and forest cover are an important component of premine drainage basin cover, it will take decades or longer to approximate premining hydrologic conditions (e.g. of forest interception, evapotranspiration, infiltration and runoff) with similar forest cover.

In general, for disturbed ephemeral drainage systems, the long-term hydrologic consequences of proposed mining depend on the adequacy of reclamation in approximating premine topography, drainage basin geomorphology and vegetation. Thus, there is a significant and ongoing emphasis on planning and reassessment of the proposed postmining topography and reclamation plans so that they could be updated and adjusted where appropriate to effectively approximate premine topographic characteristics.

Operational and long-term impacts to intermittent and perennial surface water resources would depend on the extent of mining-related changes to relevant geologic and geomorphic characteristics, groundwater resources, and direct or indirect surface water contributions. Because overburden structure is lost and coal removed during mining, the most likely impacts would occur in springs, wet reaches or ponds that depend primarily on these sources.

Most drainages in the immediate SCM mine area are ephemeral (e.g. see Spring Creek, South Fork Spring Creek and Pearson Creek hydrographs; Figures 1, 2 and 3). Some intermittent flow periods have been recorded in portions of South Fork Spring Creek (e.g. see RS-3 and RS-7 hydrographs, Figure 2). These intermittent flows were more likely derived from shallow alluvial aquifer discharges during wetter periods, rather than from the coal aquifer (Anderson-Dietz).

Other indirect impacts to intermittent or perennial surface water resources may occur where groundwater contributions to premining springs, stream reaches, or stock ponds are affected by mining impacts to contributing or source aquifers. Some of these may occur with reductions in groundwater discharges, or changes in groundwater chemistry in intermittent or perennial stream reaches downgradient of area wide mining impacts (e.g. Squirrel Creek).

Related impacts and changes to stream flow and water chemistry due to groundwater pumping and discharges from coal bed methane operations in the mine areas further affect, and complicate interpretation of mining related impacts (see below).

Offsite Disturbances (Non-Mining Activities)

Other sources of surface water disturbance in the Tongue River drainage adjacent to and upstream of the Decker/Spring Creek mine area include a variety of municipal and industrial activities, mostly in Wyoming. The more notable disturbances include those associated with the developing coalbed methane (CBM, or coalbed natural gas) industry, and the city of Sheridan, Wyoming, approximately 20 miles to the southwest, with a population of ~16,000 (2000 census). The Tongue River Reservoir itself also influences Tongue River flow and water chemistry dynamics (e.g. see Figure 4).

Ongoing and proposed coalbed methane activities within the Spring Creek/Decker mine area include operations in Squirrel Creek, Pond Creek, Coal Creek, and Deer Creek. Potential surface water impacts related to coalbed methane activities include dewatering of local aquifers, springs and stream base flows, and the ponding and discharge of higher dissolved solids groundwater into ephemeral and other drainages. Potential impacts of coal bed methane activities in the Decker Spring Creek area are discussed further in the groundwater portion of the written findings. Additional information is included in CBM Environmental Assessments (EA), including those for the Coal Creek, Pond Creek and Deer Creek Fields (MBOGC, 2005), the EA for related Tongue River MPDES permits (MDEQ 2005), and in the Statewide Oil and gas EIS (US BLM, et al. 2003).

Conclusions / Material Damage

The proposed Spring Creek Mine Application 00183 mine plan revision would result in a 1.91 $mi.^2$ (26 %) increase in proposed LOM mining and surface disturbance in the Spring Creek/Decker mine area. Proposed LOM surface disturbance for the Spring Creek, West Decker and East Decker mines would total approximately 24.6 $mi.^2$, an increase of ~2.0 $mi.^2$ (9%). However, the total surface disturbance would only affect approximately 1.4% of the 1770 $mi.^2$ Tongue River drainage basin area above and including the Tongue River Reservoir. Mining related impacts to surface water are expected to be measureable in the short term within and below mined area drainages, and would diminish with reclamation recovery and distance downstream. Cumulative mining related impacts to surface water resources within and adjacent to the Spring Creek/Decker mine area are not expected to change significantly, or to be measureable, within the main reservoir body or the Tongue River below, largely due to the much larger drainage area and streamflows of the Tongue River, e.g. see Figure 4).

Reclamation proposed for the amendment would generally approximate pre-mine topography and drainage basin morphology, but proposed PMT would have changes in drainage basin size, channel location, topography and slope diversity. The proposed mine plan would include additional mining in the South Fork and Pearson Creek valley bottoms and in steeper, more diverse upland and ridge topography. Some steeper areas would be reclaimed to less steep terrain, with fewer headwater tributaries and reduced topographic diversity. The operator has committed to ongoing reevaluation of post-mine topography (e.g. spoil placement, rough and final grading) to better approximate pre-mine topography and related hydrologic characteristics and functions.

Surface runoff (and water chemistry) would be similar to premine conditions in areas where PMT (soil and vegetation) most closely approximate premine characteristics (e.g. basin size, tributary patterns, slope diversity). Surface runoff could be reduced in areas where drainage density and topographic diversity are reduced (subject to more potential overland flow and infiltration), with potentially fewer runoff events from smaller storms.

Sediment in runoff from initial reclamation would generally be increased over natural background levels, but should recover to levels similar to premine with vegetative recovery. Water chemistry in the predominantly ephemeral drainages of the SCM mine area should be similar overall to premine characteristics. Any spoil aquifer discharges that develop (e.g. springs or intermittent /perennial channel reaches) are expected to have increased dissolved ions as discussed for groundwater systems in the following section.

Material damage with respect to the hydrologic balance is the degradation or reduction of the quality or quantity of water outside of the mine permit area in a manner or to an extent that land uses or beneficial uses of water are adversely affected, water quality standards are violated, or water rights are impacted. All proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area (and to protect the quantity and quality of water uses and the rights of water users. Overall, the proposed Spring Creek Mine Application 00183 mine plan amendment would contribute additional, more extensive mining disturbance to cumulative surface water impacts of the Spring Creek/Decker Creek mine area. However, Spring Creek Mine's proposed reclamation plan would help minimize mining related impacts to surface water resources within and adjacent to the mine, and it does not appear that premine surface water uses outside the Spring Creek Mine LOM plan area would be prevented. The Department therefore finds that no material damage to surface water systems would result from the reduced mining proposed in the Spring Creek Mine Application 00183 mine plan revision.

REFERENCES

Decker Coal Company. 2011. 2010 Annual Mining Report.

Attachment 1: Application 00183 – Surface Water CHIA

Montana Department of Environmental Quality. 1999. East Decker Major Revision Application 00152, Written Findings.

Montana Department of Environmental Quality. 2005. Environmental Assessment – Fidelity, Tongue River Project (for the Flow Based and Treatment MPDES permits).

Montana Department of Environmental Quality. 2006. West Decker Major Revision Application 175 Written Findings.

Spring Creek Coal Company. 2011. 2010 Annual Mining Report.

U.S. Bureau of Land Management, Montana Board of Oil and Gas Conservation, Montana Department of Environmental Quality. 2003. Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans.

Wyoming Department of Environmental Quality. 1996. Sheridan, Wyoming. Big Horn Coal Mine Permit Number 213-T4. Probable Hydrologic Consequences.

ILLUSTRATIONS and TABLES

Figures

Tables

Maps

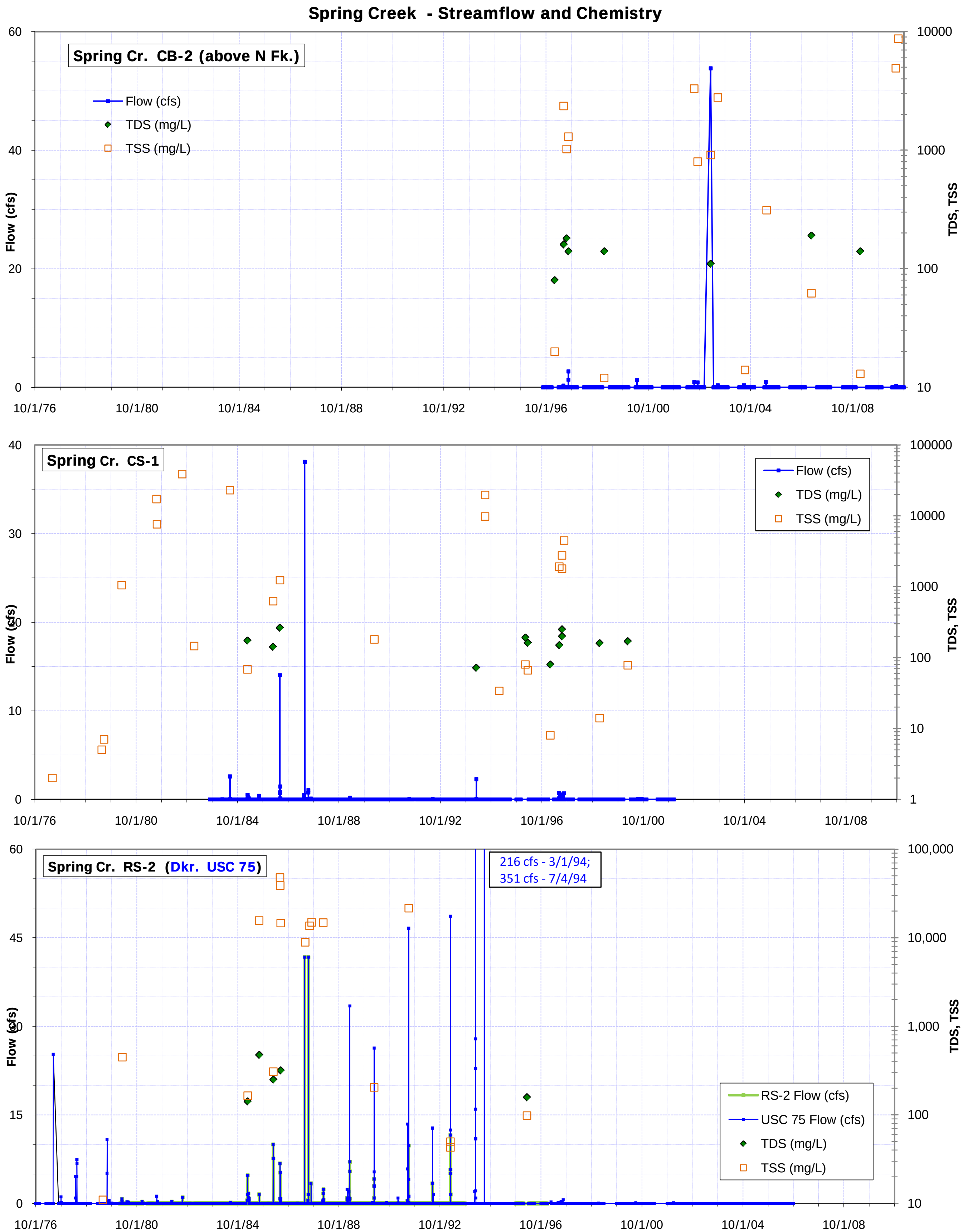


Figure 1. Streamflow hydrographs and water chemistry data for mainstem Spring Creek monitoring stations above, within and below mined areas at the Spring Creek mine (SCM) near Decker, MT. Monitoring locations include SCM sites CB-2 (active; above North Fork Spring Cr.), CS-1 (mined out ~12/2001; below North Fork Spring Creek), and Decker site RS-2 (active; below SCM mining); see Maps 1 and 2. Streamflow data given are mean daily flow rates (cubic feet/sec.; cfs); water chemistry data given include Total Dissolved Solids (TDS, mg/L), and Total Suspended Solids (TSS, mg/L); data from Spring Creek and Decker mines.

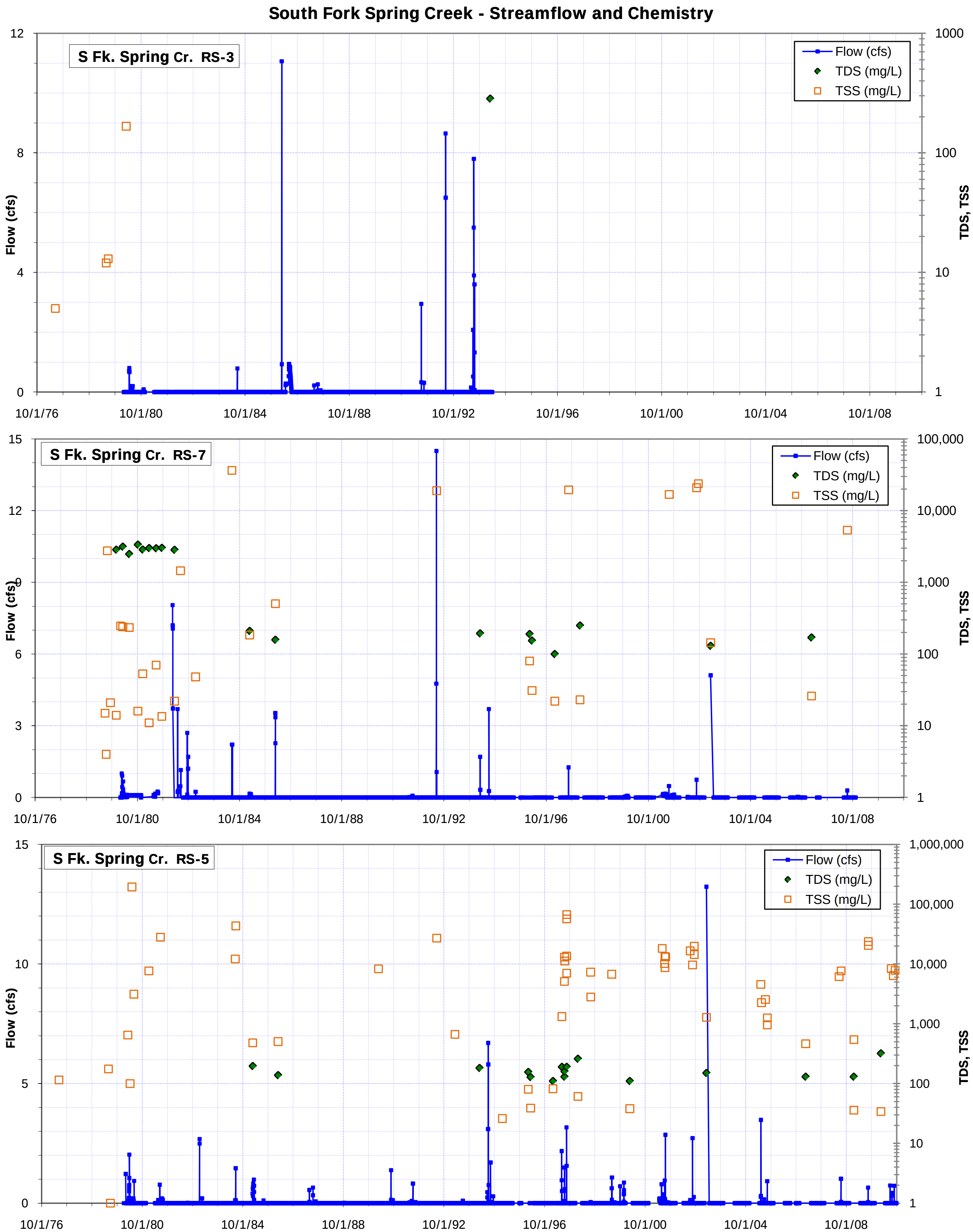


Figure 2. Streamflow hydrographs and water chemistry data for South Fork Spring Creek monitoring stations above, within and below mined areas at the Spring Creek mine (SCM) near Decker, MT. Monitoring locations include SCM sites RS-3 (inactive since ~5/96; above mining pits/below SCM South Fork Flood Control Reservoir), RS-7 (mined out ~2/2009; Pit 2 area), and RS-5 (active; below SCM mining); see Maps 1 and 2. Streamflow data given are mean daily flow rates (cubic feet/sec.; cfs); water chemistry data given include Total Dissolved Solids (TDS, mg/L), and Total Suspended Solids (TSS, mg/L); data from Spring Creek mine.

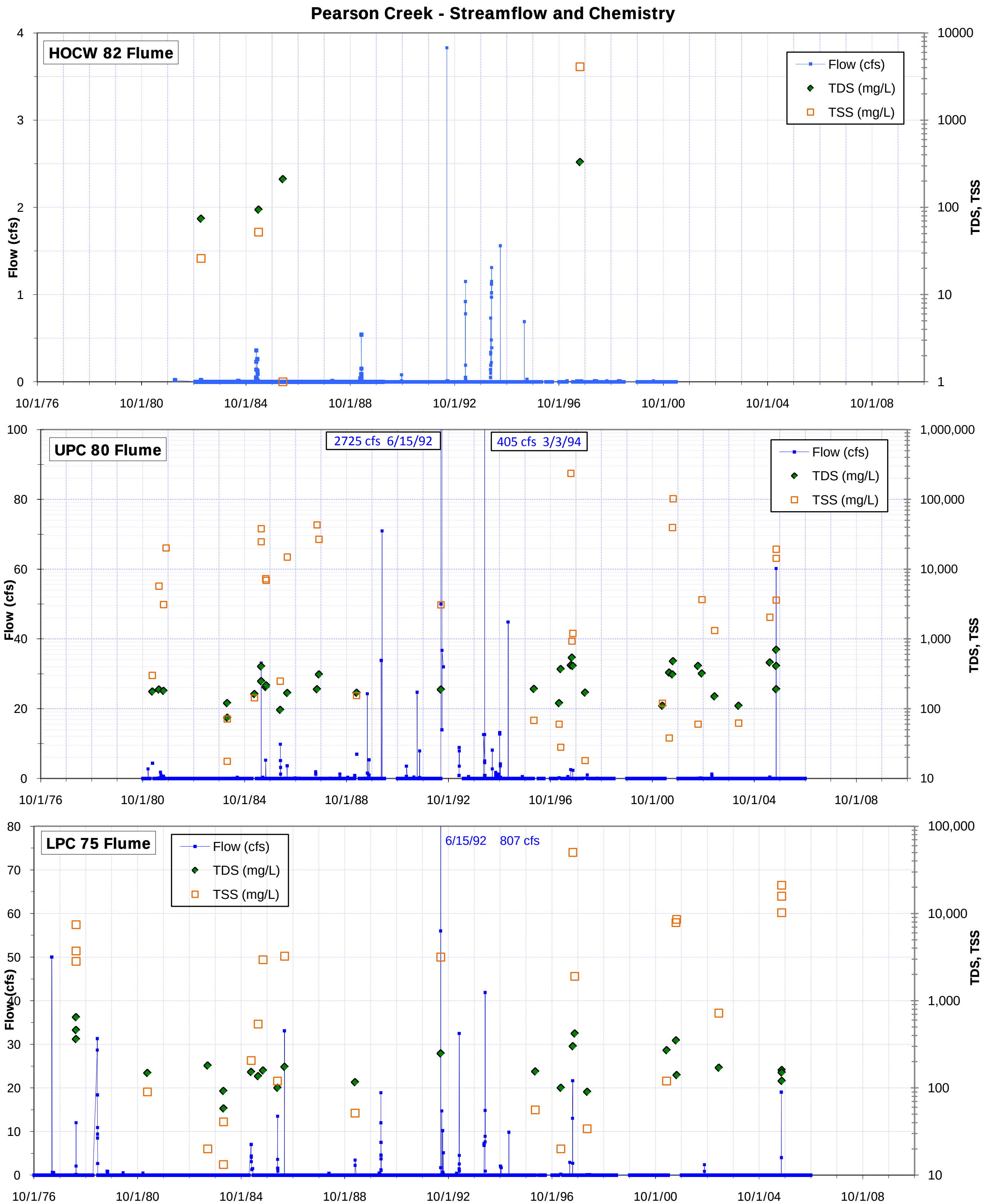
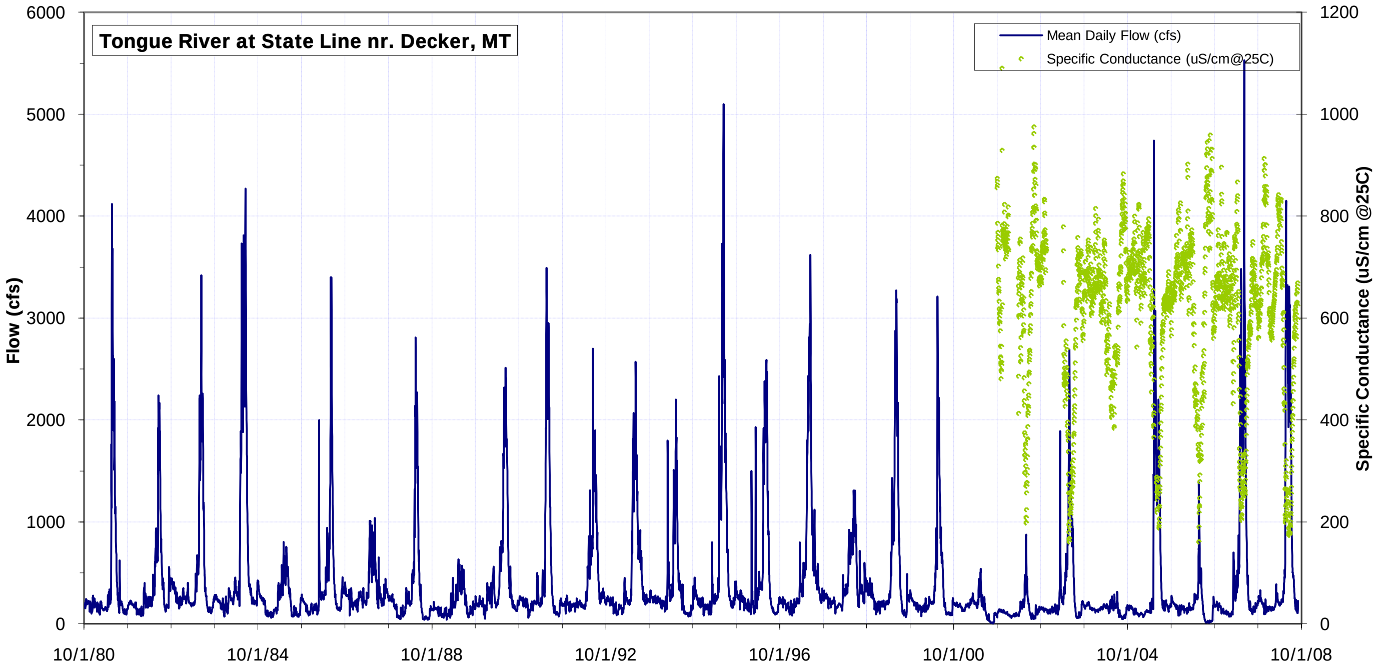


Figure 3. Streamflow hydrographs and water chemistry data for Pearson Creek, above and below proposed mining areas at the Spring Creek mine (SCM) near Decker, MT. Monitoring locations include Decker sites HOCW 82 (inactive since ~3/2001; small ephemeral tributary upstream of proposed SCM mining), UPC 80 (active; below proposed SCM mining), and LPC 75 (inactive/recorder removed 12/2007 prior to mining through; below lower edge of Decker mining, above Tongue R Reservoir); see Map 1. Streamflow data given are mean daily flow rates (cubic feet/sec.; cfs); water chemistry data given include Total Dissolved Solids (TDS, mg/L), and Total Suspended Solids (TSS, mg/L); data from Decker mine.

D-000147

Tongue River - Streamflow and Chemistry



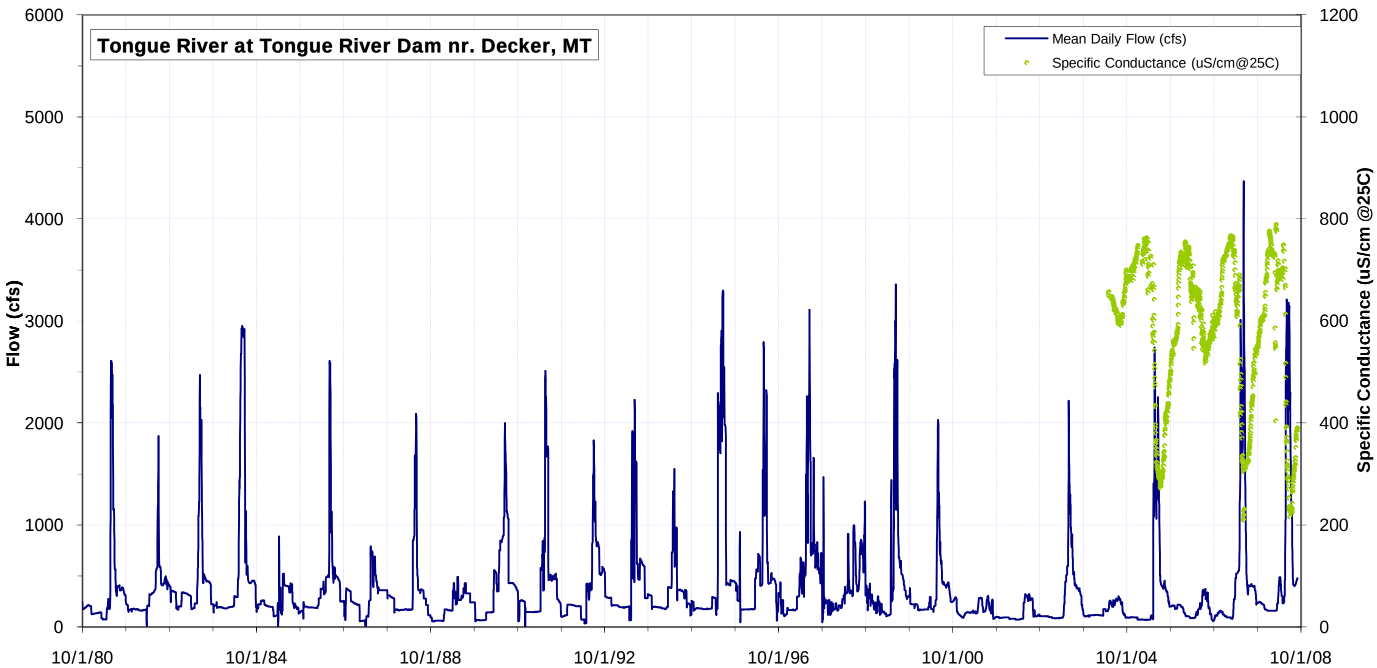


Figure 4. Streamflow and water chemistry data for USGS gaging stations above and below the Tongue River Reservoir near Decker, MT (USGS sites 06306300 and 06307500). The upper monitoring site is located just upstream of the Decker mine area, and the lower site about 10 miles to the north (~4 miles below the mine area) and just downstream of the Tongue River Dam. Data from USGS.

Table 1. Existing surface disturbance for drainage basins within and adjacent to mining disturbance in the Spring Creek/Decker mine area. Existing disturbance totals (from 2010 Annual Mine reports) are given for Spring Creek, and East and West Decker mines for each drainage affected [(mi.2), and % of drainage area (%DA), based on premine drainages]. Nearby USGS sites on the Tongue River and side drainages on each side of the Tongue River Reservoir are listed in downstream order.

Drainage Basin	Drainage Area	Spring Creek Mine Existing Disturbance		East & West Decker Mines Existing Disturbance		Total Mining Disturbance Spring Creek/Decker mine area*	
	(mi.^{2})	(mi.^{2})	(%DA)	(mi.^{2})	(%DA)	(mi.^{2})	(%DA)
Tongue River at State Line nr Decker** (Decker site TR 09-77, ~2 mi. downstream at bridge)	1453	0	0	0	0	0	0
Drainages West of Tongue R. Reservoir							
Pond Creek	6.3	0.005	0.08	3.80	60	3.80	60
Pearson Creek	8.8	0.02	0	0.93	11	0.95	11
Spring Creek (**nearby USGS site 34.7 mi.^{2})	37.4	5.48	15	0.68	2	6.16	16
includes:							
Spring Creek mainstem (incl. NFk. SC)	23.1	3.10	13	0.15	1	3.25	14
South Fork Spring Creek	13.9	2.37	17	0.15	1	2.52	18
Spring Cr below S Fork	0.5	0.01	1	0.38	81	0.39	82
Monument Creek	13.2	- -	- -	- -	- -	- -	- -
Interbasin Areas	13.6	0.28	2	3.22	24	3.50	26
Total (west of reservoir)	79.26	5.78	7	8.63	11	14.41	18
Drainages East of Tongue R. Reservoir							
Coal Creek	3.1	- -	- -	0.56	18	0.91	29
Middle Creek	6.8	- -	- -	0.96	14	1.49	22
Deer Creek (**nearby USGS site 47.7 mi.^{2})	55.5	- -	- -	0.66	1	1.04	2
Interbasin Areas	4.7	- -	- -	1.08	23	1.13	24
Total (east of reservoir)	70.1	- -	- -	3.26	5	4.57	7
Total (west and east of reservoir)	149.31	5.78	4	11.89	8	18.97	13
Tongue River at Tongue R Dam** (Decker site TR 10-78, shortly upstream)	1770	5.78	0			18.97	1

* Disturbance totals include only coal mining disturbance in the Decker and Spring Creek mine areas.

** USGS streamflow measurement sites.

Table 2. Cumulative life of mine (LOM) surface disturbance for drainage basins within and adjacent to existing and proposed mining disturbance in the Spring Creek/Decker mine area. LOM disturbance totals are given for Spring Creek, East and West Decker mines for each drainage affected [(mi.2), and % of drainage area (%DA), based on premine drainages]. Nearby USGS sites on the Tongue River and side drainages on each side of the Tongue River Reservoir are listed in downstream order.

Drainage Basin	Drainage Area (mi.^{2})	Spring Creek Mine LOM Mining Disturbance (mi.^{2})	Spring Creek Mine LOM Mining Disturbance (%DA)	East & West Decker Mines LOM Mining Disturbance (mi.^{2})	East & West Decker Mines LOM Mining Disturbance (%DA)	Total Mining Disturbance Spring Creek/Decker mine area* (mi.^{2})	Total Mining Disturbance Spring Creek/Decker mine area* (%DA)
Tongue River at State Line nr Decker** (Decker site TR 09-77, ~2 mi. downstream at bridge)	1453	0	0	0	0	0	0
<u>Drainages West of Tongue R. Reservoir</u>							
Pond Creek	6.3	0.005	0.08	4.05	64	4.05	64
Pearson Creek	8.8	0.69	8	1.60	18	2.29	26
Spring Creek (**nearby USGS site 34.7 mi.^{2})	37.4	8.42	22	0.98	3	9.39	25
<u>includes:</u>							
Spring Creek mainstem (incl. NFk. SC)	23.1	4.53	20	0.29	1	4.82	21
South Fork Spring Creek	13.9	3.88	28	0.25	2	4.13	30
Spring Cr below S Fork	0.5	0.01	1	0.45	95	0.45	96
Monument Creek	13.2	0.02	0.2	- -		0.02	0
Interbasin Areas	13.6	0.28	2	3.99	29	4.27	31
Total (west of reservoir)	79.26	9.41	12	10.62	13	20.03	25
<u>Drainages East of Tongue R. Reservoir</u>							
Coal Creek	3.1	- -	- -	0.91	29	0.91	29
Middle Creek	6.8	- -	- -	1.49	22	1.49	22
Deer Creek (**nearby USGS site 47.7 mi.^{2})	55.5	- -	- -	1.04	2	1.04	2
Interbasin Areas	4.7	- -	- -	1.13	24	1.13	24
Total (east of reservoir)	70.1	- -	- -	4.57	7	4.57	7
Total (west and east of reservoir)	149.31	9.41	6	15.19	10	24.60	16
Tongue River at Tongue R Dam** (Decker site TR 10-78, shortly upstream)	1770	9.41	1			24.60	1

* Disturbance totals include only coal mining disturbance in the Decker and Spring Creek mine areas.

** USGS streamflow measurement sites.

ATTACHMENT 2:

Decker Area Groundwater Cumulative Hydrologic Impact Assessment (CHIA) Spring Creek Mine, East and West Decker Mines Bighorn County, Montana

INTRODUCTION

Spring Creek Coal, LLC, under the ownership of Cloud Peak Energy, Inc., has submitted Application 00183, which proposes to expand mining at the Spring Creek Mine (SCM) by moving south into Pearson Creek and adding 2,042 acres to the permit area (Figure 1). With approval of this amendment, coal recovery would be expected to increase 170,780,000 tons, extending the life of the mine through 2022, at current production levels. An additional 68 million tons of recoverable coal identified as "future mining" lies within the Pearson Creek area but is not considered with this application. Hydrologic consequences associated with areas identified as future mining will be addressed in a later mine revision and update to the CHIA.

Immediately southeast of the SCM are the East Decker and West Decker mines. This groundwater CHIA is being conducted pursuant to ARM 17.24.314(5) to present an analysis of impacts to groundwater in the cumulative impact area for all existing and anticipated mining in the Decker-Spring Creek area. Techniques used to evaluate the impacts include: 1) evaluation of past and current water level measurements and water quality analyses taken from monitoring wells; 2) drawdown predictions from a transient groundwater flow model based on the mining plan for Application 00183; and 3) expected changes to the hydrologic system as a result of mining. Both quantitative and qualitative predictive methods are used to model and estimate future impacts.

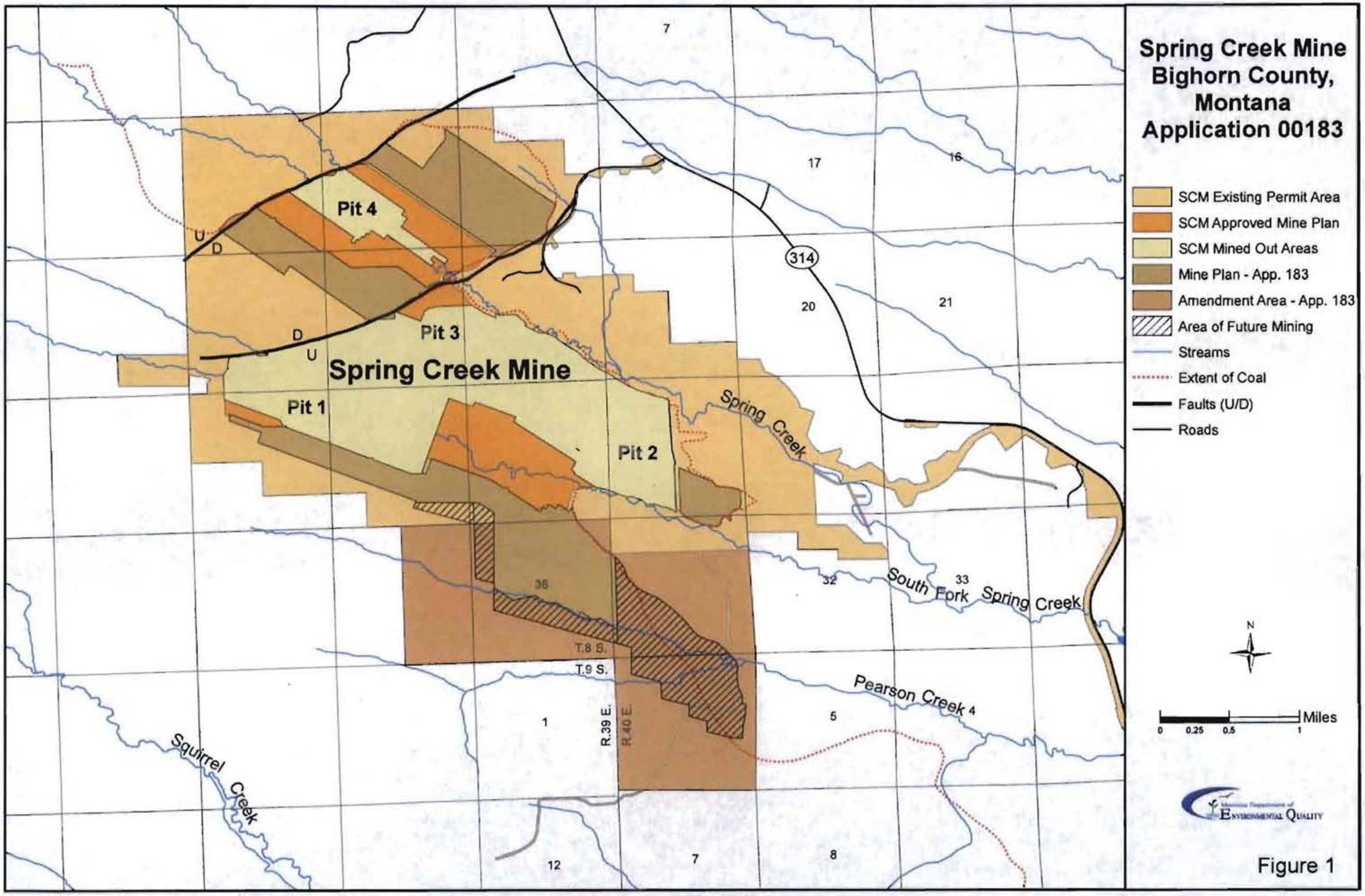
CUMULATIVE HYDROLOGIC IMPACT AREA

The SCM and East Decker and West Decker mines are located in Bighorn County, Decker, Montana. The SCM is approximately 30 miles north of Sheridan, Wyoming via highway WY338/MT-314. The East Decker and West Decker mines lie southeast of the SCM on the east and west sides of the Tongue River Reservoir.

The groundwater cumulative hydrologic impact area (Figure 2) for the Decker and Spring Creek mines covers some 130 square miles. The boundaries of the impact area were determined mainly by the geographic limits of anticipated drawdown in the stratigraphic units affected by mining. In determining the boundaries, consideration was also given for the potential of water quality impacts to groundwater from mining. Impacts to groundwater from nearby coal bed natural gas production lie within and outside the boundaries of the cumulative impact area. Evaluating the extent of impacts associated with coal bed natural gas production is not within the scope of this analysis.

GEOLOGY

Coal is mined from the Paleocene age Tongue River Member of the Fort Union Formation. The depositional setting of the Fort Union Formation was deltaic to estuarine,


Spring Creek Mine
Bighorn County,
Montana
Application 00183
SCM Existing Permit Area
SCM Approved Mine Plan
SCM Mined Out Areas
Mine Plan - App. 183
Amendment Area - App. 183
Area of Future Mining
Streams
Extent of Coal
Faults (U/D)
Roads
N
Miles
0
0.25
0.5
1
Figure 1
Spring Creek Mine
Pit 1
Pit 2
Pit 3
Pit 4
U
D
D
U
314
Spring Creek
South Fork Spring Creek
Pearson Creek
Squirrel Creek
T.8 S.
T.9 S.
R.39 E.
R.40 E.
7
17
16
20
21
32
33
36
1
5
4
12
7
8

D-000153

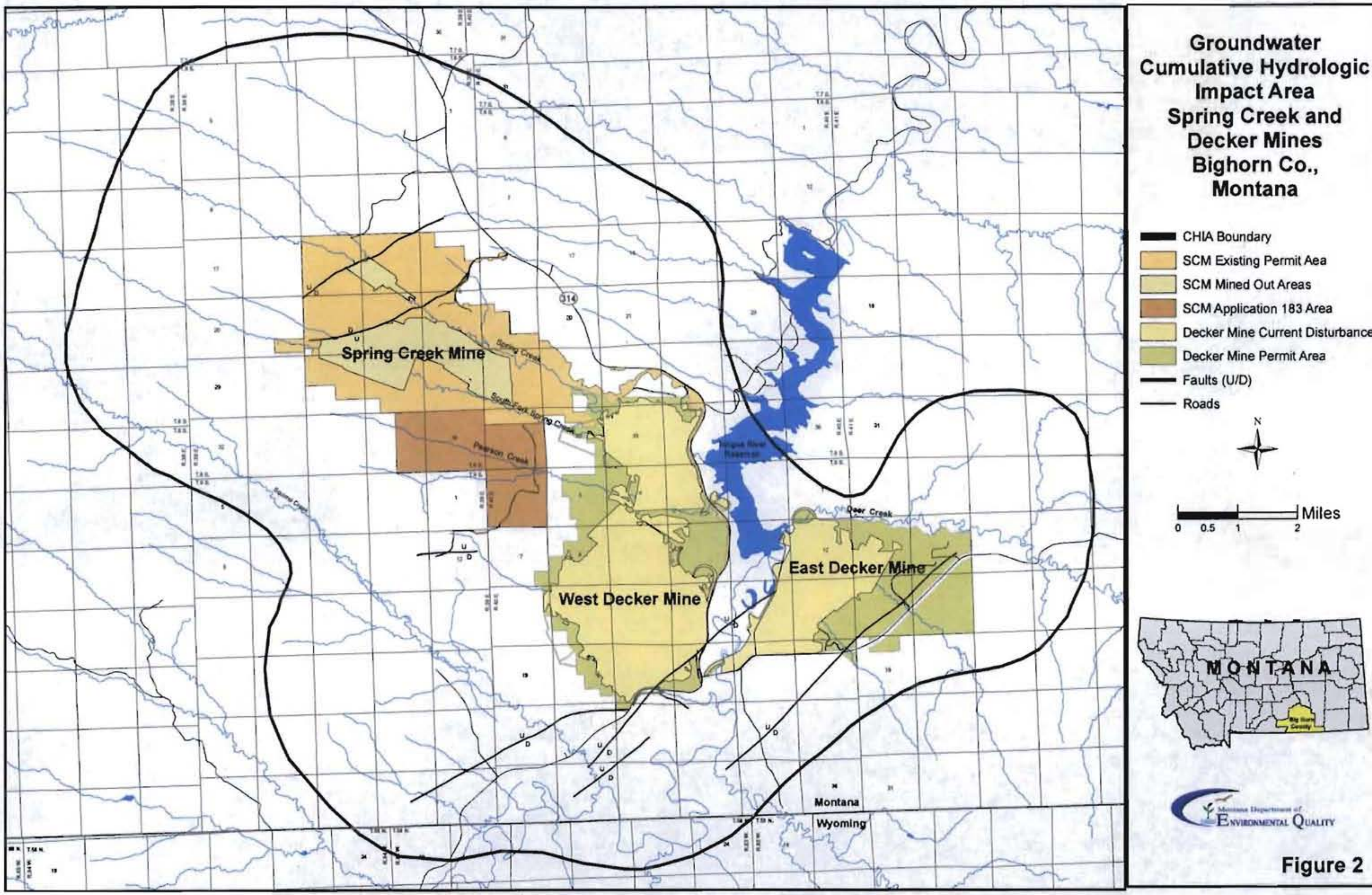

Groundwater
Cumulative Hydrologic
Impact Area
Spring Creek and
Decker Mines
Bighorn Co.,
Montana
CHIA Boundary
SCM Existing Permit Aea
SCM Mined Out Areas
SCM Application 183 Area
Decker Mine Current Disturbance
Decker Mine Permit Area
Faults (U/D)
Roads
N
Miles
0 0.5 1 2
Spring Creek Mine
Spring Creek
South Fork Spring Creek
Pearson Creek
West Decker Mine
East Decker Mine
Deer Creek
Montana
Wyoming
MONTANA
Montana Department of
Environmental Quality

Figure 2

characterized by fine to medium grained deposits that formed lenticular, truncated beds and abrupt facies changes. Coal seams are the only stratigraphic units with significant lateral continuity. The coal seams are bounded by thin, discontinuous siltstone, claystone and sandstone beds. These sedimentary units are typically moderately to highly alkaline and range to moderately high in soluble salts. Clinker, a reddish-brown, brecciated and commonly porous rock highly resistant to weathering, is common throughout the coal-bearing region. Clinker formed when siltstones and claystones were subject to high temperatures ("baked") during prehistoric insitu burning of coal. The baked sedimentary rocks became vitreous and brittle, commonly collapsing into the void created by the burned coal.

Regional dip is approximately two degrees to the south-southeast. The sedimentary beds form a gentle synclinal warp with the axis roughly coincident with the Tongue River reservoir. Northeast-trending and, less commonly, northwest-trending normal faults up to five miles long with measured displacements of up to 350 feet are numerous in the Decker area.

The coal seams in the Decker-Spring Creek area are known by varying nomenclature. In descending stratigraphic order, the uppermost seams are known locally as the Anderson, Dietz 1 (D1) and Dietz 2 (D2). At the Spring Creek Mine the three seams converge to form a single 80-foot thick seam referred to as the Anderson-Dietz seam. The next lower coal seam is approximately 15 to 20 feet thick and lies 100 feet below the Anderson-Dietz seam. It is referred to at Spring Creek Mine as the Canyon seam and as the D3 seam at the Decker mines. Coal bed natural gas producers refer to the same seam as the Monarch. The seam has never been mined in the Decker area but has been a target for coalbed natural gas.

At the West Decker Mine, the Anderson and Dietz 1 seams combine to form what is referred to as the D1 seam (Figure 3). The D1 and D2 (Dietz 2) seams are both mined at the West Decker Mine, although only the D1 was removed in Pit 11. The D1 seam diverges into two seams near the Tongue River reservoir, forming the D1 Upper (D1U) and the D1 Lower (D1L) seams at the East Decker Mine. The D1 Upper and D1 Lower as well as the D2 seam are mined at the East Decker Mine.

HISTORY OF MINING AT THE SPRING CREEK MINES AND DECKER MINES

Construction of the SCM began in April 1979, and the first coal was produced in December 1980. Mining has taken place in four pit areas, referred to as pits 1, 2, 3, and 4. Pit 4 is north of the other three pits and was opened in early 2002. Simultaneous mining from multiple pits allows blending coal of variable quality to meet contract needs. The Anderson-Dietz seam is recovered in two 40-foot lifts at the SCM. Cumulative disturbance at the mine at the end of 2009 was approximately 3,450 acres. Life of mine disturbance including Amendment 00183 is anticipated to be 5,964 acres.

Large-scale mining in the Decker area was initiated at the West Decker Mine in 1972. Three pit areas known as pits 11, 12, and 16, have been developed at West Decker. Mining in Pit 11 has removed only the uppermost (D1) coal seam. Interior to Pit 11 is Pit 12, where both the D1 and D2 seam were mined. Pit 16 lies to the north and has been in full scale production since 1992. Most production in Pit 16 is from the D2 coal because much of the D1 was burned. Mining in pits 16 and 11 is projected to continue through 2012. Pit 12 coal removal was completed in 2007. Mining at East Decker pits 14 and 15 began in 1978. Pit 13 was opened in 1979. The D1 upper, D1 lower and D2 seams are mined at East Decker.

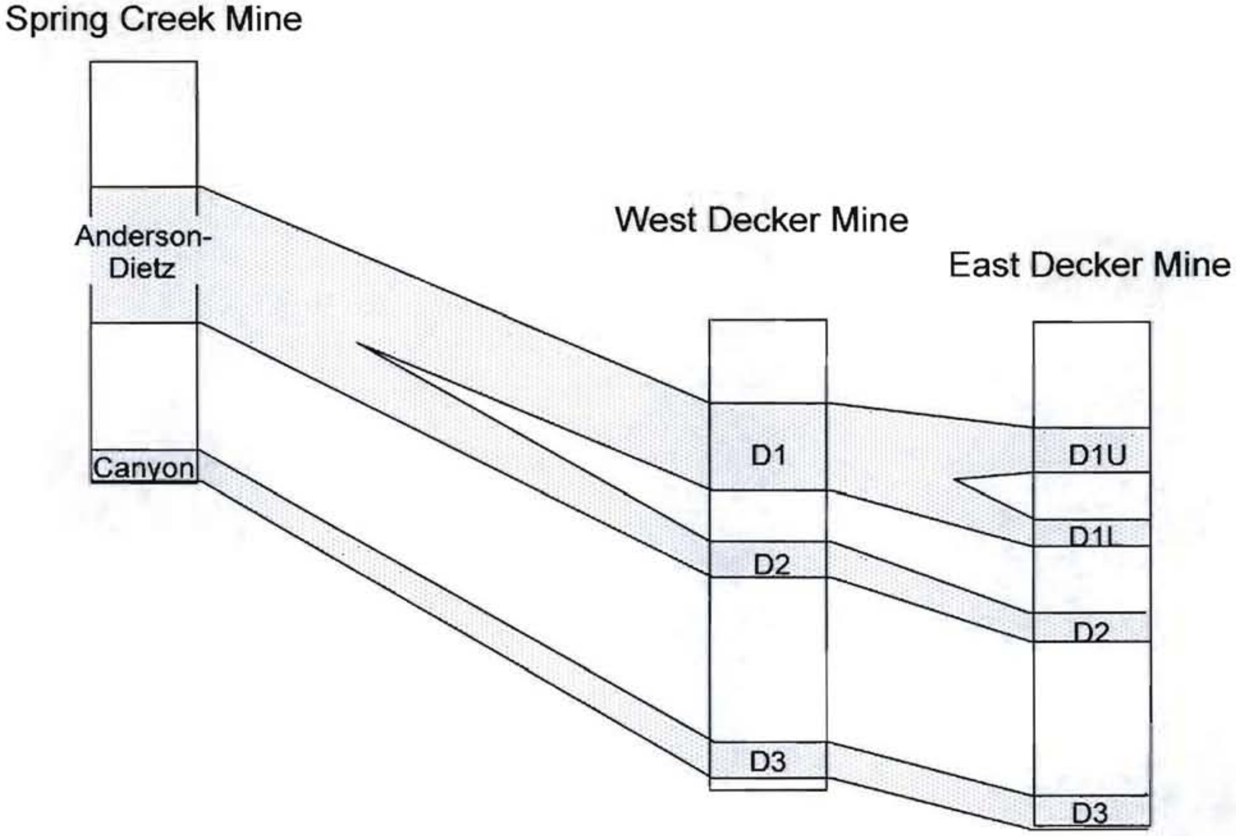


Figure 3. Schematic diagram showing the relationship of shallow coal seams in the Decker area. The Anderson-Dietz, D1, D1 upper and lower, and the D2 seams are mined. The Canyon/D3 seam is not mined but is monitored for potential impacts to groundwater from mining.

GROUND-WATER HYDROLOGY

Groundwater in the area can be found in coal seams, alluvium, clinker, and sandstone. Rapid facies change in the sandstones and siltstones result in lensoidal, discontinuous units that generally do not provide a reliable water resource. Typically, the sedimentary strata of the Fort Union Formation have low hydraulic conductivities and form aquitards between the coal seam aquifers, although they may supply limited water resources locally.

Alluvial water resources can be found in Deer Creek and Spring Creek and beneath the Tongue River flood plain. Valley fill deposits typically are dominated by fine-grained colluvium; stream-laid deposits appear to represent only a small part of the valley fill materials. With the exception of Deer Creek, which has perennial reaches, drainages in the area are ephemeral and contain little to no water except during snow melt and significant precipitation events.

Alluvial wells in the South Fork Spring Creek (SFSC) historically had a saturated thickness of 3 to 4 feet, although most of the wells have been removed by recent mining. At the southeast part of the permit area where the coal has burned and clinker is the predominant rock type, SFSC alluvium is dry. The upper reaches of Spring Creek and North Fork Spring Creek overlie clinker. Infiltration of water into and through the clinker may explain why alluvial wells in these drainages are dry. Clinker typically forms highly transmissive water table aquifers of limited areal extent. Some clinker is so highly transmissive that it is largely dry. Surface runoff and precipitation enter clinker and may form zones of saturation along the irregular clinker base.

The main shallow aquifers in the Decker area are coal seams. Permeability and hydraulic conductivity within the coal beds are highly variable and are a direct function of the degree, nature and direction of secondary fracturing within the seam. Transmissivity and storativity values from aquifer tests (pump and slug tests) at SCM and Decker mines cover a wide range (Table 1). Many of the tests at the Decker mines were complicated by gaseous conditions or questionable well efficiency and may have yielded spurious results. Production from supply wells completed in the shallow coal seams reportedly range from 10 to 60 gallons per minute (gpm) (VanVoast and Hedges, 1975), with rates of 15 gpm and less most common.

Table 1. Range of values for hydrologic parameters determined for aquifers in the Decker area (Decker Coal Company, 1991; Spring Creek Coal Company, 1978).

Aquifer	Transmissivity (g/d/f)	Storativity
D1L	96 - 5157	$6x10^{-5}$; $4x10^{-4}$
D1U	1 - 630	
D1	611	
D2	129 - 2020	$4x10^{-5}$
D3	287 - 449	
Anderson-Dietz	980 - 1320	$2x10^{-3}$; $1x10^{-3}$
Canyon	24 - 60	
Spoils	2368 - 3006	

At least four major northeast-trending normal faults form hydrologic boundaries in the area, two at the Decker mines and two at Spring Creek Mine. The "South Boundary Fault", located east and south of the East Decker pits, is approximately 5 miles long and is down-dropped approximately 350 feet to the south at its northeastern end. The amount of offset gradually decreases to the southwest. A second, unnamed fault has a mapped length of approximately 4.5 miles and extends from the southwest side of Pit 13 at the East Decker Mine to south of Pit 11 at the West Decker Mine. This fault parallels and is two miles northwest of the South Boundary fault. The resulting narrow, three-mile long fault-block is characterized by steep groundwater declines attributable to mining and coal bed methane production.

At the SCM, the northeast-trending Spring Creek fault is located north of Pit 3. The mapped length of the fault is approximately two miles and it is down-dropped 130 feet on the north side. Baseline studies (Spring Creek Coal Company, 1978) reported that flow across the fault is estimated at 2.0 gallons per day per foot (g/d/ft). In 1998, prior to the opening of Pit 4, the static water level in the Anderson-Dietz coal on the north side of the fault was 50 feet higher than the water level on the south side of the fault (Spring Creek Annual Hydrology Report, 1998).

The northeast-trending Carbone fault is parallel to and approximately one mile northwest of the Spring Creek fault. Mapped length of the Carbone fault is about two miles with a vertical displacement of 40 to 70 feet. The fault block between the Carbone and Spring Creek faults has been down-dropped to form a graben. Prior to mining, the water level in the Canyon seam north of the Carbone fault was similar to the Anderson-Dietz seam water level south of the fault, suggesting a hydrologic connection between the two units. Complete and widespread burning of the Anderson-Dietz seam took place on the upthrown (north) side of the Carbone fault creating a large area of clinker and an absence of groundwater.

Based on pre-mining potentiometric maps (VanVoast and Hedges, 1975), the flow direction of the pre-mine groundwater system was from recharge zones in highlands east and west of the mines to discharge at the Tongue River. At West Decker Mine, flow directions were from the west, north and south. At East Decker, groundwater flow was from the north and east. At the Spring Creek Mine, groundwater was moving from the west-northwest toward the Tongue River.

Although most recharge to the groundwater system is assumed to occur in highlands outside the mine boundaries, local recharge occurs via clinker, seepage along drainages and the Spring Creek fault (Spring Creek Coal Company, 1978) and ponds. The Tongue River Reservoir represents a fluctuating head boundary, recharging the adjacent backfilled pits and shallow aquifers at the East and West Decker mines in the spring and summer when reservoir stage is high. Discharge back to the reservoir typically occurs in the fall and winter when the stage is lower. Hydrographs of water levels in wells near the reservoir clearly demonstrate the effect of seasonal reservoir stage fluctuations on all monitored aquifers.

Downward vertical flow gradients (between aquifers) predominate in the area. With the exception of clinker and areas adjacent to the pits that experienced significant water level decline due to mining, coal aquifers at the Decker mines remained confined prior to nearby production of coal bed natural gas. Because coal bed natural gas production requires the reduction of pressure head, pumping produced substantial, widespread water level decline in numerous coal aquifers in the Decker area.

The D1, D2 and Anderson-Dietz aquifers discharge at mine pit faces. Because the hydraulic conductivity of coal is low, pit inflow rate is generally low except in Decker Mine pits immediately adjacent to the reservoir. Pit inflow is estimated to be less than 70 gpm at the Spring Creek Mine. The small quantity of water that accumulates in the pits is used for mine dust suppression, minimizing the need for discharge of accumulated pit water into surface water drainages.

West of the SCM permit area, the Anderson-Dietz aquifer appears to be under confining conditions. This aquifer is unconfined in the east part of the permit area (where there is extensive clinker) and in the proposed Pearson Creek Amendment area. Baseline water levels indicate that the 80-foot thick Anderson-Dietz coal seam was unconfined in the central permit area, where pits 1, 2, and 3 have subsequently been developed (south of the Spring Creek Fault). Water levels in the north part of the permit area, near Pit 4, indicated that the Anderson-Dietz aquifer was confined in the western two-thirds of the Carbone graben prior to mining.

The D3/Canyon aquifer lies 100 feet to 150 feet below the Anderson-Dietz and D2 coal seams and is the deepest aquifer monitored by the mines. It was confined throughout the Decker-Spring Creek area prior to coal bed natural gas production. Pressure head in the D3/Canyon seam is variable, but locally was as much as 300 feet above the top of the unit prior to gas production. Gassy conditions in the D3/Canyon seam make it difficult to monitor and take accurate water level measurements.

GROUND-WATER QUALITY

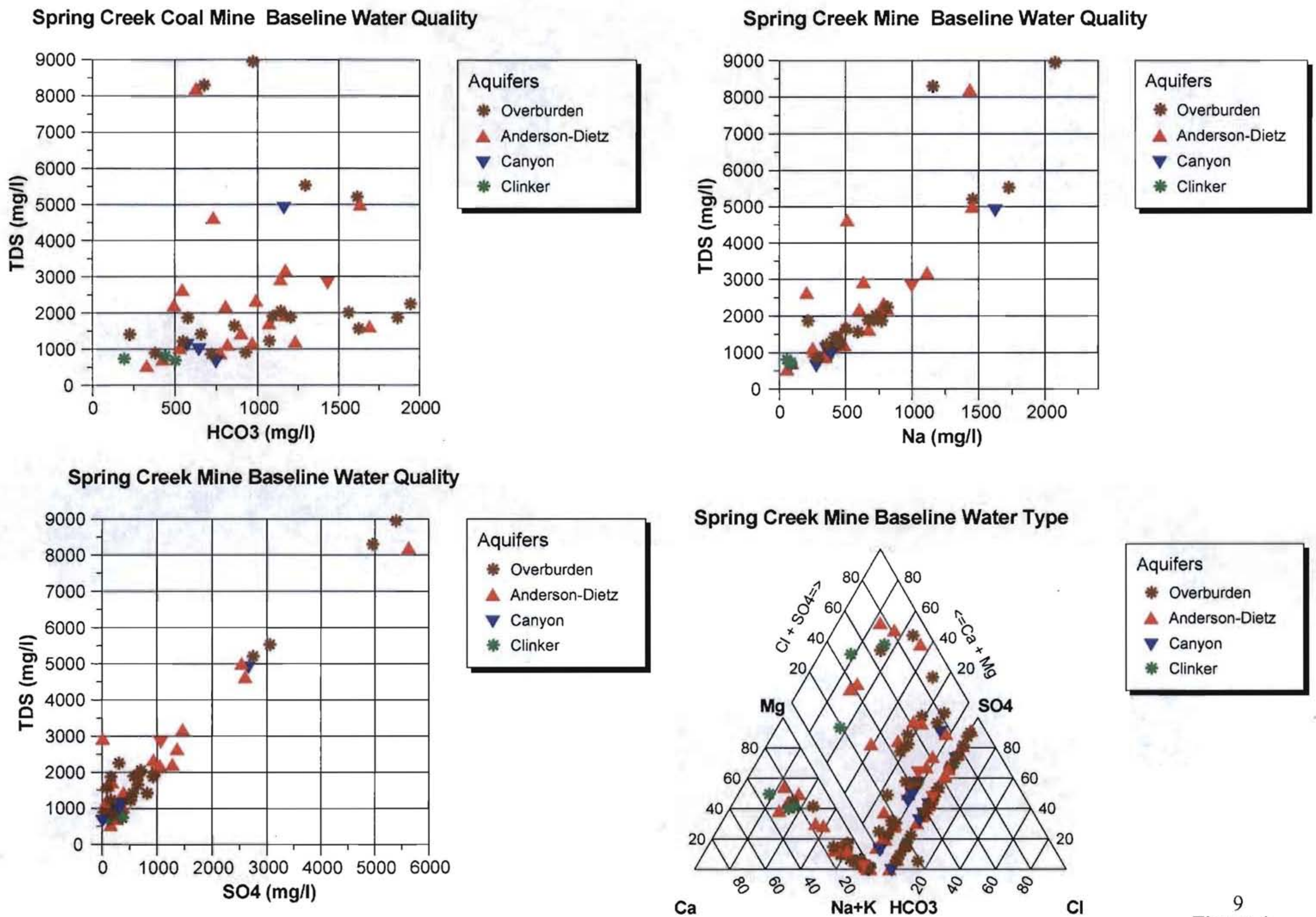
Water type in bedrock aquifers at the SCM and Decker mines most commonly ranges from sodium bicarbonate to sodium sulfate (Figures 4 and 5). Magnesium-calcium bicarbonate or calcium-magnesium sulfate types are less common. Magnesium-calcium sulfate-type water typically characterizes alluvial water.

TDS concentration in background samples from bedrock aquifers at SCM ranges from 500 mg/L to almost 9,000 mg/L, with an average of 1,800 mg/L. TDS is strongly correlated with sodium (Na) and sulfate (SO4), particularly at higher concentrations. TDS and HCO3 show a relatively poor correlation.

Total dissolved solids (TDS) concentration in background water quality samples from bedrock aquifers at the Decker mines ranges from 500 mg/L to almost 7,600 mg/L, with an average of slightly less than 2,000 mg/L. TDS is strongly correlated with sodium (Na) and somewhat correlated with bicarbonate (HCO3) at higher TDS concentrations. At higher TDS concentrations, there is also a correlation with sulfate (SO4), but at lower concentrations the correlation is relatively weak.

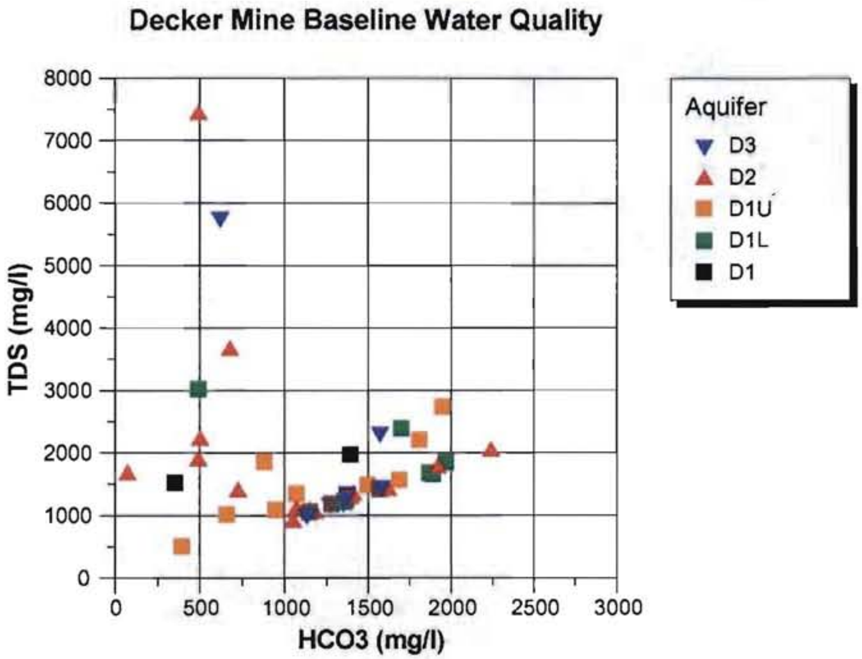
Background water quality varies but generally exceeds secondary EPA drinking water standards for TDS (>500 mg/L) and Montana Class I beneficial uses (Class I = <1,000 mg/L TDS). Most groundwater in the area meets Montana Class II standards (TDS > 1,000 mg/L and <2,500 mg/L).

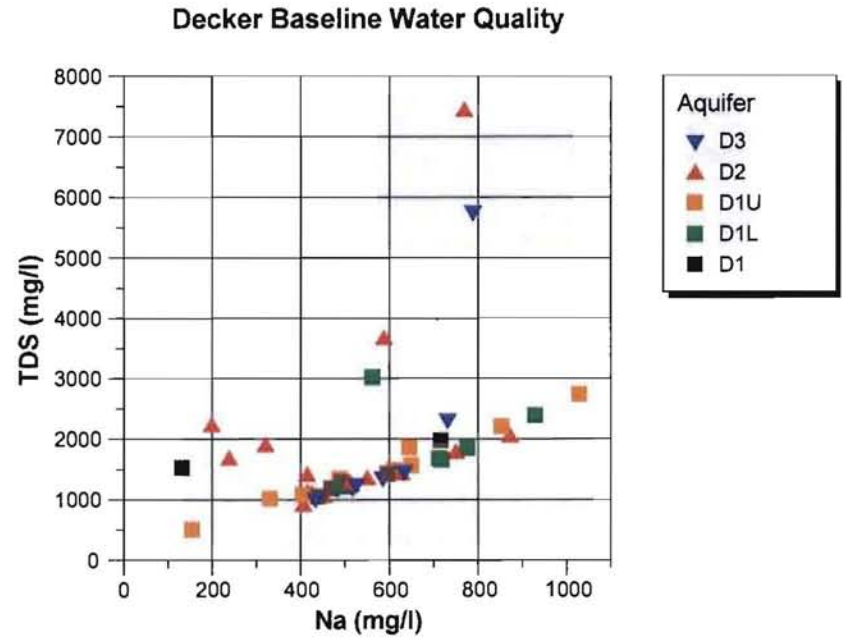
There is no strong distinction in major ion chemistry between the bedrock aquifers. Trace element chemistry among the bedrock aquifers is also similar. Small amounts of aluminum and zinc are occasionally reported in water quality analyses but these metals generally are not persistent in repeated samples from a given well. Trace amounts of cadmium, copper, manganese, nickel, lead, arsenic and selenium are less commonly reported. Arsenic has been reported in background water quality samples from overburden, Anderson-Dietz coal, Canyon coal and interburden at the Spring Creek Mine. Background arsenic levels range from 0.005 mg/L to 0.050 mg/L.

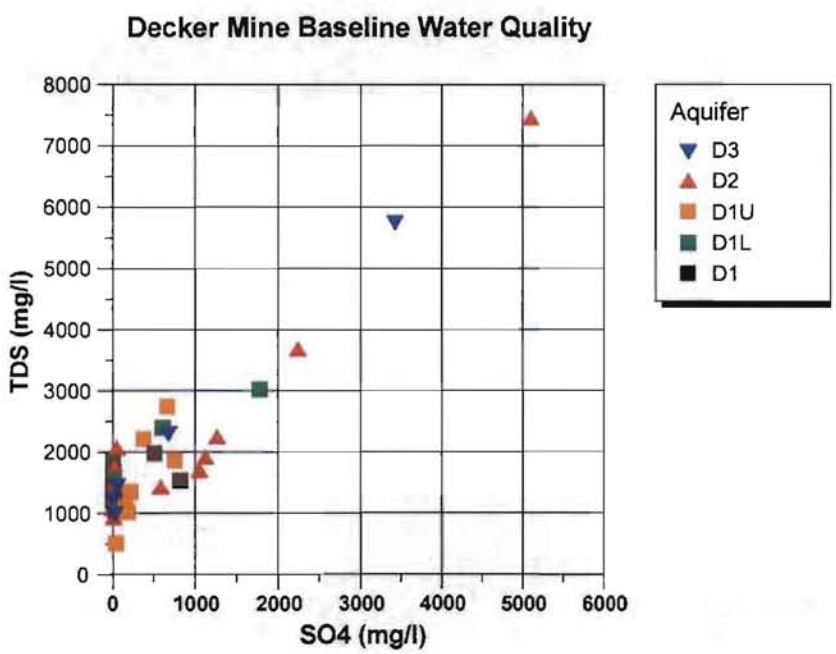


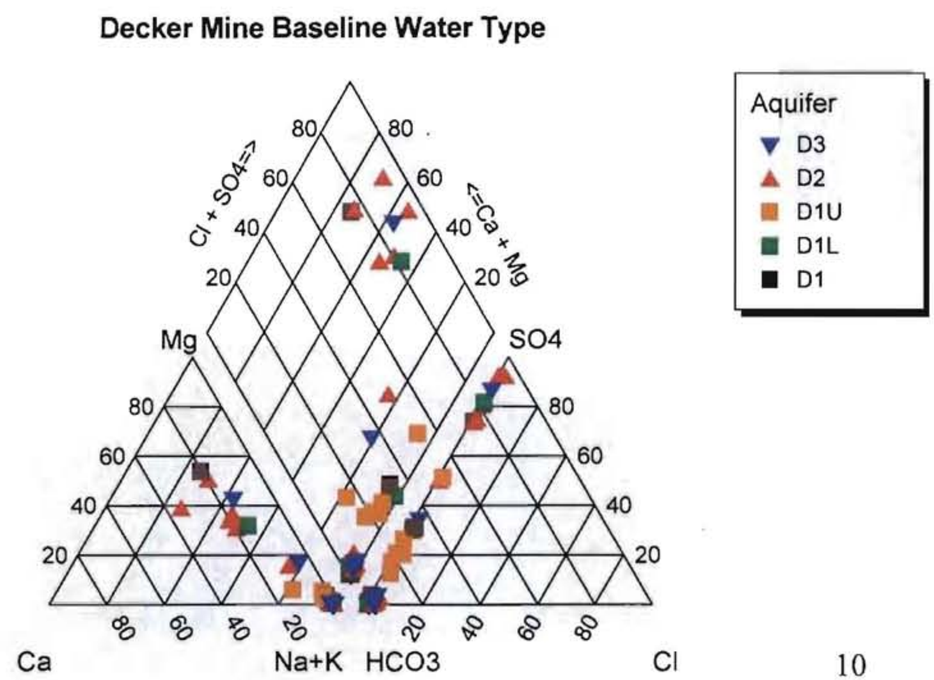
Spring Creek Coal Mine Baseline Water Quality
TDS (mg/l)
HCO3 (mg/l)
Spring Creek Mine Baseline Water Quality
TDS (mg/l)
Na (mg/l)
Spring Creek Mine Baseline Water Quality
TDS (mg/l)
SO4 (mg/l)
Spring Creek Mine Baseline Water Type
Cl + SO4=>
<=Ca + Mg
Mg
SO4
Ca
Na+K
HCO3
Cl
Aquifers
Overburden
Anderson-Dietz
Canyon
Clinker

Figure 4


Decker Mine Baseline Water Quality
TDS (mg/l)
HCO3 (mg/l)
Aquifer
D3
D2
D1U
D1L
D1


Decker Baseline Water Quality
TDS (mg/l)
Na (mg/l)
Aquifer
D3
D2
D1U
D1L
D1


Decker Mine Baseline Water Quality
TDS (mg/l)
SO4 (mg/l)
Aquifer
D3
D2
D1U
D1L
D1


Decker Mine Baseline Water Type
Cl + SO4=>
<=Ca + Mg
Mg
SO4
Ca
Na+K
HCO3
Cl
Aquifer
D3
D2
D1U
D1L
D1

GROUNDWATER USES

Current groundwater uses in the Decker-Spring Creek area include domestic, livestock and supply for the mines. Few homes or ranches are near the mine permit areas. Most domestic and livestock wells are completed in coal aquifers or overburden sandstone beds. Decker has replaced at least one private well when there was a question that water supply may have been affected by mining. There has been only one complaint to the Montana Department of Environmental Quality in the last decade from a well owner in the Decker-Spring Creek area regarding potential impacts to supply due to mining. Upon investigation by the Department, the complaint was determined not to be associated with mining. Monitoring wells are placed between mine operations and nearby private wells. These wells are monitored for water level and water quality in order to anticipate any downgradient impacts.

Numerous coal seam aquifers lie beneath the seams monitored by the mines. Some of these deeper aquifers were used for water supply at SCM during early mining but the wells have been abandoned as water production waned. A well in the northwest part of the West Decker Mine has historically provided some production water for Spring Creek Mine. Currently, SCM and the Decker mines use groundwater from coal bed methane production for most operational needs.

ALLUVIAL VALLEY FLOORS

Based on field studies at East Decker Mine, Pond Creek, Spring Creek, Pearson Creek and Deer Creek were determined by the Montana Department of Environmental Quality not to contain alluvial valley floors. There is no history of successful dry land farming or irrigation along these stream valleys and groundwater was insufficient for agricultural use. The historic land use has been undeveloped rangeland or dry land pasture.

During baseline investigations at Spring Creek Mine, South Fork Spring Creek (SFSC) was determined to be an alluvial valley floor insignificant to agriculture (Montana Department of State Lands, 1980). This determination was based on groundwater levels measured in alluvial monitoring wells, valley morphology conducive to flood irrigation, and the assumption that adequate surface water supply would be available. Twenty years of monitoring data now indicate that the alluvium (composed largely of colluvium/valley fill) of SFSC was not providing the hydrologic function originally attributed to it. Impoundment structures in the SFSC drainage and a series of wet years in the 1970's contributed substantially to saturation levels in the alluvium during the baseline study and early years of monitoring at the mine. The artificially high water levels led to the original interpretation that more water was available in the valley fill than actually existed under natural conditions. Once the dikes forming the impoundment structures were breached and precipitation returned to a more normal annual average, water levels in alluvial monitoring wells dropped 17 feet or more.

Results of early aquifer tests of SFSC alluvium were later determined to be flawed as the alluvial wells were completed below the alluvium in a sandstone bed with perched groundwater. This sandstone yielded more water than reasonably expected from the poorly sorted, relatively impermeable valley fill material. Studies of SFSC (Western Water Consultants, 1997) that examined the feasibility of installing dewatering wells into the valley fill upstream of Pit 1 concluded that the hydraulic conductivity in SFSC colluvium/valley fill material was much lower than previously assumed, measuring 50 gpd/ft^2 or less compared to the earlier pump test which yielded a conductivity of 1000 gpd/ft^2.

Spring Creek and North Fork Spring Creek were determined not to be alluvial valley floors based on surface and groundwater monitoring data. Groundwater wells installed to monitor these drainages were always dry. The hydrologic consequence of mining through the valleys of Spring Creek and its tributaries will be temporary disruption of ephemeral surface flow. The reclamation plan has been designed to restore the surface flow patterns as closely as reasonably possible in these drainages. No long-term impacts to the hydrologic balance of these or downstream valley systems are expected.

IMPACTS FROM MINING

A number of changes to groundwater and the hydrologic balance result from strip mining. Removal of the coal and overburden aquifers in the pit areas results in changes in water level, water quality, hydrologic properties such as conductivity and storativity, recharge capacity, discharge, and temporary change in flow direction near the pits. Hundreds of monitoring wells installed and maintained by the mines and the Montana Bureau of Mines and Geology form an extensive network that monitors water level and water quality inside and outside the anticipated impact areas.

Change in Hydrologic Properties

Hydraulic properties such as conductivity and storativity are changed in the process of removing overburden strata and returning it as spoil to mined-out pits. The relatively homogenous spoil backfill is expected to have a more uniform hydraulic conductivity in contrast to undisturbed, bedded lithology in which vertical conductivity is usually lower than horizontal conductivity. Aquifer tests in spoil wells at the Decker mines show transmissivity ranging from 368 g/d/ft to 3,006 g/d/ft (Table 1). Porosity of the spoils is higher than the porosity of the undisturbed bedrock, resulting in a higher storage coefficient in the spoil.

Other characteristics subject to change with mining disturbance include recharge capacity, which affects the relationship between infiltration, runoff, evaporation, and storage. No substantial areas of recharge have been disturbed by mining at the Spring Creek Mine. Changes to recharge at the West Decker Mine are discussed below. Ring infiltrometer studies in the area suggest pre-mine and post-mine infiltration rates are not significantly different given the limited amount of vertical recharge to groundwater.

Normal flow direction in the Decker-Spring Creek area is toward the hydrologic discharge boundary formed by the Tongue River. Dewatering and removal of aquifers during mining causes temporary modification of flow direction in the vicinity of the mine pits as groundwater moves toward depressed water levels in the pit area.

Change in Recharge Capacity at West Decker

Due to proximity of mine pits to the Tongue River Reservoir and the extensive, highly conductive clinker that lies between the reservoir and the mine pits, the West Decker pits have periodically had problems with water inflow. Inflow into pits, particularly at West Decker, increased since June 1999, when completed Tongue River dam and spillway reconstruction allowed the reservoir to fill to an operational stage of 3428 feet. To limit inflow and facilitate safer working conditions in pits near the reservoir, Decker Coal Company selectively placed buried earthen barriers ("dikes") between some of the pits and the reservoir. Typically, these dikes consist of compacted overburden material, are about 180 feet wide, and are placed from the base of the most permeable rock to a height above the operational stage of the reservoir. Between 5,000 and 6,000 linear feet of dike structures have been emplaced between the reservoir and Pit 16 East at West Decker. In the Pit 12 area at West Decker, there are approximately 1,600 feet of diked pit end wall.

The hydrologic connection between the reservoir and the pits via clinker provides recharge from the reservoir to the reclaimed pits and contributes to the creation of a spoil aquifer. Although the dikes are not anticipated to prevent recharge to the pits, it is anticipated that the dikes will impede the reestablishment of premine water levels and increase the amount of time necessary to establish geochemical equilibrium in spoils water. A plan for breaching the dikes at designated locations was approved by the Department and became part of the West Decker permit (Decker Coal Company, 2007). Breaching the dikes is expected to expedite restoration of the hydrologic balance at West Decker.

Changes in Water Level

Groundwater levels in alluvium, coal seams and other units have been closely monitored in and adjacent to the mine permit areas. Water level declines have been documented in annual hydrology reports. Generally, the drawdown rate at a monitoring site has not been constant but responds to changes in the location and duration of mining operations. Other characteristics such as hydrologically restricted fault blocks, highly transmissive rock units and availability of groundwater affect the vertical and horizontal extent of drawdown. Potentiometric maps for the Anderson-Dietz seam at Spring Creek Mine, and the D1 Upper, D1 Lower, D2 and D3 coal seams at the Decker mine, as well as spoil water levels, are located in Appendix 1.

Decker Mines

Monitoring wells are completed in alluvium, D1, D1 Upper, D1 Lower, D2, and D3 coal seams at the Decker mines. Water level declines associated with mining have been recorded in all mined aquifers as well as the D3 seam, which is not mined.

Coal bed natural gas production began in 1998 in Squirrel Creek, approximately a mile south of the West Decker Mine. Sharp declines in coal seam water levels followed due to aggressive pumping from the D1, D2, Canyon (D3) and deeper coal aquifers to decrease pressure head and facilitate the release of gas. A distinctive and typically sharp increase in drawdown rate is evident on hydrographs, marking the change from drawdown associated with mining to drawdown associated with coal bed natural gas production. In the past few years, monitoring has been limited or abandoned at many Decker mine monitoring wells due to safety concerns associated with venting gas.

The following discussion of drawdown attributable to mining is based on data gathered prior to initiation of gas production. Predictions for life of mine drawdown are based on water level trends observed over decades of monitoring prior to gas production.

D1 Aquifer

At West Decker, drawdown in the D1 aquifer was between 27 and 30 feet 3.5 miles west of Pit 11 (Figure 6) in late 1998, prior to coal bed methane development. The D1 Upper aquifer at East Decker had experienced two to four feet of drawdown approximately a mile east of Pit 14. The greatest amount of drawdown in the D1 Upper at East Decker was 51 feet of decline measured in the narrow, fault-bounded block approximately a mile south of Pit 14. Drawdown more than three miles southwest of the pit was at a rate of approximately 1 foot a year.

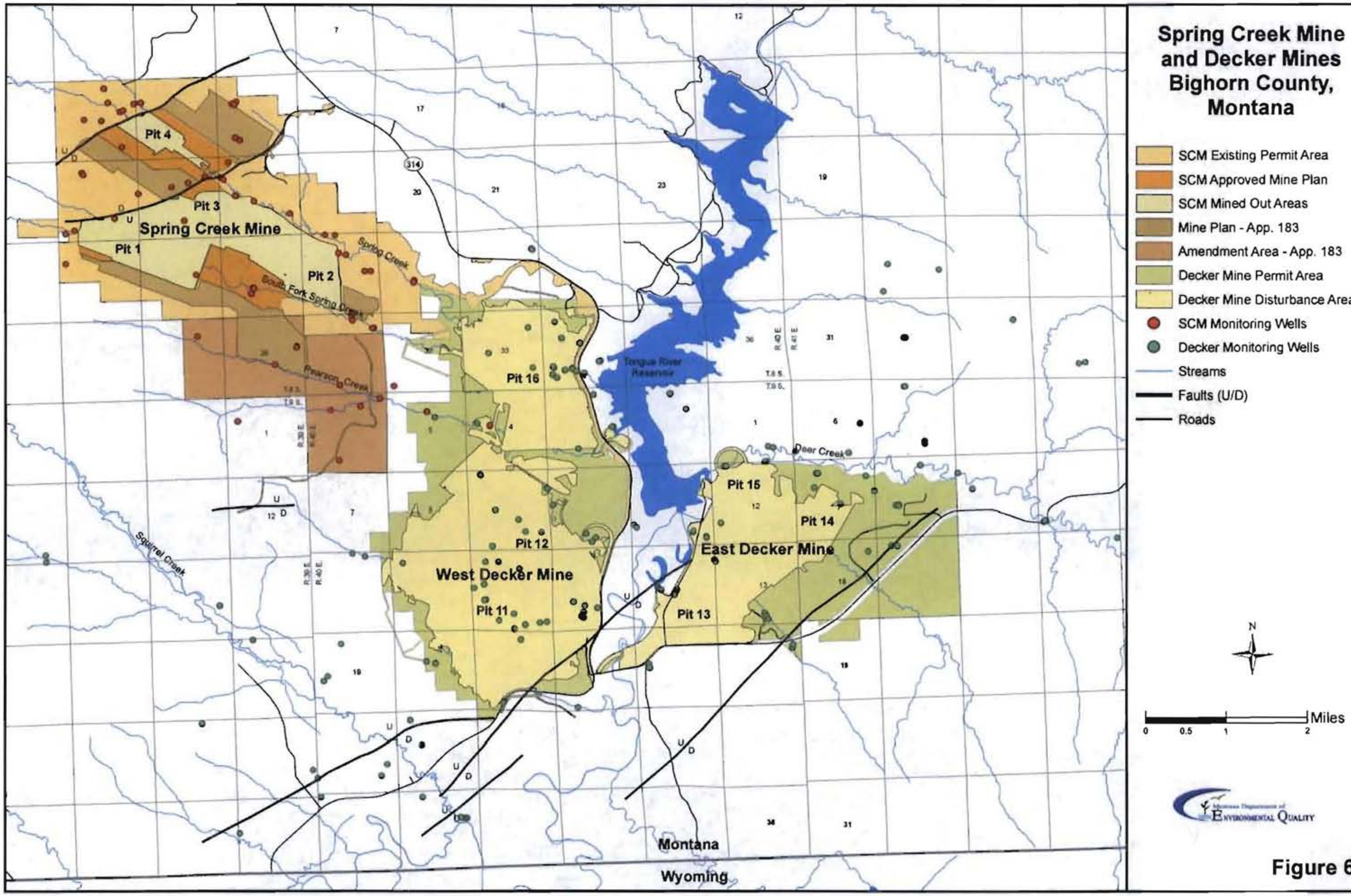
Approximately a mile southwest of Pit 13, drawdown in the D1L was 58 feet. Drawdown in the D1L was detectable as far as 3 ½ miles southwest of Pit 13. By contrast, north and northeast of the pit, the maximum amount of drawdown recorded in the D-1 Lower was 12 feet; only two feet of drawdown was recorded up to 2 ½ miles from the east edge of Pit 14. In most D1 Lower monitoring wells at East Decker, drawdown appeared to have reached steady state by 1998 and no further declines were being recorded.

D2 Aquifer

By late 1998, drawdown in the D2 aquifer was steeper and more extensive than in the other aquifers impacted by mining. At East Decker, drawdown (change in pressure head) inside the fault-bounded block at the south end of the mine was as much as 135 feet. North and northeast of Pit 14, D2 drawdown was more moderate. Drawdown of approximately 49 feet was measured 2,000 feet east of Pit 14. Approximately three miles northeast of Pit 14, drawdown was only 11 feet.

At West Decker, 29 feet of drawdown was measured approximately 3 miles southwest of Pit 11. Approximately 4 ½ miles west of Pit 11, seven feet of drawdown was measured in the combined D1/D2 seams (equivalent to the Anderson-Dietz seam at the Spring Creek Mine). Five feet of drawdown was measured in the Anderson-Dietz seam approximately 2 miles south of Pit 2 at the SCM and a little more than 2 miles northwest of Pit 11 at West Decker.

In the vicinity of Pit 16 at West Decker, drawdown in the D2 was conservative. A monitoring well installed in 1974 in the north part of Pit 16 indicated that drawdown at this site began in 1991 and accumulated a total of 9 feet by 1998.


Spring Creek Mine
and Decker Mines
Bighorn County,
Montana
SCM Existing Permit Area
SCM Approved Mine Plan
SCM Mined Out Areas
Mine Plan - App. 183
Amendment Area - App. 183
Decker Mine Permit Area
Decker Mine Disturbance Area
SCM Monitoring Wells
Decker Monitoring Wells
Streams
Faults (U/D)
Roads
Miles
0
0.5
1
2
N
Spring Creek Mine
Pit 1
Pit 2
Pit 3
Pit 4
Spring Creek
South Fork Spring Creek
Pearson Creek
Squirrel Creek
Pit 16
Pit 12
Pit 11
West Decker Mine
Pit 15
Pit 14
Pit 13
East Decker Mine
Deer Creek
Tongue River Reservoir
314
Montana
Wyoming
Environmental Quality
Figure 6

D3/Canyon Aquifer

Although the D3 seam is not physically disturbed by mining, drawdown (decline in pressure head) in this aquifer over a broad area has been documented at the Decker mines. Explanations for the decline in head of the D3 aquifer include reduction in confining pressure due to the removal of overlying coal seam aquifers and overburden, leaks due to inadequately sealed drill holes and fracturing of overburden caused by blasting at the mine site (Reiten and Wheaton, 1993). The D3/Canyon seam was also used in multiple-completion mine supply wells which may have contributed to the decline of the D-3 aquifer.

A pre-mine potentiometric surface was not established for the D3 aquifer in the Decker mines area. Most information about the D3 aquifer comes from monitoring wells installed adjacent to the West Decker and East Decker pits in 1979 and 1980, seven to eight years after mining at West Decker began. At East Decker, the greatest amount of drawdown was centered over the southwest corner of Pit 13. Drawdown of 37 feet was recorded approximately 1,500 feet west of Pit 13. Approximately 2.5 miles east of Pit 14, drawdown in the D3 measured 8.5 feet. At West Decker, immediately south of Pit 11, the D3 declined 27 feet. Approximately two miles west of Pit 11, water levels declined 5 feet. A D3 well installed in 1997 approximately 4,000 feet north of Pit 16 at West Decker and 2.3 miles east of Pit 2 at Spring Creek Mine, recorded more than 6 feet of drawdown in less than 6 months. A D3 well adjacent to the west side of the Tongue River Reservoir recorded a decline of 18 feet.

Spring Creek Mine

Groundwater monitoring in the SCM area was begun in the spring of 1976. Monitoring wells were completed in alluvium, overburden, Anderson-Dietz coal, interburden and the Canyon coal.

Alluvium

Alluvial monitoring wells were installed in Spring Creek, South Fork Spring Creek (SFSC) and North Fork Spring Creek (NFSC) and Pearson Creek. All of these drainages are ephemeral. Drill log descriptions indicate that alluvial material is predominately colluvium with few gravel-bearing zones suggestive of water-laid deposits. These deposits generally range between 10 and 20 feet thick.

Alluvial monitoring wells installed in the Spring Creek drainage south of the Spring Creek fault overlie clinker and have always been dry. Two SFSC alluvial wells downstream of Pit 1 also overlie clinker and have been dry since installation. Likewise, wells in NFSC overlie clinker and have always been dry.

Wells drilled in Pearson Creek alluvium to evaluate baseline water levels indicated that the valley fill has the ability to transmit groundwater but the supply is not adequate to sustain permanent underflow through the system. Water levels measured after snowmelt indicated local saturation of between a half a foot and 10 feet. Water levels declined precipitously within a month or two after snowmelt (Spring Creek Coal Company, 2008).

Baseline measurements from SFSC wells within a mile downstream of Pit 1 recorded a saturated thickness of up to 20 feet or more. When five earthen dikes in the SFSC drainage were breached water levels in the monitoring wells dropped up to 17 feet, leaving some wells dry and others with only a foot or two of water.

Twelve monitoring wells were completed in Spring Creek alluvium in the Carbone graben, between the Spring Creek and Carbone faults. Many of the original Spring Creek alluvial wells installed in the Pit 4 area were completed in sandy bedrock below the valley fill and consequently gave water level measurements that suggested that there was greater saturation in valley fill material than actually existed. In 1998, four new alluvial wells were installed to the base of the alluvium at the same sites as four existing wells were completed below unconsolidated material into bedrock. The new wells remained dry. Most of the alluvial wells in the Pit 4 area had a history of being dry or recorded only a trace to a couple of feet of groundwater, often coincident with snowmelt runoff.

After construction of a flood control dam less than a half-mile upstream of Pit 1, mining advanced through SFSC in 1992, eventually removing 9,000 linear feet of the drainage. Hydrographs from monitoring wells upstream and downstream of the pit did not indicate a significant change in water level trends associated with removal of this section of SFSC. Lack of change in down gradient well water level trends suggests that a well-developed, pre-mine alluvial groundwater flow system did not exist in the SFSC drainage.

Overburden, Interburden and Clinker

Numerous overburden wells were installed at SCM in the late 1970's for baseline data collection in pits 1, 2, and 3. Additional wells were installed prior to opening Pit 4. Underburden wells were completed 20 to 100 feet below the coal. Some underburden wells have been dry since installation while others measured a saturated thickness of 10 feet to 40 feet. Generally, changes in overburden water levels have been small. Hydrographs from overburden wells in or adjacent to SFSC show long-term water level responses similar to those observed in alluvial wells that reflected breaching and repair of the SFSC stock ponds in the early 1980's. This suggests that impoundment of surface water behind the dikes in SFSC was providing substantial localized vertical recharge to the overburden.

At least two interburden wells (between the Anderson-Dietz and Canyon coal seams) have recorded declines of 20 to 40 feet since mining began at Spring Creek Mine. Most interburden wells had confining pressure with heads ranging from 9 feet to nearly 100 feet. According to borehole lithology logs, a sandstone bed approximately 10 feet thick commonly underlies the Anderson-Dietz coal.

Eight or more clinker wells have been installed throughout the SCM permit area. The only clinker well with more than a trace of water is located north of the Carbone fault and contains seven feet of water.

Anderson-Dietz coal

Baseline data (Spring Creek Coal Company, 1978) indicates that the Anderson-Dietz coal aquifer was unconfined in the area of pits 1, 2, and 3. Pre-mine saturated thickness of the Anderson-Dietz increased south of the Spring Creek fault, ranging from thinly saturated near the fault to approximately 70 feet of saturation immediately southeast of where Pit 2 is now located. South of Pit 1 the Anderson-Dietz was confined, with heads 30 to 35 feet above the top of the coal. Currently, near the pit area, drawdown measures as much as 35 feet; a mile or more south of the pit area drawdown is less than 5 feet.

Baseline measurements in the west part of the Pit 4 area, indicate that the Anderson-Dietz aquifer was confined, with heads ranging from 8 feet to 99 feet above the top of coal; the highest heads were immediately north of the Spring Creek fault. Since opening Pit 4 in early 2001, water levels have dropped up to 52 feet near the fault. East of Pit 4 area, the aquifer was unconfined and had approximately 50 feet of water during baseline. The greatest drawdown in this area has been 12 feet.

Canyon/D3

The Canyon aquifer had a pressure head of as much as 224 feet before mining began in the main pit area (pits 1,2, and 3); north of the Carbone Fault in the Pit 4 area, 119 feet of confining pressure was measured prior to mining. However, water levels in this aquifer east of Pit 4 indicated a saturated thickness of only 14 to 22 feet. In the SCM area, the Canyon coal is heavily influenced by coal bed natural gas, resulting in locally fluctuating water levels.

Only two Canyon wells have shown a substantial decline in water level. West of Pit 1 there was a 35 foot decline since 2000, and south of Pit 2 there has been a decline of 35 feet since 2001. Both of these declines coincide with the initiation of coal bed methane gas production from this seam some seven miles to the south. A Canyon coal well located approximately 4,000 feet south of Pit 2, declined 10 feet prior to 1989 but since that time water levels in this well appear to have been relatively stable. A lack of contined decline as mining approached closer to the well suggests that this well is not strongly influenced by mining.

Spoil Aquifer Water Levels

East Decker

All six East Decker spoil monitoring wells are located within a half-mile of the Tongue River Reservoir. Water level measurements indicate that the spoil aquifer has recovered 45 feet in wells furthest from the reservoir and between 85 to 115 feet in wells closest to the reservoir. All wells show a seasonal fluctuation, reflecting the effect of the variable stage of the reservoir and emphasizing the importance of the reservoir in providing recharge to the developing spoil aquifer. Pre-mine water levels in the D1 lower and D2 coals in this area were at elevations of approximately 3418 to 3424 feet. Current spoil water levels range from 3390 feet to 3410 feet and continue to slowly rise. The operational stage of the reservoir is approximately 3428 feet.

Because upgradient recharge from the east is intercepted by open mine pits, the reservoir will be the primary source of recharge to the pit area until mining and backfilling are complete.

West Decker

Groundwater levels in spoil at West Decker Mine are strongly controlled by proximity to active or open pits, the reservoir and coal bed methane activity to the south and southwest. There are 30 spoil wells at West Decker. Wells closest to the reservoir show a saturated thickness of 45 to 68 feet, with a saturation of 25 to 40 feet in the more interior wells. Water levels in wells closest to the reservoir are within 10 to 15 feet of the operational reservoir stage of 3428 feet and show an increasing water level trend. The more interior wells show a flat or only slightly increasing trend in water level. Two spoil wells near the south end of Pit 11 have shown declines in water level of three feet and five feet, respectively, since 2000, coincident with the initiation of coal bed natural gas production in Squirrel Creek, a couple of miles to the south.

Pumping associated with active mining in Pit 12 slowed recovery in most spoil wells adjacent to the operation. Spoil in the reclaimed areas of Pit 11 remains cut off from natural, upgradient recharge from the west by open pits. D1 water levels in the pits 11 and 12 area were at an elevation of approximately 3442 feet prior to mining but currently remain at approximately 3400 feet. Water table levels are not expected to return to the level of the previously confined aquifers, but water levels are expected to increase beyond current levels once natural recharge is re-established.

Only one spoil well has been installed in Pit 16. The well has shown a modest five foot increase in water level to an elevation of 3389 feet since installation in 2001. D2 water level in this area prior to mining was 3409 feet.

Spring Creek Mine

Recharge in the backfill of pits 1, 2 and 3 is being recorded by seven spoil wells. The water level in a spoil well near the eastern margin of mining has slowly increased since well installation in late 1998 and has been stable since 2004. Saturated thickness is approximately 27 feet. Water level at this location remains about 27 feet below the premine level (Spring Creek Coal Company, 1978). Leaks from Trap 22, a large water storage facility located approximately 1 mile upgradient, may be providing recharge to this well.

Saturated thickness near the southwest margin of mining, immediately adjacent to the Spring Creek fault, is approximately 10 feet. Water level is approximately five feet below premine level at this location and has not shown an increase since well installation in 1998.

In the southeast corner of Pit 1, water level has increased approximately 6 feet since well installation in 2001. At this location there is approximately 25 feet of saturation but water level remains approximately 37 feet below the pre-mine level (Spring Creek Coal Company, 1978).

Spoil at the north end of Pit 3 has a saturated thickness of approximately 14 feet. Water level has not shown an appreciable increase since installation and remains approximately 8 feet below the pre-mine level at this location (Spring Creek Coal Company, 1978). Spoil water levels are likely to remain depressed until mining ceases and reclamation is complete.

Changes in Water Quality

Water quality upgradient of mining typically is unaffected by mining activities. However, due to dissolution of minerals on the broken and newly exposed surfaces of rock backfilled into the pit, spoil water quality is typically poorer than water quality than the aquifers removed by mining. This is marked by an increase in total dissolved solids (TDS) resulting from increases in most major analytes, the greatest increases are observed in bicarbonate (HCO3), sodium (Na) and sulfate (Figure 7). Spoil water quality at the Decker mines ranges from 1,900 mg/L to 7,420 mg/L with an average of 3,511 mg/L. At SCM the TDS of spoil water ranges from 3,000 mg/L to 6,000 mg/L. Although background or upgradient aquifers average a lower TDS concentration than spoil water, some background water quality samples have TDS concentrations as high as those from spoil.

Spoils water type is predominately sodium bicarbonate, but sodium sulfate type water is also common. Water quality between closely spaced spoil wells can vary considerably. Spoil aquifers are still forming in reclaimed pits in the Decker and Spring Creek mines. To date, increasing water levels in spoil generally has not resulted in improved spoil water quality. Post-mine water quality will continue to evolve as mine pits are backfilled and the upgradient recharge moves into and through the spoil aquifer. Paste extract data has been used to predict spoil water quality; however, the results are only approximate. It is estimated that approximately one pore volume of water must pass through mine spoils before water chemistry balance is restored to that of premine (VanVoast and Reiten, 1988). Depending upon pit location and the rate of groundwater flow through the spoil, it will likely take decades after the completion of reclamation to restore water quality.

At the Spring Creek Mine, two Anderson-Dietz wells located approximately 700 feet downgradient of Pit 2 have experienced water quality changes that may be related to spoil or diminished quality due to declining water levels. A partially penetrating well, installed in 1977, always had a slightly lower pH (6.5 to 6.0) than most local monitoring wells. In the mid-1990's, samples began to show increases in TDS, iron, manganese, chloride, sodium and magnesium, accompanied by the appearance of arsenic concentrations as high as 0.071 mg/L. Water level in this well declined approximately 15 feet. Water quality improved somewhat, with arsenic concentration dropping to 0.012 mg/L, until monitoring at this site was discontinued in 2005. A replacement monitoring well was completed adjacent to the original well and fully penetrated the aquifer. TDS concentrations as high as 13,100 mg/L were analyzed in samples from the replacement well. Higher than normal iron (47.4 mg/L) and manganese (0.83 mg/L) characterize the water quality but only two samples have had arsenic concentrations above detection (0.008 and 0.013 mg/L) and no arsenic been reported in samples taken since June, 2004.

Arsenic also has been detected in an Anderson-Dietz well located immediately down gradient (east) of Pit 2. Arsenic concentrations of 0.005 to 0.009 mg/L are commonly reported in samples from this well. TDS concentration remains relatively low at 1020 mg/L, but has

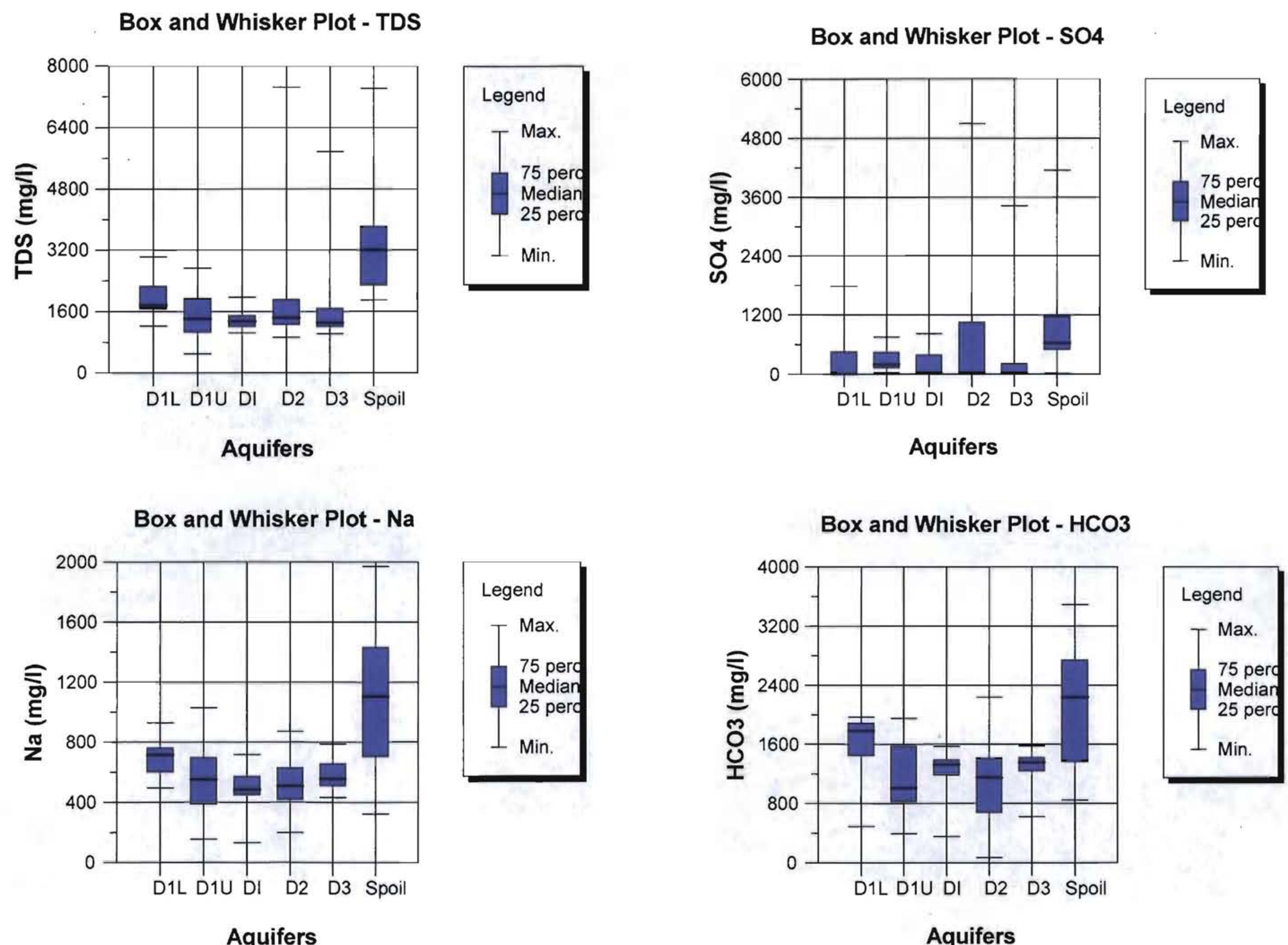


Figure 7

D-000172

shown a steady increase since 2004, suggesting the advance of spoil water. The pH is generally 8.0 to 8.3, slightly higher than water in most local monitoring wells.

One SCM spoil well has intermittent arsenic concentrations between 0.005 and 0.012 mg/L. Because arsenic is a carcinogen, it is a trace element of concern in groundwater. The Montana maximum contaminant level for arsenic in groundwater is 10 ug/L (0.010 mg/L) (Montana Department of Environmental Quality, 2006) and an increase in concentration over background violates Montana water quality standards. Arsenic in very low concentrations is found in background water quality samples from Anderson-Dietz wells. Arsenic was found at a concentration of 0.028 mg/L in a sample from a recently completed (October, 2010) supply well at SCM. This well was completed in sandstone 440 to 490 feet deep. This water represents background water quality, not water affected by mining. Reports of background water quality samples from a clinker well north of Pit 4 and an overburden well in the Pit 4 area, indicate the presence of arsenic ranging in concentration from 0.007 mg/L-0.033 mg/L. This suggests that arsenic occurs naturally in the local environment at low concentrations.

The movement of spoil water and potentially affected groundwater down gradient of the pits will continue to be monitored. Remediation measures will be implemented to address arsenic in groundwater if increases in concentration are associated with mining. There are no users of the Anderson-Dietz aquifer downgradient of pits 1 and 2. The Anderson-Dietz coal seam diverges and the uppermost (D1) seam is burned by the time it reaches Pit 16 at the West Decker Mine, approximately 1.5 miles down gradient from the Spring Creek permit boundary.

Tongue River Water Quality

Groundwater flow through the Decker and Spring Creek mines represents a small contribution to the total flow of the Tongue River. When normal flow direction is re-established, groundwater will move from upland areas through the spoils aquifer and toward the Tongue River. Using mass balance calculations, estimated post-mine ground-water flow rates and estimated river flow rates, VanVoast and Thompson (1982) made simplified calculations of expected changes in Tongue River water quality from spoils aquifer discharges. The method lacks precision, but gives a rough estimate of impacts to Tongue River water quality from the East and West Decker mines and the Spring Creek mine.

Based on flow frequency curves for the Tongue River at a gauging station near the Montana-Wyoming state line, a flow rate of 250 cubic feet per second (cfs) was equaled or exceeded 50% of the time for the water years 1961 through 1981. Using the methodology and estimated spoils water concentrations of VanVoast and Thompson (1982), an increase of 27 mg/l TDS would be expected in Tongue River water quality when the river was flowing at a rate of 250 cfs. Higher river flow rates would result in a smaller increase in the TDS concentration and lower flow rates would result in a higher TDS concentration. Median TDS concentration of 137 samples collected at the Tongue River dam monitoring site, 1978-1997, is 383 mg/l (Decker Coal Company, 1978 - 1997). TDS concentrations ranged between 136 and 1,800 mg/l. TDS contribution from the mines during median river flow would raise the median TDS concentration of the river to 410 mg/l. This increase would not change current water uses and was therefore determined to be an insignificant increase.

United States Geological Survey (U.S.G.S.) samples for the years 1976 - 1981 (as reported in VanVoast and Thompson, 1982) from the Tongue River at the Wyoming-Montana state line (n=70) and downstream at the dam (n=62), were as high as 800 mg/l TDS two percent or less of the time. When stream flows are as low as 50 cfs, which occurs approximately one percent of the time, theoretical increases in TDS from spoils water would be 332 mg/l. If increased concentrations during low flow coincided with a time of high TDS concentrations in the river, totals could reach or exceed 1100 mg/l. Concentrations of this level are unlikely and would be of short duration. Recreational, stock and irrigation uses of the Tongue River are not expected to be impacted by mining.

AFFECTED WELLS

Numerous livestock water wells have been removed over the years to facilitate mining operations but no effects to domestic supplies have been reported. Having only a few residences near the mines has lessened the likelihood of impacts to domestic supply. Wells for stock water are more numerous and are generally used for only part of the year. Information from records at the Montana Department of Natural Resources, the Montana Bureau of Mines and Geology Groundwater Information Center (GWIC) database as well as field investigation, identified wells located 3 miles downgradient and one mile in all other directions of the mines as required by ARM 17.24.304(1)(f)(i)(C). Whether or not the wells will be affected depends upon their proximity to mine drawdown, completion depth and water supply. Private wells in the vicinity of mining, excluding those owned by the mines, are listed in Table 2.

A MODFLOW-based computer model for the Anderson-Dietz aquifer at SCM (Nicklin, 2005, 2007) indicates that a number of domestic and stock wells lie within the area of predicted drawdown (Figure 8). Two wells (CO94692,149963) located west of the existing permit area are completed in the D-1 and below the D-2, respectively. The well completed in the D-1 could experience declines of almost 20 feet. Both wells report static water levels of over 300 feet, making it unlikely that supply to these wells will be interrupted.

Most wells north of SCM lie between the 10 and 20 foot drawdown contours and have shallow completions in Anderson-Dietz clinker. The complicated nature of clinker aquifers makes it uncertain how much connectivity the clinker has with the Anderson-Dietz coal aquifer, but drawdown could potentially impact the supply of wells that have less than 80 feet of water (i.e. wells 105612, 8063).

The cluster of domestic wells immediately northeast of the SCM would appear to be the wells most likely to be impacted by drawdown. A number are completed below the Anderson-Dietz but others are completed in Anderson-Dietz clinker. However, most of the wells have sufficient static water levels that drawdown of 30 feet or less would not likely interrupt supply. The wells northeast of SCM are cross-gradient to the east-southeast flow direction in the Anderson-Dietz aquifer and should not be affected by changes in water quality in the pit areas. Monitoring wells in the Anderson-Dietz and Canyon coal seams lie between Pit 4 and the domestic wells and should provide information about any changes in water quantity or quality before it reaches the domestic wells.

TABLE 2 - Private Wells

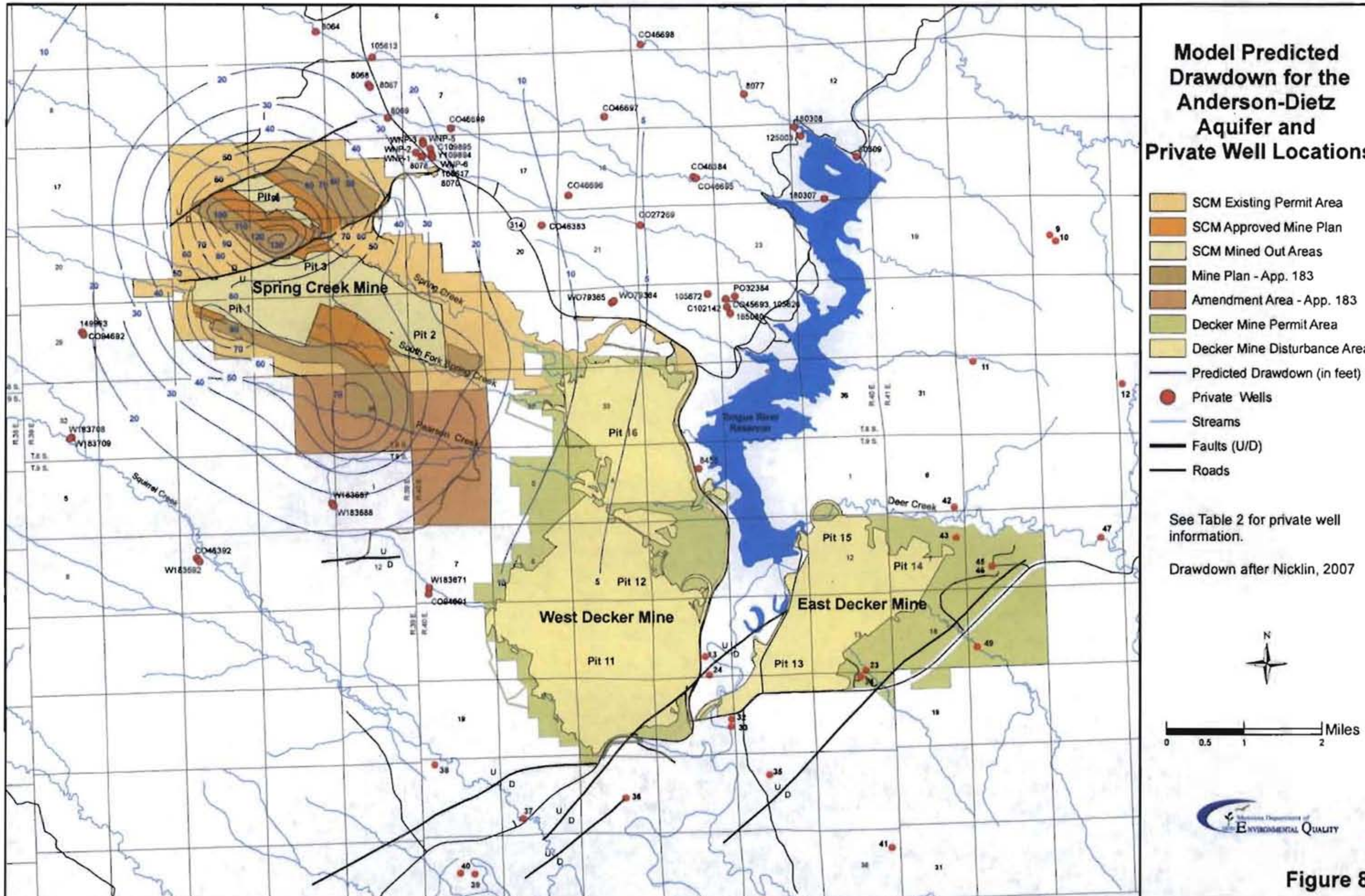
Map Number	DNRC Well Permit Number	MBMG GWIC Number	Surface Owner	Date	TSHP	RANGE	SEC	Location	Water Use	Land Surface Elevation	Well Depth (feet)	Rate (gpm)	Static Water Level (feet)	Aquifer
		8063	YOUNG, J	-	T 8 S	R 39 E	1	NWNESE	DOM/STOCK	3865	55	20	47.4	CLINKER
		105612	YOUNG, JOHN A	1948	T 8 S	R 39 E	1	NENWNW	STOCK	3910	60	5	53	CLINKER
		105613	YOUNG, JOHN A	1969	T 8 S	R 39 E	1	SESESE	STOCK	3820	98	14	78	CLINKER
		105614	YOUNG, CHARLES L.	1910	T 8 S	R 39 E	2	SENENE	DOM	3860	114	10	110	CLINKER
		105615	YOUNG, CHARLES L.	1950	T 8 S	R 39 E	2	NENENE	DOM/STOCK	3860	140	10	114	CLINKER
		8064	YOUNG, J	-	T 8 S	R 39 E	2	NENESE	DOM/STOCK	3850	130	10	114	CLINKER
		8067	PIERCE, J	-	T 8 S	R 39 E	12	NWSWNE	DOM/STOCK	3855	305	10	141	SUB D-2
		8068	PIERCE, J	1971	T 8 S	R 39 E	12	NWSWNE	DOM/STOCK	3860	370	-	175.5	SUB D-2
		8069	ROBKE, FRANK	-	T 8 S	R 39 E	12	SWNESE	DOM	3835	106	10	100	CLINKER
		8070	PIERCE, J	1972	T 8 S	R 39 E	13	SWNWNW	STOCK	4105	348	10	249	D-1 & D-2
		105617	PIERCE, JOSEPH	1972	T 8 S	R 39 E	13	WNWNW	STOCK	4100	300	10	-	D-1 & D-2
		8071	NINER, J	-	T 8 S	R 39 E	14	NWNWSW	STOCK	3815	109+	-	76.7	A/D
	C094692		CONSOLIDATION COAL COMPANY	1995	T 8 S	R 39 E	29	SWSENE	STOCK	4230	466	14	385	D-1
		149963	CONSOLIDATION COAL COMPANY	1993	T 8 S	R 39 E	29	SWSENW	STOCK	4230	662	22	385	SUB D-2
	W183708		CONSOLIDATION COAL COMPANY	1915	T 8 S	R 39 E	32	SENWSE	UNUSED	3910	29+	5	-	QAL
	W183709		CONSOLIDATION COAL COMPANY	1915	T 8 S	R 39 E	32	SENWSE	UNUSED	3910	-	5	-	QAL
	C046698		MONTAYLOR CORPORATION	1982	T 8 S	R 40 E	3	SWSWSW	STOCK	3600	-	10	-	QAL
	C046699		MONTAYLOR CORPORATION	1982	T 8 S	R 40 E	7	SWSWSE	STOCK	3800	-	16	-	QAL-CLINKER
	C046697		MONTAYLOR CORPORATION	1982	T 8 S	R 40 E	9	NWSWNE	STOCK	3760	-	8	-	-
		8077	LEE, R.	1991	T 8 S	R 40 E	11	NENESW	STOCK	3485	14	-	2.3	QAL
	C078080	125003	BOUSQUET, MAURICE E & LILLIAN	1991	T 8 S	R 40 E	13	SWNWNW	DOM/STOCK	3480	50	35	13	CLINKER
	C110547	180307	KINNISON, TOM	1999	T 8 S	R 40 E	13	SESESW	DOM	3500	200	20	94	SUB D-3
		180308	CADY, RICK	1999	T 8 S	R 40 E	13	NWNWNW	DOM	3540	100	8	48	CLINKER
		180309	TRUSSLER, BILL	1999	T 8 S	R 40 E	13	NESESW	DOM	3460	200	7	118	SUB D-3
	C046384		MONTAYLOR CORPORATION	1982	T 8 S	R 40 E	15	SENWSW	STOCK	3520	-	8	26	QAL
	C046695		MONTAYLOR CORPORATION	1982	T 8 S	R 40 E	15	SWNESE	STOCK	3520	-	15	-	-
	C046696		MONTAYLOR CORPORATION	1982	T 8 S	R 40 E	16	NWSWSW	STOCK	3655	200	8	135	D-2 CLINKER & SUB D-2

TABLE 2 - Private Wells

	WNP-1		VANHAELE, MARK AND MARY	1990	T 8 S	R 40 E	18	SENWNW	DOM/STOCK	3842.47	300	-	200	SUB D-2
	WNP-2		BROWNING, JOHN R.	2000	T 8 S	R 40 E	18	SENWNW	DOM/STOCK	3865.848	602	-	215	D-3, SUB D-3 & D-4
	WNP-3		BA CHURCH WELL	-	T 8 S	R 40 E	18	SWNENW	DOM	3842.287	303	-	190	D-3
	C109895*(WNP-4)		PIERCE, ALAN	2000	T 8 S	R 40 E	18	SWNENW	DOM/STOCK	3833.496	496	15	182	D-3 & SUB D-3
	Y109894*(WNP-7)		PIERCE, ALAN	2000	T 8 S	R 40 E	18	SWNENW	DOM/STOCK	3812.784	510	15	174	D-3 & SUB D-3
	WNP-6		PIERCE, ALAN	2000	T 8 S	R 40 E	18	SENENW	DOM	3809.54	205	-	164	CLINKER & SUB D-2
	WNP-5		BA CHURCH WELL #2	-	T 8 S	R 40 E	18	SWNENW	DOM	3843	303	-	190	D-3
	C046383		MONTAYLOR CORPORATION	1982	T 8 S	R 40 E	20	NWNENE	STOCK	3700	-	15	-	-
	C027269		MONTAYLOR CORPORATION	1980	T 8 S	R 40 E	22	SWNW	STOCK	3625	275	7	118	CLINKER & SUB D-2
	C102142	165080	MT FWP, PEE WEE NORTH #1	1997	T 8 S	R 40 E	26	NWSWNW	DOM	3515	127	7.5	28	CLINKER
	P032384		SPRING CREEK COUNTY WATER	1980	T 8 S	R 40 E	26	SENWNW	INDUST	3500	152	280	28	CLINKER
	C045693		BIG HORN, COUNTY OF	1982	T 8 S	R 40 E	26	SWNWNW	DOM/STOCK	3555	260	15	112	SUB D-2
	C058056	105627	DECKER COMMUNITY CENTER	1984	T 8 S	R 40 E	27	SWNENE	DOM	3565	200	15	98.5	CLINKER
	W079364		USA (DEPARTMENT OF INTERIOR)	1967	T 8 S	R 40 E	28	NWNE	STOCK	3545	107	4	81	D-2 CLINKER
		8081	KUKUCHKA	-	T 8 S	R 40 E	34	NESENW	IRRIGATION	3450	553	10	32.6	CLINKER & SUB D-3
		105631	KUKUCHA, WILLIAM	1973	T 8 S	R 40 E	34	SWNENW	DOM	3460	98	5	50	SUB D-2 & D-2
	W183687		CONSOLIDATION COAL COMPANY	1915	T 9 S	R 39 E	2	SENESE	STOCK	3900	-	2	-	-
	W183688		CONSOLIDATION COAL COMPANY	1915	T 9 S	R 39 E	2	SENESE	STOCK	3900	-	2	-	-
	C046392		CONSOLIDATION COAL COMPANY	1982	T 9 S	R 39 E	10	NESWNW	STOCK	3760	-	5	-	-
		8455	KUKUCHKA	-	T 9 S	R 40 E	3	NESWNE	STOCK	3425	-	3.3	-	-
	W183671	106177	POWERS, EVERETT G.	1946	T 9 S	R 40 E	7	SESE	STOCK	3740	274	50	138	D-1
	C094691	150020	CONSOLIDATION COAL COMPANY	1995	T 9 S	R 40 E	7	SWSW	STOCK	3740	462	14	302	D-2 & D-3
	W183671		CONSOLIDATION COAL COMPANY	1930	T 9 S	R 40 E	7	NESWSW	STOCK	3720	-	5	-	-
9		105641	CHARLES PENSON		T 8 S	R 41 E	21	NENWSW	STOCK		125	15	60	
10		8083	ROBERT CARLAT		T 8 S	R 41 E	21	NWNESW	STOCK	3733	99		82	D-1 CLINKER
11		105650	CHARLES PENSON	1948	T 8 S	R 41 E	32	NWNWNW	STOCK	3635	199	10	50	D-2
12		8086	HOLMES RANCH		T 8 S	R 41 E	34	SWSWNW	STOCK	3670	181		93	D-2

TABLE 2 - Private Wells

13			STATE OF MONTANA		T 9 S	R 40 E	15	SWSE	IRRIGATION		53	30	2	ALLUVIUM
23					T 9 S	R 40 E	13	SESWSWSE	STOCK	3520	75		31	D-1 OVERBURDEN
24					T 9 S	R 40 E	15	SWSESE	STOCK	3425	17		12	ALLUVIUM
32					T 9 S	R 40 E	22	SENENESE	STOCK	3455	269	5	41	D-1
33		8683	EMMETT MUNSON		T 9 S	R 40 E	22	NESENESE	DOMESTIC	3460	170		41	D-1
34		106252	EMMETT MUNSON	1964	T 9 S	R 40 E	24	NWNWNWNE	STOCK	3520	140	5	82	D-1U
35		106253	EMMETT MUNSON	1966	T 9 S	R 40 E	26	SESENENE	STOCK	3490	40	36	15	D-1 OVERBURDEN
36					T 9 S	R 40 E	28	NWNESE	STOCK	3475	600	1	unkown	
37		8714	JAMES MCCARTHY		T 9 S	R 40 E	29	SENESWSW	DOMESTIC	3520	151	30	39	D-1
38					T 9 S	R 40 E	31	NENWNW	STOCK	3570	238	18	100	D-1
39					T 9 S	R 40 E	31	SWSWNE	DOMESTIC				unkown	
40					T 9 S	R 40 E	31	SWSWNE	STOCK			20	unkown	
41					T 9 S	R 40 E	36	NESENE	STOCK	3725	290		190	Above mineable beds
42					T 9 S	R 41 E	6	SWSWSE	STOCK	3498	73		42	Above mineable beds
43					T 9 S	R 41 E	7	NWSWSENE	DOMESTIC	3515	110		64	UNKNOWN
45		8724	HOLMES RANCH		T 9 S	R 41 E	8	SESWNESW	STOCK	3530		2		UNKNOWN
46					T 9 S	R 41 E	8	NWSESW	STOCK	3550	105		43	D-1U
47		8727	HOLMES RANCH		T 9 S	R 41 E	9	SWNWSWNE	STOCK	3515	29	20	6	ALLUVIUM
48					T 9 S	R 41 E	21	NWNENE	STOCK	3550	26		5	ALLUVIUM
49					T 9 S	R 41 E	17	SWNWSW	STOCK	3570	96		26	Above mineable beds


Model Predicted Drawdown for the Anderson-Dietz Aquifer and Private Well Locations
SCM Existing Permit Area
SCM Approved Mine Plan
SCM Mined Out Areas
Mine Plan - App. 183
Amendment Area - App. 183
Decker Mine Permit Area
Decker Mine Disturbance Area
Predicted Drawdown (in feet)
Private Wells
Streams
Faults (U/D)
Roads
See Table 2 for private well information.
Drawdown after Nicklin, 2007
Miles
0 0.5 1 2
Spring Creek Mine
West Decker Mine
East Decker Mine
Pit 1
Pit 2
Pit 3
Pit 11
Pit 12
Pit 13
Pit 14
Pit 15
Pit 16
Spring Creek
South Fork Spring Creek
Pearson Creek
Squirrel Creek
Deer Creek
Figure 8

D-000178

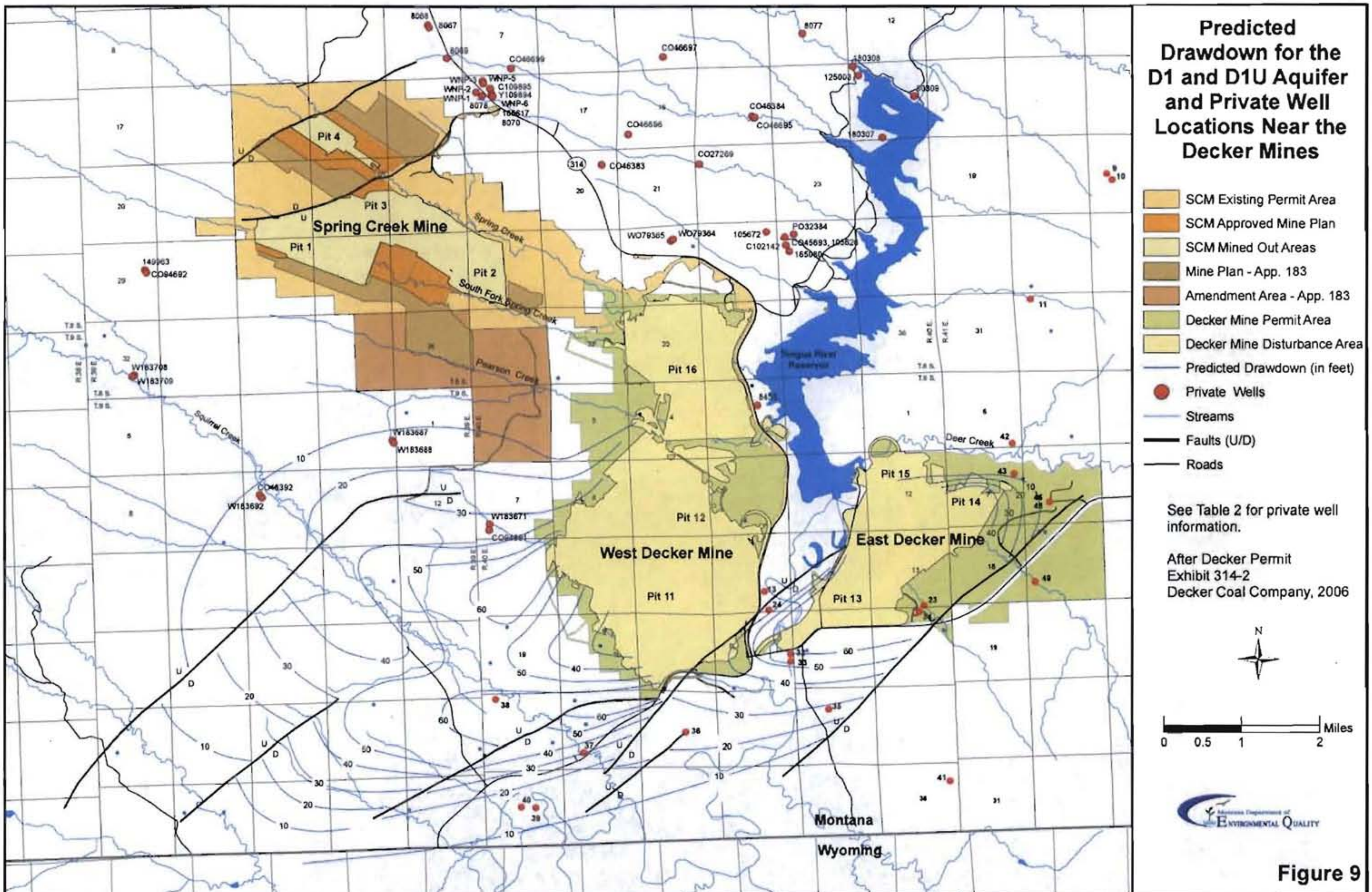
Two stock wells (183687, 183688) south of SCM are located between the 20 and 30 foot drawdown contours. These are older wells owned by Consolidated Coal Company and there is no completion information available for them. If they are completed in the Anderson-Dietz seam, they may experience diminished supply. Most likely these wells have been abandoned by coal bed natural gas operations in the Squirrel Creek area.

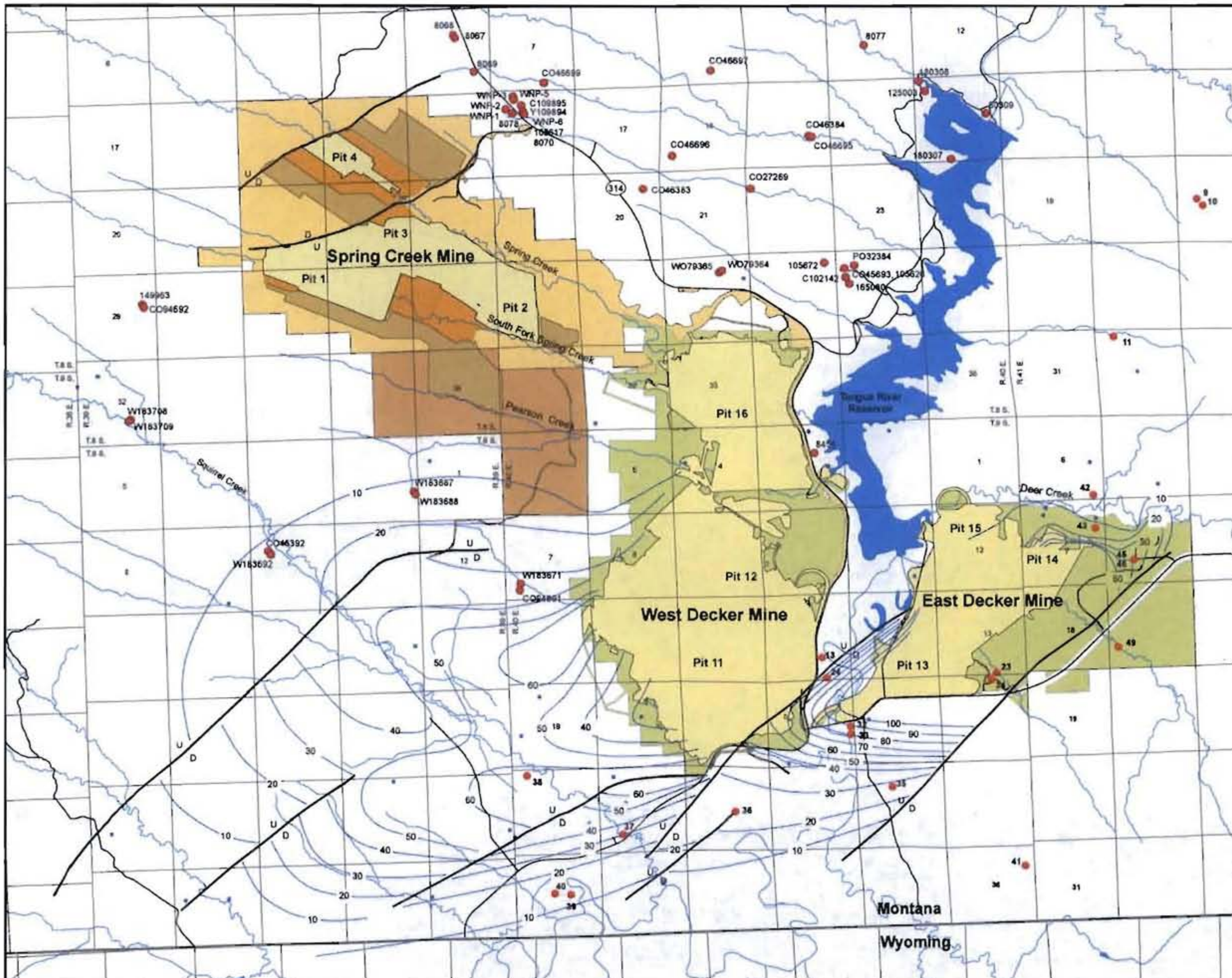
The remainder of wells in the vicinity of the SCM lie between the predicted 5 to 10 foot drawdown contours and are not likely to be significantly impacted by drawdown. Wells at this distance from the pits are not expected to be impacted by spoil water due to attenuation via mixing with background quality groundwater.

Drawdown in aquifers affected by mining at the East and West Decker mines was projected using historical drawdown rates (Decker Coal Company, 2006; Decker Coal Company, 2008). Drawdown in the D1U and D1L aquifers (Figures 9 and 10) is similar in extent and depth, with the exception of maximum drawdown depth in the fault block south of the East Decker Mine, which indicates deeper and steeper drawdown is anticipated in the D1L aquifer. A number of wells within the area of drawdown are reportedly completed in the D1U or D1L, including wells 32, 33, 34, 35, 37, 38 and W183671. Wells most likely to be affected are those in areas of greatest drawdown that have a relatively thin water column, such as wells 34 and 46. Well 34 would be expected to become dry due to the drawdown depth. A number of the wells in Table 2 that lie within drawdown-affected areas have been abandoned including 32, 33, 23,34, 45, 46 (personal communication, Greg Passini, Decker Coal Co, 2009). Decker Mining Company owns the surface on which wells 45, 46, 23 and 34 are completed. Most private wells completed in the shallow coal seams have been abandoned as a result of the development of coal bed natural gas.

In the area of predicted D2 aquifer drawdown (Figure 11), wells 11 and 12 are identified as having D2 completions. Well CO94691 is identified as having a multiple completion in the D2 and D3. Although water levels in these wells will be affected, they should all maintain levels that make the wells viable as a supply source. Other than well CO94691, no wells listed in Table 2 are completed in the D3 within the D3 drawdown area (Figure 12).

Currently, coal bed natural gas production has exceeded the amount of drawdown predicted to result from mining. Therefore, potential impacts from mining to stock and domestic wells in the area have become largely irrelevant. Most local wells completed in the D1 and D2 seams have been plugged and abandoned due to gas venting. The mines have committed to replacement of any water supply affected by mining, as required under ARM 17.24.648(1). As the next lowest coal seam and dependable supply of groundwater equivalent in quality to the Anderson-Dietz (D1 and D2) seam(s), the D3/Canyon seam has been designated as the replacement for groundwater sources lost as a result of mining. However, dewatering of the Canyon (and deeper coal seams) during gas production may make it a less reliable replacement source. The Department will continue to monitor the sustainability of existing groundwater sources and supplies.


Predicted Drawdown for the D1 and D1U Aquifer and Private Well Locations Near the Decker Mines
SCM Existing Permit Area
SCM Approved Mine Plan
SCM Mined Out Areas
Mine Plan - App. 183
Amendment Area - App. 183
Decker Mine Permit Area
Decker Mine Disturbance Area
Predicted Drawdown (in feet)
Private Wells
Streams
Faults (U/D)
Roads
See Table 2 for private well information.
After Decker Permit Exhibit 314-2 Decker Coal Company, 2006
Miles
0 0.5 1 2
Spring Creek Mine
West Decker Mine
East Decker Mine
Montana
Wyoming
Figure 9



Predicted Drawdown for the D1 and D1L Aquifer and Private Well Locations Near the Decker Mines

- SCM Existing Permit Area
- SCM Approved Mine Plan
- SCM Mined Out Areas
- Mine Plan - App. 183
- Amendment Area - App. 183
- Decker Mine Permit Area
- Decker Mine Disturbance Area
- Predicted Drawdown (feet)
- Private Wells
- Streams
- Faults (U/D)
- Roads

See Table 2 for private well information.

After Decker Permit Exhibit 314-3 Decker Coal Company, 2006

Montana Department of Environmental Quality

Figure 10

D-000181

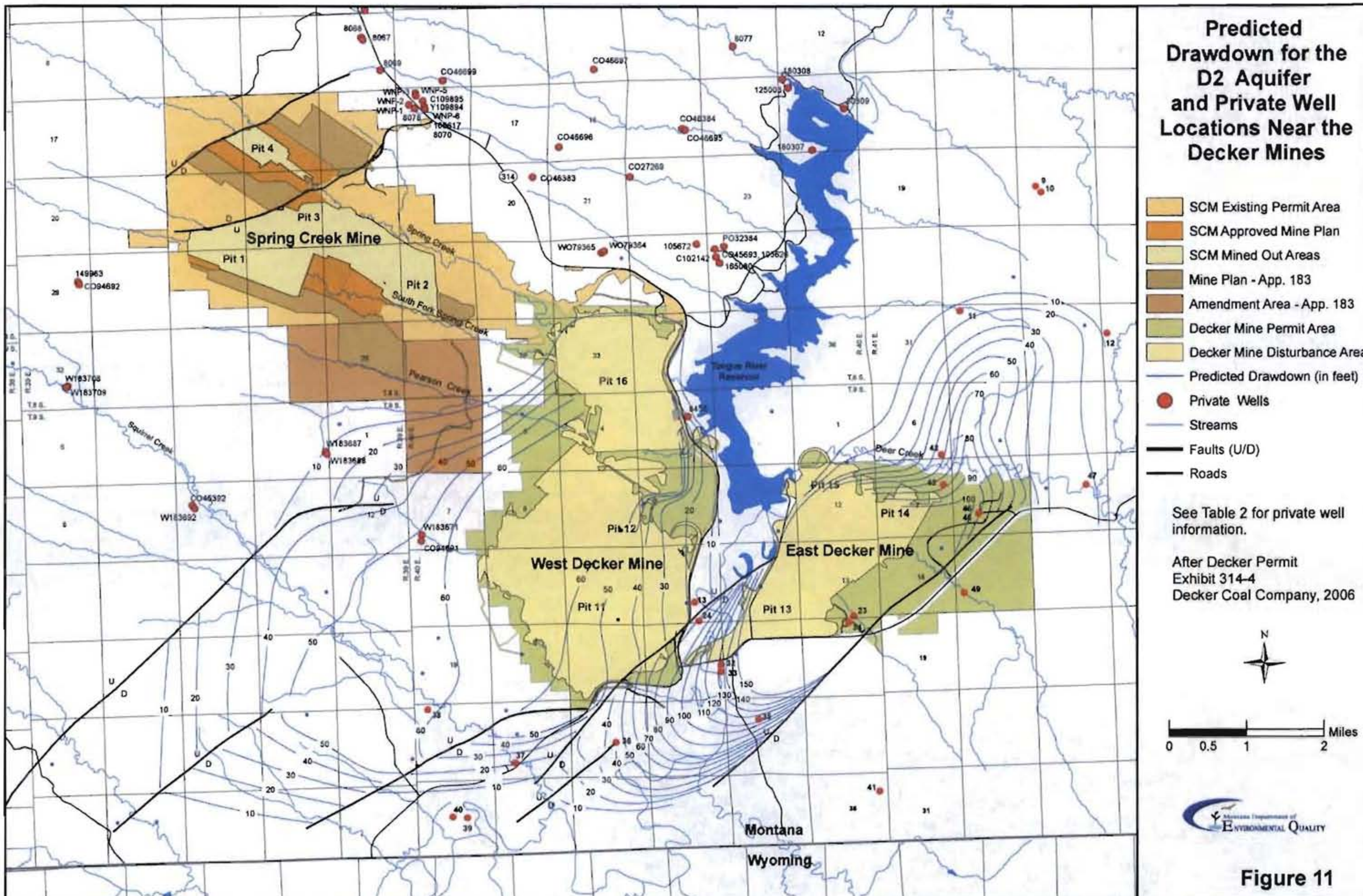

Predicted Drawdown for the D2 Aquifer and Private Well Locations Near the Decker Mines
SCM Existing Permit Area
SCM Approved Mine Plan
SCM Mined Out Areas
Mine Plan - App. 183
Amendment Area - App. 183
Decker Mine Permit Area
Decker Mine Disturbance Area
Predicted Drawdown (in feet)
Private Wells
Streams
Faults (U/D)
Roads
See Table 2 for private well information.
After Decker Permit Exhibit 314-4 Decker Coal Company, 2006
N
Miles
0 0.5 1 2
Montana Department of Environmental Quality
Spring Creek Mine
West Decker Mine
East Decker Mine
Pit 1
Pit 2
Pit 3
Pit 4
Pit 11
Pit 12
Pit 13
Pit 14
Pit 15
Pit 16
Spring Creek
South Fork Spring Creek
Pearson Creek
Squirrel Creek
Deer Creek
Tongue River Reservoir
Montana
Wyoming

Figure 11

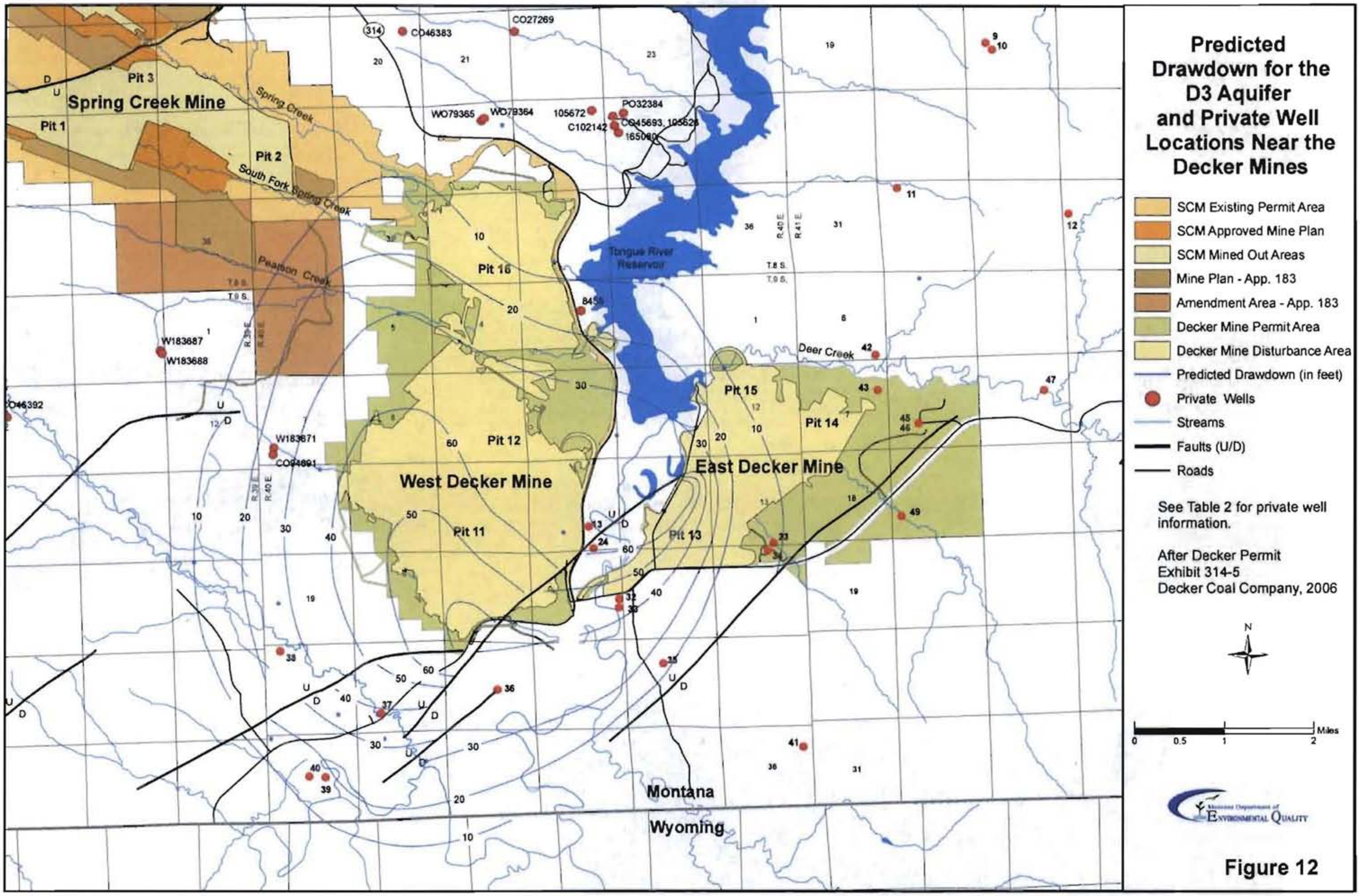


Figure 12

D-000183

AFFECTED SPRINGS

Two springs downgradient of SCM on Decker Coal Company property were identified during baseline and were reportedly located in the SW ¼ of Section 33 and the NE ¼ of Section 34, T.8S., R.40E. Both springs issued from the base of the D1 clinker and likely had limited recharge. The spring in Section 33 was destroyed by mining in Decker's north pit. The Montana Water Board spring located in Section 34 is not expected to be impacted by mining because this spring issues from the base of a clinker zone which apparently contains perched water.

POST-MINE LAND USE

Designated post-mine land uses at the Decker mines and SCM are livestock grazing and wildlife. Groundwater has been used historically for livestock watering and groundwater is anticipated to be available after mining to meet this use. Spoil water quality is highly variable but is anticipated to be suitable locally as a source for stock water. Deeper groundwater sources will also remain available.

NON-MINING IMPACTS TO GROUNDWATER

Coal bed natural gas production in the Decker area began in late 1998 in the vicinity of Squirrel Creek, south of West Decker Mine. The withdrawal of large volumes of groundwater associated with gas production has created extensive areas of drawdown and modified groundwater flow direction. Extraction of groundwater to decrease hydrostatic head, and thereby facilitate gas production, has decreased pressure head as much as 600 feet in coal seam aquifers in the vicinity of Squirrel Creek, southwest of West Decker pits (Fidelity Exploration and Production, 2005). Monitoring wells in D1, D2 and D3 aquifers at the Decker mines have recorded substantial declines and some monitoring sites have had to be abandoned because they are venting dangerous levels of gas due to reduction of hydrostatic head. Monitoring well hydrographs generally show a marked increase in the rate and amount of drawdown beginning in 2000 (Figure 13). Water quality changes have also been observed in some wells.

At West Decker, groundwater withdrawal associated with coal bed natural gas production has reversed the natural flow direction in the south part of Pit 11. Potentiometric surface maps in the annual hydrology reports of the Decker mines and annual reports submitted to the Montana Board of Oil and Gas by Fidelity Exploration and Production (2005), show that flow is now from the Tongue River reservoir toward the gas production project in Squirrel Creek. A spoil well in the south part of Pit 11 at West Decker has recorded a four foot decline in water level since 2000, coincident with a decrease in TDS concentration, suggesting that low TDS water from the Tongue reservoir has mixed with spoil water as it moves toward the area of steep drawdown created by gas production (Figure 14). Recharge to spoil in the south part of Pit 11 will be slowed until water levels are re-equilibrated and natural flow direction is restored.

Gas production on the East Decker Mine permit area was initiated in 2005. The production area is expected to continue to expand to the north on both sides of the Tongue River. Substantial decline of groundwater levels over a wide area will have profound but as yet undetermined effects on the hydrologic balance. Anticipating impacts associated with coal bed natural gas production is beyond the scope of this analysis.

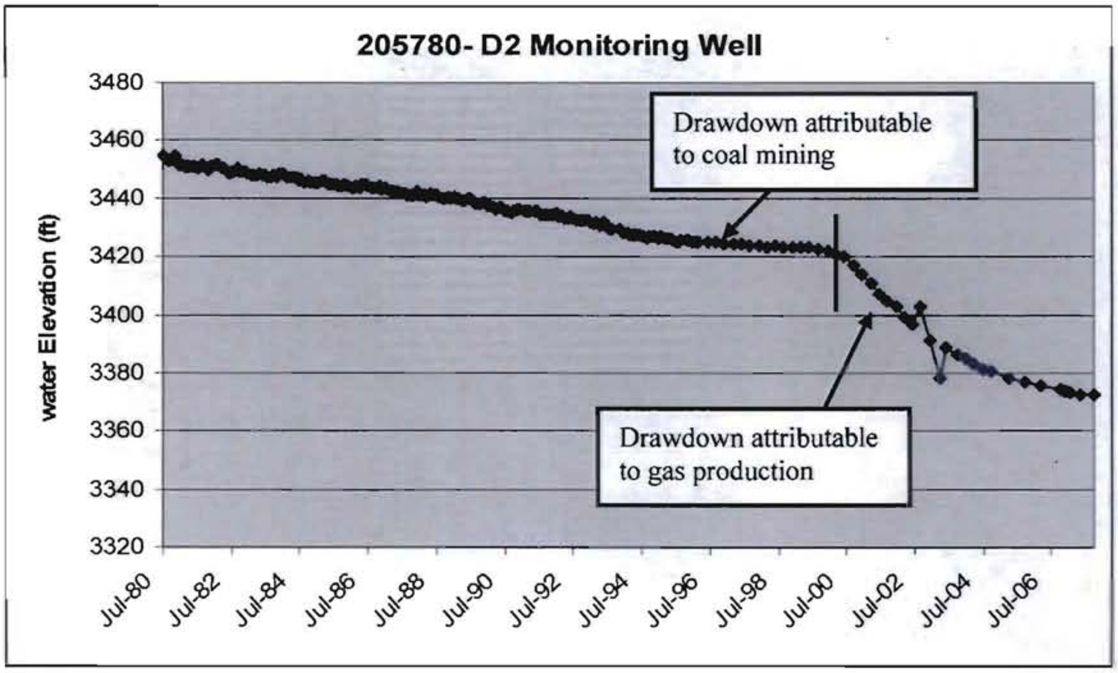
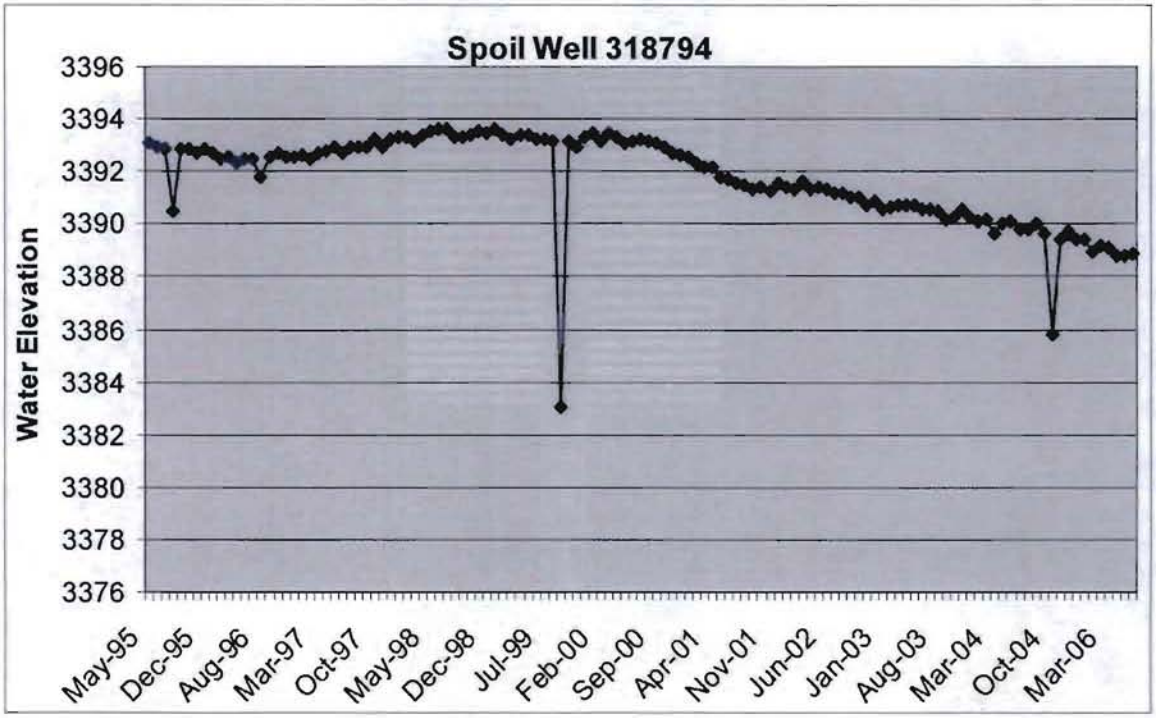


Figure 13. Hydrograph showing gradual drawdown in the D2 aquifer during approximately 20 years of coal mining at West Decker followed by the punctuated increase in drawdown rate beginning in 1999, attributable to groundwater pumping associated with production of coal bed natural gas in the Squirrel Creek area.

Material Damage

Material damage with respect to the hydrologic balance is defined at MCA 82-4-203(30). Material damage occurs if, *outside the permit boundary*: 1) land uses or beneficial uses of water are adversely affected, 2) a water quality standard is violated, or 3) water rights are impacted. "Land uses or beneficial uses" of water vary depending upon each discrete use or setting and, therefore, material damage must be determined by circumstances at each site. Water quality standards implemented under the Montana Water Quality Act and rules will be used to determine material damage outside the permit boundary. Circular DEQ-7 is used for pollutants with numeric standards. Impact to uses will be considered for analytes with narrative standards. Impact to a water right will be evaluated based on the current water right issued to the owner. All proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area. No material damage has been identified outside the permit boundaries of the Spring Creek or Decker Coal mines, and based on hydrologic analysis, no material damage is anticipated.



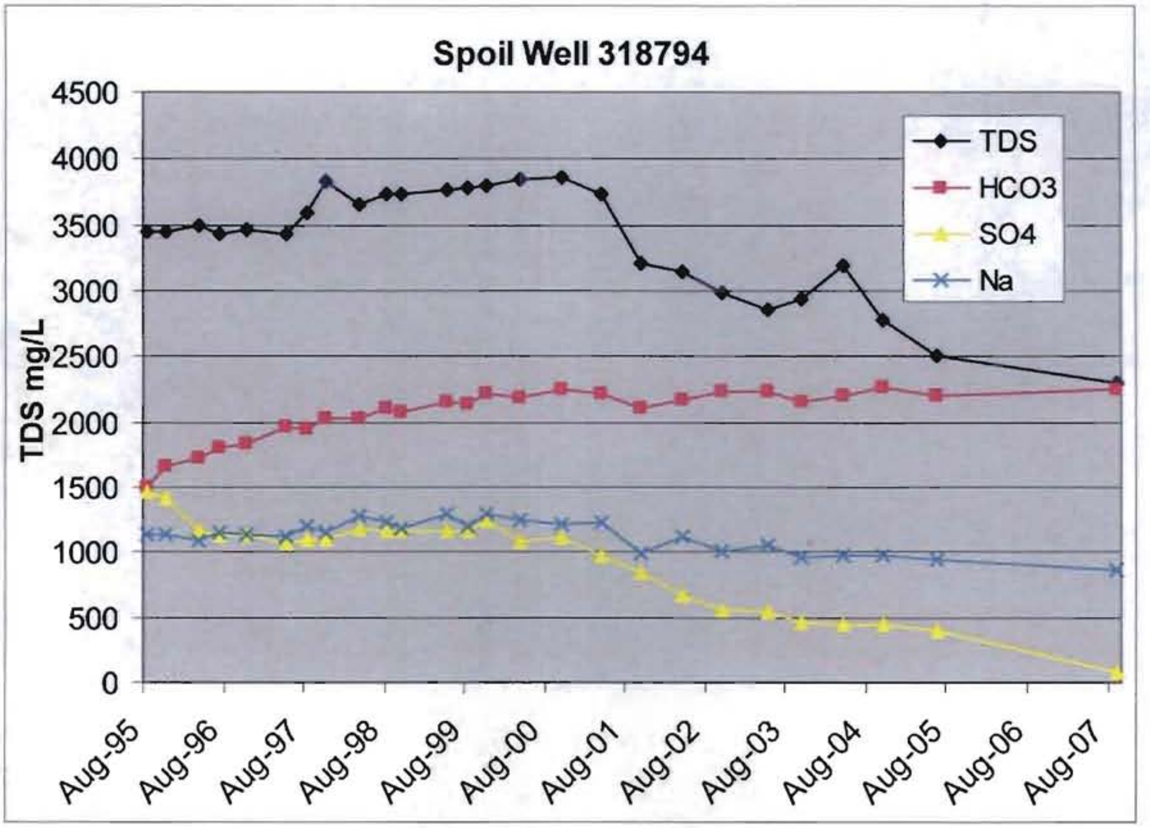


Figure 14 . Effects of coal bed natural gas production on water level and water quality in West Decker Mine spoil well 318794.

REFERENCES

Decker Coal Company, 1978 - 1997, Decker Coal Mine Annual Hydrologic Permit Reports.

Decker Coal Company, 1991, Decker Coal Mine Annual Hydrologic Permit Report, 1991 Water Year.

Decker Coal Company, 2006, West Decker Mine Permit 87001C revision.

Fidelity Exploration and Production, 2005, CX Field 2004 Annual Groundwater Monitoring Report.

Montana Department of Environmental Quality, 2010, Circular DEQ-7, Montana Numeric Water Quality Standards.

Montana Department of State Lands, 1980, Spring Creek Alluvial Valley Floor Identification Report.

Nicklin, Michael, 2005, Spring Creek Mine Groundwater Model, Nicklin Earth and Water, Inc., Bozeman, MT.

Nicklin, Michael, 2007, Spring Creek Mine Groundwater Model - 2007 Update, Nicklin Earth and Water, Inc., Bozeman, MT.

Reiten, J., and Wheaton, J., 1993, Unexpected impacts to unmined aquifers near coal mines, Proceedings of the Billings Symposium, Vol. 2, p.134 - 142.

Spring Creek Coal Company, 1978, Spring Creek Mine application, environmental baseline study, vol.2, prepared by Environmental Consultants for Northern Energy Resources Company (NERCO).

Spring Creek Coal Company, 1998, Spring Creek Mine Annual Report of Hydrologic Monitoring, 1998 Water Year.

Spring Creek Coal Company, 2008, AVF studies within the Pearson Creek Amendment Area, prepared for Spring Creek Mine by WWC Engineering, Sheridan, WY.

VanVoast, W.A., and Hedges, R.B., 1975, Hydrologic Aspects of Existing and Proposed Strip Mines Near Decker, Southeastern Montana: Montana Bureau of Mines and Geology Bulletin 97, 31 p.

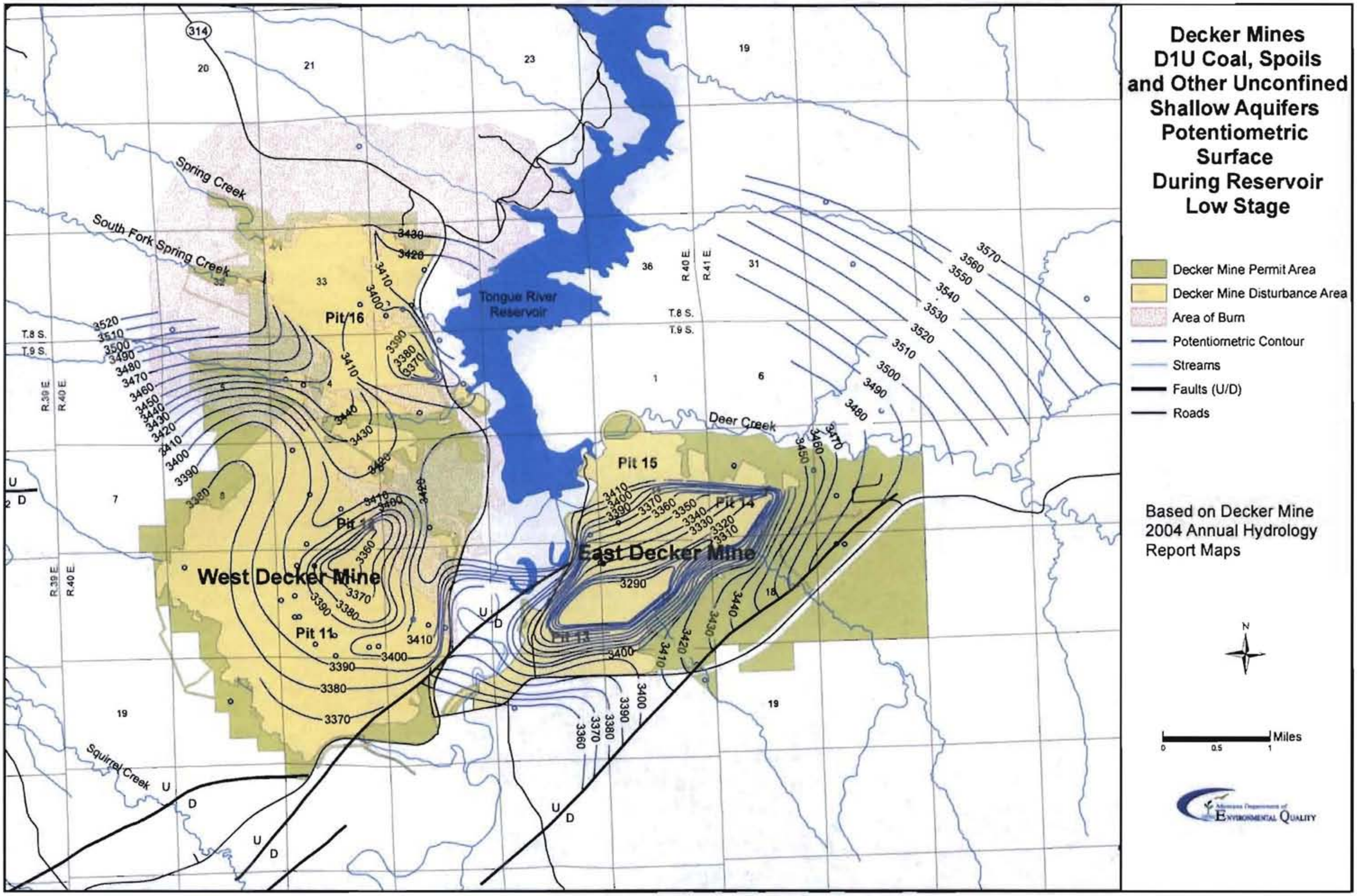
Van Voast, W.A. and Reiten, J.C., 1988, Hydrogeologic Responses: Twenty Years of Surface Coal Mining in Southeastern Montana, Montana Bureau of Mines and Geology Memoir 62.

VanVoast, W. A., and Thompson, K. S., 1982, Estimates of Post-Mining Water Quality for the Upper Tongue River, Montana and Wyoming: Montana Bureau of Mining and Geology Hydrologic Map 5.

Western Water Consultants, 1997, Alluvium Dewatering Investigation, South Fork Spring Creek, Western Water Consultants, Sheridan, WY.

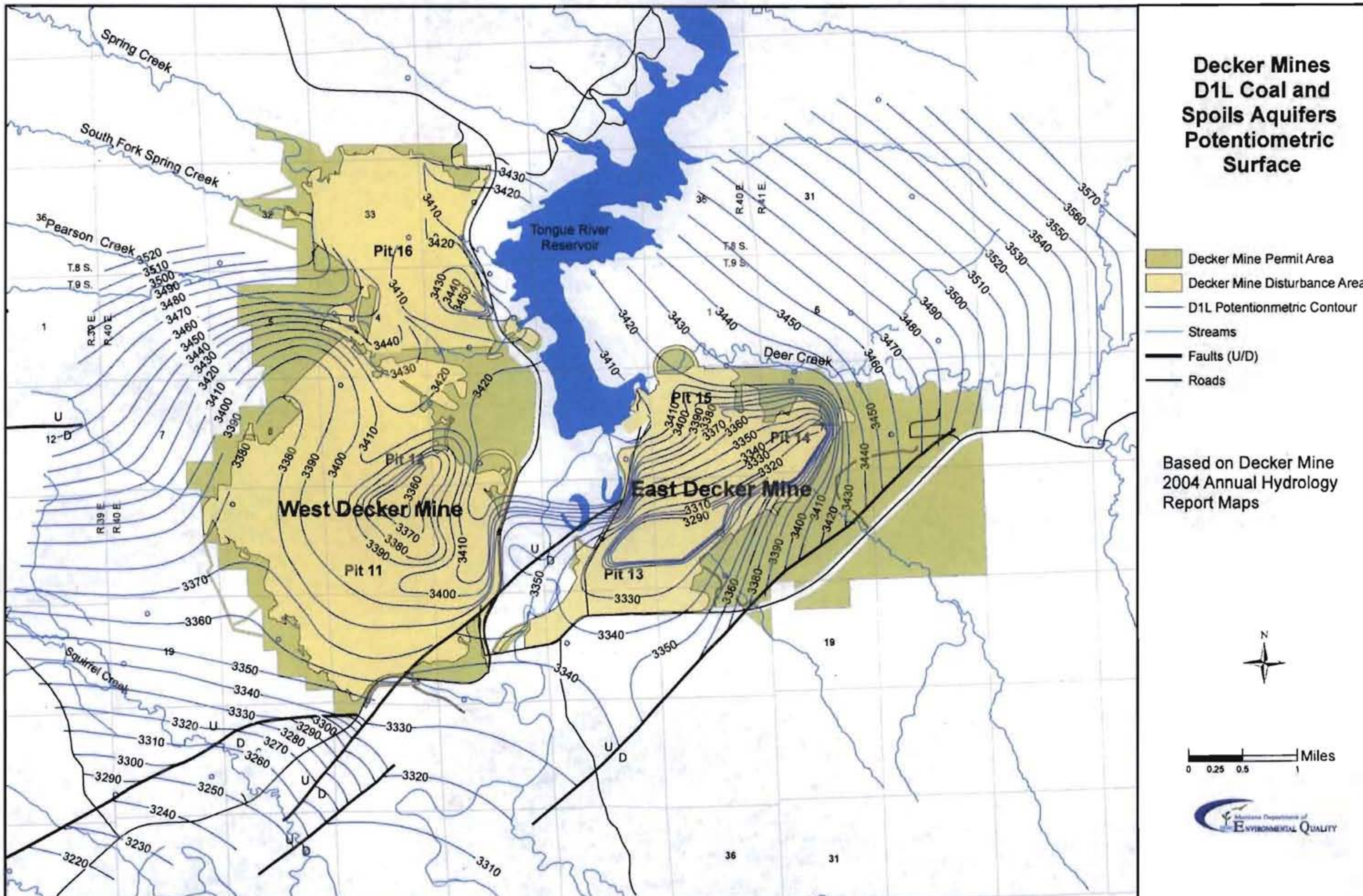
APPENDIX 1

Potentiometric Maps

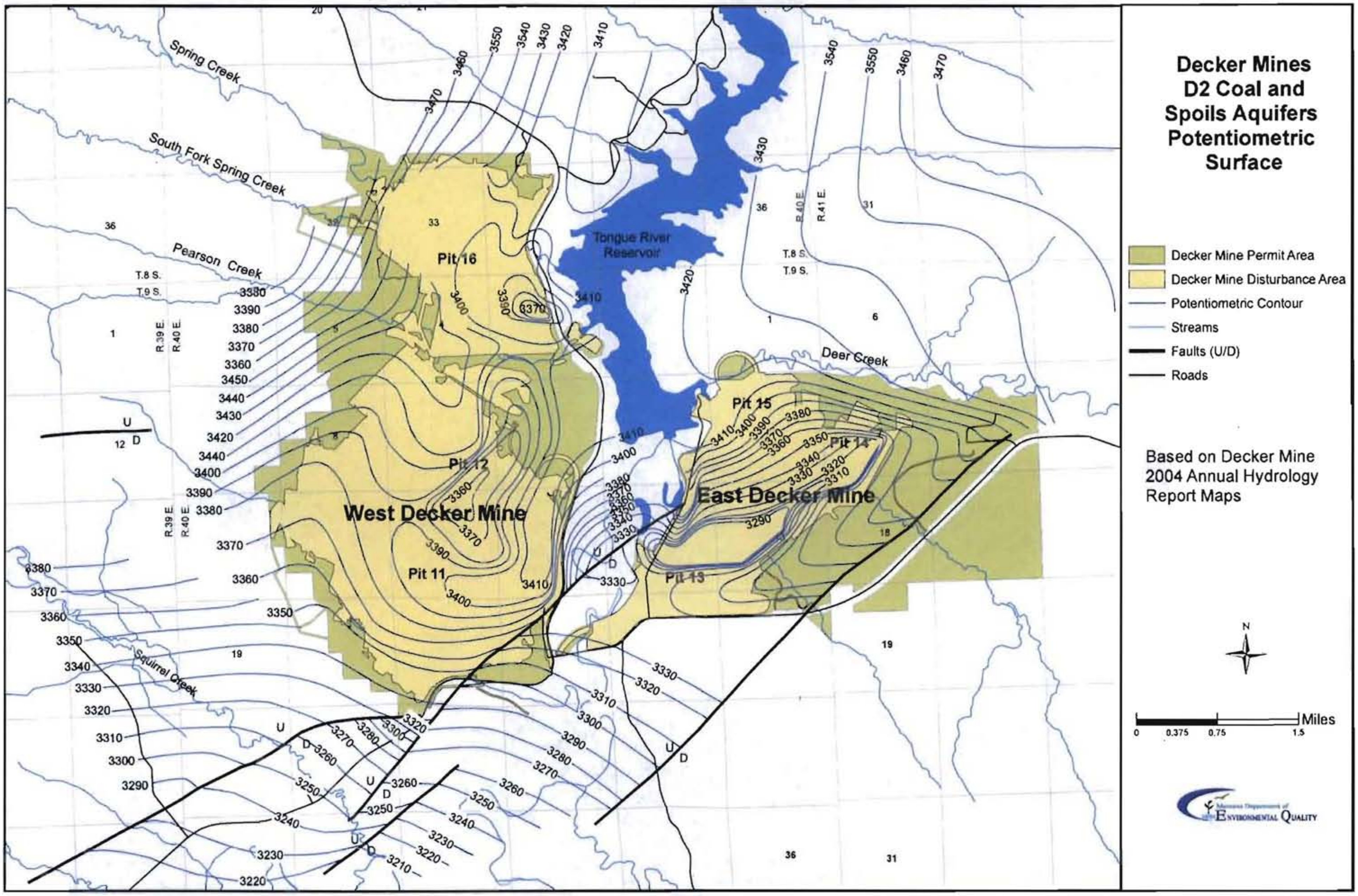


Decker Mines D1U Coal, Spoils and Other Unconfined Shallow Aquifers Potentiometric Surface During Reservoir Low Stage
Decker Mine Permit Area
Decker Mine Disturbance Area
Area of Burn
Potentiometric Contour
Streams
Faults (U/D)
Roads
Based on Decker Mine 2004 Annual Hydrology Report Maps
Miles
0
0.5
1
N
Montana Department of Environmental Quality
Tongue River Reservoir
West Decker Mine
East Decker Mine
Spring Creek
South Fork Spring Creek
Deer Creek
Squirrel Creek
Pit 16
Pit 15
Pit 14
Pit 13
Pit 11
314
T.8 S.
T.9 S.
R.39 E.
R.40 E.
R.41 E.

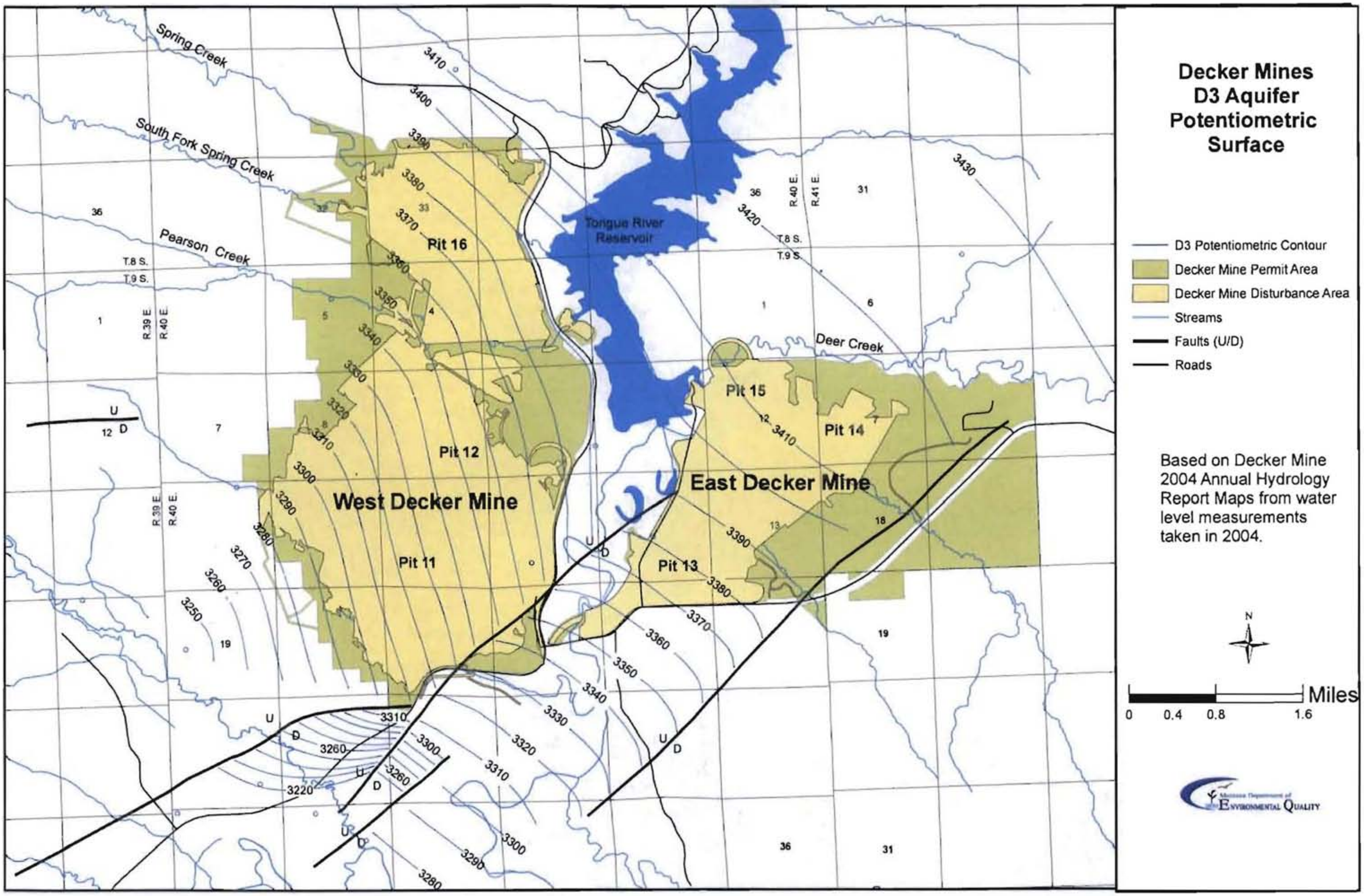
D-000190


Decker Mines D1L Coal and Spoils Aquifers Potentiometric Surface
Decker Mine Permit Area
Decker Mine Disturbance Area
D1L Potentionmetric Contour
Streams
Faults (U/D)
Roads
Based on Decker Mine 2004 Annual Hydrology Report Maps
N
Miles
0 0.25 0.5 1
Montana Department of Environmental Quality
Spring Creek
South Fork Spring Creek
Pearson Creek
Squirrel Creek
Deer Creek
Tongue River Reservoir
West Decker Mine
East Decker Mine
Pit 16
Pit 11
Pit 15
Pit 14
Pit 13
T.8 S.
T.9 S.
R.39 E.
R.40 E.
R.41 E.

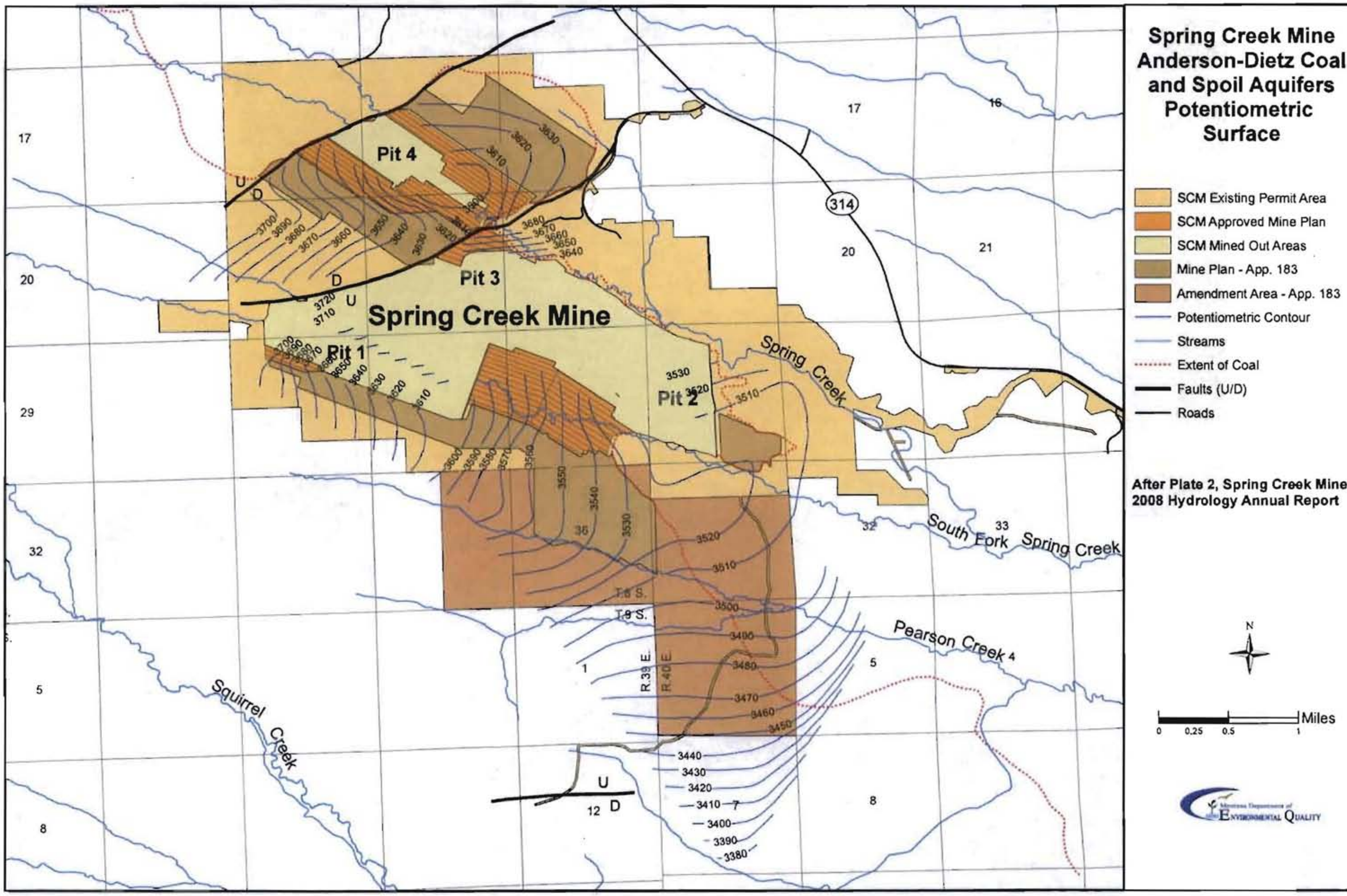
D-000191


Decker Mines
D2 Coal and
Spoils Aquifers
Potentiometric
Surface
Decker Mine Permit Area
Decker Mine Disturbance Area
Potentiometric Contour
Streams
Faults (U/D)
Roads
Based on Decker Mine
2004 Annual Hydrology
Report Maps
N
0
0.375
0.75
1.5
Miles
Spring Creek
South Fork Spring Creek
Pearson Creek
Squirrel Creek
Deer Creek
Tongue River Reservoir
West Decker Mine
East Decker Mine
Pit 16
Pit 12
Pit 11
Pit 15
Pit 14
Pit 13
T.8 S.
T.9 S.
R.39 E.
R.40 E.
R.41 E.
Environmental Quality

D-000192



Decker Mines
D3 Aquifer
Potentiometric
Surface
D3 Potentiometric Contour
Decker Mine Permit Area
Decker Mine Disturbance Area
Streams
Faults (U/D)
Roads
Based on Decker Mine 2004 Annual Hydrology Report Maps from water level measurements taken in 2004.
N
Miles
0
0.4
0.8
1.6
Spring Creek
South Fork Spring Creek
Pearson Creek
Deer Creek
Tongue River Reservoir
West Decker Mine
East Decker Mine
Pit 16
Pit 12
Pit 11
Pit 15
Pit 14
Pit 13
T.8 S.
T.9 S.
R.39 E.
R.40 E.
R.41 E.
3410
3400
3390
3380
3370
3360
3350
3340
3330
3320
3310
3300
3290
3280
3270
3260
3250
3430
3420
3220
U
D
Environmental Quality


Spring Creek Mine
Anderson-Dietz Coal
and Spoil Aquifers
Potentiometric
Surface
SCM Existing Permit Area
SCM Approved Mine Plan
SCM Mined Out Areas
Mine Plan - App. 183
Amendment Area - App. 183
Potentiometric Contour
Streams
Extent of Coal
Faults (U/D)
Roads
After Plate 2, Spring Creek Mine
2008 Hydrology Annual Report
Spring Creek Mine
Pit 1
Pit 2
Pit 3
Pit 4
Spring Creek
South Fork Spring Creek
Pearson Creek
Squirrel Creek
314
T.8 S.
T.9 S.
R.39 E.
R.40 E.
Miles
0 0.25 0.5 1
N
Montana Department of Environmental Quality

D-000194

Attachment 3

Private Property Takings Determination

Montana Department of
ENVIRONMENTAL QUALITY

Brian Schweitzer, Governor
Richard H. Opper, Director

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

To: Chris Yde

From: Jane B. Amdahl JBA

Date: June 17, 2011

Subject: Private Property Assessment Act Analysis for Spring Creek Coal Company

Spring Creek Coal Company (Spring Creek) has submitted an application for Amendment No. 00183 to Surface Mine Permit No. C1979012 for its mining operation near Decker in Bighorn County. Spring Creek proposes to add 2,042 acres in the Pearson Creek Area, 1,224 acres of which would be affected by mining. The amendment would add an estimated 170,780,000 tons of recoverable coal reserves, which is expected to provide coal recovery through at least the year 2022. You have requested whether the Department's approval of the application for amendment would comply with the Private Property Assessment Act, Title 2, Chapter 10, MCA.

The Department's approval of the application does not constitute a state action with taking or damaging implications under the Private Property Assessment Act. The approval of the amendment is not a rule, rule amendment, policy or permit condition or denial. Rather, it is analogous to a permit approval for the area that is being added to Spring Creek's current permit. Because it is not a rule, rule amendment, policy or permit condition or denial, no further analysis for taking and damaging implications is required under the Private Property assessment act. Furthermore, to the extent that approval of the amendment incorporates permit conditions, the conditions result from the legitimate exercise of the State's police powers. The permit conditions do not result in a substantial reduction in the value of property or denial of its most profitable use, do not involve the physical invasion of the property by the State, do not abolish any "strands" composing the "bundle" of property rights, and are generally applicable to all other similarly situated property owners developing their coal resource.

I have attached the Private Property Assessment Act Initial Analysis checklist for your file.

PRIVATE PROPEPRTY ASSESSMENT ACT: INITIAL ANALYSIS

IS THE PROPOSED AGENCY ACTION COVERED UNDER THE PRIVATE PROPERTY ASSESSMENT ACT?

The purpose of this checklist is to determine whether a proposed agency action is covered under the Private Property Assessment Act. If it is not, no further evaluation for taking and evaluation is required under the Act. (Further evaluation may be required, however, under the Montana Environmental Policy Act, if applicable.) If the proposed agency action is covered under the Private Property Assessment Act, the agency must complete the Attorney General's Private Property Assessment Act checklist and any further impact assessment determined to be necessary under that checklist.

If the answer to any question below is "No," no further analysis for taking and damaging implications is required under the Private Property Assessment Act or this checklist.

	Yes	No
Does the action affect real property, including water rights? (Real property in this sense includes land, whatever is erected upon, growing upon or affixed to land and interests related to land.	✓	
Is the action a rule, rule amendment, policy or permit condition or denial?		✓
Does the Department have discretion legally not to take The action or to take the action in another way that would Have less impact on private property? (In other words, is The Department bound by a statute or rule?)	✓	

Proceed to this section only if none of the answers above are "No." If the answer to any question below is "Yes," no further analysis for taking and damaging implications is required under the Private Property Assessment Act or this checklist.

	Yes	No
Is the action an eminent domain proceeding?		
Is the action a seizure of property by law enforcement officials as evidence or under a state forfeiture statute?		
Is the action a forfeiture of property during or as the Result of a criminal proceeding?		
Is the action a proposal to repeal a rule, discontinue a governmental program, or implement a proposed change That has the effect of reducing regulation of private property?		