MONTANA ENVIRONMENTAL INFORMATION CENTER

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October 14, 2013

Washington Utilities and Transportation Commission
PO Box 47250
Olympia, WA 98504-7250

Dear Commissioners:

I recently provided testimony during the October 10, 2013 public hearing on Puget Sound Energy's (PSE) Integrated Resource Plan (IRP), Dockets UE-120767 and UG-120768. My testimony focused primarily on the likelihood of rising costs associated with fuel supplies for the Colstrip coal-fired power plant. As you know, the Colstrip plant is a mine-mouth operation that receives all of its coal from the adjacent Rosebud mine.The Rosebud mine is owned independently by Westmoreland Coal Company. The owners of Colstrip have contracted for fuel supplies from the Rosebud mine through 2019. Importantly, these contracts are cost-plus contracts with price escalators. Colstrip burns an average of 9-10 million tons of coal annually, and its fuel costs represent a significant cost associated with running the plant.

It is my understanding that the costs of mining were raised at an adivsory group meeting during the development of the IRP, and it was reported by PSE that they expected no change in costs beyond those associated with inflation or cost of living. I believe that this defies both common sense and data produced by the owners of Colstrip. During my testimony I cited several documents that detail increased costs faced by the Rosebud mine. Commissioner Goltz requested I follow up with UTC staff by providing them with these documents. Attached please find:

- A due diligence analysis completed in 2000 by the John T. Boyd Company and commissioned by Pennsylvania Power and Light, which provides an analysis of the rising costs associated with production due to increasing overburden levels at the Rosebud Mine (**attached as Appendix A**).

- An August 9, 2013 article by the energy trade journal Platts, entitled *Powder River Basin Producers Finding it More Costly to Get Coal Reserves* (**attached as Appendix B**).

- Excerpts from NorthWestern Energy's 2011 IRP in Montana, which notes the increased costs of mining at Rosebud (**attached as Appendix C**). The full IRP is available online at: http://www.northwesternenergy.com/our-company/regulatory-environment/electric-supply-resource-procurement-plan

- A resource and cost study by the John T. Boyd Company on coal mines in the Powder River Basin, which notes that the Rosebud Mine has the highest production costs in the Powder River

Basin (**attached as Appendix D**).

- Prefiled direct testimony during Puget Sound Energy's 2007 general rate case by Michael L. Jones, manager of fuels for Puget Sound Energy (**attached as Appendix E**), which details possible additional costs.

I believe that the assumption that fuel supplies will essentially remain flat, beyond cost of living increases, is fatally flawed. There are several different rising costs associated with the Rosebud Mine, and certainly risks faced by both Westmoreland and the owners of Colstrip. I look forward to a full and accurate accounting of the increasing costs and potential risks associated with the fuel supply for Colstrip.

Thank you for this opportunity to provide additional comments on this important issue.

Sincerely,

Derf Johnson
Associate Program Director
Montana Environmental Information Center

Appendix A

DUE DILIGENCE FUEL SUPPLY REVIEW

COLSTRIP AND CORETTE GENERATING STATIONS MONTANA

Prepared For

CHASE SECURITIES INC.

By

JOHN T. BOYD COMPANY

MINING AND GEOLOGICAL CONSULTANTS
Denver, Colorado

[John T. Boyd LOGO]

Report No. 2817.002

JUNE 22, 2000
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[John T. Boyd LOGO]

June 22, 2000
File: 2817.002

Chase Securities, Inc., on behalf of the initial purchasers

Subject: Fuel Supply Review -- Colstrip and Corette Generating Stations

Dear Sirs:

This letter updates John T. Boyd Company's (BOYD) 1999 review of fuel supplies to the coal-fired Colstrip and Corette Generating Stations located in southeastern Montana. PPL Montana LLC (PPL) recently acquired a partial interest in the 2094 net MW Colstrip Station, and full ownership of the 154 net MW Corette Station as part of a larger purchase of generation and transmission assets from Montana Power Company.

BOYD was retained by Chase Securities, Inc., in December 1998 to conduct due diligence investigations of fuel supplies for the generating stations, addressing long-term availability and delivered cost of coal. A report on that investigation, entitled "Due Diligence Fuel Supply Review: Colstrip and Corette Generating Stations" was issued in March 1999. A comprehensive update of that report was provided in September 1999 and is attached herewith. The primary findings of the September update were essentially unchanged from the March study. This current letter update supplements these previous reports, and is subject to the conditions and limitations noted in those documents. This review does not constitute and is not intended as a comprehensive due diligence study. We have accepted the information provided for our review as accurate and complete.

Our update addresses various issues and changes in circumstances that have been identified or have occurred since the earlier reports were issued. It is based on an on-site inspection of the Rosebud Mine (which provides fuel to Colstrip), discussions with engineering and operations personnel, and a review of geologic and mine planning documents. The Corette Station fuel supply was discussed with appropriate personnel, and relevant documents were reviewed.

SUMMARY

Our review and update indicates that the fundamental conclusions reached in our March and September 1999 reports regarding long-term fuel supplies continue to be reasonable and valid as of this date. Major conclusions are briefly restated below:

- There are adequate proven and probable coal reserves available to satisfy current contractual commitments to the Colstrip station, and the Rosebud Mine reserves and resources (beyond those currently committed) are adequate to fuel the station through year 2030. WECO's property ownership is such that all reserves are effectively controlled.

- Coal reserve quality is well-defined (proven and probable), meets contract specifications, and is similar to that currently burned at the Colstrip Station.

- The mine is permitted and generally in compliance with applicable laws and regulations. No environmental "fatal flaws" were found relative to current and future operations.

- The Rosebud mining equipment and facilities are functional and appropriate for planned operations. Capital additions/commitments since our 1999 review have upgraded the capability and reliability of the equipment fleet.

- Current mining plans are reasonable and consistent with the "least-cost" mining approach. No factors or circumstances were identified which would require a material change in future mining plans and cost projections.

- Our update did not identify any circumstances or issues that would require revisions to the Colstrip fuel cost projections presented in our 1999 reports. In BOYD's opinion, those fuel cost projections remain reasonable and valid.

- The Corette plant obtains fuel from the large mines in the Southern Powder River Basin (SPRB) under short-term agreement. The SPRB will continue to be a viable coal source for Corette. Actual delivered fuel cost in 2000 exceeds our projections by approximately 11% due to higher-than-anticipated rail rates. We believe, however, that over the long term, rail rates can be reduced to levels reflected in our 1999 projections. Thus, in BOYD's opinion, the long-term fuel cost projections for Corette presented in our 1999 reports remain reasonable and valid.

These updated conclusions supplement BOYD's March and September 1999 reports. These and other issues are addressed in greater detail in those reports.

COLSTRIP GENERATING STATION FUEL SUPPLY

The Colstrip Generating Station draws its coal supply from Western Energy Company's (WECO) nearby Rosebud Mine. Coal is purchased under two long-term agreements, one for fuel to Units 1 & 2, the other for Units 3 & 4. In addition, Rosebud Mine produces coal and waste coal product for third party customers. These sales are summarized:

MINE AREA	CUSTOMER	TYPICAL PRODUCTION (TONS/YEAR-000)
A	Third Party Customers	2,000
B	Colstrip Units 3 & 4	6,500
C	Colstrip Units 1 & 2	2,900

BOYD personnel visited the Rosebud Mine in April 2000, reviewed future mining plans and projections, and discussed ongoing operations with WECO personnel. Issues addressed included:

- LAND CONTROL. Federally owned coal reserves in Area C (Sections 6 and 32) that were not controlled at the time of our March 1999 report have been successfully leased and are scheduled for mining within the next two years. The other remaining land issue relates to surface damages on the Kluver Tract in Area D. Although the issue of surface damages is unresolved, WECO has full mining rights to the coal on these properties. Any delays in negotiating the damage payments should not materially affect mining in Area D.

- EXPLORATION AND RESERVE ESTIMATES. During 1999, WECO conducted a drilling and sampling program in Area C and to a lesser extent in Area D. The holes drilled were primarily for "in-fill" purposes, and generally confirmed previous information. Some additional proven reserves were identified as a result of the program, and approximately four million tons in Area C-North have been incorporated into the mine plan. Areas were also identified where the seam can be selectively loaded (avoiding a parting), which may result in minor reserve losses.

- ENVIRONMENTAL/PERMITTING ISSUES. Permitting of the recently leased federal tracts (Sections 6 and 32) is complete. Montana DEQ and OSM indicated some concern with the length of opened highwall in idled mine areas. (The situation is attributable to the "least-cost" mining approach required in the Units 3 & 4 contract.) WECO has scheduled some pit backfilling, grading, and reclamation in 2000 and 2001, which should alleviate the concerns of DEQ and OSM. The cost of this reclamation should not impact coal price.

- MINING OPERATIONS. WECO is presently producing from Areas B, D, and C-South at the Rosebud Mine. Areas C and D have been active for some time. Area B was idle at the time of BOYD's

January 1999 site visit, but has since been restarted. Mining methods, equipment applications, and operating practices are essentially unchanged since our earlier report.

- OUTSIDE SALES. In July 1999, WECO began mining in Area B to supply approximately 1.5 million tons per year (MTPY) of coal to Minnesota Power Company and other small customers. WECO's long-term mining plans (and those addressed in our 1999 reports) do not consider these additional outside sales. While incorporating this tonnage could have some effect on future mining costs, we believe any impacts on the Colstrip price under current contracts will be minimal.

- MINE PLANNING/FUTURE OPERATIONS. WECO has not made significant changes to long-range plans since our earlier work. They have incorporated minor sequencing and optimization changes, as is normal in the course of mine planning efforts. As discussed above, mine plans have not been modified to incorporate outside sales. We do not anticipate that either the minor changes which have been made or incorporating outside sales would appreciably impact projected fuel costs to Colstrip. Our review did not identify any circumstances that would require major changes to the 1999 long-range plan.

The Units 3 & 4 contract incorporates a "least-cost" planning approach and requires a mine operating committee to approve the mine plan and budget. This approval process has been slow, and while it should improve over time, regular long-range cost forecasts have not been finalized. Our inspection of the mine, review of planning information, and discussions with mine personnel did not identify or disclose any circumstances which would engender a major revision to the existing long-range plan. However, there may be potential to make minor adjustments to the "least-cost" approach, resulting in lower overall fuel costs.

- CAPITAL EXPENDITURES. WECO has budgeted and/or spent substantial capital for equipment replacements, major repairs, and mine infrastructure since our 1999 study. BOYD previously expressed concern regarding the advanced age of the equipment and the capital expenditures needed in the near term to maintain productive capability. WECO management is cognizant of this and has budgeted and/or completed the following recent purchases:

-- Three Kress 200-ton coal trucks are scheduled for delivery in July, August, and September 2000. These are replacements for some of the Dart 160-ton trucks in Area C.

-- In late 1999, two large dozers were purchased for Area C, and in April 2000, a third large dozer was delivered to Area D.

-- Two 20,000-gallon water wagons are being purchased to replace three older and smaller-capacity units.

-- A new 60-cy class bucket for the Marion 8050 draglines is on order.

-- A replacement tub is being fabricated for the Marion 8200 dragline.
The tub replacement project is budgeted at $4.35 million.

Total capital expenditures for 2000 are budgeted at $17.6 million. This is slightly below estimates in BOYD's previous fuel supply report, but is adequate to maintain the productive capability of the mine. Additional monies are budgeted for capital replacements in future years.

These issues and changes from the circumstances reflected in our 1999 due diligence reviews are generally consistent with projections in those reviews, or are relatively minor in nature. To the extent such changes would impact projections of future fuel prices, that impact would be limited and within the range of accuracy for such projections. Thus, in our opinion, the fuel price projections presented in our 1999 reports remain valid as of this date.

CORETTE GENERATING STATION FUEL SUPPLY

The Corette Station is fueled by coal from commercial mines in the southern portion of the Powder River Basin (SPRB). At the time of our 1999 reviews, this coal was purchased from Peabody Holding Company's

Rawhide and North Antelope Mines, and delivered to Corette via the Burlington Northern -- Santa Fe Railway (BNSF). These purchase and transportation agreements expired in 1999.

Following negotiations with suppliers and the BNSF in 1999, PPL secured new coal supplies and negotiated a short-term transportation agreement. Currently, Corette receives coal from RAG Coal West, Inc.'s Eagle Butte Mine and Decker Coal Company's Decker Mine. These contracts are one-year agreements, extending through December 31, 2000. Key contract terms are:

	RAG COAL WEST	DECKER
Annual Quantity (Tons-000)	450 - 750	100 - 200
Coal Quality:		
Heat Content (Btu/Lb.)	8,200 min.	9,200 min.
Sulfur Content (Lbs.SO(2)/MMBtu)	0.7 max.	0.7 max.
Ash Content (Lbs./MMBtu)	6.4 max.	6.0 max.
Moisture (%-A.R.)	32.5 max.	28.0 max.
Price ($/Ton) -- FOB Mine	4.20	7.25

The coal price negotiated for the bulk of the tonnage, $4.20/ton from Eagle Butte, is consistent with our 1999 projections. The price of Decker coal, at $7.25/ton for a 9,200-Btu/lb. product is above projections, on both a per-ton and $/MMBtu basis. PPL indicates that the higher quality Decker coal results in more efficient combustion in the boiler, and resulting savings are expected to offset the higher fuel cost.

Coal is transported to the Corette Station by the BNSF under provisions of a short-term agreement expiring June 30, 2000. Contract rail rates, and resulting delivered price, are summarized:

DECKER	RAG COAL WEST	
FOB Mine Price ($/Ton)	4.20	7.25
Rail Transportation ($/Ton)	5.93	4.76
Delivered Price ($/Ton)	10.13	12.01
Delivered Price ($/MMBtu)	61.8	65.3

The current short-term rail rates for deliveries to Corette are approximately the same as were in effect in 1999. In the 1999 negotiations with BNSF, PPL expected to achieve a reduction from the then-existing +/- $6.00/ton rail rate. PPL was not, however, successful in obtaining such a reduction, and instead opted for a short-term/tariff agreement extending for an indefinite period beyond June 30, 2000, allowing for further bargaining. PPL is taking steps to strengthen their position and is negotiating to obtain a rate reduction in the near future.

Our review in 1999 indicated that the +/-- $6.00/ton rail rate was high, and that a negotiated rate reduction was a strong possibility. We continue to be of the opinion that such a reduction can be negotiated, and that PPL is pursuing the matter appropriately. However, the rail rate projected for 2000 in our 1999 report is approximately 18% below the actual rate, and the resulting delivered fuel cost projection is 11% below the actual fuel cost to Corette. We consider this difference, which has a net impact of approximately $800,000 per year, to be within the range of accuracy of the analysis, and believe that over the long term, the actual rate can be lowered to levels projected in our 1999 study. Thus, we consider the projections in our 1999 report reasonable as presented, and do not believe any modifications are appropriate.

In BOYD's opinion, the large mines in the SPRB will continue to provide a reliable long-term, low-cost fuel source for Corette.

SALE OF WESTERN ENERGY COMPANY

On March 28, 2000, Montana Power announced that it intends to divest its coal mining subsidiaries. WECO is consequently being offered in a stock sale, with that sale expected to be completed within 6 to

12 months. Assuming a buyer has adequate financial resources, the sale of the mine should have minimal impact on the cost of fuel to the Colstrip Station. In the worst case, where WECO, under new ownership, defaults financially or operationally, the Colstrip Station owners have multiple rights, including taking over the mine operation. Since the mine operates essentially as a stand-alone entity, this would not be expected to have a long-term adverse effect on fuel supply or price. The Corette Station would not be affected by a sale of Western Energy. Thus, we do not anticipate that the sale of WECO will materially affect the fuel supply to the Colstrip or Corette Stations.

Respectfully submitted,

JOHN T. BOYD COMPANY

By:

Lee A. Miller Senior Mining Engineer

Richard L. Bate Vice President

Lawrence M. Thomas Senior Vice President

DUE DILIGENCE FUEL SUPPLY REVIEW

COLSTRIP AND CORETTE GENERATING STATIONS MONTANA

Prepared For

CHASE SECURITIES INC.

By

JOHN T. BOYD COMPANY

MINING AND GEOLOGICAL CONSULTANTS

Denver, Colorado

[John T. Boyd LOGO]

Report No. 2817.002

SEPTEMBER 1999
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GENERAL STATEMENT

PP&L Global, Inc., has agreed to acquire certain electric power generating facilities in Montana, including the Corette Station, and a majority interest in the Colstrip Station. The 163-MW Corette Station is located near Billings, while the 2,276-MW Colstrip Station is located in Rosebud County in southeastern Montana (see Figure 1.1 following this page). Both stations are coal fired.

Chase Securities, Inc., acting as financial advisor to PP&L Global, Inc., retained John T. Boyd Company (BOYD) in December 1998 to conduct a due diligence investigation of the fuel (coal) supply for the Corette and Colstrip Stations. A report on that investigation was issued in March 1999. This updated report reflects changes from March 1999 through September 1999, and addresses certain long-term fuel supply issues. BOYD is an internationally recognized mining and geological consulting firm specializing in the coal industry, and is familiar with current and potential future fuel sources for the stations.

The Colstrip Station operates four generating units, Units 1 & 2 rated at 333 MW each, and Units 3 & 4, rated at 805 MW each. All four units burn coal produced by Western Energy Company (WECO) at the nearby Rosebud Mine. The mine is configured as two separate operations, referred to as Area D and Area C, with common management. Area D is adjacent to the plant and produces coal for Units 1 & 2. Area C, located 5 miles west of the plant, produces coal for Units 3 & 4, which WECO transports via overland conveyor to the plant. Coal is purchased under two long-term contracts, one for Units 1 & 2, the second for Units 3 & 4. A third contract governs the conveyor operation.

The Corette Station is a single 163-MW unit which, until 1996, was also fired by Rosebud Mine coal. In 1996, it was determined that coal from the large mines in Wyoming's Southern Powder River Basin (SPRB) would be less expensive, and fuel purchases were changed to that source. That coal is purchased under short-term or spot agreements, which essentially reflect market price. The coal is transported to Corette by the Burlington Northern-Santa Fe Railway (BNSF).

BOYD's due diligence study primarily addresses the availability of adequate quantities and qualities of fuel for the plants over the period July 1, 1999, through 2030. We reviewed the capability of WECO and SPRB producers to reliably supply the coal, and the estimated delivered cost of the fuel from those sources. The scope of our study considers that the subject fuel supply sources have a proven track record as reliable long-term suppliers to the plants.

In conjunction with this updated report, we have reviewed, in general terms, the potential fuel supply sources and delivery options extending through 2048.

[Rosebud Graphic Map]

Fuel cost estimates for the 1999 - 2030 period rely to a great extent on interpretations regarding the pricing structure under current coal supply agreements. We have made these interpretations and developed the estimates based on our understanding of the agreements and assumptions regarding future events. We do not intend to offer a legal interpretation of contract language, nor can we reliably define the outcome of issues such as price re-openers.

The study period extends beyond the term of all of the current coal supply agreements. We have made reasonable assumptions about extensions of those agreements; however, there is no assurance that such extensions will be agreed to. For this reason, we have assessed the availability of alternative fuel sources such as the SPRB.

Our study is based on data received from WECO, PP&L Global, and Chase, which we have accepted as accurate and complete. This data is supplemented by publicly available information, our familiarity with the specific coal properties, and knowledge of the industry in general. The available data as of March 1999 is adequate and suitable as a basis for our study and conclusions as defined herein. Updated information as of September 21, 1999, is based on telephone conversations with WECO personnel which we have accepted as accurate without verification. Specific projections of reserves, production, quality, and costs included in this update have not been revised from our March 1999 report. Although our review and update identified certain changes in circumstances since March 1999 which could affect cost projections, we do not believe those changes would substantially alter the findings of our original report. Unless noted otherwise, all dollar amounts are in 1998 dollars with no allowance for inflation.

This study is intended to conform to our proposal to Chase dated December 31, 1998, and the scope of work therein (as modified). The study is prepared in accordance with accepted professional standards for such due diligence studies. BOYD makes no other warranty, expressed or implied.

Respectfully submitted,
JOHN T. BOYD COMPANY

By:

/s/ Edward C. Mast	/s/ Lee A. Miller
Edward C. Mast Senior Geologist	Lee A. Miller Senior Mining Engineer
/s/ Richard L. Bate	/s/ Lawrence M. Thomas
Richard L. Bate Vice President	Lawrence M. Thomas Senior Vice President

SUMMARIZED FINDINGS

The primary findings of John T. Boyd Company's (BOYD) due diligence review of fuel supplies for the Colstrip and Corette Stations are summarized in this chapter. These findings are supported by and expanded on in the balance of this report.

1. The Colstrip Station is fueled by coal from Western Energy Company's (WECO) Rosebud Mine in southeastern Montana. The Rosebud Mine is expected to continue as the station's fuel source for the duration of the current Coal Supply Agreements, and possibly beyond.

The Corette Station is fueled by coal purchased under short-term agreements from mines in Wyoming's southern Powder River Basin (SPRB). The SPRB will likely continue as Corette's fuel source over the long term.

2. WECO estimated the quantity and quality of proven and probable coal reserves available at the Rosebud Mine. These estimates were reviewed by BOYD, and, based on that review, it is our opinion that there are adequate reserves available to satisfy current contractual commitments to the Colstrip Station. Our review also indicates that:

- WECO's reserve estimates are based on sufficient exploration data to be considered proven (over 95% of total tonnage) and probable, and are developed using techniques and parameters accepted in the industry.

- Estimated proven and probable reserves remaining on the Rosebud property total approximately 300 million recoverable tons divided into five geographic areas:

RECOVERABLE AREA	STATUS	REMAINING TONS (000)
Assigned Reserves:*		
Area C	Active -- Dedicated to Units 3 & 4	142,228
Area D	Active -- Dedicated to Units 1 & 2	40,211
	Subtotal	182,439
Supplemental Reserves:		
Area A	Inactive -- Partially depleted	9,400
Area B	Inactive -- Partially depleted	25,600
Area F	Unmined	79,900
	Subtotal	114,900
	Total	297,339

* Dedicated to Colstrip Station under current contracts.

The assigned reserves in Areas D and C are adequate to meet commitments under the existing contracts at estimated station consumption levels.

- WECO's property ownership is such that all reserves are effectively controlled.

- Coal quality is well defined. Product quality depends on selective mining techniques to control ash and sulfur, which are proven effective and a normal part of WECO's ongoing operation. Estimated product coal quality is:

AREA	AS-RECEIVED BASIS MOISTURE (%)	ASH (%)	BTU/LB	SULFUR (%)	NA(2)O (% IN ASH)
Assigned Reserves:					
Area C	25.97	9.32	8,509	0.68	0.49
Area D	26.83	7.95	8,558	0.62	0.58
	26.16	9.02	8,520	0.67	0.51
Supplemental Reserves:	25.36	8.74	8,634	0.75	0.84

This coal quality meets contract specifications and is similar to that currently burned at the Colstrip Station.

- Although WECO is not obligated to make additional reserves available after expiration of the existing contracts (2009 for Units 1 & 2, and 2019 for Units 3 & 4), we consider it reasonably likely that WECO will do so. Substantial reserves are available to support such an extension.

3. The Rosebud Mine has historically been a stable, reliable supplier to the Colstrip Station, and the mine can be expected to continue to perform reliably. Our review of the mine operation indicates:

- The mine equipment and facilities are appropriate for planned operations with some over-capacity. Much of the equipment is relatively old and will require replacement or major maintenance in the near future. The cost of these replacements and/or major maintenance is included in fuel price estimates herein.

- Salaried and hourly personnel are experienced and adequately skilled.
Hourly workers are represented by the International Union of Operating Engineers under a collective bargaining agreement expiring in 2001. Labor relations historically have not been contentious.

- The mine has recently taken steps to reduce costs, significantly lowering operating costs as a result.

- The mine is fully permitted and generally in compliance with applicable laws and regulations. No environmental "fatal flaws" were found relative to current and future operations. Permit modification efforts necessary to conform with current mining plans are underway.

4. WECO has developed mining plans (as of January 1999) for Rosebud covering the term of the current Colstrip contracts. BOYD reviewed these plans and extended them through the full study period (i.e., 2030). Our findings relative to future plans are:

- WECO has adopted a "least cost" mining approach. This will result in relatively low costs initially, followed by gradually increasing costs over the mine life.

- WECO's mining plans are reasonable and consistent with the "least cost" mining approach. Delays in leasing certain federal coal properties have resulted in minor variations from the plan; however, these variations do not impair the long-term viability of the plan.

- WECO projects continued use of existing equipment, methods, and techniques, with replacements and upgrades as appropriate. We consider this a reasonable assumption.

- WECO's plans are based on lower (+/-5%) production rates than required to meet projected station generation levels. BOYD has therefore accelerated and extended WECO's basic plans for purposes of this study. Key assumptions in this modified plan are:

Plan Period:	1999 - 2030
Mine Production:	10.1 MTPY
Required Coal:	319 Million
Tons	

Units 1 & 2	
Areas Mined:	D, B, A
Production:	3.0 MTPY
Avg. Eff. Ratio: BCY/Ton	7.0
Units 3 & 4	
Areas Mined:	C, F
Production:	6.9 MTPY
Avg. Eff. Ratio: BCY/Ton	5.4

- Mine operating cost estimates are based primarily on cost history at Rosebud Mine. Estimated mining costs (excluding royalties, production taxes, and non-cash expenses) over the study period are summarized:

	1998 DOLLARS PER TON			
	UNITS 1 & 2 (AREAS A, B, & D)	UNITS 3 & 4 (AREAS C & F)		
	TOTAL	MINING	TRANSPORTATION	TOTAL
1999	4.47	3.56	0.22	3.78
2000	4.34	3.38	0.22	3.60
2001	4.10	3.49	0.22	3.71
2002	3.87	3.54	0.22	3.76
Through Contract Term*	4.36	4.35	0.22	4.57
Term Through 2030	5.12	5.01	0.22	5.23

* 2003 - 2009 for Units 1 & 2 and 2003 - 2019 for Units 3 & 4

- Capital expenditure requirements over the plan period total $242 million. The bulk of this is for rebuilds and replacement of existing equipment.

5. WECO negotiated a coal sales agreement with Minnesota Power Company in July of 1999. This agreement provides for sale of up to 1.5 million tons annually beginning in January 2000 for an undisclosed term. Mining plans developed by WECO and those presented herein do not include these additional sales, and WECO reportedly has not developed the specific plans for production of this coal. Incorporating this tonnage in the mining plan would have some affect on the plan, and could affect capital and operating cost projections.

BOYD has reviewed the potential impact of this additional tonnage on fuel prices, and considers any impact under the current contracts likely to be minimal. Development of revised mine plan and cost projections, however, in our opinion, would not likely result in substantial changes to the findings of this study.

6. The Corette plant obtains fuel from the large mines in the SPRB under short-term agreement. The SPRB will continue to be a viable coal source for Corette throughout the study period, with delivered prices depending on market price for coal and the cost of rail transport to Corette.

Corette requires a relatively low-sulfur coal to meet air quality regulations in the Billings area. Currently, acceptable coal is available at a competitive cost; however, it is possible the lower sulfur fuel may command a premium in the future.

The SPRB also provides a potential alternative fuel source for Colstrip upon termination of the present contracts, and provides a competitive alternative to the Rosebud Mine in any contract extension negotiations. We anticipate SPRB coal will remain a viable fuel source for Colstrip throughout the projected life of the plant (through 2048).

7. Coal sales at the Colstrip Station are governed by two long-term supply contracts. Both are full-requirements contracts, and thus pricing is generally independent of external market trends. Key features of these contracts are summarized:

	UNITS 1 & 2	UNITS 3 & 4
Date	7/30/71	8/24/98
Expiration	12/31/09	12/31/19
Re-openers	2001	none
Pricing Structure	Base Price	Cost
Plus	plus Escalation	

The "cost plus" structure of the Units 3 & 4 contract is the result of a recent negotiation, and will be phased in over the 1999 - 2001 period. A price reduction in excess of 25% is expected as a result of this negotiation.

8. Estimated fuel price for Units 1 & 2 over the remaining term of the contract are:

	UNITS 1 & 2 DELIVERED FUEL PRICE (1998 DOLLARS)					
	1999	2000	2001	2002	2003 - 2009	AVERAGE
Tons/Yr (000)	1,510	3,020	3,020	3,020	3,020	3,020
Quality -- Btu/lb	8,558	8,558	8,558	8,558	8,558	8,558
Contract Price ($/Ton):						
Commodity Charge	5.79	5.78	5.78	5.19	5.31	5.41
Fixed Charge	1.31	1.39	1.42	1.44	1.48	1.46
Royalties*	1.04	1.04	1.05	0.96	0.98	1.00
Quality Adjustment	(0.14)	(0.14)	(0.14)	(0.13)	(0.13)	(0.13)
Total	8.00	8.078.0	8.11	7.46	7.64	7.72
Fuel Price ($/MMBtu)	0.47	0.47	0.47	0.44	0.45	0.45

* Includes production taxes associated with royalty payments.

To estimate fuel prices after contract expiration, we assumed a new contract with a "cost plus" structure similar to that for Units 3 & 4 would be implemented with pricing terms competitive with the cost of SPRB coal.

Under this assumption, fuel costs over the remaining contract term average $10.70/Ton or $0.61/MMBtu.

9. Fuel prices for Units 3 & 4 include not only the FOB mine price, but also a charge to transport the coal via conveyor to the plant. These estimated delivered fuel prices are:

UNITS 3 & 4 DELIVERED FUEL PRICE (1998 DOLLARS)

	1999	2000	2001	2002	2003 - 2019	AVERAGE
Tons/Yr (000).....	3,485	6,971	6,971	6,971	6,971	6,971
Quality -- Btu/lb.....	8,509	8,509	8,509	8,509	8,509	8,509
Contract Price ($/Ton):						
Commodity Charge.....	9.52	7.35	5.91	6.24	6.91	6.92
Fixed Charge.....	0.68	0.91	1.14	1.18	1.37	1.31
Royalties*.....	1.70	1.44	1.17	1.23	1.37	1.36
Subtotal.....	11.90	9.70	8.22	8.65	9.65	9.59

	UNITS 3 & 4 DELIVERED FUEL PRICE (1998 DOLLARS)					
	1999	2000	2001	2002	2003 - 2019	AVERAGE
Transportation ($/Ton).....	1.62	1.62	1.27	0.91	0.92	0.99
Total Cost:						
$/Ton.....	13.52	11.32	9.49	9.56	10.57	10.58
$/MMBtu.....	0.79	0.67	0.56	0.56	0.62	0.62

* Includes production taxes associated with royalty payments.

After expiration in 2019, we assumed the contract will be extended under the current structure, but with pricing terms competitive with the cost of SPRB coal. Estimated average delivered price is $10.19/Ton or $0.59/MMBtu.

10. The Corette Station will most likely continue to purchase SPRB coal at market prices under short-term agreements. Estimated delivered price is summarized:

	DELIVERED PRICE (1998 DOLLARS)				
	1999	2000	2001 - 2005	2006 - 2030	AVERAGE
FOB Mine ($/Ton).....	3.65	4.10	4.90	5.40	5.23
Transportation ($/Ton).....	5.06	5.06	5.06	5.06	5.06
Total.....	8.71	9.16	9.96	10.46	10.29
$/MMBtu @ 8,330 Btu/lb.....	0.52	0.55	0.60	0.63	0.62

Corette requires a relatively low sulfur content coal to meet emissions standards. Ample supplies are currently available; however, if supplies tighten, the cost of the lower sulfur coal could increase.

11. The Colstrip plant is projected to continue operation through 2048, some 18 years beyond the study period addressed in this report. Projections of fuel supply and costs that far into the future are highly speculative and are not developed in this report. However, certain factors which may affect such future supplies are addressed, specifically:

- Several options exist for fuel supply after depletion of the economic reserves at Rosebud. The SPRB is the most likely fuel supply source. It is anticipated that adequate supply capacity will exist in the SPRB through the anticipated life of the plant. Other supply alternatives are also available.

- Coal from the SPRB would most likely be transported to Colstrip via rail.
The necessary rail infrastructure is in-place at this time, and we are unaware of any circumstance that would impair the railroad's ability to deliver fuel in the quantities needed.

- Receiving SPRB coal at Colstrip would require construction of rail unloading facilities and modifications to the coal handling systems. The cost of such facilities would depend on the specific design and ability to integrate a new facility into the existing system. We estimate this capital cost could range between $10M and $25M (1998 dollars), depending on these factors. Assessment of impacts (or necessary modifications) on plant operations are beyond BOYD's scope of work. However, the SPRB and Rosebud coals are very similar, and we would expect any impacts to be limited.

GEOLOGY AND RESERVES

3.1 INTRODUCTION

Western Energy Company's (WECO) Rosebud Mine is situated near the town of Colstrip in southeastern Montana and lies within the northern (Montana) portion of the Powder River Basin coal region. The coal seams of interest in the Colstrip area are subbituminous in rank and occur geologically in the Paleocene Age Fort Union Formation. The Rosebud coal is similar geologically to other coals in the region that are mined for power plant fuel, and is recoverable by surface mining methods.

This chapter addresses the geology of the coal resources available to the Rosebud Mine, the extent of the reserves, and the quality of that coal from the standpoint of providing an adequate coal supply to the Colstrip Generating Station.

3.2 LOCATION AND ACCESS

The Rosebud Mine is located in southeastern Montana's Rosebud County, east and south of the town of Colstrip. Billings, Montana, the largest city in the region, is located approximately 120 miles to the west. Highway access to the property from Billings is by way of Interstate Highway 94 and State Highway 39 to the town of Colstrip. Rail access is provided by a spur line of the Burlington Northern Santa Fe (BNSF) Railway. The nearest commercial airport is at Billings.

The Colstrip Generating Station lies immediately south of the town of Colstrip, but lies within the town boundaries as defined by an incorporation election in November 1998.

3.3 TOPOGRAPHY AND DRAINAGE

The Rosebud coal deposit is located along Armells Creek and on the drainage divide south of the creek. Armells Creek is an intermittent stream with a gentle gradient that flows northeast through the deposit during periods of high precipitation and spring runoff. Most of the terrain is gently rolling, but near the northern and eastern edges, it is relatively steep and deeply dissected. Ridges formed of clinker (an erosion-resistant rock formed by the in-situ burning of the underlying coal seams) dominate the higher elevations in these areas. Prominent ridges and steep-sided valleys are also found to the southeast where the Sawyer coal bed, which lies above the Rosebud bed, has formed clinker, capping the ridges between the valleys of the north and south forks of Cow Creek.

Part of the alluvial valley of Armells Creek is utilized for dry land farming. Hay is raised in meadows along the valley bottoms. Mining generally avoids these valley floor areas.

3.4 PROPERTY OWNERSHIP AND CONTROL

WECO controls in excess of 35,000 acres of coal leases in Rosebud and Treasure Counties, Montana. Coal lessors include:

- Great Northern Properties (GNP), the successor in ownership to the Burlington Northern Railroad land grant checkerboard. GNP is lessor of approximately 20,000 acres or 56% of the WECO leasehold. The GNP properties generally carry a 12.5% (of realization) royalty and can be held indefinitely by production.

- U.S. Bureau of Land Management (BLM) leases approximately 14,000 acres to WECO. These leases also carry a 12.5% royalty and are subject to the various rules and regulations associated with federal leasing.

- State of Montana is a lessor on about 4% of the WECO landholding. These leases are subject to royalties comparable to the federal lands.

The Rosebud Mine coal lands encompass an area of approximately 60 square miles (38,775 acres) in Townships 1 and 2 North, Ranges 40, 41, and 42 East. WECO's ownership of coal rights within this area is illustrated on Figure 3.1 (following this page).

Surface rights in the area are controlled primarily by WECO or GNP. GNP's coal leases convey to WECO full surface disturbance rights. Other lands in the area are owned by a limited number of large landowners or the State of Montana. With a few minor exceptions, WECO controls appropriate surface owner consent within the reserve area assigned to meet current contract requirements.

At the time of our March 1999 study, certain federally owned reserves within the mine plan remained unleased. WECO obtained a lease on these lands in June 1999, bidding approximately $4.4 million for the 1,400-acre parcel.

BOYD did not independently perform title searches or confirm the validity of documentation or information provided by WECO. The documentation reviewed, including property maps, supported the summary information and generally confirmed the adequacy of land control. Based on our review, we conclude that WECO has adequate control of mining rights for coal needed to satisfy existing contract commitments to the Colstrip Generating Station.

[Map]

WECO controls mining rights on substantial additional reserve/resource acreage beyond current contractual commitments. These additional resources could supply the Colstrip Station upon expiration of the current contract term, or be sold to third parties.

3.5 REGIONAL GEOLOGY

The Powder River Basin (PRB) coal region encompasses some 20,000 square miles in a north-south oval-shaped area of northwestern Wyoming and southeast Montana (see Figure 3.2 following this page). The region is underlain by rocks of the Fort Union Formation, which form an asymmetrical structural basin along a north-south axis located near the western flank. The coal seams currently mined in Wyoming outcrop along the eastern flank of the basin, and dip gently westward. The beds in the Montana portion of the basin exhibit a regional southward dip, but are essentially flat lying in most places.

Mineable subbituminous coal seams in the PRB tend to be thick, flat lying, and relatively undisturbed by geologic anomalies. Seams sometimes merge, split and reform over distance, and are difficult to correlate across the Basin. In the Colstrip area, the Rosebud seam is thick and consistent, and is the seam of primary interest for mining.

3.6 LOCAL/COAL GEOLOGY

The structural setting of the Colstrip region is relatively uncomplicated with few faults with minor displacements. Seam structure is gently undulating, dipping at less then one degree to the southeast. The top of the Rosebud seam is highest in the northwestern part of the area, and lowest in the southeast.

The principal seams in the region are the Rosebud and the McKay (see Figure 3.3). The Rosebud seam averages between 20 and 25 feet of in-place coal. Eighteen to 60 feet below the Rosebud is the McKay Seam, which averages about 8 feet thick.

The Rosebud Seam resources in the Colstrip area have been actively mined since 1924, using surface mining methods. Currently, maximum cover depths over the Rosebud seam in active mining areas are in the range of 180 ft. The McKay Seam is not recovered due to quality and cost considerations.

3.7 EXPLORATION

Exploration efforts to define the Rosebud Mine reserves have relied primarily on rotary and core drilling. The first significant drilling by WECO at the Rosebud Mine began in the early 1970's. Since then, a number of drilling programs have been completed, resulting in a large body of exploration data defining the resource.

[REGIONAL MAP POWDER RIVER BASIN OF WYOMING & MONTANA]

[GRAPH]

Exploration data is the basis for resource characterization, and the more data available the better, or more reliable, that characterization. Typically, reserve estimates are categorized by reliability to indicate the degree of assurance of the estimate. Reserve estimates for deposits that (unlike the Rosebud Mine) are inadequately explored are not generally reliable and may not provide a sound basis for mine planning and/or fuel supply definition.

Reserve reliability categories as defined by the United States Geologic Survey are:

- Proven (Measured) is the highest degree of geologic assurance. Estimates of quantity and quality are well defined by exploration data. The points of observation are closely spaced to accurately determine the physical characteristics and overall mineability of the seam. This definition is predicated on a systematic arrangement of holes in a grid pattern, and does not allocate an area of proven reserve around isolated or wide-centered holes. As used in this report, proven tonnage is defined as being within 1/4 mile of an observation point (nominal drill hole spacing of 1/2 mile).

- Probable (Indicated) is a moderate degree of geologic assurance.
Estimates of quantity are computed from projections of nearby and/or widely spaced observation points. As used in this report, probable tonnages are within 3/4 mile of an observation point.

- Inferred indicates inadequate definition of the reserve, and therefore a high degree of geologic risk. These would typically be resources located beyond the limits of the probable classification.

The density of the exploration data at the Rosebud Mine is sufficient to place the coal reserves estimates in the proven and probable categories for all areas of the mine. Over 95% of the reserve is in the proven category. This gives a high level of assurance of the accuracy of reserve estimates, and provides a sound basis for fuel supply definition and planning.

3.8 RESERVE AUDIT PROCEDURES

To confirm the available reserve tonnages, BOYD audited WECO's reserve estimates. The audit process addresses the adequacy of the database and the reasonability of the procedures used by WECO to estimate the quality and quantity of economically recoverable coal. To perform the audit, BOYD reviewed methodologies and assumptions used by WECO in developing reserve estimates and mine plans. We also audited the geological interpretations and coal quality projections to determine whether they accurately reflect the underlying data and are developed using techniques and parameters accepted in the industry.

Specifically, BOYD took the following steps to assess WECO's geologic interpretations and reserves estimates:

- Met with personnel from WECO and discussed the geology, coal reserves, and methodologies used to generate reserves on the property.

- Completed a site visit of the property.

- Reviewed geophysical logs for reasonableness of coal seam and overburden thickness determinations.

- Reviewed seam correlations for consistency and accuracy.

- Cross-checked the thicknesses picked from the geophysical logs with the lab results from the coal intervals that were sampled and analyzed.

- Maps generated by geologic modeling computer software (Vulcan) were randomly checked against the exploration database to ensure that the output was representative of the underlying data.

- Coal reserves and overburden volumes were checked using these maps, and compared to the reserves and overburden volumes reported by WECO.

- The coal quality database for Areas C and D were checked against the quality maps to insure that the maps reasonably reflected the exploration information.

This audit process indicated that WECO's estimates of coal reserve tonnages and quality are reasonable, based on adequate data, and are developed by application of techniques and parameters accepted in the industry. The estimates provide a reliable basis for mine planning and fuel supply assessment.

3.9 COAL RESERVES AND RESOURCES

This section addresses the quantity of coal reserves and resources available at the Rosebud Mine. Estimates are provided by WECO (except as noted) as of 1998. These have been adjusted by BOYD to reflect anticipated depletion through June of 1999.

3.9.1 Mining Areas

For purposes of reserve definition, mine planning, and contract commitments, WECO divides the Rosebud Mine into six reserve areas (see Figure
3.4 following this page):

- AREA A. Area A lies immediately west of the town of Colstrip. The Rosebud seam reserve covers 261 acres and averages approximately 22 feet thick in this area. Overburden depth ranges from subcrop to over 340 feet, averaging 150 feet. Area A was mined extensively in the past; however, it has been inactive since 1994 because of market declines, increasing overburden depth, and high stripping ratios.

- AREA B. Area B lies south and southwest of Colstrip along the southern side of Armells Creek. The Rosebud seam reserve covers approximately 640 acres in Area B and averages 24.5 feet thick. Overburden depth averages 128 feet, and, as with Area A, mining has taken place in Area B. Area B has been inactive since 1995 because of increasing overburden depth and stripping ratios.

- AREA C. Area C lies west of Areas A and B, approximately 5 miles southwest of Colstrip. The area is currently active and is the source of coal dedicated to Units 3 & 4. The Rosebud seam covers over 3,475 acres, averaging 23 feet thick. Overburden depth ranges to over 350 feet, averaging just over 97 feet throughout. The coal reserves in Area C form the bulk of the mineable reserves at the Rosebud Mine.

Area C is further subdivided into five individual mining areas (Areas C -- South, East, Central, North, and West). Current mining is in C-South and C-East.

- AREA D. Area D lies immediately northeast of Colstrip, and is actively being mined. The Rosebud Seam covers approximately 1,000 acres and averages just less than 22 feet thick in Area D. Overburden depth ranges from subcrop to over 260 feet, averaging 112 feet throughout. Area D is dedicated to Colstrip Units 1 & 2.

- AREA E. Area E lies southeast of Colstrip and is fully depleted.

- AREA F. Area F is the westernmost of the reserves controlled by WECO, lying west of Area C and 14 to 15 miles west of Colstrip. The Rosebud Seam covers approximately 2,400 acres and averages 20.4 feet thick in this area. Overburden depth ranges from subcrop to over 250 feet. Area F has been identified by WECO as an area of future reserves. It is not dedicated to any customer, and has not been the subject of detailed reserve studies or mining plans.

[Map]

The individual reserve areas are bounded by geologic/geographic features or mine planning criteria such as overburden depth. In certain cases, additional tonnage could be recovered by extending mining into deeper cover. Such potential extension areas include Areas A, B, C-South, C-Central, C-West, and F. Coal resources in these areas are available for mining, but are not included in WECO's current plans. (Mining of these resources is not required by the plans developed herein until approximately 2028.) The McKay Seam is not considered mineable in any area.

3.9.2 Reserve/Resource Groups

Coal resource estimates have been summarized by groups for purposes of this report. These groupings are:

- Assigned Reserves. Assigned reserves are those recoverable coal and reserves "assigned" to satisfy WECO's contractual fuel supply obligations to the Colstrip Generating Station. These reserves effectively comprise the remaining tonnages in Area C (for Units 3 & 4) and Area D (for Units 1 & 2). WECO has developed long-term mine plans to recover these reserves.

- Supplemental Reserves. Supplemental reserves are those tonnages that are considered mineable by WECO if adequate prices can be obtained. These reserves are in Areas A and B, and for long-term commitments, Area F. The supplemental reserves could be available for the Colstrip Station under an extension of the current contracts, or for outside sales.

- Extended Resources. The extended resources are those tonnages accessible by extending current mining plans into deeper cover areas. These tonnages are considered marginal or sub-economic at this time, and are therefore referred to herein as "resources." The coal is well defined (consistent with the "proven" reliability category) and could be available for Colstrip under an extension of the current contracts.

These groupings are for purposes of this report and do not, particularly as relates to the extended resources, reflect WECO's long-range planning parameters.

3.9.3 Reserve Parameters

Estimating recoverable reserves based on geologic modeling work requires application of a number of factors and parameters related to the specific deposit and general mining practices. These parameters as related to the Rosebud Mine are discussed below.

WECO estimated reserves based on coal volumes developed from the computerized geologic model and a density of 1,742 tons per acre/foot. This is within the normal density range for subbituminous coals.

Some coal will inevitably be lost in the mining process; thus, not all of the in-place resource is recoverable. In WECO's case, these mining losses are increased by the need to selectively mine the seam for quality reasons. In the Rosebud Seam, certain impurities (particularly sulfur) tend to concentrate in the top and bottom 6 inches to 12 inches of the seam. WECO removes the top 6 inches prior to loading the coal, and leaves an average of 10 inches of the seam bottom in-place. By excluding these small, poor quality sections, overall product coal quality is significantly improved. Considering these and normal mining losses, the effective mining recovery applied in estimating recoverable coal reserves is 94%. This figure is consistent with past history at the mine and with analyses based on quality parameters.

Some of the top waste coal and weathered outcrop coal (these tonnages are not included in reserve estimates) are mined and used as feed stock for the Colstrip Energy Partners L.P. (CELP) power plant located 8 miles north of Colstrip. Since 1991, CELP waste coal purchased from the Rosebud Mine has averaged 240,000 tons per year. The arrangement has been mutually beneficial for both WECO and CELP.

The rock and soil material above the Rosebud coal seam is referred to as overburden. Overburden (typically measured in bank cubic yards or BCY) must be removed (or "stripped") to expose the coal seam, and overburden removal is typically the most important cost factor at the mine. Estimates of overburden volumes were made by BOYD based on WECO's geologic model and are included with reserve estimates. The

"stripping ratio," expressed in BCY per ton, is the volume of overburden which must be removed to expose one ton of recoverable coal in the surface mining process.* Stripping ratio provides an indicator of the relative economics of different reserves. The Rosebud Mine in recent years has experienced virgin stripping ratios in the range of 3.0 - 3.5 BCY/ton.

3.9.4 Reserve Estimates

Estimated proven and probable, recoverable (raw product) coal reserves for Rosebud total about 300 million tons, as summarized below and detailed on Table
3.1 following this text.

	COAL RESERVE SUMMARY		
AREA	IN-PLACE TONS (000)	RECOVERABLE TONS (000)	VIRGIN STRIP RATIO (BCY/ TON)
Assigned Reserves:			
Area C	151,307	142,228	4.1
Area D	42,777	40,211	4.7
Subtotal	194,085	182,439	4.2
Supplemental Reserves:			
Area A	10,000	9,400	6.7
Area B	27,234	25,600	5.1
Area F	85,000	79,900	4.8
Subtotal	122,234	114,900	5.1
Total Reserves	316,319	297,339	4.6

In excess of 95% of these reserves are considered proven. In addition to the assigned and supplemental reserves, estimated "extended resources" are defined and available for mining within the current mine area. These resources are considered subeconomic at this time, but would be available over the long term should economics change.

3.9.5 Colstrip Station Requirements

Reserves required to fuel the Colstrip station under the current contracts are estimated at 175 million tons, based on fuel consumption projections provided by R. W. Beck.

TONS CONTRACT	EXPIRATION DATE	REQ'D (000)
Units 1 & 2	2009	31,710
Units 3 & 4	2019	142,905
Total		174,615

Based on these estimates, the assigned reserves at Rosebud are sufficient to meet contractual obligations to the Colstrip Station.

If Rosebud continues to supply the Colstrip Station via contract extensions through 2030, an additional 138 million tons will be required. Sales to other customers during this same period are estimated at 6 million tons, bringing total reserve requirements through 2030 to approximately 319 million tons. This exceeds the reserves available at Rosebud (which are adequate for planned operations through approximately 2028) and require mining some of the "extended resources" (estimated at about 25 million tons) to fuel the plant through the study period. This need to recover extended resources will be exacerbated by any additional third

* Two stripping ratio figures are commonly quoted. "Virgin" stripping ratio is the in-place (or "virgin") BCY divided by recoverable tons. The

"effective" stripping ratio is the sum of in-place BCY and dragline rehandle BCY divided by the recoverable tonnage.

party sales secured by WECO. In July 1999, WECO negotiated such a sale, committing 1.5 MTPY to Minnesota Power Company over a multi-year contract (the contract term is confidential). Current market conditions are not generally favorable for third party sales of Rosebud coal in terms of both price and quality. While we expect WECO will sell some additional third party coal, we would not, given this market situation, expect such sales to be in large tonnages over the long term. Any such sales will, however, limit the reserves potentially available to Colstrip beyond current contract commitments.

Beyond 2030, we believe that coal available from alternative sources will be less expensive than mining the "extended resources" at Colstrip. While these "extended resources" will be available, they will probably not be mined.

3.10 COAL QUALITY

Coal quality estimates are based on analytical data gathered in the course of exploration of the deposit. This data is incorporated in the geologic model and extrapolated to estimate in-place and product coal quality. The resulting estimates of delivered coal quality are discussed in this section.

3.10.1 Data Extent and Adequacy

Extensive coal quality data were collected on both the Rosebud and, to a lesser extent, on the McKay coal seams during the WECO exploration programs from the early 1970's through 1998. The extent of the available coal quality data is sufficient to categorize the coal quality estimates as proven and probable. This provides a reliable basis for projecting future fuel quality.

3.10.2 In-Place Coal Quality

In-place quality is estimated from independent laboratory analyses of the full Rosebud Seam thickness and compiled using computer geologic modeling techniques. Estimated in-place reserve quality by area is summarized below and on Table 3.2 following this text.

IN-PLACE AS-RECEIVED BASIS

AREA	MOISTURE (%)	ASH (%)	BTU/LB	SULFUR (%)
A	25.59	9.11	8,530	0.93
B	25.52	8.97	8,580	0.80
C	25.91	9.90	8,375	0.91
D	26.75	8.96	8,467	0.84
F	25.59	9.72	8,470	0.94
Average	25.91	9.61	8,436	0.90

Based on our review of the data and modeling procedure, we consider these estimates reasonable.

3.10.3 Selective Mining

The Rosebud coal seam is characterized by the presence of high sulfur and ash values in the top and bottom 6 to 12 inches of the coal seam. This allows the mine to improve the quality of the product coal by selectively separating and discarding (or selling as waste coal) the top and bottom of the seam, leaving only the higher quality middle portion. Thus the quality of the middle portion, which is sent to the Colstrip Station, is not degraded by the poor-quality top and bottom material, as it would have been had the full seam been mined. This selective mining practice enhances the product and is a significant consideration in estimating product coal quality.

To determine the thickness of poorer quality material, the exploration cores must be split and the top and bottom sampled and analyzed separately. This "ply-by-ply" sampling technique is now standard procedure at Rosebud and reliably estimates the quality of coal recovered using selective mining techniques.

Unfortunately, prior to 1995, the importance of ply-by-ply sampling was not realized, and many of the earlier cores were analyzed as one sample of the full seam thickness. In such a case, the quality of the full core is lower than can be achieved by selective mining, but it is not possible to know by exactly how much, because separate analyses of top and bottom were not made. Much of WECO's pre-1995 exploration data reflects these full-seam samples, and thus understates the actual quality of coal that can be produced. WECO therefore decided to derive a global adjustment methodology that could be applied to this older data to accurately estimate probable product quality. This was the purpose of a "Quality Assessment Study" undertaken in 1995, based on 27 cores in Area D, and some 51 core holes drilled in 1979 - 1981. This data indicated the following typical quality variations in the seam:

	IN-PLACE COAL QUALITY AS-RECEIVED BASIS			
SULFUR INTERVAL	MOISTURE (%)	ASH (%)	BTU/LB.	(%)
Top	20.24	24.92	7,135	5.35
Middle	27.05	7.92	8,577	0.67
Bottom	22.96	26.15	6,456	2.58
Composite	26.75	8.96	8,467	0.84

Thus, by selectively mining the coal (separating or not taking the top 6 inches and bottom 12 inches), the coal quality is improved, with a decrease in sulfur of 0.17% (0.84% - 0.67%), a decrease in ash of 1.04% (8.96% - 7.92%), and an increase of 121 Btu/lb.

To utilize the older data insofar as possible in conjunction with the 1995 ply-by-ply analysis, WECO derived adjustment factors for estimating recoverable coal:

- For predicting mined coal quality, weigh the 1995 drilling program quality results and the as-mined quality results equally.

- For predicting mined coal quality other than sodium, give the pre-1995 results weighting factor equal to 20% of the 1995 program results.

- For predicting mined sodium, weigh all results equally. This decision was based on an observation of better agreement between drilling program sodium results than between other quality characteristics.

The above adjustments were made to the Area D database, and the resulting estimated recoverable coal quality by WECO is based on these factors. Similar types of adjustments were derived for Areas A, B, and C and correlated to recovered coal quality. WECO has not determined an adjustment factor for Area F because there has been no coal mined to form a basis for the adjustment.

BOYD has reviewed this adjustment procedure for predicting recoverable coal quality, and considers it reasonable.

3.10.4 Recoverable Coal Quality

The recoverable coal quality for Areas A and B are projected from the WECO computer model. The recoverable coal quality for Areas C and D was estimated from in-place coal quality using the adjustment factors discussed above. Recoverable coal quality for Area F was not estimated by WECO because no coal has been mined in Area F, and no sampling has been done on a ply-by-ply basis.

For purposes of this report, BOYD applied the parameters from the 1995 drilling program in Area D (the difference between the coal and the composite intervals) to estimate recoverable quality in Area F. The estimated recoverable coal quality of the Rosebud Mine reserves is summarized below and detailed on Table 3.2.

AREA	RECOVERABLE COAL QUALITY AS-RECEIVED BASIS MOISTURE (%)	ASH (%)	BTU/LB	SULFUR (%)	NA(2)O (% IN ASH)
Assigned Reserves:					
Area C	25.97	9.32	8,509	0.68	0.49
Area D	26.83	7.95	8,558	0.62	0.58
	26.16	9.02	8,520	0.67	0.51
Supplemental Reserves:					
Area A	25.54	8.91	8,713	0.72	0.54
Area B	25.51	8.85	8,739	0.72	0.30
Area F	25.29	8.68	8,591	0.77	1.05
	25.36	8.74	8,634	0.75	0.84
Total Reserves	25.85	8.91	8,564	0.70	0.64

Recoverable coal quality generally meets contract specifications. However, there are "pockets" of high-sodium coal that could be problematical for Units 1 & 2, even when product quality is within specifications. One such pocket will be encountered in Area D (which supplies Units 1 & 2) late in the contract life. Alternative mining plans or blending with Area C coal may be desirable at that time.

Following this text are:

Tables

3.1: Coal Resource Summary

3.2: Coal Quality Summary

TABLE 3.1

COAL RESOURCE SUMMARY
ROSEBUD MINE
ROSEBUD COUNTY, MONTANA
FOR
CHASE SECURITIES INC.
BY
JOHN T. BOYD COMPANY
MINING AND GEOLOGICAL CONSULTANTS
SEPTEMBER 1999

AREA	ACRES	SEAM THICKNESS (FT)	COAL TONS IN-PLACE (000)	COAL TONS RECOVERABLE (000)	OVERBURDEN* DEPTH (FT)	OVERBURDEN* BCY (000)	VIRGIN STRIP RATIO BCY/TON
ASSIGNED RESERVES:							
Area C:							
C West	760	23.7	31,418	29,533	83	101,308	3.4
C North	718	23.7	29,678	27,897	66	76,339	2.7
C Central	479	21.7	18,183	17,092	101	77,758	4.5
C East	777	23.7	32,036	30,114	118	148,247	4.9
C South	1,011	22.7	39,992	37,592	111	180,496	4.8
Subtotal -- Area C	3,745	23.2	151,307	142,228	97	584,148	4.1
Area D	1,040	23.6	42,777	40,211	112	187,256	4.7
Total -- Assigned	4,785	23.3	194,085	182,439	128	771,404	4.2
SUPPLEMENTAL RESERVES:							
Area A	261	22.0	10,000	9,400	150	63,146	6.7
Area B	638	24.5	27,234	25,600	128	131,482	5.1
Area F	2,400	20.4	85,000	79,900	100	387,060	4.8
Total -- Supplemental	3,299	21.3	122,234	114,900	109	581,689	5.1
TOTAL RESERVES	8,084	22.5	316,319	297,339	104	1,353,093	4.6

* Estimated by BOYD based on WECO geologic model.

Note:

"Assigned" = Reserves assigned by WECO to current Colstrip Plant contract committments.

"Supplemental" = Reserves not included in current mining plans but considered mineable by WECO.

All reserves are classified as "Proven" and "Probable."

TABLE 3.2

COAL QUALITY SUMMARY
ROSEBUD MINE
ROSEBUD COUNTY, MONTANA
FOR
CHASE SECURITIES INC.
BY
JOHN T. BOYD COMPANY
MINING AND GEOLOGICAL CONSULTANTS
SEPTEMBER 1999

		AS-RECEIVED BASIS								
		IN-PLACE				RECOVERABLE				
AREA	RECOV. TONS (000)	MOISTURE (%)	ASH (%)	BTU/LB	SULFUR (%)	MOISTURE (%)	ASH (%)	BTU/LB	SULFUR (%)	NA(2)O IN ASH (%)
ASSIGNED RESERVES:										
Area C:										
C-West	29,533	26.33	8.79	8,448	0.85	26.00	9.55	8,512	0.67	0.35
C-North	27,897	25.67	9.98	8,330	0.98	25.96	9.30	8,506	0.69	0.31
C-Central	17,092	25.45	10.37	8,305	0.99	25.94	9.23	8,505	0.69	1.22
C-East	30,114	26.54	9.61	8,437	0.81	26.02	9.38	8,511	0.67	0.58
C-South	37,592	25.45	10.73	8,335	0.93	25.94	9.15	8,508	0.68	0.34
Subtotal -- Area C	142,228	25.91	9.90	8,375	0.91	25.97	9.32	8,509	0.68	0.49
Area D	40,211	26.75	8.96	8,467	0.84	26.83	7.95	8,558	0.62	0.58
Total -- Assigned	182,439	26.09	9.69	8,396	0.89	26.16	9.02	8,520	0.67	0.51
SUPPLEMENTAL RESERVES:										
Area A	9,400	25.59	9.11	8,530	0.93	25.54	8.91	8,713	0.72	0.54
Area B	25,600	25.52	8.97	8,580	0.80	25.51	8.85	8,739	0.72	0.30
Area F	79,900	25.59	9.72	8,470	0.94	25.29	8.68	8,591	0.77	1.05
Total --Supplemental	114,900	25.57	9.50	8,499	0.91	25.36	8.74	8,634	0.75	0.84
TOTAL RESERVES	297,339	25.89	9.62	8,436	0.90	25.85	8.91	8,564	0.70	0.64

4.1 INTRODUCTION

The Rosebud Mine is a large surface coal mining operation owned and operated by Western Energy Company (WECO). WECO is a subsidiary of Entech, Inc., which, in turn, is an affiliate of Montana Power Company.

This chapter reviews the existing mine, its equipment, facilities, production capabilities, and operational performance in the context of the mine's reliability as a long-term supplier. Future mining plans and projected operating costs are also addressed.

4.2 PRESENT MINE

4.2.1 Mine Background

The Rosebud Mine was opened in 1968 to provide coal to the Corette Station. In 1975, with the construction of Colstrip Units 1 & 2, the mine expanded to a 5-million-ton per year (MTPY) capacity with a 60 cu. yd. Marion 8050 dragline working in Area E. In 1976, a second dragline was installed in Area B to produce coal under long-term supply contracts with Northern States Power (NSP) and Wisconsin Power and Light (WPL). Area C was opened in 1983, dedicated exclusively to Units 3 & 4. In 1986, Area E was depleted and Area D begun for Units 1 & 2.

In 1995, the contracts with NSP and WPL expired, and were not renewed by the utilities. Similarly, in 1996 the Corette Station began buying coal from the Southern Powder River Basin (SPRB) in place of its traditional Rosebud tonnage. As a result, Rosebud Mine production decreased from over 13 MTPY in 1994 to 8 MTPY in 1996. Annual mine production since 1972 is summarized:

PERIOD	AVERAGE TONS/YR (000)
1972 - 1975	4,745
1976 - 1980	10,363
1981 - 1985	10,742
1986 - 1990	13,342
1991 - 1995	12,956
1996	7,779
1997	9,127
1998	10,499

The reduction in mine production since 1994 has left some idle capacity in stripping and coal handling equipment. Other equipment has been retired or transferred to the areas producing coal for the Colstrip Station.

Production is currently limited to fuel for the Colstrip Station, and coal for a few smaller customers, including:

- Great Lakes Coal and Dock purchases coal for resale as industrial and stoker coal. This tonnage is limited, estimated at 200,000 tons annually.

- Colstrip Energy Limited Partners (CELP) purchase "waste coal" (the high sulfur, high ash coal cleaned from the top of the seam in the normal course of mining) for consumption in their plant located north of Colstrip. This material is typically in the range of 240,000 tons per year and is sold under separate loading and transportation agreements.

- Advanced Coal Conversion Process (ACCP) takes up to 450,000 tons per year from Area A, which provides feedstock to produce approximately 300,000 tons of low sulfur, high Btu syncoal. Approximately 200,000 tons of this is planned for sale to Units 1 & 2, while the balance would be sold to industrial or other customers.

The Rosebud Mine has difficulty competing in current utility coal markets for rail-served plants, and WECO's mine plans as of March 1999 do not provide for sales other than the Colstrip Station and the small customers noted above.

In July 1999, WECO negotiated an agreement to sell up to 1.5 MTPY to Minnesota Power Company over a multi-year term (the precise term of the agreement is confidential). Producing this additional tonnage is within the installed capacity of the mine with only minimal additions of labor and equipment. This additional tonnage could engender a change in mining plans; however, our understanding is that the mine will generally follow currently planned pit progressions, and any change would be minor. Revisions to the mining plans and cost projections in our March 1999 report as a result of the sale to Minnesota Power are beyond the scope of this update. We consider it unlikely that such revisions, if they were made, would substantially affect the findings of that study.

WECO will continue to work to sell coal into the broader utility market, and may successfully secure some future sales. We would not, however, expect these sales to be in large volumes over long terms.

Although the mine is managed as a single integrated complex, contractual provisions relating to reserve dedication, capital equipment assignments, and cost allocations tend to create two separate mines. For purposes of planning, budgeting, and costing, the Area C operation (supplying Units 3 & 4) and Area D (supplying Units 1 & 2) are quasi-independent mines.

4.2.2 Recent Performance

Recent operational performance data for Rosebud are shown on Table 4.1 following this text, and are summarized below:

1998	1995 - AVERAGE
Production (Tons/Yr - 000)	9,664
Quality: Ash(%)	9.44
Sulfur(%)	0.74
Btu/lb	8,526
Overburden Removal:	
Effective BCY/Yr (000)	36,739
Stripping Ratio (BCY/Ton)	3.80
Labor Force (No. of Employees)*	288
Labor Productivity (Tons/Empl-Hr)	16.1

* All employees -- 1996 and 1997 only

Reported 1999 production through August totaled 6.9 million tons. Mine performance has been reasonably consistent over the period reviewed, with the exception of market-driven production decreases. We consider the mine reasonably well designed and managed, although there is potential for improvement in operational performance.

4.2.3 Infrastructure and Equipment

Mine infrastructure, such as buildings, roads, power distribution, and coal handling facilities, is adequate to support production in excess of levels planned for the Colstrip Station. Over time, various upgrades and modifications will be necessary, and systems such as roads and power distribution will have to be expanded. Overall, the mine infrastructure is in good condition and adequate to supply the Colstrip Station.

Mine equipment data were reviewed and major items viewed in the field to generally assess condition and suitability for the operation. WECO provided supplemental information on equipment lifetime operating

hours and percent mechanical/electrical availability for 1997 and 1998 (an indicator of condition). This data is summarized in Appendix A and discussed below.

- Draglines. The draglines are the primary mining tools and appear to be in good condition, achieving generally acceptable availability. The machines are at an age where regular maintenance and major overhauls are a necessity to prolong the machine's useful life. Given such regular maintenance, and the excess capacity available due to production cutbacks, the draglines are adequate for the needs of the Colstrip Station.

- Shovels. As with the draglines, the shovels are performing at acceptable levels but will require regular maintenance and overhauls.

- Coal Haulers. WECO's coal hauler fleet, particularly for Area D, is relatively old. These machines are adequate now because there is excess capacity; however, they will require major rebuilds or replacement in the near future. Monies for these rebuilds/replacements are included in fuel cost projections.

- Mobile/Support Equipment. Other equipment at the mine appears to be in fair operating condition, but is, in many cases, relatively old. A number of these items will require replacement in the near future.

The equipment fleet is adequate (or has excess capacity) to reliably supply the needs of the Colstrip Station and planned third party sales. However, the equipment is relatively old, and capital expenditures for rebuilds and replacements are incorporated in the cost projections.

4.2.4 Labor Force

The January 1999 labor force at Rosebud numbers approximately 315, including administrative personnel. This represents a 22% reduction from the mine's peak employment in 1992 - 1994. Personnel assignments are approximately as follows:

	NUMBER OF EMPLOYEES		
	SALARIED	HOURLY	TOTAL
Management	4	--	4
Administrative	52	7	59
Subtotal	56	7	63
Operations:			
Area D -- Production	4	45	49
-- Maintenance	5	24	29
Subtotal	9	69	78
Area C -- Production	5	66	71
-- Maintenance	6	45	51
Subtotal	11	111	122
CELP Load/Haul	--	7	7
ACCP Plant	2	14	16
Area C Conveyor	2	13	15
Other	1	13	14
Total -- Operations	25	227	252
Total -- All	81	234	315

Labor productivity averages 15 - 17 tons per employee hour (TPEH). This is within the typical range for mines with comparable equipment, production levels, and conditions.

The hourly workers at Rosebud are represented by the International Union of Operating Engineers under two separate collective bargaining agreements (one for the mine and one for the conveyor and ACCP facility). These specify competitive hourly pay rates in the range of $20/hr to $22/hr, and provide management adequate flexibility relative to work schedules, assignments, etc. The agreements, which include no-strike clauses, extend through 2001. Generally, labor relations at Rosebud have not been contentious. Absenteeism, turnover, accident rates, etc., are within typical ranges in the industry.

The Rosebud labor force is stable, and provides adequate skills and abilities to reliably operate the mine.

4.2.5 Operating Costs

WECO provided data on direct mine operating costs for 1997 and 1998, and supplemental data for 1996. This information was reviewed to determine whether the costs were reasonable as compared to industry norms, and to identify any areas of particularly high or low costs.

Average direct operating costs for 1996, 1997, and 1998 (11 months) are summarized:

	$/TON			
	1996*	1997	1998	AVG.
Direct Mining Expense				
Overburden Removal	1.29	0.92	1.16	1.12
Coal Loading & Hauling	1.20	0.82	0.78	0.91
Reclamation	0.89	0.40	0.25	0.48
Crushing/Conveying	0.40	0.34	0.29	0.34
Supervision/Engineering	0.50	0.28	0.28	0.34
Other	0.23	0.30	0.30	0.28
Subtotal	4.51	3.06	3.07	3.47
Other Costs				
Lease Rents & Records	0.02	0.01	0.01	0.01
A & G and Overheads	1.67	0.85	0.65	1.01
Subtotal	1.69	0.86	0.66	1.02
Total	6.20	3.92	3.72	4.49

* Cost data not verified; included for comparison purposes only.

Note that these costs do not include depreciation, depletion, and amortization, nor do they incorporate the substantial production tax and royalty expense incurred by the mine.

The costs, as shown, reflect significant cost reductions achieved in 1997 and 1998 in spite of a higher stripping ratio. Much of this reduction is in the A & G and Overheads category, although reductions in operational areas are evident as well. Reductions in A & G reflect cutbacks at the mine and at WECO's head office, as well as changes in overhead allocation methodologies that have reduced costs allocated to the mine. Under the Amended and Restated Units 3 & 4 Coal Supply Agreement, future A & G charges will be determined by parameters established by an independent accounting firm.

WECO's future plans assume these cost reductions can be maintained over the long term. BOYD agrees that costs in 1998 are more likely to be representative of future operations than costs in earlier years, and cost estimates presented herein are developed accordingly.

4.3 COAL HANDLING AND TRANSPORTATION

Coal for Units 1 & 2 is hauled to the Area D tipple, crushed, and conveyed directly to the lowering well serving the power plant stockpile. The facility is equipped with a 250-ton capacity truck dump hopper, McNalley Pittsburgh double roll primary crusher, and American Pulverizer AC-7F secondary crusher. Rated

facility capacity is 1,250 tons per hour (TPH) of minus 2-inch coal. The crushed coal can also be conveyed to a 190-ton rail car loadout bin for third party sales.

The Area C crushing and conveying system, serving Units 3 & 4, incorporates primary and secondary crushing facilities, a 4.2-mile overland conveyor system, and various ancillary facilities. Major components of this system are:

- Area C truck dump with two 250-ton dump hoppers feeding two parallel single roll primary crushers which reduce the coal to minus 8 inch size. Each circuit is rated at 1,875 TPH and is capable of independently feeding the overland conveyor system.

- Secondary crusher, including tramp iron magnet and two McLanahan 30" x 72" double roll crushers sizing the coal to minus 3 inches.

- Overland conveyor system, including 22,203 ft of conveyor in five flights with 2,200 total drive hp. Conveyors are 48", travel at 800 fpm, and the system is rated at 1,875 TPH.

- Ancillary facilities include a dust collection system, water supply, and electrical, mechanical, and maintenance buildings.

The overland conveyor delivers coal directly to the Units 3 & 4 coal handling facility. This facility is rated at 1,550 TPH, which limits the effective capacity of the overland conveyor.

The existing conveyor system operates reliably and is adequate for projected fuel needs for Units 3 & 4. Overall, the Rosebud coal handling facilities are suitable for the plant.

4.4 ENVIRONMENTAL AND PERMITTING

The Rosebud Mine operates under a number of environmental-related permit provisions, the most important of which are incorporated in the Surface Mining Permit issued by the Montana Department of Environmental Quality. This permit is in conformance with requirements of the Surface Mining Control and Reclamation Act (SMCRA) and subject to oversight by the Federal Office of Surface Mining.

The environmental and permitting status of the Rosebud Mine was discussed with WECO personnel, and the permit documents reviewed to identify any issues that could affect the continued operation of the mine. The mine's records of inspections and regulatory compliance activities were also reviewed.

WECO is generally in compliance with applicable laws and regulations as they are enforced in the region. The reclamation effort is good, and the mine has won several awards for excellence in mined land reclamation.

Major outstanding environmental issues are minimal. There have been questions raised about the probable hydrological consequences of mining in Area C under the "least cost" mining approach. Mine staff considers these questions related mostly to lack of data, and believes the issue will be resolved favorably. If for some reason regulatory authorities did not approve these permit changes related to "least cost" mining, the previous mine plan (a "levelized" approach) provides an alternative. This previous plan is fully permitted, and, while it would not have certain of the benefits of "least cost" mining, it could be followed with no interruption to mining operations.

Certain portions of Area D are not within the currently permitted area. This permit modification is expected to be approved in 1999.

Planned mining through 2019 will concentrate in areas that are currently active and where the environmental issues are well defined. Area F, which is planned for mining after 2019, is less well defined. While mine personnel are unaware of any environmental limitations associated with Area F, there is still a degree of uncertainty.

Overall, our review indicates that environmental and permitting activities at Rosebud are consistent with industry norms. There do not appear to be any environmentally related issues that constitute a "fatal flaw" or pose a significant risk to the fuel supply.

The "least cost" mining approach will result in extensive final pits at the conclusion of mining. These are expensive to reclaim and will constitute a significant liability. WECO indicates that the liability is fully funded for Area C at this time (except for Puget Sound Power & Light's share, which is on an accrual basis). Area D is funded via an accrual. As a result, the Colstrip Station owners should not have any outstanding obligation as regards final reclamation at the conclusion of the current contracts. BOYD has not verified the sufficiency of these accruals or legal obligations for final reclamation.

4.5 MINING PLANS

By assignment, BOYD projected future operations over a 30-plus year period extending from July 1, 1999, to December 31, 2030. This significantly exceeds WECO's planning horizons, which extend through the expiration of the existing contracts in 2009 (for Units 1 & 2) and 2019 (for Units 3 & 4). WECO has developed two independent plans along these lines, one to satisfy each contract. We reviewed WECO's plans and believe they are generally accurate and represent a logical exploitation of the deposit. To extend these plans through 2030, we assumed that operations will continue beyond WECO's plan without major changes in production levels, methods, or equipment. The extended mining plan will recover the remaining supplemental reserves (Areas A, B, and F) and, in the final 2-3 years (2028 and later) certain deeper coal resources available via a logical continuation of WECO's planned operation.

WECO's plans are based on typical or historic plant consumption levels of
2.85 MTPY for Units 1 & 2 and 6.5 MTPY for Units 3 & 4. Based on input from R.W. Beck, we have modified the plans to produce 3.02 MTPY for Units 1 & 2 and 6.971 MTPY for Units 3 & 4. These tonnages are consistent with station generation plans.

WECO's plans, which form the basis for mine plan and cost projections presented herein, do not incorporate the 1.5 MTPY sales to Minnesota Power under the contract negotiated in July 1999. Revisions to the projections herein to include this tonnage are beyond the scope of this update. We consider it unlikely that such revisions, if made, would substantially affect the fuel cost projections presented herein.

This section discusses WECO's mine plans and BOYD's extensions through 2030.

4.5.1 Planning Concept

Units 1 & 2 are supplied by Mining Area D. WECO's plan projects this to continue, scheduling mining in Area D through year 2010 and thus covering projected coal sales through the end of the coal sales contract in 2009. Coal quality is a key design criterion, with areas of high sodium coal (Na(2)O in ash) deferred until the last years of the plan. Also, late in the plan, the mine will encounter areas of relatively deep, high-ratio coal.

BOYD's modification of the WECO plan assumes the contract will be extended and Area D worked to depletion in 2010. After that, the operations fueling Units 1 & 2 will move to Area B, depleting the remaining "supplemental" reserves, then to Area A, also depleting the available supplemental reserves. In the later years of the plan, the mine returns to Area B and recovers additional, relatively deep cover coal from the "extended resource" area. This mining schedule is shown on Table 4.2 following this text.

Units 3 & 4 are fueled by the Area C operation. The mine-planning philosophy for Area C is a "least cost" approach originally proposed in conjunction with an arbitration of the coal supply contract. The current contract mandates this "least cost" mining, and WECO has developed mine plans accordingly. The "least cost" approach favors mining of low cover, low strip ratio reserves first, deferring high cost coal until later in the mine life. As a result, initial costs are low, but will increase over the life of the mine.

WECO's mine plan projects continuing operations in Area C through contract termination in 2019. At that time, the available reserves within currently defined mining limits in Area C will be effectively depleted. BOYD's modifications assume production consistent with projected Units 3 & 4 burn, and that after depletion of Area C, operations move to Area F for the duration of the study period.

Mining in Area C is not progressing precisely according to plan due to delays in obtaining federal coal leases. As a result, the current near-term plan is not integrated with the long-term plan for the area. For

purposes of this report, we have modified the long-term plan to be consistent with the short-term situation at Rosebud as of January 1999. This modification presents a reasonable projection of future mining suitable for this study, but may not precisely reflect WECO's formal plans. This mining schedule is shown on Table 4.3 following this text.

4.5.2 Production Requirements

Mine production requirements for purposes of this study are based on estimated fuel needs of the Colstrip Station, as provided by R. W. Beck*, and anticipated sales to other customers, exclusive of tonnage committed to Minnesota Power in July 1999. That customer base is assumed to remain constant through year 2030 (i.e., coal contracts are assumed to be renewed). Resulting production requirements for the Rosebud Mine over the 1999 through 2030 timeframe are 319 million tons, as shown below:

YEAR	TOTAL TONS (000)	AVG. PER TONS (000)
Colstrip Units 1 & 2	93,960	2,983
Colstrip Units 3 & 4	218,805	6,946
CELP Power Station*	7,875	250
Great Lakes Terminal	6,300	200
	319,065	10,129

* Waste coal -- not included in totals.

The projected annual coal production tonnage for the Colstrip station reflects the fuel requirements provided by R. W. Beck, adjusted based on the thermal content (Btu/lb) of the coal produced from each mine area over the study period.

Other assumed purchasers of Rosebud production include the CELP Power Station (which consumes waste coal) at 250,000 tons per year and industrial sales (Great Lakes) at 200,000 tons per year. "Waste" coal supplied to the CELP Power Station is selectively removed from the upper 6 inches of the Rosebud seam in conjunction with Area C operations supplying Colstrip Units 3 & 4.

Coal for the Great Lakes Terminal is mined along with production for the Colstrip Units 1 & 2 from Areas A, B, and D.

Additional coal is produced as feedstock for the ACCP plant. Current plans are to mine that coal from Area A, although it could also come from Area C or D. For purposes of this study, we have assumed that any ACCP coal mined from Area C or D would be offset by synfuel sold to Units 1 & 2 and thus not impact overall production requirements. The ACCP operation will most likely close in 2007 when available tax credits end.

4.5.3 Mining Sequence and Schedule

The mining sequence is designed to advance from lower to higher strip ratio areas. The sequence to supply Colstrip Units 1 & 2 continues current operations in Area D until reserves are depleted in 2011, then moves to Mine Areas A and B.

* R. W. Beck provided the following fuel requirements for planning purposes:
-- Corette Station: 810,000 Tons per Year at 8,330 Btu/lb. -- Colstrip Units 1 & 2: 3,020,000 tons per year at 8,558 Btu/lb. -- Colstrip Units 3 & 4: 6,971,000 tons per year at 8,509 Btu/lb.

These production assumptions are adjusted for variations in coal quality to supply the required total Btu.

The Units 1 & 2 mining schedule and total coal recovered is shown in detail on Table 4.2 and summarized below:

UNITS 1 & 2 MINING

MINE AREA	YEARS OF MINING	COAL RECOVERED (TONS-000)	EFFECTIVE RATIO* BCY/TON
D	1999 - 2011	40,190	5.7
B	2012 - 2019	25,316	6.3
A	2020 - 2022	9,400	6.8
B	2023 - 2030	25,354	9.7
Total		100,260	7.0

* Effective stripping ratio includes dragline rehandle.

Coal supply to Colstrip Units 3 & 4 assumes continuation of mining in Area C and subsequent relocation to mine Area F. Mine Area C encompasses a 4 mile by 9 mile area and is comprised of five sub-areas. All of these sub-areas are mined concurrently, based on the "least cost" design concept. The schedule of mining in Areas C and F is shown on Table 4.3 and summarized below:

UNITS 3 & 4 MINING

MINE AREA	YEARS OF MINING	COAL RECOVERED (TONS-000)	EFFECTIVE RATIO* BCY/TON
C	1999 - 2019	142,905	5.0
F	2020 - 2030	75,900	6.0
		218,805	5.4

* Effective stripping ratio includes dragline rehandle.

These planned mining sequences are consistent with WECO's long-term planning concept, but assume no outside sales (except as noted) and continuing coal consumption by Colstrip at the estimated rates.

4.5.4 Mining Equipment

The mining equipment in the long-term plan is initially the same as currently in use at the Rosebud Mine. As the operation advances into areas of higher strip ratio and consequent increased overburden volumes, additional mining equipment is purchased to supplement the present fleets.

The four existing draglines, one Marion 8200 and three Marion 8050s, are projected as the primary stripping machines. Presently two of the draglines are operated regularly, with a third operated intermittently. The use of the draglines is projected to increase until all four machines are scheduled for continuous operation in the late years of the mine plan.

The draglines are supported by a fleet of large dozers (CAT D11 class). This fleet prepares an extended bench from which the draglines operate. The annual quantity of overburden the dozers push gradually increases over the mine life, and the dozer fleet is projected to expand through additional purchases according to these overburden volume increases.

The combined dragline and dozer fleets move all overburden at depths less than 180 feet. Where overburden depth exceeds 180 feet, the overheight material is assumed to be handled by contract earthmovers. The overheight material is approximately 2% of total overburden

volume, and therefore the contract operations are limited.

Coal loading methods and equipment types are projected to remain the same as at present in WECO's mine plan and as extended to 2030. The two oldest coal-loading shovels are scheduled for replacement, as is the fleet of coal haulers. The present 120-ton and 160-ton coal haulers are assumed to be replaced with 200-ton haulers. The number of coal haulers is also increased in later years of the mine life as haul distances

increase. Coal mining support fleets, including front-end loaders, drills, road graders, and water trucks, are replaced at typical unit life. The number of machines assigned to road maintenance is supplemented as haul distances increase.

4.6 COST PROJECTIONS

4.6.1 Cost Estimating Parameters and Assumptions

Capital and operating costs are generally estimated based on cost history at the Rosebud Mine. Where past costs may not be representative of planned operations, typical industry cost parameters are applied. For estimating purposes, costs are expressed on a functional unit basis (i.e., $/BCY for overburden removal, $/ton-mile for coal hauling, etc.).

Total mining costs are directly related to the material volumes (overburden and coal) moved in each year of the plan. Inasmuch as overburden volume increases gradually over the plan life, production costs increase correspondingly. Major cost estimating parameters and assumptions in the plan are:

- Present coal sales tonnages are assumed to continue beyond expiration of the current contracts.

- Current mining equipment types (draglines, dozers, shovels, etc.) will be used for future mining. No major new technologies are envisioned, although certain upgrades are incorporated.

- Mining equipment application will continue as at present. Primarily, the overburden stripping will include dozer pre-bench and dragline extended bench operations.

- Stripping and loading equipment productivities remain constant over the plan term.

- Capital expenditures for mining equipment replacement are scheduled based on typical industry machine life.

- Rebuild capital has been included for the draglines and coal-loading shovels at typical intervals in the life cycle of these machines.

- Coal haulage costs reflect the addition of larger capacity coal haulers and greater efficiency related to longer haul distances.

- Projected operating costs include accruals to fund final reclamation of the mines. These accruals are reflected in fuel costs only to the extent allowed by the existing supply agreements.

All costs are projected in 4th quarter 1998 dollars with no allowance for inflation. Costs include the direct cash cost for mine operations along with estimated capital expenditures. The estimates presented in this chapter do not include royalties, production taxes, and non-cash costs such as depreciation and depletion.

The impact on overall mine costs resulting from the additional 1.5 MTPY sold to Minnesota Power has not been quantified. We expect the overall effect on a per-ton basis to be limited to reductions in certain fixed cost components, and possibly some additional capital expenditures. We cannot reliably estimate these cost impacts at this time; however, we do not believe overall mine costs on a per-ton basis would change substantially from estimates presented herein.

4.6.2 Operating Cost Estimates

Operating costs are projected individually for the Units 1 & 2 coal supply (Areas A, B, and D) and for operations supplying Colstrip Units 3 & 4 (Areas C and F and the conveyor).

Estimated operating costs over the 1999 through 2030 study period are shown in detail on Tables 4.2, 4.3, and 4.4 at the end of this chapter and are summarized below:

	MINING COST -- 1998 $ PER TON						
MINE/OPERATION	1999	2000	2001	2002	THROUGH CONTRACT TERM*	EXTENDED THROUGH 2030	AVERAGE
Units 1 & 2 (Areas A, B & D)							
Overburden Removal	1.71	1.69	1.37	1.12	1.65	2.27	2.03
Coal Mining	1.06	0.95	1.02	1.05	1.01	1.13	1.09
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Other	1.33	1.33	1.33	1.33	1.33	1.33	1.34
Total -- 1 & 2	4.47	4.34	4.10	3.87	4.36	5.12	4.84
Units 3 & 4 (Areas C & F)							
Overburden Removal	0.76	0.60	0.61	0.62	1.59	1.75	1.54
Coal Mining	1.08	1.12	1.22	1.26	1.10	1.59	1.28
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Other	1.36	1.29	1.29	1.29	1.29	1.30	1.29
Subtotal	3.56	3.38	3.49	3.54	4.35	5.01	4.48
Conveyor	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Total -- 3 & 4	3.78	3.60	3.71	3.76	4.57	5.23	4.70

* 2003 through 2009 for Units 1 & 2, and 2003 through 2019 for Units 3 & 4.

Operating costs gradually increase over the plan period, reflecting the advance of operations into higher strip ratio reserves. Conveying costs remain essentially constant over the plan term; however, truck haulage costs (included in "Coal Mining") increase somewhat as haul distances increase.

4.6.3 Capital Costs

Projected capital expenditures in the plan total $242 million over the 1999 through 2030 term. Capital costs by mine area are shown on Tables 4.2, 4.3, and
4.4, and summarized below:

	CAPITAL EXPENDITURES ($-000)		
	UNITS 1 & 2 (A, B, & D)	UNITS 3 & 4 (C & F)	CONVEYOR SYSTEM
Site Preparation	3,185	5,262	0
Buildings & Infrastructure	6,375	11,186	0
Mining Equipment	69,285	113,965	6,990
Support Equipment	8,065	17,936	0
Total	86,910	148,349	6,990

The majority of capital expenditures (almost 80% of total) are for mining equipment replacement, rebuilds, and fleet expansion. Due to the age of much of the existing equipment, significant capital expenditures, approximately $67 million (28% of total), are scheduled between 1999 and 2005. These expenditures are considered necessary to maintain mine productivity and assure fuel supply reliability.

Actual capital expenditures for 1999 are, based on conversations with WECO personnel, reasonably consistent with projections. Exceptions are the acquisition of the federal coal leases, which was more costly than planned ($4.4 million vs. $4.0 million), and certain new equipment, which will be leased rather than purchased. Other planned capital purchases are in process, but may not be completed in 1999.

4.7 GENERAL COMMENTS

The Rosebud Mine has been producing coal for the Colstrip Power Station for over 20 years and is a proven reliable fuel source. In BOYD's opinion, the mine is capable of continuing to supply contracted fuel supplies through the term of the current contracts. The age of current mining equipment fleets is a concern, and significant capital expenditures in an equipment upgrade program are planned for and incorporated in cost projections herein.

There are areas of risk or uncertainty relative to mine operations and costs. These include:

- Renegotiation of hourly workers' collective bargaining agreements in 2001.

- Leasing of federal reserves in Area C.

- Higher sodium content coals in Areas D and F that may require blending.

- Permitting issues related to probable hydrologic consequences of mining in Area C.

We do not consider any of these uncertainties as likely to significantly affect the fuel supply.

Projections beyond the current contract terms to 2030 are more speculative. While there is no guarantee, we consider it likely that adequate reserves and resources will be available and that the mine will be capable of continuing to supply coal at costs and volumes projected.

Beyond 2030, the remaining available coal resources will be higher ratio "extended resources" which would be relatively expensive to mine. We consider it likely that lower cost fuel would be available from other sources (specifically the SPRB) at that time, and that Rosebud operations will cease.

Following this text are:

Tables:

4.1: Historical Performance Summary

4.2: Mine Plan and Cost Estimate -- Units 1 & 2

4.3: Mine Plan and Cost Estimate -- Units 3 & 4

4.4: Conveyor Operating Cost Estimate

TABLE 4.1

HISTORICAL PERFORMANCE SUMMARY
ROSEBUD MINE
ROSEBUD COUNTY, MONTANA
FOR
CHASE SECURITIES, INC.
BY
JOHN T. BOYD COMPANY
MINING AND GEOLOGICAL CONSULTANTS
SEPTEMBER 1999

	1995	1996	1997	1998	AVERAGE
PRODUCTION (TONS SOLD - 000):					
Area A	345	--	--	--	86
Area B	2,087	--	--	--	522
Area C	5,546	4,365	6,200	7,275	5,847
Area D	3,271	3,414	2,927	3,224	3,209
Total	11,249	7,779	9,127	10,499	9,664
QUALITY (AS RECEIVED):					
Area C					
Moisture (%)	25.88	25.90	25.72	25.80	25.82
Ash (%)	9.64	9.75	9.89	9.95	9.82
Sulfur (%)	0.70	0.76	0.77	0.75	0.75
BTU/lb	8,509	8,512	8,543	8,514	8,520
Area D					
Moisture (%)	25.92	26.23	26.32	26.41	26.22
Ash (%)	8.44	8.57	8.98	9.03	8.75
Sulfur (%)	0.68	0.71	0.76	0.73	0.72
BTU/lb	8,630	8,546	8,491	8,474	8,537
STRIPPING OPERATIONS:					
Area B					
Overburden:					
Virgin (BCY-000)	8,865	--	--	--	2,216
Rehandle (BCY-000)	1,468	--	--	--	367
Total	10,333	--	--	--	2,583
Stripping Ratio:					
Virgin (BCY/ton)	4.25	--	--	--	4.25
Effective (BCY/ton)	4.95	--	--	--	4.95
Area C					
Overburden:					
Virgin (BCY-000)	19,266	14,682	17,597	26,156	19,425
Rehandle (BCY-000)	3,993	2,079	1,566	3,832	2,868
Total	23,259	16,761	19,163	29,988	22,293
Stripping Ratio:					
Virgin (BCY/ton)	3.47	3.36	2.84	3.60	3.32
Effective (BCY/ton)	4.19	3.84	3.09	4.12	3.81

	1995	1996	1997	1998	AVERAGE
Area D					
Overburden:					
Virgin (BCY-000)	9,206	11,782	10,114	12,329	10,858
Rehandle (BCY-000)	1,206	1,118	766	932	1,006
Total	10,412	12,900	10,880	13,261	11,863
Stripping Ratio:					
Virgin (BCY/ton)	2.81	3.45	3.46	3.82	3.38
Effective (BCY/ton)	3.18	3.78	3.72	4.11	3.70
All Areas					
Overburden:					
Virgin (BCY-000)	37,337	26,464	27,711	38,485	32,499
Rehandle (BCY-000)	6,667	3,197	2,332	4,764	4,240
Total	44,004	29,661	30,043	43,249	36,739
Stripping Ratio:					
Virgin (BCY/ton)	3.32	3.40	3.04	3.67	3.36
Effective (BCY/ton)	3.91	3.81	3.29	4.12	3.80

	1995	1996	1997	1998	TOTAL/AVG.
LABOR FORCE:					
Employees					
Salaried	n/a	n/a	78	77	78
Hourly:					
Mine	n/a	n/a	161	188	175
Conveyor	n/a	n/a	12	13	13
ACCP	n/a	n/a	24	22	23
Subtotal	n/a	n/a	197	223	210
Total(1)	355	268	275	300	288
Employee Hrs Worked					
All Mine Employees	653,054	n/a	n/a	n/a	653,054
Reported to MSHA	700,673	518,068	547,292	n/a	588,678
Labor Productivity					
Tons/Empl. Hr. (All)	16.05	15.02	16.68	n/a	15.92
Tons/E-Hr. (MSHA)	16.61	14.94	16.67	n/a	16.07
CASH OPERATING COSTS:(2)					
Direct Mining Expense ($/ton)					
Overburden Removal	n/a	1.29	0.92	1.16	1.12
Coal Loading & Hauling	n/a	1.20	0.82	0.78	0.91
Reclamation	n/a	0.89	0.40	0.25	0.48
Crushing/Conveying	n/a	0.40	0.34	0.29	0.34
Supervision/Engineering	n/a	0.50	0.28	0.28	0.34
Other	n/a	0.23	0.30	0.30	0.28
Subtotal	n/a	4.51	3.04	3.07	3.47

	1995	1996	1997	1998	TOTAL/AVG.
Other Expenses ($/ton)					
Lease Rent & Records	n/a	0.02	0.01	0.01	0.01
A & G and Overheads	n/a	1.67	0.85	0.65	1.01
Subtotal	n/a	1.69	0.86	0.66	1.02
I -- Cash Operating Cost	n/a	6.20	3.90	3.72	4.49

Notes: (1) Data for 1995 and 1996 are based on MSHA reports and are excluded from the average.
(2) Cost data excludes royalties, taxes and non-cash costs. Cost data for 1996 is based on management control report information which has not been verified. Cost data for 1998 is through November.

TABLE 4.2

MINE PLAN AND COST ESTIMATE
ROSEBUD MINE -- UNITS 1 & 2 (AREAS A, B & D)
FOR
CHASE SECURITIES, INC.
BY
JOHN T. BOYD COMPANY
MINING AND GEOLOGICAL CONSULTANTS
SEPTEMBER 1999

FOR CHASE SECURITIES, INC.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
OVERBURDEN REMOVAL											
Virgin Overburden (Bcy-000)	8,185	16,048	13,783	11,693	11,379	12,133	11,399	11,936	19,597	20,435	21,702
Contract Pre-Bench Volume (Bcy-000)	8	152	43	--	104	77	17	93	323	189	877
Dozer Pre-Bench Volume (Bcy-000)	2,191	4,470	2,293	997	1,823	1,933	991	2,293	6,515	6,142	8,288
Dragline Strip Volume:											
Virgin (Bcy-000)	5,986	11,426	11,447	10,696	9,452	10,123	10,391	9,551	12,759	14,104	12,537
Rehandle (Bcy-000)	1,679	3,043	1,791	973	1,287	1,451	905	1,539	4,002	4,226	5,066
Total Dragline	7,664	14,469	13,238	11,669	10,739	11,574	11,297	11,090	16,761	18,330	17,603
Total Effective Overburden (Bcy-000)	9,863	19,091	15,574	12,666	12,666	13,584	12,304	13,475	23,599	24,661	26,768
COAL PRODUCTION											
COAL RECOVERED (TONS-000):											
Area D	1,610	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220
Area A (Supplemental Reserves)	--	--	--	--	--	--	--	--	--	--	--
Area B (Supplemental Reserves)	--	--	--	--	--	--	--	--	--	--	--
Area B (Extended Resources)	--	--	--	--	--	--	--	--	--	--	--
Total	1,610	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220
Virgin Strip Ratio (Bcy/Rec. Ton)	5.08	4.98	4.28	3.63	3.53	3.77	3.54	3.71	6.09	6.35	6.74
Effective Strip Ratio (Bcy/Rec. Ton)	6.13	5.93	4.84	3.93	3.93	4.22	3.82	4.18	7.33	7.66	8.31
One-way haul distance (miles)	3.0	3.0	3.8	4.0	3.9	3.6	3.7	3.4	3.7	3.7	3.5
PRODUCT COAL QUALITY (AS RECD):											
Ash (%)	8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10
Sulfur (%)	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Btu/Lb	8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558
Na2O in Ash (%)	0.40	0.40	0.42	0.44	0.45	0.46	0.47	0.46	0.41	0.57	1.01
COAL SALES (TONS-000):											
Customer #4 -- Great Lakes	100	200	200	200	200	200	200	200	200	200	200
Customer #5 -- Colstrip #1 & #2	1,510	3,020	3,020	3,020	3,020	3,020	3,020	3,020	3,020	3,020	3,020
Total Coal Tonnage	1,610	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220

FOR CHASE SECURITIES, INC.	2010	2011	2012	2013	2014	2015
OVERBURDEN REMOVAL						
Virgin Overburden (Bcy-000)	22,790	18,392	13,539	14,833	16,448	17,056
Contract Pre-Bench Volume (Bcy-000)	1,127	225	--	--	8	--
Dozer Pre-Bench Volume (Bcy-000)	9,270	5,939	2,128	3,409	5,018	5,633
Dragline Strip Volume:						
Virgin (Bcy-000)	12,393	12,229	11,411	11,424	11,422	11,423
Rehandle (Bcy-000)	5,317	4,237	2,424	3,364	3,957	4,216
Total Dragline	17,711	16,466	13,835	14,788	15,380	15,639
Total Effective Overburden (Bcy-000)	28,107	22,629	15,963	18,197	20,406	21,273
COAL PRODUCTION						
COAL RECOVERED (TONS-000):						
Area D	3,220	3,160	--	--	--	--
Area A (Supplemental Reserves)	--	--	--	--	--	--
Area B (Supplemental Reserves)	--	60	3,157	3,157	3,157	3,157
Area B (Extended Resources)	--	--	--	--	--	--
Total	3,220	3,220	3,157	3,157	3,157	3,157
Virgin Strip Ratio (Bcy/Rec. Ton)	7.08	5.71	4.29	4.70	5.21	5.40
Effective Strip Ratio (Bcy/Rec. Ton)	8.73	7.03	5.06	5.76	6.46	6.74
One-way haul distance (miles)	2.9	3.4	5.7	5.5	4.9	6.1
PRODUCT COAL QUALITY (AS RECD):						
Ash (%)	8.10	8.10	8.85	8.85	8.85	8.85
Sulfur (%)	0.64	0.64	0.72	0.72	0.72	0.72
Btu/Lb	8,558	8,558	8,740	8,740	8,740	8,740
Na2O in Ash (%)	1.38	1.35	0.30	0.30	0.30	0.30
COAL SALES (TONS-000):						
Customer #4 -- Great Lakes	200	200	200	200	200	200
Customer #5 -- Colstrip #1 & #2	3,020	3,020	2,957	2,957	2,957	2,957
Total Coal Tonnage	3,220	3,220	3,157	3,157	3,157	3,157

FOR CHASE SECURITIES, INC.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
MINE OPERATING COSTS ($-000):											
OVERBURDEN REMOVAL OPERATIONS:											
Drilling & Blasting	818	1,606	1,381	1,173	1,142	1,219	1,147	1,202	1,975	2,062	2,192
Contract Pre-Bench	7	137	38	--	94	70	15	84	293	172	797
Dozer Pre-Bench	460	940	482	210	384	408	209	485	1,379	1,301	1,758
Dragline Stripping	1,380	2,607	2,388	2,107	1,941	2,094	2,046	2,010	3,041	3,329	3,200
Misc. Overburden Removal	82	161	138	117	114	122	115	120	198	206	219
Total Overburden Cost ($-000)	2,747	5,450	4,428	3,607	3,676	3,913	3,531	3,901	6,886	7,070	8,166
COAL MINING OPERATIONS:											
Drilling & Blasting	113	225	225	225	225	225	225	225	225	225	225
Coal Cleaning	64	129	129	129	129	129	129	129	129	129	129
Coal Loading/Pit Pumping	337	674	674	674	674	674	674	674	674	674	674
Coal Haulage & Roads	925	1,469	1,719	1,808	1,773	1,667	1,693	1,597	1,693	1,703	1,642
Stockpile and Crushing	274	547	547	547	547	547	547	547	547	547	547
Total Coal Mining Cost ($-000)	1,712	3,044	3,294	3,384	3,348	3,243	3,268	3,172	3,268	3,278	3,217
RECLAMATION OPERATIONS:											
Ongoing Reclamation	451	902	902	902	902	902	902	902	902	902	902
Final Reclamation Accrual	145	290	290	290	290	290	290	290	290	290	290
Total Reclamation Cost ($-000)	596	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191
OTHER EXPENSES:											
Power Systems Maintenance	32	63	63	63	63	63	63	63	63	63	63
Supervisory/Engineering	450	900	900	900	900	900	900	900	900	900	900
Warehouse/Inventory	93	186	186	186	186	186	186	186	186	186	186
Unallocated Maintenance	354	708	708	708	708	708	708	708	708	708	708
Lease Rent & Records	16	32	32	32	32	32	32	32	32	32	32
A & G and Overheads	1,200	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
Total Other Cost ($-000)	2,145	4,290	4,290	4,290	4,290	4,290	4,290	4,290	4,290	4,290	4,290
TOTAL OPERATING COST ($-000)	7,200	13,976	13,203	12,471	12,505	12,637	12,281	12,554	15,636	15,829	16,865
MINE COST BY FUNCTION ($/TON)											
Overburden Removal	1.71	1.69	1.38	1.12	1.14	1.22	1.10	1.21	2.14	2.20	2.54
Coal Mining	1.06	0.95	1.02	1.05	1.04	1.01	1.02	0.99	1.02	1.02	1.00
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Other Expenses	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
Total	4.47	4.34	4.10	3.87	3.88	3.92	3.81	3.90	4.86	4.92	5.24
MINE COST BY CATEGORY ($/TON)											
Labor	1.23	1.18	1.13	1.07	1.07	1.08	1.05	1.07	1.33	1.35	1.42
Power	0.39	0.37	0.35	0.32	0.30	0.32	0.31	0.31	0.43	0.45	0.45
Materials & Supplies	1.73	1.66	1.50	1.36	1.39	1.40	1.33	1.40	1.98	1.99	2.24
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
A & G and Overheads	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Total ($/Ton)	4.47	4.34	4.10	3.87	3.88	3.92	3.81	3.90	4.86	4.92	5.24

FOR CHASE SECURITIES, INC.	2010	2011	2012	2013	2014	2015
MINE OPERATING COSTS ($-000):						
OVERBURDEN REMOVAL OPERATIONS:						
Drilling & Blasting	2,304	1,861	1,371	1,504	1,669	1,733
Contract Pre-Bench	1,025	205	--	--	8	--
Dozer Pre-Bench	1,968	1,262	453	726	1,070	1,202
Dragline Stripping	3,223	2,999	2,523	2,699	2,810	2,860
Misc. Overburden Removal	230	186	137	150	167	173
Total Overburden Cost ($-000)	8,751	6,513	4,484	5,079	5,723	5,968
COAL MINING OPERATIONS:						
Drilling & Blasting	225	225	221	221	221	221
Coal Cleaning	129	129	126	126	126	126
Coal Loading/Pit Pumping	674	674	662	662	662	662
Coal Haulage & Roads	1,427	1,603	2,117	2,061	1,891	2,231
Stockpile and Crushing	547	547	537	537	537	537
Total Coal Mining Cost ($-000)	3,003	3,179	3,663	3,607	3,437	3,776
RECLAMATION OPERATIONS:						
Ongoing Reclamation	902	902	884	884	884	884
Final Reclamation Accrual	290	290	284	284	284	284
Total Reclamation Cost ($-000)	1,191	1,191	1,168	1,168	1,168	1,168
OTHER EXPENSES:						
Power Systems Maintenance	63	63	63	63	63	63
Supervisory/Engineering	900	900	900	900	900	900
Warehouse/Inventory	186	186	186	186	186	186
Unallocated Maintenance	708	708	695	695	695	695
Lease Rent & Records	32	32	32	32	32	32
A & G and Overheads	2,400	2,400	2,400	2,400	2,400	2,400
Total Other Cost ($-000)	4,290	4,290	4,275	4,275	4,275	4,275
TOTAL OPERATING COST ($-000)	17,235	15,173	13,590	14,129	14,604	15,188
MINE COST BY FUNCTION ($/TON)						
Overburden Removal	2.72	2.02	1.42	1.61	1.81	1.89
Coal Mining	0.93	0.99	1.16	1.14	1.05	1.20
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37
Other Expenses	1.33	1.33	1.33	1.35	1.35	1.35
Total	5.35	4.71	4.30	4.48	4.63	4.81
MINE COST BY CATEGORY ($/TON)						
Labor	1.45	1.29	1.20	1.24	1.27	1.33
Power	0.45	0.42	0.36	0.38	0.40	0.41
Materials & Supplies	2.33	1.88	1.60	1.71	1.81	1.93

FOR CHASE SECURITIES, INC.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL CAPITAL EXPENDITURES ($-000):											
Site Preparation	100	525	260	--	--	--	--	--	--	--	--
Buildings & Infrastructure	80	80	580	80	155	80	80	80	80	80	80
Mining Equipment	400	5,000	7,200	2,940	955	955	955	955	955	955	1,305
Support Equipment	210	390	210	360	210	260	390	210	210	260	210
Total Capital ($-000)	790	5,995	8,250	3,380	1,320	1,295	1,425	1,245	1,245	1,295	1,595
Depreciation $/Yr (000)	1,900	2,194	2,331	2,396	2,545	2,535	2,518	2,627	2,662	2,604	2,589
$/Ton	1.18	0.68	0.72	0.74	0.79	0.79	0.78	0.82	0.83	0.81	0.80

FOR CHASE SECURITIES, INC.	2010	2011	2012	2013	2014	2015
TOTAL CAPITAL EXPENDITURES ($-000):						
Site Preparation	900	850	--	--	--	--
Buildings & Infrastructure	580	330	580	80	80	80
Mining Equipment	10,155	2,905	6,390	955	3,755	3,755
Support Equipment	390	210	360	210	260	390
Total Capital ($-000)	12,025	4,295	7,330	1,245	4,095	4,225
Depreciation $/Yr (000)	2,943	3,334	3,604	3,757	3,811	3,855
$/Ton	0.91	1.04	1.14	1.19	1.21	1.22

Note: Projections based on data from January 1999

TABLE 4.2 -- (CONTINUED)

MINE PLAN AND COST ESTIMATE
ROSEBUD MINE -- UNITS 1 & 2 (AREAS A, B & D)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
OVERBURDEN REMOVAL											
Virgin Overburden (Bcy-000)	17,605	16,288	17,262	17,337	16,406	18,277	18,443	22,617	22,617	24,029	24,029
Contract Pre-Bench Volume (Bcy-000)	188	57	--	146	58	119	453	--	--	--	--
Dozer Pre-Bench Volume (Bcy-000)	5,993	4,806	5,839	5,733	4,184	5,591	6,732	9,895	9,895	11,308	11,308
Dragline Strip Volume:											
Virgin (Bcy-000)	11,424	11,425	11,423	11,459	12,163	12,566	11,258	12,722	12,722	12,722	12,722
Rehandle (Bcy-000)	4,260	3,931	4,303	4,176	3,181	4,042	4,364	5,788	5,788	6,081	6,081
Total Dragline	15,684	15,357	15,726	15,634	15,344	16,608	15,622	18,510	18,510	18,803	18,803
Total Effective Overburden (Bcy-000)	21,865	20,220	21,565	21,513	19,586	22,319	22,807	28,405	28,405	30,111	30,111
COAL PRODUCTION											
Coal Recovered (Tons-000):											
Area D	--	--	--	--	--	--	--	--	--	--	--
Area A (Supplemental Reserves)	--	--	--	--	3,166	3,166	3,068	--	--	--	--
Area B (Supplemental Reserves)	3,157	3,157	3,157	3,157	--	--	--	--	--	--	--
Area B (Extended Resources)	--	--	--	--	--	--	98	3,157	3,157	3,157	3,157
Total	3,157	3,157	3,157	3,157	3,166	3,166	3,166	3,157	3,157	3,157	3,157
Virgin Strip Ratio (Bcy/Rec. Ton)	5.58	5.16	5.47	5.49	5.18	5.77	5.83	7.16	7.16	7.61	7.61
Effective Strip Ratio (Bcy/Rec. Ton)	6.93	6.40	6.83	6.81	6.19	7.05	7.20	9.00	9.00	9.54	9.54
One-way haul distance (miles)	4.9	3.6	5.7	4.3	7.5	7.5	7.5	5.5	5.5	5.6	5.6
PRODUCT COAL QUALITY (AS RECD):											
Ash (%)	8.85	8.85	8.85	8.85	8.91	8.91	8.91	8.85	8.85	8.85	8.85
Sulfur (%)	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Btu/Lb.	8,740	8,740	8,740	8,740	8,713	8,713	8,713	8,740	8,740	8,740	8,740
Na2O in Ash (%)	0.30	0.30	0.30	0.30	0.54	0.54	0.54	0.30	0.30	0.30	0.30
COAL SALES (TONS-000):											
Customer #4 -- Great Lakes	200	200	200	200	200	200	200	200	200	200	200
Customer #5 -- Colstrip #1 & #2	2,957	2,957	2,957	2,957	2,966	2,966	2,966	2,957	2,957	2,957	2,957
Total Coal Tonnage	3,157	3,157	3,157	3,157	3,166	3,166	3,166	3,157	3,157	3,157	3,157
MINE OPERATING COSTS ($-000):											
OVERBURDEN REMOVAL OPERATIONS:											
Drilling & Blasting	1,790	1,658	1,759	1,768	1,675	1,868	1,887	2,316	2,318	2,465	2,468
Contract Pre-Bench	172	52	--	134	53	110	417	--	--	--	--
Dozer Pre-Bench	1,280	1,027	1,249	1,228	897	1,200	1,446	2,128	2,130	2,436	2,439
Dragline Stripping	2,871	2,814	2,884	2,870	2,820	3,055	2,877	3,412	3,415	3,472	3,476
Misc. Overburden Removal	179	166	176	177	168	187	189	232	232	247	247
Total Overburden Cost ($-000)	6,293	5,718	6,069	6,177	5,613	6,420	6,815	8,087	8,095	8,621	8,629

	2027	2028	2029	2030	TOTAL
OVERBURDEN REMOVAL					
Virgin Overburden (Bcy-000)	24,029	25,443	25,443	26,857	578,030
Contract Pre-Bench Volume (Bcy-000)	--	--	--	1,414	5,677
Dozer Pre-Bench Volume (Bcy-000)	11,308	12,722	12,722	12,722	200,087
Dragline Strip Volume:					
Virgin (Bcy-000)	12,722	12,722	12,722	12,722	372,266
Rehandle (Bcy-000)	6,081	6,297	6,297	6,297	126,445
Total Dragline	18,803	19,019	19,019	19,019	498,711
Total Effective Overburden (Bcy-000)	30,111	31,740	31,740	33,154	704,474
COAL PRODUCTION					
Coal Recovered (Tons-000):					
Area D	--	--	--	--	40,190
Area A (Supplemental Reserves)	--	--	--	--	9,400
Area B (Supplemental Reserves)	--	--	--	--	25,316
Area B (Extended Resources)	3,157	3,157	3,157	3,157	25,354
Total	3,157	3,157	3,157	3,157	100,260
Virgin Strip Ratio (Bcy/Rec. Ton)	7.61	8.06	8.06	8.51	5.77
Effective Strip Ratio (Bcy/Rec. Ton)	9.54	10.05	10.05	10.50	7.03
One-way haul distance (miles)	5.7	5.7	5.8	5.8	
PRODUCT COAL QUALITY (AS RECD):					
Ash (%)	8.85	8.85	8.85	8.85	
Sulfur (%)	0.72	0.72	0.72	0.72	
Btu/Lb.	8,740	8,740	8,740	8,740	
Na2O in Ash (%)	0.30	0.30	0.30	0.30	
COAL SALES (TONS-000):					
Customer #4 -- Great Lakes	200	200	200	200	6,300
Customer #5 -- Colstrip #1 & #2	2,957	2,957	2,957	2,957	93,960
Total Coal Tonnage	3,157	3,157	3,157	3,157	100,260
MINE OPERATING COSTS ($-000):					
OVERBURDEN REMOVAL OPERATIONS:					
Drilling & Blasting	2,470	2,618	2,621	2,769	58,813
Contract Pre-Bench	--	--	--	1,312	5,195
Dozer Pre-Bench	2,441	2,749	2,752	2,754	42,854
Dragline Stripping	3,479	3,523	3,526	3,530	91,280
Misc. Overburden Removal	247	262	262	277	5,881
Total Overburden Cost ($-000)	8,638	9,152	9,160	10,642	204,023

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
COAL MINING OPERATIONS:											
Drilling & Blasting	221	221	221	221	222	222	222	221	221	221	221
Coal Cleaning	126	126	126	126	127	127	127	126	126	126	126
Coal Loading/Pit Pumping	662	662	662	662	664	664	664	662	662	662	662
Coal Haulage & Roads	1,891	1,635	2,117	1,721	2,401	2,401	2,401	2,061	2,061	2,089	2,089
Stockpile and Crushing	537	537	537	537	538	538	538	537	537	537	537
Total Coal Mining Cost ($-000)	3,437	3,181	3,663	3,267	3,951	3,951	3,951	3,607	3,607	3,635	3,635
RECLAMATION OPERATIONS:											
Ongoing Reclamation	884	884	884	884	886	886	886	884	884	884	884
Final Reclamation Accrual	284	284	284	284	285	285	285	284	284	284	284
Total Reclamation Cost ($-000)	1,168	1,168	1,168	1,168	1,171	1,171	1,171	1,168	1,168	1,168	1,168
OTHER EXPENSES:											
Power Systems Maintenance	63	63	63	63	63	63	63	63	63	63	63
Supervisory/Engineering	900	900	900	900	900	900	900	900	900	900	900
Warehouse/Inventory	186	186	186	186	186	186	186	186	186	186	186
Unallocated Maintenance	695	695	695	695	697	697	697	695	695	695	695
Lease Rent & Records	32	32	32	32	32	32	32	32	32	32	32
A & G and Overheads	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
Total Other Cost ($-000)	4,275	4,275	4,275	4,275	4,277	4,277	4,277	4,275	4,275	4,275	4,275
TOTAL OPERATING COST ($-000)	15,173	14,341	15,175	14,888	15,013	15,820	16,215	17,137	17,145	17,699	17,707
MINE COST BY FUNCTION ($/TON)											
Overburden Removal	1.99	1.81	1.92	1.96	1.77	2.03	2.15	2.56	2.56	2.73	2.73
Coal Mining	1.09	1.01	1.16	1.03	1.25	1.25	1.25	1.14	1.14	1.15	1.15
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Other Expenses	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Total	4.81	4.54	4.81	4.72	4.74	5.00	5.12	5.43	5.43	5.61	5.61
MINE COST BY CATEGORY ($/TON)											
Labor	1.32	1.25	1.33	1.29	1.32	1.39	1.42	1.49	1.49	1.54	1.54
Power	0.41	0.40	0.41	0.41	0.40	0.43	0.41	0.48	0.48	0.49	0.49
Materials & Supplies	1.94	1.76	1.93	1.87	1.88	2.04	2.15	2.32	2.32	2.44	2.44
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
A & G and Overheads	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Total ($/Ton)	4.81	4.54	4.81	4.72	4.74	5.00	5.12	5.43	5.43	5.61	5.61
TOTAL CAPITAL EXPENDITURES ($-000):											
Site Preparation	--	--	--	--	550	--	--	--	--	--	--
Buildings & Infrastructure	2,080	80	80	155	80	80	80	80	80	80	80
Mining Equipment	955	1,305	2,155	955	3,405	3,955	1,090	655	655	655	2,205
Support Equipment	210	210	260	210	390	210	360	210	260	390	210
Total Capital ($-000)	3,245	1,595	2,495	1,320	4,425	4,245	1,530	945	995	1,125	2,495
Depreciation $/Yr (000)	3,660	3,488	3,446	3,407	3,298	3,226	3,254	3,211	3,166	2,982	2,753
$/Ton	1.16	1.10	1.09	1.08	1.04	1.02	1.03	1.02	1.00	0.94	0.87

	2027	2028	2029	2030	TOTAL
COAL MINING OPERATIONS:					
Drilling & Blasting	221	221	221	221	7,018
Coal Cleaning	126	126	126	126	4,010
Coal Loading/Pit Pumping	662	662	662	662	21,002
Coal Haulage & Roads	2,117	2,117	2,146	2,146	60,416
Stockpile and Crushing	537	537	537	537	17,044
Total Coal Mining Cost ($-000)	3,663	3,663	3,692	3,692	109,491
RECLAMATION OPERATIONS:					
Ongoing Reclamation	884	884	884	884	28,073
Final Reclamation Accrual	284	284	284	284	9,023
Total Reclamation Cost ($-000)	1,168	1,168	1,168	1,168	37,096
OTHER EXPENSES:					
Power Systems Maintenance	63	63	63	63	1,985
Supervisory/Engineering	900	900	900	900	28,350
Warehouse/Inventory	186	186	186	186	5,859
Unallocated Maintenance	695	695	695	695	22,057
Lease Rent & Records	32	32	32	32	1,003
A & G and Overheads	2,400	2,400	2,400	2,400	75,600
Total Other Cost ($-000)	4,275	4,275	4,275	4,275	134,853
TOTAL OPERATING COST ($-000)	17,744	18,258	18,295	19,776	485,463
MINE COST BY FUNCTION ($/TON)					
Overburden Removal	2.74	2.90	2.90	3.37	2.03
Coal Mining	1.16	1.16	1.17	1.17	1.09
Reclamation	0.37	0.37	0.37	0.37	0.37
Other Expenses	1.35	1.35	1.35	1.35	1.35
Total	5.62	5.78	5.80	6.26	4.84
MINE COST BY CATEGORY ($/TON)					
Labor	1.54	1.58	1.59	1.70	1.33
Power	0.49	0.50	0.50	0.51	0.41
Materials & Supplies	2.45	2.56	2.57	2.91	1.96
Reclamation	0.37	0.37	0.37	0.37	0.37
A & G and Overheads	0.77	0.77	0.77	0.77	0.76
Total ($/Ton)	5.62	5.78	5.80	6.26	4.84
TOTAL CAPITAL EXPENDITURES ($-000):					
Site Preparation	--	--	--	--	--
Buildings & Infrastructure	155	80	--	--	6,375
Mining Equipment	455	300	50	--	69,285
Support Equipment	210	150	45	--	8,065
Total Capital ($-000)	820	530	95	--	86,910

TABLE 4.3

MINE PLAN AND COST ESTIMATE
ROSEBUD MINE -- UNITS 3 & 4 FUEL SUPPLY (AREAS C & F)
FOR
CHASE SECURITIES, INC
BY
JOHN T. BOYD COMPANY
MINING AND GEOLOGICAL CONSULTANTS

SEPTEMBER 1999

FOR CHASE SECURITIES, INC.	1999	2000	2001	2002	2003
OVERBURDEN REMOVAL					
Virgin Overburden (Bcy-000).....	9,075	14,515	14,673	14,803	15,628
Contract Pre-Bench Volume (Bcy-000).....	--	--	--	--	--
Dozer Pre-Bench Volume (Bcy-000).....	--	--	--	--	207
Dragline Strip Volume:					
Virgin (Bcy-000).....	9,075	14,515	14,673	14,803	15,421
Rehandle (Bcy-000).....	--	--	--	--	259
Total Dragline.....	9,075	14,515	14,673	14,803	15,680
Total Effective Overburden (Bcy-000).....	9,075	14,515	14,673	14,803	15,887
COAL PRODUCTION					
Coal Recovered (Tons-000) Area C.....	3,485	6,971	6,971	6,971	6,971
Area F.....	--	--	--	--	--
Total.....	3,485	6,971	6,971	6,971	6,971
Product Coal Quality (As-Recd):					
Ash (%).....	9.27	9.27	9.33	9.41	9.41
Sulfur (%).....	0.68	0.68	0.69	0.68	0.68
Btu/Lb.....	8,506	8,509	8,507	8,509	8,509
Na(2)O in Ash (%).....	0.76	0.38	0.33	0.34	0.34
Strip Ratio (Bcy/Recovered Ton).....	2.60	2.08	2.10	2.12	2.24
Effective Strip Ratio (Bcy/ Rec.Ton).....	2.60	2.08	2.10	2.12	2.28
One-Way Distance (Mi).....	4.76	5.13	6.17	7.21	7.21
Coal Sales Tonnage:					
Customer #1 -- CELP (Waste Coal).....	125	250	250	250	250
Customer #2 -- Colstrip #3 & #4.....	3,485	6,971	6,971	6,971	6,971
Total Sales Tonnage.....	3,610	7,221	7,221	7,221	7,221

FOR CHASE SECURITIES, INC.	2004	2005	2006	2007	2008	2009
OVERBURDEN REMOVAL						
Virgin Overburden (Bcy-000).....	19,203	21,923	24,569	26,283	29,041	31,649
Contract Pre-Bench Volume (Bcy-000).....	--	--	115	52	78	103
Dozer Pre-Bench Volume (Bcy-000).....	1,030	1,716	2,197	3,327	4,456	5,585
Dragline Strip Volume:						
Virgin (Bcy-000).....	18,173	20,207	22,257	22,905	24,508	25,961
Rehandle (Bcy-000).....	1,104	1,820	2,339	3,683	4,753	5,972
Total Dragline.....	19,277	22,027	24,596	26,588	29,260	31,932
Total Effective Overburden (Bcy-000).....	20,307	23,743	26,908	29,967	33,794	37,620
COAL PRODUCTION						
Coal Recovered (Tons-000) Area C.....	6,971	6,971	6,971	6,971	6,971	6,971
Area F.....	--	--	--	--	--	--
Total.....	6,971	6,971	6,971	6,971	6,971	6,971
Product Coal Quality (As-Recd):						
Ash (%).....	9.41	9.41	9.41	9.41	9.41	9.34
Sulfur (%).....	0.68	0.68	0.68	0.68	0.68	0.68
Btu/Lb.....	8,509	8,509	8,509	8,509	8,509	8,509
Na(2)O in Ash (%).....	0.34	0.34	0.34	0.34	0.34	0.48
Strip Ratio (Bcy/Recovered Ton).....	2.75	3.14	3.52	3.77	4.17	4.54
Effective Strip Ratio (Bcy/ Rec.Ton).....	2.91	3.41	3.86	4.30	4.85	5.40
One-Way Distance (Mi).....	7.21	7.21	7.21	5.06	5.06	5.06
Coal Sales Tonnage:						
Customer #1 -- CELP (Waste Coal).....	250	250	250	250	250	250

FOR CHASE SECURITIES, INC.	1999	2000	2001	2002	2003
MINE OPERATING COSTS ($-000):					
OVERBURDEN REMOVAL OPERATIONS:					
Drilling & Blasting	907	1,453	1,470	1,485	1,569
Contract Pre-Bench	--	--	--	--	--
Dozer Pre-Bench	--	--	--	--	44
Dragline Stripping	1,633	2,615	2,646	2,673	2,834
Misc. Overburden Removal	91	145	147	148	157
Total Overburden Cost ($-000)	2,632	4,214	4,264	4,306	4,603
COAL MINING OPERATIONS:					
Drilling & Blasting	244	488	488	488	488
Coal Cleaning	139	279	279	279	279
Coal Loading/Pit Pumping	730	1,459	1,459	1,459	1,459
Coal Haulage & Roads	2,210	4,677	5,399	5,639	5,639
Stockpile and Crushing	592	1,185	1,185	1,185	1,185
Total Coal Mining Cost ($-000)	3,915	8,089	8,811	9,050	9,050
RECLAMATION OPERATIONS:					
Ongoing Reclamation	976	1,952	1,952	1,952	1,952
Final Recl. Accrual	314	627	627	627	627
Reclamation Cost ($-000)	1,289	2,579	2,579	2,579	2,579
OTHER EXPENDITURES:					
Power Systems Maintenance	68	135	135	135	135
Supervisory/Engineering	975	1,950	1,950	1,950	1,950
Warehouse/Inventory	400	400	400	400	400
Unallocated Maintenance	592	1,185	1,185	1,185	1,185
Lease Rent & Records	67	67	67	67	67
A & G and Overheads	2,625	5,250	5,250	5,250	5,250
Total Other Cost ($-000)	4,727	8,987	8,987	8,987	8,987
TOTAL MINE OPERATING EXPENSE:					
Total Dollars ($-000) All Coal	12,563	23,869	24,641	24,922	25,220
Total Dollars ($-000) Units 3&4 Fuel	12,424	23,590	24,362	24,643	24,941
MINE COST BY FUNCTION ($/TON -- UNITS 3&4 FUEL ONLY)					
Overburden Removal	0.76	0.60	0.61	0.62	0.66
Coal Mining	1.08	1.12	1.22	1.26	1.26
Reclamation	0.37	0.37	0.37	0.37	0.37
Other Expenses	1.36	1.29	1.29	1.29	1.29
Total	3.56	3.38	3.49	3.54	3.58

FOR CHASE SECURITIES, INC.	2004	2005	2006	2007	2008	2009
MINE OPERATING COSTS ($-000):						
OVERBURDEN REMOVAL OPERATIONS:						
Drilling & Blasting	1,930	2,205	2,474	2,649	2,930	3,197
Contract Pre-Bench	--	--	104	47	70	93
Dozer Pre-Bench	217	362	465	704	944	1,185
Dragline Stripping	3,487	3,989	4,458	4,824	5,314	5,805
Misc. Overburden Removal	193	221	247	265	293	320
Total Overburden Cost ($-000)	5,827	6,777	7,748	8,490	9,552	10,600
COAL MINING OPERATIONS:						
Drilling & Blasting	488	488	488	488	488	488
Coal Cleaning	279	279	279	279	279	279
Coal Loading/Pit Pumping	1,459	1,459	1,459	1,459	1,459	1,459
Coal Haulage & Roads	5,639	5,156	5,156	4,290	4,290	4,290
Stockpile and Crushing	1,185	1,185	1,185	1,185	1,185	1,185
Total Coal Mining Co	9,050	8,568	8,568	7,701	7,701	7,701
($-000)						
RECLAMATION OPERATIONS:						
Ongoing Reclamation	1,952	1,952	1,952	1,952	1,952	1,952

FOR CHASE SECURITIES, INC.	1999	2000	2001	2002	2003
MINE COST BY CONTRACT CATEGORY ($/TON -- UNITS 3&4 FUEL ONLY)					
Labor	0.99	0.92	0.96	0.97	0.98
Power	0.28	0.25	0.25	0.25	0.26
Materials & Supplies	1.15	1.09	1.16	1.19	1.21
Reclamation (Excl Accrual)	0.28	0.28	0.28	0.28	0.28
A & G and Overheads	0.77	0.76	0.76	0.76	0.76
Total ($/Ton)	3.47	3.29	3.40	3.45	3.49
TOTAL CAPITAL EXPENDITURE ($-000):					
Site Preparation	366	974	520	932	920
Buildings & Infrastructure	--	2,495	710	410	985
Mining Equipment	2,210	10,650	4,740	1,850	3,950
Support Equipment	385	436	210	170	170
Total Capital	2,961	14,555	6,180	3,362	6,025
Depreciation $/Yr (000)	2,327	3,062	3,997	4,302	4,555
$/Ton (Units 3&4 Fuel Only)	0.67	0.44	0.57	0.62	0.65

FOR CHASE SECURITIES, INC.	2004	2005	2006	2007	2008	2009
MINE COST BY CONTRACT CATEGORY ($/TON -- UNITS 3&4 FUEL ONLY)						
Labor	1.03	1.04	1.08	1.07	1.11	1.15
Power	0.29	0.31	0.33	0.35	0.37	0.40
Materials & Supplies	1.30	1.33	1.41	1.39	1.48	1.57
Reclamation (Excl Accrual)	0.28	0.28	0.28	0.28	0.28	0.28
A & G and Overheads	0.76	0.76	0.76	0.76	0.76	0.76
Total ($/Ton)	3.66	3.73	3.87	3.85	4.00	4.15
TOTAL CAPITAL EXPENDITURE ($-000):						
Site Preparation	--	--	--	--	--	--
Buildings & Infrastructure	132	132	132	132	132	132
Mining Equipment	4,465	5,665	1,665	2,015	1,665	2,100
Support Equipment	660	855	585	585	660	585
Total Capital	5,257	6,652	2,382	2,732	2,457	2,817
Depreciation $/Yr (000)	5,057	5,519	5,846	5,980	5,996	5,948
$/Ton (Units 3&4 Fuel Only)	0.73	0.79	0.84	0.86	0.86	0.85

FOR CHASE SECURITIES, INC.	2010	2011	2012	2013	2014	2015
MINE COST BY CONTRACT CATEGORY ($/TON -- UNITS 3&4 FUEL ONLY)						
Labor	1.19	1.23	1.24	1.24	1.24	1.24
Power	0.42	0.44	0.45	0.45	0.45	0.45
Materials & Supplies	1.65	1.74	1.79	1.79	1.79	1.79
Reclamation (Excl Accrual)	0.28	0.28	0.28	0.28	0.28	0.28
A & G and Overheads	0.76	0.76	0.76	0.76	0.76	0.76
Total ($/Ton)	4.31	4.46	4.52	4.52	4.52	4.52
TOTAL CAPITAL EXPENDITURE ($-000):						
Site Preparation	--	--	--	--	--	--
Buildings & Infrastructure	132	132	132	132	132	132
Mining Equipment	5,165	4,865	4,915	1,365	5,865	3,565
Support Equipment	855	585	885	585	660	855
Total Capital	6,152	5,582	5,932	2,082	6,657	4,552
Depreciation $/Yr (000)	6,117	6,217	6,062	5,759	5,760	5,620
$/Ton (Units 3&4 Fuel Only)	0.88	0.89	0.87	0.83	0.83	0.81

Note: Projections based on data from January 1999

TABLE 4.3 -- CONTINUED

MINE PLAN AND COST ESTIMATE
ROSEBUD MINE -- UNITS 3 & 4 FUEL SUPPLY (AREAS C & F)

FOR CHASE SECURITIES INC	2016	2017	2018	2019	2020
OVERBURDEN REMOVAL					
Virgin Overburden (Bcy-000).....	39,139	38,859	38,859	42,422	22,845
Contract Pre-Bench Volume (Bcy-000).....	101	800	800	840	--
Dozer Pre-Bench Volume (Bcy-000)...	11,456	13,719	13,719	14,483	1,088
Dragline Strip Volume:					
Virgin (Bcy-000).....	27,582	24,339	24,339	27,099	21,757
Rehandle (Bcy-000).....	9,077	8,963	8,963	9,484	1,034
Total Dragline.....	36,659	33,302	33,302	36,583	22,790
Total Effective Overburden (Bcy-000).....	48,216	47,821	47,821	51,906	23,879
COAL PRODUCTION					
Coal Recovered (Tons-000)					
Area C.....	6,971	6,971	6,971	6,971	--
Area F.....	--	--	--	--	6,900
Total.....	6,971	6,971	6,971	6,971	6,900
Product Coal Quality (As-Recd):					
Ash (%).....	9.28	9.22	9.22	9.17	8.68
Sulfur (%).....	0.68	0.68	0.68	0.69	0.77
Btu/Lb.....	8,509	8,508	8,508	8,516	8,591
Na2O in Ash (%).....	0.60	0.62	0.62	0.66	1.05
Strip Ratio (Bcy/Recovered Ton):...	5.61	5.57	5.57	6.09	3.31
Effective Strip Ratio (Bcy/Rec.Ton):.....	6.92	6.86	6.86	7.45	3.46
One-Way Distance (Mi).....	4.53	5.65	5.65	5.65	6.20
Coal Sales Tonnage:					
Customer #1 -- CELP (Waste Coal)...	250	250	250	250	250
Customer #2 -- Colstrip #3 & #4....	6,971	6,971	6,971	6,971	6,900
Total Sales Tonnage.....	7,221	7,221	7,221	7,221	7,150
MINE OPERATING COSTS ($-000):					
OVERBURDEN REMOVAL OPERATIONS:					
Drilling & Blasting.....	3,980	3,956	3,960	4,242	2,287
Contract Pre-Bench.....	93	733	734	756	--
Dozer Pre-Bench.....	2,447	2,933	2,936	3,041	229
Dragline Stripping.....	6,711	6,102	6,108	6,585	4,106
Misc. Overburden Removal.....	398	396	396	424	229
Total Overburden Cost ($-000).....	13,629	14,120	14,133	15,049	6,851
COAL MINING OPERATIONS:					
Drilling & Blasting.....	488	488	488	488	483
Coal Cleaning.....	279	279	279	279	276
Coal Loading/Pit Pumping.....	1,459	1,459	1,459	1,459	1,446
Coal Haulage & Roads.....	3,957	4,660	4,660	4,660	4,954
Stockpile and Crushing.....	1,185	1,185	1,185	1,185	1,173
Total Coal Mining Cost ($-000).....	7,369	8,071	8,071	8,071	8,332
RECLAMATION OPERATIONS:					
Ongoing Reclamation.....	1,952	1,952	1,952	1,952	1,932

FOR CHASE SECURITIES INC	2021	2022	2023	2024	2025	2026
OVERBURDEN REMOVAL						
Virgin Overburden (Bcy-000).....	22,659	20,257	28,203	33,101	34,066	41,283
Contract Pre-Bench Volume (Bcy-000).....	--	--	25	50	47	676
Dozer Pre-Bench Volume (Bcy-000)...	1,043	658	4,269	5,401	5,934	11,351
Dragline Strip Volume:						
Virgin (Bcy-000).....	21,616	19,599	23,910	27,650	28,086	29,255
Rehandle (Bcy-000).....	990	587	3,484	4,332	4,813	7,888
Total Dragline.....	22,607	20,186	27,394	31,982	32,900	37,143
Total Effective Overburden (Bcy-000).....	23,649	20,844	31,687	37,433	38,880	49,170
COAL PRODUCTION						
Coal Recovered (Tons-000)						

FOR CHASE SECURITIES INC	2016	2017	2018	2019	2020
Final Recl. Accrual	627	627	627	627	621
Reclamation Cost ($-000)	2,579	2,579	2,579	2,579	2,553
OTHER EXPENDITURES:					
Power Systems Maintenance	135	135	135	135	135
Supervisory/Engineering	1,950	1,950	1,950	1,950	1,950
Warehouse/Inventory	400	400	400	400	400
Unallocated Maintenance	1,185	1,185	1,185	1,185	1,173
Lease Rent & Records	67	67	67	67	67
A & G and Overheads	5,250	5,250	5,250	5,250	5,250
Total Other Cost ($-000)	8,987	8,987	8,987	8,987	8,975
TOTAL MINE OPERATING EXPENSE:					
Total Dollars ($-000) All Coal	32,564	33,757	33,771	34,687	26,711
Total Dollars ($-000) Units 3&4 Fuel	32,285	33,479	33,492	34,408	26,435
MINE COST BY FUNCTION ($/TON -- UNITS 3&4 FUEL ONLY)					
Overburden Removal	1.96	2.03	2.03	2.16	0.99
Coal Mining	1.02	1.12	1.12	1.12	1.17
Reclamation	0.37	0.37	0.37	0.37	0.37
Other Expenses	1.29	1.29	1.29	1.29	1.30
Total	4.63	4.80	4.80	4.94	3.83
MINE COST BY CONTRACT CATEGORY ($/TON -- UNITS 3&4 FUEL ONLY)					
Labor	1.25	1.30	1.30	1.33	1.04
Power	0.45	0.42	0.42	0.45	0.32
Materials & Supplies	1.80	1.95	1.95	2.02	1.33
Reclamation (Excl Accrual)	0.28	0.28	0.28	0.28	0.28
A & G and Overheads	0.76	0.76	0.76	0.76	0.77
Total ($/Ton)	4.54	4.71	4.71	4.85	3.74
TOTAL CAPITAL EXPENDITURE ($-000):					
Site Preparation	--	--	--	1,050	500
Buildings & Infrastructure	132	132	132	982	2,782
Mining Equipment	2,715	1,865	1,365	9,900	4,365
Support Equipment	585	585	660	585	855
Total Capital	3,432	2,582	2,157	12,517	8,502
Depreciation $/Yr (000)	5,305	5,149	4,970	5,056	4,769
$/Ton (Units 3&4 Fuel Only)	0.76	0.74	0.71	0.73	0.69

FOR CHASE SECURITIES INC	2021	2022	2023	2024	2025	2026
Final Recl. Accrual	621	621	621	621	621	621
Reclamation Cost ($-000)	2,553	2,553	2,553	2,553	2,553	2,553
OTHER EXPENDITURES:						
Power Systems Maintenance	135	135	135	135	135	135
Supervisory/Engineering	1,950	1,950	1,950	1,950	1,950	1,950
Warehouse/Inventory	400	400	400	400	400	400
Unallocated Maintenance	1,173	1,173	1,173	1,173	1,173	1,173
Lease Rent & Records	67	67	67	67	67	67
A & G and Overheads	5,250	5,250	5,250	5,250	5,250	5,250
Total Other Cost ($-000)	8,975	8,975	8,975	8,975	8,975	8,975
TOTAL MINE OPERATING EXPENSE:						
Total Dollars ($-000) All Coal	28,851	28,186	32,653	34,739	34,467	37,374
Total Dollars ($-000) Units 3&4 Fuel	28,575	27,910	32,377	34,463	34,191	37,098
MINE COST BY FUNCTION ($/TON -- UNITS 3&4 FUEL ONLY)						
Overburden Removal	0.98	0.87	1.30	1.54	1.60	2.08
Coal Mining	1.49	1.50	1.72	1.78	1.69	1.63
Reclamation	0.37	0.37	0.37	0.37	0.37	0.37
Other Expenses	1.30	1.30	1.30	1.30	1.30	1.30
Total	4.14	4.04	4.69	4.99	4.96	5.38
MINE COST BY CONTRACT CATEGORY ($/						

Note: Projections based on data from January 1999

TABLE 4.4

CONVEYOR OPERATING COST ESTIMATE
ROSEBUD MINE -- UNITS 3 & 4 (AREAS C & F)
FOR
CHASE SECURITIES, INC.
BY
JOHN T. BOYD COMPANY
MINING AND GEOLOGICAL CONSULTANTS
SEPTEMBER 1999

YEAR:	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
COAL CONVEYED (TONS-000).....	3,485	6,971	6,971	6,971	6,971	6,971	6,971	6,971	6,971	6,971	6,971	6,971
CONVEYOR OPERATING COSTS												
Operating Expense by Category ($-000)												
Labor.....	345	690	690	690	690	690	690	690	690	690	690	690
Power.....	230	460	460	460	460	460	460	460	460	460	460	460
Materials & Supplies.....	192	383	383	383	383	383	383	383	383	383	383	383
Total ($/Ton Sold).....	767	1,534	1,534	1,534	1,534	1,534	1,534	1,534	1,534	1,534	1,534	1,534
Operating Expense by Category ($/Ton)												
Labor.....	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Power.....	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Materials & Supplies.....	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Total Dollars ($-000).....	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
CONVEYOR CAPITAL COSTS ($-000):												
Facility Upgrades.....	--	--	--	--	100	--	--	--	--	100	--	--
Conveyor Belting & Structure.....	160	160	160	160	160	160	160	160	160	160	160	160
Maintenance/Support Equipment.....	30	60	30	60	30	60	30	60	30	60	30	60
Miscellaneous.....	25	25	25	25	25	25	25	25	25	25	25	25
Total Capital ($-000).....	215	245	215	245	315	245	215	245	215	345	215	245
Conveyor Depreciation ($-000).....	473	506	533	557	592	621	642	685	698	693	687	680
Conveyor Depreciation ($/Ton).....	0.14	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.10	0.10

YEAR:	2011	2012	2013	2014	2015
COAL CONVEYED (TONS-000).....	6,971	6,971	6,971	6,971	6,971
CONVEYOR OPERATING COSTS					
Operating Expense by Category ($-000)					
Labor.....	690	690	690	690	690
Power.....	460	460	460	460	460
Materials & Supplies.....	383	383	383	383	383
Total ($/Ton Sold).....	1,534	1,534	1,534	1,534	1,534
Operating Expense by Category ($/Ton)					
Labor.....	0.10	0.10	0.10	0.10	0.10
Power.....	0.07	0.07	0.07	0.07	0.07
Materials & Supplies.....	0.06	0.06	0.06	0.06	0.06
Total Dollars ($-000).....	0.22	0.22	0.22	0.22	0.22
CONVEYOR CAPITAL COSTS ($-000):					
Facility Upgrades.....	--	--	100	--	--
Conveyor Belting & Structure.....	160	160	160	160	160
Maintenance/Support Equipment.....	30	60	30	60	30
Miscellaneous.....	25	25	25	25	25
Total Capital ($-000).....	215	245	315	245	215
Conveyor Depreciation ($-000).....	626	626	629	633	633
Conveyor Depreciation ($/Ton).....	0.09	0.09	0.09	0.09	0.09

YEAR:	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
COAL CONVEYED (TONS-000).....	6,971	6,971	6,971	6,971	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,900
CONVEYOR OPERATING COSTS												
Operating Expense by Category ($-000)												
Labor.....	690	690	690	690	683	683	683	683	683	683	683	683
Power.....	460	460	460	460	455	455	455	455	455	455	455	455
Materials & Supplies.....	383	383	383	383	380	380	380	380	380	380	380	380
Total ($/Ton Sold).....	1,534	1,534	1,534	1,534	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518
Operating Expense by Category ($/Ton)												
Labor.....	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Power.....	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Materials & Supplies.....	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Total Dollars ($-000).....	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
CONVEYOR CAPITAL COSTS ($-000):												
Facility Upgrades.....	--	--	100	--	--	--	--	100	--	--	--	--
Conveyor Belting & Structure.....	160	160	160	160	160	160	160	160	160	160	100	50
Maintenance/Support Equipment.....	60	30	60	30	60	30	60	30	60	30	60	20
Miscellaneous.....	25	25	25	25	25	25	25	25	25	25	25	20
Total Capital ($-000).....	245	215	345	215	245	215	245	315	245	215	185	90
Conveyor Depreciation ($-000).....	633	633	627	255	251	251	251	251	251	251	246	234
Conveyor Depreciation ($/Ton).....	0.09	0.09	0.09	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03

YEAR:	2028	2029	2030	1999-2030 TOTAL
COAL CONVEYED (TONS-000).....	6,900	6,900	6,900	218,805
CONVEYOR OPERATING COSTS				
Operating Expense by Category ($-000)				
Labor.....	683	683	683	21,662
Power.....	455	455	455	14,441
Materials & Supplies.....	380	380	380	12,034
Total ($/Ton Sold).....	1,518	1,518	1,518	48,137
Operating Expense by Category ($/Ton)				
Labor.....	0.10	0.10	0.10	0.10
Power.....	0.07	0.07	0.07	0.07
Materials & Supplies.....	0.06	0.06	0.06	0.06
Total Dollars ($-000).....	0.22	0.22	0.22	0.22
CONVEYOR CAPITAL COSTS ($-000):				
Facility Upgrades.....	--	--	--	500
Conveyor Belting & Structure.....	--	--	--	4,470
Maintenance/Support Equipment.....	--	--	--	1,280
Miscellaneous.....	15	5	--	740
Total Capital ($-000).....	15	5	--	6,990
Conveyor Depreciation ($-000).....	206	172	140	15,168
Conveyor Depreciation ($/Ton).....	0.03	0.02	0.02	0.07

Note: Projections based on data from January 1999

ALTERNATIVE SUPPLIES

5.1 INTRODUCTION

This study assumes that Colstrip will continue to acquire fuel from the Rosebud Mine over the 30-year study period. However, should Rosebud costs prove excessive or reserves inadequate, and for the period beyond 2030, alternative fuel supplies are available. The most likely of these alternatives is the Southern Powder River Basin (SPRB) of Wyoming, the current source of coal to Corette.

This chapter addresses the SPRB mines, both as primary suppliers to Corette, and as an alternative and/or post 2030 supply at Colstrip.

5.2 SOUTHERN POWDER RIVER BASIN

The SPRB includes portions of Campbell and Converse Counties, Wyoming (see Figure 3.2). The area of active mining encompasses a three to six mile wide north-south zone extending from approximately 15 miles north of Gillette, Wyoming, to a point 60 miles south of Gillette. Within this area, the thick Anderson-Wyodak coal seam is recoverable using low-cost surface mining methods. Fifteen large mining operations are active in the area, producing about 270 million tons in 1998.

5.2.1 SPRB Geology and Reserves

The Anderson-Wyodak seam occurs in the Paleocene Fort Union Formation, outcropping along a north-south trend and dipping to the west. The seam varies from over 100 ft thick north of Gillette, to 50 - 70 ft thick at the southern end of the deposit.

The SPRB constitutes the largest in-place coal resource in the contiguous U.S. Regional reserve estimates are available from a variety of sources and vary widely. The majority of the available tonnage is low sulfur compliance quality, and at moderate depths. Even with relatively aggressive production projections, the resources available in the SPRB are unlikely to be depleted prior to 2050.

SPRB coals are subbituminous in rank, and characterized by high moisture, low sulfur, low ash, and relatively low heat content. Quality improves to the south, with the highest Btu coals found in the southern portion of the deposit. Following are typical quality ranges for SPRB coals:

PROXIMATE ANALYSIS (AS-RECEIVED)	SPRB
Moisture (%)	26.0 - 32.0
Ash (%)	4.0 - 10.0
Volatile Matter (%)	29.0 - 33.0
Sulfur (%)	0.1 - 0.6
Lbs SO(2)/MM Btu	0.3 - 1.4
Btu/lb	7,600 - 8,850

The north-south quality variations result in two distinct coal products. The northern mines produce a lower Btu coal in the 8,300 - 8,500 Btu/lb range, while the southern mines produce an 8,700 - 8,800 Btu/lb product. Sulfur content is also lower at many of the southern mines, resulting in a "super compliance" coal with less than 0.5 lbs SO(2)/MMBtu. Economics generally favor shipping the higher Btu southern coal to more distant customers, while the lower Btu coals go to plants closer to the mines.

All SPRB coal is sold raw after crushing and screening. There are several projects planned or in place to upgrade SPRB coals, including production of synfuels; however, these represent fairly small tonnages. In excess of 95% of SPRB coal is sold for electric power generation.

5.2.2 SPRB Supply

SPRB mines are typically large, high volume surface mining operations. Average production is over 16 million tons per year, and the largest, Black Thunder, produces in excess of 35 million tons annually. In 1997, there were 6 mines producing more than 20 MTPY (excludes Caballo at 19.9 million). The mines typically employ the largest available equipment, high volume coal handling and processing systems, and many other techniques to allow maximum advantage of the operation's inherent economies of scale.

Production and quality data for the 15 active mines are summarized:

		TYPICAL QUALITIES (AS-RECEIVED)		
MINE	1997 TONS (MILLIONS)	ASH (%)	SULFUR (%)	BTU/LB
Buckskin	14.4	5.2	.40	8,450
Rawhide	10.7	4.9	.40	8,320
Eagle Butte	17.9	4.6	.41	8,350
Dry Fork	0.9	4.8	.37	8,175
Fort Union	0.6	6.0	.40	8,200
Wyodak	3.3	6.0	.42	8,050
Caballo	20.0	5.1	.38	8,400
Belle Ayr	22.8	4.6	.30	8,550
Cordero Rojo	28.0	5.6	.35	8,350
Coal Creek	2.9	5.7	.33	8,350
Jacobs Ranch	27.1	5.6	.44	8,690
Black Thunder	37.7	5.0	.28	8,850
North Rochelle	--	4.7	.23	8,800
Rochelle	24.9...	4.7	.21	8,750
North Antelope	35.0	4.7	.24	8,800
Antelope	13.6	5.3	.22	8,800
Total	259.8			

Note: Data derived from MSHA and FERC reports.

Total SPRB production has increased rapidly in recent years from approximately 3 million tons in 1975 to 157 million tons in 1990 and 270 million tons in 1998.

Operations are gradually moving into more expensive reserves due to a combination of increasing stripping ratio and greater haul distances. Many operations are currently in 200 ft - 300 ft of cover and experience stripping ratios of 2.5 BCY/ton or more. Typically, cash operating costs (before royalties, taxes, and depreciation) are in the range of $1.75 - $3.00 per ton. We believe these costs will gradually increase at a rate of 1% to 2% per year in real terms.

The SPRB coal supply is capable of growing at a rapid rate to meet demand. However, there are constraints related to loadout capacity, rail logistics, industry consolidation, and economics. In situations of rapid demand increase, some increase in prices due to tightening of supplies can be expected.

The SPRB provides a large, stable alternative fuel source for Colstrip. Mineable reserves are extensive and sufficient to sustain operations through the study period and beyond. The mines themselves are efficient low-cost operations, and, while we believe costs (and prices) will gradually increase, we do not believe that increase will be prohibitive.

5.2.3 SPRB Demand

The primary market for SPRB coals is and will continue to be electric power generators. Future fueling decisions by the electrical generating industry will be influenced by a number of factors, including:

- Deregulation

- Clean Air Act Amendments (CAAA)

- Sulfur dioxide limitations

- NO(x) emission reductions.

Some, if not all, of these issues favor burning SPRB coal for electrical generation. The desirability of SPRB coal for these reasons will result in significant future demand growth, particularly in the 2000 - 2005 period, as CAAA Phase 2 requirements become effective. BOYD estimates demand for SPRB coal will increase to 330 million tons in 2000, and 415 million tons in 2010. Growth is projected to moderate after about 2015 due to uncertainty in future environmental regulation and lack of planned new coal-fired capacity. The mines in the SPRB will generally be able to satisfy this demand growth, although some tightening of supplies, particularly in the 2000 - 2005 period, is likely.

5.2.4 SPRB Prices

The Colstrip Station, if it were to purchase SPRB coal, would most likely take that coal from the mines producing 8,300 - 8,500 Btu/lb coal. The higher Btu coals carry a price premium related to savings in transportation costs, which would not be realized over the relatively short rail haul to Colstrip. Projected FOB mine prices for the lower Btu coals are summarized:

	8,400
BTU/LB	
YEAR	1998 $/TON
2000	4.25
2001	4.60
2002	4.85
2003	5.00
2004	5.25
2005	5.35
2006 on	5.40

Expected price increases in the 2000 - 2005 time frame result from increased demand in that period, largely as a result of CAAA Phase 2. Beyond that date, we do not anticipate major price increases in real terms.

5.3 TRANSPORTATION

SPRB coal, with only minor exceptions, moves to market via rail. Rail transportation costs are very significant to the economics of SPRB coal, typically constituting 50% to 80% of the delivered fuel costs. The ability of the railroads to lower rates, particularly on longer hauls, has been a key factor in the growth of the SPRB.

Two railroads compete for SPRB originations, the Union Pacific-Southern Pacific (UPSP) and the Burlington Northern-Santa Fe (BNSF). Both railroads serve the mines south of Gillette, while the mines north of Gillette are captive to the BNSF. Traditionally, the mines served by both railroads have enjoyed lower rail rates because of the competitive situation. However, recent consolidation among suppliers and a more competitive posture by the BNSF has minimized this differential.

Corette and Colstrip are both captive to the BNSF. Although this captive situation is not as great a disadvantage as in the past, it is still a consideration which will impact transportation cost to those plants.

The bulk of SPRB coal movements are under terms of contracts between the railroads and shippers. Very little tonnage moves under public tariff. While regulatory agencies (primarily the federal Surface Transportation Board) place some limitations on rates the railroads can charge, these tend to be at higher levels than are typically arrived at through negotiation. Coal movements to Corette, and potentially to Colstrip, would be the result of negotiations between the BNSF and the utility. Factors that would affect such negotiations include:

- Volume. Higher volume movements of one to two million tons/year or more generally enjoy lower rates. The large volumes involved at Colstrip would be an advantage.

- Distance. Longer hauls are lower-cost on a ton-mile basis. Rail distances to Corette (253 miles) and Colstrip (360 miles) are comparatively short for SPRB movements.

- Competition. If there is effective competition from alternative carriers or other fuel sources, lower rates are possible. This would not be the case for Colstrip and Corette.

Typically, high-volume, long-distance (1,000 miles or more) movements are relatively low-cost, in the range of $0.01/ton-mile. Shorter movements of 500 miles or less can be significantly more expensive on a ton-mile basis, ranging from $0.015/ton-mile to $0.025/ton-mile or more.

The transportation infrastructure to move SPRB coal to Corette and, if need be, to Colstrip is in place and proven. We are unaware of any circumstances that would impair the railroad's ability to deliver to the stations, either in the near term or very long term (through 2048) at Colstrip. Current trends are towards more efficient railroad operations and lower costs. The cost of coal movements to Corette and Colstrip would be the subject of negotiations with the railroad.

5.4 CORETTE STATION FUEL SUPPLY

The Corette Station, located near Billings, Montana, is fueled by coal purchased from the SPRB, and transported via rail to the plant. It is anticipated that Corette will continue to be fueled by SPRB coal for the duration of the study period. Prices are essentially at market, and transportation agreements remain to be negotiated.

The Corette Station requires a relatively low-sulfur coal, equivalent to 0.60 lbs SO(2)/MMBtu, to meet emissions regulations. This is lower than the average sulfur at most of the northern, low-Btu SPRB mines; however, those mines can generally use selective mining techniques to supply a limited amount of lower sulfur coal. Alternatively, an acceptable low-sulfur coal is available from several mines (at a premium of $1.00/ton or more) in the southern, higher-Btu portion of the SPRB Corette is currently receiving coal from this source under contract which allows the supplier to provide coal from either area. The specifics of the Corette fuel supply situation are discussed in detail in the Fuel Cost chapter of this report.

5.5 OTHER SUPPLY SOURCES

Other potential supply sources exist for both Colstrip and Corette; however, most are not established operations, and there are questions of coal quality and cost.

These other sources include:

- Bull Mountains. The Bull Mountains coal field is located 35 miles north of Billings in Yellowstone and Musselshell Counties. Burlington Resources, Inc., owns a large reserve which could be mined using underground methods. The property does not have access to rail, but coal could be trucked to Billings. Issues of cost and quality would require investigation.

- Tongue River. The Tongue River Region is a large coal field located about 35 miles southeast of Colstrip. The area has no rail access, and thus has never been developed. Proposals are in place, however, to provide rail access either connecting to the BNSF at Miles City or via an extension of the Colstrip spur. If development in the Tongue River field takes place, it could provide an alternative supply for the Colstrip Station.

- Big Sky. The Big Sky Mine is located just south of WECO's Rosebud Mine and recovers coal from the same seam. Big Sky is close enough to deliver coal directly to the Colstrip Station (via over-the-road truck). Big Sky would have capacity and cost constraints, but could be viable in an emergency.

- Other Rosebud Seam Resources. Extensive Rosebud Seam resources exist southeast of Colstrip. These could be developed as a long-term supply, but would require investment in mine and transportation facilities.

In general, none of these alternatives is as attractive as the established mines in the SPRB. However, over the plant lifetime through 2048, one of these could develop into a viable supply option and/or an alternative to the Rosebud Mine. Ample alternatives exist to fuel the plant over its projected remaining life.

FUEL COSTS

6.1 INTRODUCTION

The long-term cost of fuel to the Colstrip and Corette Stations is related to a number of issues. At Corette, which will most likely be fueled by SPRB coal, market supply, demand, and price, along with transportation costs, determine the delivered fuel price. At Colstrip, the situation is more complex, with price affected not only by production costs at the Rosebud Mine, but also by the specific terms and conditions of various coal sales and transportation agreements. This chapter analyzes these issues and develops estimates of resulting long-term fuel costs.

6.2 COLSTRIP -- GENERAL

The Colstrip Station is fueled entirely by coal from WECO's Rosebud Mine, which is purchased under long-term contracts between WECO and the station owners. The contracts are full-requirements agreements, making the mine and station effectively captive to each other. The provisions of these contracts determine coal price.

The coal supply for Units 1 & 2 is contractually, as well as physically, separate from that for Units 3 & 4. Historically, the price of coal to Units 3 & 4 has been significantly above that to Units 1 & 2.

There are operational advantages to combining the two coal supplies. In particular, combining the operations would provide opportunities to blend coal to provide a more desirable quality for Units 1 & 2. The combined operations would also allow more efficient utilization of equipment and personnel. However, the existence of the contracts, differences in quality and price, and a continuing minority ownership in Units 3 & 4 may make a combination problematical. For purposes of this study, we have assumed that the coal supply to Units 1 & 2 remains separate from Units 3 & 4, each being administered under the respective contracts.

Sales of coal to outside customers, particularly the recent 1.5 MTPY contract with Minnesota Power, could have some affect on mining plans and costs. However, the sale will probably not significantly affect coal price due to allocation mechanisms incorporated in the contracts. If significant additional outside sales are secured, the ability to supply Colstrip beyond the current contract term could be affected.

6.3 COLSTRIP UNITS 1 & 2

6.3.1 Existing Contract

Colstrip Units 1 & 2 are fueled by coal from the Rosebud Mine's Area D, which is delivered directly to the plant. Sales are under provisions of a long-term agreement signed July 30, 1971.

Key factors affecting future coal supply under this contract include:

- Term. The contract extends through December 31, 2009, with provisions for extension under mutually agreeable terms.

- Quantity. The contract is for the full requirements of Colstrip Units 1 & 2. Typically, the units take +/-2.6 million tons per year.

- Pricing. Pricing structure is base price plus escalation, with a commodity price per ton (including labor, M & S, power, profit, etc.) and a fixed charge per month (depreciation, A & G, etc.). Also included in the price is an accrual (estimated at $0.10/Ton) for final mine reclamation. Production taxes and royalties are passed through at cost. Current delivered prices under this contract are in the range of $8.00 - $9.00/ton.

- Price Re-opener. A price re-opener will occur on July 30, 2001. If the parties are unable to agree on Base Price revisions, the matter is to be arbitrated so as to be "equitable to all parties and . . . shall reflect the sellers reasonable costs of mining." Thus, the re-opener is effectively based on costs, not market.

- Assignment. The buyer's rights under the contract can be assigned only in conjunction with a sale of the buyer's interest in Units 1 & 2.

Re-openers, such as that in 2001, have occasionally been contentious issues at Colstrip. There are incentives at the time of the re-opener to renegotiate the contract, perhaps along lines of the Amended and Restated Units 3 & 4 agreement. However, unlike Units 3 & 4, the Units 1 & 2 price is relatively low under the current contract, and operating costs will increase significantly late in the agreement's life. Thus a renegotiation may be disadvantageous for the plant owners. In estimating future fuel prices for Units 1 & 2, we assume the current contract remains in force through its normal expiration date (2009), and that the 2001 re-opener results in only minor price adjustments to reconcile to actual operating costs. This is a reasonable assumption given the relative position of the parties, but not a certainty.

In addition to the Coal Supply Agreement, there is an agreement to purchase synfuel produced at Entech's (WECO's parent) Advanced Coal Conversion Process (ACCP) plant for use in Units 1 & 2. The synfuel is priced equal to the variable cost of Area D coal on a MMBtu basis. There is also a bonus arrangement based on a proportional rebate of savings that may occur at the plant as a result of burning the synfuel. Synfuel tonnages will likely be low, on the order of 200,000 tons annually.

This synfuel agreement is structured such that the net fuel price approximately equals the price of supplying an energy-equivalent amount of coal. Thus for purposes of fuel price estimates, we assume the total fuel expense will be essentially the same whether or not some portion is actually synfuel.

The ACCP synfuel plant operation realizes certain significant tax advantages that expire in 2007; the plant will most likely close at that time.

The existing coal supply agreement precludes purchasing outside (i.e., SPRB) coal through its expiration in 2009. Upon expiration, the contract may be extended "on terms mutually agreeable to the Seller and Buyers, reflecting then existing market conditions for such existing . . . (Rosebud) . . . coal." The contract does not contain language that clearly obligates either party to reach a mutual agreement on contract extension. It is probable that, upon contract expiration in 2009, WECO would effectively have no further obligations to the Units 1 & 2 owners.

6.3.2 Units 1 & 2 Supply Reliability

Our review indicates that sufficient recoverable, proven and probable reserves remain in Area D to satisfy requirements of the current contract through expiration in 2009. Late in the term, the mine will incur higher costs due to deep cover and will encounter an area of relatively high sodium coal. The higher costs will not affect the price of coal due to the contract's base price plus escalation cost structure.

The higher-sodium coal (in excess of 1% NaO(2) in ash), which will be encountered in 2008 and later, will meet contractual quality specifications (there is no specific limit on sodium). However, high-sodium coal has caused difficulties in Units 1 & 2 in the past, and may do so in this instance. The potential problem could be avoided by blending with lower sodium (Area C) coals, substituting reserves, or some combination of measures.

Certain equipment and facilities at Mine Area D are, as discussed in Chapter 4, adequate for current operations but are relatively old. Substantial capital investment is required in the 2000 - 2002 period to assure reliable operation over the remaining contract term. We assume WECO will be reluctant to make major investments in new, long-lived equipment and facilities with only +/-9 years remaining on the contract. Therefore, the projected investments are assumed to be mostly in overhauls, rebuilds, and other "stop-gap" expenditures with relatively short depreciable lifetimes. This investment will increase the price of coal by $0.10 - 0.15/ton via the depreciation component of the fixed charge.

6.3.3 Units 1 & 2 Existing Contract Fuel Costs

We estimated future fuel prices under the existing contract, considering the contractual pricing parameters and likely future events. The 2001 re-opener will have some effect on price, as certain price

components may vary from actual costs. Although there is considerable uncertainty, we have assumed a limited price cut will result from the re-opener. We do not expect the sale of coal to Minnesota Power to significantly affect contract price.

Estimated fuel costs under the existing contract are shown on Table 6.1 following this text, and summarized below (1998 dollars):

	UNITS 1 & 2 DELIVERED FUEL PRICE (1998 DOLLARS)					
	1999	2000	2001	2002	2003 - 2009	AVERAGE
Tons/Yr (000)	1,510	3,020	3,020	3,020	3,020	3,020
Quality -- Btu/lb	8,558	8,558	8,558	8,558	8,558	8,558
Contract Price ($/Ton):						
Commodity Charge	5.79	5.78	5.78	5.19	5.31	5.41
Fixed Charge	1.31	1.39	1.42	1.44	1.48	1.46
Royalties*	1.04	1.04	1.05	0.96	0.98	1.00
Quality Adjustment	(0.14)	(0.14)	(0.14)	(0.13)	(0.13)	(0.13)
Total	8.00	8.07	8.11	7.46	7.64	7.72
Fuel Price ($/MMBtu)	0.47	0.47	0.47	0.44	0.45	0.45

* Includes production taxes associated with royalty payments.

The cost estimates, as shown, assume a price cut as a result of the 2001 re-opener, roughly reconciling price to costs at that time. Our analysis of mine operations also indicates that mining costs will increase significantly in the last 2 - 3 years of the contract term. Under the current contract format, this increase will not be reflected in the price and will reduce WECO's profits.

6.3.4 Units 1 & 2 Long-Term Fuel Cost

Beyond the expiration date of the current contract, the fuel source for Units 1 & 2, and therefore the price, is speculative. We developed estimates of price based on reasonable assumptions about future events as outlined below.

It is reasonable to assume the current supplier relationship will be extended at (or before) expiration of the current contract. However, the "market" price for "such existing coal" as stated in the contract will be indefinite, since the only other currently identifiable market for such coal is Units 3 & 4. The reserves available at Rosebud for an extension will also be more costly to mine. Thus the outcome of price negotiations for any extended term is uncertain. For purposes of this study, we have assumed:

- The contractual relationship with WECO will be extended for the entire study period (i.e., through 2030).

- A new contract structure will be negotiated for Units 1 & 2 similar to the Amended and Restated supply agreement for Units 3 & 4. This "cost plus" pricing structure is acceptable to WECO and provides reasonable compensation and profit, while allowing the station owners considerable control over the operation.

- The pricing structure under a new contract would be designed to assure delivered fuel costs are equal to or less than the delivered cost of alternative (SPRB) fuel. This competitive benchmark is assumed to be $0.65/MMBtu.

- Existing reserves in Areas A and B would be dedicated to the contract, and delivered directly to the existing coal handling facility.

- Operations supplying fuel to Units 1 & 2 would continue to be physically separate from the Units 3 & 4 supply.

This revised and extended contract would result in an increase in fuel costs due to increased costs at the mine, and capital investment needed to operate over the extended contract term.

Estimated delivered fuel costs for Units 1 & 2 over the 2010 - 2030 period are shown on Table 6.1 following this text, and are summarized below (1998 dollars):

	AVERAGE 2010 - 2030
Tons/Yr (000)	2,964
Quality (Btu/lb)	8,728
Coal Price ($/Ton)	
Fixed Charge	1.66
Commodity Charge	
Mine Operating Expense	4.26
Return on Investment	0.54
Fees	0.55
Royalties & Production Taxes	3.69
Subtotal	9.04
Total Price	10.70
Price per MMBtu	0.61

The price is relatively consistent over the study period, but does gradually increase from +/-$10.50/ton in the early years to over $11.00/ton late in the period. These increases relate to increases in mining costs as operations progress into deeper cover areas. Resource depletion as a result of third party sales could increase prices further late in the study period.

6.4 COLSTRIP UNITS 3 & 4

6.4.1 Units 3 & 4 -- Existing Coal Supply Contract

Colstrip Units 3 & 4 are fueled by coal from Area C, which is transported to the plant via a 4.2-mile conveyor owned and operated by WECO. Sales are governed by an agreement originally signed in 1980, and extensively amended in 1998. The August 24, 1998, "Amended and Restated Coal Supply Agreement" significantly changes the terms and provisions of the original 1980 contract (which was similar in form to the Units 1 & 2 agreement) by changing to a cost plus pricing structure and eliminating future re-openers. The new contract will result in a significant price decrease estimated at +/-$4.00/ton. This decrease will be phased in over a two-year period, taking full effect on July 1, 2000. Prior to that time, the old pricing structure will remain, with labor and ad valorem tax cost components limited to actual amounts.

Key provisions affecting future coal supply and costs include:

- Term. The contract terminates on December 31, 2019. The parties can, by mutual agreement, extend the contract beyond that date, but there is no obligation to do so.

- Quantity. The contract is for the full requirements of Units 3 & 4. The agreement provides for WECO to substitute outside coal for Rosebud Mine coal under certain conditions.

- Pricing. Pricing structure is cost plus, including certain fees, incentives, and return on investment compensation.

- Administrative Structure. The Amended and Restated Contract provides for a Mine Operating Committee to monitor the mine operation, approve budgets, review plans, etc. Effectively, the station owners control major planning and investment aspects of the mine while WECO manages day-to-day operations.

- Assignment. In general, the buyer's rights under the coal supply agreement can be assigned only as part of a sale of the buyer's interest in the generating station. Special provisions apply relative to

Montana Power's obligations guaranteeing WECO's performance of final reclamation work. Montana Power cannot assign this obligation except with the consent of the other owners.

Sufficient recoverable proven and probable coal reserves remain in Area C for the duration of the contract, and Area C will be essentially depleted when the contract expires. Additional reserves are available farther west in Area F, but are not committed to Units 3 & 4.

Under the Amended and Restated contract, all coal requirements for Units 3 & 4 must be purchased under terms of the contract, but those terms provide for the purchase of coal from outside sources (probably from the SPRB). Should outside coal be purchased, WECO is entitled to add certain fees to the selling price and will recover certain fixed costs (depreciation, return on investment, etc.) in full, irrespective of outside coal purchases. Based on our estimates of Rosebud fuel costs and that from alternative sources, we consider it unlikely that any significant tonnage of third party coal could be economically purchased in the normal course of dealing under the Amended and Restated Contract.

Upon termination in 2019, the contract can be extended by mutual agreement. If the parties are unable to agree, the contract terminates. Thus, WECO has no obligation to continue supplying coal beyond 2019, and the Units 3 & 4 owners have no legal right to any reserves beyond that date. Should the contract not be extended, coal from the SPRB could provide a viable, competitive alternative fuel supply for the balance of the study period and beyond.

6.4.2 Units 3 & 4 Coal Transportation Agreement

WECO's operation of the 4.2-mile overland conveyor which delivers Area C coal to Units 3 & 4 is under a separate agreement with the owners of Units 3 &
4. That agreement was initially negotiated in 1981; it was amended in 1987 and again in 1998. The 1998 amendment significantly alters the economic parameters of the agreement, reducing the price, and eliminates future price re-openers. Key provisions of the amended agreement are:

- Term. The transportation agreement remains in force for so long as the Units 3 & 4 Coal Supply Agreement continues, i.e., through 2019. The contract can be extended by mutual agreement.

- Quantity. All coal sold under the Coal Supply Agreement (from Area C) will be transported via the conveyor.

- Price. Under the 1998 amendment, effective July 1, 2001, the price is the sum of the actual costs to operate the conveyor, fixed charges such as depreciation, taxes, etc., and a "Fee-Operating Profit" of $0.58/Ton indexed for inflation.

- Other Terms. The 1998 amendment eliminates re-openers in 2001, 2006, and 2011, and deletes the gross inequity provision.

- Assignment. Can be assigned by buyer only in conjunction with an assignment of rights under the Coal Supply Agreement.

The price revisions incorporated in the amendment will result in a decrease in transportation cost of about $0.70/ton from $1.60 - $1.65/ton to $0.90 - $0.95/ton. The higher price remains in effect until the new price is phased in on July 1, 2001.

The amended contract provides the station owners considerable control over operating decisions affecting the conveyor, particularly as relates to capital expenditures. We anticipate that future capital expenditures on the conveyor will be minimal, mostly related to replacements and major rebuilds.

6.4.3 Units 3 & 4 Existing Contract Price

The Amended and Restated Contract provides for a phasing in of the new "cost plus" pricing structure. Approved capital expenditures made after January 1, 1999, will be incorporated into the capital investment base. The basic "cost plus" pricing structure becomes effective on July 1, 2000, and the Fixed Fee

($0.40/ton) is implemented on July 1, 2001. Prior to July 1, 2000, the old pricing (a "base price plus escalation" structure) remains in place with certain limitations on labor cost and property taxes.

Mining equipment in Area C is relatively old and will require rebuilding or replacement in the near future. WECO has a five-year $40 million capital budget (including an additional dragline to be moved from Area A) for this purpose. These expenditures will affect coal price under the Amended and Restated Agreement via depreciation and return on investment provisions of the contract.

The Amended and Restated Agreements create a funding mechanism for final reclamation expenses at the Rosebud Mine. Under this mechanism, WECO takes the responsibility for final reclamation expenses, except for Puget Sound Power & Light's proportional (25%) share. (Puget's share is assumed to continue as an accrual equal to 25% of the appropriate total accrual on a per-ton basis.) The contractual funding mechanism requires Montana Power to effectively guarantee WECO's performance in this area.

The Amended and Restated Agreement gives the Units 3 & 4 owners strong rights over mining plans, capital expenditures, and budgets. The contract also dictates a "least cost" mining approach which will result in relatively low costs in the initial years of the contract, with gradual increases over the contract term. These gradually increasing mining costs will, with the "cost plus" structure, result in gradually increasing coal prices. Estimated fuel prices under the Amended and Restated Agreement are shown on Table 6.1, and summarized below (1998 dollars):

	UNITS 3 & 4 DELIVERED FUEL PRICE (1998 DOLLARS)					
	1999	2000	2001	2002	2003 - 19	AVERAGE
Tons/Yr (000)	3,485	6,971	6,971	6,971	6,971	6,971
Quality -- Btu/lb	8,509	8,509	8,509	8,509	8,509	8,509
Contract Price ($/Ton)						
Commodity Charge	9.52	7.35	5.91	6.24	6.91	6.92
Fixed Charge	0.68	0.91	1.14	1.18	1.37	1.31
Royalties*	1.70	1.44	1.17	1.23	1.37	1.36
Subtotal	11.90	9.70	8.22	8.65	9.65	9.59
Transportation ($/Ton)	1.62	1.62	1.27	0.91	0.92	0.99
Total Cost:						
$/Ton	13.52	11.32	9.49	9.56	10.57	10.58
$/MMBtu	0.79	0.67	0.56	0.56	0.62	0.62

* Includes production taxes associated with royalty payments.

Delivered fuel price projections could be affected by third party sales (Minnesota Power); however, the structure of the contract will serve to minimize this impact.

6.4.4 Units 3 & 4 Estimated Price -- Extended Term

Following expiration in 2019, the contract can be extended by mutual agreement. Although there is no assurance, it appears likely that WECO would have reserves available for such an extension in Area F.

For purposes of estimating fuel prices to Units 3 & 4 after 2019, we have assumed that the present contract will be extended on terms and conditions similar to those currently in the agreement, and that WECO will dedicate Area F to Units 3 & 4. This is a reasonable assumption given the current lack of other markets for WECO's coal. The initial mining in Area F is relatively low-cost, as shallow reserves are available, but will increase over time as deeper overburden and longer haul distances affect prices.

Our review indicates that prices under this extended contract will be in the same range, or possibly higher than the delivered cost of coal from the SPRB. In estimating these long-term fuel costs, we have assumed that WECO will make concessions in the form of reduced profits to assure the Rosebud coal is priced competitively with SPRB coal. This pricing benchmark is estimated at $0.65/MMBtu delivered to the plant.

Contract costs are for delivery to the Area C tipple. Additional expense will be incurred conveying the coal from Area C to the power plant. Our estimates assume the current transportation contract pricing structure, as amended, will remain in place for the entire study period (through 2030). That structure incorporates a 15% discount of certain price components after 120.5 million tons have been delivered. At projected production rates, this occurs in 2018.

Projected fuel costs for Units 3 & 4 after 2019 are shown on Table 6.1 and summarized below (1998 dollars):

	AVERAGE 2020 - 2030
Tons/Yr (000)	6,900
Quality (Btu/lb)	8,591
Fob Mine Price ($/Ton):	
Commodity Charge	6.79
Fixed Charge	1.28
Royalties*	1.34
Subtotal	9.41
Transportation ($/Ton)	0.78
Total Cost:	
$/Ton	10.19
$/MMBtu	0.59

* Includes production taxes associated with royalty payments.

6.5 COLSTRIP -- ALTERNATIVE SUPPLY POTENTIAL

The availability of relatively low-priced coal from the SPRB provides Colstrip an alternative to the Rosebud Mine for fuel supply. This is addressed in general in the "Alternative Supplies" chapter of this report; specific impact at Colstrip is discussed in this section.

6.5.1 Alternative Supply Issues

Bringing SPRB coals to Colstrip raises a number of issues. These include:

- Transportation. Coal would move to Colstrip by rail via the BNSF. Rail distance from Gillette, Wyoming, to Colstrip is approximately 350 miles, and the movement would be captive to the BNSF.

- Coal Handling. The Colstrip Station is not equipped to receive coal by rail in significant volumes. SPRB coal delivered prices would have to include the capital and operating costs associated with a coal receiving facility.

- Plant Design. The Colstrip plant is designed specifically for Rosebud coal; the operational impact of burning SPRB coal is unknown. We would expect the impact to be minimal due to the general similarity of the coals; thus, we have not considered any impacts in this study.

- Units 1 & 2 Contract. The existing contract would preclude purchasing any SPRB coal for Units 1 & 2 prior to January 1, 2010. SPRB coal could be a viable option after that time.

- Units 3 & 4 Contract. The current Units 3 & 4 contract allows purchase of outside coal, but specifies certain payments to WECO that would add to the delivered cost. Outside coal could be purchased without these payments beginning January 1, 2020, following expiration of the contract.

All of these issues impact the economics of any alternative outside supplies, and must be considered in assessing the viability of such a supply.

6.5.2 SPRB Prices

As discussed in the Alternative Supplies chapter of this report, the most economical SPRB sources for Colstrip are likely to be the lower quality +/-8,400 Btu/lb coal mines in the northern portion of the SPRB. BOYD's long-term projections of prices at these mines increase from a projected $4.25/ton (1998 dollars) in 2000 to $5.40/ton in 2006, remaining constant in real terms thereafter.

6.5.3 Transportation Costs

Transportation to Colstrip will be via the BNSF, a distance of approximately 360 miles. Typically, such movements are under contracts negotiated between the shipper and the BNSF. The precise outcome of such a negotiation regarding Colstrip is unknown and subject to considerable uncertainty due to the specifics of the movement, including:

- At 350 miles, the movement is fairly short as compared to most SPRB hauls. Shorter hauls are typically less efficient and more costly on a ton-mile basis.

- The haul is captive to the BNSF as delivering carrier and probably as originating carrier. This places the BNSF in a strong position in rate negotiations.

- The potential volume, at +/-10 million tons per year, is very large and would represent an attractive business for the BNSF.

- The route, particularly from Gillette to Huntly, Montana (near Billings), is relatively uncongested, resulting in minimal delays in transit.

Considering these factors, we estimate the cost of rail transportation from the Gillette area at $6.05 per ton. This estimate includes the carrier charge and an allowance for ownership and maintenance costs on the required cars.

6.5.4 Coal Handling

To take SPRB coal, the Colstrip Station would have to construct a coal receiving facility and integrate that facility into the existing coal handling infrastructure. The capital and operating costs for such a facility could vary significantly depending on specific design criteria. For purposes of comparative fuel cost estimates for this study, we have assumed a total cost, including facility depreciation and operating cost, of $0.25/ton.

6.5.5 WECO Charges

Under the Units 1 & 2 coal supply contract, no outside coal could be purchased for those units prior to expiration in 2009. After that time, outside coal could be purchased with no fee or other payment to WECO.

For Units 3 & 4, the purchase of outside coal under the current contract would require certain compensation to WECO, both in the form of a specific fee, and fixed payments dictated by contract irrespective of the tonnage produced at Rosebud. These include:

- Average Fixed Fee Per Ton ($0.40/ton) on each ton of outside coal purchased.

- Earned portion of the "Incentive Fee Per Ton" (base $0.35/ton) on each ton of outside coal purchased.

- Per-Ton Return on Investment (ROI) paid on a pro-rata basis on the first 5 million tons purchased, whether those tonnages are Rosebud or outside coal. In effect, outside coal must bear its proportional per-ton share of the ROI charge.

- Conveyor "Fee-Operating Profit" of $0.54/ton under the Amended Transportation Agreement is paid on all coal sold under the contract, whether by WECO or a third party.

These estimated WECO charges averaged over the life of the Units 3 & 4 contract are summarized (1998 dollars):

CHARGE	2000 - 2019 AVERAGE $/TON
Fixed Fee	0.37
Incentive Fee	0.28
ROI Charge	0.72
Conveyor Fee	0.58
Total	1.95

The actual WECO charge allocated to outside purchases varies from year to year, and could depend on the relative proportions of Rosebud and outside coal. The above figure is, however, reasonable for comparative purposes.

6.5.6 Total Cost of Alternative Fuel

The comparative cost of SPRB coal delivered to the Colstrip station is summarized (1998 dollars):

COST	UNITS 1 & 2 AFTER 2009	UNITS 3 & 4 2000 - 2019	UNITS 3 & 4 AFTER 2019
FOB Mine Price (Average)	5.40	5.25	5.40
Rail Transport	6.05	6.05	6.05
Handling	0.25	0.25	0.25
WECO Charges	--	1.95	--
Total	11.70	13.50	11.70
$/MMBtu @ 8,400 Btu/lb	0.70	0.80	0.70

As shown, the cost of SPRB coal delivered to Units 3 & 4 under the current contract is likely to be significantly more expensive than Rosebud coal (at $0.60 to $0.65 per MMBtu), largely due to the added WECO charges.

After termination of the current contracts, SPRB supplies could be delivered to Colstrip at prices in the range of $0.70/MMBtu, or perhaps, given the uncertainties in the estimates, for as little as $0.60 to $0.65 per MMBtu. For purposes of this study, we have assumed that Rosebud coal would have to be priced at a delivered cost of less than $0.65 per MMBtu to be competitive with the SPRB after expiration of the existing contracts.

While it appears that SPRB coal will not be an economical replacement for Rosebud coal over the study period, the potential to purchase SPRB coal effectively caps the post-contract fuel cost for Colstrip.

6.5.7 Long-Term Fuel Alternatives

The Colstrip plant is expected to continue operation beyond the specific study period addressed in this report, with current plans extending to 2048. Projections for the 2030 - 2048 period would be highly speculative and are not developed herein. However, there are certain long-term factors affecting fuel supplies beyond 2030 that can be addressed. These include:

- Fuel Source. Economically recoverable coal at the Rosebud Mine will likely be depleted in 2030 or perhaps earlier. Several alternative coal sources are likely to be available at that time (discussed in Chapter 5), with the most likely source being the SPRB. Available reserves in the

SPRB are, based on current projections, likely to be adequate to fuel Colstrip over the 2030 - 2048 period.

- Delivery. Coal would most likely be delivered to Colstrip via rail, specifically by the BNSF. The existing rail infrastructure is in-place, and we are unaware of any circumstances that would impair the ability of the railroad to deliver adequate volumes of coal. Projections of rail rates to 2030 and beyond

are not meaningful; however, the recent trend is towards lower rail rates. We would not expect this to continue indefinitely; however, we would also not expect a major reversal towards significantly higher rates.

- Plant Modifications. Receiving SPRB coal via rail would require construction of a receiving facility, and probably some modifications to coal handling facilities, all of which appear feasible. The cost of these unloading facilities would depend on specific design criteria and ability to integrate with the existing system. Assuming the existing WECO spur, loop track, and conveyor facilities are available, and that no major surge storage is needed, we estimate the facility cost in the range of $10 million. Surge capacity and/or throughput improvements could increase this by $5 million to $7 million, and a fully independent facility could range up to $25 million.

Modifications needed to the plant itself are beyond the scope of BOYD's study; however, given the general similarities between the coals, we would not anticipate major new investment.

In general, adequate and feasible fuel supplies appear to be available for the Colstrip Station for the 2030 - 2048 period.

6.6 CORETTE

The Corette Station, located near Billings, Montana, is fueled by coal purchased from the SPRB, and transported via rail to the plant. It is anticipated that Corette will continue to be fueled by SPRB coal for the duration of the study period.

6.6.1 Fuel Supply Source

The Corette Station currently buys coal under provisions of a short-term agreement with Caballo Coal Company, a subsidiary of Peabody Holding Company (Peabody). The contract extends through December 31, 1999, and specifies delivery of 750,000 tons during 1999.

The coal was traditionally supplied by the Rawhide Mine in Campbell County, Wyoming, which is owned and operated by a Peabody affiliate. Quality specifications call for a relatively low-sulfur coal, which Rawhide produced via selective mining within the seam horizon. These specifications are:

EXPECTED MONTHLY WEIGHTED AS-RECEIVED SPECIFICATIONS	
Moisture	30.8%
Ash	5.0%
Btu/lb	8,320
Sulfur	0.25%
SO(2)/MMBtu	0.60lb

By contract, calculated sulfur dioxide on a trainload basis is not to exceed 0.60 lbs/MMBtu. This low sulfur coal is needed to meet emissions regulations in the Billings area.

Contract price for 1999 is set at $3.65/ton. This is competitive for the +/-8,400 Btu/lb SPRB coals, and does not appear to carry a significant premium for the low sulfur. We believe that, in the future, the lower sulfur coal will carry a small premium due to demand for CAAA compliance.

The base contract was amended to allow coal produced at Peabody's North Antelope/Rochelle complex to be substituted for Rawhide coal after April 1, 1999. Peabody exercised this option, and has been delivering from North Antelope since April (the Rawhide Mine has been idled). North Antelope is located at the southern end of the SPRB and produces a higher quality (8,800 Btu/lb, 0.22% sulfur) "super compliance" coal. The North Antelope coal is priced at a discount to current market, and would be delivered to Corette for approximately the same price per MMBtu as Rawhide.

Future coal supplies will likely continue to be purchased from SPRB Mines. The traditional supplier, the Rawhide Mine, provides an attractive source due to the ability to selectively mine a low-sulfur product. Other

mines in the vicinity of Rawhide (Buckskin and Eagle Butte) also have the ability to selectively mine a low-sulfur product. If Rawhide is unable to supply future coal, these nearby mines offer a viable, competitively priced alternative low-sulfur, low-Btu source.

In the worst case, several mines, such as North Antelope/Rochelle in the southern, higher-Btu portion of the SPRB could supply coal, meeting the 0.60-lb SO(2)/MMBtu limit. These coals are higher priced (typically by $1.00/ton or more) than Corette's current contract price and must be transported farther. The higher-Btu content offsets some of this expense, but the delivered cost would still likely be $0.05 to $0.08/MMBtu (or more) higher than for coal supplied from Rawhide or other nearby mines.

Overall, we believe the SPRB mines will provide a reliable long-term source of low-sulfur coal for Corette. If Rawhide or nearby suppliers cannot provide adequate low-sulfur coal, the plant can obtain low-sulfur coal from the higher-Btu mines in the southern portion of the SPRB at the expense of a small premium.

6.6.2 Corette Coal Transportation

Coal is currently transported to Corette under two transportation agreements with the Burlington-Northern Santa Fe Railway. The first agreement is for coal movements from Rosebud to Corette. Although no coal is moved under the agreement, a fixed fee of approximately $1.1 million per year is charged. The second rate agreement is for movements between various Wyoming (SPRB) origins and Corette. These movements are priced at $5.00 - $6.00 per ton, depending on origin, plus various supplemental charges. Shipper-owned cars are specified. Overall transportation cost to Corette (excluding the $1.1 million dollar fixed fee) are typically in the range of $6.00/ton or $0.024/ton-mile for the 253-mile haul.

The existing Corette contract was scheduled to terminate June 30, 1999, but was extended to the end of 1999 to coincide with the termination of the coal supply agreement. PP&L Montana intends to negotiate a new rail transportation agreement with substantially different terms prior to that date. The outcome of these negotiations is unknown at this time. Factors that could affect the negotiations include:

- The distance involved is relatively short at 253 miles. Variable costs per ton-mile are higher on short hauls.

- The current rate at +/-$0.025 per ton-mile is relatively high.

- The utility owns 75-cars, which are moved as a unit. Shipper ownership of cars will result in a lower rate; however, a 75-car train is relatively short.

- The volume involved, at 750,000 to 800,000 tons per year, is relatively small. The railroad may not be able to dedicate locomotives to the movement full-time.

- Corette is captive to the BNSF. There is little effective competition for fuel deliveries.

We believe a rate reduction can be negotiated, but that reduction will be limited, given the railroad's negotiating position. Our estimated cost for transportation of Corette coal is $0.020/ton-mile ($5.06/ton). This considers savings due to car ownership and maintenance (which is charged to power station O & M).

6.6.3 Corette Coal Supply -- Delivered Cost

Coal supplies from the SPRB are adequate for Corette over the study period. Although the sulfur restrictions limit the possible sources, there are sufficient potential suppliers in both the northern and southern portions of the SPRB to assure adequate supply alternatives.

Coal costs FOB mine are estimated based on benchmark price projections for 8,400 Btu/lb coal (see Chapter 5). These are adjusted for the lower Btu required at Corette and a premium for low sulfur content.

Delivered fuel prices are the sum of the FOB mine price and the transportation cost. These fuel price estimates are shown on Table 6.1 following this text, and summarized below (1998 dollars):

	DELIVERED PRICE (1998 $)				
	1999	2000	2001-2005	2006-2030	AVERAGE
FOB Mine ($/Ton)	3.65	4.10	4.90	5.40	5.23
Transportation ($/Ton)	5.06	5.06	5.06	5.06	5.06
Total	8.71	9.16	9.96	10.46	10.29
$/MMBtu @ 8,330 Btu/lb	0.52	0.55	0.60	0.63	0.62

6.7 FUEL PRICE ESTIMATES -- INFLATED BASIS

Estimated fuel prices over the study period are shown on Table 6.1 (following this text) expressed in 4th quarter 1998 dollars with no allowance for inflation. Because the fuel price is the sum of a number of components, not all of which inflate at similar rates (or at all), the delivered fuel cost will likely lag inflation somewhat. We have therefore developed parallel fuel price estimates on a nominal (i.e., inflated) dollar basis, as shown on Table 6.2 (following this text). Inflation assumptions incorporated in Table 6.2 are based on a number of projections which we consider reasonable for the price estimates, including general inflation (GDP-IPD) of 2% - 3% per year.

Following this text are:

Tables:
6.1: Estimated Fuel Price Summary -- 1998 Dollars
6.2: Estimated Fuel Price Summary -- Inflated Dollars

TABLE 6.1

ESTIMATED FUEL PRICE -- COLSTRIP & CORETTE STATIONS
1998 DOLLARS -- NO ALLOWANCE FOR INFLATION
FOR
CHASE SECURITIES, INC.
BY
JOHN T. BOYD COMPANY
MINING & GEOLOGICAL CONSULTANTS
SEPTEMBER 1999

	1999	2000	2001	2002	2003	2004	2005	2006
COLSTRIP UNITS 1 & 2								
Coal Purchased:								
Rosebud Mine (Tons-000)	1,510	3,020	3,020	3,020	3,020	3,020	3,020	3,020
Other Sources (Tons-000)	--	--	--	--	--	--	--	--
Total	1,510	3,020	3,020	3,020	3,020	3,020	3,020	3,020
Avg. Quality (Btu/Lb)	8,558	8,558	8,558	8,558	8,558	8,558	8,558	8,558
Fuel Price (Delivered):								
Rosebud Mine Coal ($/Ton)	8.00	8.07	8.11	7.46	7.51	7.50	7.50	7.53
Other Sources ($/Ton)	--	--	--	--	--	--	--	--
Total -- $/Ton	8.00	8.07	8.11	7.46	7.51	7.50	7.50	7.53
Units 1 & 2 Total Fuel Cost -- $-000	12,078	24,381	24,500	22,541	22,670	22,661	22,647	22,741
--$/MMBtu	0.47	0.47	0.47	0.44	0.44	0.44	0.44	0.44
SUMMARY BY FIXED AND VARIABLE COMPONENTS								
UNITS 1 & 2 DELIVERED FUEL COST:								
Fixed Cost ($/Yr-000)	2,261	4,745	4,862	4,909	5,036	5,027	5,013	5,106
Variable Cost:								
Per Year ($-000)	9,816	19,636	19,638	17,632	17,634	17,634	17,633	17,635
Per Ton ($)	6.50	6.50	6.50	5.84	5.84	5.84	5.84	5.84
Per MMBtu ($)	0.38	0.38	0.38	0.34	0.34	0.34	0.34	0.34
COLSTRIP UNITS 3 & 4								
Coal Purchased:								
Rosebud Mine (Tons-000)	3,485	6,971	6,971	6,971	6,971	6,971	6,971	6,971
Other Sources (Tons-000)	--	--	--	--	--	--	--	--
Total	3,485	6,971	6,971	6,971	6,971	6,971	6,971	6,971
Avg. Quality (Btu/Lb)	8,509	8,509	8,509	8,509	8,509	8,509	8,509	8,509
Fuel Price (Delivered):								
Rosebud Mine Coal:								
Coal Cost FOB Mine ($/Ton)	11.90	9.70	8.22	8.65	8.77	9.15	9.33	9.55
Transportation Cost ($/Ton)	1.62	1.62	1.27	0.91	0.92	0.92	0.92	0.93
Subtotal	13.52	11.32	9.49	9.56	9.69	10.07	10.25	10.48
Other Sources ($/Ton)	--	--	--	--	--	--	--	--
Total -- $/Ton	13.52	11.32	9.49	9.56	9.69	10.07	10.25	10.48
Units 3 & 4 Total Fuel Cost -- $-000	47,122	78,910	66,166	66,675	67,517	70,168	71,485	73,063
--$/MMBtu	0.79	0.67	0.56	0.56	0.57	0.59	0.60	0.62

	2007	2008	2009	2010	2011	2012	2013	2014
COLSTRIP UNITS 1 & 2								
Coal Purchased:								
Rosebud Mine (Tons-000)	3,020	3,020	3,020	3,020	3,020	2,957	2,957	2,957
Other Sources (Tons-000)	--	--	--	--	--	--	--	--
Total	3,020	3,020	3,020	3,020	3,020	2,957	2,957	2,957
Avg. Quality (Btu/Lb)	8,558	8,558	8,558	8,558	8,558	8,740	8,740	8,740
Fuel Price (Delivered):								
Rosebud Mine Coal ($/Ton)	7.85	7.83	7.82	10.34	10.12	10.06	10.40	10.59
Other Sources ($/Ton)	--	--	--	--	--	--	--	--
Total -- $/Ton	7.85	7.83	7.82	10.34	10.12	10.06	10.40	10.59
Units 1 & 2 Total Fuel Cost -- $-000	23,692	23,641	23,629	31,230	30,554	29,741	30,765	31,317
--$/MMBtu	0.46	0.46	0.46	0.60	0.59	0.58	0.60	0.61
SUMMARY BY FIXED AND VARIABLE COMPONENTS								
UNITS 1 & 2 DELIVERED FUEL COST:								
Fixed Cost ($/Yr-000)	5,140	5,090	5,078	10,564	10,856	11,112	11,472	11,547
Variable Cost:								
Per Year ($-000)	18,552	18,551	18,551	20,666	19,698	18,629	19,293	19,770
Per Ton ($)	6.14	6.14	6.14	6.84	6.52	6.30	6.52	6.69
Per MMBtu ($)	0.36	0.36	0.36	0.40	0.38	0.36	0.37	0.38
COLSTRIP UNITS 3 & 4								
Coal Purchased:								
Rosebud Mine (Tons-000)	6,971	6,971	6,971	6,971	6,971	6,971	6,971	6,971
Other Sources (Tons-000)	--	--	--	--	--	--	--	--
Total	6,971	6,971	6,971	6,971	6,971	6,971	6,971	6,971
Avg. Quality (Btu/Lb)	8,509	8,509	8,509	8,509	8,509	8,509	8,509	8,509
Fuel Price (Delivered):								
Rosebud Mine Coal:								
Coal Cost FOB Mine ($/Ton)	9.45	9.55	9.65	9.83	10.00	9.99	9.87	9.82
Transportation Cost ($/Ton)	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.92
Subtotal	10.38	10.48	10.58	10.76	10.92	10.91	10.79	10.74
Other Sources ($/Ton)	--	--	--	--	--	--	--	--
Total -- $/Ton	10.38	10.48	10.58	10.76	10.92	10.91	10.79	10.74
Units 3 & 4 Total Fuel Cost -- $-000	72,337	73,045	73,773	74,986	76,129	76,074	75,207	74,891
--$/MMBtu	0.61	0.62	0.62	0.63	0.64	0.64	0.63	0.63

	2015
COLSTRIP UNITS 1 & 2	
Coal Purchased:	
Rosebud Mine (Tons-000)	2,957
Other Sources (Tons-000)	--
Total	2,957
Avg. Quality (Btu/Lb)	8,740
Fuel Price (Delivered):	
Rosebud Mine Coal ($/Ton)	10.90

	1999	2000	2001	2002	2003	2004	2005	2006
SUMMARY BY FIXED AND VARIABLE COMPONENTS								
UNITS 3 & 4 DELIVERED FUEL COST:								
Fixed Cost ($/Yr-000)	3,899	14,956	23,181	23,649	24,060	25,127	25,771	26,228
Variable Cost:								
Per Year ($-000)	43,223	63,954	42,985	43,026	43,456	45,040	45,714	46,835
Per Ton ($)	12.40	9.17	6.17	6.17	6.23	6.46	6.56	6.72
Per MMBtu ($)	0.73	0.54	0.36	0.36	0.37	0.38	0.39	0.39
CORETTE STATION								
Coal Purchased (Tons -- 000)	405	810	810	810	810	810	810	810
Avg. Quality (Btu/Lb)	8,330	8,330	8,330	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):								
Coal Cost FOB Mine ($/Ton)	3.65	4.10	4.45	4.70	4.90	5.15	5.30	5.40
Transportation Cost ($/Ton)	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06
Total -- $/Ton	8.71	9.16	9.51	9.76	9.96	10.21	10.36	10.46
Corette Total Fuel Cost* -- $-000	3,528	7,420	7,703	7,906	8,068	8,270	8,392	8,473
--$/MMBtu	0.52	0.55	0.57	0.59	0.60	0.61	0.62	0.63

	2007	2008	2009	2010	2011	2012	2013	2014
SUMMARY BY FIXED AND VARIABLE COMPONENTS								
UNITS 3 & 4 DELIVERED FUEL COST:								
Fixed Cost ($/Yr-000)	25,823	25,617	25,394	25,586	25,871	25,768	25,181	24,967
Variable Cost:								
Per Year ($-000)	46,514	47,428	48,379	49,400	50,258	50,306	50,026	49,924
Per Ton ($)	6.67	6.80	6.94	7.09	7.21	7.22	7.18	7.16
Per MMBtu ($)	0.39	0.40	0.41	0.42	0.42	0.42	0.42	0.42
CORETTE STATION								
Coal Purchased (Tons -- 000)	810	810	810	810	810	810	810	810
Avg. Quality (Btu/Lb)	8,330	8,330	8,330	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):								
Coal Cost FOB Mine ($/Ton)	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40
Transportation Cost ($/Ton)	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06
Total -- $/Ton	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46
Corette Total Fuel Cost* -- $-000	8,473	8,473	8,473	8,473	8,473	8,473	8,473	8,473
--$/MMBtu	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63

	2015
SUMMARY BY FIXED AND VARIABLE COMPONENTS	
UNITS 3 & 4 DELIVERED FUEL COST:	
Fixed Cost ($/Yr-000)	24,796
Variable Cost:	
Per Year ($-000)	49,843
Per Ton ($)	7.15
Per MMBtu ($)	0.42
CORETTE STATION	
Coal Purchased (Tons -- 000)	810
Avg. Quality (Btu/Lb)	8,330
Fuel Price (Delivered):	
Coal Cost FOB Mine ($/Ton)	5.40
Transportation Cost ($/Ton)	5.06
Total -- $/Ton	10.46
Corette Total Fuel Cost* -- $-000	8,473
--$/MMBtu	0.63

* Corette costs are considered 100% variable

Note: All dollar values are in 4th quarter 1998 dollars with no allowance for inflation.

Note: Projections based on data from January 1999

TABLE 6.1 -- CONTINUED

ESTIMATED FUEL PRICE -- COLSTRIP & CORETTE STATIONS
1998 DOLLARS -- NO ALLOWANCE FOR INFLATION

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
COLSTRIP UNITS 1 & 2										
Coal Purchased:										
Rosebud Mine (Tons-000).....	2,957	2,957	2,957	2,957	2,966	2,966	2,966	2,957	2,957	2,957
Other Sources (Tons-000).....	--	--	--	--	--	--	--	--	--	--
Total.....	2,957	2,957	2,957	2,957	2,966	2,966	2,966	2,957	2,957	2,957
Avg. Quality (Btu/Lb).....	8,740	8,740	8,740	8,740	8,713	8,713	8,713	8,740	8,740	8,740
Fuel Price (Delivered):										
Rosebud Mine Coal ($/Ton).....	10.82	10.30	10.59	10.35	10.32	10.72	10.89	11.23	11.10	11.61
Other Sources ($/Ton).....	--	--	--	--	--	--	--	--	--	--
Total -- $/Ton.....	10.82	10.30	10.59	10.35	10.32	10.72	10.89	11.23	11.10	11.61
Units 1& 2 Total Fuel Cost										
-- $-000...	31,983	30,461	31,323	30,616	30,595	31,787	32,293	33,220	32,835	34,323
-- $/MMBtu...	0.62	0.59	0.61	0.59	0.59	0.62	0.62	0.64	0.64	0.66
SUMMARY BY FIXED AND VARIABLE COMPONENTS										
UNITS 1 & 2 DELIVERED FUEL COST:										
Fixed Cost ($/Yr-000).....	11,616	11,109	11,179	10,891	10,786	11,089	11,157	11,255	10,994	11,644
Variable Cost:										
Per Year ($-000).....	20,367	19,351	20,144	19,725	19,809	20,698	21,136	21,965	21,841	22,678
Per Ton ($).....	6.89	6.54	6.81	6.67	6.68	6.98	7.13	7.43	7.39	7.67
Per MMBtu ($).....	0.39	0.37	0.39	0.38	0.38	0.40	0.41	0.42	0.42	0.44
COLSTRIP UNITS 3 & 4										
Coal Purchased:										
Rosebud Mine (Tons-000).....	6,971	6,971	6,971	6,971	6,900	6,900	6,900	6,900	6,900	6,900
Other Sources (Tons-000).....	--	--	--	--	--	--	--	--	--	--
Total.....	6,971	6,971	6,971	6,971	6,900	6,900	6,900	6,900	6,900	6,900
Avg. Quality (Btu/Lb).....	8,509	8,509	8,509	8,509	8,591	8,591	8,591	8,591	8,591	8,591
Fuel Price (Delivered):										
Rosebud Mine Coal:										
Coal Cost FOB Mine ($/Ton)....	9.70	9.85	9.71	9.97	8.03	8.59	8.62	9.55	9.52	9.46
Transportation Cost ($/Ton)...	0.92	0.92	0.83	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Subtotal.....	10.62	10.77	10.54	10.75	8.81	9.37	9.40	10.33	10.31	10.24
Other Sources ($/Ton).....	--	--	--	--	--	--	--	--	--	--
Total -- $/Ton.....	10.62	10.77	10.54	10.75	8.81	9.37	9.40	10.33	10.31	10.24
Units 3 & 4 Total Fuel Cost										
-- $-000...	74,045	75,058	73,484	74,958	60,792	64,657	64,879	71,301	71,119	70,673
--$/MMBtu...	0.62	0.63	0.62	0.63	0.51	0.55	0.55	0.60	0.60	0.60

	2026	2027	2028	2029	2030	TOTAL/AVERAGE
COLSTRIP UNITS 1 & 2						
Coal Purchased:						
Rosebud Mine (Tons-000).....	2,957	2,957	2,957	2,957	2,957	93,960
Other Sources (Tons-000).....	--	--	--	--	--	--
Total.....	2,957	2,957	2,957	2,957	2,957	93,960
Avg. Quality (Btu/Lb).....	8,740	8,740	8,740	8,740	8,740	8,664
Fuel Price (Delivered):						
Rosebud Mine Coal ($/Ton).....	10.98	10.83	10.86	10.69	11.10	9.70
Other Sources ($/Ton).....	--	--	--	--	--	--
Total -- $/Ton.....	10.98	10.83	10.86	10.69	11.10	9.70
Units 1& 2 Total Fuel Cost						
-- $-000...	32,474	32,016	32,106	31,622	32,821	911,506
-- $/MMBtu...	0.63	0.62	0.62	0.61	0.63	0.56
SUMMARY BY FIXED AND VARIABLE COMPONENTS						
UNITS 1 & 2 DELIVERED FUEL COST:						
Fixed Cost ($/Yr-000).....	10,389	10,054	9,791	9,427	9,281	280,287
Variable Cost:						
Per Year ($-000).....	22,085	21,962	22,315	22,196	23,540	631,219
Per Ton ($).....	7.47	7.43	7.55	7.51	7.96	6.72
Per MMBtu ($).....	0.43	0.42	0.43	0.43	0.46	0.39
COLSTRIP UNITS 3 & 4						
Coal Purchased:						
Rosebud Mine (Tons-000).....	6,900	6,900	6,900	6,900	6,900	218,805
Other Sources (Tons-000).....	--	--	--	--	--	--
Total.....	6,900	6,900	6,900	6,900	6,900	218,805
Avg. Quality (Btu/Lb).....	8,591	8,591	8,591	8,591	8,591	8,537
Fuel Price (Delivered):						
Rosebud Mine Coal:						
Coal Cost FOB Mine ($/Ton)....	9.86	10.00	9.89	9.62	10.38	9.52
Transportation Cost ($/Ton)...	0.78	0.78	0.78	0.77	0.77	0.91
Subtotal.....	10.64	10.78	10.67	10.39	11.15	10.43
Other Sources ($/Ton).....	--	--	--	--	--	--
Total -- $/Ton.....	10.64	10.78	10.67	10.39	11.15	10.43
Units 3 & 4 Total Fuel Cost						
-- $-000...	73,420	74,404	73,600	71,705	76,914	2,283,196
--$/MMBtu...	0.62	0.63	062	0.60	0.65	0.61

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SUMMARY BY FIXED AND VARIABLE COMPONENTS										
UNITS 3 & 4 DELIVERED FUEL COST:										
Fixed Cost ($/Yr-000).....	24,306	24,086	23,507	23,876	20,664	21,856	22,429	23,865	24,074	23,968
Variable Cost:										
Per Year ($-000).....	49,738	50,972	49,977	51,082	40,128	42,801	42,450	47,437	47,045	46,705
Per Ton ($).....	7.14	7.31	7.17	7.33	5.82	6.20	6.15	6.87	6.82	6.77
Per MMBtu ($).....	0.42	0.43	0.42	0.43	0.34	0.36	0.36	0.40	0.40	0.39
CORETTE STATION										
Coal Purchased (Tons -- 000).....	810	810	810	810	810	810	810	810	810	810
Avg. Quality (Btu/Lb).....	8,330	8,330	8,330	8,330	8,330	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):										
Coal Cost FOB Mine ($/Ton).....	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40
Transportation Cost ($/Ton).....	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06	5.06
Total -- $/Ton.....	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46
Corette Total Fuel Cost*										
-- $-000...	8,473	8,473	8,473	8,473	8,473	8,473	8,473	8,473	8,473	8,473
-- $/MMBtu.....	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63

	2026	2027	2028	2029	2030	TOTAL/AVERAGE
SUMMARY BY FIXED AND VARIABLE COMPONENTS						
UNITS 3 & 4 DELIVERED FUEL COST:						
Fixed Cost ($/Yr-000).....	24,408	24,494	23,939	22,869	23,478	747,720
Variable Cost:						
Per Year ($-000).....	49,012	49,910	49,661	48,909	53,436	1,535,475
Per Ton ($).....	7.10	7.23	7.20	7.07	7.74	7.02
Per MMBtu ($).....	0.41	0.42	0.42	0.41	0.45	0.41
CORETTE STATION						
Coal Purchased (Tons -- 000).....	810	810	810	810	810	25,515
Avg. Quality (Btu/Lb).....	8,330	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):						
Coal Cost FOB Mine ($/Ton).....	5.40	5.40	5.40	5.40	5.40	5.25
Transportation Cost ($/Ton).....	5.06	5.06	5.06	5.06	5.06	5.06
Total -- $/Ton.....	10.46	10.46	10.46	10.46	10.46	10.31
Corette Total Fuel Cost*						
-- $-000...	8,473	8,473	8,473	8,473	8,473	263,100
-- $/MMBtu.....	0.63	0.63	0.63	0.63	0.63	0.62

* Corette costs are considered 100% variable

Note: All dollar values are in 4th quarter 1998 dollars with no allowance for inflation.

Note: Projections based on data from January 1999

TABLE 6.2

ESTIMATED FUEL PRICE -- COLSTRIP & CORETTE STATIONS
INFLATED DOLLAR BASIS
FOR
CHASE SECURITIES, INC.
BY
JOHN T. BOYD COMPANY
MINING & GEOLOGICAL CONSULTANTS

SEPTEMBER 1999

	1999	2000	2001	2002	2003
COLSTRIP UNITS 1 & 2					
Coal Purchased:					
Rosebud Mine (Tons-000)	1,510	3,020	3,020	3,020	3,020
Other Sources (Tons-000)	--	--	--	--	--
Total	1,510	3,020	3,020	3,020	3,020
Avg. Quality (Btu/Lb)	8,558	8,558	8,558	8,558	8,558
Fuel Price (Delivered):					
Rosebud Mine Coal ($/Ton)	8.13	8.32	8.61	8.14	8.43
Other Sources ($/Ton)	--	--	--	--	--
Total -- $/Ton	8.13	8.32	8.61	8.14	8.43
Units 1& 2 Total Fuel Cost -- $-000	12,276	25,131	26,009	24,595	25,459
-- $/MMBtu	0.47	0.49	0.50	0.48	0.49
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 1 & 2 DELIVERED FUEL COST:					
Fixed Cost ($/Yr-000)	2,271	4,789	4,980	5,114	5,315
Variable Cost:					
Per Year ($-000)	10,005	20,342	21,029	19,482	20,145
Per Ton ($)	6.63	6.74	6.96	6.45	6.67
Per MMBtu ($)	0.39	0.39	0.41	0.38	0.39
COLSTRIP UNITS 3 & 4					
COAL PURCHASED:					
Rosebud Mine (Tons-000)	3,485	6,971	6,971	6,971	6,971
Other Sources (Tons-000)	--	--	--	--	--
Total	3,485	6,971	6,971	6,971	6,971
Avg. Quality (Btu/Lb)	8,509	8,509	8,509	8,509	8,509
Fuel Price (Delivered):					
Rosebud Mine Coal:					
Coal Cost FOB Mine ($/Ton)	12.08	9.92	8.50	9.11	9.41
Transportation Cost ($/Ton)	1.63	1.65	1.29	0.94	0.96
Subtotal	13.71	11.57	9.80	10.04	10.37
Other Sources ($/Ton)	--	--	--	--	--
Total -- $/Ton	13.71	11.57	9.80	10.04	10.37
Units 3 & 4 Total Fuel Cost -- $-000	47,774	80,644	68,312	70,016	72,301
-- $/MMBtu	0.81	0.68	0.58	0.59	0.61

	2004	2005	2006	2007	2008	2009
COLSTRIP UNITS 1 & 2						
Coal Purchased:						
Rosebud Mine (Tons-000)	3,020	3,020	3,020	3,020	3,020	3,020
Other Sources (Tons-000)	--	--	--	--	--	--
Total	3,020	3,020	3,020	3,020	3,020	3,020
Avg. Quality (Btu/Lb)	8,558	8,558	8,558	8,558	8,558	8,558
Fuel Price (Delivered):						
Rosebud Mine Coal ($/Ton)	8.68	8.94	9.25	9.92	10.22	10.54
Other Sources ($/Ton)	--	--	--	--	--	--
Total -- $/Ton	8.68	8.94	9.25	9.92	10.22	10.54
Units 1& 2 Total Fuel Cost -- $-000	26,210	27,002	27,935	29,963	30,856	31,820
-- $/MMBtu	0.51	0.52	0.54	0.58	0.60	0.62
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 1 & 2 DELIVERED FUEL COST:						
Fixed Cost ($/Yr-000)	5,374	5,431	5,600	5,711	5,741	5,817
Variable Cost:						
Per Year ($-000)	20,836	21,571	22,335	24,252	25,115	26,002
Per Ton ($)	6.90	7.14	7.40	8.03	8.32	8.61
Per MMBtu ($)	0.40	0.42	0.43	0.47	0.49	0.50
COLSTRIP UNITS 3 & 4						
COAL PURCHASED:						
Rosebud Mine (Tons-000)	6,971	6,971	6,971	6,971	6,971	6,971
Other Sources (Tons-000)	--	--	--	--	--	--
Total	6,971	6,971	6,971	6,971	6,971	6,971
Avg. Quality (Btu/Lb)	8,509	8,509	8,509	8,509	8,509	8,509
Fuel Price (Delivered):						
Rosebud Mine Coal:						
Coal Cost FOB Mine ($/Ton)	10.00	10.43	10.90	11.02	11.40	11.81
Transportation Cost ($/Ton)	0.99	1.02	1.06	1.09	1.12	1.15
Subtotal	11.00	11.45	11.96	12.11	12.52	12.96
Other Sources ($/Ton)	--	--	--	--	--	--
Total -- $/Ton	11.00	11.45	11.96	12.11	12.52	12.96
Units 3 & 4 Total Fuel Cost -- $-000	76,677	79,814	83,354	84,400	87,280	90,344
-- $/MMBtu	0.65	0.67	0.70	0.71	0.74	0.76

	1999	2000	2001	2002	2003
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 3 & 4 DELIVERED FUEL COST:					
Fixed Cost ($/Yr-000)	3,925	15,206	23,975	24,846	25,716
Variable Cost:					
Per Year ($-000)	43,849	65,438	44,337	45,170	46,585
Per Ton ($)	12.58	9.39	6.36	6.48	6.68
Per MMBtu ($)	0.74	0.55	0.37	0.38	0.39
CORETTE STATION					
Coal Purchased (Tons-000)	405	810	810	810	810
Avg. Quality (Btu/Lb)	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):					
Coal Cost FOB Mine ($/Ton)	3.75	4.32	4.82	5.23	5.60
Transportation Cost ($/Ton)	5.06	5.01	4.96	4.91	4.86
Total -- $/Ton	8.81	9.33	9.78	10.14	10.46
Corette Total Fuel Cost* -- $-000	3,567	7,560	7,921	8,212	8,472
-- $/MMBtu	0.53	0.56	0.59	0.61	0.63

	2004	2005	2006	2007	2008	2009
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 3 & 4 DELIVERED FUEL COST:						
Fixed Cost ($/Yr-000)	27,348	28,604	29,680	29,810	30,233	30,683
Variable Cost:						
Per Year ($-000)	49,329	51,210	53,674	54,590	57,047	59,661
Per Ton ($)	7.08	7.35	7.70	7.83	8.18	8.56
Per MMBtu ($)	0.42	0.43	0.45	0.46	0.48	0.50
CORETTE STATION						
Coal Purchased (Tons-000)	810	810	810	810	810	810
Avg. Quality (Btu/Lb)	8,330	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):						
Coal Cost FOB Mine ($/Ton)	6.04	6.39	6.68	6.86	7.05	7.24
Transportation Cost ($/Ton)	4.81	4.76	4.72	4.67	4.62	4.62
Total -- $/Ton	10.85	11.15	11.40	11.53	11.67	11.86
Corette Total Fuel Cost* -- $-000	8,792	9,032	9,233	9,341	9,453	9,608
-- $/MMBtu	0.65	0.67	0.68	0.69	0.70	0.71

	2010	2011	2012	2013	2014	2015
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 3 & 4 DELIVERED FUEL COST:						
Fixed Cost ($/Yr-000)	31,726	33,011	33,906	34,123	34,734	35,565
Variable Cost:						
Per Year ($-000)	62,499	65,362	67,343	68,794	70,468	72,287
Per Ton ($)	8.97	9.38	9.66	9.87	10.11	10.37
Per MMBtu ($)	0.53	0.55	0.57	0.58	0.59	0.61
CORETTE STATION						
Coal Purchased (Tons-000)	810	810	810	810	810	810
Avg. Quality (Btu/Lb)	8,330	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):						
Coal Cost FOB Mine ($/Ton)	7.43	7.64	7.84	8.05	8.27	8.49
Transportation Cost ($/Ton)	4.62	4.62	4.62	4.62	4.62	4.62
Total -- $/Ton	12.06	12.26	12.46	12.68	12.89	13.12
Corette Total Fuel Cost* -- $-000	9,766	9,928	10,095	10,267	10,443	10,624
-- $/MMBtu	0.72	0.74	0.75	0.76	0.77	0.79

TABLE 6.2 -- CONTINUED

ESTIMATED FUEL PRICE -- COLSTRIP & CORETTE STATIONS
INFLATED DOLLAR BASIS

	2016	2017	2018	2019	2020
COLSTRIP UNITS 1 & 2					
Coal Purchased:					
Rosebud Mine (Tons-000).....	2,957	2,957	2,957	2,957	2,966
Other Sources (Tons-000).....	--	--	--	--	--
Total.....	2,957	2,957	2,957	2,957	2,966
Avg. Quality (Btu/Lb).....	8,740	8,740	8,740	8,740	8,710
Fuel Price (Delivered):					
Rosebud Mine Coal ($/Ton).....	16.14	15.78	16.63	16.65	17.04
Other Sources ($/Ton).....	--	--	--	--	--
Total -- $/Ton.....	16.14	15.78	16.63	16.65	17.04
Units 1 & 2 Total Fuel					
Cost -- $-000.....	47,730	46,659	49,169	49,238	50,544
--$/MMBtu...	0.92	0.90	0.95	0.95	0.98
SUMMARY BY FIXED AND VARIABLE					
COMPONENTS UNITS 1 & 2 DELIVERED					
FUEL COST:					
Fixed Cost ($/Yr-000).....	17,429	17,114	17,634	17,580	17,900
Variable Cost:					
Per Year ($-000).....	30,301	29,545	31,535	31,657	32,644
Per Ton ($).....	10.25	9.99	10.66	10.71	11.01
Per MMBtu ($).....	0.59	0.57	0.61	0.61	0.63
COLSTRIP UNITS 3 & 4					
Coal Purchased:					
Rosebud Mine (Tons-000).....	6,971	6,971	6,971	6,971	6,900
Other Sources (Tons-000).....	--	--	--	--	--
Total.....	6,971	6,971	6,971	6,971	6,900
Avg. Quality (Btu/Lb).....	8,509	8,509	8,509	8,509	8,591
Fuel Price (Delivered):					
Rosebud Mine Coal:					
Coal Cost FOB Mine ($/Ton)...	14.40	15.02	15.21	16.09	13.39
Transportation Cost ($/Ton).....	1.38	1.42	1.32	1.31	1.35
Subtotal.....	15.79	16.44	16.53	17.40	14.73
Other Sources ($/Ton).....	--	--	--	--	--
Total -- $/Ton.....	15.79	16.44	16.53	17.40	14.73
Units 3 & 4 Total Fuel					
Cost -- $-000.....	110,058	114,603	115,248	121,273	101,669
--$/MMBtu...	0.93	0.97	0.97	1.02	0.86

	2021	2022	2023	2024	2025	2026
COLSTRIP UNITS 1 & 2						
Coal Purchased:						
Rosebud Mine (Tons-000).....	2,966	2,966	2,957	2,957	2,957	2,957
Other Sources (Tons-000).....	--	--	--	--	--	--
Total.....	2,966	2,966	2,957	2,957	2,957	2,957
Avg. Quality (Btu/Lb).....	8,710	8,710	8,740	8,740	8,740	8,740
Fuel Price (Delivered):						
Rosebud Mine Coal ($/Ton).....	18.20	18.96	20.05	20.31	21.01	21.32
Other Sources ($/Ton).....	--	--	--	--	--	--
Total -- $/Ton.....	18.20	18.96	20.05	20.31	21.01	21.32
Units 1 & 2 Total Fuel						
Cost -- $-000.....	53,995	56,249	59,283	60,049	62,130	63,049
--$/MMBtu...	1.05	1.09	1.15	1.15	1.20	1.22
SUMMARY BY FIXED AND VARIABLE						
COMPONENTS UNITS 1 & 2 DELIVERED						
FUEL COST:						
Fixed Cost ($/Yr-000).....	18,963	19,559	20,191	20,195	20,207	20,439

	2016	2017	2018	2019	2020
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 3 & 4 DELIVERED FUEL COST:					
Fixed Cost ($/Yr-000).....	35,937	36,616	36,712	38,730	34,943
Variable Cost:					
Per Year ($-000).....	74,121	77,987	78,536	82,543	66,726
Per Ton ($).....	10.63	11.19	11.27	11.84	9.67
Per MMBtu ($).....	0.62	0.66	0.66	0.70	0.56
CORETTE STATION					
Coal Purchased (Tons -- 000).....	810	810	810	810	810
Avg. Quality (Btu/Lb).....	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):					
Coal Cost FOB Mine ($/Ton).....	8.72	8.96	9.20	9.45	9.70
Transportation Cost ($/Ton)....	4.62	4.62	4.62	4.62	4.62
Total -- $/Ton.....	13.35	13.58	13.82	14.07	14.33
Corette Total Fuel					
Cost* -- $-000.....	10,810	11,000	11,196	11,398	11,604
-- $/MMBtu.....	0.80	0.82	0.83	0.84	0.86

	2021	2022	2023	2024	2025	2026
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 3 & 4 DELIVERED FUEL COST:						
Fixed Cost ($/Yr-000).....	38,245	40,203	43,749	45,211	46,129	48,235
Variable Cost:						
Per Year ($-000).....	73,183	74,480	85,287	86,303	87,897	94,462
Per Ton ($).....	10.61	10.79	12.36	12.51	12.74	13.69
Per MMBtu ($).....	0.62	0.63	0.72	0.73	0.74	0.80
CORETTE STATION						
Coal Purchased (Tons -- 000).....	810	810	810	810	810	810
Avg. Quality (Btu/Lb).....	8,330	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):						
Coal Cost FOB Mine ($/Ton).....	9.97	10.23	10.51	10.80	11.09	11.39
Transportation Cost ($/Ton)....	4.62	4.62	4.62	4.62	4.62	4.62
Total -- $/Ton.....	14.59	14.86	15.13	15.42	15.71	16.01
Corette Total Fuel						
Cost* -- $-000.....	11,816	12,034	12,258	12,488	12,724	12,967
-- $/MMBtu.....	0.88	0.89	0.91	0.93	0.94	0.96

	2027	2028	2029	2030	TOTAL/AVERAGE
SUMMARY BY FIXED AND VARIABLE COMPONENTS UNITS 3 & 4 DELIVERED FUEL COST:					
Fixed Cost ($/Yr-000).....	49,607	49,676	48,818	51,534	1,117,437
Variable Cost:					
Per Year ($-000).....	98,464	100,487	101,367	112,611	2,272,097
Per Ton ($).....	14.27	14.56	14.69	16.32	10.38
Per MMBtu ($).....	0.83	0.85	0.86	0.95	0.61
CORETTE STATION					
Coal Purchased (Tons -- 000).....	810	810	810	810	25,515
Avg. Quality (Btu/Lb).....	8,330	8,330	8,330	8,330	8,330
Fuel Price (Delivered):					
Coal Cost FOB Mine ($/Ton).....	11.69	12.01	12.33	12.67	8.53
Transportation Cost ($/Ton)....	4.62	4.62	4.62	4.62	4.68
Total -- $/Ton.....	16.32	16.63	16.96	17.29	13.21
Corette Total Fuel					
Cost* -- $-000.....	13,216	13,471	13,734	14,004	337,038
-- $/MMBtu.....	0.98	1.00	1.02	1.04	0.79

* Corette costs are considered 100% variable

Note: All dollar values are on an inflated (nominal) basis.

Note: Projections based on data from January 1999

APPENDIX A

MAJOR EQUIPMENT LIST
ROSEBUD MINE
ROSEBUD COUNTY, MONTANA
FOR
CHASE SECURITIES, INC.
BY
JOHN T. BOYD COMPANY
MINING AND GEOLOGICAL CONSULTANTS

SEPTEMBER 1999

ITEM/DESCRIPTION	CAPACITY	LOCATION	EQUIP. NO.	YEAR PUT IN SERVICE	AGE (YRS)	OPER. HRS THROUGH 1998	AVAILABILITY 1997 (%)	AVAILABILITY 1998 (%)
DRAGLINES:								
Marion -- 8200	75 Cu Yd	Area C	W7000	1983	16	76,465	88.5	88.0
Marion -- 8050	60 Cu Yd	Area D	W5	1980	19	83,336	67.2	90.9
Marion -- 8050	60 Cu Yd	Idle	W46	1975	24	57,701	99.7	100.0
Marion -- 8050	60 Cu Yd	Idle	W47	1976	23	98,945	99.2	95.4
POWER SHOVELS:								
Marion 191M	27 Cu Yd	Area C	W7027	1983	16	49,283	84.1	90.6
B-E 280B	17 Cu Yd	Area D	W41	1973	26	29,641	93.5	96.1
B-E 280B	17 Cu Yd	Idle	W42	1974	25	27,554	99.9	99.8
OVERBURDEN/PARTING/COAL DRILLS:								
B-E Track Drill -- 60 R	12 1/4"	--	W48	n/a	--	13,024	98.0	93.1
Marion -- M3	12 1/4"	Area C	W7034	1984	15	24,623	85.6	97.5
Ingersol Rand -- DM45E	9 7/8"	--	W415	n/a	--	16,250	98.8	88.9
Gardner Denver -- RDC16	4 1/4"	Area D	W422	1989	10	10,610	n/a	100.0
Gardner Denver -- RDC16	4 1/4"	Area C	W7055	1985	14	13,454	n/a	100.0
FRONT-END LOADERS:								
Caterpillar -- 992C	16 Cu Yd	Area D	W416	1989	10	29,422	79.1	82.1
Caterpillar -- 992D	16 Cu Yd	Area C	W7074	1992	7	20,306	90.3	93.9
Caterpillar -- 992C	15 Cu Yd	Area C	W15	1981	18	42,222	86.4	77.3
Caterpillar -- 970F	8.75 Cu Yd	--	716	1998	1	1,980	New 1998	99.1
Komatsu -- WA600lL	8 Cu Yd	Area D	W458	1994	5	24,102	79.8	90.9
Caterpillar -- IT28	2.25 Cu Yd	Conv.	W9016	n/a	--	9,992	n/a	n/a
John Deere Loader/BH	1 Cu Yd	Conv.	W9006	1983	16	6,145	n/a	n/a
BOTTOM DUMP COAL HAULERS:								
Dart -- 4160	160 Ton	Area C	W7028	1983	16	49,250	88.0	82.7
Dart -- 4160	160 Ton	Area C	W7029	1983	16	53,467	81.4	83.6
Dart -- 4160	160 Ton	Area C	W7030	1984	15	51,547	79.1	85.2
Dart -- 4160	160 Ton	Area C	W7031	1984	15	51,612	83.1	80.4
Caterpillar 776B	160 Ton	Area C	W7061	1988	11	39,460	79.0	63.5
Euclid -- CH120	120 Ton	Area D	W34	1974	25	72,663	80.8	72.6
Euclid -- CH120	120 Ton	Area D	W35	1974	25	68,820	80.3	91.4
Euclid -- CH120	120 Ton	Area D	W36	1975	24	74,292	76.5	71.5
Euclid -- CH120	120 Ton	Area D	W37	1975	24	80,864	84.2	75.3
Euclid -- CH120	120 Ton	Area D	W38	1975	24	70,675	77.0	74.3
Euclid -- CH120	120 Ton	Area D	W66	1976	23	83,427	72.0	80.4
Euclid -- CH120	120 Ton	Area D	W67	1976	23	71,905	90.2	70.1

ITEM/DESCRIPTION	CAPACITY	LOCATION	EQUIP. NO.	YEAR PUT IN SERVICE	AGE (YRS)	OPER. HRS THROUGH 1998	AVAILABILITY 1997 (%)	AVAILABILITY 1998 (%)
END DUMP TRUCK:								
Euclid -- R35	35 Ton	Area D	W264	1983	16	23,552	n/a	n/a
WATER TRUCKS:								
Caterpillar -- 631D	10000 Gal.	Area D	W258	1983	16	26,601	89.6	76.1
Caterpillar -- 631D	10000 Gal.	Idle	W259	n/a	--	32,932	72.6	82.6
Caterpillar -- 631D	10000 Gal.	Area D	W455	1983	16	26,096	77.4	68.8
Caterpillar -- 631D	10000 Gal.	Area C	W7003	1983	16	27,403	83.6	83.5
Caterpillar -- 631D	10000 Gal.	--	W7011	n/a	--	41,004	89.3	93.5
Caterpillar -- 631D	10000 Gal.	Area C	W7046	1983	16	41,234	96.3	66.4
TRACK DOZERS:								
Caterpillar -- D11N	53 Cu Yd	Area C	W424	1989	10	44,163	75.5	71.5
Caterpillar -- D11R	45 Cu Yd	Area D	630	1997	2	12,363	91.6	86.2
Komatsu -- D475A2	45 Cu Yd	Area C	W7073	1992	7	31,828	83.0	66.9
Caterpillar -- D10N	28 Cu Yd	Area D	W412	1988	11	39,983	71.2	81.2
Komatsu -- D375A3	28 Cu Yd	Area D	701	1997	2	5,332	79.9	83.8
Caterpillar -- D10R	28 Cu Yd	Area C	615	1996	3	15,170	81.9	76.4
Komatsu -- D375A	26 Cu Yd	--	W467	n/a	--	33,657	80.8	76.5
Caterpillar -- D9N	17 Cu Yd	Area C	W7075	1994	5	20,014	92.6	95.0
GRADERS:								
Caterpillar -- 14G	18 ft.	Area C	W7026	1984	15	38,202	91.3	85.0
Caterpillar -- 16G	16 ft.	Area C	W423	1989	10	40,449	74.6	82.5
Caterpillar -- 16H	16 ft.	Area D	616	1996	3	10,483	93.7	90.7
Caterpillar -- 16H	16 ft.	Area C	727	1998	1	3,073	New 1998	94.3
Caterpillar -- 130G	14 ft.	Area D	W7068	1984	15	12,222	99.5	91.0
SCRAPERS:								
Caterpillar -- 657E	35 Cu Yd	Area C	610	1996	3	13,689	91.9	94.5
Caterpillar -- 657E	35 Cu Yd	Area D	611	1996	3	13,087	90.6	94.4
BACKHOE:								
Caterpillar -- 245	3 - 5 Cu Yd	Area D	W207	1981	18	22,789	73.1	94.3

Note: n/a indicates not available.

[LOGO]

Appendix B

Power River Basin producers finding it more costly to get to coal reserves

Washington (Platts)--9Aug2013/414 pm EDT/2014 GMT

When Powder River Basin coal producer Cloud Peak Energy in late July said it might cut production at its Cordero Rojo mine in 2015, the decision was based in part on projected increases in capital expenditures.

And although the company's final decision will depend on whether coal prices rebound, the announcement highlights a growing issue for PRB miners -- as production moves westward, the coal dips deeper into the earth and becomes more expensive to get to.

The amount of rock and dirt that must be removed to access the coal is known as a strip ratio. A strip ratio of 1 to 1 means a cubic yard of rock and dirt must be removed to mine one cubic yard of coal.

Article continues below...

When PRB production began in the 1970s, it mostly started on the eastern edge of the lease tracts, where strip ratios were sometimes better than 1 to 1, as the basin's low-sulfur coal sat nearly exposed at the surface.

But as one moves west across the basin the coal seams dip further underground and the overburden -- the rock and dirt covering the coal -- increases.

Later this month, the lease for the Maysfield II North coal tract in Wyoming will be sold at auction by the US Bureau of Land Management. The lease tract is adjacent to the west end of Cordero Rojo and has a strip ratio of roughly 4.5 to 1, according to the BLM's sale notice.

To put that into perspective, the tract's coal seam is roughly 69 feet thick, but with overburden ranging in thickness from 266 to 397 feet, according to the BLM.

"There's very little low ratio coal out there anymore," said Al Elser, BLM's assistant district manager for solid minerals in Casper, Wyoming.

PRB production peaked in 2008 at 496 million st, according to MSHA data. In 2012, the basin produced 425 million st.

But by 2030, the BLM expects PRB coal production to range between 500 and 700 million st annually, according to its 2010 resource management plan, which is now being updated.

At the same time, the basin's productivity, based on tons per employee hour, is declining, according to MSHA data. Productivity peaked in 2001 at roughly 43 tons per employee-hour, but by 2012, the figure had dropped to roughly 28 tons.

According to Bob Burnham, president of Burnham Coal, a mine consulting group based in Arvada, Colorado, much of the decline is the result of higher strip ratios.

Bill Meister, a St. Louis-based mining consultant with Golder Associates, estimates the PRB strip ratio climbs by a tenth of a percent each year as production moves westward.

Incrementally, the increase is small, but it sooner or later it becomes an issue. "You have to add more equipment to add capacity," said Meister.

If there's a point where strip ratios are uneconomical, that remains to be seen, said Burnham. Technology changes could improve mining efficiencies, but it also depends a lot on the price of coal.

Brandon Blossman, a Houston-based coal equities analyst for Tudor Pickering Holt, said the challenges of higher strip ratios are well-known to the basin's producers.

Blossman believes higher strip ratios will push up costs and likely prices, but given the fact that prices of delivered PRB are already elevated given transportation charges, any increase from strip ratios is unlikely to matter much.

"Moving up a dollar or two doesn't really matter, except to the producers," said Blossman. "If it landed at $65 in China or South Korea from $63, it's not much of a percentage change."

An industry analyst, who asked that he not be identified to protect business relationships, said the larger challenge facing basin producers isn't higher costs, but low prices.

Producers might push for higher production to spread out mining costs, but more tons on the market means a drop in price.

He said a better move would be for everyone in the basin to pull back production.

"PRB doesn't have much of a cost curve," the analyst said. "You have this much dirt, to get to this seam, so in the absence of producer discipline, no one makes any

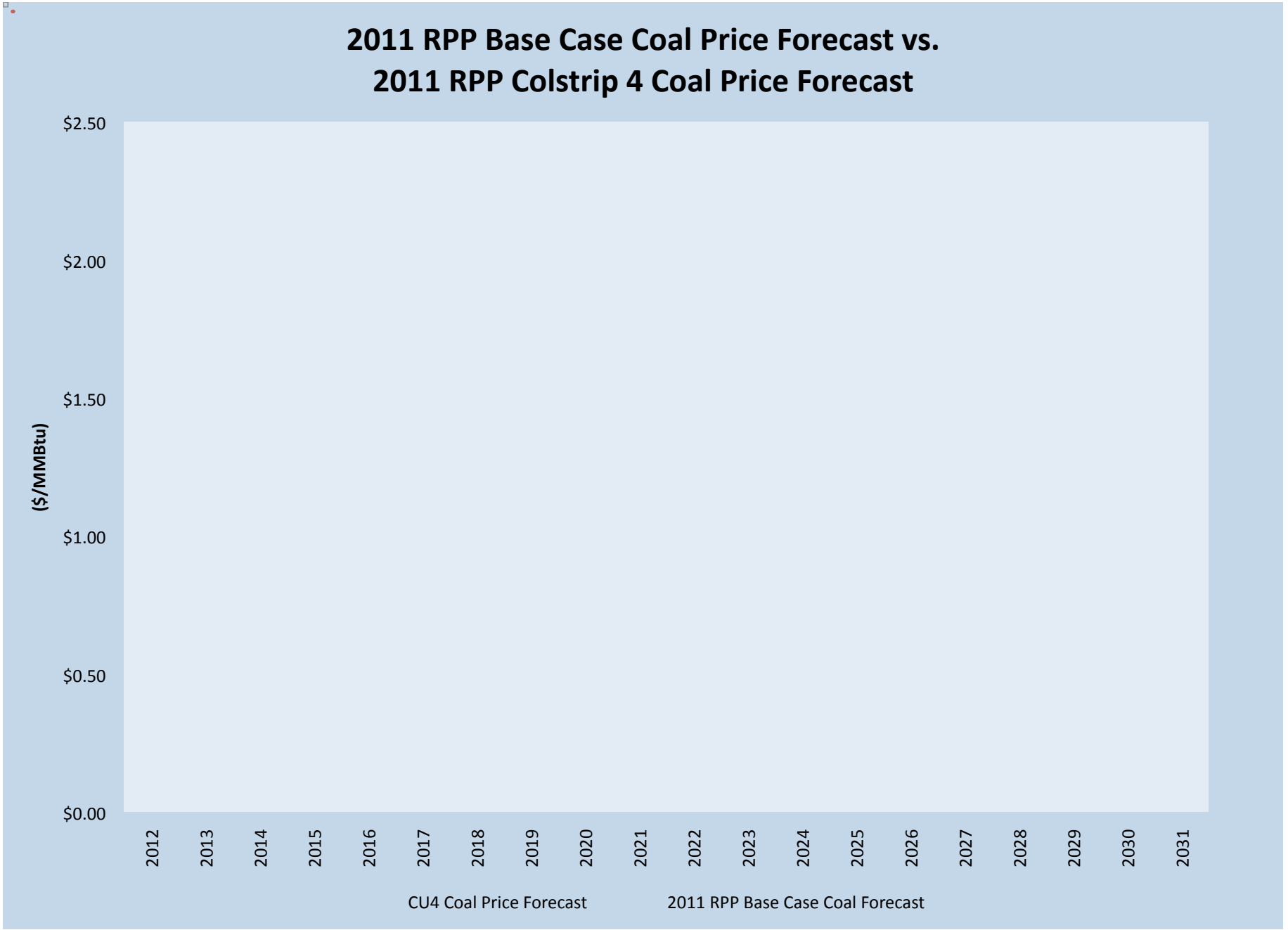
money."

The analyst said he believes a 10% production cut in the basin could push up prices 15%.

"If everybody did that for 2015, you could see price increases," said the analyst. "I think Cloud Peak is doing themselves a favor by announcing it."

--Andrew Moore, andrew.moore@platts.com
--Edited by Jeff Barber, jeff.barber@platts.com

Appendix C


2011 RPP Base Case Coal Price Forecast vs.
2011 RPP Colstrip 4 Coal Price Forecast
$2.50
$2.00
$1.50
$1.00
$0.50
$0.00
($/MMBtu)
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
CU4 Coal Price Forecast
2011 RPP Base Case Coal Forecast

NorthWestern Energy
2011 Resource Procurement Plan
Colstrip Coal Price Forecast
(Nominal $/MMBtu)

	2011 RPP Base Case EIA AEO Montana	2011 RPP Colstrip Base Case
2012	$0.92	$1.17
2013	$0.95	$1.27
2014	$0.98	$1.28
2015	$1.01	$1.33
2016	$1.04	$1.39
2017	$1.08	$1.41
2018	$1.11	$1.45
2019	$1.14	$1.49
2020	$1.16	$1.52
2021	$1.16	$1.57
2022	$1.21	$1.62
2023	$1.25	$1.67
2024	$1.30	$1.72
2025	$1.35	$1.76
2026	$1.39	$1.80
2027	$1.44	$1.85
2028	$1.51	$1.91
2029	$1.56	$1.96
2030	$1.60	$2.02
2031	$1.65	$2.08

Question - What was the source of the costs for compressed air storage?
Answer - The costs were regional average values taken from PacifiCorps' 2010 resource plan.

Question - What losses are assumed for compressed air storage?
Answer - A 70% energy loss is assumed.

Question - For pumped storage, do you get about two-thirds of the energy back?
Answer - You get back a little more than two-thirds. Our information about pump storage comes from discussions with a developer who has two projects proposed in Montana. The projects will have capacities ranging from 5-10 MW capacities to 40-50 MW. The project costs have not reached the pro-forma stage. These projects will not pencil out as an energy resource because the electricity market does not currently provide a large enough spread between on- and off-peak prices. The project economics are based on providing ancillary services that will be a function of size and operation. The projects cycle water between an upper and lower reservoir that occurs within a 24-hour period and are therefore limited to short-term peak production.

Question - Is NWE in the market for ancillary services?
Answer - Not for regulation. Ancillary services also include spinning and non-spinning reserves and a load sink to store wind energy to assist with load-resource balance.

Question - Will carbon capture add complexity to your portfolio modeling?
Answer - We will address carbon capture only by applying a cost adder. No carbon reservoirs have been identified.

Comment - I agree that addressing details regarding carbon capture is not worth a lot of time.

Comment by John Hines - The context for assessing market purchases versus company-owned resources is that we need resources during heavy hours rather than light hours. Because we seek to avoid being long, i.e., having surplus energy, we do not need flat resources. We have signed 2012 contracts for heavy load hours only.
Response - We addressed this context in past ETAC meetings discussing load and resource forecasts.

Other Fuel Price Forecasts

Coal - Todd Guldseth reviewed a spread sheet table and chart entitled, respectively, "2011 Resource Procurement Plan Montana Coal Price Forecast (Nominal $/MMBtu)" and "2011 Resource Procurement Plan Nominal Coal Price Forecast". NWE is using a 2.16% escalator to convert to nominal dollars. The source of coal costs is the 2011 Energy Information Administration Annual Energy Outlook (EIA AEO). The coal plants are assumed to be mine mouth plants.

Question - Are the EIA AEO prices spot market prices?
Answer - No; if they were based on the spot market they would show more volatility.

Question - The EIA AEO Montana line on the chart changes at the year 2020. What causes the change?
Answer - I don't know. The report I reviewed did not explain the change.

Question - How is the EIA AEO Montana price correlated to the Westmoreland coal contract for Colstrip?
Answer - We have not calculated a correlation. Updated response: The Colstrip coal price forecast has been developed for the 2011 RPP and is attached. The chart attached in Appendix 1 below compares the Colstrip coal price forecast with the 2011 RPP base case coal forecast. The minemouth coal mining at Colstrip has entered a stage in which the coal is more difficult to obtain than in previous years and therefore is experiencing about an $8.00/ton premium compared to the base case forecast. This equates to a higher $/MMBtu fuel cost at Colstrip by an annual average $0.35. An alternative to mining the more difficult coal at Colstrip would be to mine in the Wyoming Powder River Basin and have it shipped to Colstrip, but the cost of shipping is roughly the same as the $8.00/ton additional cost experienced at Colstrip.

Comment - Long-term coal contracts contain price escalators; they are not fixed price contracts.
Response - This is correct; we will look at the price escalators in actual coal contracts.

Comment - For the 2009 procurement plan, NWE used the Colstrip coal contract.
Response - We will look at the price escalators in the Colstrip contract.

Question - Does the EIA AEO price forecast account for increased coal exports?
Answer by Tom Power - It does not account for the recent projections of coal exports.

Biofuels - Mr. Guldseth also reviewed a spreadsheet table and chart entitled, respectively, "NorthWestern Energy 2011 Resource Procurement Plan Montana Wood Biofuel Price Forecast(Nominal $/MMBtu)" and "2011 Resource Procurement Plan Nominal Wood Biofuel Price Forecast". The price information in the most recent forecast is based on the 2010 report entitled, *Developing a Business Case for Sustainable Biomass Generation, A Regional Model for Western Montana.* This report is available through the ETAC web page. The price per million Btu is based on the 2010 report price of $20-30 per bone dry ton of biomass fuel. The table and chart show that the biofuel price forecast has dropped by over one-half from the 2009 procurement plan forecast. The price has dropped due to the closure of the Smurfit-Stone paper mill which has reduced demand for this product.

Comment - The price drop is also probably due to the beetle killed timber. Private land owners must pay to have dead trees removed from their land.
Response - The 2010 report does not assume that timber from state or federal land is used as fuel for the plant. Only existing mill residue, logging slash and urban wood waste within a 40-mile radius of the prototypical mill is assumed as the fuel for the biomass generation plant.

Comment by John Hines - After the Smurfit-Stone plant shut down, we looked at a biomass plant at that site and at locations at Thompson Falls, Columbia Falls, and Deer Lodge. The plant capacities were in the 10-18 MW range. We did not see fuel prices as low as $30 per bone dry ton. All plants relied on biomass from the forests. A fundamental issue was the lack of a long-term supply. Also, the 2009 community resource request for resources included one biomass generation bid at an all-in price of $125 MW. We should check these analyses, not just the 2010 report.
Response - We will check into these analyses in addition to the 2010 report.

Appendix D

POWDER RIVER BASIN COAL RESOURCE AND COST STUDY

Campbell, Converse and Sheridan Counties, Wyoming

Big Horn, Powder River, Rosebud and Treasure Counties, Montana

Prepared For

XCEL ENERGY

By

John T. Boyd Company

Mining and Geological Consultants

Denver, Colorado

Report No. 3155.001

SEPTEMBER 2011

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October 6, 2011
File: 3155.001

Mr. Mark W. Roberts
Manager, Fuel Supply Operations
Xcel Energy
1800 Larimer St., Suite 1000
Denver, CO 80202

Subject: Powder River Basin Coal Resource and Cost Study

Dear Mr. Roberts:

Presented herewith is John T. Boyd Company's (BOYD) draft report on the coal resources mining in the Powder River Basin of Wyoming and Montana. The report addresses the availability of resources, the cost of recovery of those resources and forecast FOB mine prices for the coal over the 30 year period from 2011 through 2040. The study is based on information available in the public domain, and on BOYD's extensive familiarity and experience with Powder River Basin operations.

Respectfully submitted,

JOHN T. BOYD COMPANY
By:

John T. Boyd II
President and CEO

K:\Projects\3155.001 Xcel Energy - PRB Resource & Cost Study\GBG\Final Report\Cover Letter.doc

EXECUTIVE SUMMARY

The Powder River Basin (PRB) of Wyoming and Montana is the largest coal producing region in the world, supplying over 40% of the coal consumed for power generation in the United States. Xcel Energy, which purchases substantial volumes of coal from the region retained John T. Boyd Company (BOYD), a worldwide mining and geological consultancy with extensive experience in the PRB, to develop an analysis of coal resource availability, future cost trends and prices. This summary presents the key findings of that analysis.

Coal Resources

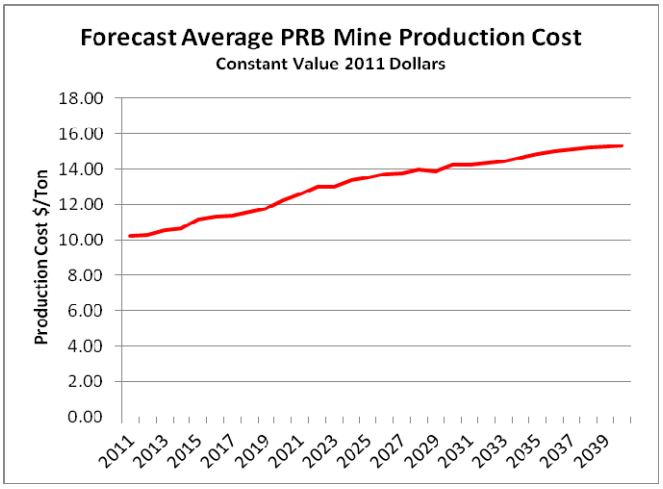
BOYD's forecast of PRB demand indicates approximately 17 billion tons of recoverable coal resources will be required over the 30 year timeframe of this study. While no comprehensive basin-wide resource assessment is available, the U.S. Geological Survey (USGS) has completed studies focusing on certain portions of the basin. These studies indicate a coal resource of over 140 billion tons in the areas that are of most interest for mining. In the Gillette Coalfield, which is the primary PRB production area, authoritative estimates by the USGS indicate approximately 77 billion tons of coal are potentially recoverable, with about 10 billion tons considered "reserves" (i.e., economically recoverable at the time of estimation). Based on information in the USGS study, BOYD estimates an additional 24 billion tons for a total of 34 billion would reasonably be expected to be economically viable over the study period. Thus, in the Gillette field alone, sufficient resources are available to satisfy nearly double the expected demand.

To further assess resource availability, BOYD reviewed the coal accessible to the operating mines and selected development projects in the PRB as of year-end 2010. Each mine or project was evaluated independently, with production requirements estimated, and available coal resources assessed in specific tracts logically mineable by the operation. The results of this mine-by-mine evaluation indicated that 20.5 billion tons of the 34 billion tons of economically viable resources are mineable from existing or planned operations, as summarized:

	Tons (Millions)
Resources Within Mine Permit Areas	5,773
Resources Recently Leased or Identified for Leasing	4,680
Resources Logically Mineable Within a Mine's Area of Interest	10,113
Total	20,566

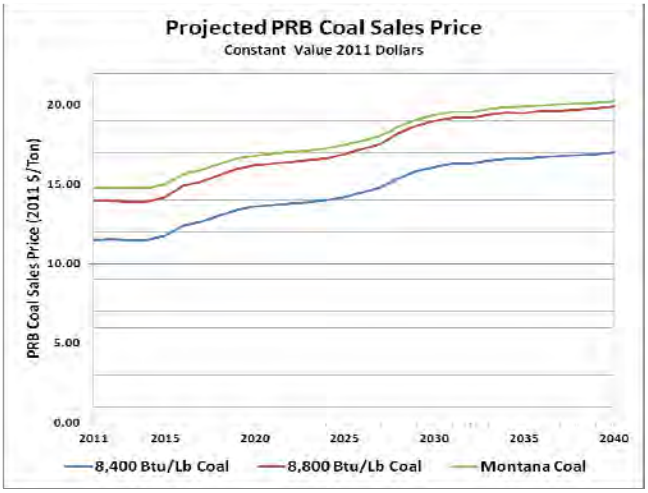
This site specific analysis further demonstrates that sufficient resources are available to support planned mining over the 30 year period. Moreover, as indicated by the USGS study, extensive additional resources are available beyond the areas identified.

Cost Trends



Typically as a coal basin matures, mining proceeds from the most favorable to less favorable resources, a trend which puts upward pressure on costs. Generally speaking, this is the case in the PRB, particularly in the Gillette area where the mines are progressing from shallower, less expensive resources on the eastern edge of the basin to more deeply buried and thus more costly resources to the west. In addition, physical factors such as road relocations and coal haul distances will tend to increase costs. This increase will however, occur very slowly due to the nature of the deposit and scale of operations. BOYD's forecasts of average mining costs, shown on the nearby graph indicate a modest increase of ±1% per year in real terms from about $10/ ton (constant 2011 dollars) to about $15/ton in 2040.

Price Forecasts



Over the long term, prices in the PRB are primarily driven by costs – prices will experience upward pressure as production costs at marginal, higher cost mines increase. BOYD's forecast of prices for the three common "benchmark" grades of PRB coal are illustrated on the nearby graph.

As shown, we expect prices to increase modestly, averaging 1% to 2% per year. We would also note that the forecast is inherently conservative (high) insofar as it does not incorporate the impacts of potential technological or operational improvements. Generally we would expect such improvements to be modest.

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1.0 GENERAL STATEMENT

Xcel Energy operates several electrical generating facilities that are fueled by coal produced in the Powder River Basin (PRB) of Wyoming and Montana (see Figure 1.1, Regional Location Map, following this chapter). The PRB is a major source of coal for utilities in the United States and the large surface mines in the PRB currently produce around 470 million tons per year, making the PRB the largest coal producing region in the world.

Recently, questions have been raised about the PRB's viability as a long term fuel source for electrical power generation. To provide an independent assessment of this issue, Xcel Energy retained the services of John T. Boyd Company (BOYD) to provide expert opinions as to:

- The quantity and economic viability of the coal resources remaining in the PRB.
- Probable trends in mining costs in the PRB.
- Forecast prices for PRB coal.

By assignment this study addresses a 30 year timeframe (through 2040), and we have also provided comments regarding industry trends during and beyond the 30 year period which could affect the PRB. This study is completed on a desktop basis based on publically available information and our extensive knowledge of the PRB mines and markets. Our review of the literature regarding the PRB also identified two key concepts which are important to understanding the long term future of the PRB:

- **Reserves and Resources**. The terms "reserves" and "resources" are often used interchangeably. However, in the industry, and more importantly for financial reporting purposes, the terms are not synonymous and are understood to reflect differing levels of assurance and economic viability. Under currently accepted definitions "resources" generally include all of the coal in a specific deposit which, in consideration of technical and legal constraints can reasonably be considered recoverable. "Reserves" are the portion of those resources that have been adequately explored and that can be mined and marketed economically at the time the estimate is made. Any "reserve" estimate is not a static value, rather it is essentially a "snapshot" subject to change over time. For purposes of this report, we have used the broader term "resources" to characterize the recoverable coal available in the PRB recognizing that the term "reserves" is not appropriate when assessing a 30 year timeframe.
- **Long Term Mining and Cost Trends**. When possible, mining companies generally produce the most economical coal first, deferring the more expensive resources for

the future. Thus, as a coal basin matures, and the more expensive resources are mined, overall costs increase. This is the case in the PRB, particularly in the Gillette area. In that coalfield the coal seams dip gradually to the west, thus increasing the depth at which the seams are buried. The mines, which were developed initially along the eastern edge of the coalfield, therefore experience increasing overburden depths as they progress to the west. Overburden removal is the major driver of costs, thus the increase in overburden depth puts upward pressure on costs throughout the basin.

Certain environmental interests have opposed coal development in the PRB, both politically and legally. While BOYD's view is that this opposition can generally be accommodated, that cannot be assured. This study is based on the assumption that the various laws and regulations governing coal leasing, mine permitting, health, safety and transportation, and the enforcement of those laws and regulations will effectively continue as they are today. Major changes in the legal/regulatory framework could affect our conclusions.

Primary sources of public information utilized in this study include the following:

- Mining Permit Applications (from the Office of Surface Mining).
- United States Geological Survey (USGS) publications.
- Bureau of Land Management maps and data.
- Mine Safety and Health Administration (MSHA) data.
- Annual Reports and 10-K filings for producers and consumers of PRB coal.
- Coal Industry Periodicals including Argus Coal Daily, Argus Coal Weekly, Platts Coal Trader, Platts Coal Outlook, Platts Coal Trader International, International Longwall News, Coal Age, Coal Transporter, etc.
- Environmental Impact Statements associated with various proposed activities in the PRB region.

We have relied upon the information from these public sources as being accurate within the reasonable limits of the data available and depth of study. Our analysis is performed on a mine by mine basis and accumulated to define basin-wide trends. While site-specific mining conditions and/or operating practices may result in variations between a specific mine's actual performance versus the estimates shown herein, our methodology and assumptions provide a reasonable basis for estimates and forecasts for the PRB industry as a whole. Price forecasts address the three major product types of PRB coal, those being Wyoming 8,800 Btu/Lb, Wyoming 8,400 Btu/Lb, and Montana 8,600 Btu/Lb (Absaloka) coal. All price and cost forecasts are expressed in constant value 2011 dollars.

This report is prepared for the use of Xcel Energy to enhance the understanding of PRB coal resources, production costs and price trends. The findings and conclusions presented herein represent the independent professional opinions of BOYD based on our review of the available data. Although we believe the findings and conclusions are reasonable and consistent with accepted standards for such studies, we do not warrant this report in any manner, express or implied.

Following this page is Figure 1.1, Regional Location Map, Powder River Basin, Southeastern Montana & Northeastern Wyoming.

Respectfully submitted,

JOHN T. BOYD COMPANY
By:

Lee A. Miller
Senior Mining Engineer

Richard L. Bate
Vice President

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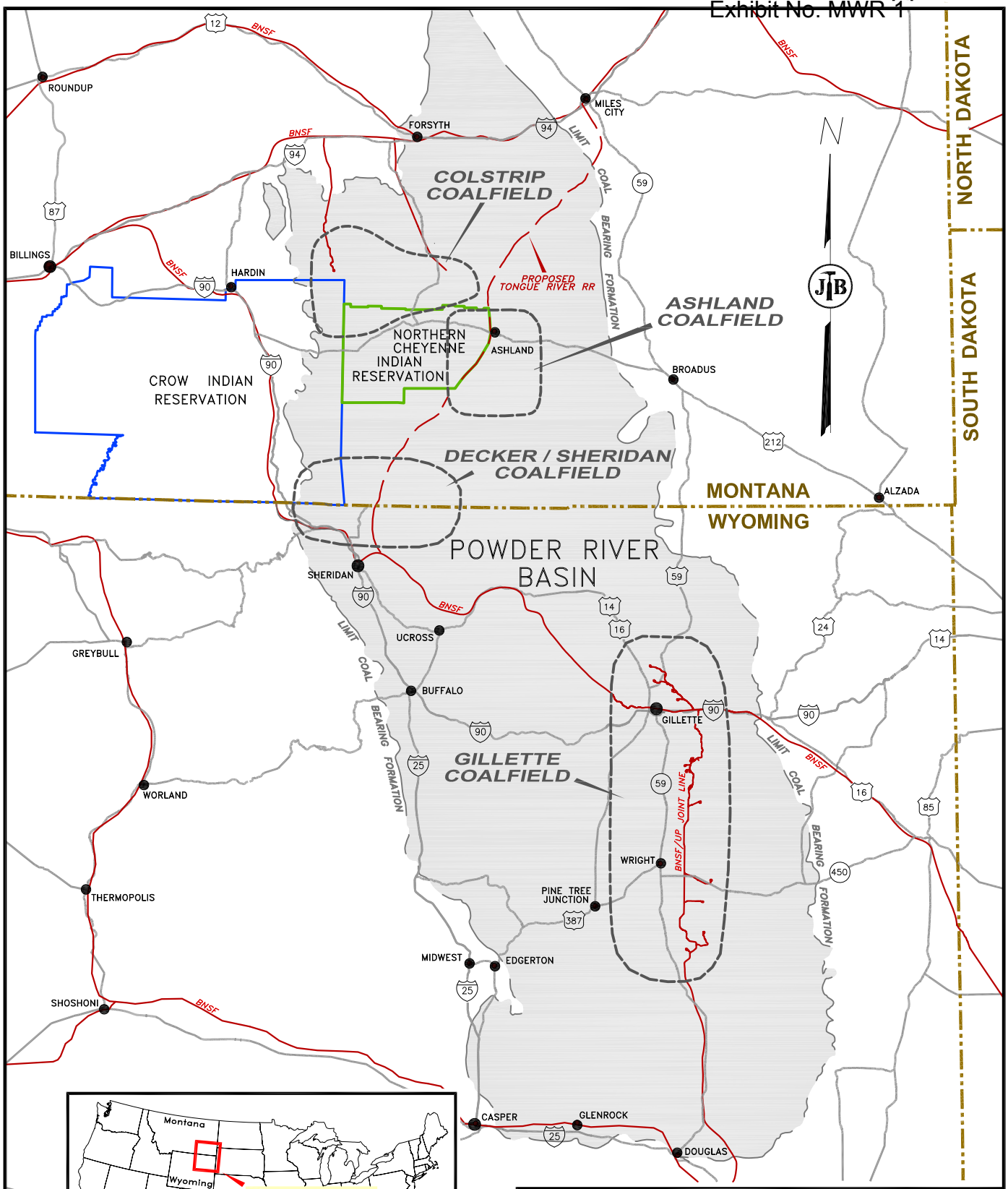

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FIGURE 1.1

REGIONAL LOCATION MAP

POWDER RIVER BASIN

Southeastern Montana & Northeastern Wyoming

Prepared For

XCEL ENERGY

John T. Boyd Company

September 2011
Scale As Shown

2.0 SUMMARIZED FINDINGS

The major findings and conclusions of BOYD's study are summarized in this chapter. These summary points are supported by and expanded upon in the text, tables and figures in the subsequent chapters of this report.

2.1 PRB Coal Resources

The Powder River Basin (PRB) is located in northeastern Wyoming and southeastern Montana, extending roughly 300 miles north-south by 100 miles east-west. The geology of the PRB is relatively simple with generally flat-lying, thick coal seams situated close to the surface so as to make production economically viable by high production surface mining methods. The coals are subbituminous in rank with low ash, low sulfur and thermal content in the range of 8,200 to 9,400 Btu/Lb.

2.1.1 Land Tenure

The United States is the dominant owner of coal rights in the PRB, and coal rights leased from the federal government are the core reserve holding of most mines. The Bureau of Land Management (BLM) leases the coal competitively, primarily using a Lease by Application (LBA) process. BLM has historically leased coal at approximately the rate it is mined. This allows the operating mines to control resources to support between 10 and 20 years of operation, a sufficient amount to justify necessary investment and planning. Overall, the most important issue relative to obtaining the right to mine future resources is the availability of federal coal for leasing. Our review indicates that, for the 30 year study period of this report (and well beyond), and so long as the current BLM policy remains in-place, availability of federal coal leases in the PRB should be adequate to meet projected demand.

2.1.2 PRB Coal Resource Estimates

Numerous assessments have been conducted over the years to quantify the "Reserves" or "Resources" available in the PRB. In this study we have addressed PRB coal resources from the standpoint of the available supply of coal for use as fuel for electrical generation – coal which would be considered a "Resource", but not necessarily a "Reserve". For purposes of this report "viable resources" are defined as the recoverable coal tonnage that is or could reasonably be expected to become technically and legally mineable, and which is economic today or could reasonably be expected to become economic within the 30 year timeframe of this study.

Our review indicates that most PRB production within the timeframe of this study will come from existing mines, with a relatively small amount coming from new mine development. The existing mines will progress into new mining areas, and will experience gradually less favorable conditions and modestly increasing costs. Our assessment of the viable resources available to these mines focuses on three categories:

- Permitted Resources. Includes resources that are permitted and/or reported in financial filings. These resources are typically well explored, permitted for mining, and committed to a specific mine plan.
- LBA Resources. Includes resources that are controlled but are not permitted or reported in financial filings, and resources on identified tracts that have been applied for via the LBA process and are considered likely to be leased.
- Future Resources. Includes resources on lands that are within a particular mine's area of interest, are accessible from the existing operation, and which could logically be incorporated into future plans for the mine.

Our estimate of viable coal resources available for the PRB mines is summarized:

Mine	Coal Resources (Millions of Tons) Permitted	LBAs	Future	Total
Antelope	252.0	406.6	479.0	1,137.6
North Antelope/Rochelle	723.0	1,179.0	1,535.0	3,437.0
School Creek	762.0	0.0	279.0	1,041.0
Black Thunder	1,256.4	1,988.4	1,944.6	5,189.4
Coal Creek	198.0	56.0	224.0	478.0
Cordero Rojo	190.1	776.7	701.5	1,668.3
Belle Ayr	155.0	0.0	745.0	900.0
Caballo	235.2	221.7	598.0	1,054.9
Wyodak	261.9	0.0	0.0	261.9
Dry Fork	110.9	0.0	0.0	110.9
Eagle Butte	425.0	0.0	398.0	823.0
Rawhide	329.7	0.0	1,448.0	1,777.7
Buckskin	280.7	52.0	1,202.0	1,534.7
Decker	12.0	0.0	0.0	12.0
Spring Creek	329.0	0.0	271.0	600.0
Absaloka	49.8	0.0	130.2	180.0
Rosebud	202.0	0.0	158.0	360.0
Totals	5,772.7	4,680.4	10,113.3	20,566.4

Coal Resource estimates are as of December 31, 2010.

As shown, the available viable resources total about 20.6 billion tons, an amount that is more than adequate to meet the anticipated coal demand over the 30 year period of this

study. Extensive additional resources exist to support both new mine development and for mine life extension beyond the study period.

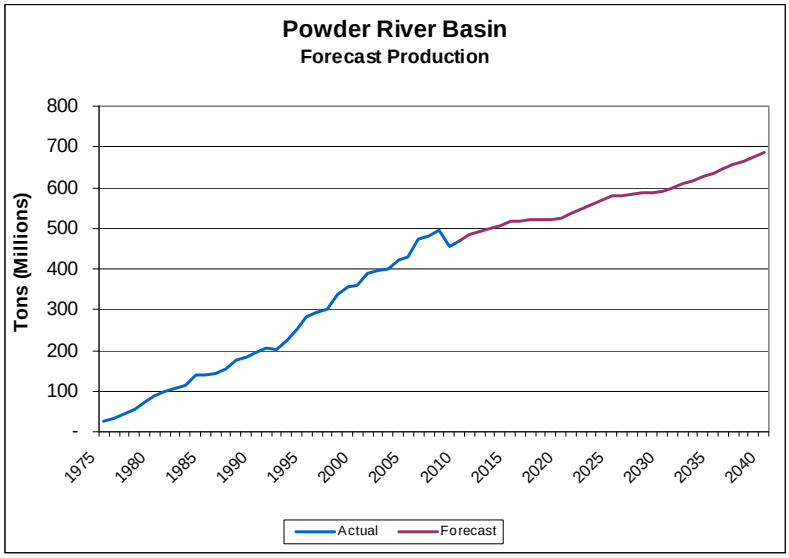
Throughout the history of the PRB, mine expansion and new mine development have been driven by market demand and accessibility to rail transportation. Availability of resources for mining has rarely, if ever, been a significant impediment. In BOYD's opinion, this will continue to be the case. The PRB has sufficient recoverable coal resources to meet even the most aggressive demand levels for the foreseeable future.

2.2 PRB Mines – Production and Costs

There are sixteen existing mines in the PRB – twelve in Wyoming and four in Montana. The majority of the large PRB coal mines, accounting for over 90% of production, are located in the Gillette Coalfield portion of the PRB. The Gillette-area producers are commonly divided into two groups based on coal quality; those in the southern portion of the coalfield producing an 8,800-Btu/Lb coal and the northern mines producing an 8,400-Btu/Lb coal.

2.2.1 Projected PRB Production

Production in the PRB is driven primarily by market demand, and to the extent the producers in the basin have not met that demand, it has been by a small margin and temporary. Past production and BOYD's projections of demand, and therefore production, in the PRB are illustrated below:



As shown, we expect that over the long term demand will continue to increase, but at a slower pace than has been the case historically. Our forecast has demand reaching approximately 685 million tons per year by 2040, with capacity in the range of 700 million tons.

The future production will come primarily from the existing mines with a relatively small component from new mines in the future years. Current and projected coal production from the existing and potential new mines is summarized below.

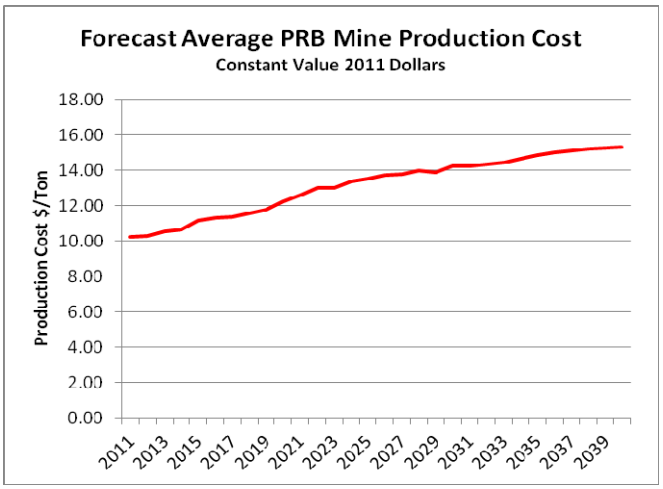
	Annual Coal Production (million tons)			
	2011	2020	2030	2040
Montana Mines:				
Rosebud	12.0	12.0	12.0	12.0
Absaloka	6.0	6.0	6.0	6.0
Spring Creek	20.0	20.0	20.0	20.0
Decker	3.0	-	-	-
Subtotal	41.0	38.0	38.0	38.0
Existing Wyoming “8,400 Btu/Lb” Mines:				
Buckskin	25.0	25.0	30.0	45.0
Rawhide	14.5	25.0	30.0	45.0
Eagle Butte	25.0	25.0	25.0	-
Dry Fork	5.5	5.5	5.5	-
Wyodak	6.0	6.0	6.0	6.0
Caballo	25.0	25.0	34.0	40.0
Belle Ayr	25.0	20.0	20.0	20.0
Cordero Rojo	40.0	40.0	40.0	50.0
Coal Creek	15.0	15.0	15.0	15.0
Subtotal	181.0	186.5	205.5	221.0
Existing Wyoming “8,800 Btu/Lb” Mines:				
Black Thunder	122.0	125.0	135.0	165.0
North Antelope Rochelle	105.0	100.0	100.0	100.0
Antelope	36.0	28.0	28.0	24.0
Subtotal	263.0	253.0	263.0	289.0
Undeveloped Properties:				
School Creek	-	30.0	30.0	35.0
Otter Creek	-	18.0	34.9	34.9
Youngs Creek	-	2.0	15.0	15.0
Others	-	-	4.3	52.6
Subtotal	-	50.0	84.2	137.5
Total PRB Production	485.0	524.4	590.7	685.5

2.2.2 Production Costs

Projected production costs for each existing and potential new mine were estimated considering the individual mine’s production levels, geologic conditions, mining methods, labor force productivities, coal haul distances, and coal ownership (federal, state,

private). The total estimated production cost includes all mining costs, overheads, royalties, production taxes, property taxes and insurance, to arrive at a total cost loaded into the railcar.

Typically as a coal basin matures, mining proceeds from the most favorable to less favorable resources, a trend which puts upward pressure on costs. Generally speaking, this is the case in the PRB, particularly in the Gillette area where the mines are progressing from shallower, less expensive resources on the eastern edge of the basin to more deeply buried and thus more costly resources to the west. In addition, civil features (roads, railroads, etc.) and increasing coal haul distances will tend to increase costs. This increase will occur very slowly due to the nature of the deposit and scale of operations. BOYD's forecasts of average mining costs, shown on the nearby graph indicate a modest increase of ± 1% per year in real terms from about $10/ton (constant 2011 dollars) to about $15/ton in 2040.



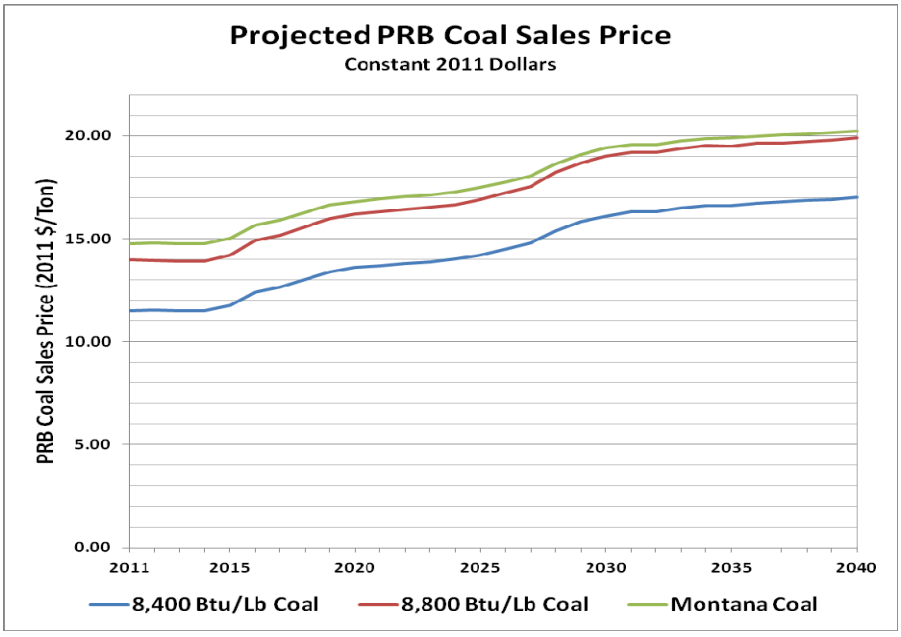
2.3 PRB Markets and Prices

PRB coal is marketed across the United States due to its favorable quality characteristics – notably low sulfur – and relatively low price. PRB coal is the most widely consumed coal in the U.S., supplying approximately 43% of total U.S. production on a tonnage basis. Significant production began in the late 1970s, and since that time the PRB has become a large, reliable, competitive and relatively stable fuel supply source for electrical generation, and is the dominant player in coal markets across most of the United States. BOYD projects PRB coal demand to continue to increase over the timeframe of this study albeit at a slower rate than experienced historically, to around 685 million tons per year in 2040.

PRB coal prices are fundamentally driven by coal production cost. Market imbalances which might potentially lead to higher prices – such as a sharp increase in demand or a production shortfall – have occurred, but not frequently. There are occasions when PRB coal prices have "spiked" for a short period of time; usually due to a brief disruption in coal supply – e.g., railroad problems, pit flooding, or extreme weather events (snow).

Oftentimes these events are so short lived that there is little or no impact on coal prices, largely because a large portion of the coal is sold under multi-year contracts at set prices[1].

This study develops long term price forecasts for three different types of PRB coal – Gillette 8,400 and 8,800 Btu/Lb products, and a typical Montana product. The projected prices (FOB Mine in constant value 2011 dollars) for these coal types over the 30 year study period are:



The projected coal sales prices for the three coal products are summarized at five-year intervals in the table below.

	Projected Coal Sales Price ($/Ton)		
Year	8,400 Btu/Lb	8,800 Btu/Lb	Montana
2011	11.50	14.00	14.75
2015	11.75	14.20	15.00
2020	13.60	16.20	16.80
2025	14.20	16.90	17.50
2030	15.80	17.80	18.80
2035	16.60	19.00	19.40
2040	17.50	19.50	19.90

Projected coal sales prices are stated in constant value 2011 dollars.

[1] For purposes of this report “market prices” are defined as the price that would be negotiated, at the relevant time, between a knowledgeable buyer and reliable seller for substantial quantities of coal to be delivered over a multi-year future period. As used herein “price” is not necessarily the same as a spot price, a forward market price, or prices that would reflect a distressed situation on the part of either buyer or seller.

As shown, we project a relatively steady increase in prices throughout the forecast period albeit at a rate that is below historic norms. Note that our forecast is intended as a long term projection – there will almost certainly be variations from the forecast due to shorter term factors that could significantly impact prices.

Overall, our evaluation of future mine costs and projection of long term price trends indicates that while prices for PRB coal will increase in real terms, that increase will not be at the pace of the past decade, and buyers will not experience large price increases due to resource shortages within the timeframe of this study.

3.0 POWDER RIVER BASIN COAL RESOURCES

3.1 Introduction

The Powder River Basin (PRB) of Wyoming and Montana is, in terms of production, the largest coal mining region in the world, and is widely viewed as holding sufficient resources to support production for the foreseeable future. Many estimates of PRB coal resources have been made since the first geological studies in the early 1900s. These estimates were developed for various purposes, often incorporated differing estimating parameters, and may or may not have been based on adequate geological data. As such, the resulting estimates of available coal resources varied considerably from study to study.

This chapter describes the geological setting of the PRB, provides background on land ownership issues, summarizes various studies of the quality and quantity of PRB resources, and provides estimates of identified resources within the logical mining advance areas of the existing and planned mines.

3.2 PRB Geology

The PRB extends roughly 300 miles north-south by 100 miles east-west, spanning large portions of northeastern Wyoming and southeastern Montana. The coal bearing rocks in the basin occur in the Cretaceous age Ft Union Formation which is over 2,000 ft thick, and contains aggregate coal thicknesses of nearly 400 ft in up to 12 seams.

The Wyoming portion of the basin is part of a broad asymmetrical syncline with relatively shallow dips along the eastern boundary, and steeply inclined strata adjacent to the Bighorn Mountains on the West. The coal seam of primary interest is the Wyodak-Anderson (or Roland) which is relatively thick (60 ft to 120 ft) and amenable to surface mining over large areas. The major mines are found in the Gillette Coalfield and account for over 90% of PRB production. In the Gillette area, mining began along the outcrop of the Wyodak-Anderson on the east, and has gradually progressed into deeper cover to the west.

The Gillette-area producers are loosely divided into “Southern” mines and “Northern” mines. This division is based on coal quality with the “Southern” mines nominally producing 8,800-Btu/Lb coal and the “Northern” mines producing 8,400-Btu/Lb coal. The “Southern” mines include the three southernmost operations in the PRB (Black Thunder,

North Antelope/Rochelle, and Antelope). These mines alone currently produce around 60% of total PRB output, and are major players in PRB coal markets. It should also be noted that the actual quality at any one mine will likely vary from the 8,800-Btu/Lb and 8,400-Btu/Lb values, and other factors such as sulfur content are important from a market perspective.

In the Montana portion of the basin, the Fort Union Formation strata dip very gradually to the southeast, but are essentially flat lying over large areas. Some faulting is present although it tends to be fairly widely spaced and is not a major impediment to mining. The coal seams of interest mainly occur in the Tongue River Member, and while some are correlative with the Wyodak-Anderson Zone, the strata often split, resulting in multiple seams which, while still relatively thick, are not in the 100 ft range found near Gillette.

There are two primary producing areas in the Montana portion of the PRB, the Sheridan (or Decker) Coalfield and the Colstrip Field. Two mines are operating in the Sheridan Coalfield producing a higher heat value coal (± 9,300-Btu/Lb), while two other mines operate in the Colstrip Field producing an approximate 8,600-Btu/Lb product. A third area in Montana, the Ashland Field is in the early stages of development. Coal resources extend well beyond these areas, but have not been the focus of exploration or development efforts.

All coal currently produced in the PRB is classified as subbituminous. The most important quality parameters relate to thermal content (measured as Btu/Lb) and sulfur, with sodium as a concern in certain areas. Typically the thermal content is in the range of 8,200 to 9,400 Btu/Lb although some mines produce a lower or higher Btu product. PRB coals tend to be low in sulfur, typically in the 0.5% range and some of the coal produced from the area south of Gillette or available in the Ashland area is a very low sulfur product in the range of 0.3% sulfur. Sodium in ash (which can be problematic in utility boilers) is typically in the 1% – 2% range, but can exceed 5% in some of the Montana regions.

3.3 Land and Mineral Ownership

Mineral rights (including coal) ownership in much of the Powder River region is, as elsewhere in the western U.S., often severed from the surface ownership. The United States is the dominant mineral owner in the PRB, and those mineral rights can only be leased, not purchased. The Bureau of Land Management (BLM) controls federal leasing activities and most of the resource availability in the PRB is dictated by BLM land management policy.

Federally owned coal rights in the PRB are leased competitively, primarily using a Lease by Application (LBA) process. With an LBA, a proponent (usually a coal producer) nominates a particular tract for leasing. The BLM evaluates the tract, perhaps modifying its boundaries, and determines whether it is suitable for leasing. Generally, some level of environmental assessment (EA or Environmental Impact Statement) with attendant public comment opportunities is required. If the tract is found suitable for leasing, BLM holds a sealed bid auction-type sale, allowing the original proponent, and any other interested, qualified party, to bid on the coal rights within that tract. Once the bids are received, BLM analyzes the high bid to assure that it meets “Fair Market Value”, and if so, the coal on that tract will be leased to the winning bidder. This process from nomination to leasing, can take five years (or more) to complete.

As a practical matter, most companies will attempt to define LBA tracts that, because of location or geometry, are of interest only to the nominating company. This minimizes competitive bidding on the tract, and may result in a lower cost lease. Where competition has existed for coal leases (mostly in the southern Gillette area but recently in the central portion of the coalfield) relatively high bonus bids in the range of $0.90 – $1.10/ton have resulted. BLM has, even in non-competitive cases, required “Fair Market Value” bids in this range, particularly in the Southern PRB. This is illustrated in the following summary of recently awarded coal leases:

Lease	Date	Tons (Millions)	Bonus Bid ($/Ton)
Wyoming			
NARO South	June 2004	297	0.92
NARO North	July 2004	325	0.92
Little Thunder	Sept. 2004	719	0.85
Hay Creek	Nov. 2004	143	0.30
West Antelope	Dec. 2004	195	0.75
West Roundup	Feb. 2005	327	0.97
Eagle Butte West	Feb. 2008	255	0.71
South Maysdorf	Apr. 2008	288	0.87
North Maysdorf	Jan. 2009	55	0.88
West Antelope II (N)	May 2011	350	0.85
West Antelope II (S)	June 2011	56	0.88
Belle Ayr North	July 2011	222	0.95
West Caballo	Aug. 2011	130	1.10
Montana			
Spring Creek Ext.	Apr. 2007	109	0.18

Portions of the Montana PRB coal deposits are located within the Crow and Northern Cheyenne Indian Reservations. These lands are also administered by the federal government (acting as trustee for the tribes), working in conjunction with Tribal authorities. The Absaloka Mine in Montana operates on Crow Tribal lands.

State owned land (mostly state school sections) and limited private lands are also interspersed among the federal ownership. Coal rights on these lands are leased, or purchased, separately, and lease terms may differ from the federal standard. While the federal government is the dominant owner of the coal rights, it is difficult but not impossible to assemble a logical mining unit without incorporating some federal or Indian lands. The proposed Youngs Creek Mine in the Sheridan Field is an example of a logical mining unit does not include federal coal rights.

Various environmental interests have recently threatened or filed lawsuits to force greater consideration of global climate issues and similar concerns in leasing decisions. While this has the potential to limit the resources available for leasing, there is strong bipartisan opposition, and it is considered more likely than not that leasing will continue more or less as at present into the foreseeable future.

Ownership of the surface rights in the PRB is primarily in private hands, although some state, federal or Indian surface occurs. Although the surface estate is usually severed from the minerals, the surface owner has, as a result of various laws and regulations governing coal mining, considerable influence over the mineral owner. For federal coal leasing purposes “surface owner consent” is required before the lease can be issued. Surface owners may also influence mine development activities via the permitting process. Often, but not always, operators have found it more effective to purchase the surface rights prior to undertaking leasing activities.

The BLM has historically pursued a practice of leasing coal at a rate approximately equal to the rate at which it is mined. Currently the BLM is considering leasing on at least nine tracts with an estimated four billion tons of coal resources:

LBA Property	Adjacent Mine	Application Date	Tons (Millions)
North Hilight Field	Black Thunder	Oct. 2005	325
South Hilight Field	Black Thunder	Oct. 2005	266
West Hilight Field	Black Thunder	Jan. 2006	440
West Coal Creek	Coal Creek	Feb. 2006	57
West Jacobs Ranch	Black Thunder	Mar. 2006	957
Hay Creek II	Buckskin	Mar 2006	52
Maysdorf II	Cordero Rojo	Aug. 2006	434
North & South Porcupine	North Antelope Rochelle	Sep. 2006	1,179
Belle Ayr West	Belle Ayr	Aug 2011	253
Total			3,963

It is likely that additional tracts are being evaluated by the various operating companies, but have not been nominated for leasing as yet. The leasing of the nine LBA properties identified above would allow the operating mines to control sufficient resources to support between 10 and 20 years of production, which is thought to be sufficient to justify necessary investment and planning. It is also important to consider that the PRB mining companies have limited incentive to control more than the 10 to 20 years of coal resources, for two primary reasons:

- Federal leases carry diligent development requirements such that if the lease is not combined into a “Logical Mining Unit” (LMU) or put into production within 10 years, the lease will be forfeited.
- The bonus bid is paid by the company “up-front” (actually over a 5 year period following lease issuance). The most recent bonus bids have now exceeded $1.00/ton, or in the most recent auction, over $140 million. It is financially challenging for even the largest mining companies to make such large up-front payments if the coal will not be mined for many years. Consequently, the companies must balance the need to control sufficient resources with the economic penalty of making the large up-front payment.

Overall, the most important issue relative to obtaining the right to mine future resources is the availability of federal coal leases. Our review indicates that, for reasonable planning horizons, and so long as the current BLM policy remains in-place, availability of federal leases in the PRB should be adequate for projected demand.

3.4 PRB Coal Resource Estimates

Estimates of resources in the PRB vary widely, and can be both conflicting and confusing. Two specific areas which are critical are technical/legal recoverability, and economic viability.

Several of the more broadly based estimates of coal resources are expressed as “in-place” tons without regard to technical or legal recoverability. In such cases the portion of the resource that is actually recoverable will be less, and sometimes only a small fraction of the in-place resource. Statements of in-place resources should be viewed as being indicative of the maximum potential tonnage that might be recoverable eventually, but not representative of the resources that could be recovered under current conditions using existing technologies.

As discussed previously, the terms “reserves” and “resources” are understood in the industry to reflect economic viability, although in many cases past studies used those terms more or less interchangeably. Over the last decade the difference between “reserves” and “resources” has become increasingly important, primarily due to financial reporting regulations. Under currently accepted definitions “resources” generally include all of the coal in a specific deposit which, in consideration of technical and legal constraints can reasonably be considered recoverable. “Reserves” are the portion of those resources that have been explored to the point that the estimated tonnages are “demonstrated” and that can be mined and marketed economically at the time the estimate is made, essentially resulting in a “snapshot” at that time. Because exploration is going on constantly, and market factors (primarily prices) change over time “reserve” tonnages may also change – coal that might not be considered “reserves” this year may qualify as “reserves” next year.

This study addresses the PRB resources from the standpoint of the available supply of coal for use as fuel for electrical generation. Because fuel planning is necessarily a long term issue, and most coal is purchased under term contracts at set prices, our focus is on the coal that is in known deposits, is legally and technically available, or likely to become available for mining, within reasonable limits of economic viability – i.e., “resources”. Some or all of those resources may or may not qualify as “reserves” at the present time. For that reason this report addresses “viable resources” defined as the recoverable (as opposed to in-place) coal tonnage that is, or could reasonably be expected to become technically and legally mineable, and which is economic today or could reasonably be expected to become economic within the 30 year timeframe of this study.

As discussed in Section 3.5, BOYD bases the assessment of available resources on site specific mine level analyses. However, it is helpful to view those estimates in the larger context of the total PRB resource. Basin-wide geological studies of the PRB have varied widely in estimates of coal resources, with some approaching 2 trillion tons and others arriving at substantially lower totals. Several recently published studies have provided important insights into these PRB coal resource estimates. The first of these, prepared in 1999 by the United States Geological Survey (USGS) as part of its National Coal Resource Assessment (NCRA) effort, addressed coal resources within three specific planning areas which include the majority of coal lands in the PRB. Resources were defined as coal in seams greater than 2.5 ft in thickness, and less than 2,000 ft in depth. These estimated resources total over 500 billion in-place tons as summarized:

State/County	Resources (Tons-Millions)
Wyoming	
Campbell	280,000
Converse	15,000
Johnson	160,000
Sheridan	52,000
Subtotal	507,000
Montana	
Powder River	22,200
Rosebud	4,700
Big Horn	4,200
Treasure	1,300
Subtotal	32,400
Total Resources	539,400

The estimates above do not include coal occurring on non-federal acreage, or on Indian lands in Montana. Those additional resources are very loosely estimated to be in the range of 80 billion tons. Thus, one might impute an order of magnitude estimate of ± 620 billion in-place resource tons in the PRB.

A second study was published in late 2007 by the U.S. Departments of Energy, Agriculture and Interior. This study addressed the federally owned coal in the PRB, and attempted to determine the portion that would be available for leasing for coal development. This study found that only about 5% of the federally owned coal land was actually available for leasing. However, the bulk of the rest of the coal resources were considered unavailable because land use planning had not been completed (70%), or because surface owner consent had not been obtained (14%). Only about 10% was unleaseable due to environmental or legal restrictions. Extrapolating this to the 620

billion ton estimate, something on the order of 560 billion tons of resources could be legally available for mining pending land use evaluations and obtaining requisite surface and mineral rights.

An important implication of this study is that the vast majority of coal resource areas in the PRB have never been explored or evaluated for development (and thus had not been the subject of land use planning efforts), but are available for possible future mining.

Several more detailed studies have recently become available from the USGS that are focused on specific coal producing areas. These include:

- USGS Open-File Report 2008-1202 – *"Assessment of Coal Geology, Resources, and Reserves in the Gillette Coalfield, Powder River Basin, Wyoming"*
- USGS Professional Paper 1625-A – *"Ashland Coalfield: Powder River Basin, Montana: Geology, Coal Quality and Coal Resources"*
- USGS Professional Paper 1625-A – *"Colstrip Coalfield: Powder River Basin, Montana: Geology, Coal Quality and Coal Resources"*
- USGS Professional Paper 1625-A – *"Decker Coalfield: Powder River Basin, Montana: Geology, Coal Quality and Coal Resources"*

These reports have estimated a combined 141 billion tons of coal resources within the Gillette, Ashland, Colstrip and Decker coalfields. Although the PRB resources are much more extensive than just these four coalfields they are generally considered the most favorable mining regions in the PRB.

The entire 141 billion tons of coal resources would not be economically viable at today's prices for coal, but much of the total could reasonably be expected to become economically viable over the 30-year timeframe of this study.

To provide an indication of the magnitude of the viable resource that is available to supply utility coal markets we have estimated a subset of the 141 billion tons based on economic and recoverability criteria as follows:

PRB Region	Coal Resources (Million tons)	Viable Resources (Million tons)
Gillette Coalfield	77,000	33,878
Ashland Coalfield	6,000	1,921
Colstrip Coalfield	13,000	427
Decker Coalfield	45,000	6,937
Total	141,000	43,163

Gillette Coalfield coal resources were estimated by the USGS in 2008.

Ashland, Colstrip & Decker Coalfield coal resources were estimated by the USGS in 1999.

Viable Resources are defined as follows:

Gillette Coalfield - Produced at less than $20/ton.
Ashland and Decker Coalfields - measured and indicated resources, < 200 ft OB, >40 ft Coal
Colstrip Coalfield – measured and indicated resources, < 150 ft OB, >20 ft Coal, excludes coal within the mine areas.

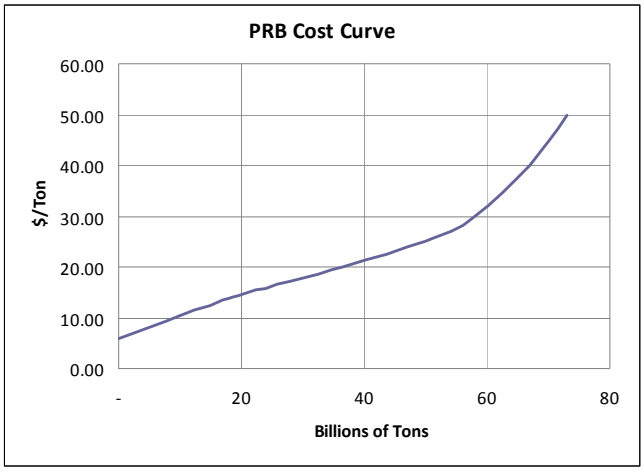
The viable resources of 43.2 billion tons would be sufficient to supply the PRB coal market for 91 years at the current production rate of 470 million tons per year. At higher production rates (which are expected), the viable resources would be depleted sooner. However, even if the production rate increased well beyond any current forecast, these resources are still sufficient to provide fuel for the life of existing power plants and beyond.

The study addressing the Gillette Coalfield (USGS Open-File Report 2008-1202) is important not only because the Gillette Coalfield is the largest production source in the PRB, but because the study imposes specific operational and economic constraints on the resources to arrive at an estimate of the then (2007) economically recoverable reserves in the coalfield. The study estimated the original in-place coal resource in just the Gillette Field at over 200 billion tons, with the technically and legally recoverable portion of that in-place figure, as shown above totaling about 77 billion tons (maximum stripping ratio [2] of 10 BCY/ton and deducting mining and processing losses). Economic analyses, based on a coal price of $10.47/ton and an 8% after-tax return on investment, concluded that approximately 10 billion tons or about 6% of the original in-place

[2] Stripping Ratio is defined as the amount of overburden which must be removed, measured in bank cubic yards (BCY), to expose a ton of recoverable coal. Because overburden removal is the largest cost factor in surface mining, the ratio of overburden to coal is a key economic indicator.

resource would be economically recoverable as of 2007. BOYD, as noted above, estimates an additional 24 billion tons, for a total of 34 billion tons would reasonably be expected to be economically viable over the timeframe of this study.

While this USGS analysis, and the conclusion that only 6% of the original in-place resource is economically recoverable, has been widely quoted, it may wrongly give the impression that coal resources in the Gillette Field are more limited than is truly the case. Even by this relatively conservative analysis, the available economically recoverable reserve is still quite large, exceeding 20 years production at current rates. Furthermore, the USGS study recognizes that the reserve estimate is based on a single point in time and provides a "cost curve" to allow assessment of the economically recoverable reserve at various pricing levels. That curve is reproduced below:



As shown, as the price increases, the "reserve" total increases significantly. At $14/ton, approximately 18.5 billion tons are estimated to be economically viable, and at $20/ton approximately 38 billion tons would be viable. This compares to the 34 billion tons at $20/ton estimated by BOYD (above) as viable resources in the Gillette Field.

The important point of the USGS study and other evaluations is that in an overall context, the cost curve for the PRB is relatively "flat", meaning that small changes in price (or costs) can have major impacts on the magnitude of the economically recoverable resource.

3.5 Coal Resources at Existing Mines

Reliable evaluation of available resources in the PRB requires analyzing each operating or potential mine individually to assess the resources that could logically be recovered by that mine. Over the 30 year timeframe of this study, most production will come from the existing PRB mines which can be expected to expand production capacity as demand for PRB coal increases. Thus risks associated with new mine development are minimal in the context of the overall supply. New supply sources will be developed, but only when they can compete economically with the existing mines, and when transportation infrastructure is extended into more remote parts of the PRB.

Several sources of information were used to evaluate the coal resources at the existing PRB mines, including:

- Mining Permit Application data
- Bureau of Land Management (BLM) information regarding federal coal leases and Lease By Application (LBA) tracts
- Annual Reports and 10-K Reports from the various mining companies
- Environmental Impact Statements
- USGS coal resource studies
- Montana Bureau of Mines and Geology studies

The resource estimates derived from these and other sources generally fall into three categories:

- Permitted Resources. Includes resources that are permitted and/or reported in financial filings. These resources are typically well explored, permitted for mining, and committed to a specific mine plan. Permitted resources must be controlled, typically via a federal lease, and the mining company must have the legal right to mine those tonnages. Resource tonnage estimates as reflected in permit documents and financial filings are considered very reliable.
- LBA Resources. Includes resources in two categories reflecting coal rights control:
    - Resources that are controlled (i.e., leased) by the operating company, but are not permitted or reported in financial filings and;
    - Resources in federally owned tracts that have been applied for via the LBA process and are considered likely to be leased.

  Estimates of resources in this category are relatively reliable because the LBA process requires adequate exploration and evaluation of the tract. However, resources in this category may not be controlled, and would typically not be permitted.

- Future Resources. Includes resources on lands that are generally within a particular mine's area of interest, and which could logically be incorporated into future plans for the mine. These resources are not controlled by the mining company, and estimates of resource quantities are typically less reliable than for permitted or LBA resources. However, the estimates are computed based on data from the USGS Open-File Report 2008-1202 which is comprehensive and considered adequately reliable. Future resources are evaluated in this study only to the extent necessary to sustain the mines through the 30 year study period – extensive additional "future resources" exist.

The estimated coal resources for the existing PRB mines based on the information discussed above are discussed in detail for each mine in Chapter 4 of this report. The estimates are summarized by category in the table below. The locations of these mines are shown on Exhibit 1, following this report.

	Coal Resources (Millions of Tons)			
Mine	Permitted	LBAs	Future	Total
Antelope	252.0	406.6	479.0	1,137.6
North Antelope/Rochelle	723.0	1,179.0	1,535.0	3,437.0
School Creek	762.0	0.0	279.0	1,041.0
Black Thunder	1,256.4	1,988.4	1,944.6	5,189.4
Coal Creek	198.0	56.0	224.0	478.0
Cordero Rojo	190.1	776.7	701.5	1,668.3
Belle Ayr	155.0	0.0	745.0	900.0
Caballo	235.2	221.7	598.0	1,054.9
Wyodak	261.9	0.0	0.0	261.9
Dry Fork	110.9	0.0	0.0	110.9
Eagle Butte	425.0	0.0	398.0	823.0
Rawhide	329.7	0.0	1,448.0	1,777.7
Buckskin	280.7	52.0	1,202.0	1,534.7
Decker	12.0	0.0	0.0	12.0
Spring Creek	329.0	0.0	271.0	600.0
Absaloka	49.8	0.0	130.2	180.0
Rosebud	202.0	0.0	158.0	360.0
Totals	5,772.7	4,680.4	10,113.3	20,566.4

Coal Resource estimates are as of December 31, 2010.

As shown, the existing mines effectively control about 10.5 billion tons of coal resources. The identified Future Resources total about 10.1 billion tons, bringing the total to about 20.6 billion tons. Of this, some 1.2 billion tons are in the Montana portion of the basin, with the balance – 19.4 billion tons being in the Gillette Coalfield. That resource is sufficient to allow the mines to meet projected demand over the 30 year study period addressed in this report. Note also that the 19.4 billion tons available in the Gillette Field approximates the resources shown on the USGS cost curve at approximately a $14/ton price – a level comparable with current prices.

It should be emphasized that throughout the PRB the available resources are much more extensive than is required to meet demand over the 30 year period of this study. As discussed above, the viable resources in the PRB could readily double the amount shown at reasonably foreseeable prices and without major additions to transportation infrastructure.

3.6 New Mine Development

Most of the PRB coal produced over the next 30 years will come from existing mines. New mines will be developed but only when they can compete economically with the existing mines and when transportation infrastructure is extended into more remote parts of the PRB. New mines that have good development potential include:

- Otter Creek. The Otter Creek property is located in the Ashland Field with coal occurring primarily in the Knobloch Seam. The coal is typical of PRB in terms of quality but is high in sodium. The property is controlled by Arch Coal Inc. via leases with the State of Montana and Great Northern Properties. Resources are reported to total 1.3 billion tons at stripping ratios in the range of 3 BCY/ton. Coal quality is in the range of 8,600 Btu/lb and 0.3% sulfur. Arch has announced its plans to develop the Otter Creek tracts to serve export markets.

  Development in the Otter Creek area will require construction of the Tongue River Railroad, which is permitted but not yet built. This railroad would likely provide access to additional resources in the same coal formations that exist south along the Tongue River as well as north and west onto the Northern Cheyenne Indian Reservation.

- Decker, Montana region. The existing Decker Mine is approaching depletion. As that mine tapers off, a new mine may be developed to fill that production void. Some of the more prominent new mine projects are the CX Ranch Mine which was delineated and designed more than 20 years ago, and the Youngs Creek Mine. The Youngs Creek Mine, a joint venture of Consol Energy and Chevron Mining is planned for production of up to 15 million tons per year, with quality in the range of 9,350 Btu/Lb and 0.5% sulfur. Early stage efforts to secure permits for the project have been underway for some time. There are also extensive coal resources on the Crow Indian Reservation in the Decker area that could be developed in one or more new mines.

- North of Gillette, Wyoming. The Burlington Northern Santa Fe (BNSF) Railway presently extends north of Gillette as far as the Buckskin Mine. The outcrop of the Wyodak-Anderson Seam; however, extends north and west of the Buckskin Mine for some distance. Potential coal leases have been identified in this area in the past, including the Calf Creek, Rock Pile and Wild Cat tracts. An incremental extension of the railroad extension would open these mines for development.

- Buffalo, Wyoming region. Very large, low cost coal resources exist in the vicinity of Lake DeSmet in Johnson County, Wyoming. These resources were delineated by Texaco in the early 1970s. The coal is poorer quality than elsewhere in the PRB

(±6,200 Btu/Lb, 23% ash and 0.55% sulfur) but would be ideal for a large coal-to-liquid (gasoline or diesel) facility. It is currently being studied for that application.

In the more distant future – beyond 2040 – other properties and areas of the PRB may be developed. Those areas may include the following:

- Between the Wyodak and Caballo mines. In this area the coal seams tend to split into multiple seams and the coal quality is poorer (lower Btu/Lb, higher ash and higher sulfur).
- Between the Black Thunder and Coal Creek mines. In the past, the Kintz Creek and Keeline federal coal properties were delineated but either were never leased (Kintz Creek) or the lease was relinquished (Keeline). The coal seams tend to split in this area resulting in somewhat higher mining costs.
- Western Flank of the PRB. The Glenrock Mine was located on the western flank of the PRB and had been the fuel source for the Dave Johnson power plant for many years. As the mine advanced into higher strip ratio areas, it became less economic and coal was purchased from mines in the Gillette area. Transportation infrastructure would have to be developed along the western flank of the basin to provide access to coal markets.
- Underground Coal Production. The USGS Study of the Gillette Coalfield estimated 77 billion tons of coal resources. The production costs corresponding to those resources ranged between $6/ton and $60/ton assuming the coal is produced by surface mining methods. It is common for surface mines to transition to underground mining methods when surface mining becomes more costly than underground mining the same deposit. At production costs around $30/ton, it would likely become more economic to produce coal by underground methods than surface methods. As a consequence, PRB production costs could effectively be capped around $30/ton regardless of increasing strip ratio. This production cost cap would exist not only in the Gillette Coalfield but throughout the PRB, and thus allow production from the many billions of tons of deeper coal resources throughout the PRB.

Throughout the history of the PRB new mine development has been driven by market demand and accessibility to rail transportation. Availability of resources for mining has rarely, if ever, been more than a temporary impediment. In BOYD's opinion this continues to be the case. The PRB has sufficient recoverable coal resources to meet even the most aggressive demand levels for the foreseeable future.

4.0 POWDER RIVER BASIN OPERATIONS AND COSTS

4.1 Introduction

There are 16 existing PRB mines which currently produce around 470 million tons per year. This chapter provides a description of each existing mine and potential new mines that may come on line over the next 30 years. The assessment of each mine describes the resources available to that mine, and develops estimates of future operating costs, emphasizing the key cost drivers that are specific to that mine.

Xcel also requested BOYD provide comments regarding future trends (beyond 2040) in the PRB. That assessment of long term future trends is provided in Section 4.6 of this chapter.

4.2 PRB Mine Cost Model

Production costs for existing and new PRB mines were estimated using BOYD's proprietary PRB surface mine cost model. The cost model provides estimates of the coal production costs through to loading coal in the railcar or in the case of Wyodak and Rosebud for delivery to nearby generating stations. The production costs estimated include all direct operating costs, royalties, taxes, overhead and non-cash costs such as depreciation, depletion and amortization.

The primary cost drivers in the model include the following:

- Annual coal production (tons per year)
- Strip ratio (Prime Bank Cubic Yards of waste per ton of coal produced)
- Average coal seam thickness (feet)
- Annual disturbance area (acres)
- Average topsoil depth (feet)
- Percent of overburden removed with draglines
- Estimated dragline rehandle (% of dragline overburden excluding cast blast benefit)
- Percent of overburden removed with trucks and shovels
- Percent of overburden cast blasted
- Cast blast powder factor (Lbs of explosives per BCY of overburden)
- Cast blast benefit (% to final placement)

- Percent of overburden fragmented with conventional blasting
- Conventional blasting powder factor (Lbs of explosives per BCY of overburden)
- Percent of overburden not blasted
- Coal blasting powder factor (Lbs of explosive per ton of coal)
- Coal truck haul distance (one-way distance in miles)
- Coal conveying distance (miles)
- Labor force productivity (measured in “equivalent mining units” – EMUs which are defined as BCY of overburden plus tons of coal per employee-hour)
- Federal coal production (% of total coal production)
- State coal production (% of total coal production)
- Private land (Fee coal) coal production (% of total production)

The major cost drivers focus on the key mining functions or processes within a surface mine which include the following:

- Topsoil salvage and replacement
- Overburden drilling and blasting
- Overburden removal (by dragline, truck/shovel)
- Coal drilling and blasting
- Coal loading and hauling
- Mine support operations
- Coal processing (crushing, handling, storage and loadout)
- Land reclamation

The key mining function or process costs are estimated by multiplying the various annual production quantities by their associated unit costs ($/BCY, $/ton, $/acre). General maintenance costs and General and Administrative costs are added to the functional costs. The cost model also includes a Mine Closing Accrual which amounts to a $/ton cost that is accrued over the life of the mine to cover the costs of reclaiming the final pit and removing the mine facilities and infrastructure.

Royalties, production taxes, and estimated property taxes and insurance are added to the mining cost as summarized below.

- Federal royalty – 12.5% of realization
- Montana state royalty – 12.5% of realization

- Wyoming state royalty – 8.0% of realization
- Private land royalties – 8.0% of realization
- Coal workers Pneumoconiosis (Black Lung) excise tax – 4.4% of realization up to maximum $0.55/ton
- Abandoned Mine Lands (AML) reclamation fee – $0.315/ton (2011 and 2012), $0.28/ton (2013 – 2021) and $0.35/ton (2022 and thereafter)
- Wyoming severance and gross proceeds taxes – 13.0% of realization (less royalties and processing costs)
- Montana gross proceeds tax – 5.0% of realization
- Montana severance taxes – 15.0% of realization (less Black lung tax less AML fee less royalties less gross proceeds tax plus $0.15/ton)
- Montana resource indemnity trust tax (RITT) – 0.4% of realization
- Property taxes – estimated at 1.0% of asset value per year
- Insurance – estimated at 0.5% of asset value per year

Initial, replacement and sustaining capital investment in the mines is recognized through addition of a $/ton depreciation cost. Federal bonus bid expenditures have been included as a $/ton depletion cost rather than as lump sum payments in the five years following award of the federal lease.

The individual costs described above are summed to a total mine production cost.

4.3 Mining Obstacles or Limitations

There are some obstacles to the normal progression of mining that are not directly calculated within the cost model. We have adjusted individual mine costs to account for the additional expenses related to mining around these obstacles. The obstacles and limitations and expenses involved are described below.

The Burlington Northern Santa Fe (BNSF) and the Union Pacific (UP) railroads serve the mines in the PRB. The mines located south of the town of Gillette are served by both railroads via the Joint Line. All the mines located north of Gillette and into Montana are served only by the BNSF Railway. When the mines south of Gillette were initially developed, most of the mines were west of the Joint Line. A few of the mines including North Antelope/Rochelle, North Rochelle, Black Thunder, Jacobs Ranch and Coal Creek were developed east of the Joint Line. As these mines advance west from shallow to deeper resource areas, they will eventually encounter the Joint Line right-of-way. There are several options for addressing this situation with two that appear most viable. One is

to relocate the Joint Line to the west and when mining progresses to that point, and once mining is complete relocate the line it back on to mined out ground. A second and more conservative solution is to develop new pits on the west side of the Joint Line without relocating the railroad.

For purposes of this study, we have made the conservative assumption and assumed the mines would develop new pits on the west side of the Joint Line. This cost is addressed by increasing the amount of overburden that must be moved in five years preceding the transition to the new pits, thus accounting for the development of the new box pits. The increase in overburden removal requirements results in increased production costs in those years.

Another obstacle as mines advance to the west is Highway 59 which is the main highway from Gillette to the south. Some of the mines are already within about one mile of Highway 59. We have addressed this obstacle by including costs to relocate Highway 59 to the west. This relocation would be similar to the relocation of Highway 14-16 that runs north out of Gillette. It has recently been relocated to the east of the Eagle Butte Mine to allow unhindered advance of the mine to the west.

While the towns of Gillette and Wright, Wyoming could be obstacles to mining, the existing operations will not mine near these towns over the 30-year timeframe of this study.

The haulage capacity of the BNSF and UP railroads may be viewed as a limitation on the production output of the PRB. However, the railroads will not be likely to have a long term limiting impact on PRB coal production. In the past the railroads have responded to increases in demonstrated demand for PRB coal by adding new capacity to their systems. This is apparent from the double, triple and quadruple trackage along certain sections of the railroads. It is reasonable to expect that the railroad companies will respond to increasing demand by adding new capacity as it is required.

4.4 Existing PRB Mines

The existing PRB mines are typically categorized by state (Montana or Wyoming) and the thermal content of the coal. There are 16 existing mines which currently produce around 470 million tons per year. The existing mines include the following operations:

Montana PRB mines:

- Rosebud
- Absaloka

- Spring Creek
- Decker

Wyoming PRB – 8,400 Btu/Lb Coal Mines:

- Buckskin
- Rawhide
- Eagle Butte
- Dry Fork
- Wyodak
- Caballo
- Belle Ayr
- Cordero Rojo
- Coal Creek

Wyoming PRB – 8,800 Btu/Lb Coal Mines:

- Black Thunder
- North Antelope/Rochelle (NARO)
- Antelope

Each of these mines is described in the following sections. Table 4.1, following this chapter, provides a summary of key data for each mine. Table 4.2, summarizes the projected annual production and production cost for all of the mines over the 2011 – 2040 timeframe. The locations of these mines are shown on Exhibit 1, at the end of this report.

4.4.1 Rosebud Mine

The Rosebud Mine is owned and operated by Western Energy Company (a subsidiary of Westmoreland Coal Company). The mine has been in operation since 1968, and primarily provides the fuel supply to the nearby Colstrip power plant. As coal resources near the plant are depleted, more distant resources have been leased or purchased. Over the last 10 years mine production has ranged between 10.0 and 13.4 Million tons per year (Mtpy) with the mine producing 12.2 million tons of coal of coal in 2010. We have assumed the mine will continue to operate over the 30-year study horizon and supply a steady 12.0 Mtpy to the Colstrip plant. At that projected production level, currently controlled coal resources of 202 Million tons (Mt) will be depleted in 2027. We have assumed additional more-distant coal resources, which are known to exist, will be acquired for the 2028 through 2040 period.

Four draglines – 3 Marion 8050 models and 1 Marion 8200 – and truck/shovel fleets are the primary mining equipment. Key cost drivers for the Rosebud Mine include:

- Total coal thickness averages 30 feet in two seams (22-foot Rosebud Seam and 8-foot McKay Seam)
- 75% of overburden removed by a cast blast and dragline system
- 25% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 97 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below:

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	5.4	12.0	16.10
2015	5.6	12.0	16.47
2020	3.9	12.0	13.77
2025	7.0	12.0	20.36
2030	5.9	12.0	18.63
2035	6.2	12.0	19.27
2040	6.5	12.0	20.17

The Rosebud Mine currently has higher strip ratio than other mines in the PRB and associated higher production cost. The mine is adjacent to the power plant therefore the delivered cost of coal is generally less than if coal was purchased and delivered by railroad from other PRB mines. Although the mine has sold coal on the open market previously, it is not likely to be a significant influence on markets and prices since nearly all of the coal goes to the Colstrip power plant.

4.4.2 Absaloka Mine

The Absaloka Mine is owned and operated by Westmoreland Resources, Inc. (a subsidiary of Westmoreland Coal Company). The coal resources are leased from the Crow Indian Tribe. Over the last ten years, mine production has been in the 5.0 to 7.0 Mtpy. In 2010, the Absaloka Mine produced 5.5 million tons of coal.

A single dragline, BE-2570 (100 cy), and multiple truck/loader fleets are the primary mining equipment. The mine opened in 1974 and shallow coal resource areas were targeted that could be stripped almost entirely by dragline. Most of the shallow coal resources have been mined and future mining areas will require increasing amounts of pre-strip ahead of the dragline. The remaining coal resources within the Absaloka Mine

plan (49.2 Mt) are sufficient to sustain the operation at 6.0 Mtpy production level through 2018. Considerable resources occur nearby on the Crow Reservation, and in currently leased areas north of the Reservation. We have assumed additional higher strip ratio resources will be obtained to support the operation through 2040.

Key cost drivers for the Absaloka Mine include the following:

- Total coal thickness averages 29 ft in two seams (12-ft Rosebud and 17-ft McKay seam)
- 80% of overburden removed by a cast blast and dragline system
- 20% of overburden removed by truck/loader fleets
- Labor force productivity in 2010 was approximately 71 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	3.7	6.0	13.13
2015	3.7	6.0	13.10
2020	3.7	6.0	13.25
2025	3.9	6.0	13.83
2030	4.1	6.0	14.83
2035	4.3	6.0	15.56
2040	4.5	6.0	15.99

The Absaloka Mine produces an 8,600 Btu/Lb coal product. While this coal is not appreciably better than coal from the Gillette-area mines, Absaloka has a transportation advantage into power plants in the upper mid-west. We project the mine will continue to produce at current levels over the 30-year study horizon.

4.4.3 Spring Creek Mine

The Spring Creek Mine is owned by Cloud Peak Energy Resources LLC. Mine production has increased in recent years as production has declined at the nearby Decker Mine. In 2010, the Spring Creek Mine produced 19.3 million tons of coal which is its highest annual production since the mine opened in 1982. In addition to serving traditional US utility markets, Spring Creek coal has been exported through Canadian ports to Asian markets in limited but increasing quantities since 2008. This appears to be a growing trend and we project exports will increase as new port capacity is installed along the west coast. The current permitted capacity is 24 million tons per year.

Cloud Peak's 2010 10K report states total proven and probable reserves are 329.0 Mt. This is sufficient coal to sustain production through 2026 at a 20.0 Mtpy rate. There are extensive coal resources to the south and east of the operation though at increasing strip ratio. We have assumed these additional resources will be acquired to support mine operation through 2040.

Two draglines, BE-1570 (78 cy) and Page 757 (52 cy), and multiple truck/shovel fleets are the primary mining equipment. Key cost drivers for the Spring Creek Mine include:

- Total coal thickness averages 80 ft (the Anderson and Dietz seams merge into one seam at Spring Creek)
- 63% of overburden removed by a cast blast and dragline system
- 37% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 121 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below:

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	2.5	20.0	10.15
2015	2.9	20.0	10.80
2020	3.3	20.0	11.51
2025	3.7	20.0	12.62
2030	4.0	20.0	13.56
2035	4.2	20.0	14.32
2040	4.5	20.0	14.99

The Spring Creek Mine produces a 9,350 Btu/Lb coal product which is favorable from a transportation perspective (cheaper to transport a higher Btu/Lb product on a $/mmBtu basis). High sodium content in the ash causes problems in some boilers. The coal is also considered desirable in the Asian markets as it can be blended with other lower sodium coals to achieve acceptable boiler performance.

4.4.4 Decker Mine

The Decker Mine is jointly-owned by Level 3 Communications and Cloud Peak Energy Resources LLC, and operated by Kiewit Mining Group Inc. Mine production has declined in recent years as long-term sales contracts have expired and economically viable coal resources have depleted. In 2010 the Decker Mine produced 3.0 million tons of coal, down from the high of 13.0 million tons per year in the late 1970s.

The Decker Mine contains extensive coal resources at higher strip ratios – around 5.0 to 6.0+ BCY/ton. Other mines in the PRB generally will not reach that strip ratio range for approximately 25 to 30 years, thus, we expect Decker will close in the near future, and not reopen within the time horizon of this study.

Two draglines and multiple truck/shovel fleets are the primary mining equipment. Key cost drivers for the Decker Mine are:

- Total coal thickness averages 67 ft (in multiple seams)
- 50% of overburden removed by a cast blast and dragline system
- 50% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 47 EMUs/employee-hour (this may reflect a high level of reclamation activities)

The projected strip ratio trend, annual coal production and estimated production costs are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	4.5	3.0	15.39
2015	-	-	-
2020	-	-	-
2025	-	-	-
2030	-	-	-
2035	-	-	-
2040	-	-	-

The Decker Mine produces a 9,500 Btu/Lb coal product which is favorable from a transportation perspective. There may be a few niche markets for this coal in the near term, but over the longer term we believe the Decker Mine will not be economically viable. We have projected the mine will be idled or closed around 2014.

4.4.5 Buckskin Mine

The Buckskin Mine is owned and operated by Kiewit Mining Properties, Inc. In 2010 the Buckskin Mine produced 25.5 million tons of coal. The current permitted capacity is 27 Mtpy.

The Buckskin Mine permit includes 280.7 Mt of controlled coal resources. Kiewit has submitted an application to lease the Haystack II property which contains 52 million tons of coal, sufficient to extend the mining operation through about 2023. We have identified

an additional 1.2 billion tons of future coal resources north and west of the current operations within the mine's area of influence [3]. The strip ratios associated with these coal resources gradually increase from around 3.0 to 5.0 BCY/ton. The combined coal resources within permitted areas, LBA and future mine areas total 1.53 billion tons.

The primary mining equipment at Buckskin is multiple large truck/shovel fleets. Key cost drivers at the Buckskin Mine are:

- Total coal thickness averages 104 ft
- 100% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 97 EMUs/employee-hour

The projected strip ratio trend, annual coal production and estimated production costs through 2040 are:

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	2.4	25.0	9.55
2015	2.4	25.0	9.59
2020	1.7	25.0	8.37
2025	3.6	30.0	13.41
2030	3.7	30.0	14.30
2035	4.0	38.5	15.00
2040	4.0	45.0	14.65

The Buckskin Mine appears to be in a favorable strip ratio position for several years to come, and consequently the mine can support increased annual coal production as demand dictates. While the Buckskin Mine is located among the group of mines producing 8,400 Btu/Lb coal, there have been occasions when Buckskin coal had lower thermal content (i.e., <8,400 Btu/Lb). In such instances there are typically price adjustments which result in an overall lower coal sales price.

4.4.6 Rawhide Mine

The Rawhide Mine is owned and operated by Caballo Coal Company, a subsidiary of Peabody Energy Corp. In 2010 the Rawhide Mine produced 11.2 million tons of coal. The current permitted capacity is 24 Mtpy.

[3] The term "area of influence" as used in this study refers to the geographic area which is adjacent to and could be logically developed as an extension of the current operation. Future resources referred to herein generally occur within the mine's area of influence.

The Rawhide Mine has generally been operated to supplement production from Peabody's North Antelope/Rochelle and Caballo mines. Since the mine was opened in 1977, production has ranged widely between zero (the mine was idled in 2000 and 2001) and 18.4 Mtpy.

The Rawhide Mine permit area incorporates 329.7 million tons of coal resources, sufficient to sustain mine operation through 2024 at 24.0 Mtpy. No LBA tracts are being pursued at this time. An additional 1.14 billion tons of future coal resources lie west of the current mining operation within the mines area of influence. The strip ratio for these additional coal resources gradually increases from around 2.9 to 5.3 BCY/ton. The total combined coal resources within the Rawhide mine plan and area of interest are 1.47 billion tons.

The primary mining equipment at Rawhide is multiple large truck/shovel fleets. Key mining factors and cost drivers include:

- Total coal thickness averages 116 feet
- 100% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 74 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	1.6	14.5	8.44
2015	1.6	23.4	7.86
2020	1.9	25.0	8.44
2025	2.4	30.0	10.06
2030	2.6	30.0	11.49
2035	4.2	35.0	14.75
2040	4.2	45.0	15.47

The Rawhide Mine will enjoy a relatively low strip ratio for several years to come, and we have therefore projected its annual production to rise to meet anticipated demand. As with Buckskin, the Rawhide Mine is grouped with mines producing 8,400 Btu/Lb coal, although the coal does not always meet this specification. In such instances there are typically price adjustments which result in an overall lower coal sales price.

4.4.7 Eagle Butte Mine

The Eagle Butte Mine is owned and operated by Alpha Coal West, Inc., a subsidiary of Alpha Natural Resources. In 2010 the Eagle Butte Mine produced 23.2 million tons of coal. The current permitted capacity is 35 Mtpy.

In May 2008 the previous owner of the Eagle Butte Mine successfully leased the Eagle Butte West LBA containing 255 Mt of coal. The bonus bid for property was $180.5 million, equivalent to $0.71/ton. The average strip ratio for the property is reported to be 2.9 BCY/ton. Alpha Coal West has since incorporated the Eagle Butte West LBA tract within their mine plan and permits. Highway 14-16 which runs north out of Gillette divided the Eagle Butte Mine from the Eagle Butte West LBA. The highway has already been rerouted to the east of the Eagle Butte Mine to allow an uninterrupted transition into the Eagle Butte West property.

The Eagle Butte Mine permit allows production of 425 million tons through 2027 (at a 25.0 Mtpy rate). The Eagle Butte West LBA has been incorporated into the mine plan and permits. Beyond 2027, additional coal resources will need to be acquired. We have identified 398.0 million tons of future coal resources situated west of the mine permit area. The strip ratios for these future resources range from 4.6 to 6.8 BCY/ton. The future expansion potential of the Eagle Butte Mine appears limited due to the rising topography (buttes and bluffs) approximately one to two miles west of the current mining area and the associated higher production costs. Excluding this area, the total coal resources within the mine permit and future area of interest are 823.0 million tons.

Multiple large truck/shovel fleets are the primary mining equipment at Eagle Butte. Key cost drivers for the operation include the following:

- Total coal thickness averages 123 ft
- 100% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 123 EMUs/employee-hour

The projected strip ratio trend, annual coal production and estimated production costs through 2038 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	2.6	25.0	9.83
2015	3.1	25.0	10.86
2020	3.3	25.0	11.72
2025	2.7	25.0	10.60
2030	4.9	25.0	16.32
2035	5.0	25.0	16.63
2040	-	-	-

The Eagle Butte Mine has a very favorable coal resource position with relatively low strip ratios in their current mining areas and the Eagle Butte West LBA. Beyond these areas the strip ratios increase rapidly. The mine is located near the Gillette airport and we have project mining around the airport (instead of relocating the airport). The topography west of the mine includes several buttes. Mining in those areas causes the strip ratio to increase into the 6.0+ BCY/ton range. Consequently, we would anticipate the mine will be idled or closed late in the study period.

4.4.8 Dry Fork Mine

The Dry Fork Mine is owned and operated by Western Fuels Association Inc. The coal is primarily sold to various electric Co-ops that rely upon Western Fuels for fuel supply services. In 2010 Dry Fork produced 5.4 million tons of coal. The current permitted capacity is 15 Mtpa.

The Dry Fork Mine has a large coal resource base but has minimal opportunity to add resources to that base in the future. The mine is bordered by the Eagle Butte Mine to the west, Wyodak Mine and City of Gillette to the south, and the coal subcrop to the north and east. Total coal resources within the mine permit area are 110.9 million tons.

The primary mining equipment at Dry Fork are multiple truck/shovel/loader fleets. Key cost drivers for the Dry Fork Mine include:

- Total coal thickness averages 87 feet
- 100% of overburden removed by truck/shovel/loader fleets
- Labor force productivity in 2010 was approximately 82 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2030 are summarized below:

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	1.22	5.5	7.32
2015	1.15	5.5	7.27
2020	1.76	5.5	8.92
2025	2.70	5.5	11.55
2030	1.50	5.5	8.85
2035	-	-	-
2040	-	-	-

We have projected the Dry Fork Mine will continue to supply fuel to the various member Co-ops. Dry Fork will also be the fuel source for the newly commissioned Dry Fork power plant located adjacent to the mine. As currently projected, the mine will deplete the available resources in the 2030 time frame.

4.4.9 Wyodak Mine

The Wyodak Mine is predominantly a captive mine to the Wyodak and Wygen Power Plants located immediately east of Gillette, Wyoming. Relatively minor amounts of coal are sold on the open market to other utilities. The mine is operated by Wyodak Resources a subsidiary of Black Hills Power and Light. In 2010, Wyodak produced 5.9 million tons of coal. The current permitted capacity is 12 Mtpy. The Wyodak Mine controls over 40 years of coal resources (261.9 million tons), so there are no current efforts to acquire additional coal properties.

The primary mining equipment at Wyodak includes trucks/shovels to remove the overburden and an in-pit crushing and conveying system and large front end loaders to mine and transport the coal. Key cost drivers for the Wyodak Mine include the following:

- Total coal thickness averages 90 feet
- 100% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 85 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	2.5	6.0	9.95
2015	2.5	6.0	10.17
2020	2.5	6.0	10.64
2025	2.5	6.0	10.97
2030	2.5	6.0	11.12
2035	3.0	6.0	12.39
2040	3.0	6.0	12.39

The Wyodak Mine will continue to be the primary fuel supply for the Wyodak power plant. We do not anticipate any appreciable increase in production from Wyodak, and we do not anticipate the Wyodak coal being sold on the open market in significant volumes.

4.4.10 Caballo Mine

The Caballo Mine is owned and operated by Caballo Coal Company, a subsidiary of Peabody Energy Corp. In 2010 the Caballo Mine produced 23.5 million tons of coal. The current permitted capacity is 50 Mtpy.

In July 2004 a previous owner of the Belle Ayr Mine (immediately south of Caballo) applied for the Belle Ayr North LBA. This coal property was intended as a future mining area for Belle Ayr when current coal resources deplete around 2019. A lease sale was held in July 2011, and Peabody Energy Company outbid Alpha Coal West (Belle Ayr's owner) with a bonus bid of $210 million for 221.7 million tons of coal ($0.95/ton).

In a subsequent lease sale in August 2011, Alpha Coal West outbid Peabody for the West Caballo LBA which lies in advance of the Caballo Mine. The winning bonus bid established a new high of $1.10/ton based on a bid of $143.4 million for 130.2 M tons (at 4.2 BCY/ton strip ratio).

These lease sales appear to leave Alpha Coal West in a difficult position in that the West Caballo LBA tract does not appear to be adjacent to the Belle Ayr Mine, and consequently the Belle Ayr pit cannot advance onto the West Caballo property. The West Caballo tract does not appear to be essential to the Caballo Mine operation as other coal properties are available. The natural solution would appear to be trading LBA properties, however, it is not assured that will happen.

The Caballo mining sequence emphasizes advancing to the west although there are extensive unmined coal properties on the eastern side of the Caballo Mine. These eastern areas had been included and scheduled in earlier mining permits, but are currently excluded. While the Caballo mining permit does not explain this change of course, it may be due to coal quality or other geologic issues.

The Caballo Mine permit includes 235.2 million tons of controlled coal resources. The Belle Ayr North LBA, with 221.7 million tons would bring the controlled total to 456.9 Mt. Future coal resources estimated at 598.0 million tons are situated immediately west of the Caballo Mine and could extend the mine life beyond 2040. The strip ratios of these future resources steadily trend from 3.5 to 5.4 BCY/ton.

The primary mining equipment at Caballo are multiple large truck/shovel fleets. Key geologic factors and cost drivers for the Caballo Mine are:

- Total coal thickness averages 75 feet
- 100% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 132 EMUs/employee-hour

The projected strip ratio trend, annual coal production and estimated production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	3.7	25.0	11.56
2015	3.7	25.0	11.60
2020	3.9	25.0	12.90
2025	4.2	30.0	13.54
2030	4.2	34.0	14.10
2035	4.5	35.0	14.79
2040	5.0	40.0	15.82

The Caballo Mine appears to be in a generally favorable strip ratio position for most of the study period. Thus, the mine is relatively well positioned to meet future demand growth. We have therefore projected annual coal production rates to rise from 25.0 Mtpy to 40.0 Mtpy.

4.4.11 Belle Ayr Mine

The Belle Ayr Mine is owned and operated by Alpha Coal West, Inc., a subsidiary of Alpha Natural Resources. In 2010 Belle Ayr produced 25.8 million tons of coal. The current permitted capacity is 45 Mtpa.

The Belle Ayr Mine permit provides for production of 155.0 million tons of controlled coal resources which should be sufficient to support the operation through 2016 at 25.0 Mtpy production rate. Alpha Coal West recently leased the Caballo West LBA which contains 130.2 million tons. This LBA is not adjacent to the Belle Ayr Mine permit area and thus does not allow a logical mining transition into the LBA. The cost to develop a new pit and the limited tonnage within the LBA are factors that will likely mean Alpha will not develop this LBA. We consequently have not included this tonnage in our forecast. Future coal resources will likely be acquired west of the present mine permit area. We have identified 745.0 million tons of coal resources with strip ratios gradually increasing from 4.2 to 5.6 BCY/ton. The combined mine permit and future coal resources total 900.0 million tons.

The Belle Ayr Mine appears is in a difficult coal resource position in the near term. If a trade cannot be negotiated with Peabody for the Belle Ayr North LBA, then alternate LBA tracts will have to be leased. The leasing process is currently taking 5 to 7 years. Controlled and permitted coal resources would be near depletion before an alternate LBA could be leased. Delays would then be incurred to obtain mining permits over the new lease area.

The Belle Ayr Mine employs multiple truck/shovel fleets are the primary mining equipment. Key cost drivers for the Belle Ayr Mine include the following:

- Total coal thickness averages 72 feet
- 100% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 166 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	3.5	25.0	10.69
2015	3.8	25.0	11.21
2020	4.3	20.0	13.60
2025	4.4	20.0	14.15
2030	4.7	20.0	15.05
2035	4.7	20.0	15.51
2040	5.3	20.0	16.32

Due to its limited coal resource position, we do not believe there will be near term production increases at Belle Ayr. When the coal resource situation is ultimately resolved, Belle Ayr will be facing increasing strip ratios and production costs.

4.4.12 Cordero Rojo Mine

The Cordero Rojo Mine is owned and operated by Cordero Mining Company, a subsidiary of Cloud Peak Energy Resources LLC. In 2010 the Cordero Rojo Mine produced 38.5 million tons of coal. The current permitted capacity is 65 Mtpy.

In 2008 and 2009, Cordero Mining Company successfully bid on the North and South Maysdorf LBA tracts. These two tracts contain 342.6 million tons of coal. The bonus bids for two tracts totaled $298.9 million and equivalent to $0.87/ton. The average strip ratio for these tracts is reported to be 3.7 BCY/ton.

The Cordero Rojo Mine permit (August 2007 version) schedules production totaling 190.1 million tons of coal. The North and South Maysdorf LBAs add 346.2 MT, bringing the controlled total to 536.3 million tons, sufficient to extend the mine life into 2024. The mine would subsequently advance onto the Maysdorf II LBA tract which contains 434.0 million tons and an additional future coal resource of 701.5 million tons is located west of the LBA tracts within the mine's area of interest. The additional coal resources have an average strip ratio around 5.5 BCY/ton. The total coal resources within the mine permit area, LBAs and future area of interest are 1.67 billion tons.

Three draglines (2 Marion 8750 and 1 Marion 8200) and multiple truck/shovel fleets are the primary mining equipment at Cordero Rojo. Key cost drivers for the mine include:

- Total coal thickness averages 60 feet

- 64% of overburden removed by a cast blast and dragline system
- 36% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 138 EMUs/employee-hour

The projected strip ratio trend, annual coal production and estimated production costs through 2040 are:

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	3.6	40.0	9.53
2015	3.8	40.0	10.00
2020	3.7	40.0	11.20
2025	4.0	40.0	11.82
2030	4.8	40.0	13.89
2035	5.3	50.0	15.30
2040	5.6	50.0	15.98

The Cordero Rojo Mine is currently equipped so that draglines move the majority of the overburden. As the mine strip ratio and pit depth steadily increase, the more costly truck/shovel fleets will move a large percentage of the overburden (67% in 2040) which will impact the cost structure.

4.4.13 Coal Creek Mine

The Coal Creek Mine is owned and operated by Thunder Basin Coal Company, a subsidiary of Arch Coal Inc. In 2010 Coal Creek produced 11.4 million tons of coal. The current permitted capacity is 50 Mtpy. The Coal Creek Mine has generally been operated to supplement production from the Black Thunder Mine. Since the mine was opened in 1982, production has ranged widely between zero (the mine was idled from 2001 through 2005) and 11.5 Mtpy.

Thunder Basin Coal Company recently bid on the West Coal Creek LBA. That bid was rejected by the BLM due to the absence of Qualified Surface Owner Consent. This decision should not, however have any impact on the ability of the Coal Creek Mine to reach and sustain the projected 15.0 Mtpa production over the study horizon.

The Coal Creek Mine permit provides for production of 198.0 million tons. The West Coal Creek LBA would extend the mine life through 2027 if surface owner consent can be secured. Additional future coal resources of 224.0 million tons are available immediately south and west of the mine permit area to support the mine operation through 2040. The average strip ratio of these future coal resources is around 3.0

BCY/ton. The combined total coal resources including tonnage within the mine permit, LBA and future areas of interest are 478.0 million tons.

The primary mining equipment currently at Coal Creek comprises multiple truck/shovel fleets. Earlier in the mine life, the BE-1300 dragline was assigned to the Coal Creek Mine, but that machine is now in use at Black Thunder. Key cost drivers for the Coal Creek Mine include the following:

- Total coal thickness averages 35 ft (in two seams)
- 100% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 118 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	2.5	15.0	9.37
2015	2.5	15.0	9.71
2020	2.5	15.0	10.04
2025	3.3	15.0	12.69
2030	3.0	15.0	12.66
2035	3.0	15.0	12.75
2040	3.0	15.0	12.85

Although the Coal Creek Mine does not have a high annual production level, it should remain competitive over the study horizon due to its relatively low strip ratio.

4.4.14 Black Thunder Mine

The Black Thunder Mine is owned and operated by Thunder Basin Coal Company, a subsidiary of Arch Coal Inc. In 2010, Arch purchased the adjacent Jacobs Ranch Mine from Rio Tinto Energy America and incorporated that operation into the Black Thunder Mine. As a consequence, Black Thunder Mine production totaled 116.2 million tons in 2010. The current permitted capacity is 125 Mtpy.

The Black Thunder and Jacobs Ranch Mine permits incorporate lands with 1.256 billion tons of controlled coal resources. This is sufficient tonnage to support the mining operation through 2020.

Thunder Basin Coal Company currently has application submitted for three LBA properties with combined coal tonnage of 1.99 billion tons:

- West Hilight Field LBA – 440 M tons
- Hilight Field (includes a North and South tract) LBA – 591 M tons
- West Jacobs Ranch LBA – 957 M tons

Lease sales for these LBAs may occur as soon as late 2011. These three LBAs would support the mining operation through 2036 at a 120.0 Mtpy production rate. We have identified additional future coal resources of 1.94 billion tons that are situated immediately west and north of the Black Thunder Mine. The strip ratios within these future areas of interest range from 4.5 to 5.5 BCY/ton. The combined total coal resources within the mine permit boundary, LBAs and future area of interest are 5.19 billion tons.

The primary mining equipment at Black Thunder includes six large draglines – 3 BE-2570, 1 BE-1570, 1 BE-1300, 1 Marion 8750 – and multiple truck/shovel fleets. Key cost drivers for the Black Thunder Mine are:

- Total coal thickness averages 70 ft
- 36% of overburden removed by a cast blast and dragline system
- 64% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 161 EMUs/employee-hour

The projected strip ratio trend, annual coal production and estimated production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	3.8	122.0	10.66
2015	4.2	130.0	12.11
2020	4.6	125.0	13.11
2025	4.7	131.8	14.32
2030	4.9	135.0	14.26
2035	5.1	150.0	14.81
2040	5.0	165.0	14.81

With the acquisition of Jacobs Ranch the Black Thunder Mine is now the largest coal mine in the United States. Strip ratios increase more slowly – even at higher production rates – than at the competing North Antelope/Rochelle Mine. Consequently we have

projected significant production increases at Black Thunder over the next 30 years and stable production at North Antelope/Rochelle.

4.4.15 North Antelope/Rochelle Mine

The North Antelope/Rochelle Mine is owned and operated by Powder River Coal LLC, a subsidiary of Peabody Energy Corp. In 2010 the North Antelope Rochelle Mine produced 105.8 million tons of coal. The current permitted capacity is 110 Mtpy.

The North Antelope Rochelle mine permit incorporates a production schedule for 723.0 million tons of coal resources. This is sufficient tonnage to support the operation into 2017 at 105.0 Mtpy production rate.

Powder River Coal LLC has submitted an application to lease the North and South Porcupine LBA tracts containing 1.18 billion tons of coal. The lease sale is scheduled for the later part of 2011. These LBAs have adequate coal resources to extend the mining operation through 2027.

Future coal resources of 1.53 billion tons are located immediately west of the North Antelope/Rochelle Mine. This tonnage is sufficient to support the mining operation through 2040 at 105.0 Mtpy production rate. The strip ratio of these resources average around 5.6 BCY/ton.

Total coal resources within the mine permit boundary, LBAs and future areas of interest total 3.44 billion tons.

The primary mining equipment at North Antelope/Rochelle includes three large draglines - BE-2570 (100 cy), Marion 8200 (64 cy) and BE-2570 (117 cy) – and multiple truck/shovel fleets. Key cost drivers for the North Antelope/Rochelle Mine include:

- Total coal thickness averages 73 feet
- 27% of overburden removed by a cast blast and dragline system
- 73% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 172 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	3.0	105.0	9.49
2015	3.4	105.0	11.33
2020	4.5	100.0	14.24
2025	5.4	100.0	16.13
2030	5.5	100.0	16.02
2035	5.5	100.0	16.14
2040	5.8	100.0	16.93

The North Antelope Rochelle Mine had been the largest mine (on an annual production basis) in the United States until Arch Coal combined Black Thunder Mine and Jacobs Ranch Mine into a large mining complex. We have projected North Antelope/Rochelle Mine production to remain stable at 105.0 Mtpy through 2040. If production was increased above this level then the mine would advance more rapidly into areas of higher strip ratio – over 6.0 BCY/ton – with corresponding higher production costs.

4.4.16 Antelope Mine

The Antelope Mine is owned and operated by Antelope Coal Company, a subsidiary of Cloud Peak Energy Resources LLC. In 2010 the Antelope Mine produced 35.9 million tons of coal. The current permitted capacity is 45 Mtpy.

The mining sequence in the Antelope mine permit schedules production through 2017 when permitted coal resource would deplete.

In July 2011 Antelope Coal company successfully bid on the West Antelope II LBA. This LBA includes north and south tracts. The north tract contains an estimated 350 million tons of coal at a strip ratio of 4.6 BCY/ton. The south tract contains 56 million tons at a reported 5.0 BCY/ton strip ratio. These LBAs would support the mining operation through 2028 at a production rate of 36.0 Mtpy.

Additional coal resources would be needed to carry the mining operation through the 2040 term of this study. We have identified future coal resource of 479.0 million tons that are west of the current operations. The strip ratios of these coal resources range from 5.6 to 6.8 BCY/ton.

The total coal resource within the Antelope Mine permit, LBAs and future areas of interest are 1.14 billion tons.

A single dragline and multiple truck/shovel fleets are the primary mining equipment. Key cost drivers for the Antelope Mine include the following:

- Total coal thickness averages 70 ft
- 25% of overburden removed by a cast blast and dragline system
- 75% of overburden removed by truck/shovel fleets
- Labor force productivity in 2010 was approximately 147 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	2.9	36.0	10.08
2015	3.3	36.0	10.84
2020	4.4	28.0	13.37
2025	4.8	28.0	14.59
2030	5.2	28.0	15.32
2035	5.7	24.0	16.53
2040	6.1	24.0	17.39

Although the Antelope Mine has the desirable 8,800 Btu/Lb coal, the mine will rapidly advance into higher strip ratio areas. As a consequence we have projected declining production in the later years of this forecast.

4.5 Future PRB Mines

Several future PRB mines are in various stages of planning and development. We have identified those projects that appear to be the most likely to move toward development and incorporated production as appropriate from these mines over the 30-year timeframe of this study. We have included three specific properties in our production schedule: Otter Creek in Montana, and School Creek and Youngs Creek in Wyoming. In addition, we would expect two or more other mines to come on line within the study period, however exactly which properties would be developed is unknown. We have therefore incorporated two “generic” mines in the forecast one in Montana (potentially CX Ranch, Tanner Creek/Youngs Creek, Montco, Cook Mountain, Coal Creek and/or

Many Stars), and one in Wyoming (potentially Calf Creek, Rock Pile, Wild Cat, Kintz Creek and/or Keeline).

Each of the identified mines and their primary cost drivers are described in the following sections. Table 4.2, following this chapter, summarizes the projected annual production and production cost for these mines.

4.5.1 Otter Creek Mine

The Otter Creek Mine is located approximately six miles from Ashland, Montana, and consists of private, state and federal coal properties controlled by Arch Coal Company. Projected coal quality is approximately 8,600 Btu/Lb and 0.3% sulfur. The proposed Tongue River Railroad will have to be constructed at least as far as Ashland, Montana for the Otter Creek Mine to be viable.

A key source of information about the Otter Creek Mine is a valuation prepared for the Montana Department of Natural Resources and Conservation in 2009. That valuation includes a conceptual mine plan and cost forecasts.

Key cost drivers for the Otter Creek Mine include the following:

- Total coal thickness averages 57 ft
- 75% of overburden removed by a cast blast and dragline system
- 25% of overburden removed by truck/shovel fleets
- Labor force productivity is assumed to be similar to the Spring Creek Mine at approximately 120 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	-	-	-
2015	-	-	-
2020	2.3	18.0	8.96
2025	3.3	34.9	10.72
2030	3.5	34.9	11.44
2035	3.7	34.9	12.20
2040	3.8	34.9	12.41

We have scheduled the Otter Creek Mine to come online in 2018.

4.5.2 School Creek Mine

The School Creek Mine is owned by Powder River Coal LLC, a subsidiary of Peabody Energy Corp. The mine is situated between the Arch's Black Thunder Mine and Peabody's North Antelope/Rochelle Mine. Total controlled and permitted coal resources are 762.0 million tons. We have identified an additional 279.0 Mt of future coal resources that may logically be added to the currently controlled resources for a total resource base of 1.04 billion tons. Quality of the School Creek Mine coal is estimated at 8,800 Btu and 0.3% sulfur. The School Creek Mine is fully permitted and can be brought into production in a relatively short timeframe.

The northern part of the School Creek Mine is the idled North Rochelle Mine. The North Rochelle Mine adjoins the Black Thunder Mine and was purchased by Arch from Triton Coal Company in August 2004. Arch intended to expand the North Rochelle coal resource base through addition of the West Roundup LBA property. Peabody competitively bid against Arch in May 2005 for West Roundup and won the lease with a bonus bid of $0.97/ton – the highest bonus bid rate ($/ton) to that time. Arch's future at North Rochelle was effectively cut off as Peabody controlled the coal resources ahead of the mine. Arch and Peabody subsequently negotiated an agreement whereby Arch received the North Rochelle mining equipment and Peabody received the remaining coal resources and mine infrastructure including coal storage barn, rail loadout, and rail spur and loop track. Another key asset with the remaining coal resources was the fully developed pit. Peabody can essentially start the School Creek mining operation from the idled North Rochelle pit.

Key cost drivers for the School Creek Mine include the following:

- Total coal thickness averages 67 ft
- 25% of overburden removed by a cast blast and dragline system
- 75% of overburden removed by truck/shovel fleets
- Labor force productivity is assumed to be similar to the North Antelope Rochelle Mine at approximately 170 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	-	-	-
2015	4.0	17.9	11.56
2020	3.6	30.0	11.29
2025	3.8	30.0	12.09
2030	4.2	30.0	13.44
2035	4.0	30.0	13.25
2040	5.7	35.0	16.40

We have scheduled the School Creek Mine to come online in 2013.

4.5.3 Youngs Creek Mine

The proposed Youngs Creek Mine is a joint venture (50/50) between Chevron Mining Inc. and CONSOL Energy Inc. The Youngs Creek Mine is located 15 miles north of Sheridan, Wyoming and encompasses approximately 7,700 acres of predominately privately-held coal resources and surface rights. Estimated recoverable coal resources are 325 million tons, with quality of 9,350 Btu/Lb and 0.3% sulfur. Approximately half of the resource has strip ratio under 3.0 BCY/ton.

Draglines and truck/shovel fleets would be the primary mining equipment. Key cost drivers for the Youngs Creek Mine include the following:

- Total coal thickness is estimated to average 60 ft
- 50% of overburden removed by a cast blast and dragline system
- 50% of overburden removed by truck/shovel fleets
- Labor force productivity is assumed to be similar to the Spring Creek Mine at approximately 120 EMUs/employee-hour

The projected strip ratio trend, annual coal production and production costs through 2040 are summarized below.

Year	Strip Ratio (BCY/Ton)	Projected Coal Production (Million Tons)	Estimated Production Cost ($/Ton)
2011	-	-	-
2015	-	-	-
2020	4.0	2.0	14.54
2025	2.8	15.0	10.43
2030	3.0	15.0	11.17
2035	3.4	15.0	12.05
2040	3.8	15.0	12.69

We have scheduled the Youngs Creek Mine to come online in 2020.

4.5.4 Other Mines

There are several potential mine projects that might come online in the latter years of the study timeframe. In Montana, these include CX Ranch, Tanner Creek/Youngs Creek, Montco, Cook Mountain, Coal Creek and/or Many Stars. In Wyoming, potential mining properties include Calf Creek, Rock Pile, Wild Cat, Kintz Creek and Keeline. Other tracts may be developed between the Wyodak and Caballo mines. All of these tracts have been identified and evaluated to a greater or lesser extent for potential mine development. In each case the available resources are considered sufficient to support mine development if market demand justifies. For purposes of forecasting production and costs, we developed generic mines with characteristics typical of these properties and incorporated those values into the models.

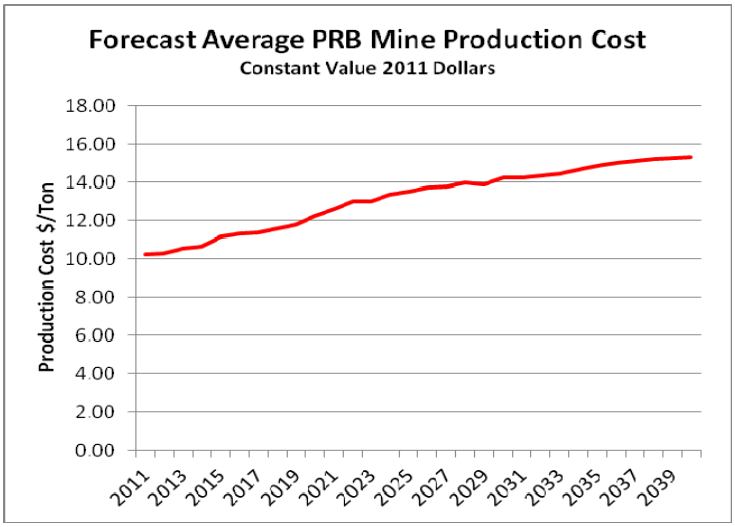
4.6 Overall Mining Cost Trends

Typically as a coal basin matures, mining proceeds from the most favorable to less favorable resources, a trend which puts upward pressure on costs. This is particularly true in the Gillette area where the mines are progressing from shallower, less expensive resources on the eastern edge of the basin to more deeply buried and thus more costly resources to the west. For most of the mines, this advance will also tend to increase coal haul distances putting further upward pressure on costs. Civil features (roads, railroads, buildings, pipelines etc.) will also require additional expenditures in some cases to accommodate.

Historically the trend towards increasing costs in the PRB has largely been offset by improved technology and economies of scale. The next section describes some of the technological trends which could continue to offset increasing costs going forward. For purposes of developing the cost forecasts in this study however, we have assumed that mining technology remains essentially unchanged over the forecast period. While we would expect such improvements to be modest, the forecasts presented herein are still considered conservative (i.e., likely to be high). As shown on Table 4.2, and summarized below, the result is a gradual increase in average mining costs in real terms, over the forecast period.

	Coal Production Cost (2011 $/Ton)			
	2011	2020	2030	2040
Montana Mines:				
Rosebud	16.10	13.77	18.63	20.17
Absaloka	13.13	13.25	14.83	15.99
Spring Creek	10.15	11.51	13.56	14.99
Decker	15.39	-	-	-
Existing Wyoming “8,400 Btu/Lb” Mines:				
Buckskin	9.55	8.37	14.30	14.65
Rawhide	8.44	8.44	11.49	15.47
Eagle Butte	9.83	11.72	16.32	-
Dry Fork	7.32	8.92	8.85	-
Wyodak	9.95	10.64	11.12	12.39
Caballo	11.56	12.90	14.10	15.82
Belle Ayr	10.69	13.60	15.05	16.32
Cordero Rojo	9.53	11.20	13.89	15.98
Coal Creek	9.37	10.04	12.66	12.85
Existing Wyoming “8,800 Btu/Lb” Mines:				
Black Thunder	10.66	13.11	14.26	14.81
North Antelope Rochelle	9.49	14.24	16.02	16.93
Antelope	10.08	13.37	15.32	17.39
Undeveloped Properties:				
School Creek	-	11.29	13.44	16.39
Otter Creek	-	8.96	11.44	12.41
Youngs Creek	-	14.54	11.17	12.69
Unidentified MT	-	-	17.01	14.38
Unidentified WY	-	-	-	13.79

The cost trend is illustrated on the nearby graph. Unlike many coal producing areas, this increase occurs very slowly in the PRB due to the nature of the deposit and scale of operations. BOYD's forecasts of average mining costs indicate a modest increase of ± 1% per year in real terms from about $10/ton (constant 2011 dollars) to about $15/ton in 2040. Note that this represents the average of all mines studied – individual mines may vary significantly both in trend and magnitude of costs.



4.7 Future Trends

The viability of PRB coal as a power plant fuel source over the timeframe of this study and beyond may be influenced in many ways including the following:

- Mining technology trends
- Geologic trends
- Transportation changes
- Energy industry trends
- Political influences

These trends are speculative but reasonably define potential future trends.

4.7.1 Mining Technology Trends

Past technology changes in the PRB have generally centered around introduction of draglines into the PRB mines and up-scaling the size of the mining equipment. While future up-scaling of machine sizes may continue, we think the potential for doubling or tripling machine sizes is minimal. Future size increases will be incremental.

Equipment Automation. Automation of equipment will be a trend in the future. Fully autonomous machines (for example, haul trucks) will offer savings in labor cost as no operator is required, and increased operating time as no operator-related delays (shift changes, shift breaks, lunch breaks, etc.) will be incurred. The automation of trucks is the main focus as the numbers of truck in the mines will increase as strip ratios increase.

Fully autonomous trucks are now in the testing stages in large iron ore mines in Australia. The benefits of this early testing will spread as the technology is proven.

Remote Machine Monitoring. Remote monitoring of machine systems and functions is continuing to evolve to effect improvements in machine availability and productivity. Modern mining machines are being equipped with sensors to monitor nearly all systems and functions of the machines. The collected information is transmitted via wireless signal to the mine office, corporate office, and to maintenance providers. The ability to react to machine needs is enhanced and will result in shorter downtimes and increased operating time. This all combines to decrease mining costs.

Electrical-Powered Equipment. Fuel price increases present a level of vulnerability to the mining operations as much of the haulage and support equipment is diesel driven. The transition to more electrical-driven equipment will work to mitigate some of that fuel price risk. Trolley assist for large haul trucks is being used in certain areas of the world, particularly where trucks must drive up long, steep grades to exit deep pits. This technology will continue to spread especially as the power distribution system that drives the trolley assist operation becomes more flexible and moveable.

Widespread GPS Usage. The use of global positioning system (GPS) equipment is currently being used in some of the PRB mines. That use will spread to all of the mines. GPS equipment is used to both monitor the performance of machines and also load electronically-transmitted mining plans to the mining equipment. This technology is used to achieve precise reclamation grades.

Advanced Mine Planning. Mining industry software and simulation packages will continue to improve. These will be able to interface with surveying hardware and software that can scan the mine surface in a short time so that topographic surfaces can be rapidly updated. A large number of mine plan alternatives will be evaluated in a short time so that the most cost-effective mining alternative can be followed.

Underground Mining Methods. The transition to underground mining methods will occur when it is less expensive than surface mining. Longwall Top Coal Caving methods are currently being used in thick-seam Chinese coal mines to achieve maximum recovery of the coal resource. The introduction of underground mining methods would effectively cap mining costs as underground mining is not influenced by increases in strip ratio.

4.7.2 Geologic Trends

The main geologic trend that will influence production costs is the gradual increase in strip ratio as mines advance down dip. As production costs in the deeper mines increase, new mines will be developed along the edges of the basin where strip ratios and mining costs are lower.

Other geologic trends include the splitting or parting of seams so that multiple coal seams are mined. This generally increases mining costs compared to mining a single, thick seam.

Coal quality generally improves as mines advance away from the subcrop line. There are often areas of higher sulfur and ash and lower Btu/Lb along the subcrop line. As mines advance down dip, there is often a slight increase in thermal content (Btu/Lb). This helps to offset the production cost when measured on a $/mmBtu basis.

4.7.3 Transportation Changes

Railroads will continue to be the primary transporters of PRB coal over the longer term. Capacity will be increased in step with increased PRB coal demand. Other transportation trends include the following:

Tongue River Railroad. The Tongue River Railroad was originally planned as an extension off the BNSF Railway between Miles City, Montana and the Montana-Wyoming border near Sheridan, Wyoming. In June 2011 Forrest Mars, the billionaire former chief executive of Mars Inc, purchased about one-third of the planned railroad that would have passed through his 140 square mile Diamond Cross Ranch near Birney, Montana. The railroad extension will now terminate around Ashland, Montana. This new railroad would provide access to the proposed Otter Creek Mine near Ashland, Montana.

Dakota, Minnesota and Eastern (DM&E) Railroad. The DM&E railroad (a subsidiary of the Canadian Pacific Railroad) has contemplated a build in to the PRB from DM&E lines that currently extend to the western side of South Dakota. The addition of a third railroad (along with the Burlington Northern Santa Fe railroad and Union Pacific railroad) would increase rail competition and result in lower transportation rates. The final Environmental Impact Statement for the build in has been approved and the next major step involves securing financing for the project.

Port Capacity. Increased coal demand within Asian markets has spurred new interest in PRB coal. In the past, a small percentage of overall PRB production has been delivered into Asian markets. This coal was primarily shipped through ports around Vancouver,

British Columbia. Earlier this year, Arch Coal announced an agreement to ship PRB coal through Ridley coal terminal located near Prince Rupert, British Columbia. Ambre Energy, an Australian company, has purchased a port facility near Portland, Oregon on the Columbia River. They plan to expand the port to transload coal for sales into Asian markets. Other coal port projects along the west coast are in various stages of development. Even with all these port projects in operation, still only a relatively small percentage of overall PRB production would be exported. The increased demand for PRB coal would generally result in slight upward price pressures.

Power Transmission. The rail component of the delivered cost of PRB coal to various power plants is generally greater than the coal production cost. If rail transportation costs increase, it may become more economic to locate new power plants within or near the PRB and transmit the power over high-voltage transmission lines. This coal-by-wire alternative will become more viable with technological advances in power transmission.

Diesel Fuel Prices. A major component in transportation costs (and mining costs) is the cost of diesel fuel. If diesel prices increases significantly, the market range for PRB coal could be impacted. In such case locally produced coals or lignite may be more cost competitive than PRB coal.

4.7.4 Energy Industry Trends

The various sources of energy (coal, natural gas, uranium, petroleum) will continue to go through market cycles which will lead to emphasizing production of certain fuels over others. Many of the large electric utilities manage these market cycles by diversifying their power generating fleet through a mix of coal-fired, gas-fired, nuclear, and renewable generation.

Oil prices will continue to have an influence on mining costs as well as the cost of diesel fuel and gasoline at the pump. Some of the energy industry trends that may impact PRB viability include the following:

Low Cost Natural Gas. Large quantities of natural gas are being discovered and produced from shale formations across the country. The production of shale gas involves directional drilling (horizontal) and fracturing the formation (fracing) to liberate the gas. The potential impact of fracing on overlying aquifers is gaining attention within the media and may hinder growth of the industry if new regulations are passed. The current increase in gas supply has resulted in lower gas prices. This in turn has led exploration companies to re-direct their efforts more toward oil production which

currently has higher profit margins. While natural gas prices are relatively low, it may be more economic for utilities to emphasize gas-fired power generation.

Carbon Capture and Sequestration (CCS) Technology. CCS technology aims to collect the CO2 that would otherwise be emitted into the atmosphere and inject it into permeable geologic formation. The sequestration of CO2 through injection into older oil fields may enhance oil recovery from the fields and also partially or totally offset the CCS cost. If this technology is proven and applied, then it should mitigate the alleged impacts of CO2 on global warming.

Coal to Liquids. The technology to convert coal to liquid fuels (diesel and gasoline) has been in commercial-scale applications since World War II. During the apartheid era in South Africa, essentially all the diesel and gasoline was produced from coal. Today it still remains a major source of diesel and gasoline in South Africa. There are several patented processes to convert coal to liquid fuels. The conversion of coal to liquid fuels becomes competitive with traditional petroleum refining costs when crude oil prices are around $60/barrel. The development of coal to liquid plants would tend to divert PRB coal use from power plant fuel to coal to liquid plant fuel. The increased demand would generally result in slightly higher prices. Alternately, this new source of diesel fuel would tend to lower the price of diesel which is a major component in mining and transportation costs.

Renewal of Nuclear Power Generation. It has been more than two decades since new nuclear power capacity has been constructed. The high up-front capital costs and lengthy time required to construct a nuclear plant are the greatest obstacles to resurgence in nuclear power. The standardized design of a modular nuclear plant has been proposed to address the noted obstacles. Other challenges continue to be long-term disposal of nuclear waste materials and public sentiment in view of the idled Japanese nuclear units following the tsunami earlier this year. Over the longer term, nuclear power should experience a resurgence. At that time, it will compete head on with coal-fired power generation.

Renewable Power Sources. Renewable power sources, particularly wind and solar, will continue to increase over the term of this study and beyond. Currently, renewable power sources are not competitive with conventional coal-fired power generation. Renewable power expansion presently relies on mandates to install some percentage of renewable power or user willingness to pay higher prices for “green” energy. Advances in renewable power technology will improve its competitiveness against traditional power

sources, though we do not see renewable power becoming the least costly source of power over the term of this study (through 2040).

4.7.5 Potential Political Influences

Perhaps the greatest uncertainty to long term PRB coal viability arises from potential legislation aimed at reducing greenhouse gases – notably CO2. The burning of coal in power plants is a major source of CO2. If CO2 emissions were taxed via a “cap and trade” scheme, coal-fired generation would become more costly. The magnitude of the tax would influence whether alternate sources of power would be more economic than coal-fired power generation. It is quite difficult to project when such a tax may be legislated. It seems the most likely time would have been during the initial years of the current administration when the congress and executive office were controlled by individuals that seemed sympathetic to the environmental agenda. Proposed CO2 emission legislation was not able to gain the required minimum votes. It does not appear such favorable control of the congress and presidency will again be aligned over the near term to force the environmental agenda.

The regulatory requirements to open new mines and continue to operate existing mines have increased over the years. Both the time and cost to obtain the necessary permits and licenses has continually increased. Some of these increases arise from the orchestrated campaign of numerous groups to block or at least delay mine development. Almost all of the proposed mines eventually come online, albeit at a higher cost to obtain permits and licenses. While such groups are free to engage in such delay tactics, it should be recognized that the additional permitting costs are merely rolled into the coal sales price which is ultimately passed on to the electric rate payer.

Following this page are Tables:

4.1; Coal Supplier Summary, Powder River Basin
4.2: Projected Annual Production, Cash Cost and Production Costs, Powder River Basin Mines

TABLE 4.1

COAL SUPPLIER SUMMARY
POWDER RIVER BASIN
Prepared For
XCEL ENERGY
By
John T. Boyd Company
Mining and Geological Consultants
September 2011

Mine/Property	Primary Owner (Opera ing Company)	Mine Type	2010 Production (M Tons)	Transportation Logistics	Available Resources* (M Tons)	As Received Quality Ash (%)	Sulfur (%)	Btu/Lb	Comments
8,800 Btu (Southern) Mines									
Antelope	Cloud Peak Energy	Surface, Dragline & Truck/Shovel	35.9	On-Site Loadout, UP or BNSF	1,138	5.3	0 22	8,850	Highest quality mine in the Gillette area. Increasing strip ratios will impact this mine before the other 8,800 Btu coal producers.
North Antelope Rochelle	Peabody Energy (Powder River Coal Co)	Surface, Dragline & Truck/Shovel	105.8	On-Site Loadout, UP or BNSF	3,437	4.5	0 20	8,800	Combination of Peabody's North Antelope mine and Rochelle mine. Has previously been the largest mine in US on a tonnage basis.
School Creek	Peabody Energy (Powder River Coal Co)	Surface, Dragline & Truck/Shovel	-	On-Site Loadout, UP or BNSF	1,041	5.0	0 30	8,800	The mine is fully permitted and mining can commence from the old North Rochelle mine pit. This will be the next PRB mine to come online.
Black Thunder/Jacobs Ranch	Arch Coal Inc. (Thunder Basin Coal)	Surface, Dragline & Truck/Shovel	116.2	On-Site Loadout, UP or BNSF	5,189	5.4	0 30	8,800	Arch acquired the Jacobs Ranch Mine in 2009 and integrated hat operation into the overall Black Thunder Complex. Current largest US coal mine.
8,400 Btu (Northern) Mines									
Cordero Rojo	Cloud Peak Energy (Cordero Mining Co)	Surface, Dragline & Truck/Shovel	38.5	On-Site Loadout, UP or BNSF	1,668	5.4	0 30	8,400	Combination of the Cordero and Caballo Rojo Mines.
Belle Ayr	Alpha Natural Resources (Alpha Coal West)	Surface, Truck/Shovel	25.8	On-Site Loadout, UP or BNSF	900	4.5	0 32	8,500	Formerly Foundation Coal Inc. - Merged with Alpha Natural Resources in 2009.
Caballo	Peabody Energy (Caballo Coal Company)	Surface, Truck/Shovel	23.5	On-Site Loadout, UP or BNSF	1,055	5.0	0 32	8,500	
Wyodak	Black Hills Corporation (Wyodak Resources Inc.)	Surface, Truck/Shovel	5.9	Conveyor Delivery to Power Plant, On-Site Truck & Rail Loadouts, BNSF	262	5.5	0.40	8,000	Primarily captive to on-site power plants
Eagle Butte	Alpha Natural Resources (Alpha Coal West)	Surface, Truck/Shovel	23.2	On-Site Loadout, BNSF	823	4.7	0 36	8,400	Formerly Foundation Coal Inc. - Merged with Alpha Natural Resources in 2009.

TABLE 4.1 - Continued

Mine/Property	Primary Owner (Opera ing Company)	Mine Type	2010 Production (M Tons)	Transportation Logistics	Available Resources* (M Tons)	As Received Quality Ash (%)	Sulfur (%)	Btu/Lb	Comments
Dry Fork	Western Fuels	Surface, Truck/Shovel	5.4	On-Site Loadout, BNSF	111	4.9	0 30	8,100	Will increase production to supply Basin Electric's Dry Fork Station.
Rawhide	Peabody Energy (Caballo Coal Company)	Surface, Truck/Shovel	11.2	On-Site Loadout, BNSF	1,778	5.1	0.40	8,300	Historically Rawhide has been Peabody's swing producer with production ranging between 0.0 and 18.4 Mtpy, but has worked continuously since 2001.
Buckskin	Kiewit Mining	Surface, Truck/Shovel	25.5	On-Site Loadout, BNSF	1,535	5.1	0.40	8,300	Acquired by Kiewit Mining Group in 2007. Blends to meet a variety of specifications but does not generally produce an average 8400 Btu/Lb product.
Coal Creek	Arch Coal Inc. (Thunder Basin Coal)	Surface, Dragline, Truck/Shovel	11.4	On-Site Loadout, UP or BNSF	478	5.7	0 35	8,400	Historically a swing producer, but has worked continuously since 2006.
Wyoming Total			428.3		19,415				
Montana Mines									
Decker	Kiewit Mining and Cloud Peak Energy (Decker Coal Company)	Surface, Dragline, Truck/Shovel	3.0	On-Site Loadout, BNSF	12	4.2	0 50	9,500	Available resources are nearly depleted. Significant resources of +5 0 BCY/T coal remain within the lease area. High sodium - 6.4% in ash.
Spring Creek	Cloud Peak Energy (Spring Creek Coal Co)	Surface, Dragline, Truck/Shovel	19.3	On-Site Loadout, BNSF	600	4.3	0 30	9,300	High sodium in ash - 8.5%
Absaloka	Westmoreland Resources	Surface, Dragline, Truck/Shovel	5.5	On-Site Loadout, BNSF	180	8.9	0.60	8,600	Coal is leased from the Crow Indian Tribe. Moderately high sodium in ash - 2.0%
Rosebud	Westmoreland Resources (Western Energy Co)	Surface, Dragline, Truck/Shovel	12.2	Conveyor Delivery to Power Plant, On-Site Loadout, BNSF	360	9.0	0.70	8,575	Most of he production is delivered to the adjacent Colstrip power plant.
Montana Total			40.0		1,152				
PRB Total			468.3		20,567				

* Available Resources include controlled and permitted resources as of 12/31/2010, identified LBA properties and Future resources within the area of interest of each mine.

Exhibit No. MWR-1

TABLE 4.2

PROJECTED ANNUAL PRODUCTION, CASH COSTS AND PRODUCTION COSTS
POWDER RIVER BAS N MINES
Prepared For
XCEL ENERGY
By
John T. Boyd Company
Mining and Geological Consultants
September 2011

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	TOTAL
Montana Mines																															
Rosebud Mine																															
Production (Tons-000)	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	360,000
Cash Cost ($/Ton)	15.10	14 93	15 07	15 20	15.45	15.41	15 59	14.69	12 91	12 97	14.75	16 01	16.83	18.16	18 91	19 26	20.12	17.16	17 22	17.36	17.45	17.75	17.84	17.90	17 95	18.31	18.35	18.60	18 66	18.81	
Production Cost ($/Ton)	16.10	15 90	16 07	16 22	16.47	16.42	16.62	15.66	13.71	13.77	15.68	17 04	17.93	19.34	20 36	20.74	21.68	18.42	18.48	18.63	18.73	19 04	19.14	19.21	19 27	19.63	19.68	19.94	20 01	20.17	
Absaloka Mine																															
Production (Tons-000)	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	180,000
Cash Cost ($/Ton)	12.39	12 39	12 36	12 36	12 36	12.46	12.46	12.46	12.46	12 51	12.62	12 95	12.95	13.06	13 06	13 34	13.34	13.51	13 90	13.98	13.98	14 26	14.26	14.64	14 64	14.76	14.76	15.04	15 04	15.04	
Production Cost ($/Ton)	13.13	13.13	13.10	13.10	13.10	13 21	13 21	13.21	13 21	13.25	13.36	13.71	13.71	13.83	13 83	14.12	14.12	14.35	14.75	14.83	14.83	15.13	15.13	15.56	15 56	15.69	15.69	15.99	15 99	15.99	
Spring Creek Mine																															
Production (Tons-000)	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	600,000
Cash Cost ($/Ton)	9.26	9 36	9.44	9 54	9 83	10 03	9 98	10.15	10.15	10 52	10.75	11 09	11.39	11.53	11 53	11 84	11.84	11.98	11 98	12.39	12.65	12.79	12.79	13.10	13.10	13.25	13.25	13.55	13 55	13.69	
Production Cost ($/Ton)	10.15	10 28	10 37	10.49	10 80	11 01	10 93	11.12	11.12	11.51	11.77	12.13	12.46	12.62	12 62	12 96	12.96	13.12	13.12	13.56	13.81	13 98	13.98	14.32	14 32	14.49	14.49	14.82	14 82	14.99	
Decker Mine																															
Production (Tons-000)	3,000	3,000	3,000	3,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,000
Cash Cost ($/Ton)	14.39	14 39	14 36	14 36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Production Cost ($/Ton)	15.39	15 39	15 36	15 36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Wyoming Mines (8,400 Btu/Lb)																															
Buckskin Mine																															
Production (Tons-000)	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	31,700	35,800	38,200	38,500	40,000	40,000	45,000	45,000	45,000	924,200
Cash Cost ($/Ton)	8.64	8 62	8 57	8 55	8 68	8 66	7.44	7.42	7.44	7 54	7.54	11 68	11 68	11.65	11 65	11 65	11.70	12.03	12 05	12.51	12.51	12 50	13.00	13.12	13.14	13.13	13.13	12.79	12.79	12.79	
Production Cost ($/Ton)	9.55	9 53	9.47	9.45	9 59	9 57	8 27	8.25	8 28	8 37	8.37	13.44	13.44	13.41	13.41	13.41	13.46	13.79	13 82	14.30	14.30	14 28	14.85	14.98	15 00	14.99	14.99	14.65	14 65	14.65	
Rawhide Mine																															
Production (Tons-000)	14,500	20,400	20,400	20,400	23,400	25,000	25,000	25,000	25,000	25,000	25,000	28,800	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	34,000	35,000	35,000	35,000	35,000	37,000	36,700	43,500	45,000	45,000	899,100
Cash Cost ($/Ton)	7.78	7 59	7.43	7 32	7 20	7.19	7.18	7.18	7 21	7.71	8.66	9 33	9 33	9.32	9 20	9 36	9 38	9.31	9 33	9.97	10.49	10 64	10.65	11.14	12 84	13.51	13.53	13.53	13 54	13.56	
Production Cost ($/Ton)	8.44	8 24	8 08	7 98	7 86	7 84	7 83	7.83	7 86	8.44	9.55	10 21	10 21	10.20	10 06	10 82	10.84	10.77	10.79	11.49	12.07	12 22	12.24	12.81	14.75	15.42	15.44	15.44	15.45	15.47	
Eagle Butte Mine																															
Production (Tons-000)	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	-	-	-	675,000
Cash Cost ($/Ton)	8.65	8 63	9.48	9.48	9 57	9 57	9 57	9.96	9 99	10 38	10.38	10.45	9.41	9.41	9.41	9.41	9.47	13.75	13.75	14.23	14.23	14 23	14.23	14.49	14 52	14.61	14.61	-	-	-	
Production Cost ($/Ton)	9.83	9 80	10.77	10.77	10 86	10 86	10 86	11.30	11 33	11.72	11.72	11.79	10 60	10.60	10 60	10 60	10.66	15.83	15 83	16.32	16.32	16 32	16.32	16.60	16 63	16.72	16.72	-	-	-	
Dry Fork Mine																															
Production (Tons-000)	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	-	-	-	-	-	-	-	-	-	-	110,000
Cash Cost ($/Ton)	6.70	6 67	6 60	6 60	6 67	6 67	7 23	7.34	8 06	8.17	8.27	8 69	8 69	8.75	10 57	9 28	8.11	7.68	7 26	8.16	-	-	-	-	-	-	-	-	-	-	
Production Cost ($/Ton)	7.32	7 28	7 20	7 20	7 27	7 27	7 91	8.01	8 81	8 92	9.02	9.48	9.48	9.54	11 55	10.11	8.82	8.32	7 82	8.85	-	-	-	-	-	-	-	-	-	-	
Wyodak Mine																															
Production (Tons-000)	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	180,000
Cash Cost ($/Ton)	9.07	9 07	9 03	9 03	9 29	9 29	9 29	9.29	9 61	9.76	9.76	9 83	10.09	10.09	10 09	10 09	10 09	10.09	10 09	10.24	11.25	11 38	11.38	11.38	11 38	11.38	11.38	11.38	11 38	11.38	
Production Cost ($/Ton)	9.95	9 95	9 92	9 92	10.17	10.17	10.17	10.17	10.49	10 64	10.64	10.71	10 97	10.97	10 97	10 97	10.97	10.97	10 97	11.12	12.26	12 39	12.39	12.39	12 39	12.39	12.39	12.39	12 39	12.39	
Caballo Mine																															
Production (Tons-000)	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	30,000	30,000	30,000	30,000	31,400	33,700	34,000	34,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	40,000	40,000	40,000	918,100
Cash Cost ($/Ton)	10.22	10 22	10.19	10.19	10 27	10.65	10.65	10.65	10 80	10.86	11.32	11.41	11.39	11.41	11.43	11.44	11.50	12.10	11.77	11.99	12.00	11 94	11.92	12.52	12 60	12.62	12.64	13.30	13 50	13.51	
Production Cost ($/Ton)	11.56	11 56	11 52	11 52	11 60	12 65	12 65	12.65	12.79	12 90	13.43	13 52	13 50	13.52	13 54	13 55	13.61	14.29	13 88	14.10	14.11	14 03	14.00	14.70	14.79	14.80	14.82	15.58	15 81	15.82	
Belle Ayr Mine																															
Production (Tons-000)	25,000	25,000	25,000	25,000	25,000	25,000	25,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	635,000
Cash Cost ($/Ton)	9.51	9 51	9.47	9.47	9 95	10.03	10.29	10.99	11 33	11.54	11.62	11 82	11.82	11.95	12 06	12 62	12.62	12.62	12 65	12.88	13.09	13 09	13.09	13.34	13 34	13.43	13.58	14.03	14 03	14.03	
Production Cost ($/Ton)	10.69	10 69	10 66	10 66	11 21	11 29	12 23	13.02	13.40	13 60	13.69	13 88	13 88	14.01	14.15	14.78	14.78	14.78	14 82	15.05	15.25	15 25	15.25	15.51	15 51	15.59	15.77	16.32	16 32	16.32	
Cordero Rojo Mine																															
Production (Tons-000)	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	44,900	50,000	50,000	50,000	50,000	50,000	50,000	1,264,900
Cash Cost ($/Ton)	8.67	8 67	8 91	8 91	9 09	9 34	9 34	9.34	9 57	9.64	9.57	9 65	9.67	9.69	10.18	10 58	11.15	11.38	11.78	12.05	12.41	12.42	12.72	13.11	13 27	13.29	13.40	13.60	13 86	13.88	
Production Cost ($/Ton)	9.53	9 53	9 80	9.80	10 00	10 90	10 90	10.90	11.13	11 20	11.13	11 21	11 23	11.25	11 82	12 27	12.89	13.16	13 62	13.89	14.29	14 31	14.65	15.11	15 30	15.32	15.44	15.66	15 96	15.98	
Coal Creek Mine																															
Production (Tons-000)	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	11,900	13,900	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	445,800
Cash Cost ($/Ton)	8.43	8.45	8.43	8.45	8.78	8 80	8 81	8.83	8 90	9.10	9.04	9.11	9.44	10.48	10 92	10 94	11.14	10.88	10.79	10.97	10.99	11 01	11.03	11.05	11 06	11.08	11.10	11.12	11.14	11.16	
Production Cost ($/Ton)	9.37	9 39	9 37	9 39	9.71	9.73	9.75	9.77	9 84	10 04	9.98	10 05	10 37	12.19	12 69	12.71	12 91	12.59	12.48	12.66	12.68	12.70	12.72	12.74	12.75	12.77	12.79	12.81	12 83	12.85	

TABLE 4.2 - Continued

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	TOTAL
Wyoming Mines (8,800 Btu/Lb)																															
Black Thunder Mine																															
Production (Tons-000)	122,000	130,000	130,000	130,000	130,000	130,000	130,000	125,000	125,000	125,000	125,000	125,000	125,000	128,300	131,800	134,100	135,000	135,000	135,000	135,000	135,000	143,000	148,000	148,000	150,000	150,000	150,000	158,000	160,000	165,000	4,093,200
Cash Cost ($/Ton)	9.51	9 68	9 94	10 21	10.48	10 58	10 63	10.75	11 02	11.11	11.49	11 93	11.91	12.15	12 20	12 33	12.37	12.39	12 09	12.16	12.18	12 34	12.41	12.59	12 64	12.74	12.78	12.60	12 62	12.65	
Production Cost ($/Ton)	10.66	10 88	11.16	11 81	12.11	12 23	12.51	12.65	12 95	13.11	13.55	14 01	13.99	14.26	14 32	14.47	14.52	14.53	14.18	14.26	14.28	14.47	14.55	14.73	14 81	14.93	14.97	14.75	14.77	14.81	
North Antelope/Rochelle Mine																															
Production (Tons-000)	105,000	105,000	105,000	105,000	105,000	105,000	105,000	105,000	105,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	3,045,000
Cash Cost ($/Ton)	8.50	8 63	8.73	8 86	9 57	9.70	9 55	9.91	10 65	12.11	12.72	12 57	12.71	13.57	13.79	13 95	13.88	13.53	13 50	13.74	13.76	13.78	13.79	13.81	13 86	14.19	14.42	14.54	14 56	14.57	
Production Cost ($/Ton)	9.49	9 65	9.77	9 92	11 33	11.49	11 36	11.80	12 61	14.24	14.92	14.72	14.88	15.87	16.13	16 32	16.22	15.82	15.78	16.02	16.04	16 06	16.07	16.09	16.14	16.48	16.75	16.89	16 91	16.93	
Antelope Mine																															
Production (Tons-000)	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	876,000
Cash Cost ($/Ton)	8.76	8 89	8 93	9 06	9.42	9 55	9 67	10.74	11.17	11.44	11.54	11 97	12 07	12.19	12 57	12 67	12.54	12.64	12 65	13.21	13.56	13.75	14.27	14.29	14 30	14.44	14.52	14.60	15 00	15.07	
Production Cost ($/Ton)	10.08	10 24	10 30	10.46	10 84	10 99	11.15	12.65	13.10	13.37	13.49	13 93	14.05	14.19	14 59	14.71	14.60	14.72	14.75	15.32	15.71	15 92	16.50	16.51	16 53	16.69	16.78	16.87	17 30	17.39	
Undeveloped Properties																															
School Creek Mine																															
Production (Tons-000)	-	-	3,500	14,900	17,900	26,700	26,500	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	35,000	35,000	35,000	35,000	799,500
Cash Cost ($/Ton)	-	-	15 87	9 02	10 35	10 01	9 69	9.74	9 85	9 91	9.93	10 02	10.14	10.29	10.42	10 60	10.98	10.90	10 98	11.44	11.02	11 02	11.07	11.16	11 29	11.38	12.42	13.82	13 94	14.05	
Production Cost ($/Ton)	-	-	18.14	10 04	11 56	11.42	11 02	11.07	11 22	11 29	11.56	11 64	11.77	11.94	12 09	12 32	12.94	12.86	12 95	13.44	12.94	12 93	12.99	13.10	13 25	13.35	14.52	16.12	16 25	16.39	
Youngs Creek																															
Production (Tons-000)	-	-	-	-	-	-	-	-	-	2,000	4,000	7,500	7,500	7,500	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	268,500
Cash Cost ($/Ton)	-	-	-	-	-	-	-	-	-	13 06	10.04	8 85	8 87	9.11	8.79	9 02	9.04	9.06	9 08	9.42	9.67	9 69	9.71	9.95	10.19	10.21	10.45	10.47	10.49	10.73	
Production Cost ($/Ton)	-	-	-	-	-	-	-	-	-	14 54	11.55	10 39	10.42	10.69	10.43	10 69	10.72	10.76	10 80	11.17	11.46	11.49	11.56	11.81	12 05	12.09	12.36	12.39	12.43	12.69	
Unidentified MT																															
Production (Tons-000)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,000	4,300	13,700	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	164,000
Cash Cost ($/Ton)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16 07	15.45	10.31	9 99	10.13	10.97	11.40	11.70	11.83	12.43	12 57	13.00	
Production Cost ($/Ton)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17 63	17.01	11.32	10 95	11.26	12.13	12 61	12.93	13.09	13.74	13 90	14.38	
Otter Creek																															
Production (Tons-000)	-	-	-	-	-	-	-	12,100	17,500	18,000	25,000	27,500	32,300	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	34,900	725,700
Cash Cost ($/Ton)	-	-	-	-	-	-	-	8.45	8 35	8 38	9.10	9.18	9 31	9.98	10 00	10 00	10.00	10.09	10.17	10.70	10.70	10.70	10.79	10.84	11 24	11.24	11.24	11.33	11 37	11.44	
Production Cost ($/Ton)	-	-	-	-	-	-	-	9.01	8 92	8 96	9.75	9 83	9 99	10.69	10.72	10.72	10.72	10.81	10 90	11.44	11.44	11 64	11.73	11.79	12 20	12.20	12.20	12.30	12 34	12.41	
Unidentified WY																															
Production (Tons-000)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,000	4,000	10,000	15,000	25,000	31,500	36,600	124,100
Cash Cost ($/Ton)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.60	12 36	11.25	11.15	11.49	11 53	11.58	
Production Cost ($/Ton)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.72	14.48	13.39	13.30	13.65	13.72	13.79	
Production Summary																															
Montana Mines	41,000	41,000	41,000	41,000	38,000	38,000	38,000	50,100	55,500	56,000	63,000	65,500	70,300	72,900	72,900	72,900	72,900	72,900	74,900	77,200	86,600	88,900	88,900	90,900	92,900	98,900	103,900	113,900	120,400	125,500	2,165,800
Wyoming Mines (8,400 Btu/Lb)	181,000	186,900	186,900	186,900	189,900	191,500	191,500	186,500	186,500	185,400	189,400	197,800	204,000	209,000	216,500	216,500	217,900	220,200	220,500	220,500	220,000	222,700	226,800	234,100	239,500	243,000	242,700	234,500	236,000	236,000	6,320,600
Wyoming Mines (8,800 Btu/Lb)	263,000	271,000	274,500	285,900	288,900	297,700	297,500	296,000	296,000	283,000	283,000	283,000	283,000	286,300	289,800	292,100	293,000	293,000	293,000	293,000	293,000	297,000	302,000	302,000	304,000	304,000	309,000	317,000	319,000	324,000	8,813,700
Total PRB Production	485,000	498,900	502,400	513,800	516,800	527,200	527,000	532,600	538,000	524,400	535,400	546,300	557,300	568,200	579,200	581,500	583,800	586,100	588,400	590,700	599,600	608,600	617,700	627,000	636,400	645,900	655,600	665,400	675,400	685,500	17,300,100

K \Projects\3155.001 Xcel Energy - PRB Resource & Cost Study\GBG\Final Report\Tables\[Table 4.2.xls]TABLE 4.1 Production & Costs

5.0 POWDER RIVER BASIN MARKETS AND PRICES

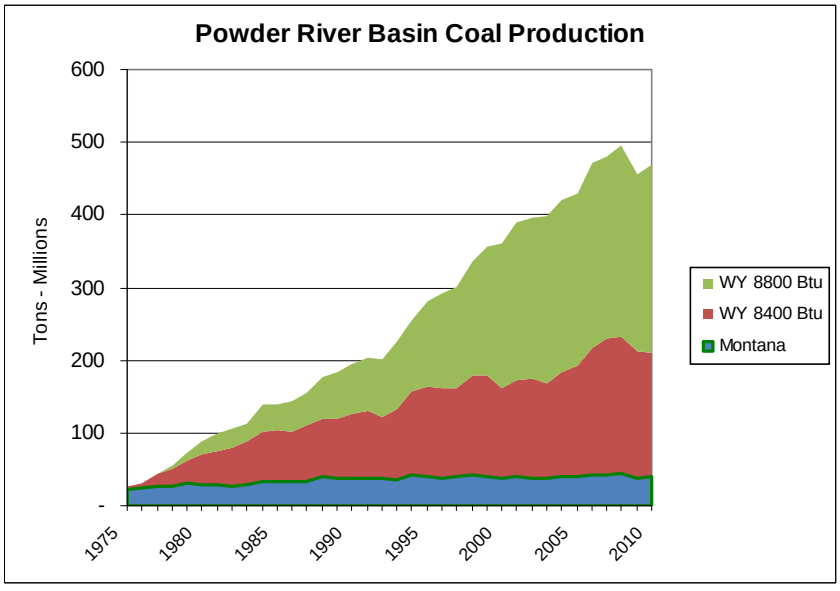
5.1 Introduction

PRB coal is marketed across the United States due to its favorable quality characteristics – notably low sulfur – and relatively low price. PRB coal is the most widely consumed coal in the U.S., supplying over 40% of the total U.S. market on a tonnage basis. Significant production began in the late 1970s, and since that time the PRB has become a large, reliable, competitive and relatively stable fuel supply source for electrical generation, and is the dominant player in coal markets across most of the U.S.

This chapter addresses PRB markets and prices in a basin-wide context based on the mine by mine analyses in the previous chapter. Supply and demand balances are addressed as are pricing considerations for PRB coal. Finally, BOYD's projection of coal prices over the study period are presented and discussed. All coal prices and price projections are expressed in constant value 2011 dollars.

5.2 PRB Coal Supplies

The Powder River Basin, as compared to other producing regions in the country, is a fairly new supply source, but one which has grown dramatically over a relatively short period, as illustrated:



Prior to about 1974, production was limited to a handful of mines in Montana and the Sheridan Field, primarily due to lack of transportation elsewhere, and the relatively low Btu content of the coal as compared to other western U.S. sources. Several factors, including the construction of numerous new power plants in the mid 1970s and early 1980s, the passage in 1978 of the Clean Air Amendments Act (which put a premium on low sulfur content), and the 1984 construction of the "Joint Line" rail access into the southern portion of the basin promoted a very rapid increase in production in the PRB.

PRB coal production peaked in 2008 at about 496 million tons, declining to about 455 million tons in 2009 due to the recession. Since that time production has recovered somewhat to about 470 million tons. Even with the 2009 decrease, PRB production has grown, on average, by approximately a 5% per year rate since the mid-1980s.

PRB supplies have historically been driven primarily by demand – geologic, environmental, operational, and logistical constraints have typically been managed successfully by mine operators and the railroads. Supply shortfalls, although rare, have occurred, but are typically not severe or sustained over an extended term. While the mines have tended to maintain some excess capacity, that excess has typically been relatively small. This is largely because given the nature of the mines and the coal deposit, adding capacity to an existing mine, within limits, is relatively straightforward and economical. Thus, the producers can respond to modest increases in demand in relatively short timeframes. BOYD expects this situation, with a relatively small but adequate excess capacity to continue for the foreseeable future.

5.3 PRB Coal Demand

Virtually all PRB production goes for power generation – industrial sales are very limited. Geographically, PRB customers are primarily to the east and south. Relatively little PRB coal moves west from the basin, although greater interest by consumers in the Southwestern U.S. and for export are likely to increase this flow.

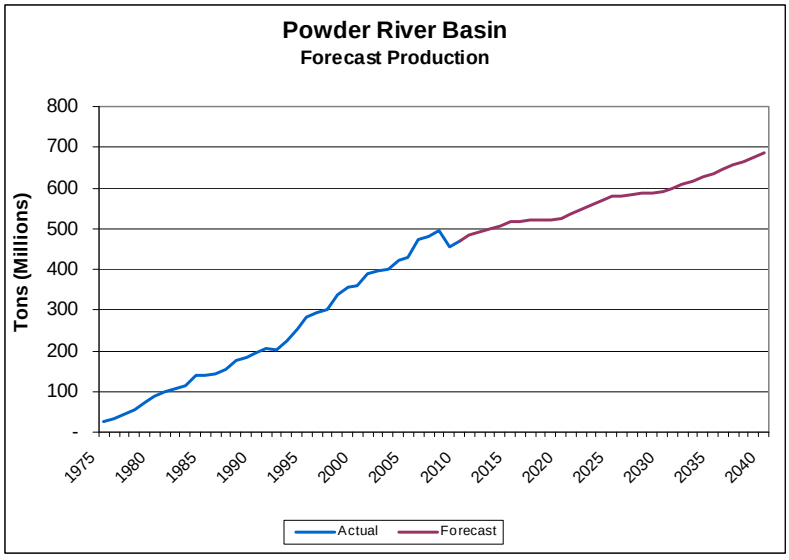
BOYD has developed a forecast of PRB coal demand in conjunction with electrical industry expert R. W. Beck Inc. (a unit of SAIC) for BOYD's annual multiclient market study entitled – "US CoalVision 2011". That demand forecast relies upon a market model for steam coal use in U.S. electric power generation. In the market model, coal supply choices are handled principally (but not entirely) on the basis of estimated busbar costs for each economically and technically feasible coal product on a unit-specific basis. Transportation costs from each U.S. coal supply region are used in consideration of the coal choice for each coal-fired unit.

In addition to the PRB share of the U.S. electric generation market, the model incorporates anticipated tonnages moving to export markets, and for potential coal-to-liquid (CTL) projects. Tonnage consumed by CTL development does not generally affect markets as those projects tend to be isolated and draw coal from new, dedicated sources, not established open market mines. Forecast export tonnages are uncertain due to both economics, and the lack of port facilities for such exports. Generally, while exports will be a factor in PRB markets, the tonnage is not expected to be large in the context of total PRB production.

Based on this modeling, BOYD projects PRB coal demand to continue to increase over the timeframe of this study albeit at a slower rate than experienced historically, to around 685 million tons per year in 2040, as summarized below:

Year	Annual Coal Production (Million tons)
2011	485.0
2015	516.8
2020	524.4
2025	579.2
2030	590.7
2035	636.4
2040	685.5

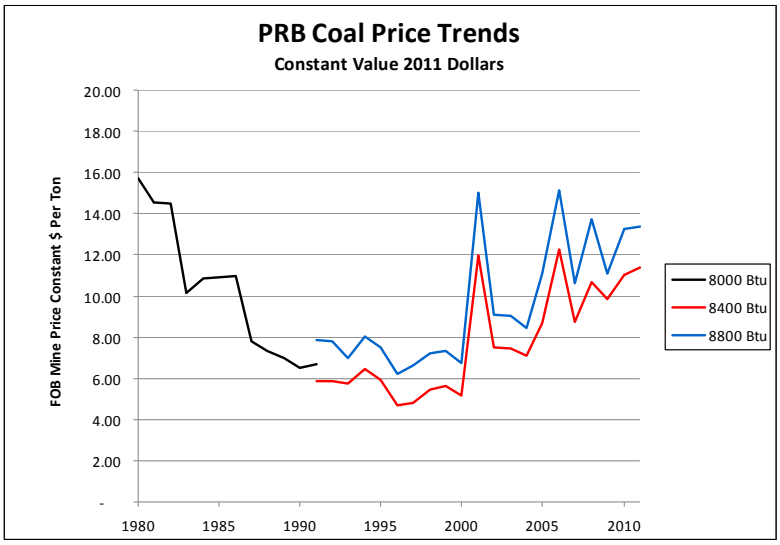
This forecast is illustrated graphically below and compared to historic production.



5.4 PRB Coal Prices

PRB coal prices are fundamentally driven by coal production cost. Market imbalances which might potentially lead to higher prices – such as a sharp increase in demand or a production shortfall – have been rare. There are occasions when PRB coal prices have "spiked" for a short period of time or a particular quality of coal. This is usually due to a brief disruption in coal supply – e.g., railroad problems, pit flooding, extreme weather events (snow) or market factors (demand for "ultra-low" sulfur coal). Oftentimes these events are so short lived that there is little or no impact on overall coal prices. PRB coal production capacity has generally expanded in step with power plant fuel needs so that coal supply and demand are typically in balance, and over the longer term coal sales price trends reasonably closely with coal production cost.

Since initial mine development in the 1970s, various parties have tracked coal market price trends [4]. The chart below reflects the indicative prices published by Coal Outlook, a daily/weekly coal market newsletter. In the early years, price was reported for a generic PRB coal, generally being the lower Btu/Lb material mined in the immediate Gillette area. As new, higher quality mines developed to the south and along the Joint Line, Coal Outlook began differentiating between the higher 8,800 Btu/Lb and lower 8,400 Btu/Lb products. The long term price trend, expressed in constant value 2011 dollars is illustrated below:



[4] For purposes of this report "market prices" are defined as the price that would be negotiated, at the relevant time, between a knowledgeable buyer and reliable seller for coal in substantial volumes to be delivered over a multi-year future period. As used herein "price" is not necessarily the same as a spot price, a forward market price, or prices that would reflect a distressed situation on the part of either buyer or seller.

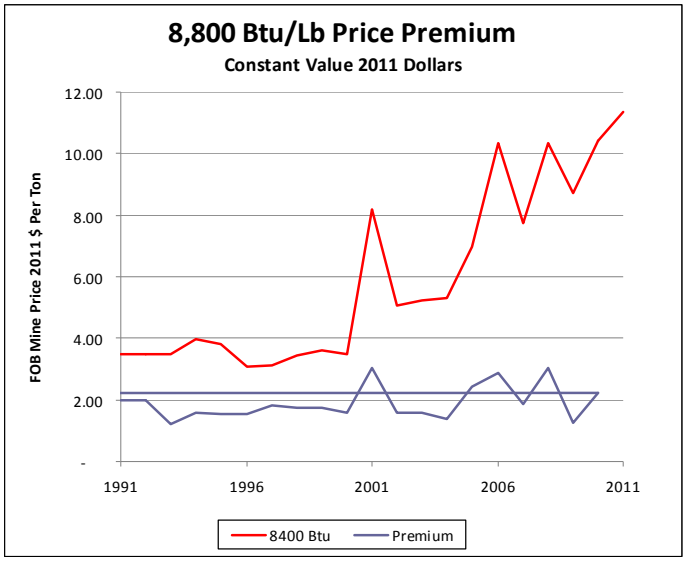
As shown, prices decreased significantly as new mines came on-line or expanded in the late 1980s and 1990s. FOB mine prices remained in the ± $6/ton range ($3 to $4/ton in nominal dollars) throughout the 1990s. During this period, increases in underlying cost drivers, including stripping ratio and haul distance, were largely offset by improvements in technology and economies of scale. Since that time coal prices have increased as the cost of diesel fuel, labor, explosives, machine parts and other consumables have increased, and as the mines have advanced westward into areas of deeper overburden with longer haul distances. This has forced an underlying increase in prices, which coupled with two price “spikes” in 2001 and 2008, have increased prices into the $11 to $14/ton range depending on quality.

Over the 1990 – 2010 period, real prices for PRB coal increased at approximately a 3% rate. However, since 2000 that growth rate has approached 7%. This growth has significantly increased the FOB mine cost of PRB coal, but has not significantly limited demand. This is understandable in the context of the coal market as a whole and as related to delivered cost to the customer. For instance, the PRB price remains very low compared to eastern U.S. compliance coal (12,000 Btu/Lb and <1% sulfur) which is presently selling for $75/ton with prices projected to trend higher.

Transportation costs are also an important consideration in evaluating PRB markets. Because of its low cost at the mine, PRB can be transported relatively large distances and still be competitive with other fuel sources at the destination. A typical delivered cost for PRB coal might total $32/ton, with $12 of that being FOB mine cost, and $20 being transportation cost. In that case, an increase in FOB mine price of, say 10%, results in only a 4% increase in the cost to the customer. A 10% increase in the FOB mine price of the eastern U.S. compliance coal noted above, and assuming a $5/ton transportation cost, would result in a 9% increase in cost to the customer.

As shown on the PRB coal price trend chart above, the higher quality 8,800 Btu/Lb PRB coal commands a disproportionate (relative to Btu content) premium over the lesser quality 8,400 Btu material. Historically, this premium has averaged about $1.90/ton, and generally varied between about $1.50 and $2.40/ton (in 2011 dollars). In times of high demand and higher prices, this premium has tended to increase, while in times of lesser demand and lower prices, the premium has decreased.

This relationship is illustrated on the nearby chart.



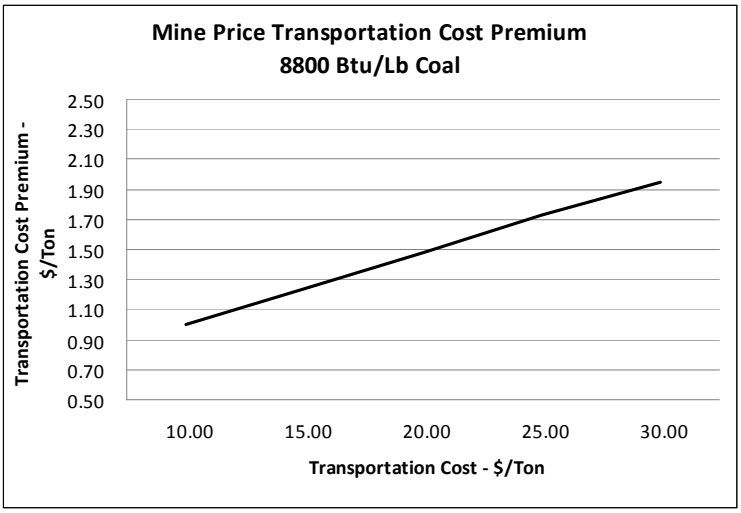
Currently the price premium for the 8,800 Btu/Lb coal is unusually high at about $2.70/ton, a premium that has been exceeded only during the 2001 and 2008 “spikes”. Although the premium for 8,800 Btu/Lb coal is relatively high at the current time, we believe that over the longer term of this study, the premium will return to more typical levels in the $2.00/ton range.

The price premium on the higher quality coal is the result of a number of factors, the most important of which is transportation cost – fewer tons of 8,800 Btu/Lb coal must be hauled via railroad to provide the same total Btus at the power plant – thus, delivered cost for the 8,400 Btu product will be higher on a Btu basis. This is illustrated below, for a typical haul costing $20/ton.

	Product	
	8,400 Btu/Lb	8,800 Btu/Lb
Volume		
Tons per year (000)	4,000	3,818
Btu/Lb	8,400	8,800
Btu/Ton (Millions)	16.8	17.6
FOB Mine Price ($/Ton)	11.00	12.48
Transportation Cost ($/Ton)	20.00	20.00
Delivered Cost ($/Ton)	31.00	32.48
Delivered Cost per mmBtu	1.85	1.85
Fuel Cost per Year ($-000)	124,000	124,000

As shown, the customer could theoretically pay a $1.48/ton premium ($12.48/ton for 8,800 Btu/Lb coal vs. $11.00/ton for 8,400 Btu/Lb) for the 8,800 Btu/Lb product without increasing the total delivered fuel cost.

The transportation distance and cost relationships tend to bifurcate the market for PRB coal. The greater the distance the coal is transported, the greater the transportation cost, and thus the larger the premium for the higher Btu coal. This is illustrated on the nearby graph which shows the premium that would provide the 8,800 Btu product at the same delivered cost as the 8,400 Btu product at various transportation costs. As shown, the premium ranges from about $0.90/ton at a $10 transportation cost to over $1.90/ton at a $30/ton transportation cost. In this situation, a consumer that is located fairly near the PRB will tend to purchase the lower price 8,400 Btu/Lb product, while consumers that are located at significant distances will favor the higher Btu product. Those consumers in the mid-range are positioned to take advantage of whichever product can be purchased and delivered most cheaply.



While transportation cost is the most important single factor, there are other considerations that, depending on the customer, affect the 8,800 Btu/Lb coal premium. These include:

- The higher Btu PRB coals may also have lower sulfur content, particularly on a Lbs of SO2 per mmBtu basis.
- Some power plant boilers were designed to burn higher Btu coal. Burning lower Btu coal may lead to de-rates of unit capacity.
- Burning the lower Btu coal requires approximately 5% more material be dumped, stockpiled and crushed at the plant. This increases cost and may reduce capacity.

While the higher Btu PRB coal is generally perceived as the more important in terms of pricing (because it is the preferable product in most cases), we believe that over the long term, prices will be influenced more by the 8,400 Btu/Lb product because those

resources are more plentiful and the competition in that segment is more robust. The PRB coal price projections developed in this chapter are therefore based on the production cost of 8,400 Btu/Lb coal more than the 8,800 Btu product. The producers of the higher Btu coal will be able to price their product at a level equivalent to the cost of the lower Btu material plus a premium for so long as the cost of the higher product remains below that (price + premium) level. Should production costs at the higher Btu mines increase beyond that level, then the price of the higher Btu coal will be forced upwards. However, as discussed in the previous chapter, we do not project this to occur within the timeframe of this study.

This report also addresses a pricing scenario for the Montana mines. As mentioned, there are four operating mines in the Montana PRB, one of which (Decker) will close in the near future. Of the other three mines, one (Spring Creek) competes in essentially the same markets as the high Btu Wyoming mines, and thus would expect to realize that price with appropriate adjustments for higher energy content and higher sodium. The other two mines, Rosebud and Absaloka, are both owned by Westmoreland Coal Company. At this time Rosebud is essentially dedicated to the mine mouth Colstrip Generating Station. Absaloka is an open market mine generally serving customers in the upper Midwest. Absaloka competes in that market against the Wyoming PRB mines, and therefore the delivered cost of coal to/from those mines will be the key factor in setting market prices for Absaloka, as well as for other potential mine developments in Montana. For this reason, we have focused on the 8,600 Btu/Lb Absaloka coal as the benchmark Montana coal product.

5.5 PRB Supply Forecast

BOYD's analysis of PRB coal supply indicates that over the study period, demand will primarily be met from existing mines which will expand production capacity as demand gradually increases. New mines will be developed when they can compete economically with the existing mines and when transportation infrastructure is extended into more remote parts of the PRB. However, new mines will not be a major factor in terms of markets or prices.

To develop projections of costs and supply, the production level of each PRB mine was projected based on our analysis of geology, resources and production capability for each such that the cumulative production of all mines met the annual projected coal demand. This process of setting the individual mine production levels was repeated for each year over the 2011 through 2040 timeframe.

Production increases were generally forecast from the lower cost mines and/or those with adequate resource availability. Production from higher cost mines was held constant or decreased as would be expected in a competitive market. The forecasts vary from this general principle in certain cases where site specific circumstances would influence production, including:

- Wyodak Mine – is a captive fuel supply to the Wyodak and Wygen power plants and is generally independent from the PRB coal market. Although the mine is relatively low cost, we consider it unlikely that the mine would sell significant tonnages into any other markets.
- Dry Fork Mine – has a limited coal resource base and focuses on supplying Western Fuels Association members. Coal resources for Dry Fork deplete around 2030, and we would not expect outside sales in that period.
- Coal Creek – has a limited coal resource base and would not be able to supply over the longer term.

Similarly, the forecast assumes certain higher cost mines will maintain current production levels for specific reasons, including:

- Rosebud Mine – is more or less captive to the Colstrip power plant and generally independent from the PRB coal market.
- Decker Mine – is nearly depleted. Although near term closure of this mine had been announced, we consider it more likely the mine will continue at a relatively low production level for some period. The forecast assumes Decker operates through 2014 and then is phased out. Decker would not have a material influence on markets in any event.

New mines were added to the projection to meet the demand increases in the following years:

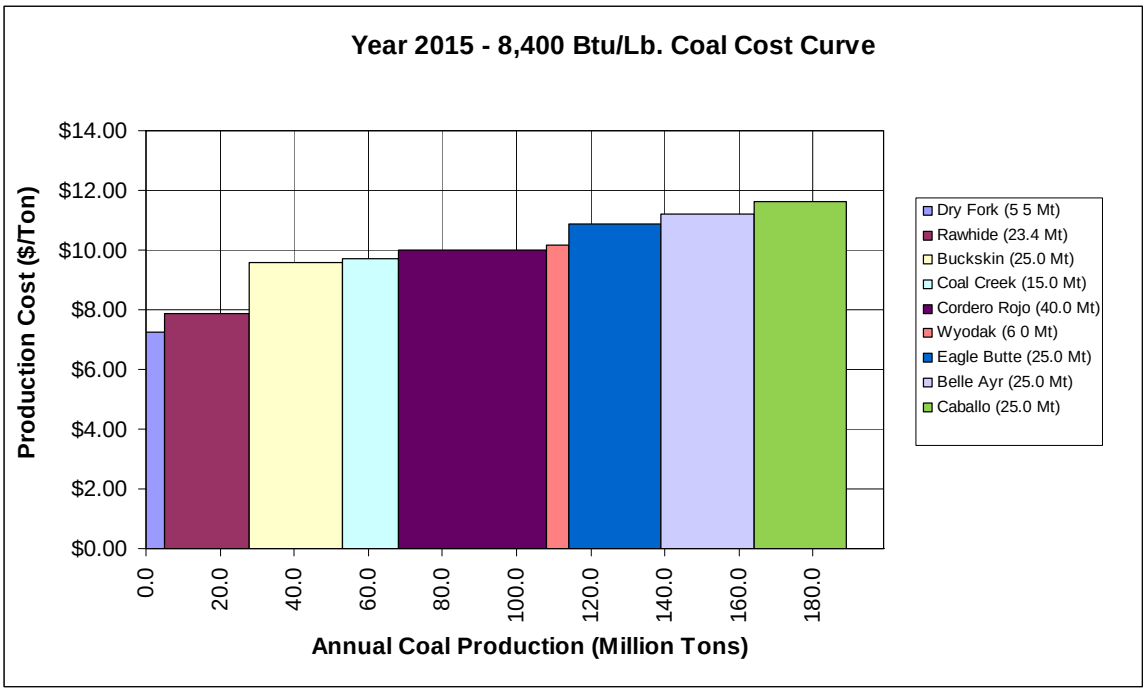
- 2013 – School Creek Mine
- 2018 – Otter Creek Mine
- 2020 – Youngs Creek Mine
- 2029 – Unidentified MT Mine
- 2034 – Unidentified WY Mine

The mines shown as “unidentified” could be any one (or more) of several prospects that may be developed in the future (as discussed in Chapter 4). The combined annual production capacity of these new mines in 2040 is just under 140 million tons.

5.6 PRB Coal Price Forecasts

Based on the supply/demand balance and resulting production schedule, a 30-year production forecast is developed for each of the PRB mines. Those forecasts are one of the inputs into BOYD's mine cost model used to develop estimates of production cost trends for each mine over the forecast period. The resulting information can then be plotted in the form of production vs. cost curves for the three product types: 1) 8,400 Btu/Lb coal, 2) 8,800 Btu/Lb coal, and 3) Montana PRB coal. We developed production vs. cost curves at 5-year intervals as a basis to project PRB coal prices.

A typical curve, with costs expressed in constant value 2011 dollars, is illustrated below:



The coal sales price is estimated as the production cost of the marginal increment of production required to meet the coal demand. That marginal increment is essentially the highest cost mine that supplies coal against the required demand.

The primary driver of PRB prices, as discussed above, has historically been 8,400 Btu/Lb product. In the price forecast, the marginal production cost of the 8,400 Btu/Lb product is used as a baseline for developing projections of price for the three primary PRB products.

As discussed above, the 8,800 Btu/Lb Gillette Field coal carries a price premium that is related to transportation cost advantages, quality (sulfur) differentials, and operating

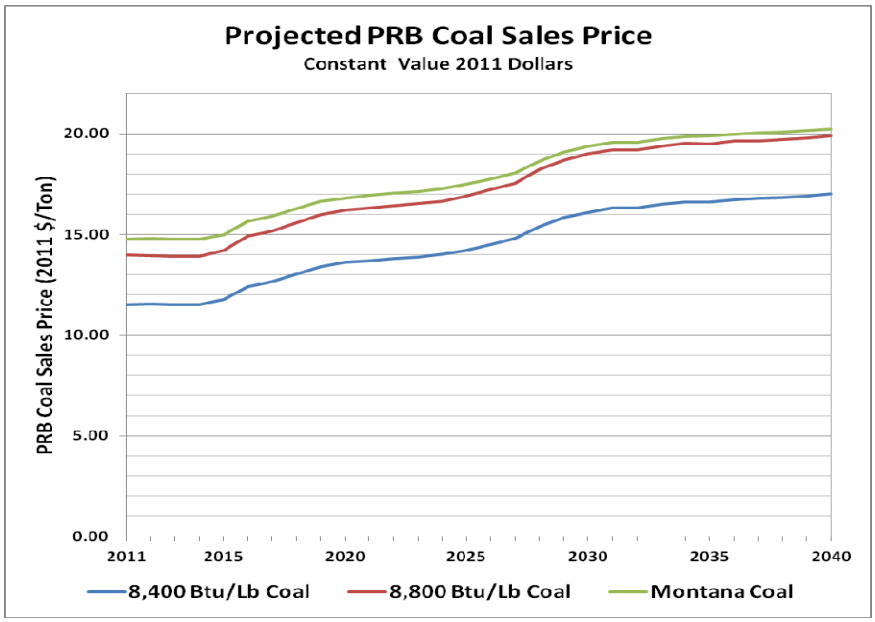
concerns at the power plant. The forecast price of 8,800 Btu/Lb coal developed herein is based on the 8,400 Btu/Lb price plus the premium, with that premium modeled as a combination of fixed and variable (proportional to total price) components.

Montana market prices are difficult to quantify and project due to the limited number of mines, and portion of production that is essentially captive. The Montana coals can be broadly grouped into two market related categories:

- 9,300 Btu/Lb coal from mines in the Decker, MT and Sheridan, WY area. These coals generally compete in the same markets as the Gillette area coals, however, they carry a premium due to higher thermal content and sometimes a penalty due to sodium content.
- 8,600 Btu/Lb coal from mines in the Colstrip and Ashland areas along the northern border of the PRB. Westmoreland Coal Company's Absaloka Mine is the only truly open market mine in this region at this time, but Arch Coal's planned Otter Creek operation could be a significant source eventually.

As the price benchmark for Montana coal, we have focused primarily on the Colstrip and Ashland sources or potential sources. These coals would compete with Gillette area coals into upper Midwest markets, and possibly into export markets. Mines in this area have a transportation advantage in the upper Midwest markets vs. Gillette area mines which we estimate to be in the $3.00 to $4.00/ton range. The coals may however, be penalized in those and other markets due to the high sodium content in ash. Overall, we estimate the transportation benefit and quality penalties to equate to an approximate $3.30/ton premium over the Gillette area 8,400 Btu/Lb sales price. That premium with minor adjustments has been incorporated into forecast Montana PRB coal sales prices.

BOYD's price projection for the three PRB coal products is shown on the following graph (FOB mine price expressed in constant value 2011 dollars):



The projected coal sales prices, FOB rail at the mine, for the three coal products are summarized at five-year intervals in the table below:

	Projected Coal Sales Price (2011 $/Ton)		
Year	8,400 Btu/Lb	8,800 Btu/Lb	Montana
2011	11.50	14.00	14.75
2015	11.75	14.20	15.00
2020	13.60	16.20	16.80
2025	14.20	16.90	17.50
2030	15.80	17.80	18.80
2035	16.60	19.00	19.40
2040	17.50	19.50	19.90

As shown, we project a relatively steady increase in prices throughout the forecast period. That increase which equates to 1% to 2% per year is significantly less than the historic trends over the past decade. We consider this result reasonable over the long term given the large overall production volume, the relatively flat cost curves, and the competitive nature of the business. This forecast is considered inherently conservative (high) since no major technological or operational advancements are incorporated. While we would expect such improvements to be modest, historically, PRB producers have been able to partially offset less favorable geologic conditions with such improved technology, thus limiting price increases.

We would note that the forecast is intended as a long term projection – there will almost certainly be variations from the forecast due to shorter term factors that could significantly impact prices. Overall however, our evaluation of future mine costs and projection of long term price trends indicates that while prices for PRB coal will increase in real terms, that increase will not be at the pace of the past decade, and buyers will probably not experience large increases due to resource shortages within the timeframe of this study.

K:\Projects\3155.001 Xcel Energy - PRB Resource & Cost Study\GBG\Final Report\Chapters\Chapter 5 - PRB Price Projection.doc

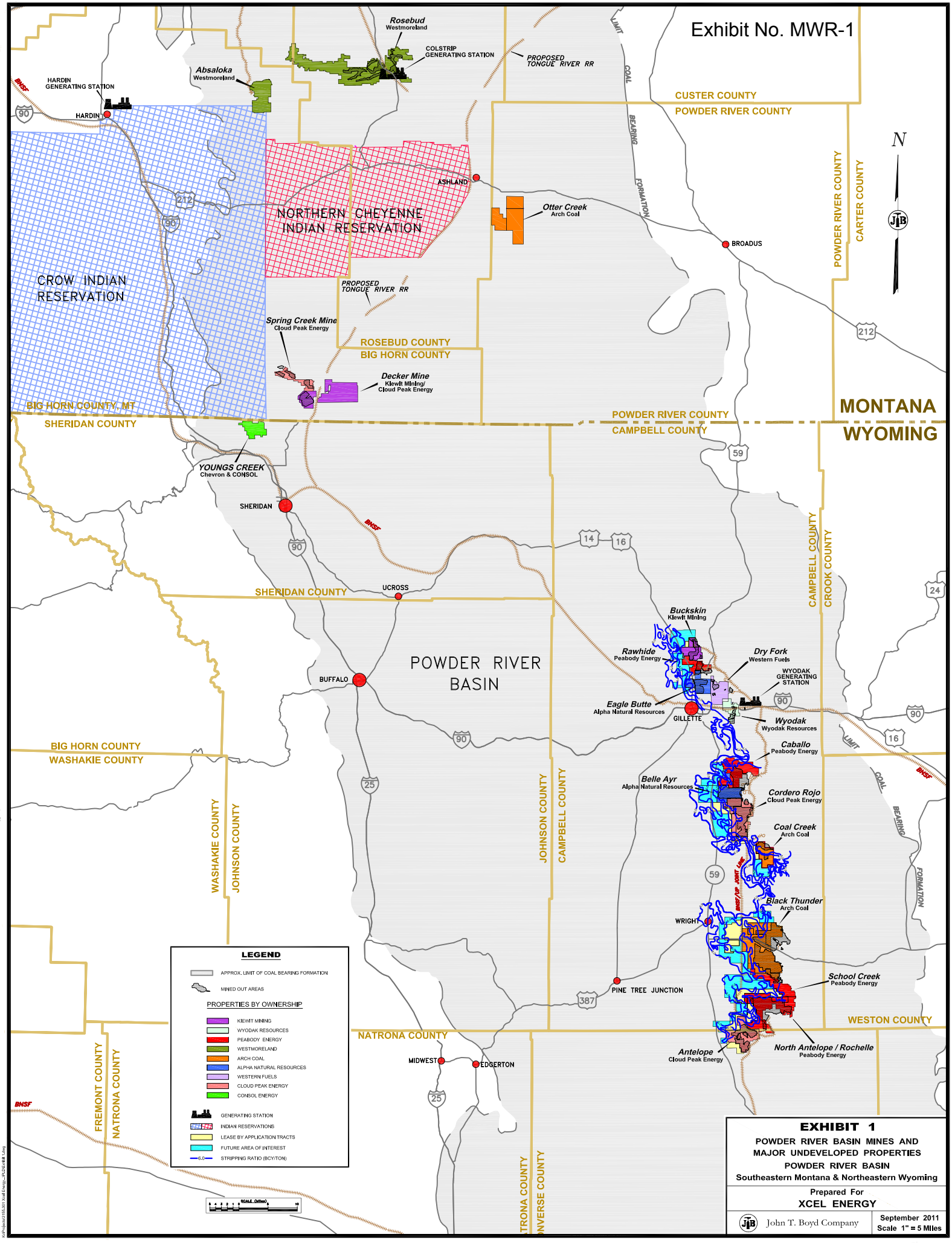


Exhibit No. MWR-1
Rosebud
Westmoreland
COLSTRIP GENERATING STATION
PROPOSED TONGUE RIVER RR
Absaloka
Westmoreland
HARDIN GENERATING STATION
HARDIN
BNSF
90
212
CUSTER COUNTY
POWDER RIVER COUNTY
COAL BEARING FORMATION LIMIT
ASHLAND
NORTHERN CHEYENNE INDIAN RESERVATION
Otter Creek
Arch Coal
BROADUS
POWDER RIVER COUNTY
CARTER COUNTY
N
CROW INDIAN RESERVATION
PROPOSED TONGUE RIVER RR
Spring Creek Mine
Cloud Peak Energy
ROSEBUD COUNTY
BIG HORN COUNTY
Decker Mine
Kiewit Mining/
Cloud Peak Energy
BIG HORN COUNTY, MT
SHERIDAN COUNTY
POWDER RIVER COUNTY
CAMPBELL COUNTY
MONTANA
WYOMING
59
YOUNGS CREEK
Chevron & CONSOL
SHERIDAN
BNSF
90
14
16
SHERIDAN COUNTY
UCROSS
CAMPBELL COUNTY
CROOK COUNTY
24
Buckskin
Kiewit Mining
Rawhide
Peabody Energy
Dry Fork
Western Fuels
WYODAK GENERATING STATION
POWDER RIVER BASIN
BUFFALO
Eagle Butte
Alpha Natural Resources
GILLETTE
Wyodak
Wyodak Resources
Caballo
Peabody Energy
BIG HORN COUNTY
WASHAKIE COUNTY
Belle Ayr
Alpha Natural Resources
Cordero Rojo
Cloud Peak Energy
Coal Creek
Arch Coal
WASHAKIE COUNTY
JOHNSON COUNTY
JOHNSON COUNTY
CAMPBELL COUNTY
25
59
BNSF/UP JOINT LINE
Black Thunder
Arch Coal
WRIGHT
School Creek
Peabody Energy
PINE TREE JUNCTION
387
WESTON COUNTY
NATRONA COUNTY
MIDWEST
EDGERTON
Antelope
Cloud Peak Energy
North Antelope / Rochelle
Peabody Energy
FREMONT COUNTY
NATRONA COUNTY
BNSF
LEGEND
APPROX. LIMIT OF COAL BEARING FORMATION
MINED OUT AREAS
PROPERTIES BY OWNERSHIP
KIEWIT MINING
WYODAK RESOURCES
PEABODY ENERGY
WESTMORELAND
ARCH COAL
ALPHA NATURAL RESOURCES
WESTERN FUELS
CLOUD PEAK ENERGY
CONSOL ENERGY
GENERATING STATION
INDIAN RESERVATIONS
LEASE BY APPLICATION TRACTS
FUTURE AREA OF INTEREST
STRIPPING RATIO (BCY/TON)
SCALE (Miles)
TRONA COUNTY
INVERSE COUNTY
EXHIBIT 1
POWDER RIVER BASIN MINES AND MAJOR UNDEVELOPED PROPERTIES
POWDER RIVER BASIN
Southeastern Montana & Northeastern Wyoming
Prepared For
XCEL ENERGY
John T. Boyd Company
September 2011
Scale 1" = 5 Miles

Appendix E

EXHIBIT NO. ___(MLJ-1CT)
DOCKET NO. UE-07___/UG-07___
2007 PSE GENERAL RATE CASE
WITNESS: MICHAEL L. JONES

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.,** **Respondent.**	**Docket No. UE-07____** **Docket No. UG-07____**

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF MICHAEL L. JONES ON BEHALF OF PUGET SOUND ENERGY, INC.

Revised Redacted
October 14, 2011

DECEMBER 3, 2007

PUGET SOUND ENERGY, INC.

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF MICHAEL L. JONES

CONTENTS

PUGET SOUND ENERGY, INC.

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF MICHAEL L. JONES

I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy, Inc.

A. My name is Michael L. Jones. My business address is 10885 N.E. Fourth Street, Bellevue, WA 98004. I am Manager, Colstrip Project Operations & Fuels for Puget Sound Energy, Inc. ("PSE" or the "Company").

Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?

A. Yes, I have. It is Exhibit No. ___(MLJ-2).

Q. What are your duties as Manager, Colstrip Project Operations & Fuels for PSE?

A. I am responsible for the management of PSE's ownership and contract interests in the four-unit Colstrip Steam Electric Station in Colstrip, Montana. My responsibilities include oversight of plant operations, environmental issues, budget performance and the Colstrip Steam Electric Station's fuel supply contracts. Additionally, I am actively involved in PSE's generating resource

development and acquisition efforts, focusing on solid fuel technologies.

Q. Please summarize the purpose of your prefiled direct testimony.

A. My prefiled direct testimony provides background regarding the Colstrip Steam Electric Station in Colstrip, Montana. It describes PSE's due diligence activities, consideration of alternative supply options, and negotiations for an additional supply of coal for Colstrip Steam Electric Station Units 1 and 2. Finally, my testimony explains the current capacity levels of the four Colstrip Steam Electric Station units and the scheduling of major plant maintenance overhauls.

II. BACKGROUND REGARDING THE COLSTRIP STEAM ELECTRIC STATION

Q. What is the Colstrip Steam Electric Station?

A. The Colstrip Steam Electric Station is a four-unit, mine mouth, coal-fired electricity-generating facility operated by PPL Montana, LLC ("PPL") in Colstrip, Montana, about 120 miles southeast of Billings. The Colstrip Steam Electric Station is capable of producing a total of up to 2,094 megawatts of electricity. Units 1 and 2 each has about 307 megawatts of generating capacity and began commercial operation in 1975 and 1976, respectively. Units 3 and 4 each currently has about 740 megawatts of generating capacity and began commercial operation in 1984 and 1986, respectively.

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Q. What is PSE's interest in the Colstrip Steam Electric Station?

A. PSE owns a 50% undivided interest in Units 1 and 2, and a 25% undivided interest in Units 3 and 4. PSE receives additional energy from Unit 4 pursuant to a purchased power contract between PSE and NorthWestern Energy that expires at the end of 2010. In total, the Colstrip Steam Electric Station provides approximately 20% of the Company's overall energy needs.

III. COLSTRIP UNITS 1 AND 2 COAL PURCHASE AND SALE AGREEMENT

Q. What is the current coal supply arrangement for Units 1 and 2?

A. PSE and the Montana Power Company ("Montana Power") built Units 1 and 2 in the 1970s to burn coal from the nearby Rosebud Mine, which was owned and operated by Western Energy Company ("Western Energy").[1] Western Energy delivers coal from the Rosebud Mine to Units 1 and 2 by off-road truck. The Rosebud Mine has been supplying the full coal requirements of Units 1 and 2 since the units were commissioned in 1975 and 1976 under a contract that will expire on December 31, 2009. The Rosebud mine contains five permitted mining areas: Areas A, B, C, D and E. Area D, northeast of the power plant, currently supplies coal to Units 1 and 2.

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[1] Montana Power sold its interests in Units 1 and 2 to PPL-Montana ("PPL") in 1999, and Western Energy was sold to Westmoreland Coal Company ("Westmoreland Coal") in 2001.

A. Identification of Alternatives

Q. When did PSE and PPL begin evaluating replacement alternatives for the current coal supply arrangement?

A. PSE and PPL established a Coal Supply Task Team ("Task Force") and an executive Steering Committee in early 2004 to identify and evaluate coal supply opportunities and negotiate new coal supply arrangements. The goal of the Task Force was to (i) examine alternative sources of coal supply and (ii) select the coal supply source, or sources, that would provide a secure source of supply of quality coal at a low delivered cost. The purpose of the executive Steering Committee was to support and guide the Task Force in this effort.

Q. What criteria did the Task Force identify for evaluating potential coal supply sources?

A. The Task Force identified the following criteria for the evaluation of potential coal supply sources:

- Adequate coal reserves to support a contract term of at least ten years.
- A low present value delivered cost, including but not limited to commodity costs, delivery costs, and owner and supplier capital cost recovery.
- The quality of coal used must be such that it will not cause a derating to Units 1 and 2.
- The quality of coal used in Units 1 and 2 must be such that it does not require plant modifications that could trigger the New Source Review provisions of the Clean Air Act.

- Any additions or modifications to the generating facilities necessary to support the coal supply source must fit within the plant's existing site limitations.

- Any coal supply source must be confirmed by independent mining consultants with respect to mining cost, capital costs and quantity and quality of the reserves.

Q. How did the Task Force seek to identify and evaluate coal supply opportunities and negotiate new coal supply arrangements?

A. The Task Force hired two mining engineering consultants to assist in its initial identification of potential coal supply sources. The John T. Boyd Company (the "Boyd Company") compiled and summarized current information on active and potential coal mine sites in the Powder River Basin of Montana and Wyoming. Please see Exhibit No. ___(MLJ-3C) for a copy of the Boyd Company report.

Concurrent with the commissioning of the Boyd Company report, the Task Force also retained Marston & Marston, Inc. ("Marston"), a mining and engineering firm that has monitored mining activities at the Rosebud Mine for PSE and PPL for a number of years, to (i) evaluate mining plans that utilize mining combinations in Areas B, C, and D of the Rosebud Mine, (ii) prepare an analysis of the quantity and quality of reserves at the Rosebud Mine, and (iii) provide an estimate of the costs of mining to supply Units 1 and 2 after expiration of the current contract. Marston's initial report is Exhibit No. ___(MLJ-4C).

Next, the Task Force contacted [redacted] to determine its interest and ability to further develop [redacted]

[redacted] The Task Force contacted [redacted] because of the [redacted] and the potential for [redacted] to deliver coal to Units 1 and 2 by truck.

B. Development of Fuel Quality Guidelines

Q. Did the Task Force develop fuel quality guidelines and perform boiler modeling for the range of qualities of Powder River Basin coal?

A. Yes. Alstom Power Inc. ("Alstom")[2] developed fuel quality guidelines and performed boiler modeling for Units 1 and 2 for a range of coal qualities found in the Powder River Basin.

Q. Could you please provide examples of the design and operating characteristics of Units 1 and 2?

A. Yes. The boilers in Units 1 and 2 were originally designed to operate on the quality of coal found in the Rosebud Mine. The boiler furnace cross-sections and overall furnace volumes of Units 1 and 2 were minimized to lower their cost--consistent with industry practices in the 1970s when the units were built.

Operating experience has shown that the boilers in Units 1 and 2 are quite

[2] The boilers for Units 1 and 2 were designed and supplied by Combustion Engineering, Inc., now the Performance Products Group of Alstom and Alstom continues to support boiler operations, maintenance and capital projects associated with Units 1 and 2.

sensitive to coal heat content, ash fusion temperature, ash content, and the sodium content of the ash. Units 1 and 2 have scrubbers for post-combustion removal of SO_2, and the calcium level and alkalinity of the ash affects such scrubber performance. The calcium level and alkalinity of the ash also affect the amount, if any, of lime that must be added to meet emission limits.

Coal from [redacted] contains much less sodium than other Powder River coals, and operating experience has shown the boilers to be especially sensitive to sodium content over 1%. Sodium levels above 1% cause plugging and fouling of the boiler economizers and require frequent outages for cleaning and removal of the plugging. Given these unique design and operating characteristics, the coal supply for Units 1 and 2 must fall within a certain range of qualities.

C. Development of a Short List of Potential Suppliers

Q. Did the Task Force create a short list of potential coal suppliers from the various reports prepared by the Boyd Company, Marston and Alstom?

A. Yes. Based on the reports prepared by the Boyd Company, Marston and Alstom, the Task Force began detailed discussions with Western Energy and [redacted]. The Task force also contacted the Burlington Northern Santa Fe Corporation ("BNSF Railway"). The BNSF Railway's interest, ability and cost to deliver coal from the many other Powder River Basin coal suppliers would be a an essential element of our analysis.

Q. Did the Task Force retain other consultants to provide assistance with the due diligence process?

A. Yes, the Task Force retained Roberts & Schaefer Company ("Roberts & Schaefer"), an engineering design and construction services firm, and L. E. Peabody & Associates, Inc. ("Peabody & Associates"), an economic consulting firm, to provide projected capital and operating costs for an on-site railcar unloading facility. Such a facility would be necessary for unloading any coal supplied by rail, as no such facilities currently exist at the Colstrip plant site. Please see Exhibit No. ___(MLJ-5C) for the reports prepared by Roberts & Schaefer and Peabody & Associates. The draft version of the Roberts & Schaeffer report was used, as described below, and never finalized.

Q. Did the Task Force develop "all-in" cost projections for each supply source?

A. Yes, the responses of Western Energy, [redacted] and BNSF Railway together with cost estimates of plant modifications provided by Roberts and Schaeffer, Peabody & Associates and Alstom were used to develop "all-in" cost projections for each supply source. Such cost projections allowed the Task Force to compare costs for each option taking into account other anticipated costs that would likely affect one or more of the proposals.

Additionally, the Task Force relied on price projections for Powder River Basin coal published by Hill & Associates, Inc. ("Hill & Associates"), a consulting firm that specializes in the coal and electricity markets. The Task Force confirmed the

reasonableness of the Hill & Associates projected coal prices with [redacted], which operates several mines in the region.

PSE and PPL then each developed an economic model (each using a slightly different approach) that ranked the alternatives, and each economic model produced the same economic ranking of the projects. Please see Exhibit No. ___(MLJ-6C) for the presentation to the Steering Committee on July 6, 2005 containing the economic analysis (page 8) of the coal supply alternatives on the short list. This presentation also included a qualitative analysis (see pages 17 -19) of the coal supply alternatives.

D. PSE Management Review

Q. Did the Task Force regularly update the Coal Supply Steering Committee during the due diligence process?

A. Yes. The Task Force regularly met with the Coal Supply Steering Committee, which consisted of senior PSE and PPL executives, to share information and receive direction.

The Task Force first briefed the Coal Supply Steering Committee in a meeting on June 23, 2004. The Task Force also briefed the Coal Supply Steering Committee on November 18, 2004, June 7, 2005, and July 6, 2006.

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Revised Redacted
October 14, 2011

Q. Did the Coal Supply Steering Committee provide subsequent direction?

A. Yes, on July 6, 2005, the Coal Supply Steering Committee identified the following next steps for the Task Force to pursue:

i. Ask Marston & Marston to review the information supporting Western Energy's proposal dated April 6, 2005.

ii. Prepare a term sheet for submittal to Western Energy indicating a preference for an agreement with a term of twenty-five years.

iii. Continue discussions with BNSF Railway about its rail proposal and analyze the terms of the standard BNSF Railway rail agreement.

iv. Develop plans, schedules and cost estimates for a test burn for calendar year 2006 of 8500 Btu coal of Powder River Basin coal.

v. Develop permitting plans for (1) a test burn and (2) long-term delivery and burning of Powder River Basin coal.

vi. Begin preliminary engineering and cost estimating for rail unloading and storage facilities.

vii. Confirm property ownership and real estate issues related to permanent coal unloading and storage for coal delivered by rail.

viii. Update the Hill & Associates price forecast of Powder River Basin coal for January 1, 2010, and beyond.

Q. Did the Task Force update PSE's Energy Management Committee ("EMC") on the status of the Task Force's efforts?

A. Yes. On August 18, 2005, PSE's representatives on the Task Force provided a report to PSE's EMC of the activities performed by the Task Force to date and the direction provided by the Coal Supply Steering Committee. Please see Exhibit No. ___(MLJ-7C) for the presentation provided to the EMC. At that meeting, the

EMC supported the next steps identified by the Steering Committee on July 6, 2005.

Q. Did PSE update its Board of Directors regarding the ongoing negotiations with Western Energy?

A. Yes. At the July 2006 meeting of the Board of Directors, a presentation was made regarding the ongoing negotiations with Western Energy regarding a new coal supply agreement for Units 1 and 2. Please see Exhibit No. ___(MLJ-8C) for a copy of the presentation to the PSE Board of Directors. The Board was also updated on November 3, 2006, that an agreement with Western Energy was being finalized.

Q. Did Marston provide review of Western Energy's reserve data and projected mining costs?

A. Yes. Marston independently reviewed Western Energy's reserves data and projected mining costs and provided a report to the Task Force on October 12, 2005. Please see Exhibit No. ___(MLJ-9C) for a copy of the Western Energy report prepared by Marston. The report confirmed Western Energy's geologic model, reserve estimates, production schedules and coal quality estimates.

The report also concluded that Western Energy's projected operating costs were reasonable. The report indicated Marston's belief that Western Energy's expected profit and projected capital equipment and related depreciation costs were high.

Marston also confirmed that any shipments of coal from Western Energy to customers other than the Colstrip Electric Steam Station could have a significant impact on the future cost of coal to Units 1 and 2 because such sales would reduce the amount of mineable coal available to Units 1 and 2.

Q. Did Hill & Associates update the price forecast of Powder River Basin coal?

A. Yes, in September 2005, the Task Force obtained a price forecast for future Powder River Basin coal from Hill & Associates. Please see Exhibit No. ___(MLJ-10C) for a copy of the updated price forecast for Powder River Basin coal. This price forecast was consistent with the prior Hill & Associates price forecast that PSE and PPL used in their respective economic models.

Q. Were there any significant changes in costs for Powder River Basin Coal?

A. Yes. In late Fall 2005, Powder River Basin coal prices for deliveries in calendar year 2006 increased dramatically--from $6 to$7 per ton to over $20 per ton. In the beginning of calendar year 2006 Powder River Basin coal prices began to drop, but the prices have not yet returned to historical levels.

Q. Did the Task Force continue the design analysis of the boilers and permanent rail unloading and storage equipment?

A. Yes, based on additional engineering work by the Alstom, the estimate of the cost of boiler modifications--engineering, materials, fabrication, and installation--was

increased to $40 million per unit. These modifications would be necessary to allow use of Powder River Basin coal from mines other than the Rosebud Mine without requiring regular maintenance outages. Without these modifications to the boilers, it is estimated that Units 1 and 2 would require an additional two weeks of maintenance outage, per unit, each year for cleaning and removal of ash pluggage. At a replacement power cost of $50 per MWH, the annual cost impact of these additional maintenance outages could be over $10 million per year.

The Task Force also continued the conceptual engineering design and analysis of rail unloading and storage equipment at Units 1 and 2.

Q. Was a test burn planned and conducted?

A. The Task Force initially developed plans for a test burn of Powder River Basin coal (e.g., Wyoming 8500 Btu coal) to be conducted in the fall of 2006. On March 21, 2006, however, the decision was made to cancel the previously proposed October 2006 test burn of Powder River Basin coal at Units 1 and 2 for several reasons, including but not limited to the following:

(i) the unavailability of Powder River Basin coal for the test burn because suppliers had sold all of their 2006 delivery;

(ii) the expected incremental cost of conducting the test burn doubled from $4.5 million to over $9 million, and

(iii) a concern that a test burn could damage the boiler from fouling and pluggage and become a liability in negotiations with Western Energy.

/////

Q. Did the Task Force conduct further negotiations with BNSF Railway regarding the rate proposal?

A. No. The Task Force did not conduct further negotiations with BNSF Railway because (i) pricing of Powder River Basin coals, as discussed above, had risen significantly in Fall 2005 and (ii) Alstom's boiler modeling confirmed the sodium content of other Powder River Basin coals would cause operating problems requiring periodic outages to clean boiler and economizers.

Based on the results of the evaluation of alternatives and the report prepared by Marston the Task Force focused all of its efforts, beginning in October 2005, on negotiating a new coal supply agreement with Western Energy.

E. Negotiations with Western Energy

Q. Please describe the contract negotiations with Western Energy.

A. The Task Force commenced contract negotiations with Western Energy in the fall of 2005 with the discussion of alternative forms of agreements and the preparation of an initial term sheet by PSE and PPL.

Q. [redacted]

A. [redacted]

[redacted]

Q. Did Western Energy provide comments on the draft term sheet?

A. Yes. At a meeting on January 26, 2006, Western Energy presented its comments on the draft term-sheet. Western Energy identified numerous areas of agreement with the proposed terms but [redacted]

[redacted]

Q. Did the Task Force and Western Energy subsequently meet to discuss these five areas of negotiation?

A. Yes. Meetings were held on February 17, 2006 and March 2, 2006, to discuss the areas requiring further negotiation. On March 13, 2006, the parties reached

tentative agreement on the determination and allocation of final reclamation costs to all coal mined.

The Task Force and Western Energy next met on April 24 and 25, 2006. At that meeting, Western Energy presented a revised term sheet and an initial draft of a proposed coal supply agreement.

PSE and PPL expressed concern that [redacted]

Q. Did the Task Force update its economic analysis of the various coal supply alternatives for Units 1 and 2?

A. Yes. In August 2006, an updated economic analysis was prepared to estimate the present value cost of five possible coal supply options--one based on Powder River Basin coal delivered by rail, two Western Energy coal supply scenarios, and two hybrid scenarios with Western Energy supplying coal for three years (until Area D is exhausted) followed by supply of Powder River Basin coal by rail.

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Q. [redacted]

A. [redacted]

Q. Did the parties reach final agreement on the outstanding coal supply issues?

A. Yes. In November 2006, Western Energy offered to [redacted] Western Energy would dedicate substantially all the remaining reserves in Areas A, B and D of the Rosebud Mine to supply Units 1 and 2. [redacted]

Q. Was the final coal supply agreement finalized and executed?

A. Yes. Between November 2006 and March 2007, the parties worked to finalize the coal supply agreement and supporting exhibits. On December 21, 2006, the EMC considered a detailed summary of the expected contract provisions and approved the execution of a contract, provided there were no material changes from the summary provided to them. The final coal supply agreement was executed by the parties on March 21, 2007. Please see Exhibit No. ___(MLJ-13C) for a copy of the final coal supply agreement.

IV. CURRENT CAPACITY LEVELS OF THE COLSTRIP UNITS

Q. What are capacity limits?

A. Every generating station has limits to the output it can safely produce (i.e., the capacity limit). The design ratings of plant components, such as the boiler, turbine, generator, step-up transformer or other plant components, will limit the safe output. Additionally, the characteristics and conditions of the interconnected transmission system will limit the safe output of a generator.

Q. What are the original design ratings for Units 1 and 2?

A. The original design rating for each of Unit 1 and 2 is 333 MWe gross and 307 MWe net.

Q. What are the original design ratings for Units 3 and 4?

A. The original design rating for each of Unit 3 and 4 is 805 MWe gross and 700 MWe net. In the mid-1990s, "ruggedized" low pressure turbine sections were installed and an increase to the units' boiler firing rate was implemented to increase steam flow up to the capacity of the new turbine components. These modifications increased the design rating for each of Unit 3 and 4 to 740 MWe net.

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Q. Have recent modifications been made to these Units?

A. Yes. In October 2006, high pressure and intermediate pressure steam turbine sections were replaced on Unit 1; Unit 2 will have the same turbine upgrades completed in June 2008. The high pressure steam turbine sections of Unit 4 were replaced in June 2006, and the high pressure steam turbine sections of Unit 3 were replaced in June 2007.

Q. Will these upgrades affect the design ratings of the Colstrip Electric Steam Station units?

A. No. These upgrades are designed to increase fuel efficiency by reducing boiler firing rate and return each unit's maximum net power output to its original design ratings. The units had not been operating at their design ratings due to degradations to the units due to normal equipment aging.

Q. Do actual performance test results support the position that the turbine upgrades simply returned the units to their original design ratings?

A. The actual performance test results, conducted immediately after the new component installation, showed maximum net generation of 310 MW for Unit 1, 758 MW for Unit 3 and 728 MW for Unit 4. These results are based on a one-hour test of each unit.

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Q. If one were to assume that the turbine upgrades increased the design ratings of each unit, could the units be operated in excess of design ratings of 307 MWe net for Units 1 and 2 and 740 MWe net for Units 3 and 4?

A. No. Even if the units could be operated in excess of design ratings of 307 MWe net for Units 1 and 2 and 740 MWe net for Units 3 and 4, transmission system ratings and system conditions limit the output of the Colstrip Steam Electric Station units.

NorthWestern Energy, operator of the jointly-owned Colstrip Transmission System, which runs 200 miles from the Colstrip Electric Steam Station in eastern Montana to Townsend, Montana (in the western part of the state), has established an operating limit of 2100 MW for the combined generation output by the four units of the Colstrip Electric Steam Station. Please see Exhibit No. ___(MLJ-14) for a copy of the operating limit of 2100 MW established by NorthWestern Energy.

Based on this operating limit, the Colstrip Owners' Operating Committees have

(i) reconfirmed the unit ratings as 307 MWe for each of Units 1 and 2 and 740 MWe for each of Units 3 and 4; and

(ii) established an operating procedure that limits the combined output from Units 1 and 2 to no more than 614 MW and the combined output from Units 3 and 4 to no more than 1480 MW.

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Q. Why did the Colstrip Owners' Operating Committee establish this operating procedure?

A. The Colstrip Owners' Operating Committees established this operating procedure to ensure that the 2100 MW limit of the Colstrip Transmission System would be satisfied while maintaining flexibility to allow one unit in each pair to be operated above its design rating (if possible) when the other unit of the pair is derated or out of service. The procedure also provides if one pair of units cannot reach their aggregate limit, the other pair can make up the difference provided all safe operating limits are maintained.

V. PLANNED MAJOR MAINTENANCE OVERHAULS

Q. Please describe the scheduling of the planned major maintenance overhauls for Units 1, 2, 3 and 4.

A. Each Colstrip unit undergoes a major maintenance overhaul on a three-year cycle. These overhauls are planned well in advance, usually in the spring to coincide with spring run-off and the high availability of hydro capacity and energy, and the schedule is approved by all the Owners. The unit being overhauled is shutdown for a period of six to eight weeks while this maintenance is being performed. In calendar year 2005 Unit 2 was overhauled, Units 1 and 4 were overhauled in 2006, Unit 3 was overhauled in 2007 and Unit 2 will be overhauled in 2008. During the rate year (Spring 2009) both Units 1 and 4 will be overhauled.

VI. CONCLUSION

Q. Please summarize your testimony.

A. A thorough investigation and analyses of coal supply alternatives for Colstrip Units 1 and 2 was conducted to develop a coal supply agreement for the supply of quality coal at a low delivered cost following the termination of the current agreement. Colstrip's upgraded steam turbine components are meeting their design objectives of restoring generating capacity that has been lost through normal aging of the plant equipment. PSE management and its Board of Directors have provided review and direction in implementing both of these actions.

Q. Does that conclude your prefiled direct testimony?

A. Yes, it does.