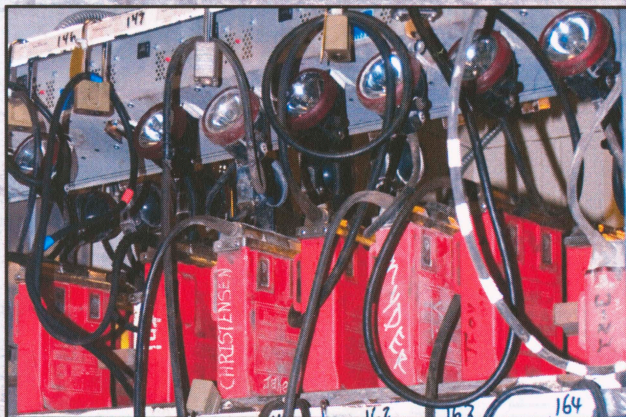


Annual Review and Forecast of  
**UTAH COAL**  
Production and Distribution - 2006

by  
*Michael D. Vanden Berg*



**CIRCULAR 103**  
**UTAH GEOLOGICAL SURVEY**  
*a division of*  
**Utah Department of Natural Resources**  
**2007**

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**Cover photographs by Michael Vanden Berg:**

Clockwise from the top:

Coal loadout at the West Ridge mine, coal pile at the Wellington Cleaning Facility, head lamps worn by coal miners.

ISBN: 1-55791-783-3



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## **PREFACE**

This report was prepared by Michael Vanden Berg under the direction of David Tabet, Energy and Minerals Program Manager, and Rick Allis, Director of the Utah Geological Survey, Utah Department of Natural Resources. Additional information about the data in this report can be obtained from Michael Vanden Berg at 801-538-5419, or email at [michaelvandenber@utah.gov](mailto:michaelvandenber@utah.gov).

Data for the annual Utah Coal Report were gathered directly from coal producers and consumers, and comparisons were made to national data, news and company reports, and industry experts.

For more information on Utah coal or other energy-related data, please refer to the "Utah Energy and Mineral Statistics" Web-based data repository located at <http://geology.utah.gov/sep/energydata>.

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## **EXECUTIVE SUMMARY**

Utah coal production in 2006 increased for the second straight year to 26.1 million short tons, 6.4% higher than 2005's production total and 20% higher than the 10-year low experienced in 2004. This year's increase was the result of renewed longwall mining at the Skyline mine and significant production increases at Aberdeen, West Ridge, and SUFCO. In addition, Utah achieved record production in the Book Cliffs coal field, record production in Carbon County, and record production on State lands. In fact, in 2007, coal production on State lands is expected to out-pace federal coal production for the first time in history. Despite this recent surge in production, many coal mine operators are experiencing increasingly difficult mining conditions, resulting in a higher ash product. To help mitigate this growing problem, two new coal-cleaning facilities have been built, Canyon Fuel's Castle Valley Coal Preparation Plant and Headwater's Wellington Cleaning Facility, both located near Price, Utah.

With more Utah coal available, distribution increased slightly to 24.8 million short tons, and out-of-state coal imports dropped to a 10-year low of 1.9 million short tons. Despite the fact that three small mines went idle in 2006 — the Pinnacle, Bear Canyon #3, and South Crandall Canyon mines—Utah coal operators hired 191 new employees for a total active mine workforce of 1994, the highest since 1997. Furthermore, the average price of Utah coal increased in 2006 by 16.4% to \$22.51 per short ton, the highest price in nominal dollars recorded in the last 20 years.

Utah's coal industry will continue to be strong in 2007, with production expected to total 26.4 million short tons, possibly increasing even further in 2008 to around 28 million short tons, which would set a new state production record. This continued increase would mostly be the result of ramped up longwall production at the Skyline mine, higher production at SUFCO and Aberdeen, as well as new longwall production at Bear Canyon. Coal-related employment in 2007 is projected to increase by 47 individuals and total 2041 employees. The average price of Utah coal is expected to increase by 4.9% to \$23.62 per short ton, the highest price in nominal dollars since 1987. Overall Utah coal distribution should increase to 26.2 million short tons, while imports, mostly Colorado coal going to the Bonanza power plant, are expected to remain steady at 2.0 million tons.

Two newly proposed coal mines are in various stages of the permitting process, the Lila Canyon mine in the southern Book Cliffs coal field in Emery County, and the Coal Hollow mine in the Alton coal field in southern Utah's Kane County. As electricity consumption continues to increase, and with 1200 MW of new Utah coal-fired electric capacity in the planning process, these new mines, along with increased productivity at existing mines, will be needed to meet consumer demands.

# Annual Review and Forecast of **UTAH COAL** Production and Distribution – 2006

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*Michael D. Vanden Berg*

## **UTAH COAL PRICES, EMPLOYMENT, AND PRODUCTION**

The U.S. Energy Information Administration (EIA) reports that U.S. coal production in 2006 increased by 2.7% to 1161.6 million short tons (table 1). This is the third straight year of increased production after significant declines from 2001–2003. This continued upward trend was the result of eight out of the top 12 coal producing states increasing their production in 2006. The Western region led the way, increasing their production by 5.9%, with Wyoming alone increasing its production by 42 million short tons. Interior states also increased their production by 1.5%, while the Appalachian region's production decreased by 1.7%.

Utah's coal production increased for the second straight year, from 24.6 million short tons in 2005 to 26.1 million tons in 2006. This increase of 6.4% ranks Utah as the 12th highest coal producing state, two higher than last year. Despite a second year of significant increases, the largest two-year increase since the mid-1980s, Utah's 2006 coal production was still 3.5% lower than the peak-year production of 27.1 million short tons recorded in 1996. Projections for 2007 indicate a much smaller 0.9% increase in coal production to 26.4 million short tons, even after three small mines—Pinnacle, South Crandall, and Bear Canyon #4—were idled in late 2006. Operator projections for 2008 are more optimistic, totaling roughly 28 million short tons, which would be more coal produced than in any previous year. While this estimate is speculative, it is not unreasonable, especially with the Bear Canyon mine expected to commence longwall operations. This figure becomes even more realistic if the proposed Lila Canyon mine begins operation in 2008.

### **Prices and Revenue**

The average Free on Board (FOB) price for Utah coal increased 16.4% in 2006 from \$19.34 per short ton in 2005 to \$22.51, the highest nominal price since 1988 and the largest single-year increase in 30 years (table 2). As recently as 2003, the average Utah coal price was at a 30-year low of \$16.64 per short ton in nominal dollars. Nearly half of all Utah mines are unable to take advantage of Utah's presently high spot price for coal, currently at about \$33.00 per short ton, because their production is mostly committed to lower-

priced contracts, thus reducing the overall average FOB mine price. The average coal price should continue to increase if demand for coal remains steady, prices for other fuels remain high, older lower-priced contracts expire, and mining becomes more difficult. However, with the recent surge in Utah coal production, many operators express concern that the price of coal is reaching a plateau rather than rising to levels originally expected. Still, the average FOB price for 2007 is projected to increase by 4.9% to \$23.62 per short ton. This price is still well below the highest inflation-adjusted price reached in 1976 of \$83.22 (table 2).

Revenues from coal produced in Utah increased substantially in 2006 because of the large increases in price and production. Revenues reached an estimated \$588 million in 2006, 24% higher than in 2005 and 52% higher than 2004. Another small increase in production and price are expected in 2007, pushing the estimated revenue up an additional 5.8% to \$623 million, the highest amount ever recorded in nominal dollars, but little more than half the highest inflation-adjusted price of \$1065 million reached in 1982.

### **Employment**

During 2006, the number of active mines remained steady at 13, but the total number of employees at these mines increased from 1803 to 1994 (table 2). The largest employment increase occurred at the Skyline mine, which after shutting down briefly in 2004, reopened in 2005, and restarted longwall mining in 2006 (table 3). Both the Tower division and the West Ridge mine added significant numbers as they ramped up production. In fact, all Utah mines, except Crandall Canyon, increased or maintained roughly the same number of employees in 2006. Active mine related employment totals are projected to increase by an additional 47 individuals in 2007 even after the idling of three mines. Employment totals could increase by another 100 to 200 people by 2009 if the proposed Lila Canyon mine starts production.

### **Coal Mining Productivity**

Production efficiency at Utah coal mines significantly increased in 2006, from 5.2 short tons of coal produced per employee per hour in 2005 to 6.3 tons per employee hour in 2006 (table 2). This increase was the result of higher long-



**Table 1.** U.S. coal production by state, 2005-2006.

Thousand short tons

2006 Rank	State	2005	2006	Percent Change
1	Wyoming	404,319	446,742	10.5%
2	West Virginia	153,650	151,874	-1.2%
3	Kentucky	119,734	120,054	0.3%
4	Pennsylvania	67,494	66,002	-2.2%
5	Texas	45,939	45,548	-0.9%
6	Montana	40,354	41,823	3.6%
7	Colorado	38,510	36,322	-5.7%
8	Indiana	34,457	35,741	3.7%
9	Illinois	32,014	32,191	0.6%
10	North Dakota	29,956	30,411	1.5%
11	Virginia	27,743	29,735	7.2%
<b>12</b>	<b>Utah</b>	<b>24,556</b>	<b>26,131</b>	<b>6.4%</b>
13	New Mexico	28,519	25,913	-9.1%
14	Ohio	24,718	22,722	-8.1%
15	Alabama	21,339	18,830	-11.8%
16	Arizona	12,072	8,216	-31.9%
17	Maryland	5,183	5,054	-2.5%
18	Louisiana	4,161	4,114	-1.1%
19	Mississippi	3,555	3,797	6.8%
20	Tennessee	3,217	2,804	-12.8%
21	Washington	5,266	2,580	-51.0%
22	Oklahoma	1,856	1,998	7.7%
23	Alaska	1,454	1,425	-2.0%
24	Kansas	171	426	149.1%
25	Missouri	598	394	-34.1%
26	Arkansas	3	23	666.7%
	Refuse Recovery	696	689	-1.0%
	Appalachian	396,666	389,834	-1.7%
	Interior	149,166	151,473	1.5%
	Western	585,006	619,563	5.9%
	East of Mississippi R.	493,104	488,804	-0.9%
	West of Mississippi R.	637,734	672,066	5.4%
	U.S. Total	1,131,534	1,161,559	2.7%

Source: U.S. Energy Information Administration, U.S. Coal Supply and Demand: 2006 Review; Utah production from UGS coal company questionnaires

**Table 2.** Utah coal industry production, employment, productivity, prices, and revenue, 1960-2007.

Year	Production	# of operators	# of mines	Employment <sup>1</sup>	Productivity	Average FOB Price		Revenue	
	Thousand short tons			# of employees	Tons/employee hour	\$/Ton (nominal dollars)	\$/Ton (real 2007 dollars)	Million \$ (nominal dollars)	Million \$ (real 2007 dollars)
1960	4,955	na	45	2,418	na	6.35	44.30	31.5	219.5
1961	5,159	na	50	2,206	na	6.03	41.65	31.1	214.8
1962	4,297	na	38	2,034	na	5.40	36.92	23.2	158.7
1963	4,359	na	36	1,596	na	5.22	35.23	22.8	153.6
1964	4,720	na	35	1,679	na	7.03	46.83	33.2	221.0
1965	4,992	na	31	1,495	na	6.37	41.76	31.8	208.5
1966	4,636	na	25	1,374	na	5.77	36.77	26.7	170.5
1967	4,174	na	24	1,238	na	5.82	35.98	24.3	150.2
1968	4,317	na	23	1,155	na	5.77	34.24	24.9	147.8
1969	4,657	na	21	1,193	na	6.31	35.50	29.4	165.3
1970	4,733	na	20	1,469	na	7.28	38.75	34.5	183.4
1971	4,626	na	22	1,430	na	7.37	37.58	34.1	173.8
1972	4,802	na	22	1,582	na	8.93	44.12	42.9	211.8
1973	5,650	na	16	1,603	na	11.19	52.04	63.2	294.0
1974	6,046	na	15	1,514	na	12.24	51.27	74.0	310.0
1975	6,937	na	20	2,550	na	19.84	76.15	137.6	528.3
1976	7,968	na	24	2,614	na	22.93	83.22	182.7	663.1
1977	8,838	na	26	2,703	na	20.32	69.24	179.6	612.0
1978	9,253	na	28	3,424	na	21.52	68.16	199.1	630.7
1979	12,096	na	25	3,656	na	22.71	64.60	274.7	781.3
1980	13,236	na	29	3,512	na	25.63	64.23	339.2	850.2
1981	13,808	16	28	4,166	1.99	26.87	61.04	371.0	842.9
1982	16,912	16	29	4,296	2.05	29.42	62.96	497.6	1,064.7
1983	11,829	15	25	2,707	2.41	28.32	58.72	335.0	694.5
1984	12,259	15	24	2,525	2.97	29.20	58.03	358.0	711.4
1985	12,831	15	22	2,563	2.73	27.69	53.14	355.3	681.9
1986	14,269	16	21	2,881	3.01	27.64	52.08	394.4	743.1
1987	16,521	16	20	2,650	3.49	25.67	46.66	424.1	770.9
1988	18,164	14	17	2,559	3.77	22.85	39.89	415.0	724.5
1989	20,517	14	20	2,471	4.03	22.01	36.65	451.6	752.0
1990	22,012	13	18	2,791	4.17	21.78	34.41	479.4	757.5
1991	21,875	11	16	2,292	4.71	21.56	32.69	471.6	715.1
1992	21,015	10	16	2,106	4.78	21.83	32.13	458.8	675.2
1993	21,723	9	15	2,161	5.36	21.17	30.25	459.9	657.2
1994	24,422	8	14	2,024	5.64	20.07	27.97	490.1	683.0
1995	25,051	7	14	1,989	6.18	19.11	25.89	478.7	648.7
1996	27,071	7	13	2,077	6.47	18.50	24.35	500.8	659.1
1997	26,428	8	16	2,091	5.51	18.34	23.60	484.7	623.6
1998	26,600	8	17	1,950	6.60	17.83	22.59	474.3	600.8
1999	26,491	8	15	1,843	5.40	17.36	21.52	459.9	570.0
2000	26,920	8	13	1,672	6.84	16.93	20.30	455.8	546.5
2001	27,024	7	13	1,564	9.42	17.76	20.71	479.9	559.6
2002	25,299	8	13	1,525	6.22	18.47	21.20	467.3	536.4
2003	23,069	9	14	1,595	5.80	16.64	18.67	383.9	430.8
2004	21,818	8	13	1,523	5.69	17.70	19.35	386.2	422.2
2005	24,556	8	13	1,803	5.15	19.34	20.45	474.9	502.2
2006	26,131	8	13	1,994	6.26	22.51	23.06	588.2	602.5
2007*	26,355	8	10	2,041	5.63	23.62	23.62	622.5	622.5

Source: UGS coal company questionnaires

<sup>1</sup>Includes only active Utah coal mines and their associated operations

\*Forecast

**Table 3.** Coal mining employment in Utah by coal mine, 2001-2007.

Number of employees

Company	Mine	County	2001	2002	2003	2004	2005	2006	2007*
UtahAmerican Energy, Inc. - Tower Division	Aberdeen/Pinnacle <sup>1</sup>	Carbon	32	116	136	134	166	219	215
Canyon Fuel, LLC - Arch Coal, Inc.	Dugout Canyon	Carbon	77	121	171	206	217	231	215
	Skyline #3	Emery/Carbon	351	234	183	38	120	185	199
	SUFCO	Sevier	273	275	291	295	303	337	370
CONSOL Energy	Emery	Emery	3	61	60	116	130	140	145
C.W. (Co-op) Mining Co.	Bear Canyon #1, #3, #4	Emery	134	138	156	45	115	121	125
Energy West Mining Co.	Deer Creek	Emery	335	331	341	354	362	358	360
	Trail Mountain	Emery	71	--	--	--	--	--	--
GENWAL Resources, Inc. - UtahAmerican Energy, Inc., Intermountain Power Agency	Crandall Canyon/ South Crandall Canyon <sup>2</sup>	Emery	124	98	73	141	197	154	64
Hidden Splendor Resources, Inc.	Horizon <sup>3</sup>	Carbon	16	29	45	45	44	60	95
Lodestar Energy, Inc.	Whisky Creek #1	Carbon	--	21	22	--	--	--	--
	White Oak #2	Carbon	48	--	--	--	--	--	--
WEST RIDGE Resources, Inc. - UtahAmerican Energy, Inc., Intermountain Power Agency	West Ridge <sup>2</sup>	Carbon	100	101	117	149	149	189	253
Total			1,564	1,525	1,595	1,523	1,803	1,994	2,041

Source: UGS coal company questionnaires

<sup>1</sup>Owned by Andalex Resources, Inc. until fall 2006<sup>2</sup>Partially owned by Andalex Resources, Inc. until fall 2006<sup>3</sup>Owned by Lodestar in 2001

\*Forecast

wall production rates at both Skyline and West Ridge. The SUFCO mine remains the state's most productive, producing 11.9 tons per employee hour, with Dugout and West Ridge in second and third with 8.8 and 7.4 tons per employee hour, respectively. Among mines with only continuous miner equipment, Emery leads the way with a productivity of 3.3 tons per employee hour. Utah's 2006 productivity is still lower than the 7.5 tons per employee hour recorded by EIA's Annual Coal Report for underground mines in western U.S. states during 2005. Mining productivity projections for 2007 suggest a decrease to 5.6 short tons per employee per hour due to increased employment but steady production rates.

On average, each employee produced 13,100 tons during 2006, down from 13,600 tons in 2005, but still higher than the 1990s' average of 11,600 tons per employee and much higher than the 1980s' average of 5300 tons per employee. Utah's most productive year was in 2001 when productivity reached 9.4 tons per employee hour and each employee produced an average of 17,300 tons.

### Production By Coal Field

Mines in the Wasatch Plateau coal field accounted for 59.4% of Utah's coal production in 2006, up slightly from 58.8% the year before (table 4; maps on figures A1, A2). The Skyline mine restarted longwall operations in May of 2006, more than tripling their 2005 production (table 5). Skyline's

significant production increase was augmented by smaller production increases at SUFCO (4.5%) and Bear Canyon (7.3%). Conversely, production at the Deer Creek mine decreased by 4.2%, production at Crandall Canyon decreased by 24.6%, and production at Horizon decreased by 11.3%. Wasatch Plateau coal production is expected to remain roughly the same in 2007, even though two small mines, Bear Canyon #3 and South Crandall, were idled in 2006. The difference will be made up by projected production increases at Skyline and Bear Canyon #4.

The Book Cliffs coal field accounted for 36.5% of total production in 2006, the second highest behind 2004's share of 38.9% (table 4). Overall production from mines in the Book Cliffs increased by 6.9% in 2006 to an all-time high of 9.5 million short tons, and production from this field is predicted to increase by an additional 2.2% in 2007. The UtahAmerican Tower Division, which operates the Aberdeen and Pinnacle mines, greatly increased its production from 1.7 million short tons in 2005 to 2.1 million tons in 2006, even with the idling of the Pinnacle mine early in the year (table 5). The West Ridge mine also increased production in 2006 by 471,000 short tons to a total of 3.1 million tons. In contrast, Canyon Fuel's Dugout mine decreased production from 4.6 million short tons in 2005 to 4.3 million tons in 2006. The Book Cliffs coal field could become an even more prominent producer in the future with the proposed opening of the Lila Canyon mine.

**Table 4. Coal production in Utah by coal field, 1982-2007.**

Thousand short tons

Year	Wasatch Plateau	Book Cliffs	Emery	Sego	Coalville	Others	Total
1870-1981	166,404	234,547	5,723	2,654	4,262	3,095	416,685
1982	12,342	3,718	852	0	0	0	16,912
1983	10,173	1,568	88	0	0	0	11,829
1984	10,266	1,993	0	0	0	0	12,259
1985	9,386	2,805	640	0	0	0	12,831
1986	10,906	2,860	503	0	0	0	14,269
1987	13,871	2,348	269	0	33	0	16,521
1988	15,218	2,363	548	0	35	0	18,164
1989	17,146	2,785	586	0	0	0	20,517
1990	18,591	3,085	336	0	0	0	22,012
1991	18,934	2,941	0	0	0	0	21,875
1992	18,631	2,384	0	0	0	0	21,015
1993	19,399	2,324	0	0	0	0	21,723
1994	22,079	2,343	0	0	0	0	24,422
1995	22,631	2,420	0	0	0	0	25,051
1996	23,616	3,455	0	0	0	0	27,071
1997	22,916	3,512	0	0	0	0	26,428
1998	22,708	3,892	0	0	0	0	26,600
1999	23,572	2,919	0	0	0	0	26,491
2000	22,967	3,953	0	0	0	0	26,920
2001	21,919	5,106	0	0	0	0	27,024
2002	19,654	5,619	26	0	0	0	25,299
2003	15,868	6,958	243	0	0	0	23,069
2004	13,082	8,479	256	0	0	0	21,818
2005	14,442	8,927	1,187	0	0	0	24,556
2006	15,532	9,545	1,054	0	0	0	26,131
2007*	15,500	9,755	1,100	0	0	0	26,355
Cumulative Production	602,253	332,849	12,311	2,654	4,330	3,095	957,492

Source: UGS coal company questionnaires

\*Forecast, 2007 numbers not included in cumulative totals

**Table 5. Coal production and recoverable reserves in Utah by coal mine, 2001-2007.**

Thousand short tons

Company	Mine	County	Coal Field	2001	2002	2003	2004	2005	2006	2007*	Estimated Recoverable Reserves Currently Under Lease
UtahAmerican Energy, Inc. - Tower Division	Aberdeen <sup>1</sup>	Carbon	Book Cliffs	531	37	444	1,984	1,519	2,103	1,800	19,300 <sup>4</sup>
	Pinnacle <sup>1</sup>	Carbon	Book Cliffs	296	662	584	419	189	8	--	
Canyon Fuel, LLC - Arch Coal, Inc.	Dugout Canyon	Carbon	Book Cliffs	1,981	2,080	2,941	3,811	4,592	4,335	4,040	33,900
	Skyline #3	Emery/Carbon	Wasatch Plateau	3,822	3,477	2,771	551	405	1,759	2,490	14,500
	SUFCO	Sevier	Wasatch Plateau	7,001	7,600	7,126	7,568	7,567	7,908	7,685	66,600
CONSOL Energy	Emery	Emery	Emery	--	26	243	256	1,187	1,054	1,100	31,300
C.W. (Co-op) Mining Co.	Bear Canyon #3	Emery	Wasatch Plateau	--	4	310	227	304	27	--	35,600 <sup>4</sup>
	Bear Canyon #4	Emery	Wasatch Plateau	--	--	--	112	151	462	600	
	Bear Canyon #1	Emery	Wasatch Plateau	1,254	953	403	--	--	--	--	
Energy West Mining Co.	Deer Creek	Emery	Wasatch Plateau	4,338	3,984	3,938	3,356	3,910	3,748	3,500	50,000
	Trail Mountain	Emery	Wasatch Plateau	924	--	--	--	--	--	--	--
GENWAL Resources, Inc. - UtahAmerican Energy, Inc., Intermountain Power Agency	Crandall Canyon <sup>2</sup>	Emery	Wasatch Plateau	3,996	3,248	1,161	872	1,593	613	625	11,300 <sup>4</sup>
	South Crandall Canyon <sup>2</sup>	Emery	Wasatch Plateau	--	--	26	103	225	759	--	
Hidden Splendor Resources, Inc.	Horizon <sup>3</sup>	Carbon	Wasatch Plateau	23	110	108	293	286	257	600	9,000
Lodestar Energy, Inc.	Whisky Creek #1	Carbon	Wasatch Plateau	--	278	25	--	--	--	--	--
	White Oak #2	Carbon	Wasatch Plateau	560	--	--	--	--	--	--	--
WEST RIDGE Resources, Inc. - UtahAmerican Energy, Inc., Intermountain Power Agency	West Ridge <sup>2</sup>	Carbon	Book Cliffs	2,298	2,840	2,989	2,265	2,627	3,098	3,915	34,300
<b>Total</b>				<b>27,024</b>	<b>25,299</b>	<b>23,069</b>	<b>21,818</b>	<b>24,556</b>	<b>26,131</b>	<b>26,355</b>	<b>305,800</b>

Source: UGS coal company questionnaires

<sup>1</sup>Owned by Andalex Resources, Inc. until fall 2006<sup>2</sup>Partially owned by Andalex Resources, Inc. until fall 2006<sup>3</sup>Owned by Lodestar in 2001<sup>4</sup>Combined total for entire operation

\*Forecast

Coal production resumed in the Emery coal field in 2002 with the reopening of the Emery mine (table 4). This mine produced 243,000 short tons in 2003 before closing again in August of that year due to contract and ownership issues. The Emery mine reopened in August of 2004, producing 256,000 short tons before the year was finished. Mining was continuous throughout 2005 and 2006, with total production equaling 1.2 and 1.1 million short tons, respectively. The Emery coal field produced 4.0% of Utah's total coal production in 2006.

The remainder of Utah's coal fields are inactive, as they have been for many years (table 4). Several fields, such as the Kaiparowits Plateau, which holds an estimated 9.1 billion tons of recoverable coal (see appendix table A5), cannot be mined because of land-use restrictions and/or the fields are too remote for economical transport to market. However, a new surface mine is being proposed in the Alton coal field in southern Utah. This mine has the potential to produce up to two million short tons of coal per year.

### Production By County

Carbon County led other counties in coal production in 2006, reaching a record-high 11.6 million short tons, 44.2% of Utah's total, up from 9.6 million tons in 2005 (table 6). Production increases at Skyline (where mining shifted to Carbon County in 2005), Tower, and West Ridge, have added significantly to Carbon County's overall total. The mines in Emery County decreased production to 6.7 million short tons in 2006, 25.5% of Utah's total, compared to producing 7.4 million tons in 2005, well below the peak annual production of 17.3 million tons produced in 1995. Emery County could see a significant resurgence in coal production if the proposed Lila Canyon mine begins operation. Sevier County's only active mine, SUFCO, increased production to 7.9 million short tons in 2006, 30.3% of Utah's total. Projections for 2007 show similar trends, with Carbon County accounting for 49% of total production, Emery County providing 22%, and Sevier County supplying 29%.

### Production By Landownership

Federal leases continued to dominate Utah's production picture as mines on U.S. Bureau of Land Management (BLM) and Forest Service land accounted for 17.5 million short tons, or 66.9%, of the state's total coal production in 2006 (table 7). However, this is much less than the 2004 federal share of 92.9%, and the federal percentage is expected to plummet to 39% in 2007. This decline is the result of many operators moving production to state leases.

Lands owned by the State of Utah supplied a record 7.0 million short tons of coal in 2006, which is more than two and a half times the 2005 production of 2.7 million tons. State lands accounted for 26.8% of total state production in 2006, up from 10.9% in 2005 and just 3.9% in 2004. This increase was the result of a full year of longwall production from Deer Creek's state-owned Mill Fork tract, as well as significant state production at Dugout Canyon, West Ridge, and Crandall Canyon. Production on State lands is expected to significantly increase again in 2007 to about 15.6 million short tons, or 59% of the state's total, as the SUFCO mine

commences longwall operations in its large State-owned leases. This will be the first year that coal production on State lands has out-paced coal produced on federal leases.

Production on private "fee" land decreased from 2.3 million short tons in 2005 to 1.7 million tons in 2006, 6.3% of Utah's total. The majority of fee coal production in 2006 came from the Emery, Tower, and Bear Canyon mines, with lesser amounts from Crandall Canyon and West Ridge. Coal produced on private land is expected to decrease to 610,000 short tons in 2007 as the Tower Division finishes mining on their private leases.

### Production By Mining Method

During 2006, seven longwall mining machines produced 20.4 million short tons of coal, accounting for 78.0% of total Utah production. In the fall of 2006, Crandall Canyon's low-profile longwall was moved to the West Ridge mine, while West Ridge's old longwall was dismantled. In addition, the SUFCO mine bought a new longwall machine, which began operation in February of 2007. Their old machine was also dismantled. The remaining 22.0% of state coal production came from 23 continuous mining machines.

The processing of waste coal piles at the closed Sunnyside and Star Point mines is not generally considered coal mining, but rather reclamation activity. Fluidized-bed combustion technology allows discarded wash plant waste and other coal refuse to be used as fuel at Utah's Sunnyside Cogeneration power plant. Annual waste coal consumption at the Sunnyside Cogeneration facility averages roughly 450,000 short tons.

### ACTIVITIES OF UTAH COAL OPERATORS

Compared to the previous year, Utah coal production rose 6.4% in 2006 to 26.1 million short tons. This rise was mainly fostered by production increases at the Skyline (334.5%), Aberdeen (38.4%), West Ridge (17.9%), Bear Canyon (7.3%), and SUFCO (4.5%) mines (table 5). The substantial increase over the last two years has eased worries of supply shortages created by the 10-year production low of 2004.

Recent record growth in Utah's coal industry will slow somewhat in 2007, but the industry should remain strong. Coal production is expected to increase slightly to 26.4 million short tons, based mostly on full-year longwall production at Skyline and significant production increases at West Ridge. Prices are expected to continue to climb and operators plan to hire an additional 47 employees. Predictions for 2008 are optimistic; operators are suggesting a statewide production total of roughly 28 million short tons, which would establish a new single-year record.

Utah coal companies report their operations are faced with the soaring costs of fuel, steel, rubber, and general labor. As the cost of mining increases, so does the cost of Utah coal, making it more difficult to compete with cheaper surfaced-mined coal from Wyoming and Colorado. Many Utah operators also report that difficult geologic conditions, such as thinner coalbeds, rock partings, and faults, are resulting in a higher-ash product. In the past, the primary method for

**Table 6. Coal production in Utah by county, 1960-2007.**

Thousand short tons

Year	Carbon	Emery	Sevier	Summit	Iron	Kane	Others	Total
1870-1959	211,028	49,166	4,046	4,012	521	45	3,608	272,426
1960	3,698	1,137	49	20	50	0	1	4,955
1961	3,916	1,124	47	20	52	0	0	5,159
1962	3,105	1,077	49	20	46	0	0	4,297
1963	3,493	752	47	18	48	1	0	4,359
1964	3,752	848	47	17	54	2	0	4,720
1965	3,779	1,101	61	13	36	2	0	4,992
1966	3,380	1,170	65	15	4	2	0	4,636
1967	2,971	1,113	72	13	3	2	0	4,174
1968	3,062	1,167	70	13	3	2	0	4,317
1969	3,367	1,200	72	12	4	2	0	4,657
1970	3,349	1,292	79	13	0	0	0	4,733
1971	3,347	1,097	158	12	0	12	0	4,626
1972	2,956	1,656	184	6	0	0	0	4,802
1973	2,866	2,445	339	0	0	0	0	5,650
1974	2,754	2,901	391	0	0	0	0	6,046
1975	2,984	3,126	827	0	0	0	0	6,937
1976	3,868	3,057	1,043	0	0	0	0	7,968
1977	4,390	3,107	1,337	0	0	0	4	8,838
1978	4,005	3,640	1,558	0	0	0	50	9,253
1979	5,292	5,147	1,657	0	0	0	0	12,096
1980	5,096	6,319	1,821	0	0	0	0	13,236
1981	6,123	5,609	2,076	0	0	0	0	13,808
1982	8,335	6,329	2,248	0	0	0	0	16,912
1983	4,194	5,404	2,231	0	0	0	0	11,829
1984	5,293	4,825	2,141	0	0	0	0	12,259
1985	6,518	4,516	1,797	0	0	0	0	12,831
1986	6,505	5,404	2,360	0	0	0	0	14,269
1987	7,495	6,765	2,228	33	0	0	0	16,521
1988	7,703	7,801	2,625	35	0	0	0	18,164
1989	8,927	8,531	3,059	0	0	0	0	20,517
1990	8,810	10,315	2,887	0	0	0	0	22,012
1991	5,816	12,980	3,079	0	0	0	0	21,875
1992	3,386	15,049	2,580	0	0	0	0	21,015
1993	2,642	15,528	3,553	0	0	0	0	21,723
1994	4,523	16,330	3,569	0	0	0	0	24,422
1995	3,801	17,344	3,906	0	0	0	0	25,051
1996	5,985	16,872	4,214	0	0	0	0	27,071
1997	6,956	14,533	4,939	0	0	0	0	26,428
1998	7,206	13,675	5,719	0	0	0	0	26,600
1999	4,514	16,214	5,763	0	0	0	0	26,491
2000	4,615	16,399	5,906	0	0	0	0	26,920
2001	5,689	14,334	7,001	0	0	0	0	27,024
2002	6,007	11,692	7,600	0	0	0	0	25,299
2003	7,091	8,852	7,126	0	0	0	0	23,069
2004	8,772	5,477	7,568	0	0	0	0	21,818
2005	9,618	7,372	7,567	0	0	0	0	24,556
2006	11,560	6,662	7,908	0	0	0	0	26,131
2007*	12,845	5,825	7,685	0	0	0	0	26,355
Cumulative Production	454,542	368,454	125,669	4,272	821	70	3,663	957,492

Source: UGS coal company questionnaires

\*Forecast, 2007 numbers not included in cumulative totals

**Table 7. Coal production in Utah by landownership, 1980-2007.**

Thousand short tons

Year	Federal Land	% of Total	State Land	% of Total	County Land	% of Total	Fee Land	% of Total	Total
1980	8,663	65.5%	1,105	8.3%	0	0.0%	3,468	26.2%	13,236
1981	8,719	63.1%	929	6.7%	0	0.0%	4,160	30.1%	13,808
1982	10,925	64.6%	998	5.9%	0	0.0%	4,989	29.5%	16,912
1983	6,725	56.9%	419	3.5%	0	0.0%	4,685	39.6%	11,829
1984	8,096	66.0%	285	2.3%	0	0.0%	3,878	31.6%	12,259
1985	9,178	71.5%	510	4.0%	0	0.0%	3,143	24.5%	12,831
1986	11,075	77.6%	502	3.5%	0	0.0%	2,692	18.9%	14,269
1987	13,343	80.8%	488	3.0%	0	0.0%	2,690	16.3%	16,521
1988	15,887	87.5%	263	1.4%	0	0.0%	2,014	11.1%	18,164
1989	16,931	82.5%	375	1.8%	153	0.7%	3,058	14.9%	20,517
1990	17,136	77.8%	794	3.6%	606	2.8%	3,476	15.8%	22,012
1991	18,425	84.2%	942	4.3%	144	0.7%	2,364	10.8%	21,875
1992	17,760	84.5%	1,384	6.6%	136	0.6%	1,735	8.3%	21,015
1993	19,099	87.9%	1,682	7.7%	116	0.5%	826	3.8%	21,723
1994	22,537	92.3%	1,227	5.0%	243	1.0%	415	1.7%	24,422
1995	23,730	94.7%	571	2.3%	289	1.2%	461	1.8%	25,051
1996	25,996	96.0%	446	1.6%	15	0.1%	614	2.3%	27,071
1997	25,161	95.2%	339	1.3%	0	0.0%	928	3.5%	26,428
1998	24,954	93.8%	297	1.1%	37	0.1%	1,312	4.9%	26,600
1999	21,982	83.0%	3,071	11.6%	65	0.2%	1,373	5.2%	26,491
2000	20,812	77.3%	4,021	14.9%	0	0.0%	2,087	7.8%	26,920
2001	18,369	68.0%	5,386	19.9%	331	1.2%	2,939	10.9%	27,024
2002	18,365	72.6%	4,353	17.2%	278	1.1%	2,303	9.1%	25,299
2003	18,815	81.6%	2,192	9.5%	25	0.1%	2,037	8.8%	23,069
2004	20,268	92.9%	849	3.9%	0	0.0%	701	3.2%	21,818
2005	19,602	79.8%	2,665	10.9%	6	0.0%	2,283	9.3%	24,556
2006	17,478	66.9%	6,995	26.8%	0	0.0%	1,657	6.3%	26,131
2007*	10,151	38.5%	15,594	59.2%	0	0.0%	610	2.3%	26,355

Source: UGS coal company questionnaires

\*Forecast

dealing with high ash was to blend with better quality coal; however, better quality coal is becoming harder to find. As an alternative, two new coal-cleaning facilities, the Wellington Cleaning Facility and the Castle Valley Coal Preparation Plant, both located near the Savage Coal Terminal, will help mitigate coal quality problems. Utah coal operators are also having trouble finding experienced employees. With an aging labor force that shrinks each year due to retirements and competition from the booming oil and gas industry, finding qualified employees will be a continuing problem.

Two proposed coal mines are in different stages of the permitting process, one in the Book Cliffs coal field of central Utah and one in the Alton coal field of southern Utah. These proposed mines may be positioning themselves to meet a surge in coal demand when a third unit is built at the Intermountain Power Project. This new unit could burn up to 3.0 million short tons of coal per year. Also, Nevco Energy's proposed circulating fluidized-bed coal-fired power plant near Sigurd, Utah would add 1.0 million short tons of new demand if plans are approved and the plant is built.

### UtahAmerican Energy, Inc. – Murray Energy Corporation

In August of 2006, Murray Energy Corporation, the largest independent, family-owned coal producer in the United States, acquired ANDALEX Resources and its four subsidiary companies: the Tower Division, consisting of the Aberdeen and Pinnacle mines; GENWAL Resources, Inc., which manages the Crandall Canyon and South Crandall Canyon mines; WEST RIDGE Resources, Inc., which man-

ages the West Ridge mine; and the Carbon County-based Wildcat Loadout. UtahAmerican Energy, a Murray Energy subsidiary, will wholly own and operate the Tower Division and the Wildcat Loadout, while GENWAL and WEST RIDGE will continue to be half-owned by the Intermountain Power Agency (IPA). IPA owns and operates the Intermountain Power Project near Delta, which is the largest single coal consumer in the state. UtahAmerican Energy also owns the reserves at the proposed Lila Canyon mine in the Emery County portion of the Book Cliffs coal field.

### Tower Division – Aberdeen and Pinnacle Mines

The Tower Division is located in Deadman Canyon about 7 miles north of Price. Combined production from both the Aberdeen and Pinnacle mines totaled 2.1 million short tons in 2006, a significant increase from the 1.7 million short tons produced in 2005. Virtually all of the Tower's 2006 production came from the Aberdeen seam in the Aberdeen mine where longwall equipment ran with little interruption. Retreat mining in the Centennial seam of the Pinnacle mine produced only 8000 short tons before it was indefinitely idled in January of 2006. Roughly 100,000 short tons of coal may still be available in unpulled pillars near the Pinnacle portal, but re-entry is unlikely.

The Aberdeen seam is typically 9 to 10 feet thick, with coal quality averaging 12,200 British thermal units (Btu) per pound and a sulfur content of 0.5%. Currently, equipment is mining at a depth of 2800 feet with plans to approach a depth of 3200 feet, which is deeper than any longwall machine has ever successfully been used in the United States. Tower operators say that the longwall machine is running well at



these depths, but the development work with continuous miners causes delays and concerns. To mitigate “bounce” problems, large barriers of coal are left between longwall panels for additional support. As is typical in gassy Book Cliffs coal mines, production is also limited by the ability to adequately ventilate the mine. Operators are drilling several gob-vent gas wells to aid in ventilation and recently added a new, larger fan that increased airflow in the mine by 20%. Production in the Aberdeen mine is expected to decrease to 1.8 million short tons in 2007 as continued ventilation concerns slow longwall production.

Tower operators acquired the lease for the Kenilworth federal tract in 2006 where they plan to mine the Aberdeen seam, which is located stratigraphically below the old mine workings in the Kenilworth seam. This new tract could yield up to 16.5 million short tons of coal. Currently, plans call for development work in this tract to start in 2010 followed by longwall mining in 2012.

### **Lila Canyon Mine**

UtahAmerican Energy’s proposed Lila Canyon mine is located south of Horse Canyon in the Book Cliffs coal field in Emery County. UtahAmerican is working on obtaining the necessary permits, which could be in hand as early as late 2007. An earlier permit package was found deficient in 2001, but subsequent data gathering should allow the new permit to withstand any appeals. By the time the mine is at full working capacity, which would take two to three years after a permit is issued, it could employ up to 200 people and produce up to 4.5 million short tons of coal per year. Coal would be mined from the merged upper and lower Sunnyside seams, which averages 13.0 to 13.5 feet thick in this area. Recoverable reserves are estimated between 26 and 40 million short tons.

### **GENWAL Resources, Inc. – Crandall Canyon and South Crandall Canyon Mines**

UtahAmerican Energy and IPA share equally in ownership of the Crandall Canyon and South Crandall Canyon mines, both of which are located in the Wasatch Plateau. The mines are operated by GENWAL Resources, Inc., a wholly owned subsidiary of UtahAmerican Energy.

Production at Crandall Canyon and South Crandall Canyon totaled 1.4 million short tons in 2006, down 24.6% from 1.8 million tons in 2005. After Crandall Canyon’s longwall equipment was moved to the Aberdeen mine in 2003, the company installed a low-profile longwall machine in October of 2004. This specialized longwall, capable of mining seams to a minimum of 5.2 feet thick, operated within the Blind Canyon seam of the South Crandall Canyon mine until August of 2006. High ash was the main concern with the coal produced during this period because the coal seam locally thinned to only 4 feet. In October of 2006, the low-profile longwall was moved to the West Ridge mine. The South Crandall Canyon mine was idled at this time after producing 759,000 short tons of coal. Current plans call for pulling pillars with one continuous miner in the Hiawatha seam of the Crandall Canyon mine for the next few years, producing about 625,000 short tons in 2007 and 586,000 tons in 2008. Continuous miner retreat production is expected to

shift to South Crandall in 2010. Up to 11 million short tons of reserves still remain in the area, but the complicated geology and the thin lenticular coal seams make mining very difficult.

### **WEST RIDGE Resources, Inc. – West Ridge Mine**

The West Ridge mine began operation in 1999 in the Book Cliffs coal field with production from the lower Sunnyside seam. The mine is operated by WEST RIDGE Resources while mine assets are co-owned equally by IPA and UtahAmerican Energy.

The West Ridge mine produced a record-high 3.1 million short tons of coal in 2006, up from 2.6 million tons produced in 2005. Operations moved to a new sequence of panels in 2006, located northwest of older workings, and the company installed Crandall’s low-profile longwall in October of that year. West Ridge’s old longwall was dismantled. Current mining depths are about 1500 feet with plans to go to a maximum depth of 3000 feet. Difficult mining conditions at the West Ridge mine result in ash contents averaging around 9.9%, but hopefully the new low-profile longwall will help mitigate ash problems. Sulfur is also high, averaging 1.4%, requiring blending with lower-sulfur coal from the Aberdeen mine. Estimated reserves currently under lease total roughly 34 million short tons.

### **Canyon Fuel Company – Arch Coal**

#### **Dugout Canyon Mine**

Dugout Canyon produced 4.3 million short tons of coal from the Gilson seam in 2006, 5.6% less than the 4.6 million tons produced in 2005. Operators expect to produce 4.0 million short tons in 2007. Production ended in the Rock Canyon seam in February of 2004, after which longwall equipment was moved to the stratigraphically lower Gilson seam. Parts of three longwall panels had to be abandoned in the Rock Canyon seam because of “bounce” problems and in-seam rock partings. Nearly 2.0 million tons of reserves were left in the Rock Canyon seam. These reserves could potentially be retrieved at a later date.

As with other gassy Book Cliffs operations, production is limited by how fast methane can be vented from the working face. In addition to the vent wells already in place, a second ventilation fan began operating in November of 2005 in nearby Pace Canyon to help alleviate this problem. Also, with cover depths ultimately reaching 3000 feet in some places, great care is being taken to address “bounce” problems and provide safe working conditions. Wider barriers are left between longwall panels for added support, and the mine operator is experimenting with artificial coal seam fracturing to help reduce overburden stress.

In the fall of 2006, mining began on new State leases and accounted for 40% of coal production for the year. In 2007, roughly 75% of coal production will be on State-owned land. The opening of Arch Coal’s Castle Valley Preparation Plant has given Dugout greater production flexibility and eliminated the need to stockpile or discard high-ash coal. In fact, 134,000 short tons of previously mined high-ash coal was trucked to the plant and washed into a salable product. Dugout’s recoverable reserves are estimated at 34 million

short tons, with an additional 10 million tons of potential reserves remaining under lease at the idled Soldier Canyon mine.

### **Skyline Mine**

Canyon Fuel Company's Skyline mine, located in the Wasatch Plateau coal field, was closed in May of 2004 due to substantial water infiltration and the resultant increased cost of operation. Production for 2004 before the mine closed totaled only 551,000 short tons, significantly less than the 3.7 million tons averaged between 1996 and 2003. The closure of the Skyline mine greatly reduced Utah's overall production total for 2004, creating coal shortages that forced some users of Utah coal to look elsewhere to meet their needs.

With the recent rise in coal price, Canyon Fuel decided to reopen the Skyline mine in February 2005. Mining now occurs in the Lower O'Connor 'A' seam on the North lease (Winter Quarters lease) in Carbon County, and no water problems have been encountered like those found with the previously mined Lower O'Connor 'B' seam on leases located farther south in Emery County. Production for 2005 totaled 405,000 short tons from development work in preparation for future longwall mining.

Longwall mining began in May of 2006, increasing production for the year to 1.8 million short tons. With a full year of longwall operation scheduled for 2007, production should increase even further to 2.5 million short tons. Canyon Fuel estimates that 15 million short tons of reserves are located in the North lease area south of the Winter Quarters graben, and an additional 12 million tons of coal may exist north of the graben. Several exploratory wells have shown that the area north of the graben has several faults and dikes cutting a coal seam with a thickness of 9 to 10 feet, thinner than the current longwall can effectively cut. A decision on whether to pursue these reserves will be made later in 2007.

Reserves within the Lower O'Connor 'B' seam, some still under lease, but the majority unleased federal coal, are estimated at 20 million short tons. Water infiltration problems associated with these reserves will have to be solved before mining can occur.

### **SUFCO Mine**

SUFCO is Utah's largest coal producer and the fifth largest underground coal mine in the U.S. It is also the only coal mine in Sevier County. SUFCO produced a record 7.9 million short tons in 2006 from the upper Hiawatha seam, but is expected to slightly decrease production to 7.7 million short tons in 2007. Coal must be promptly trucked to distant stockpiles at the Levan loadout or the Hunter power plant due to the small surface storage space at this isolated mountain facility. SUFCO loads roughly 900 trucks per day, five days per week.

Longwall production ended in the Pines federal tract in January of 2007. A brand-new longwall mining system was ordered in December of 2005 and installed in the upper Hiawatha seam in the state-owned Muddy tract in February 2007. This new system is capable of producing 5000 tons of coal per hour from panels up to 1110 feet wide. The old longwall system was dismantled and stored for possible future use. The new working face in the State-owned Muddy tract will be only 6 miles from the portal, as opposed to 13

miles of travel to the last panel of the Pines tract. In addition, a third continuous miner will be brought online to aid in development work. This State-owned lease is estimated to contain 13 million short tons of coal, while the adjacent federal Greens Hollow tract has reserves in the lower Hiawatha seam totaling approximately 55 million short tons. In addition, there are an additional 5 million short tons of coal in the lower Hiawatha that are part of the Muddy lease.

SUFCO has received all the necessary permits to build the "Quitcupah Creek" access road. This road would shorten the coal haulage distance to Emery County power plants by more than 25 miles. A Final Environmental Impact Statement was released in January of 2006, and a Record of Decision by both the BLM and the Forest Service was announced in March of 2006. Both agencies chose "Alternative D", the Water Hollow Road Alignment, which generally follows an existing road in Convulsion Canyon for 2.1 miles where it crosses Quitcupah Creek and then continues for approximately half a mile to the Fishlake National Forest boundary and on to State Route 10. The Forest Service decision was appealed but upheld in court. Engineers are drafting the final construction plan, with possible construction slated to start in the next year or two. For more information, please refer to the Forest Service Web site at <http://www.fs.fed.us/r4/fishlake/projects/quitcupah/>.

## **CONSOL Energy**

### **Emery Mine**

CONSOL Energy is one of the nation's largest coal producers. CONSOL's Emery mine, their only mine in the western U.S., produced intermittently during 2003 and shut down in August of that year after producing 243,000 short tons. The mine reopened in August of 2004 and produced 256,000 short tons before year-end. With a full year of production in 2005, the Emery mine produced 1.2 million short tons. Production in 2006 decreased slightly to 1.1 million short tons and is expected to remain the same in 2007.

A new portal was opened in 2003, providing access to the "I" seam, which is between 20 and 25 feet thick and under just 60 feet of cover at the portal. Three continuous miners remove the upper 10 to 12 feet of coal first, then go back after bolting the roof and remove the lower portion of the seam. Coal quality averages 12,000 Btu per pound and roughly 1.0% sulfur. The majority of production is from private land supplemented with a smaller amount of federal coal. Reserves are estimated to be roughly 31 million short tons, while some estimates suggest more than 100 million tons are available in the surrounding unleased area. CONSOL has investigated mining conditions on their Hidden Valley property to the south of the Emery mine; however, any development there would depend on future market conditions.

## **C.W. Mining Company (Co-op)**

### **Bear Canyon Mines**

Coal production at the privately-owned Bear Canyon mines peaked in 2001 at 1.3 million short tons before declining to just 339,000 tons in 2004, primarily due to labor prob-

lems. Production increased in 2005 to 456,000 short tons, and increased again in 2006 to 489,000 tons. Mining ceased in the Blind Canyon seam of the Bear Canyon #3 mine in the winter of 2006 after producing just 27,000 short tons. The majority of Co-op's 2006 production, 462,000 short tons, came from the Tank seam in the Bear Canyon #4 mine.

C.W. Mining is in the process of purchasing a used longwall mining machine with plans to install it in the Tank seam in the fall of 2007. Development work and some longwall production will push Co-op's total coal production to 600,000 short tons in 2007. A full year of longwall production in 2008 should yield roughly 1.5 million short tons, with peak production reaching 2.5 million tons in 2009. The Tank seam in the Bear Canyon #4 mine averages 8 to 9 feet thick with a maximum depth of 1600 feet. Reserves are estimated at 14 million short tons. After longwall mining is completed in the Tank seam, room and pillar mining will resume in the Blind Canyon seam where remaining reserves are estimated at 5.5 million short tons.

To the north of current leases, the Blind Canyon seam merges with the Hiawatha creating a potential longwall mining area. This area could be accessed through new entries near Mohrland or through old workings of the King #6 mine. Total reserves in the Mohrland area are estimated at roughly 50 million short tons.

### **Energy West Mining Company (PacifiCorp)**

#### **Deer Creek Mine**

Coal produced from the Energy West Mining Company's Deer Creek mine moves via conveyer belt to PacifiCorp's Huntington power plant located near the mouth of the mine in Huntington Canyon. In addition, smaller amounts of Deer Creek coal are trucked to PacifiCorp's Hunter power plant, located south of the town of Castle Dale, and to the Carbon power plant located near Helper. Production has declined in the last few years, from 3.9 million short tons in 2003 to 3.4 million short tons in 2004, as development work began on the new Mill Fork tract, and as the company recovered coal from smaller, isolated longwall panels on older leases. Production increased to 3.9 million short tons in 2005 as longwall equipment began operating in the State-owned Mill Fork tract, but decreased to 3.7 million short tons in 2006 as miners encountered unexpected geologic problems, including a large rock split that necessitated an early longwall move. Blending at the Huntington and Hunter power plants has so far mitigated the increased ash content from the initial Mill Fork tract coal. Coal production is expected to decrease again to 3.5 million tons in 2007 and remain at that level into 2008.

The Mill Fork tract is estimated to contain roughly 50 million short tons of coal in two seams, the upper Blind Canyon and the lower Hiawatha, and mining in the tract should continue for the next 15 to 20 years. The two seams are each 7 to 9 feet thick, separated by 80 to 100 feet of interburden, and are located under 1800 to 2600 feet of cover. Coal is currently longwall mined from the Hiawatha seam, while development work commences in the stratigraphically higher Blind Canyon seam. Operators plan to move longwall operations to the Blind Canyon in the spring of 2008, and resume mining the Hiawatha when the Blind Canyon

reserves are depleted. Exploration drilling is still being conducted to help delineate the northern extent of the Blind Canyon reserves.

Work continues on new portals in Rilda Canyon, which will allow for efficient and safer access to the ever more distant working face, and the installation of a fan that will aid in ventilation of the Mill Fork tract. In addition, Energy West plans another breakout near the Crandall Canyon mines for added ventilation. Coal production will continue to exit through existing portals in Deer Creek Canyon.

Energy West has nominated for leasing the state-owned Cottonwood tract. If the company is successful in obtaining the lease, it plans to use the currently closed Trail Mountain mine as the access to the new reserve.

### **Hidden Splendor Resources, Inc.**

#### **Horizon Mine**

Production at the Horizon mine ceased temporarily in February of 2003, with the sale of assets and lease holdings from Lodestar Resources, Inc. to Hidden Splendor Resources, Inc. Operations resumed in August of that year, resulting in total 2003 production of 108,000 short tons, down only slightly from 2002 production of 110,000 tons. A full year of production in 2004 with one continuous miner yielded 293,000 short tons, with similar production of 286,000 tons in 2005. Production decreased in 2006 to 257,000 short tons, but Hidden Splendor believes it can nearly double production in 2007 if a second continuous miner is added.

The discovery of an erroneously mapped fault increased available reserves from 5 to 9 million short tons. In addition, potential leases with another 13 million short tons of coal lie on federal land northwest of the mine, but this reserve needs further exploration. Current production is primarily in areas north and west of the portal, where the Hiawatha seam ranges from 5.5 to 7 feet thick and is under 1400 to 1600 feet of cover. Coal quality is typical of the Wasatch Plateau and averages 11,700 Btu per pound, 0.6% sulfur, and 5.0% moisture. Water infiltration has been somewhat of a problem, but water quality is good making disposal less of an issue. Longwall production is not feasible at this mine due to numerous faults and the small reserve.

### **Alton Coal Development, LLC**

#### **Coal Hollow Mine**

Alton Coal Development, LLC has submitted a mine plan to the Utah Division of Oil, Gas and Mining to open a new coal mine in the Alton coal field in southern Utah's Kane County. Alton Coal plans to surface mine 2 million short tons of coal per year from 440 acres of private land and 3200 acres of unleased federal land located about 3 miles south of the town of Alton. The coal would be trucked on U.S. Highway 89 to State Route 20 and then on Interstate 15 to a coal loadout facility west of Cedar City. Currently, the greatest concern about the proposed mine has been from residents in the towns of Panguitch and Hatch regarding the potential number and frequency of double-trailer, coal-hauling trucks running through their towns. The BLM expects a

draft EIS for leasing the Alton coal tract to be completed by summer 2008. In June of 2006, the Utah Division of Oil, Gas and Mining began processing an Alton Coal Development application to start mining on the 440 acres of private land.

The proposed surface mine would produce subbituminous coal that ranges from 9500 to 10,000 Btu per pound, and averages about 1% sulfur and 9% ash. Reserves within the combined private and federal mining area are estimated between 40 and 45 million short tons.

### **Globex Mining Enterprises, Inc.**

#### **Razor Mine**

In the spring of 2007, Canadian-based Globex Mining Enterprises, Inc. signed an agreement to purchase the Razor property, roughly 5200 acres, located just south of the town of Sunnyside in the Book Cliffs coal field in Carbon County. U.S. Steel Corporation operated the Columbia mine on this property from 1923 to 1966 to supply metallurgical coal to its steel-making operations. The mine was idled because of economic and labor issues. Arizona-based Bronco Land Co. acquired the land and mineral rights in the spring of 2005, but plans to open the mine never materialized. Reserves for the proposed new Razor mine are located east of the old workings of the Columbia mine in the merged upper and lower Sunnyside seam, which averages 15.0 feet thick in this area. Depth of cover could be an issue for future mining because overburden ranges from 1500 to 3500 feet. Potential reserves for the entire area could total as much as 100 million short tons, with 35 million tons located on company-owned land. A future mine could yield as much as 3.0 million short tons of coal per year with heat content ranging between 11,800 and 13,600 Btu per pound.

## **DISTRIBUTION OF UTAH COAL**

The total amount of Utah coal distributed to market is proportional to the amount of Utah coal production. With an increase in production in 2006, distribution of Utah coal also increased to 24.8 million short tons, up 0.4% from 2005 (table 8). All of the increase occurred in the electric utility sector, where distribution rose from 20.4 million short tons in 2005 to 20.8 million tons in 2006. Coal delivered to the industrial sector decreased from 4.1 million short tons in 2005 to 4.0 million tons in 2006, while coal going to residential and commercial customers decreased from 53,000 short tons in 2005 to just 14,000 tons in 2006. Parallel with a small increase in production projected for 2007, distribution of Utah coal is also expected to rise. Utah coal producers plan to deliver a total of 26.2 million short tons of coal in 2007, a 5.3% increase over 2006, with a record 22.1 million short tons going to electric utilities, 4.1 million tons to industrial users, and 22,000 tons going to residential and commercial customers. The following sections provide descriptions of major electric utility and industrial customers that use Utah coal; however, this is not an exhaustive list.

### **Electric Utility Market**

During 2006, 83.8% of Utah coal distribution, 20.8 mil-

lion short tons, was delivered to the electric utility market in both Utah and other states (table 8). In 2006, coal fuel accounted for 89.7% of all electricity generated in Utah, which is substantially more than the U.S. average of 49.0%. This figure has significantly decreased since 2005, when coal accounted for 94.3% of all electric generation in Utah, because of the recent construction of new natural-gas power plants. Despite this decrease in coal's overall share of Utah's electric generation portfolio, demand for Utah coal at power plants will remain steady as electricity consumption continues to rise. However, with the increased awareness of global warming and a call to reduce carbon dioxide emissions and other pollutants, the use of conventional pulverized coal technology at future power plants may begin to include additional carbon capture technology, which would significantly increase the cost of using Utah coal.

### **Out-of-State Electric Utility Market**

Electric utility companies outside of Utah received 5.9 million short tons of Utah coal in 2006, significantly less than peak deliveries of 7.7 million tons in 1998 (table 8). Nevada received the majority of that coal, 2.6 million short tons, while 1.1 million tons went to electric utility markets in Tennessee, 593,000 tons went to electric plants in Wisconsin, 451,000 tons went to electric plants in Missouri, and 28,000 tons went to electric plants in Oregon. The remaining 779,000 short tons went to California cogeneration plants (table 9).

**Nevada Plants – Reid Gardner and North Valmy Power Plants:** Nevada Power's Reid Gardner power plant, located in southern Nevada and serving the Las Vegas area, consists of four coal-fired steam electric generating units with a combined net capacity of 619 megawatts (MW). Unit 1 came into service in 1965, Unit 2 was added in 1968, Unit 3 in 1976, and Unit 4 was completed in 1983. Each unit has SO<sub>2</sub> scrubbers that operate at modern day removal rates, and Unit 4 contains a baghouse for fly ash capture. The plant purchased 1.5 million tons of Utah coal in 2006, with smaller amounts, 356,000 tons, purchased from Colorado (table 10). Utah coal purchases in 2007 are expected to increase to 1.8 million short tons, with no coal expected to be purchased from Colorado. Net power generation in 2006 was 3749 gigawatthours (GWh) running at 76.4% of capacity. Plant availability will increase from 82.5% in 2006 to 94% in 2007, resulting in an expected net generation of 4261 GWh.

Sierra Pacific's North Valmy power plant, located in northern Nevada near Battle Mountain, consists of two coal-fired steam electric generating units with a combined net capacity of 554 MW. Unit 1 came online in 1981, while Unit 2 was added in 1985, and both units contain a baghouse for fly ash removal. In 2006, the plant received 1.1 million short tons of Utah coal and about 645,000 tons of coal from Wyoming. Wyoming imports have risen every year since 2003 when only 58,000 tons was purchased. Imports from Wyoming in 2007 are expected to reach 1.0 million short tons. Conversely, imports of Utah coal are expected to decrease to 1.0 million short tons in 2007. In 2006, the North Valmy plant generated a net of 3551 GWh with an availability of 82.3%. Availability is expected to increase in 2007 to 95%, increasing net generation to 4367 GWh.

**Table 8. Distribution of Utah coal, 1981-2007.**

Thousand short tons

Year	Production	Distribution of Utah Coal													
		Electric Utilities <sup>1</sup>			Coke Plants			Industrial <sup>2</sup>			Residential & Commercial			Exports <sup>3</sup>	Total
		Outside UT	In UT	Total	Outside UT	In UT	Total	Outside UT	In UT	Total	Outside UT	In UT	Total		
1981	13,808	2,688	4,829	7,517	779	267	1,046	1,645	493	2,138	180	197	377	3,472	14,550
1982	16,912	3,643	6,135	9,778	859	136	995	1,349	728	2,077	233	177	410	2,177	15,437
1983	11,829	3,404	5,220	8,624	0	32	32	1,091	581	1,672	292	191	483	1,346	12,157
1984	12,259	3,730	4,688	8,418	0	163	163	1,542	466	2,008	311	257	568	849	12,006
1985	12,831	3,746	7,192	10,938	0	39	39	1,866	352	2,218	312	252	564	625	14,384
1986	14,269	2,989	6,955	9,944	0	485	485	1,745	271	2,016	81	191	272	551	13,268
1987	16,521	3,182	10,772	13,954	0	131	131	1,813	249	2,062	83	204	287	555	16,989
1988	18,164	2,797	11,233	14,030	0	171	171	1,996	679	2,675	88	236	324	1,044	18,244
1989	20,517	2,623	11,563	14,186	0	355	355	2,401	765	3,166	84	323	407	2,175	20,289
1990	22,012	3,373	12,604	15,977	0	617	617	2,327	612	2,939	59	380	439	1,708	21,680
1991	21,875	3,608	12,162	15,770	0	615	615	2,158	622	2,780	76	320	396	2,112	21,673
1992	21,015	4,000	11,619	15,619	0	553	553	2,006	488	2,494	81	347	428	2,245	21,339
1993	21,723	3,914	11,842	15,756	0	510	510	2,146	594	2,740	134	228	362	2,567	21,935
1994	24,422	4,841	12,344	17,185	0	109	109	2,322	643	2,965	308	157	465	2,717	23,441
1995	25,051	6,570	11,771	18,341	0	0	0	2,399	642	3,041	68	182	250	3,811	25,443
1996	27,071	7,258	11,923	19,181	0	0	0	2,339	517	2,856	51	260	311	5,468	27,816
1997	26,428	5,638	13,271	18,909	0	0	0	2,164	665	2,829	60	96	156	3,513	25,407
1998	26,600	7,704	12,812	20,516	0	0	0	2,749	680	3,429	82	212	294	2,735	26,974
1999	26,491	6,910	13,162	20,072	0	0	0	2,529	830	3,359	75	107	182	2,567	26,180
2000	26,920	6,639	14,276	20,915	0	5	5	2,892	634	3,526	141	82	223	2,960	27,629
2001	27,024	7,419	12,480	19,899	0	0	0	3,055	792	3,847	254	394	648	2,404	26,798
2002	25,299	5,562	13,009	18,571	0	0	0	3,543	735	4,278	282	372	654	875	24,378
2003	23,069	6,789	13,121	19,910	0	0	0	2,856	633	3,489	28	50	78	222	23,699
2004	21,818	5,798	12,947	18,745	0	0	0	2,902	590	3,492	128	152	280	295	22,812
2005	24,556	5,934	14,428	20,362	0	0	0	3,238	875	4,113	9	44	53	212	24,740
2006	26,131	5,888	14,928	20,816	0	0	0	3,094	883	3,977	2	11	13	34	24,841
2007*	26,355	6,462	15,600	22,062	0	0	0	3,188	892	4,080	3	19	22	0	26,164

Source: UGS coal company questionnaires

<sup>1</sup>Includes cogeneration facilities<sup>2</sup>A large portion of out-of-state industrial deliveries are most likely going to cogeneration plants, which are only required to use 5.0% of their power for industrial use; the remainder typically goes into the consumer power grid.<sup>3</sup>Exports from 1981 to 2003 went overseas to the Pacific Rim; 2004 to 2006 exports went to Canada.

\*Forecast

## Utah Electric Utility Market

As power companies look to refill their depleted stockpiles resulting from the 2004 low Utah coal production year, the amount of coal delivered to electric utilities within the state hit a new all-time high in 2006 of 14.9 million short tons, increasing 3.5% over 2005's total of 14.4 million tons (table 8). Additional increases in production in 2007 should again result in record-high Utah deliveries of 15.6 million short tons. Demand for coal at Utah power plants is expected to remain steady as electricity needs continue to grow.

**PacifiCorp – Hunter:** PacifiCorp's Hunter power plant began operating in 1978 with Unit 1; Units 2 and 3 began supplying power in 1980 and 1983, respectively. PacifiCorp and Provo City jointly own Hunter Plant Unit 1 with undivided interest of 93.75% and 6.25%, respectively. PacifiCorp, Deseret Generation and Transmission Cooperative, and Utah Associated Municipal Power Systems, with undivided interests of 60.31%, 25.11%, and 14.58%, respectively, own Hunter Plant Unit 2. PacifiCorp wholly owns Hunter Unit 3.

The three coal-fired steam electric generating units at the Hunter power plant have a combined total gross capacity of 1472 MW with a net capacity of 1320 MW. Units 1 and 2 are tangentially fired, dry bottom units, and Unit 3 is a wall-fired, dry bottom unit. Roughly 18,000 barrels of fuel oil per year are used during cold startups, to maintain boiler flame stabilization, and to operate a 200 million Btu per hour auxiliary boiler. Hunter uses electrostatic precipitators and SO<sub>2</sub> scrubbers to reduce pollution from Units 1 and 2, while a baghouse and SO<sub>2</sub> scrubber are used for pollution control on Unit 3.

The Hunter power plant purchased 5.2 million short tons of Utah coal in 2006, up from 5.0 million tons in 2005, relying mostly on Canyon Fuel mines (table 10). The plant increased net power generation to 9886 GWh in 2006 over 2005's total of 9732 GWh. Hunter expects to receive only 4.4 million short tons of Utah coal in 2007 and estimates that net power generation will decrease to about 9280 GWh.

**PacifiCorp – Huntington:** Completed in 1977, PacifiCorp's Huntington plant was built in Huntington Canyon, very close to the company's Deer Creek mine. Huntington's two coal-fired steam electric generating units, both tangentially fired with dry bottoms, have a combined gross capacity of 960 MW with a net capacity of 895 MW. The plant uses roughly 13,000 barrels of fuel oil per year for cold startups and for boiler flame stabilization. The Huntington plant uses an electrostatic precipitator and SO<sub>2</sub> scrubber to reduce pollution from Unit 1 and low-NO<sub>x</sub> burners, a separated overfire air system, a SO<sub>2</sub> scrubber, and pulse jet fabric filters for Unit 2. In 2006, Huntington generated a net of 6131 GWh, down from 6374 GWh produced in 2005. Power generation is expected to increase in 2007 to 6780 GWh.

Huntington's coal purchases decreased slightly to 2.5 million short tons in 2006 from 3.0 million tons the year before (table 10). The Deer Creek mine continues to supply the majority of coal used at the Huntington plant, with smaller amounts coming from Canyon Fuel mines. Coal delivery in 2007 is expected to significantly increase to 3.3 million short tons.

**PacifiCorp – Carbon:** The Carbon power plant, PacifiCorp's oldest and smallest coal-fired power plant in Utah, is a steam electric generating facility consisting of two units.

Located at the intersection of State Routes 6 and 191, just north of Helper, Carbon's two units, which came online in 1954 and 1957, respectively, have a combined gross capacity of 189 MW with a net capacity of 172 MW. Units 1 and 2 are both tangentially-fired, dry bottom units. Roughly 2000 barrels of fuel oil per year are used for cold startups and for boiler flame stabilization. Carbon uses an electrostatic precipitator and a cyclonic dust collector to reduce pollution from Unit 1 and an electrostatic precipitator only for Unit 2.

Coal delivered to the Carbon power plant decreased from 677,000 short tons in 2005 to 637,000 tons in 2006 (table 10). The plant generated a net of 1397 GWh in 2006, slightly more than the 1349 GWh generated in 2005. Net generation for 2007 is expected to be near 1169 GWh.

During 2006, the Carbon plant utilized coal from five different mines; the majority came from two Canyon Fuel mines, with smaller amounts from Deer Creek, Horizon, and Co-op. Coal purchases are expected to again decrease to 597,000 short tons in 2007, with increasing amounts of coal coming from the Dugout mine.

**Intermountain Power Agency – Intermountain Power Project:** The Intermountain Power Agency (IPA) and its Intermountain Power Project (IPP), located just north of Delta, were created in 1977 to meet the power needs of Utah and southern California. Power purchasers include 23 Utah municipalities (entitlement share of 14%), six Utah cooperatives (7%), Rocky Mountain Power (PacifiCorp) (4%), and six California municipalities (75%). The Power Sales Contracts for these entities will expire in 2027. The plant is operated and managed by the Los Angeles Department of Water and Power.

In the fall of 2006, the six California municipalities, which purchase at least 75% of IPP's power, decided not to extend their contracts to 2044 as originally planned. Instead they plan to explore more environmentally friendly sources of electricity. IPP has given the municipalities until 2027 to revise this decision, and is currently exploring ways to modernize its facility to bring it into compliance with California's greenhouse gas legislation, including possibly burning biomass and/or sequestering carbon dioxide emissions.

Plans for expanding IPP by adding a third unit would increase generation capacity by another 900 MW. Construction is set to begin in late 2008, with completion expected in 2013. Coal consumption would rise almost 50% with such an expansion, with demand expected to be met by Utah, Wyoming, and Colorado coal. However, California, currently the largest IPP power purchaser, has opted not to participate in the proposed third unit without carbon capture technology, as have several Utah municipalities including Logan and Bountiful. With significant power purchasers unwilling to invest in the currently designed IPP expansion, it appears that Utah coal's long-term demand may depend on technology different than the current pulverized coal boilers.

As of April 2004, IPP increased its net capacity rating on its two coal-fired electric steam generating units to 1800 MW, making it the largest power generation facility in Utah. Both units consist of dry-bottom, wall-fired boilers. Roughly 12,000 barrels of fuel oil per year are used for cold startups, shutdowns, and boiler flame stabilization. Both Units 1 and 2 reduce pollution with low-NO<sub>x</sub> burners, separated overfire air-port systems, baghouse technology, and SO<sub>2</sub> scrubber systems.

In 2006, IPP generated a record 14,447 GWh of power, up 5.8% from the 13,658 GWh produced in 2005. IPP purchased a total of 6.2 million short tons of coal in 2006, 6.1 million short tons from Utah, and 167,000 short tons from Wyoming (table 10). IPP first purchased out-of-state coal from Wyoming and Colorado in 1997. For 2007, IPP is expecting power generation to increase to a net of 14,802 GWh, and coal deliveries are projected to total 6.0 million short tons, all of which would be from Utah.

## Cogeneration Market

### Out-of-State Cogeneration Plants

Cogeneration plants (“cogen”) in California are major customers of Utah coal. Cogen facilities provide process steam and power for industry, but are primarily devoted to generating electricity for consumer markets, generally providing a maximum allowable 95% of total net capacity to the grid. The increasing stringency of California air quality standards means that conventional stoker power plants, particularly for coal, will eventually give way entirely to cleaner technology. At present, circulating fluidized-bed combustion is the most popular technology for cogen facilities due to its low oxide emissions and its ability to burn a variety of fuels, including high-ash coal.

**ACE Cogeneration:** Located in Trona, California, ACE Cogeneration, with a capacity of 102 MW, produced a net of 768 GWh of electricity during 2006 using a combination of Utah coal, petroleum coke, and natural gas. In addition to generating electricity, the circulating fluidized-bed power plant supplied process steam to an adjacent chemical company as required by its cogeneration status. Plant availability during 2006 reached 93.8% and is expected to decrease to 90% in 2007 with power generation reaching 763 GWh. Deliveries of Utah coal in 2006 totaled 397,000 short tons, up 13.1% compared with 2005, however deliveries are expected to decrease slightly in 2007 to 385,000 tons (table 10).

**Mt. Poso:** Located in Bakersfield, California, Mt. Poso is a 58 MW circulating fluidized-bed cogeneration plant that provides a minimum 5.0% of its energy generation to steam production for enhanced oil recovery at nearby oil wells. As with other cogeneration plants, the remaining generation capacity is supplied to the consumer grid. In 2006, Mt. Poso generated a net of 394 GWh of electricity, a decrease of 10.5% over 2005. Plant utilization and availability were at 96.8% and 89.0%, respectively. Net generated power is expected to increase in 2007 to 416 GWh. During 2006, Mt. Poso purchased 126,000 short tons of Utah coal, 19.2% less than the 156,000 tons purchased in 2005 (table 10). Utah coal deliveries are expected to increase in 2007 to 152,000 short tons.

**Rio Bravo Poso:** Rio Bravo Poso, also located in Bakersfield, California, uses circulating fluidized-bed combustion to generate power at a rated net capacity of 33 MW. Like Mt. Poso, this plant distributes at least 5.0% of generated energy to steam-based enhanced recovery at nearby oil wells. Remaining power is sold into the California grid.

Rio Bravo Poso generated a net of 288 GWh in 2006 and purchased 59,000 short tons of Utah coal (table 10). Plant

utilization and availability were 99.8% and 94.2%, respectively. Plant availability during 2007 is expected to increase slightly to 97%, and power generation is expected to increase to 290 GWh. Utah coal deliveries in 2007 are expected to substantially increase to 74,000 short tons.

**Rio Bravo Jasmin:** Rio Bravo Jasmin is yet another circulating fluidized-bed cogeneration plant located 7 miles from the nearly identical Rio Bravo Poso. Both plants provide roughly the same amount of steam for enhanced oil recovery in the surrounding oil fields. Remaining generation is sold to Southern California Edison.

Plant utilization and availability in 2006 were 100.0% and 90.0%, respectively, producing a net of 277 GWh of electricity. Rio Bravo Jasmin purchased 60,000 short tons of Utah coal in 2006, nearly double the 33,000 tons purchased in 2005 (table 10). Net electricity generation for 2007 is expected to increase to 286 GWh, while Utah coal purchases are expected to increase again to 73,000 short tons.

**Stockton Cogeneration Company:** The Stockton Cogeneration facility in California was created to supply process heat for agricultural products. In 2006, the plant generated a net of 449 GWh on a base rating of 55 MW running at 95.7% availability. Stockton plans to increase power generation in 2007 to a net of 452 GWh by increasing availability to 96%. Stockton purchased a total of 127,000 short tons of Utah coal in 2006 and expects to increase that amount to 137,000 tons in 2007 (table 10).

### Utah Cogeneration Plant

**Sunnyside Cogeneration Plant:** The Sunnyside Cogeneration plant, built in 1993 in the town of Sunnyside, Utah, was originally designed as a true cogeneration plant, which would have supplied a minimum of 5.0% of its power to a commercial greenhouse. However, since the plant burns waste coal, it is designated as a “qualifying facility,” which under the Federal Public Utility Regulatory Policy Act, is exempt from the cogeneration requirement, and the proposed commercial greenhouse was never developed. Subsequently, all of Sunnyside’s power goes directly to the grid.

The Sunnyside plant, rated at a net of 51 MW, uses circulating fluidized-bed combustion technology to burn waste coal left from the Kaiser Sunnyside coal wash operation and coal from the old Star Point waste pile. The heating value of the Sunnyside fuel varies from 4000 to 5500 Btu per pound, which is less than half the Btu value for most Utah coal. The sulfur content of the fuel averages about 1.5%.

Constellation’s Sunnyside power station consumed about 467,000 short tons of waste coal during 2006. At that rate, Sunnyside waste coal “reserves” on site are expected to last two to four more years. In anticipation of the Sunnyside resource depletion, Constellation purchased a waste coal pile from a wash plant associated with the now-closed Cyprus-Plateau Star Point mine. That fuel is of higher quality than that from Sunnyside, averaging 5700 to 6000 Btu per pound with 0.7% sulfur. With these additional reserves, Sunnyside Cogen should have enough fuel to last until 2025.

Net power generation in 2006 totaled 419 GWh, down from the 472 GWh generated in 2005. This figure is expected to drop even further in 2007 to 395 GWh based on the consumption of 431,000 short tons of waste coal.

In contrast to conventional coal combustion, where high-ash content hampers performance, the use of circulating fluidized-bed combustion at the Sunnyside plant requires the addition of noncombustible material. The plant consumes about 48,000 tons of pulverized limestone per year, most of which is purchased from the Graymont lime plant in the Cricket Mountains, in order to achieve proper combustion and eliminate sulfur emissions. Bag house technology is used to remove fly ash.

## Industrial Market

### Out-of-State Industrial Market

Deliveries of Utah coal to industrial plants in other states have gradually increased during previous decades with a record 3.5 million short tons shipped in 2002 (table 8). In 2006, deliveries decreased by 4.4% over the previous year to 3.1 million short tons. Deliveries for 2007 are expected to increase to 3.2 million short tons as overall Utah coal distribution increases.

California is the largest industrial consumer of Utah coal, with deliveries of 2.0 million short tons in 2006, about the same as in 2005 (table 9). Other states receiving significant amounts of Utah coal for industrial use were Arizona, Idaho, Illinois, Nevada, Oregon, and Wisconsin.

It is important to note that a large portion of out-of-state industrial deliveries could be going to cogeneration plants. These plants are only required to use 5.0% of their power generation for industrial use, with the remainder typically sold to the power grid.

### Utah Industrial Market

The amount of coal delivered to industrial users within the state of Utah had steadily decreased in previous years

from 792,000 short tons in 2001 to only 590,000 short tons in 2004 (table 8). Deliveries in 2005 increased dramatically by 48.3% to 875,000 short tons, and increased another 0.9% in 2006 to reach a new record of 883,000 tons. During 2004, a few Utah companies had to look elsewhere to meet their coal needs due to lower total Utah coal production. However, with the increase in overall state production in the last two years, only minor out-of-state coal purchases are planned (table 10).

**Ash Grove Cement:** Ash Grove Cement uses a 25 MW conventional boiler to produce steam and electricity for Portland cement production at its remote site about 25 miles west of Nephi. During 2006, this plant purchased 127,000 short tons of Utah coal, similar to amounts purchased in 2005 (table 10). Plant availability was rated at 90.0% for 2006, on utilization of 91.1%. Utah coal purchases for 2007 are expected to total 129,000 short tons.

**Graymont:** Graymont Western U.S., Inc., is an affiliate of Graymont Dolime of Genoa, Ohio, one of the largest producers of limestone products in the United States. The Utah operation is located about 40 miles south of Delta, where limestone from the nearby Cricket Mountains is used to produce calcium oxide, “quicklime,” and magnesium oxide in a rotary kiln. Graymont purchased 184,000 short tons of Utah coal in 2006 and expects to purchase about the same in 2007 (table 10).

**Holcim, Inc.:** Holcim is one of the world’s leading suppliers of cement, sand and gravel, and construction-related services. The company’s Devil’s Slide plant, located in Morgan County, produces Portland cement and washed aggregates. During 2006, this plant purchased 59,000 short tons of Utah coal and 31,000 tons of coal from Wyoming (table 10). In 2007, Holcim plans to purchase only 33,000 short tons of Utah coal and 50,000 short tons of Wyoming coal. Holcim hopes to reduce its future overall coal consumption by increasing the use of alternative fuels.

**Table 9.** Distribution of Utah coal by state, 2006.

Thousand short tons						
Destination	Residential	Commercial	Industrial	Electric Utility <sup>1</sup>	Broker <sup>2</sup>	Total
Arizona	0	0	202	0	0	202
California	0	0	2,040	779	0	2,819
Colorado	0	0	*	0	141	141
Idaho	0	2	161	0	0	163
Illinois	0	0	130	0	0	130
Kansas	0	*	0	0	0	*
Michigan	0	0	1	0	0	1
Missouri	0	0	8	451	0	459
Nevada	0	0	341	2,640	0	2,981
Ohio	0	0	0	*	0	*
Oregon	0	0	89	28	0	117
Tennessee	0	0	0	1,148	0	1,148
<b>Utah</b>	<b>4</b>	<b>7</b>	<b>883</b>	<b>14,907</b>	<b>21</b>	<b>15,823</b>
Wisconsin	0	0	119	593	108	819
Wyoming	0	0	2	0	0	2
Exports - Canada	0	0	6	0	28	34
Total - U.S.	4	10	3,977	20,546	270	24,807
Total - U.S. and Exports	4	10	3,983	20,546	298	24,841

Source: UGS coal company questionnaires

<sup>1</sup>Includes cogeneration facilities

<sup>2</sup>3rd party broker; destination state is location of coal broker, not final destination; sector is also unknown.

\*Amounts less than 500 tons



**Kennecott Utah Copper:** Kennecott Utah Copper uses coal to produce electricity for copper refining at its Salt Lake County facility. During 2006, Kennecott purchased 495,000 short tons of coal, all from Utah mines, after purchasing nearly half their coal from out-of-state sources in 2004 (table 10). In 2007, coal purchases will decrease to 452,000 short tons, all of which will be from Utah. Like many coal users, Kennecott is concerned about stability of price and supply, especially since Kennecott keeps very little coal stockpiled at the refinery. Increased Utah coal production will hopefully help ease supply concerns and keep demand for Utah coal high.

The Kennecott steam boiler is fed by a conventional stoker and is rated at 172 MW. In 2006, Kennecott produced a net of 803 GWh of electricity, up substantially from the 737 GWh generated in 2005, based on a plant availability of 88.0%. Generation is expected to increase again in 2007 to 863 GWh.

**Utelite Corp.:** The Utelite Corporation, located near the town of Coalville, produces expanded lightweight shale aggregates used in applications ranging from structural concrete to geotechnical fill. The raw shale is quarried, crushed, and fed into a rotary kiln where it is heated to 2000 degrees Fahrenheit, using coal as the fuel source. At this temperature the shale is red hot and somewhat plastic. Internal gases escaping the shale expand or "bloat" the particles, creating a myriad of small non-interconnecting internal voids. These voids are retained after the material cools and solidifies. The extreme firing temperature also vitrifies the shale, creating a hard ceramic shell. These attributes account for the material's light weight, high strength, and acoustic, insulative, and fire resistant qualities. Utelite purchased 21,000 short tons of coal in 2006, 13,000 tons from Utah and 8000 tons from Wyoming (table 10). Plans for 2007 call for deliveries of 16,000 short tons of coal from Utah and 11,000 tons from Wyoming.

### Utah Coking Coal Market

The coking coal market was once a major Utah industry in support of steel-making and other industrial processes. During the early 1980s, an annual average of 1.0 million short tons of Utah coking coal were delivered to companies, the majority of which was shipped out-of-state (table 8). By 1983, Utah stopped delivering coking coal to out-of-state customers, while deliveries ceased altogether in 1994, except for a one-time delivery of 5000 tons in 2000. Utah stopped importing coking coal in 2001 when the Geneva Steel plant ceased operation (see appendix table A4).

### Residential And Commercial Markets

About 13,000 short tons of Utah coal was shipped to businesses and residences during 2006, with 11,000 tons going to Utah customers and 2,000 tons going to customers out-of-state (table 8). This is substantially less than the 654,000 short tons delivered in 2002 and 648,000 tons delivered in 2001. The recent large swings in total residential and commercial coal deliveries are partly due to changing reporting methods and purchases by commercial coal brokers. Commercial brokers buy and sell substantial amounts of coal each year, with most of their volumes going to utilities for

power generation. These transactions may be logged as commercial deliveries, but are probably not going to homes or businesses.

There is little market evidence of coal use by businesses and residences in Utah. Approximately 20 wholesale and retail outlets for coal have been identified in the state, but these sources have dwindled in number, and few proprietors report useful customer information, except to say that a few customers, mostly in rural areas, continue to use coal as a backup fuel or for decorative fireplaces. In addition, a few tons of Pennsylvania anthracite coal is distributed in Utah and nearby states as "boutique" fuel. Due to the expansion of natural gas networks, there are only a few remote locations in Utah where coal still competes favorably with propane, electricity, or renewable sources of energy for residential and commercial applications.

### Exports

Demand for Utah coal by foreign countries peaked in the early 1980s and mid-1990s, reaching a record 5.5 million short tons in 1996, matching peaks in both production and total distribution (table 8). Through 2003, as deliveries dwindled to 222,000 short tons, all exported coal went to Asian markets. In 2004, 295,000 short tons of Utah coal went to Canadian markets, followed by 212,000 tons in 2005 and only 34,000 tons in 2006. Utah operators do not expect to export any coal in 2007.

Prior to 2004, Utah exported coal mostly to Japan, but as coal production continues to grow in Asia, this market has virtually disappeared. In fact, a significant resurgence in overseas demand for Utah coal is not expected as Australia and Indonesia continue to increase their coal exports. Meanwhile, ever since the Port of Los Angeles coal terminal was closed, the capability for the western United States to export coal to Asia has significantly declined.

### DTE Utah Synfuels, LLC

DTE Energy Services is owner and operator of a synthetic fuel production facility called DTE Utah Synfuels, located near Price. This is the only synfuel plant west of the Mississippi River. The synthetic fuel process begins by combining crushed coal with a chemical reagent. This mixture then undergoes a shaping process using heat and pressure to form an enhanced coal product. The end product is used by customers in electric generating plants and industrial facilities in Utah and other states. DTE Utah sold 1.1 million short tons of synthetic fuel in 2006, down from the 1.7 million tons processed in 2005, with a crew of 24 individuals, including hourly and management personnel. DTE Utah has received waste coal from several Utah mines including Bear Canyon, Horizon, West Ridge, and Dugout.

The DTE Utah facility was idle between May 12, 2006 and October 4, 2006, when crude oil prices reached record levels, causing the tax credit taken by DTE to phase out. DTE expects to process 2.1 million short tons of coal in 2007, the maximum allowed by the tax credit. In total, DTE has sold about 9.0 million short tons over the life of the plant. Tax credits associated with synthetic fuel production are scheduled to cease at the end of 2007, with little hope for renewal.

**Table 10. Utah and non-Utah coal purchases by select companies, 2003-2007.**

Thousand short tons

Company	Plant Location	Coal purchased in 2003 from:				Coal purchased in 2004 from:				Coal purchased in 2005 from:			Coal purchased in 2006 from:			Coal purchased in 2007* from:		
		UT	WY	CO	Other <sup>1</sup>	UT	WY	CO	Other <sup>1</sup>	UT	WY	CO	UT	WY	CO	UT	WY	CO
PacifiCorp - Carbon	UT	657	--	--	--	567	--	--	--	677	--	--	637	--	--	597	--	--
PacifiCorp - Hunter	UT	3,839	--	--	--	4,150	--	--	--	4,967	--	--	5,186	--	--	4,367	--	--
PacifiCorp - Huntington	UT	2,891	--	--	--	3,326	--	--	--	3,035	--	--	2,485	--	--	3,267	--	--
DG&T - Bonanza	UT	--	--	2,036	--	--	--	2,553	--	--	--	2,142	--	--	1,723	--	--	1,948
IPP	UT	5,304	--	--	--	5,270	468	--	--	5,457	634	--	6,074	167	--	6,000	--	--
Ash Grove Cement	UT	124	--	--	--	123	--	--	--	123	--	--	127	--	--	129	--	--
Graymont	UT	150	--	--	--	166	--	--	--	156	--	--	184	--	--	184	--	--
Holcim	UT	70	--	--	--	79	7	--	--	84	0.5	--	59	31	--	33	50	--
Kennecott Utah Copper	UT	400	--	--	--	207	175	--	3	398	--	--	495	--	--	452	--	--
Utelite Corp.	UT	16	0.2	--	--	12	3	--	--	25	9	--	13	8	--	16	11	--
ACE Cogen. Plant <sup>2</sup>	CA	222	--	--	--	300	--	--	--	351	--	--	397	--	--	385	--	--
Mt. Poso Cogen. <sup>2</sup>	CA	150	--	--	--	114	--	--	--	156	--	--	126	--	--	152	--	--
Rio Bravo Jasmin Cogen. <sup>2</sup>	CA	66	--	--	--	41	--	--	--	33	--	--	60	--	--	73	--	--
Rio Bravo Poso Cogen. <sup>2</sup>	CA	66	--	--	--	49	--	--	--	49	--	--	59	--	--	74	--	--
Stockton Cogen.	CA	121	--	--	9	135	--	15	6	141	--	22	127	--	--	137	--	--
North Valmy Power Plant	NV	1,220	58	--	--	1,356	487	--	--	1,611	527	10	1,119	645	--	1,000	1,000	--
Reid Gardner Power Plant	NV	1,756	--	48	--	1,721	--	187	--	1,490	--	330	1,510	--	356	1,777	--	--

Source: UGS coal company questionnaires

Note: This table only includes a sampling of companies that use Utah coal. This is not an exhaustive list.

<sup>1</sup>Includes coal from Canada, Montana, Oklahoma, and Pennsylvania<sup>2</sup>Reports coal purchased only in Utah

\*Forecast

## Headwaters Energy Services - Wellington Cleaning Facility

Covol Engineered Fuels, a Headwaters Energy Services company, started operation of the Wellington Cleaning Facility in 2006, across the road from the Savage loadout. The new coal cleaning facility uses a custom waterless system for removing unwanted ash with its associated sulfur and mercury. Headwaters contracts with local end users and brokers to clean high-ash coal, but also buys "waste" coal, which they then clean and resell. At full capacity, the plant is designed to process more than 750,000 short tons of coal per year and employ up to 12 individuals. The plant processed 119,000 short tons of coal in 2006.

## Canyon Fuel Company – Castle Valley Coal Preparation Plant

During 2006, Canyon Fuel Company, LLC, a subsidiary of Arch Western Bituminous Group, LLC, constructed a new coal preparation plant at the Savage Coal Terminal in Wellington, Utah. The new plant uses the same structure that once housed the old ARCO Coal plant.

The plant utilizes a heavy media process and has a cleaning capacity of 2 million short tons per year. Canyon Fuel will use the plant to optimize coal quality specifications. The plant will enable Canyon Fuel, through its sales agent Arch Coal Sales Company, to offer a premium product with a more consistent ash and heat content than coals that are not washed. In 2006, the plant processed 152,000 tons of coal, mostly from the Dugout Canyon mine, with minor amounts from the Skyline mine. Already in 2007, through the end of May, the plant has processed 287,000 tons of coal.

## COAL IMPORTED INTO UTAH

The combination of growing demand and decreasing Utah coal production helped push coal imports to record levels in 2004, when Utah consumers imported 3.2 million short tons of Wyoming and Colorado coal, up 57.5% from 2003 (table 11). The vast majority of imported coal went to the Bonanza power plant in eastern Utah, which has always used Colorado coal, but 2004 also saw several regular users of Utah coal having to look out-of-state in order to meet their needs (table 10). However, with the large increase in Utah coal production over the past two years, coal imports dropped to 1.9 million short tons in 2006, a 10-year low.

### Electric Utilities

#### Deseret Generation and Transmission Co. – Bonanza Plant

Deseret Generation and Transmission Co. (DG&T) is a cooperative of Utah and Colorado municipalities that jointly developed and operate a 458 MW coal-fired power plant located near Bonanza, Utah, a remote area of Uintah County near the Utah-Colorado border. During 2006, the Bonanza power plant purchased 1.7 million short tons of coal from the Deserado mine in Colorado, operated by Blue Mountain

Energy, a wholly owned subsidiary of DG&T (table 10). The power plant burned 2.1 million short tons of coal to generate a net of 3896 GWh of electricity in 2006, for distribution to communities served by the six cooperative organizations that control the plant.

Power plant availability reached 99.1% in 2006, with plant utilization at 97.1%. Both figures are expected to decrease to 90% and 82%, respectively, in 2007, with total net generation of 3322 GWh. Bonanza plans to purchase 1.9 million short tons of coal in 2007, all from Blue Mountain Energy, with no current plans to buy Utah coal.

DG&T has begun the permitting process for a new 86 MW circulating fluidized-bed combustion unit at the Bonanza plant. This new plant would burn waste coal from the Deserado mine.

#### Intermountain Power Agency – Intermountain Power Project

IPP imported a total of 167,000 short tons of Wyoming coal in 2006 (table 10). This is the third year that Intermountain has purchased significant amounts of out-of-state coal; 468,000 short tons was purchased in 2004 and 634,000 tons in 2005. Volatile prices, quality issues, and short supplies of Utah coal in the last few years have necessitated IPP's need to look to other states to meet demand. However, with increased supplies available in Utah, IPP has no plans to purchase out-of-state coal in 2007. If Intermountain builds a third unit, it is uncertain if the coal will primarily come from in-state mines or from other sources.

**Table 11.** Utah coal imports, 1981-2007.

Thousand short tons

Year	Electric Utilities	Coke Plants	Industrial	Res./Com.	Total
1981	8	1,030	98	0	1,136
1982	18	695	84	0	797
1983	0	854	83	0	937
1984	224	1,229	85	1	1,539
1985	193	1,289	98	0	1,580
1986	659	383	103	0	1,145
1987	905	160	100	0	1,165
1988	1,300	1,088	60	0	2,448
1989	1,400	922	45	0	2,367
1990	1,449	679	7	2	2,137
1991	1,310	695	2	0	2,007
1992	1,517	629	9	0	2,155
1993	1,501	579	20	0	2,100
1994	1,495	1,089	4	0	2,588
1995	779	1,062	0	0	1,841
1996	805	1,120	0	0	1,925
1997	1,509	1,106	0	0	2,615
1998	1,733	982	0	0	2,715
1999	1,431	728	0	0	2,159
2000	1,531	936	0	0	2,467
2001	2,028	648	0	0	2,676
2002	2,074	0	16	0	2,090
2003	2,036	0	0	0	2,036
2004	3,021	0	185	0	3,206
2005	2,776	0	10	0	2,786
2006	1,890	0	38	0	1,928
2007*	1,946	0	61	0	2,007

Source: UGS coal company questionnaires

\*Forecast

## Industrial Plants

Holcim's Devil's Slide cement plant imported 31,000 short tons of coal from Wyoming in 2006, 34.4% of their total purchases for the year (table 10). The company plans to purchase even more, 50,000 tons from Wyoming in 2007. Holcim cites coal quality issues as the main reason for purchasing out-of-state coal. Utelite, Inc. also purchased 8000 short tons of Wyoming coal in 2006, with plans to purchase 11,000 tons in 2007. Kennecott Utah Copper imported 175,000 short tons of coal from Wyoming and 2500 tons from Montana in 2004, but has not purchased any out-of-state coal since, and has no plans to do so in the future.

## Minor Coal Imports

Small amounts of coal for specialized purposes are imported into Utah from other states. Anthracite coal from Pennsylvania is burned in some residential fireplaces, and eastern coke is used by some steel fabricators and foundries. These markets are small and are declining as natural gas replaces coal in nearly all but the most remote areas, and markets for specialized uses in homes and industry are limited and relatively insignificant.

## OUTLOOK FOR UTAH'S COAL INDUSTRY

After a 10-year low in 2004, Utah coal production increased by 12.6% to 24.6 million short tons in 2005 and increased another 6.4% to 26.1 million tons in 2006. Rising coal prices, increased employment, the commencing of longwall operations at the Skyline mine, significant production increases at several other Utah mines, and the proposed opening of two new coal mines all suggest a bright future for Utah's coal industry, at least over the next several years.

In 2007, coal-fired power generation is projected to supply more than a third of worldwide electricity demand, roughly 50% of the United State's electricity needs, and about 90% of Utah's electricity generation. With Utah coal mines currently running at high levels and efficiently, Utah consumers will continue to enjoy a stable supply of electricity from coal-fired power plants, and Utah electricity prices will continue to be among the lowest in the nation. Utah will also continue to be a net exporter of electricity.

In recent years, air quality concerns, ease of construction, and demand for peaking capacity have increasingly favored natural gas as a fuel for electric generation. In fact, Utah has recently added roughly 400 megawatts (MW) of natural gas-fired electric capacity with another 490 MW planned to come online in 2007. Nevertheless, 1200 MW of new Utah coal-fired electric capacity is in the planning stage.

Utah's long-term (50 years and beyond) coal future is less certain. With the high-quality reserves being depleted in the Book Cliffs and Wasatch Plateau coal fields, coal companies will have to look to other Utah coal fields to meet future demand. However, this future use of coal is uncertain, as questions of global warming and carbon mitigation, whether through carbon taxes or caps, receive increased attention.

Emission standards remain a major undefined regulatory issue for coal combustion, and legislation and research on clean coal technology, including coal gasification and coal-

to-liquid plants, is being vigorously pursued around the world, particularly in the United States. Also, research continues on possible carbon sequestration, including a UGS test project within the Aneth oil field in southeastern Utah. For additional information about current sequestration research, visit the UGS Web site at <http://geology.utah.gov/emp/co2sequest/>.

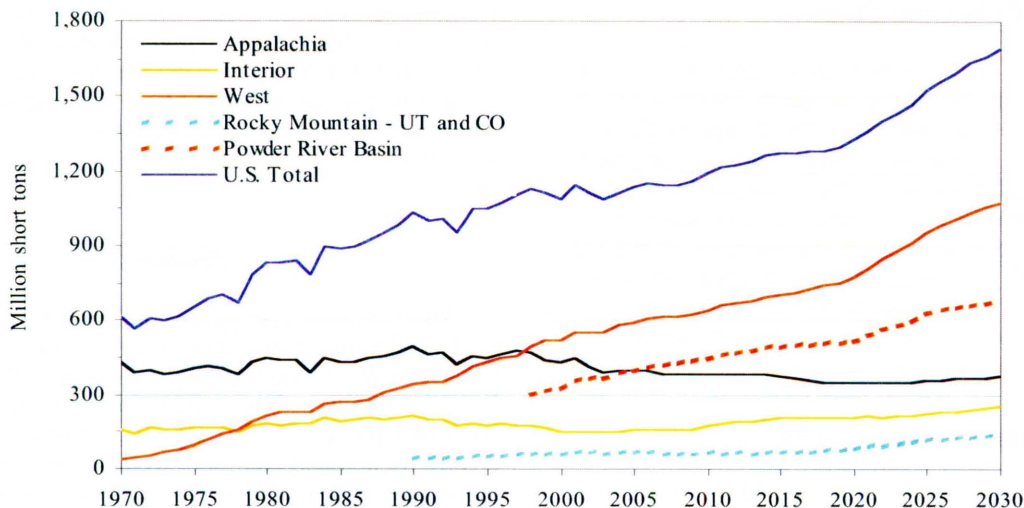
## Production

EIA's Annual Energy Outlook for 2007 predicts that U.S. coal production will increase by an average of 1.1% each year until 2015, when total production will equal 1266 million short tons. Coal production growth should be even stronger between 2015 and 2030, averaging 2.0% per year, as electricity demand continues to increase and will most likely be met by new or expanded coal-fired power plants. This increase in demand also assumes that several coal-to-liquids plants will be built. Cheap, low-sulfur coal from western mines, especially Wyoming's Powder River Basin, is expected to furnish the vast majority of the production increase predicted for the country. Powder River Basin coal is expected to increase from 411 million short tons in 2006 to roughly 680 million tons in 2030. Interior coal production is also projected to increase from 149 million short tons in 2006 to nearly 250 million tons in 2030, while Appalachian production is expected to decrease from 394 to about 370 million short tons over the same period (figure 1). Rocky Mountain production, coal from both Utah and Colorado, is expected to more than double from a 2006 total of 60 million short tons to more than 130 million tons in 2030.

Short-term projections from coal companies for Utah coal production also show a significant increase in 2007 to 26.4 million short tons, and to roughly 28 million tons in 2008, which would be a new single-year record. The majority of the increase is expected to be met as Skyline ramps up longwall production and Bear Canyon commences longwall mining. Other increases are expected at West Ridge, Aberdeen, and Horizon. These production increases will make up for the dwindling production at the Crandall Canyon facility, which is expected to close in the next few years. Production should remain at the 25 to 27 million short tons per year range for the foreseeable future as proposed mines, like Lila Canyon or Coal Hollow, replace declining production from current mines.

## Prices

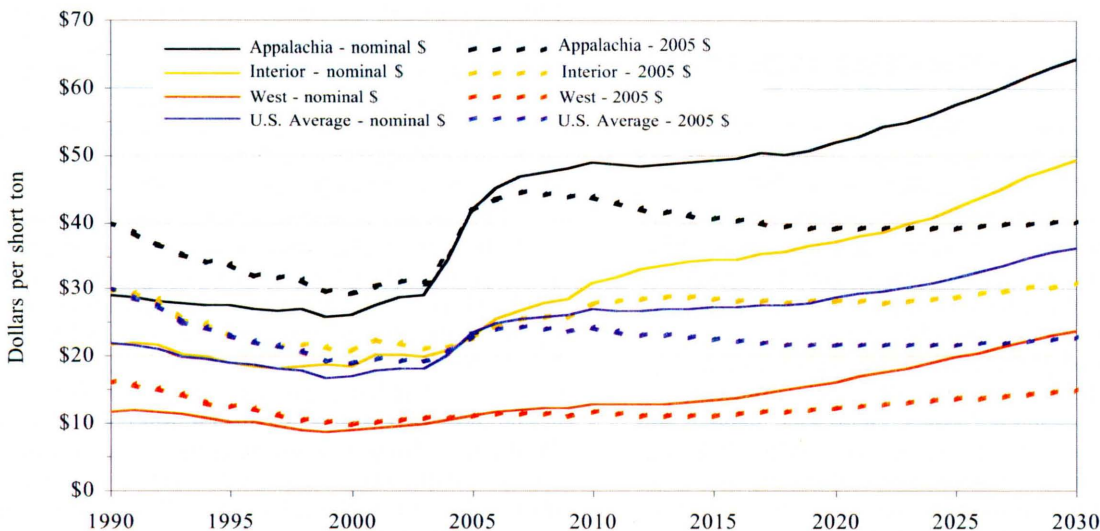
EIA projects that the average minemouth coal price in the United States should increase from \$24.84 per short ton in 2006 (all prices in nominal dollars) to around \$27.00 per short ton by 2015 (figure 2), equating to about an average 0.7% increase each year. This more moderate increase is expected for several reasons including improvements in mining productivity and a continuing shift to low-cost coal from Wyoming's Powder River Basin. Between 2015 and 2030, the average U.S. coal price is projected to increase by an average of 2.0% each year to about \$36.00 per short ton as predicted rising natural gas prices and the need for baseload generating capacity result in the expansion or new construction of coal-fired power plants. The average minemouth price of Rocky Mountain (Utah and Colorado) coal was



**Figure 1.** U.S. coal production by region, 1970-2030.

Source: U.S. Energy Information Administration, Annual Energy Outlook 2007

Note: Data available in appendix table A1



**Figure 2.** Average minemouth price of U.S. coal by region, 1990-2030.

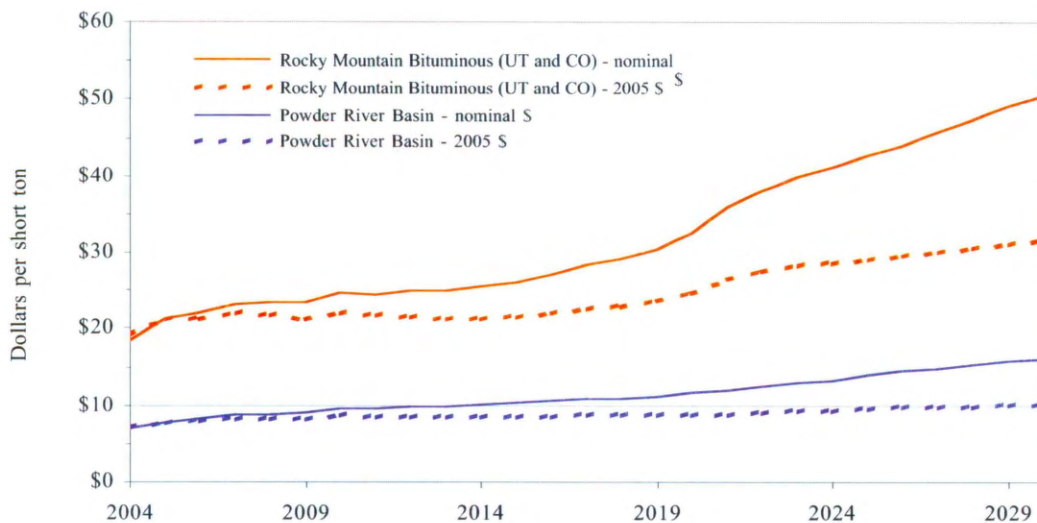
Source: U.S. Energy Information Administration, Annual Energy Outlook 2007

Note: Data available in appendix table A2

\$21.93 per short ton in 2006 and is predicted to steadily increase at an average rate of 3.6% to roughly \$50.50 per ton in 2030 (figure 3). In comparison, Powder River Basin coal is predicted to rise from \$8.00 per ton to \$16.00 at an average rate of 2.8% per year, Appalachian coal from \$45.00 to \$64.00 at an average rate of 1.5% per year, and Interior coal will rise from \$25.50 to \$49.00 at an average rate of 2.8% per year.

According to responses from UGS questionnaires, the average FOB price for Utah coal decreased from \$18.47 per short ton in 2002 to \$16.64 in 2003, the lowest price in the past 30 years. Since 2003, prices have increased by 35.3% to an average price of \$22.51 per short ton in 2006 (table 2;

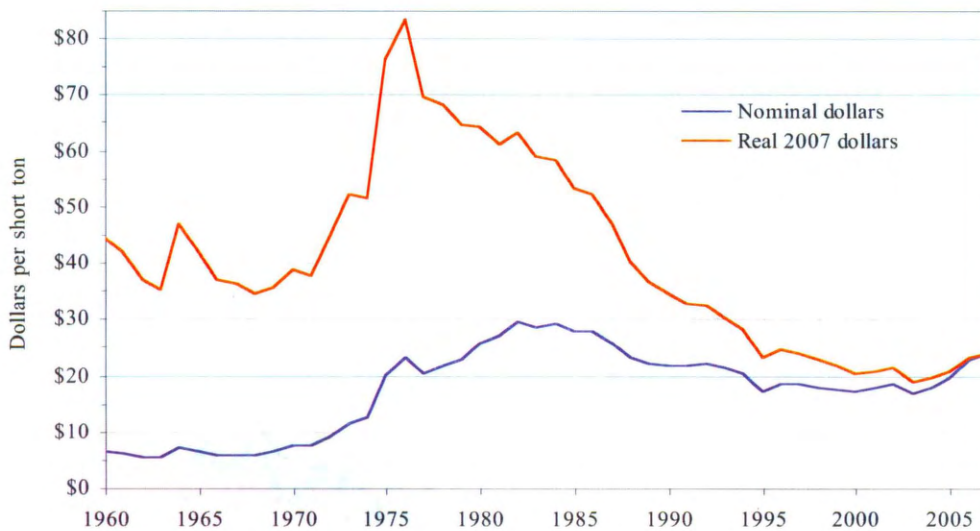
figure 4). The average price of Utah coal is strongly influenced by long-term contracts; some Utah mines were selling coal in 2006 for only about \$18.00 per short ton. Conversely, current spot prices for Utah coal are as high as \$33.00 per short ton, which indicates there will be upward pressure on the price for Utah coal in coming years. The average Utah coal price is estimated to increase another 4.9% to \$23.62 per short ton in 2007 and could reach \$24.50 by 2008. Also, as mining becomes more difficult and ash contents rise, washing some of the coal might be the only option for operators to meet coal-quality standards set in their contracts. Coal washing has already started at the new Castle Valley Preparation Plant and the Wellington Cleaning Facility. Washing



**Figure 3.** Average minemouth price of Rocky Mountain and Powder River Basin coal, 2004-2030.

Source: U.S. Energy Information Administration, Annual Energy Outlook 2007

Note: Data available in appendix table A2



**Figure 4.** Average FOB price of Utah coal, 1960-2007.

Source: UGS coal company questionnaires

Note: 2007 value is estimated, FOB - Free on board, data available in table 2

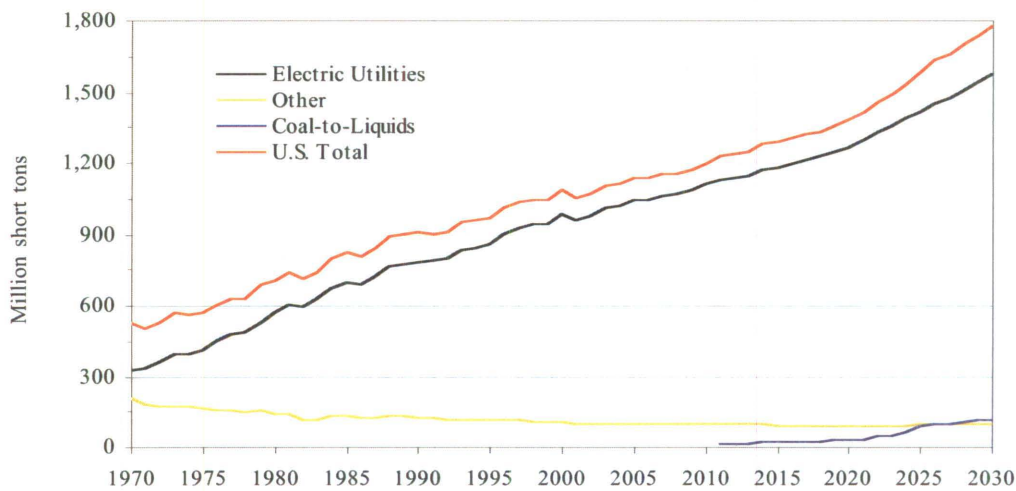
coal adds roughly \$2.00 to \$4.00 to its delivered price. However, Utah coal will always have to compete with lower-cost Powder River Basin coal, which puts downward pressure on Utah’s coal price.

### Distribution and Consumption

EIA projects U.S. domestic consumption of coal for all uses will total 1147 million short tons in 2007, of which 1058 million short tons, or 92.2%, will be consumed at electric

utility plants. Looking ahead, U.S. consumption should increase by an average of 1.9% per year and total 1772 million short tons by 2030, with 1570 million short tons going to electric utilities (figure 5). EIA also predicts that a total of 112 million short tons will be consumed at new coal-to-liquids plants by 2030.

For 2006 and beyond, increased distribution of Utah coal is expected to parallel predicted production increases. For example, as production increased 6.4% in 2006, distribution of Utah coal also increased by 0.4% to 24.8 million short tons (table 8). A more significant distribution increase of



**Figure 5.** U.S. coal consumption by sector, 1970-2030.

Source: U.S. Energy Information Administration, Annual Energy Outlook, 2007  
 Note: Data available in appendix table A3

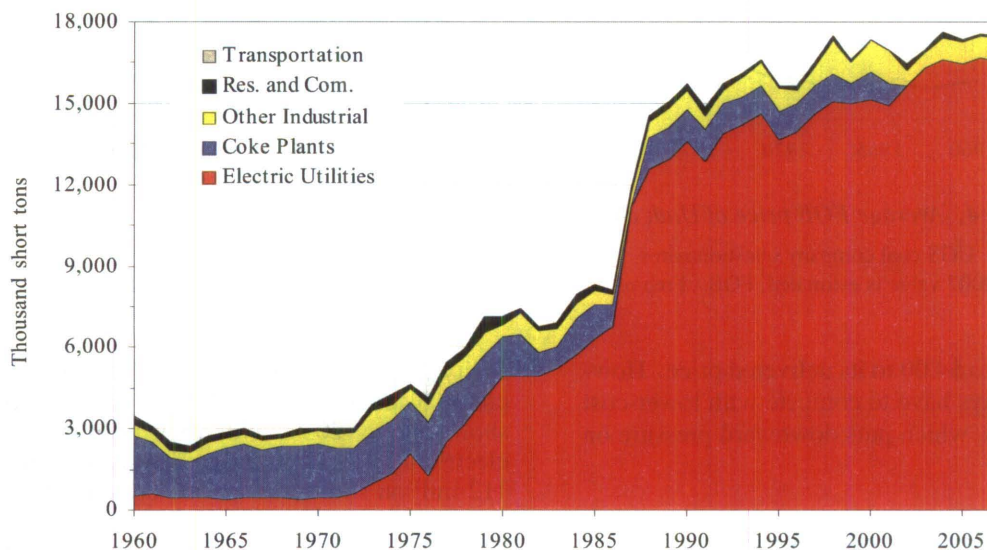
5.3% is expected for 2007, bringing Utah’s total distribution to 26.2 million short tons.

Coal demand in Utah is expected to follow demand for electricity, which continues to increase with increases in population. According to UGS questionnaire responses, coal consumption for power generation totaled a record-high 16.6 million short tons in 2006 and accounted for 94.7% of all coal used in the state (figure 6). This total is expected to decrease slightly to 16.5 million short tons in 2007. In the last few years, even with the rising costs of natural gas, Utah has experienced a surge in natural gas-fired power plants with over 400 megawatts of new capacity, and another 490 megawatts coming online in 2007. This new capacity has dropped coal’s percentage of Utah’s total electric generation from 94.2% in 2005 to 89.7% in 2006, with another decrease

expected for 2007. Despite this addition of cleaner-burning natural gas, Utah remains dependant on coal for the vast majority of its baseload capacity. The proposed expansion of IPP, as well as the proposed coal plant near Sigurd, could increase demand for Utah coal by 3.5 to 4.0 million short tons per year. If Utah mines cannot meet growing coal demand, plants such as IPP, which has the ability to burn lower-rank coals, may need to import coal from places like Wyoming.

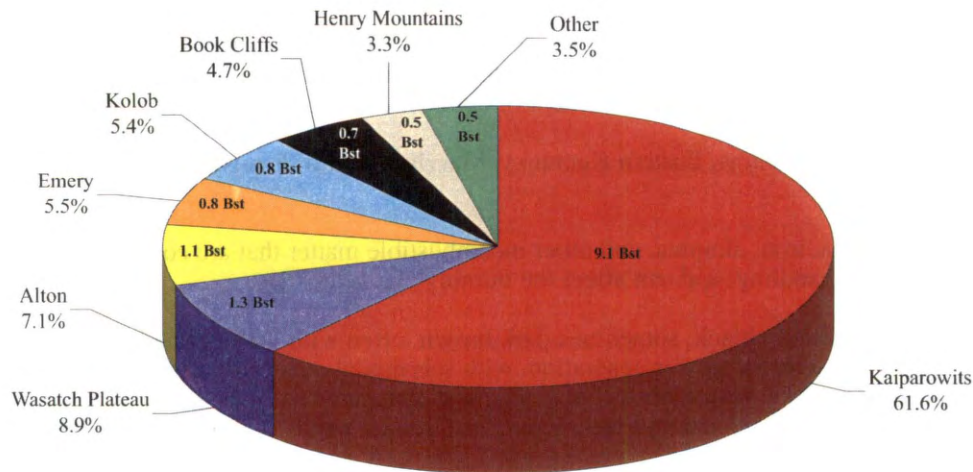
### Reserves

The Kaiparowits Plateau coal field is estimated to contain about 9.1 billion short tons, or 61.6%, of Utah’s remaining recoverable coal reserves, but most of this coal is un-



**Figure 6.** Consumption of coal in Utah by end use, 1960-2007.

Source: U.S. Energy Information Administration, 2006 Annual Coal Report, 2005; UGS  
 Note: 2007 values are estimated, data available in appendix table A4



**Figure 7.** Remaining recoverable reserves in Utah by coal field, 2006.

Source: Smith and Jahanbani, 1988; Quick and others, 2004; Bon and others, 2006

Note: Bst - Billion short tons, data available in appendix table A5

available for development due to its location within the Grand Staircase-Escalante National Monument (figure 7). Other nonproducing coal fields in Utah with good quality resources are farther from transportation networks and less economic to mine. As a result, Utah coal production will continue to rely heavily on reserves in the Wasatch Plateau coal field, estimated at 1.3 billion short tons; the Emery coal field, estimated at 0.8 billion short tons; and the Book Cliffs coal field, with reserves estimated at 0.7 billion short tons.

Most of Utah's mining companies generally have 10 to 15 years worth of coal reserves under lease. This time frame changes little from year to year as the companies are constantly applying for new leases on nearby land to replace reserves depleted by production. The Cottonwood and North Horn tracts, both located in the Wasatch Plateau, may represent the last large virgin tracts of good quality, accessible coal, that are not already adjacent to an operating mine. Combined reserves in these two tracts could exceed 175 mil-

lion short tons and provide 20 to 30 years of steady production for two longwall operations. In addition, large reserves exist in the southern Book Cliffs and are being pursued by UtahAmerican Energy. As demand for Utah coal continues to increase, reserves in other coal fields may become attractive to mine. For example, the newly proposed mine in the Alton coal field could produce up to 2.0 million short tons per year from a projected reserve base of 40 to 45 million short tons.

The gradual depletion of central Utah's "easy" coal turns interest toward more difficult and/or lower-quality reserves. For example, the Emery mine in the southern portion of the Emery coal field is located near unleased reserves that could total more than 100 million short tons, including reserves in the Hidden Valley area. These reserves, and others, may become more attractive if prices increase and coal washing becomes more economic.

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## GLOSSARY

**Anthracite** - The highest rank of coal, used primarily for residential and commercial space heating. It is a hard, brittle, and black lustrous coal, containing a high percentage of fixed carbon and a low percentage of volatile matter. The moisture content of fresh-mined anthracite generally is less than 15%. The heat content of anthracite ranges from 11,000 to 14,000 Btu per pound.

**Appalachian Region** - Consists of Alabama, Eastern Kentucky, Maryland, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

**Ash** - Impurities consisting of silica, iron, alumina, and other incombustible matter that are contained in coal. Ash increases the weight of coal, adds to the cost of handling, and can affect the burning characteristics.

**Bituminous coal** - A dense coal, usually black, sometimes dark brown, often with well-defined bands of bright and dull material, used primarily as fuel in steam-electric power generation, with substantial quantities also used for heat and power applications in manufacturing and to make coke. Bituminous coal is the most abundant coal in active U.S. mining regions. Its moisture content usually is less than 20%. The heat content of bituminous coal ranges from 10,500 to 15,000 Btu per pound.

**Bounce** - A sudden outburst of coal and rock that occurs when stresses in a coal pillar, left for support in underground workings, cause the pillar to rupture without warning, sending coal and rock flying with explosive force.

**British thermal unit (Btu)** - The amount of heat needed to raise the temperature of 1 pound of water by 1 degree Fahrenheit.

**Cogeneration power plant** - A generating facility that produces electricity and another form of useful thermal energy (such as heat or steam) used for industrial, commercial, heating, and cooling purposes. To receive status as a qualifying facility under the Public Utility Regulatory Policies Act, the facility must produce electric energy and "another form of useful thermal energy through the sequential use of energy," and meet certain ownership, operating, and efficiency criteria established by the Federal Energy Regulatory Commission.

**Coke (coal)** - A solid carbonaceous residue derived from low-ash, low-sulfur bituminous coal from which the volatile constituents are driven off by baking in an oven at temperatures as high as 2000 degrees Fahrenheit so that the fixed carbon and residual ash are fused together. Coke is used as a fuel and as a reducing agent in smelting iron ore in a blast furnace. Coke from coal is grey, hard, and porous and has a heating value of 12,400 Btu per pound.

**Continuous mining** - A form of room-and-pillar mining in which a continuous mining machine extracts and removes coal from the working face in one operation; no blasting is required.

**Electric utility sector** - The electric utility sector consists of privately and publicly owned establishments that generate, transmit, distribute, or sell electricity primarily for use by the public, and that meet the definition of an electric utility. Nonutility power producers are not included in the electric utility sector.

**Field** - An area consisting of a single coal deposit or multiple deposits all grouped on, or related to, the same individual geological structural feature and/or stratigraphic condition. There may be two or more deposits in a field that are separated vertically by intervening strata or laterally by local geologic barriers, or by both.

**Fluidized-bed combustion** - A method of burning particulate fuel, such as coal, in which the amount of air required for combustion far exceeds that found in conventional burners. The fuel particles are continually fed into a bed of mineral ash in the proportions of 1 part fuel to 200 parts ash, while a flow of air passes up through the bed, causing it to act like a turbulent fluid.

**F.O.B. mine price** - The free on board mine price. This is the price paid for coal at the mining operation site. It excludes freight or shipping and insurance costs.

**Generator capacity** - The maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, adjusted for ambient conditions.

**Gob** - Coal leftover from underground mining in the form of cave-ins or waste piles.

**Industrial sector** - The industrial sector comprises manufacturing industries, which make up the largest part of the sector, along with mining, construction, agriculture, fisheries, and forestry. Establishments in the sector range from steel mills, to small farms, to companies assembling electronic components.

**Interior Region** - Consists of Arkansas, Illinois, Indiana, Kansas, Louisiana, Mississippi, Missouri, Oklahoma, Texas, and West-ern Kentucky.

**Longwall mining** - An automated form of underground coal mining characterized by high recovery and extraction rates, feasible only in relatively flat-lying, thick, and uniform coalbeds. A high-powered cutting machine is passed across the exposed face of coal, shearing away broken coal, which is continuously hauled away by a floor-level conveyor system. Longwall mining extracts all machine-minable coal between the floor and ceiling within a contiguous block of coal, known as a panel, leaving no support pillars within the panel area. Panel dimensions vary over time and with mining conditions but currently average about 900 feet wide (coal face width) and more than 8000 feet long (the minable extent of the panel, measured in direction of mining). Longwall mining is done under movable roof supports that are advanced as the bed is cut. The roof in the mined-out area is allowed to fall as the mining advances.

**Metallurgical coal** - Coking coal and pulverized coal consumed in making steel.

**Moisture** - A measure of the coal's natural inherent or bed moisture, but not including water adhering to the surface.

**Net generation** - The amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries.

**Nominal price** - The price paid for a product or service at the time of the transaction. The nominal price, which is expressed in current dollars, is not inflation adjusted.

**Powder River Basin** - Consists of the Montana counties of Big Horn, Custer, Powder River, Rosebud, and Treasure, and the Wyoming counties of Campbell, Converse, Crook, Johnson, Natrona, Niobrara, Sheridan, and Weston.

**Real price** - A price that has been adjusted for inflation.

**Reserves** - That portion of the demonstrated reserve base that is estimated to be recoverable at the time of determination. The reserve is derived by applying a recovery factor to that component of the identified resources of coal designated as the demonstrated reserve base.

**Residential and commercial sector** - Housing units; wholesale and retail businesses (except coal wholesale dealers); health institutions (hospitals); social and educational institutions (schools and universities); and Federal, State, and local governments (military installations, prisons, office buildings).

**Seam** - A bed of coal lying between a roof and floor.

**Spot price** - The price for a one-time open market transaction for immediate delivery of a specific quantity of product at a specific location where the commodity is purchased "on the spot" at current market rates.

**Subbituminous coal** - A coal whose properties range from those of lignite to those of bituminous coal and used primarily as fuel for steam-electric power generation. It may be dull, dark brown to black, soft and crumbly, at the lower end of the range, to bright, jet black, hard, and relatively strong, at the upper end. Subbituminous coal contains 20% to 30% inherent moisture by weight. The heat content of subbituminous coal ranges from 8500 to 12,000 Btu per pound.

**Sulfur** - One of the elements present in varying quantities in coal that contributes to environmental degradation when coal is burned.

**Synfuel** - Coal that has been processed by a coal synfuel plant; and coal-based fuels such as briquettes, pellets, or extrusions, which are formed by binding materials and processes that recycle material.

**Waste coal** - Usable coal material that is a byproduct of previous processing operations or is recaptured from what would otherwise be refuse.

**Western Region** - Consists of Alaska, Arizona, Colorado, Montana, New Mexico, North Dakota, Utah, Washington, and Wyoming.

**APPENDIX**  
**ADDITIONAL UTAH AND U.S. COAL-RELATED DATA**

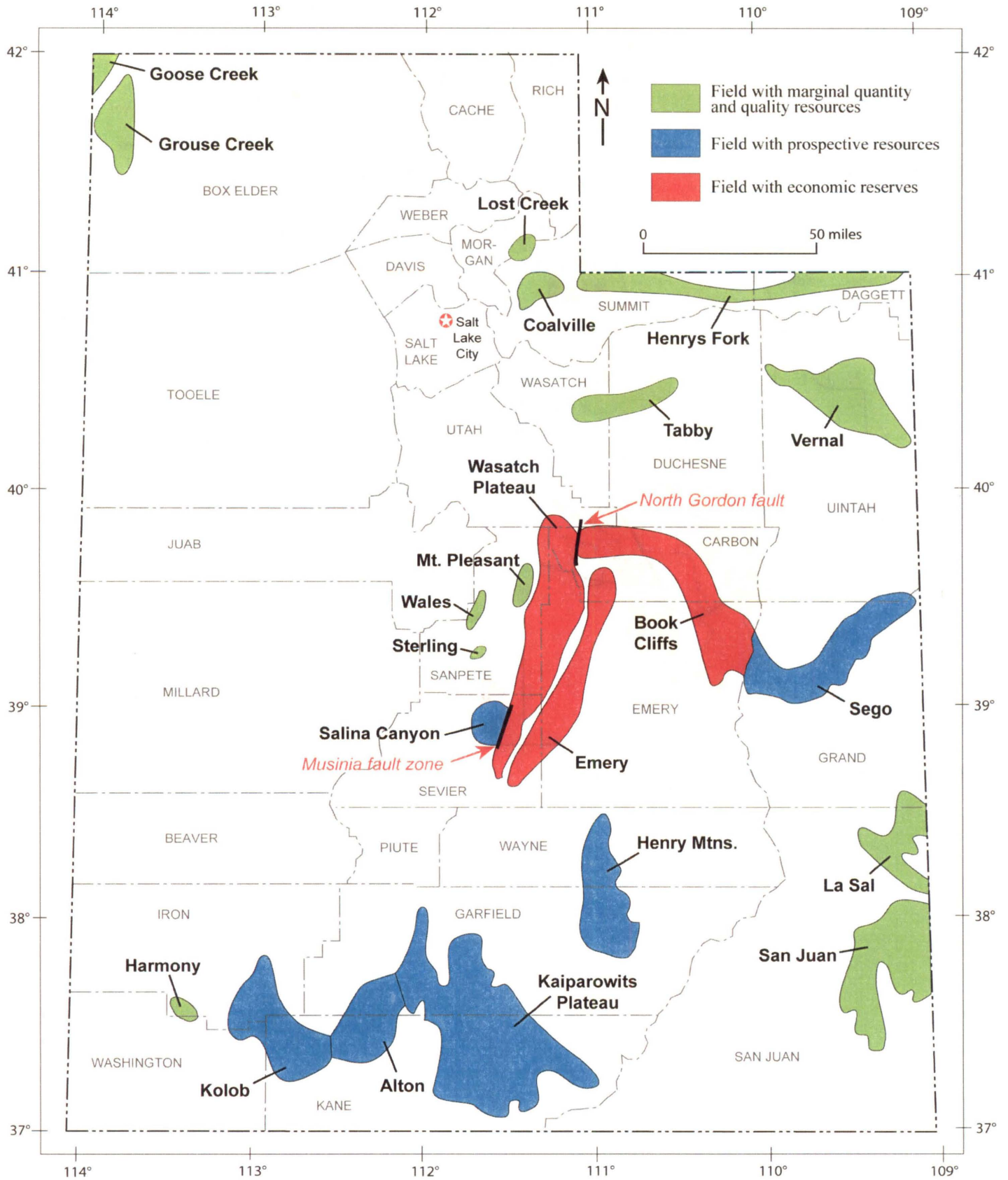


Figure A1. Location and significance of Utah coal fields.

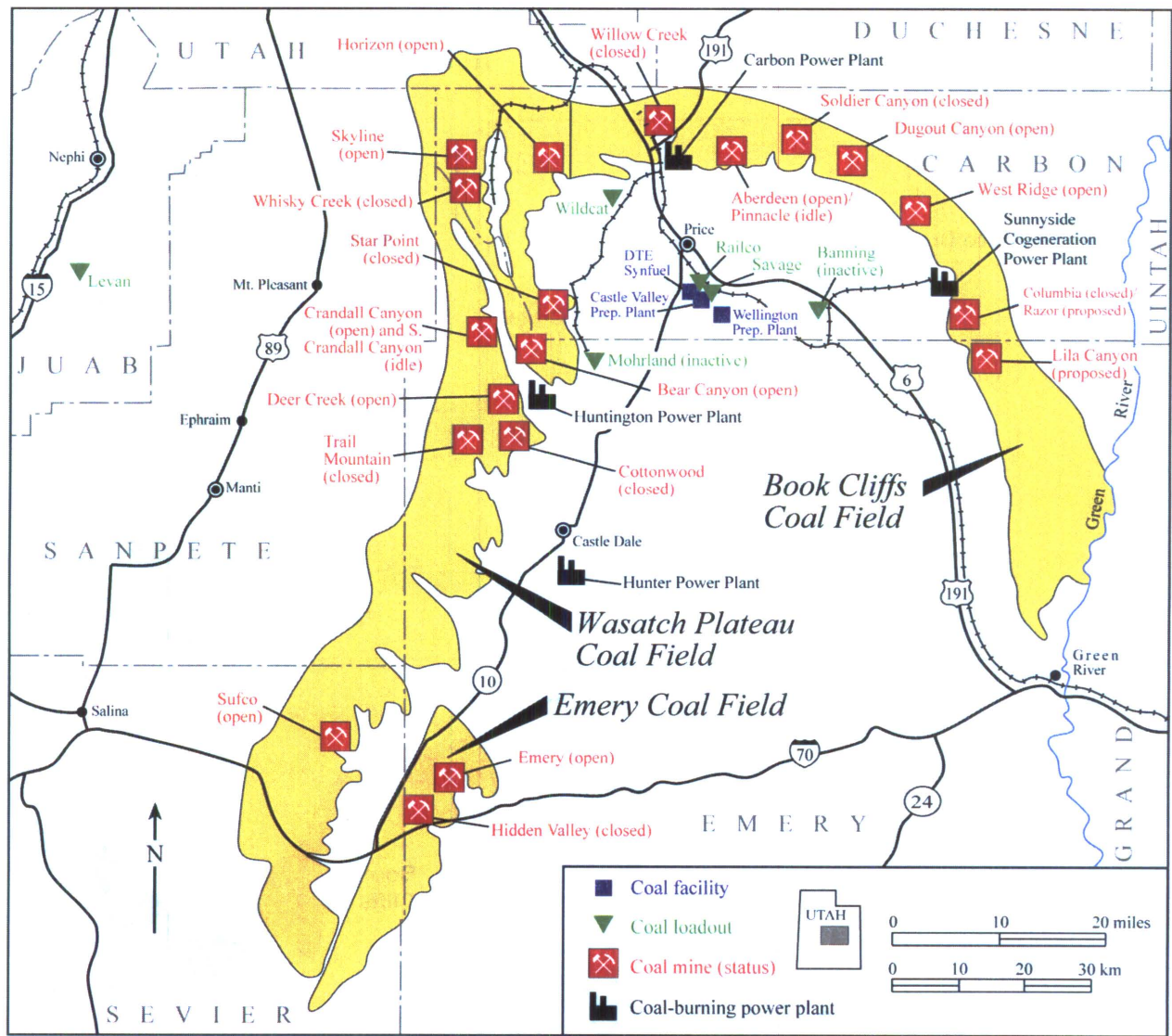


Figure A2. Location and status of Utah coal mining operations.

**Table A1. U.S. coal production by region, 1970-2030.**

Million short tons

Year	Appalachia	Interior	West	Rocky Mountain - UT and CO	Powder River Basin	U.S. Total
1970	427.6	149.9	35.1	na	na	612.6
1971	382.3	136.3	42.3	na	na	560.9
1972	394.4	157.5	50.6	na	na	602.5
1973	381.6	156.4	60.5	na	na	598.5
1974	384.3	150.2	75.5	na	na	610.0
1975	402.7	162.1	89.8	na	na	654.6
1976	412.4	162.0	110.6	na	na	685.0
1977	399.7	163.8	133.8	na	na	697.3
1978	374.9	146.2	149.0	na	na	670.1
1979	429.5	170.2	181.4	na	na	781.1
1980	444.3	176.3	209.1	na	na	829.7
1981	433.0	166.6	224.1	na	na	823.7
1982	433.2	178.2	226.8	na	na	838.2
1983	383.1	173.7	225.3	na	na	782.1
1984	444.0	198.0	253.8	na	na	895.8
1985	427.2	187.8	268.7	na	na	883.7
1986	428.5	196.6	265.2	na	na	890.3
1987	443.3	201.7	273.8	na	na	918.8
1988	449.4	193.0	307.9	na	na	950.3
1989	464.5	197.9	318.4	na	na	980.8
1990	489.0	205.7	334.4	40.9	na	1,029.1
1991	457.8	195.4	342.8	39.7	na	996.0
1992	462.6	195.7	345.3	40.2	na	1,003.5
1993	416.1	167.2	368.5	43.6	na	951.8
1994	453.3	179.9	408.3	49.7	na	1,041.4
1995	443.4	168.5	429.6	50.8	na	1,041.5
1996	460.7	172.8	439.1	52.0	na	1,072.7
1997	475.9	170.9	451.3	53.8	na	1,098.0
1998	469.4	168.4	488.8	56.2	293.4	1,126.5
1999	435.2	162.5	512.3	56.5	316.9	1,110.0
2000	429.5	143.5	510.7	56.0	323.0	1,083.7
2001	443.4	147.0	547.9	60.4	354.0	1,138.3
2002	408.1	146.9	550.4	60.4	359.5	1,105.4
2003	388.4	146.3	548.7	58.9	363.4	1,083.4
2004	390.7	146.3	575.2	61.7	381.7	1,112.1
2005	397.3	149.2	585.0	63.1	390.2	1,131.5
2006	394.0	149.4	605.2	60.3	411.3	1,148.6
2007	379.2	153.1	610.8	59.5	420.1	1,143.1
2008	377.3	153.9	613.3	56.2	425.2	1,144.6
2009	380.0	156.6	622.1	55.4	435.6	1,158.7
2010	380.7	171.2	636.8	62.0	440.1	1,188.7
2011	378.1	178.2	658.1	59.9	461.2	1,214.4
2012	377.3	183.7	664.5	60.9	468.3	1,225.4
2013	377.9	186.8	672.7	58.9	475.0	1,237.4
2014	375.0	192.3	692.9	60.7	488.8	1,260.2
2015	370.8	198.6	696.6	62.4	489.3	1,266.0
2016	362.5	199.0	710.3	65.9	496.9	1,271.9
2017	357.4	196.9	724.4	67.8	501.8	1,278.8
2018	342.0	200.0	737.6	71.7	503.6	1,279.6
2019	343.5	203.0	750.0	75.1	507.3	1,296.4
2020	348.2	202.7	772.2	80.0	515.2	1,323.1
2021	348.0	206.7	802.9	86.3	535.4	1,357.6
2022	347.7	204.8	846.6	92.1	562.5	1,399.0
2023	347.6	208.7	875.2	98.4	576.9	1,431.5
2024	347.8	212.5	906.1	103.8	596.3	1,466.5
2025	350.7	215.1	951.1	108.7	625.9	1,517.0
2026	356.8	222.2	983.6	113.7	642.7	1,562.6
2027	361.2	226.2	1,003.6	119.2	649.7	1,591.0
2028	364.9	235.9	1,026.8	124.3	660.6	1,627.7
2029	365.6	243.7	1,049.1	129.1	669.0	1,658.4
2030	372.7	246.5	1,071.8	134.2	679.0	1,691.0

Source: U.S. Energy Information Administration, Annual Energy Outlook, 2007

Note: The 2006 total is forecast, hence it does not match the actual 2006 total recorded in table 1.

**Table A2. Average minemouth price of U.S. coal by region, 1990-2030.**

Dollars per short ton

Year	Appalachia		Interior		West		Rocky Mountain – Utah and Colorado – (bituminous)		Powder River Basin		U.S. Average	
	Nominal dollars	Real 2005 dollars	Nominal dollars	Real 2005 dollars	Nominal dollars	Real 2005 dollars	Nominal dollars	Real 2005 dollars	Nominal dollars	Real 2005 dollars	Nominal dollars	Real 2005 dollars
1990	28.89	39.87	21.45	29.60	11.60	16.01	na	na	na	na	21.76	30.03
1991	28.69	38.25	21.86	29.15	11.71	15.62	na	na	na	na	21.49	28.65
1992	27.94	36.58	21.61	28.29	11.60	15.19	na	na	na	na	21.03	27.53
1993	27.64	35.08	20.03	25.41	11.14	14.14	na	na	na	na	19.85	25.19
1994	27.36	33.98	19.87	24.68	10.57	13.13	na	na	na	na	19.41	24.10
1995	27.45	33.69	18.81	23.09	10.15	12.46	na	na	na	na	18.83	23.11
1996	26.79	32.02	18.41	22.01	10.03	11.99	na	na	na	na	18.50	22.11
1997	26.55	31.55	17.91	21.28	9.52	11.32	na	na	na	na	18.14	21.55
1998	26.85	31.43	18.45	21.60	8.76	10.26	na	na	na	na	17.67	20.69
1999	25.58	29.47	18.52	21.34	8.59	9.90	na	na	na	na	16.63	19.16
2000	25.99	29.24	18.37	20.66	8.72	9.82	na	na	na	na	16.78	18.88
2001	27.55	30.50	20.14	22.30	9.06	10.03	na	na	na	na	17.59	19.47
2002	28.68	30.99	20.12	21.73	9.55	10.32	na	na	na	na	17.90	19.34
2003	29.02	31.02	19.65	21.00	9.84	10.52	na	na	na	na	17.93	19.17
2004	34.31	35.36	20.66	21.30	10.24	10.55	18.35	18.92	6.85	7.06	20.07	20.68
2005	41.65	41.65	22.84	22.84	11.02	11.02	21.25	21.25	7.49	7.49	23.34	23.34
2006	45.02	43.53	25.50	24.66	11.54	11.15	21.93	21.20	8.14	7.87	24.84	24.02
2007	46.53	44.28	26.61	25.32	11.86	11.28	22.99	21.88	8.48	8.07	25.34	24.11
2008	47.34	43.96	27.72	25.74	12.00	11.14	23.26	21.60	8.67	8.05	25.77	23.93
2009	47.75	43.61	28.22	25.78	12.11	11.06	23.26	21.24	8.87	8.10	25.98	23.73
2010	48.67	43.84	30.77	27.72	12.78	11.52	24.39	21.97	9.43	8.49	26.87	24.20
2011	48.53	42.97	31.63	28.01	12.61	11.16	24.31	21.52	9.48	8.39	26.58	23.54
2012	48.14	41.90	32.67	28.43	12.63	10.99	24.70	21.49	9.53	8.29	26.57	23.12
2013	48.44	41.47	33.35	28.55	12.77	10.94	24.83	21.25	9.70	8.30	26.77	22.92
2014	48.79	41.09	33.95	28.59	13.05	10.99	25.25	21.26	9.92	8.36	26.87	22.63
2015	48.95	40.55	34.16	28.29	13.36	11.07	25.91	21.46	10.11	8.37	27.05	22.41
2016	49.41	40.26	34.40	28.03	13.73	11.19	26.97	21.97	10.35	8.43	27.13	22.11
2017	50.14	39.89	35.10	27.93	14.32	11.40	28.13	22.38	10.69	8.50	27.53	21.91
2018	49.92	39.35	35.31	27.84	14.68	11.58	28.92	22.80	10.79	8.51	27.33	21.54
2019	50.57	39.01	36.20	27.93	15.26	11.77	30.28	23.36	11.07	8.54	27.89	21.51
2020	51.64	39.00	36.98	27.93	15.95	12.05	32.44	24.50	11.40	8.61	28.57	21.58
2021	52.70	39.08	37.79	28.02	16.75	12.42	35.65	26.43	11.76	8.72	29.17	21.63
2022	53.92	39.08	38.47	27.89	17.52	12.70	37.85	27.44	12.29	8.91	29.63	21.48
2023	54.77	38.91	39.54	28.10	18.16	12.90	39.58	28.12	12.67	9.01	30.17	21.43
2024	55.69	38.91	40.57	28.35	18.86	13.18	40.86	28.55	13.17	9.20	30.74	21.48
2025	57.37	39.09	42.04	28.64	19.79	13.48	42.58	29.01	13.86	9.44	31.64	21.55
2026	58.56	39.28	43.50	29.18	20.46	13.72	43.95	29.48	14.24	9.55	32.43	21.75
2027	60.03	39.43	45.02	29.57	21.27	13.97	45.60	29.95	14.67	9.63	33.45	21.97
2028	61.32	39.60	46.80	30.22	22.06	14.25	47.18	30.46	15.08	9.74	34.45	22.24
2029	62.94	39.73	47.91	30.24	22.93	14.48	49.12	31.01	15.55	9.82	35.42	22.36
2030	63.98	39.99	49.04	30.65	23.53	14.70	50.47	31.55	15.86	9.91	36.16	22.60

Source: U.S. Energy Information Administration, Annual Energy Outlook, 2007

**Table A3.** U.S. coal consumption by sector, 1970-2030.

Million short tons

Year	Electric Utilities	Other	Coal-to-Liquids	U.S. Total	Year	Electric Utilities	Other	Coal-to-Liquids	U.S. Total
1970	320	203	--	523	2001	957	94	--	1,050
1971	327	174	--	502	2002	976	90	--	1,066
1972	352	173	--	524	2003	1,005	90	--	1,095
1973	389	173	--	563	2004	1,016	91	--	1,107
1974	392	167	--	558	2005	1,039	89	--	1,128
1975	406	157	--	563	2006	1,043	92	--	1,135
1976	448	155	--	604	2007	1,058	89	--	1,147
1977	477	148	--	625	2008	1,061	91	--	1,152
1978	481	144	--	625	2009	1,079	90	--	1,169
1979	527	153	--	681	2010	1,104	90	--	1,195
1980	569	133	--	703	2011	1,121	91	10	1,222
1981	597	136	--	733	2012	1,132	90	11	1,233
1982	594	113	--	707	2013	1,145	89	11	1,245
1983	625	111	--	737	2014	1,168	89	15	1,272
1984	664	127	--	791	2015	1,178	89	15	1,282
1985	694	124	--	818	2016	1,195	88	15	1,299
1986	685	119	--	804	2017	1,209	88	18	1,315
1987	718	119	--	837	2018	1,222	88	21	1,331
1988	758	125	--	884	2019	1,239	88	24	1,350
1989	772	123	--	895	2020	1,262	88	26	1,377
1990	781	122	--	903	2021	1,292	88	29	1,409
1991	784	115	--	899	2022	1,323	89	43	1,454
1992	795	113	--	908	2023	1,356	89	45	1,489
1993	832	112	--	944	2024	1,384	89	60	1,532
1994	838	113	--	951	2025	1,411	89	82	1,582
1995	850	112	--	962	2026	1,442	89	97	1,628
1996	897	109	--	1,006	2027	1,472	90	97	1,659
1997	921	109	--	1,030	2028	1,505	90	104	1,699
1998	937	100	--	1,037	2029	1,538	90	108	1,735
1999	941	98	--	1,039	2030	1,570	90	112	1,772
2000	983	98	--	1,081					

Source: U.S. Energy Information Administration, Annual Energy Outlook, 2007



**Table A4.** Consumption of coal in Utah by end use, 1960-2007.

Thousand short tons

Year	Electric Utilities <sup>1</sup>	Coke Plant	Other Industrial	Residential & Commercial	Transportation	Total
1960	515	2,195	445	249	45	3,449
1961	563	1,910	383	243	10	3,110
1962	462	1,414	338	275	7	2,497
1963	447	1,351	342	228	6	2,374
1964	411	1,676	392	204	8	2,690
1965	363	1,892	414	181	8	2,857
1966	440	1,961	409	185	7	3,003
1967	410	1,829	330	180	5	2,753
1968	417	1,903	359	119	5	2,803
1969	375	1,951	496	161	4	2,988
1970	435	1,959	518	109	4	3,025
1971	417	1,841	545	240	3	3,047
1972	571	1,705	586	161	2	3,024
1973	984	1,890	811	199	2	3,886
1974	1,296	1,984	627	355	1	4,263
1975	2,026	1,932	546	131	0	4,636
1976	1,267	1,959	683	208	0	4,117
1977	2,511	1,991	644	282	0	5,429
1978	3,148	1,700	826	281	0	5,954
1979	4,151	1,569	842	542	0	7,104
1980	4,895	1,473	501	237	0	7,106
1981	4,956	1,477	804	196	0	7,432
1982	4,947	845	818	177	0	6,787
1983	5,223	831	627	191	0	6,873
1984	5,712	1,326	608	259	0	7,905
1985	6,325	1,254	472	252	0	8,303
1986	6,756	785	380	191	0	8,112
1987	11,175	0	507	124	0	11,807
1988	12,544	1,176	597	196	0	14,513
1989	12,949	1,178	686	231	0	15,044
1990	13,563	1,231	676	267	0	15,738
1991	12,829	1,192	508	305	0	14,834
1992	13,857	1,114	525	223	0	15,719
1993	14,210	1,005	727	121	0	16,063
1994	14,656	1,007	835	105	0	16,603
1995	13,693	990	915	77	0	15,675
1996	13,963	1,047	512	94	0	15,615
1997	14,654	1,020	709	123	0	16,507
1998	15,094	971	1,304	113	0	17,482
1999	15,011	741	744	114	0	16,611
2000	15,164	984	1,166	59	0	17,373
2001	14,906	806	1,235	60	0	17,007
2002	15,644	0	592	198	0	16,434
2003	16,302	0	611	61	0	16,974
2004	16,606	0	795	213	0	17,614
2005	16,484	0	800	45	0	17,329
2006	16,647	0	871	58	0	17,576
2007*	16,543	0	871	49	0	17,463

Source: U.S. Energy Information Administration, 2006 Annual Coal Report, 2005; UGS

Note: Consumption differs from distribution (Table 7) because of additional consumption from consumer stockpiles.

<sup>1</sup>Includes waste coal burned at Sunnyside Cogeneration

\*Forecast

**Table A5. Utah coal reserves by coal field, 2006.**

Million short tons

Coal Field	Original Principal Reserves	Original Recoverable Reserves	Cumulative Production 1870-2006	Remaining Recoverable Reserves	% of Remaining Recoverable Reserves
Kaiparowits	22,740.0	9,096.0	0.1	9,095.9	61.6%
Wasatch Plateau	6,378.9	1,913.7	602.3	1,311.4	8.9%
Alton	2,155.0	1,055.7	0.0	1,055.7	7.1%
Emery	2,336.0	817.6	12.3	805.3	5.5%
Kolob	2,014.3	805.9	0.9	805.0	5.4%
Book Cliffs	3,527.3	1,033.5	332.8	700.7	4.7%
Henry Mountains	925.5	484.7	0.0	484.7	3.3%
Sego	696.3	208.9	2.7	206.2	1.4%
Mt. Pleasant	249.1	99.6	0.0	99.6	0.7%
Tabby Mountain	231.7	69.4	0.0	69.4	0.5%
Vernal	177.1	53.2	0.5	52.7	0.4%
Coalville	186.0	55.8	4.3	51.5	0.3%
Salina Canyon	86.4	30.2	0.5	29.7	0.2%
Wales	12.2	3.7	0.8	2.9	*
Harmony	1.3	0.4	0.0	0.4	*
Lost Creek	1.1	0.4	0.0	0.4	*
Sterling	2.0	0.6	0.3	0.3	*
<b>Total</b>	<b>41,720.2</b>	<b>15,729.3</b>	<b>957.5</b>	<b>14,771.8</b>	

Source: Smith and Jahanbani, 1988; Quick and others, 2004; Bon and others, 2006; production data from UGS coal company questionnaires

\* Value less than 0.1%

**Table A6. Utah coal reserves by county, 2006.**

Million short tons

County	Original Principal Reserves	Original Recoverable Reserves	Cumulative Production 1870-2006	Remaining Recoverable Reserves	% of Remaining Recoverable Reserves
Kane	19,579.6	8,025.6	0.1	8,025.5	54.3%
Garfield	7,493.1	3,106.3	0.0	3,106.3	21.0%
Carbon	4,993.6	1,475.8	454.5	1,021.3	6.9%
Emery	4,457.7	1,392.9	368.5	1,024.4	6.9%
Sevier	2,651.1	858.5	125.7	732.8	5.0%
Iron	650.8	260.2	0.8	259.4	1.8%
Grand	696.3	208.9	2.7	206.2	1.4%
Sanpete	489.5	171.8	0.7	171.1	1.2%
Wasatch	177.3	53.2	0.0	53.2	0.4%
Uintah	177.1	53.2	0.3	52.9	0.4%
Summit	186.0	55.8	4.3	51.5	0.3%
Washington	86.1	34.4	0.0	34.4	0.2%
Duchesne	53.9	16.2	0.0	16.2	0.1%
Wayne	27.0	16.2	0.0	16.2	0.1%
Morgan	1.1	0.4	0.0	0.4	*
<b>Total</b>	<b>41,720.2</b>	<b>15,729.3</b>	<b>957.5</b>	<b>14,771.8</b>	

Source: Smith and Jahanbani, 1988; Quick and others, 2004; Bon and others, 2006; production data from UGS coal company questionnaires

\* Value less than 0.1%

**Table A7. Electricity generation and coal consumption at coal burning power plants in Utah, 1990-2007.**

Year	Deseret Generation & Transmission Co.			Intermountain Power Agency			PacifiCorp			PacifiCorp		
	Bonanza			Intermountain (IPP)			Carbon			Hunter		
	Coal Consumption	Net Generation	MWh per Short Ton	Coal Consumption	Net Generation	MWh per Short Ton	Coal Consumption	Net Generation	MWh per Short Ton	Coal Consumption	Net Generation	MWh per Short Ton
	Short Tons	MWh		Short Tons	MWh		Short Tons	MWh		Short Tons	MWh	
1990	1,237,312	2,577,271	2.08	4,967,883	12,410,005	2.50	582,320	1,260,497	2.16	4,022,009	9,019,470	2.24
1991	1,309,770	2,764,208	2.11	4,145,585	10,106,144	2.44	547,905	1,192,091	2.18	4,124,260	8,915,149	2.16
1992	1,511,878	3,201,401	2.12	4,959,568	12,264,308	2.47	623,178	1,307,598	2.10	4,107,391	8,605,835	2.10
1993	1,414,980	3,132,999	2.21	4,856,527	11,936,833	2.46	631,909	1,358,949	2.15	4,253,731	9,151,459	2.15
1994	1,533,363	3,242,413	2.11	4,916,555	12,171,664	2.48	622,621	1,366,103	2.19	4,277,130	9,323,744	2.18
1995	1,125,003	2,344,439	2.08	4,248,623	10,306,059	2.43	605,712	1,351,984	2.23	4,376,632	9,453,500	2.16
1996	1,341,076	2,831,105	2.11	4,350,752	10,711,308	2.46	622,126	1,410,369	2.27	4,343,571	9,337,663	2.15
1997	1,532,158	2,947,675	1.92	5,158,831	12,762,721	2.47	653,833	1,403,936	2.15	4,220,568	8,893,113	2.11
1998	1,734,613	3,456,787	1.99	5,278,344	12,973,101	2.46	600,317	1,286,805	2.14	4,140,205	9,044,084	2.18
1999	1,598,296	3,227,344	2.02	5,266,047	13,069,535	2.48	552,590	1,217,838	2.20	4,220,721	9,483,957	2.25
2000	1,510,407	2,931,869	1.94	5,301,096	13,176,578	2.49	628,623	1,371,586	2.18	4,226,218	9,518,367	2.25
2001	2,013,770	3,932,642	1.95	5,365,021	13,383,601	2.49	632,124	1,371,822	2.17	3,722,062	8,289,465	2.23
2002	2,092,485	3,921,576	1.87	5,429,620	13,479,234	2.48	612,536	1,322,047	2.16	4,327,402	9,393,626	2.17
2003	1,893,338	3,512,734	1.86	5,518,129	13,554,882	2.46	657,111	1,369,884	2.08	4,563,686	9,934,622	2.18
2004	1,996,868	3,734,811	1.87	5,996,797	14,429,288	2.41	556,458	1,133,139	2.04	4,668,586	9,957,531	2.13
2005	1,978,718	3,712,862	1.88	5,689,688	13,657,657	2.40	673,436	1,348,569	2.00	4,692,991	9,732,018	2.07
2006	2,127,658	3,895,543	1.83	5,898,719	14,446,581	2.45	681,505	1,397,212	2.05	4,677,662	9,885,959	2.11
2007*	1,813,865	3,321,984	1.83	6,000,000	14,802,083	2.47	597,000	1,169,486	1.96	4,611,000	9,280,262	2.01

Year	PacifiCorp			Sunnyside Cogeneration Plant			Total		
	Huntington			Waste Coal			Coal		
	Coal Consumption	Net Generation	MWh per Short Ton	Consumption	Generation	MWh per Short Ton	Consumption	Net Generation	MWh per Short Ton
	Short Tons	MWh		Short Tons	MWh		Short Tons	MWh	
1990	2,753,717	6,253,702	2.27	--	--	--	13,563,241	31,520,945	2.32
1991	2,701,376	5,907,238	2.19	--	--	--	12,828,896	28,884,830	2.25
1992	2,655,409	6,164,281	2.32	--	--	--	13,857,424	31,543,423	2.28
1993	2,837,819	6,339,069	2.23	214,580	184,187	0.86	14,209,546	32,103,496	2.26
1994	2,919,715	6,660,541	2.28	386,800	348,287	0.90	14,656,184	33,112,752	2.26
1995	2,968,886	6,803,932	2.29	368,550	332,194	0.90	13,693,406	30,592,108	2.23
1996	2,927,155	6,402,742	2.19	378,230	392,483	1.04	13,962,910	31,085,670	2.23
1997	2,686,976	6,136,491	2.28	402,040	385,829	0.96	14,654,406	32,529,765	2.22
1998	2,910,474	6,445,954	2.21	430,000	376,057	0.87	15,093,953	33,582,788	2.22
1999	2,952,484	7,126,340	2.41	421,230	398,945	0.95	15,011,368	34,523,959	2.30
2000	3,021,448	7,047,404	2.33	476,170	430,408	0.90	15,163,962	34,476,212	2.27
2001	2,670,253	6,226,810	2.33	502,490	387,382	0.77	14,905,720	33,591,722	2.25
2002	2,686,747	5,964,496	2.22	494,715	390,985	0.79	15,643,505	34,471,964	2.20
2003	3,155,334	7,207,036	2.28	514,564	399,490	0.78	16,302,162	35,978,648	2.21
2004	2,878,761	6,379,605	2.22	508,950	395,307	0.78	16,606,420	36,029,681	2.17
2005	2,960,952	6,373,756	2.15	487,854	471,735	0.97	16,483,639	35,296,597	2.14
2006	2,793,793	6,131,487	2.19	467,364	418,618	0.90	16,646,701	36,175,400	2.17
2007*	3,090,000	6,779,855	2.19	431,138	395,352	0.92	16,543,003	35,749,022	2.16

Source: UGS coal company questionnaires

\*Forecast

**Table A8.** Average coal quality at Utah mines, 2006.

Company	Mine	Coal Field	Seam(s)	Heat Content Btu/lb	% Sulfur	% Ash	% Moisture
UtahAmerican Energy, Inc.	Aberdeen/Pinnacle	Book Cliffs	Aberdeen/Centennial	12,200	0.5%	8.5%	6.5%
Canyon Fuel, LLC	Skyline #3	Wasatch	Lower O'Connor 'A'	11,550	0.4%	9.6%	9.0%
Canyon Fuel, LLC	SUFCO	Wasatch	Upper Hiawatha	11,162	0.4%	9.5%	10.6%
Canyon Fuel, LLC	Dugout Canyon	Book Cliffs	Gilson	12,028	0.6%	11.1%	6.5%
CONSOL Energy	Emery	Emery	I	12,000	1.0%	11.0%	8.0%
C.W. (Co-op) Mining Co.	Bear Canyon #3 & #4	Wasatch	Tank/Blind Canyon	11,700	0.7%	12.0%	7.5%
Energy West Mining Co.	Deer Creek	Wasatch	Hiawatha/Blind Canyon	11,500	0.8%	13.0%	9.0%
GENWAL Resources, Inc.	Crandall Canyon and South C.C.	Wasatch	Hiawatha/Blind Canyon	11,655	0.6%	11.7%	8.8%
Hidden Splendor Resources, Inc.	Horizon	Wasatch	Hiawatha	11,700	0.6%	10.0%	5.0%
WEST RIDGE Resources, Inc.	West Ridge	Book Cliffs	Lower Sunnyside	12,460	1.4%	9.9%	6.4%

Source: UGS coal company questionnaires

**Table A9.** Coalbed methane proved reserves and production in Utah and the U.S., 1985-2006.

Million cubic feet

Year	Reserves in Utah <sup>1</sup>	Reserves in U.S. <sup>1</sup>	Production in Utah <sup>2</sup>			Production in U.S. <sup>1</sup>
			Carbon County	Emery County	Total	
1985	na	na	0	0	0	na
1986	na	na	0	0	0	na
1987	na	na	9	0	9	na
1988	na	na	37	0	37	na
1989	na	3,676,000	0	0	0	91,000
1990	na	5,087,000	0	0	0	196,000
1991	na	8,163,000	76	0	76	348,000
1992	na	10,034,000	156	0	156	539,000
1993	na	10,184,000	905	0	905	752,000
1994	na	9,712,000	4,681	0	4,681	851,000
1995	na	10,499,000	12,206	1	12,207	956,000
1996	na	10,566,000	16,718	221	16,939	1,003,000
1997	na	11,462,000	22,528	356	22,883	1,090,000
1998	na	12,179,000	31,750	799	32,549	1,194,000
1999	na	13,229,000	49,819	1,840	51,659	1,252,000
2000	1,592,000	15,708,000	71,990	3,602	75,591	1,379,000
2001	1,685,000	17,531,000	85,683	7,316	92,999	1,562,000
2002	1,725,000	18,491,000	88,753	13,302	102,054	1,614,000
2003	1,224,000	18,743,000	81,060	16,586	97,646	1,600,000
2004	934,000	18,390,000	72,628	16,660	89,288	1,720,000
2005	902,000	19,892,000	66,051	15,873	81,925	1,732,000
2006	na	na	61,449	15,232	76,681	na

Source: <sup>1</sup>U.S. Energy Information Administration, U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 2005<sup>2</sup>Utah Division of Oil, Gas and Mining, Annual Coalbed Methane Gas Production

Note: Coalbed methane wells are classified as gas wells in the state of Utah. The production shown above is included in the state's published gas production volumes.