

1993 Annual Review and Forecast of

UTAH COAL

Production and Distribution

November 1994

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Executive Summary

Utah's 1993 coal production reached 21.7 million tons and replaced 1992 production as the third highest year of production in the state's one hundred and twenty-four year history of recorded production. Only in 1990 and 1991 was production higher.

In 1993, Utah coal distribution reached its highest level. During the record production year of 1990 that Utah produced more than 22 million tons of coal, distribution of Utah coal was 21.68 million tons, but, in 1993, distribution reached 21.93 million tons. For five of the past seven years, distribution of Utah coal has surpassed production. Only in 1990 and 1991, was production greater than distribution.

Two main factors contributed to this surge of 1993 Utah coal distribution; they were electric utility coal consumption in Utah and overseas export. The only year Utah exported more coal was 1981. Utah coal export increased more than eleven percent in 1993 over 1992.

During 1994, both production and distribution should break through 24 million ton mark and set new all time records.

Utah's coal mines remain the most productive underground mines in the United States. Productivity of Utah coal mines, which was just under two tons per miner-hour (tpmh) in 1980 and 1981, has

been on the rise ever since, and has had a new high almost every year. In 1993, Utah's mines achieved a new record of 5.43 tons per miner-hour and in 1994, another record (5.61 tpmh) is expected to be established.

This high productivity is the direct result of both the high degree of mechanization and a highly skilled workforce. These factors have led to more competitive coal prices for Utah's coal mines that, in turn, have enhanced the success of the coal industry in Utah.

The bulk of Utah's coal production was consumed by electric utilities. A total of 11.84 million tons were consumed by the Hunter, the Huntington and the Carbon plants of Utah Power and Los Angeles Department of Water and Power's Intermountain Power plant. Together these four plants consumed 55 percent of all coal produced in Utah, making Utah its own best coal customer. In addition we consumed 1.5 million tons of coal from Colorado in Bonanza plant of Deseret Generation and Transmission. Also in 1993, 3.91 million tons of Utah produced coal were consumed by electric utilities and cogeneration plants outside of Utah. All together, 72.5 percent of the coal produced in Utah was consumed by electric utilities in the United States. If we include those volumes of Utah coal that were exported to the Pacific Rim, then 84.3 percent of all the

coal produced in Utah was consumed by electric utilities.

During 1993, Utah purchased and consumed various amounts of coking coal from both inside and outside of Utah. This amounted to 1.18 million tons; more than half a million tons came from Utah.

Industrial coal consumption represents the third largest consuming sector in Utah in 1993. Half of Utah's industrial coal consumption of 0.6 million tons was by Kennecott and the other half by various cement and lime plants in Utah. The out-of-state industrial consumption of Utah coal amounted to 2.1 million tons in 1993 and was used basically by chemical and cement plants in California and cement plants in Nevada.

Almost 0.4 million tons of residential and commercial coal were consumed inside and outside of the state.

Some 2.6 million tons of coal was exported to Pacific Rim Countries of Japan, Korea and Taiwan. This market is expanding and should account for more than five million tons per year by the end of the decade.

1993 Utah Coal Production

Production of coal in Utah was more than 21.72 million tons, the third highest production in 124 years of recorded Utah coal production. Only during 1990 and 1991 did Utah mines produce more coal. Gross production was 22,540,000 tons and net production was 21,723,000 tons (Appendix, Table 1).

Even though 1993 production and employment were both up from the previous year, productivity in Utah's mines continued to improve, increasing 5.8 percent. As a result, Utah's miners retained their position as the nation's most productive underground coal miners. Productivity in 1992 was seven percent above 1991, and increased another 5.8 percent in 1993.

During 1993, a total of 21,723,000 tons of coal was produced by 2,161 miners. Working an average of 243 days per year (496,058 miner days), Utah's miners produced an average of 5.43 tons per miner hour (Appendix, Table 1), almost a six percent increase over 1992's 5.13 tons per miner hour. These figures are based on net production. On the basis of gross production, productivity of Utah's miners was even higher.

The Wasatch Plateau coal field was again the major coal producer in 1993. More than 89 percent of Utah's 1993 coal production, 19.4 million tons, came from Wasatch Plateau coal field while the remaining

11 percent, or 2.3 million tons, was produced from the Book Cliffs coal field. The Emery coal field, the only other Utah coal field that had experienced any significant production in recent years, did not produce any coal in 1993. During 1994, Wasatch Plateau coal field is expected to produce a record amount of coal, more than 90 percent of Utah's total production. Less than 10 percent of Utah's 1994 coal production is expected to come from Book Cliffs coal field. For the fourth year in a row, no production is likely to come from the Emery coal field (Appendix, Table 2).

tion is staying rather stable leaving Sevier as the third largest producing county. As Skyline Mine of Coastal States Energy and Starpoint Mine of Cyprus Amax Plateau shift their production from their leases located in Carbon County to those located in Emery County, the balance of coal production by county shifts dramatically from Carbon to Emery since these two mines combined account for more than 35 percent of total coal production in Utah. The actual shift by both mines started in 1991, became more pronounced in 1992, and almost complete in 1993. For

Utah Coal Industry Production, Employment, Productivity and Prices

	Production Million Short Tons	Employment No. of Employees	Productivity Tons/Miner Hour	Prices \$/Ton
1981	13.80	4,166	1.99	26.87
1982	16.91	4,296	2.05	29.42
1983	11.82	2,707	2.59	28.32
1984	12.25	2,525	2.94	29.20
1985	12.83	2,563	2.80	27.69
1986	14.26	2,881	3.08	27.64
1987	16.52	2,650	3.25	25.67
1988	18.16	2,559	3.69	22.85
1989	20.51	2,471	4.42	22.01
1990	22.01	2,791	4.22	21.78
1991	21.87	2,292	4.79	21.56
1992	21.02	2,106	5.13	21.83
1993	21.72	2,161	5.43	21.17
1994	24.13	2,333	5.61	21.23

1994 values are forecast

On a county basis, the majority of Utah's coal production is now shifting from Carbon County to Emery County. Sevier County produc-

adjusted figures, see Appendix Table 3. Skyline Mine production will most likely shift back to Carbon County within four years resulting in more production from Carbon County

leases than Emery County. The shift for Starpoint Mine is expected to be more accelerated than that of Skyline Mine.

The volume of coal mined from federal leases during 1993 increased to a record high of 19.1 million tons. Its contribution as a percentage of total state production also increased. This was primarily due to a decrease in production from fee lands. Never before has so much coal been produced from federally-owned land on tonnage basis (19.1 million tons) or as a percent of total production than in 1993 (87.9 percent).

Production of coal from state lands had not reached the one-million-ton mark since 1981. In 1992, this mark was easily surpassed with 1,384,000 tons of coal produced from Utah's state-owned lands. In 1993, this record was surpassed by 0.3 million tons, resulting in a 22 percent increase in production from state lands. As a percentage of total production, state lands production has been at the one to five percent level. During 1993, it was almost eight percent (7.7 percent). Production from county land has always been almost non-existent and, at best, erratic. During 1993, coal was produced on county-owned land to the tune of 116,000 tons, amounting to just over half a percent of total production.

For the first time in a decade coal production from the fee land slipped below two million ton in 1992 to 1.735 million tons and in 1993

this was reduced by 50 percent again to 826,000 tons or 3.8 percent of total production. By contrast, coal produced from fee lands in 1983 amounted to almost 40 percent of total production (Appendix, Table 4).

During 1993, seven operating longwall panels were responsible for 65 percent of production, or 14,043,000 tons. This amounted to an average of more than two million tons of coal production per-panel, per-year. Considering the fact that one of the longwalls was not working at full capacity because of market constraints, each operating longwall actually averaged 2.25 million tons per year. A total of 7,680,000 tons of coal was produced by 33 continuous miners for an average of 223,000 tons per-machine, per-year. However, some machines have produced between 300,000 to 500,000 tons per year.

Utah Coal Markets and Distribution of Coal in Utah

Distribution of Utah coal during the last five years has been relatively stable, remaining within a range of two percent. Even though the production of coal in Utah was down by about 300,000 tons in 1993 - compared to 1990's record year - the distribution of Utah coal hit an all time high of 21,935,000 tons. Never in the 124 years of recorded history of Utah's coal industry has so much Utah coal been distributed as in 1993. Distribution of Utah coal to end-users in Utah was 13,174,000 tons. The distribution to end-users in other states totaled 6.2 million tons, about 100,000 tons more than in 1992. Overseas exports amounted to 2,567,000 tons, about 322,000 tons above 1992 exports.

Electric Utility Markets

It has been almost two decades since electric utility consumption of coal surpassed other industrial coal and coke plant coal consumption to become the number one market for Utah coal operators. Today, more than three quarters of Utah's coal production is consumed to generate electricity in Utah and other states. If overseas exports are considered, and they should be, about 85 percent of Utah's coal production is consumed to generate electricity.

Out-of-State Markets

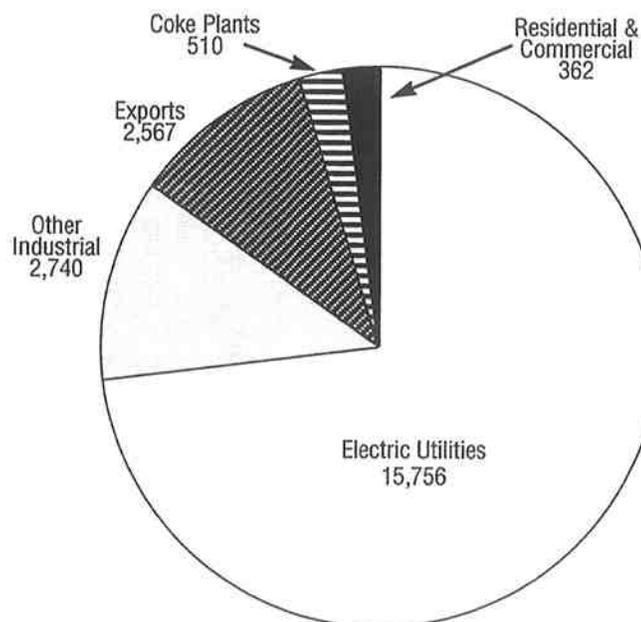
Distribution of Utah coal to out-of-state markets during 1993 decreased by two per-

cent from the 1992 level. A total of 3.9 million tons was shipped to out-of-state customers. With the exception of 1992, Utah has never before sold this much coal to out-of-state electric utility/cogeneration customers. The majority of out-of-state coal shipment went to coal-fired power plants and cogeneration facili-

Table 5).

In Nevada, three electric power generation facilities burn bituminous or subbituminous coal. Two of these plants, the Nevada Power Company's Reid Gardner Plant and Sierra Pacific Power Company's North Valmy Plant, burn Utah coal.

1993 Distribution of Utah Coal by Consuming Sector
Thousand Short Tons



ties in Nevada and California. In addition, in 1993, Missouri received 381,000 tons, Indiana purchased a substantial 204,000 tons, Illinois was a sizeable customer with 196,000 tons, Florida purchased more than 155,000 tons, and Oregon purchased 111,000 tons. Tennessee, Minnesota and Washington also purchased small amounts (Appendix,

Nevada Power's Reid Gardner Plant, with a cumulative capacity of 636 megawatts (MW) purchased a total of 1.38 million tons of coal and burned 1.4 million tons of coal to generate 3,240 gigawatt hours (GWh) of electricity. Approximately 880 thousand tons of this purchase came from Utah with the remaining half million tons coming from

Colorado. Before 1993 the four units of the Reid Gardner Plant relied almost entirely on Utah coal. One of the four major contracts of Nevada Power with Utah coal producers was with Arco which was originally supplying the coal from its Gordon Creek mines and lately from its Trail Mountain mine. In September 1992, Arco sold its Trail Mountain mine to PacifiCorp but continued to fulfill its contractual obligation to Nevada Power from its stock-pile in Utah and through some local purchases. However, in 1993, the major portion of Arco's obligation was fulfilled by production from its West Elk mine in Colorado.

The two units of the Sierra Pacific Power Company's North Valmy Plant have a combined generation capacity of 521 MW. Sierra Pacific Power Company and Washington Water Power Company now have a petition of merger before the Federal Energy Regulatory Commission (FERC). Should this merger be approved by state and federal regulatory bodies, the new company will be called Resources West Energy Corporation.

North Valmy plant requires about 1.45 million tons of coal per year. Utah and Wyoming mines share equally to supply the requirement of this plant on a BTU basis. Since the BTU content of Utah coal is higher than the Wyoming coal, the percent by weight of the Wyoming coal is somewhat higher. In 1993, Utah coal

shipments to the North Valmy Plant totaled 695,000 tons, which represented a decrease of 6.5 percent over 1992. Sierra Pacific purchased an additional 760,000 tons of coal from Black Butte Coal Company near Rock Springs Wyoming.

The two units of North Valmy plant had an average availability of 90 percent and an output factor of 75.25 percent in 1993. They burned 1.544 million tons of coal to generate 3,362 GWh of electricity. During 1994, this plant is expected to generate about the same as 1993. The amount of coal purchased from Utah could increase by about five percent.

Utah and Wyoming coal delivered to the North Valmy Plant are similar in price and quality; Wyoming coal slightly less than Utah coal in price and Utah coal slightly less in sulfur content and higher BTUs than Wyoming coal. They are of nearly the same geographical distance from North Valmy plant though Utah's coal is closer by 30 miles. Neither coal has ever demonstrated a large enough competitive advantage to expect a change in the share each supplies the North Valmy Plant in the near future.

A third coal-fired electric utility plant, one that does not burn Utah coal, is the Southern California Edison Company Mojave Power Plant near Laughlin, Nevada. The Mojave Power Plant has a combined nameplate generation capacity of 1,636 MW and

consumes about 4.2 million tons of coal per year. This coal is currently shipped to the Mojave plant through a 273-mile, 16- to 18-inch slurry pipeline from the Black Mesa-Kayenta coal mine complex near Kayenta, Arizona. At this time, Black Mesa coal is probably the plant's only viable coal supply. However, competition for a share of Mojave's coal supply could occur if, and when, coal from Utah's southern coal fields is developed.

Besides Nevada's electric utilities, more than 1.2 million tons of Utah coal went to cogeneration facilities in California. The Energy Information Administration in adhering to a more restricted definition of electric utility and other industrial coal consumption, classifies cogeneration consumption under the definition of other industrial coal. For purposes of this report, coal shipped for consumption in cogeneration facilities is considered electric utility consumption, since its main purpose is to generate electricity for sale.

The electric utility market for Utah coal presently includes six coal-fired cogeneration units operating in California. Stockton, California is the site of the first coal-fired cogeneration facility to burn Utah coal. This unit is operated by Air Products & Chemicals, Inc. and began commercial operation in March 1988. This 49.9 MW unit is capable of consuming 220,000 tons of coal per year to generate about 425 GWh of

electricity. In 1993, this plant purchased 228,000 tons of coal, all of which came from Utah. The plant generated a total of 471 GWh of electricity. Some of the electricity and all of the steam by-product were used by an adjacent corn wet milling plant owned by Corn Product Co. International. The remaining electricity was sold to Pacific Gas and Electric Co.

In May 1989, a second coal-fired cogeneration facility was commissioned. It is owned by Mt. Poso Cogeneration Co., a consortium of Pyropower Development Corp. (Ahlstrom Development Corp. as of July 1, 1991), Pacific Generation Co., and Bechtel Enterprises Inc. This 49.9 MW plant is located in the San Joaquin Valley and is operated by Pyropacific Operating Co. and Pacific Generation Co. During 1993, this unit purchased 171,000 tons of Utah coal and burned 163,000 tons to generate 316 GWh of electricity that was sold to Pacific Gas & Electric Co. The steam by-product was used for enhanced oil recovery in Mt. Poso Field-West.

The largest coal-fired cogeneration facility in California, with 96 MW of installed electric generation capacity, is owned by ACE Cogeneration Co., which is in turn, owned by Pyropower Development Corp., Constellation Holding, Inc. and Kerr McGee Chemical Co. This cogeneration unit is located in Trona, California and started operation September

1990 under Kerr McGee Chemical Co. whose two soda ash plants adjacent to the ACE plant use the steam by-product. This unit has the capacity to burn 300,000 to 350,000 tons of coal per year to generate between 650 to 750 GWh of electricity. During 1993, it purchased 319,000 tons of Utah coal and burned 336,000 tons to generate 764 GWh of electricity. This was the gross generation. The net generated electricity of 690 GWh was sold to Southern California Edison Co.

Ultra Power, Constellation and Hadson are the owners of a twin cogeneration plant in Bakersfield named Rio Bravo Poso and Rio Bravo Jasmin. Construction of this twin plant started on December 28, 1987 and was completed on March 23, 1990. The plant's start-up was on September 27, 1989 and it went on-line early in 1990.

During 1993, Rio Bravo Poso purchased 136,000 tons of Utah coal and burned almost all of it to generate 281 GWh of electricity that was sold to Pacific Gas and Electric. The steam by-product was used in enhanced oil recovery in the Rio Bravo oil field. During 1994, this plant may consume a smaller amount of Utah coal due to scheduled maintenance in the fall of 1994. Rio Bravo Jasmin purchased 135,000 tons of Utah coal and burned nearly all of it to generate 269 GWh of electricity that was sold to Southern California Edison. The steam by-product of this

unit was also used for the enhanced oil recovery in the Rio Bravo oil field. During 1994, this plant is expected to purchase and burn the same amount of Utah coal as in 1993 and generate the same amount of electricity.

Another cogeneration plant, Energy Factor, is located in Stockton. This 45-MW cogeneration plant was purchased by Sithe Energy in January 1990. The name of the plant was later changed to Port Of Stockton District Energy Facility Power Company (POSDEF). The steam by-product from this plant goes to three processing plants within the same industrial complex: California Cedar Products which manufactures cedar wood products including dura flame logs; and Cargil and Liquid Sugar that each import raw sugar from Hawaii and manufacture various food products for human and animal consumption. This cogeneration unit can use about 200,000 tons of coal per year. The coal supply contract for this company is with Pacific Basin Resources, a division of Oxbow Carbon & Minerals of Colorado. During 1993, this company purchased 182,000 tons of coal, all of which came from various Utah coal suppliers. This unit consumed 163,000 tons of coal to generate 361 GWh, of which 312 GWh (of net electric generation) was sold to Pacific Gas & Electric.

Shipments of coal for consumption by electric power plants in Nevada are anticipat-

ed to either remain the same or decrease slightly in 1994, in comparison to 1993. During 1993, the amount of coal sold to electric utilities within the U.S. excluding Utah, Nevada, California, the main users of Utah coal, jumped by nearly one hundred percent.

In 1992, Utah sold 556,000 tons of coal to electric utilities in states other than Utah, Nevada and California and in 1993 this increased to 1,087,000 tons. These states included Missouri (381,000 tons), Indiana (204,000 tons), Illinois (196,000 tons), Florida (155,000 tons), and Oregon (111,000 tons) followed by Tennessee, Minnesota and Washington.

Sales to this market will double again in 1994 for three reasons. First, Utah coal operators will continue their energetic marketing of Utah coal outside of the state. Second, Utah Power will ship more than one third of a million tons of coal from its mines in Huntington Canyon to PacifiCorp's Centennial plant in Washington. In addition to sales to electric utilities increasing, shipment of coal to cogeneration facilities in California is also expected to increase in 1994 compared to 1993. As a result, Utah coal distributed to other states to generate electricity is expected to increase from 3.9 million tons in 1993 to 5.0 million tons in 1994.

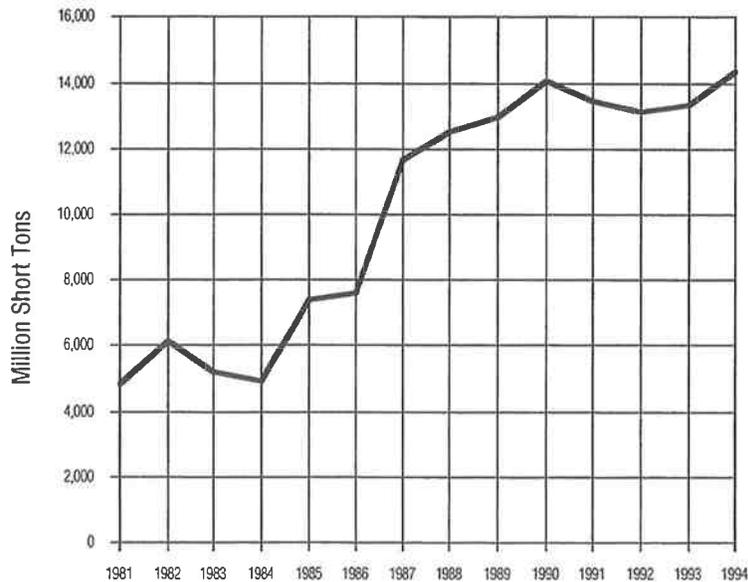
Utah Markets

Coal consumed in Utah to generate electricity amounted to nearly 13.959 million tons in

1993. Coal shipped to electric utility plants was 13.343 million tons. Coal consumed by coal-fired electric power plants in Utah during 1993 was higher than expected. Utah Power's Hunter I, II, and III, with availability of 91.92 percent and utilized availability of 96.0 percent, consumed 4.25 million tons of coal to generate 9,160 GWh of electricity. This coal was produced by Utah Power's Cottonwood Mine. During 1994, this plant should be working at about a three percent lower availabili-

ty, but higher utilized availability than in 1993, resulting in about the same coal burned and generated electricity. The coal for this plant was purchased on the spot market by competitive bids from various companies. Going to the spot market to meet the coal needs of its Carbon plant, helped Utah Power reduce coal costs. It is very likely that the capacity factor for the three plants of Utah Power

Distribution of Coal to Utah Electric Utilities



1994 values are forecast

ty, but higher utilized availability than in 1993, resulting in about the same coal burned and generated electricity.

Huntington I and II, with plant availability of about 91.69 percent and utilized availability of over 96.78 percent, consumed 2.84 million

The coal for this plant was purchased on the spot market by competitive bids from various companies. Going to the spot market to meet the coal needs of its Carbon plant, helped Utah Power reduce coal costs. It is very likely that the capacity factor for the three plants of Utah Power

could be slightly lower in 1994 than in 1993, and coal consumption could decrease from 7.8 to 7.7 million tons. However, the decrease in coal production for distribution to Utah electric utilities is likely to be much more than the 0.1 million tons reduction in coal burned. Utah Power reduced its coal stockpile in 1993 by 321,000 tons from its 1992 level and it is very likely that it may decrease its stockpile by 387,000 tons again in 1994. So the amount of coal production by Utah Power for consumption within Utah could decrease by as much as half a million tons.

Intermountain Power Plant (IPP), of the Los Angeles Department of Water and Power, with availability of 92.4 percent operated at utilized availability of 92.2 percent during 1993. The two units of this plant, with the total name plate capacity of 1,640 MW, burned 4.8 million tons of coal to generate 11,948 GWh. The amount of coal purchased was close to that consumed. More than eighty percent of the coal was purchased through five long-term contracts and the remainder was purchased on the spot market. All the generated electricity was sold outside of the state. During 1994, this plant will burn approximately 4.872 million tons of Utah coal to generate 11,784 GWh of electricity, all of which would be sold outside of Utah.

During 1993, the Bonanza plant of Deseret Generation and Transmission (DG&T)

with the rated peak capacity of 420 MW, had an availability of 93.99 percent and a capacity factor of 84.0 percent. This plant consumed 1.415 million tons of Colorado coal to generate 3,019 GWh of electricity, 1,780 GWh or 59 percent of which was sold outside of the state. The coal was purchased from Deserado mine located just 36 miles east of the plant in Colorado. During 1994, the availability will decrease to 92 percent due to scheduled maintenance. The capacity factor would increase to 88 percent and the amount of coal consumed will be 1.548 million tons, resulting in 3,259 GWh of electricity generation, of which 59 percent or 1,923 GWh will be sold outside of Utah.

Utah Coking Coal Markets

The market for Utah-produced coking coal is limited to Geneva Works Steel Mill in Orem, Utah, owned by Basic Manufacturing and Technology of Utah, Inc. Coal purchased by Geneva Works to make coke totaled 1.081 million tons during 1993. The plant consumed 1.1 million tons of coal to make coke for steel production.

As the coke-making battery of Geneva Works ages, its capacity to make coking coal is decreasing, limiting the plant's steel-making capacity. During 1993, Geneva overcame this constraint by directly purchasing 140 thousand tons of coke - 128 thousand tons from Japan and 12 thousand tons from China, to produce a total of 2.3 million tons of

steel.

To meet its requirement of low- to mid-volatile hard coking coal, Geneva Works has negotiated a long term contract with eastern producers and a five year, 500,000 tons-per-year transportation contract with Southern Pacific railroad.

During 1993, Geneva bought 213 thousand tons of low-volatile Pennsylvania coking coal from Cooney Brothers Coal Company of Cresson, Pennsylvania and burned it with two thousand tons of the same coal from its stockpile, for a total of 215 thousand tons. In addition, Geneva bought 76 thousand tons of high-volatile Colorado coking coal from Pacific Basin Resources of Littleton, Colorado. This coal is from the same seam as the coal Geneva purchased from the Bear Coal Co., Inc. of Somerset, Colorado during 1991, but this coal is coming from across the valley from San Born Creek mine.

Geneva also bought 188 thousand tons of mid-volatile Virginia coal from the United Coal Company of Bristol, Virginia, 110 thousand tons of which was from Lady H mine and another 78 thousand tons from Elk Run mine. It also purchased and consumed 8,000 tons from Well More Coal Company of Virginia, and 94 thousand tons of mid-volatile Virginia coking coal from Cardinal Coal Company, a division of Pittston Coal.

Utah mines provided 510

thousand tons of high-volatile coking coal which was consumed, along with ten thousand tons from the Geneva stockpile, for a total of 520 thousand tons.

The consumption of coking coal by Geneva is expected to slowly decrease as the units get older. In 1994, Geneva will purchase 200 thousand tons of coking coal from Cooney Brothers, about 300 thousand tons of coking coal from Pacific Basin Resources' San Born Creek mine, 250 thousand tons of mid-volatile coking coal from United Coal Company and 250 thousand tons of mid-volatile coal from Well More Company of Virginia.

In February 1994, Geneva's coal purchase contract with Sunnyside Coal company expired and, due to financial considerations Geneva chose not to renew this contract.

Through the end of March 1994, Geneva purchased 172 thousand tons of coal from Sunnyside Coal Company. At the expiration of the contract, Sunnyside — not being able to persuade Geneva to renew its contract — began closing the mine. By early June all useable equipment was taken out of the mine, pumping of water was halted and ventilation of the mine ceased. Mine portals were later sealed and final clean up has begun.

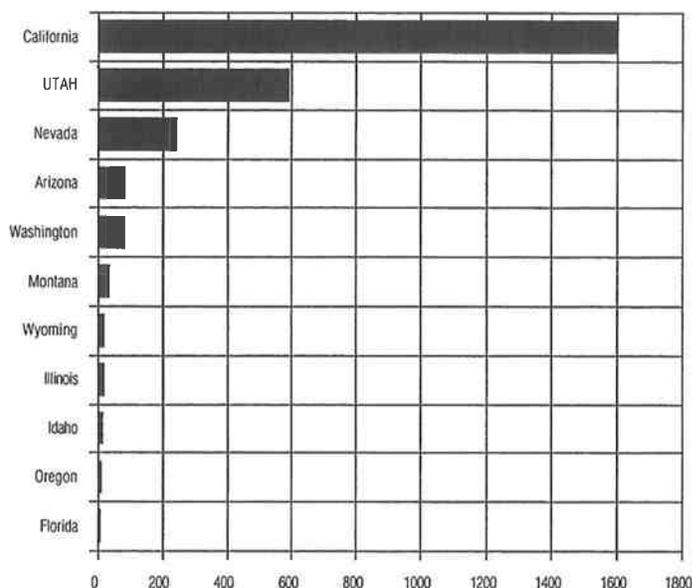
Other Industrial Coal Markets

Out-of-state markets

Since 1989, when the shipment of coal to other states for

Distribution of Utah Industrial Coal by State

Thousand Short Tons



industrial consumption peaked at 2.4 million tons, consumption for this market sector has been on the decline, reaching only 2.0 million tons in 1992. During 1993, shipments increased for the first time in four years as seven operators shipped 2.146 million tons of industrial coal to ten states outside Utah. The largest recipient of industrial coal was California. More than three quarters of all the industrial coal from Utah went to chemical and cement manufacturing plants there. Nevada received 246,000 tons for use mainly in cement plants. Arizona was next with 87,000 tons. Washington also purchased 87,000 tons, followed by Montana, with 39,000 tons, Wyoming, with 22,000 tons, Illinois, with 21,000 tons, Idaho, with 16,000 tons, Oregon, with 14,000 tons and finally Florida, with 10,000 tons.

Utah Markets

In 1993, industrial consumption of coal in Utah increased by 23.5 percent, to 614,000 tons from 497,000 tons the previous year. About one half of the total industrial coal was used by Kennecott Copper to generate electricity. During 1993, Kennecott purchased 303 thousand tons of Utah coal and consumed 305 thousand tons during an eight month period to generate 638 GWh of electricity. During the other four months, Kennecott consumed a little more than 2.8 billion cubic feet of natural gas to generate 286 GWh of electricity. The coal consumption in 1993 was 16 percent higher than the previous year.

In 1994, Kennecott's electric generation will increase by thirteen percent, resulting in greater coal and natural gas consumption. Total coal consumption will amount to

344,959 tons and natural gas consumption will increase to 3.293 billion cubic feet.

The Devils Slide Plant of Ideal Basic Industries switched from Wyoming coal to natural gas in 1991 and continued to burn natural gas until August of 1992. In August 1992, the price of natural gas increased to the point where consumption of coal became more desirable economically. During the remainder of 1992 Devils Slide Plant used 27,000 tons of coal. A significant event occurred when this plant converted from natural gas to coal; it did not automatically switch to Wyoming coal as it had in the past, but instead started using Utah coal.

During 1993, Devils Slide plant purchased 60,000 tons of coal, 40,000 tons of that came from Utah with the remainder coming from Wyoming. This is a significant development for Utah coal to compete against Wyoming coal. The Devils Slide Plant does not burn natural gas on a regular basis, as it did prior to mid-1992. The only time natural gas is consumed is when the coal handling apparatus experience operational problems. Devils Slide Plant's total natural gas consumption during 1993 amounted to less than 10 percent of its total energy consumption. It produced a total of 346,000 tons of cement.

Ashgrove Cement, formerly Southwest Portland Cement (formerly Martin Marietta), purchased 78,660 tons of Utah coal and consumed about the same amount along with

17,473 barrels of used motor oil and 1,924 tons of used tires to produce 611,000 tons of cement. In addition, Ashgrove used small amounts of diesel fuel to startup its kilns after rebricking and/or maintenance. This amounted to 1,224 barrels of diesel fuel in 1993.

Early in 1993, Ashgrove received regulatory approval to use alternative fuels for its energy needs and the plant is forecasting supplying about 15 percent of its energy requirements from used tires and another 15 percent from used motor oils. Ashgrove will continue to be one of the important industrial coal users for years to come and its use of used tires and motor oil should not affect its coal consumption more than 30 percent.

Nearly 100,000 tons of coal was consumed by other industrial coal consumers, such as gypsum and lime plants. Industrial coal consumption in Utah should increase by about four percent from 614,000 tons in 1993 to about 637,000 tons in 1994, but the actual increase could be slightly smaller than forecasted.

Residential and Commercial Coal Markets

Out-of-state markets

Since the early 1980's, when consumption was about 300,000 tons per year, demand for residential and commercial coal has been on the decline. By 1990, it stood at only 59,000 tons, its lowest level. In 1991, sales of Utah coal to this market sector increased to

76,000 tons and in 1992, to 81,000 tons. During 1993, this jumped by 63 percent to 134,000 tons. This unusual jump was due mainly to consumption by California that was nonexistent in the past few years. Idaho and Washington were the other major consuming states. Missouri, Colorado and Nevada also bought small amounts (Appendix, Table 5). Consumption by the residential and commercial sectors in these states will probably increase in the future.

Utah markets

During 1993, residential and commercial consumption of coal in Utah decreased by 34 percent to 228,000 tons. Of 537,000 households in Utah, more than 7,200 (or 1.3 percent) use coal product for primary home heating. This is the statewide average. Residents of some counties use coal product at a much higher percentage. More than 20 percent of residents of Emery and Wayne counties use coal for home heating. In Millard, Juab and Sanpete counties this percentage is above 18 percent and in Sevier and Carbon counties it is above 16 percent. On the other hand, for residents of Davis, Weber and Salt Lake counties coal consumption for home heating is almost nonexistent mostly due to air quality restrictions. Commercial consumption of coal for space heating in Davis, Weber and Salt Lake counties are also low.

Two elements affect resi-

dential and commercial consumption. One is consideration for the environment and adherence to standards set by various air quality control agencies; the other is the cost of the fuel. From 1987 to 1992 natural gas declined in price and became very competitive with coal on a cent-per-million-Btu-delivered basis and many consumers switched to natural gas. However, in late 1992 and during 1993, increases in the spot price of natural gas provided an economic incentive for some consumers to switch back to coal. Therefore, Utah coal producers might see an increase in out-of-state consumption of Utah coal by residential and commercial markets.

This is borne out by our expectations for 1994 where out-of-state consumption is expected to increase to 155,000 tons and Utah consumption will increase to 250,000 tons for a total of 405,000 tons.

Coal Imports

Utah imports coal for consumption in coking ovens, industrial plants and a coal-fired power plant in Uintah County. There are no imports to the residential and commercial sector. In 1993, companies operating in Utah imported 2.1 million tons of coal.

Utah imports low- to mid-volatile hard coking coal to mix with its own high volatile coking coal for Geneva steel mill. Imports of industrial coal to Utah is basically for use at Devils Slide Plant located in

Morgan near the Wyoming border. However, this plant's consumption is now beginning to be met by Utah coal, and imports to this plant could cease in the near future in favor of Utah coal. The only other coal import to Utah is about 1.5 million tons of electric utility coal to Bonanza plant of Deseret Generation and Transmission (DG&T). Shipments of Colorado coal to this plant has more to do with the mine, the railroad and the plant having the same owner than anything else.

Compared to 1992, coal shipped to Utah from mines in other states decreased slightly in 1993. This was expected due to lower consumption of coal by the Deseret Generation and Transmission Bonanza Plant. This plant purchased 1.501 million tons of coal from Colorado in 1993. In 1994 imports are expected to increase as the Bonanza Plant is expected to increase its purchases to 1.522 million tons and Geneva Works coal imports should increase from 579,000 tons to 1.089 million tons. Ideal Basic Industries' Devils Slide Plant purchased a little more than 9,000 tons of Wyoming coal when it switched from natural gas during the second half of 1992. During 1993, this plant purchased 20,000 tons of industrial coal from Wyoming and in 1994 it will purchase the same amount.

There is no indication that coal will be imported into Utah for use by the residential and commercial sector in

1994. Altogether, the imports of coal into Utah are expected to rise to 2.62 million tons in 1994.

Overseas exports

Utah coal exports to overseas markets during 1993 were quite encouraging, surpassing the impressive exports of the previous year (Appendix, Table 1). The number of Utah mines exporting coal in 1993 stayed at six, but coal exports increased 322,000 tons to 2.567 million tons. Utah has a unique position in the coal export market. Its low cost, high productivity, low sulfur high BTU coal is closer to West Coast ports for shipment to Pacific Rim countries than any other U.S. coal. U.S. coal may be slightly more expensive than other coals in the Pacific Rim region, but it is a better coal. In addition to the coal quality, U.S. coal producers do not have delivery problems. This is an attribute of Utah's coal that Pacific Rim countries value very highly.

The cost of production and price of Utah coal has steadily decreased over the past decade as a result of increased productivity. This has made Utah coal almost competitive on a price-per-million BTU basis with coal produced in other countries. The price advantage of foreign coal producers is the result of cheaper labor and less stringent environmental and safety regulations.

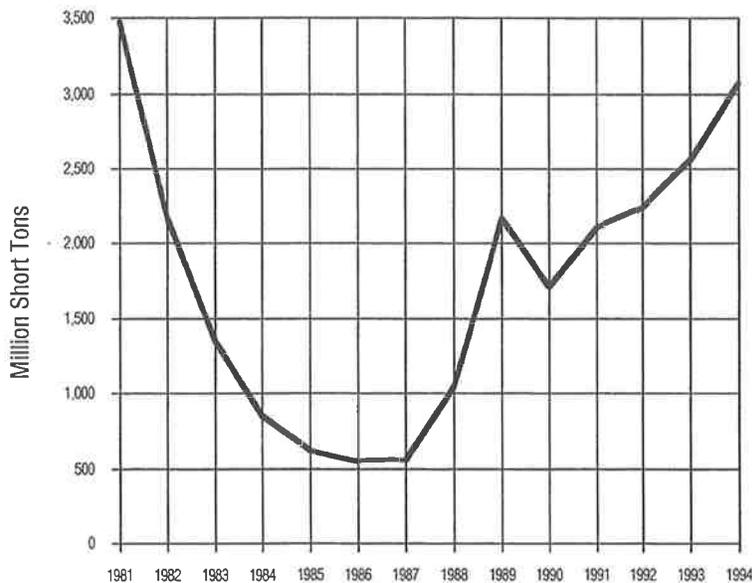
Utah coal production for

exports is influenced by the world coal market. During the next ten years, steam coal demand will rise in Europe as well as the Pacific Rim. European coal imports will increase about 80 percent during this period due to greater consumption but, more importantly, because of production curtailment in Europe. Production there will fall for several reasons. First, Europe has historically used lignite coal, but will discontinue its use because of environmental considerations. Second, many European coal mines are unprofitable to operate but have continued to produce coal with subsidies from their country's governments. These subsidies have either ended or will soon end, making many of these mines unprofitable. There are also some deep underground coal mines that are more difficult to mine. Production from those mines will also stop when faced with competition from imported coal. This will indirectly effect Utah coal exports. As major eastern exporting coal companies with subsidiaries in Utah start to ship more coal to Europe they may shift more of their Pacific Rim obligation to their Utah subsidiaries and affiliates. On the other hand, increased imports in the Asian coal market are basically consumption driven and will continue to be in the five percent range for the next ten years. In this market, fuel oil competes very strongly with coal.

In 1994, Utah coal exports will surpass the 3 million ton mark and by the end of the

decade it will be in excess of 5 million tons.

Utah Coal Exports to Pacific Rim Countries



1994 values are forecast

1993 Activities of Utah Coal Operators

PacifiCorp

The Deer Creek and Cottonwood/Trail Mountain Mines, owned by PacifiCorp and operated by Energy West Mining Company had a very successful year in 1993. The total production from the three mines was 6.106 million raw tons of coal. The Deer Creek Mine produced 2.389 million tons using longwall methods and 0.849 using continuous miner development. The coal produced from the Deer Creek Mine averaged 11.95 percent ash for the year, with the coal produced in November and December being well below ten percent ash. Because of this, some of the low ash coal was suitable for use in PacifiCorp's Carbon Plant, and 13.7 thousand tons of this coal was shipped there in December of 1993. The coal with the lower ash content was produced by the longwall section in the northern reserves of the Deer Creek Mine. It is anticipated that the low ash production will continue throughout 1994.

The Cottonwood Mine produced 2.869 million tons in 1993. Longwall production accounted for 2.325 million tons and continuous miner development accounted for 0.544 million tons. The average ash content of the coal produced in 1993 was 13.37 percent on a raw, as received basis. Of this production, 1.150 million tons were washed at the Hunter prep plant. Part of the continuous

miner development was for the access from the Cottonwood Mine to the Trial Mountain Mine. The access should be completed in late 1994 and production in the Trail Mountain Mine will follow sometime in 1995.

Coastal States Energy Company

In late 1993, Coastal purchased the Soldier Creek Coal Company and its parent, Sage Point Coal Company, from Sun Coal. The Sage Point Coal company acquisition has added approximately 86 million tons of new, recoverable, high-quality, low-sulfur coal to Coastal's reserve base. The addition of Soldier Creek will result in 1994 Utah production by Coastal of approximately 9.0 million tons.

During 1993, SUFCo and Skyline combined to achieve higher levels of production and sales. These two mines provided more than ten percent additional coal to the market in 1993 than in 1992. Sales volume increases from the two mines basically followed the increases in production. With SUFCo's and Skyline's core business remaining stable, most of the added volume was due to increases in exports to the Pacific Rim countries and shipments to Midwestern utilities.

Furthering Coastal's commitment to the export market, and reflecting its success in exporting Western coal, Coastal has joined several U.S.

entities to form a partnership with many Japanese participants in the new Port of Los Angeles Dry Bulk Terminal, taking an 8.5 percent interest in the project. The partners believe the new terminal will reduce transportation and loading costs for coal and petroleum coke bound for the growing Pacific Rim market. The first coal should move through the terminal in 1997.

White Oak Mining and Construction Company, Inc.

In September 1993, White Oak Coal Company, a subsidiary of Quaker Coal Company of Kentucky (no relation to Quaker State Oil Company), purchased Valley Camp of Utah, Inc. from the Quaker State Oil Company. Coal production started on September 14 and before the conclusion of the calendar year, White Oak produced the equivalent to 80 percent of the Valley Camp production of the previous year.

White Oak is now producing coal under the contract and for the spot market from White Oak No. 2 Mine (Lower O'Connor Seam), at a rate of nearly 80,000 tons per month using continuous miners. Spot market for low-sulfur coal remains good, with sales in Minnesota, Missouri, Nevada, Tennessee and overseas export markets.

Other plans for 1994 include the possibility of producing coal from White Oak No. 1. Mine (Upper O'Connor

Seam) this fall as well as entering the Miller/Gordon Creek Lease area just East of the Utah No. 2 Mine.

Sunnyside Coal Co.

During 1993, production from Sunnyside mine decreased by 20 percent compared to 1992. The major purchaser of Sunnyside coal was Geneva Works in Orem, Utah. Various amounts of industrial coal were also shipped to California and Washington. Since the Geneva Works contract with Sunnyside was not renewed after its expiration in February 1994, Sunnyside closed its mine and started reclamation work.

Andalex Resources, Inc.

The Tower Division of Andalex Resources (Utah operation) produced about 1.2 million tons of coal in 1993 for the fourth consecutive year and is expected to produce 1.5 million tons in 1994.

The long awaited, newly installed, longwall section of Andalex went into operation in mid-July of 1994. The operation of this state-of-the-art longwall is quite satisfactory but invariably there are some glitches that have to be worked out. Andalex has very strong and varied engineering talent at its disposal and can easily overcome any difficulty that may arise in this newly operational phase of production.

The present production rate of 3,000 tons per shift may not seem to be very high but, considering the coal cut of seven feet in the present

section, this rate of production has markings of well run operation.

Andalex is still pursuing the permitting process of the Smoky Hallow Mine in southern Utah. The Environmental Impact Statement (EIS) is now nearing completion and should be finalized within the first half of 1995.

Cyprus Plateau Coal Company

The production rate at Cyprus Plateau Mining expanded significantly in 1993. Operations at the Starpoint No. 2 Mine focused mainly on longwall mining in a structural horst west of the Bear Canyon Graben, but also included some pillaring activities. Programs emphasizing increased continuous miner production coupled with safety awareness have been very successful. Significant upgrades were also made to the water handling and conveyor systems. The mine produced over three million raw tons in 1993.

Exploration and development activities consisted of vertical and horizontal underground drill holes, underground water monitor wells and surface mapping of open federal tracts west of the active leases. Permitting of exploration holes for this western area continued in 1993.

Cyprus Plateau Mining Company services Utah and Nevada steam plants, institutional and industrial utilities in the West and Pacific Rim markets.

In November, 1993, the Willow Creek Mine reserve (formerly called the Blackhawk Reserve or Blackhawk East) was purchased from American Electric Power (AEP). The acquisition culminated a data gathering and evaluation effort spanning parts of 1992 and 1993. Permitting efforts and environmental studies will start in 1994 for a projected mine startup in 1997. Additionally, a merger in late 1993 of Cyprus Minerals Company with AMAX Mining Co. resulted in the acquisition of the idled Castle Gate Mines west of the Price River Canyon and adjacent leases. While the reclamation of the previously mined Castle Gate property will continue the remaining reserves will be combined with the adjacent Willow Creek property in 1994.

Genwal Coal Company

The Crandall Canyon Mine, operated by Genwal Coal Company, experienced continued progress through 1993. Genwal Coal produced 1,474,824 tons of coal with two continuous miner sections. One section, supported by a continuous haulage system, was used in room-and-pillar extraction, while the second section, supported with haulage cars, was used primarily for section setup and development.

In 1993, Genwal Coal Company gained the highest productivity, in tons per man day, of any continuous-miner operation in the country. For 1993, tons per man day reported was 71.1 tons.

Genwal has set goals to continue its success in the coal industry in 1994. A second continuous haulage system is on order and a longwall system is being evaluated. These improvements will increase Genwal's production capability, guaranteeing safety, productivity and maximum recovery of reserves.

Co-op Coal Company

Co-op production in 1993 showed a marked increase over 1992. Shipment to the James River Plant of Springfield (MO) city utilities was responsible for most of the added production. Co-op has been quite successful in sending various amounts of coal for test burn to the Eastern sector of the country. A recent shipment to R.M. Schafher station of Northern Indiana Public Service Company could also lead to sizable out-of-state Utah coal sales.

Coal Leasing Activity in Utah

During 1993, only one federal coal lease sale occurred in Utah. On December 29, 1993, Intermountain Power Agency (IPA) the wholly owned subsidiary of the Los Angeles Department of Water and Power and Nevada Electric Investment Company (NEICO) the wholly owned subsidiary of Nevada Power Company jointly submitted a bid of \$3,810,000 for 2,979 acres of BLM land. This is adjacent to the existing leases of Genwal Coal Company which is equally owned by them. The bid was accepted.

The amount of recoverable coal estimated by the BLM to exist on this lease is about 18.7 million tons making the coal worth just over 20 cents per ton. By company estimate, recoverable coal reserve on this lease is 15.7 million tons. This would make the coal just over 24 cents per ton.

Five other leases have been applied for and the BLM is presently working on processing these applications.

On January 10, 1991, Coastal States Energy Company filed a Lease By Application (LBA) for 2,020 acres of federal land in Winter Quarters Canyon in the Wasatch Plateau coal field. The application covered sections 2, 3, 10 and 11 in Township 13 South (S) and Range 6 East (E). The tract delineation has been made for 3,351 acres covering all or parts of sec-

tions 26, 34 and 35 of Township 12S and Range 6E and sections 2, 3 10 and 11 of Township 13S and Range 6E. This LBA should go out for competitive bid by as early as November 1994 or as late as spring, 1995. Coastal needs more reserves as it extends the Skyline mine. Adequate reserves are essential for long term contracts. Coal operators, in general, attempt to keep a 30-year coal reserve on hand on the basis of their ongoing volume of sales.

On May 22, 1992, Sage Point Coal Company, which is now owned by Coastal, filed an LBA for 2,098 acres for the Alkali Creek Tract in Township 13S and Range 11E, sections 1, 11, 12, 13, 14, 15, 23 and 24. This new LBA can be used for continuous miner as well as longwall operation. The tract delineation for this lease was made in 1982 which covered all or parts of sections 1, 10, 11, 12, 13, 14, 15, 23 and 24. The new tract delineation should not be very different and may contain the second seam of the 40 acre Rock Canyon Lease modification that was previously sold to Sage Point Coal Company's subsidiary Soldier Creek Coal Company.

The first LBA for Crandall Canyon was submitted by Mining and Energy Resources, Inc. (MERI) of Golden, Colorado on December 29, 1989 covering an area of 3,431 acres in Wasatch Plateau coal field. MERI has been allowed

to begin its environmental studies by the end of 1994. If no action is taken by MERI this LBA will be rejected. On March 3, 1991, Genwal Coal Company, a subsidiary of Nevada Electric Investment Company (NEICO) filed for an LBA covering an area of 1,974 acres overlapping some of the previously applied for LBA by MERI. This tract was sold to Genwal. On February 4, 1993, Genwal Coal Company filed another LBA for 4,051 acres of federal leases covering all or parts of sections 1, 10, 11, 12, 13, 14 and 15 of Township 16S and Range 6E and sections 6, 7 and 8 of Township 16S and Range 7E on land adjoining its presently operating mine and the previously applied for LBA. This LBA is not expected to go out for competitive bid until 1995.

PacifiCorp Electric Operations (Utah Power) of Salt Lake City submitted an LBA on February 26, 1991 for 7,864 acres in the Trail Mountain/Cottonwood Creek area of the Wasatch Plateau coal field in Emery County covering all or parts of sections 2, 3, 4, 9, 10, 11, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32 and 33 of Township 17S and Range 6E. This application is in full conformity with responsible and prudent coal operation. The BLM is processing this application and this lease will be offered for competitive bid probably by 1995.

Outlook for Utah's Coal Industry

Forecast for 1994

Prices

Over the past decade, coal prices in Utah have been on the decline. In 1984, Utah coal, on the average, was sold for \$29.20 per ton. During 1993, the same coal was selling for \$21.17 per ton. This is a decrease of 27.5 percent in current dollars, but a decrease of almost 50 percent on a constant dollar basis.

For the past four years, the average price of Utah coal has fluctuated around a \$21 per ton price. This is an indication of a possible bottoming out of the coal prices. For the next two years, the average coal price in Utah will most likely remain stable. The nominal dollar price will start moving up after two years, however, the price of coal as measured in constant dollars is expected to continue going down. In other words, even though the average dollar price per ton of coal will start going up, the rate of increase will be an amount that will not be in excess of the rate of inflation.

Utah's coal prices are influenced by the world price of coal. The correlation may not be a hundred percent, but the existence of strong influence cannot be denied.

Currently, world coal prices are in decline. Coal operators in Utah recently agreed to a one dollar per short ton decrease in coal prices exported to the Pacific

Rim countries of Korea and Japan. Other countries such as Australia, Canada and South Africa had accepted much larger price decreases, some as much as \$3.50 per ton, for their coal. Even though export prices for Utah producers are not a determining factor in overall coal prices and the sale takes place on the marginal production, it does affect the spot market and the spot market to some extent affects the average coal price.

Other factors also tend to bring coal prices down. Technological developments in coal production and handling continues to lower the break-even point for coal production and to reduce coal prices. Large volume production by coal producers allows operators to reduce profit margin per ton of coal by leveraging prices and still keep overall profit high. The abundance of coal supply on the international market will continue to exert a pressure on Utah coal producers to keep the prices competitive.

World recoverable coal reserves stand at 1.145 trillion tons, while world coal production and consumption is about 5 billion tons per year, implying that at the present rate of consumption, the world has an adequate supply of coal for the next 229 years. This, of course, is based on the recoverable reserves that are known and reported at this time. There are many coal reserves in the world that are not dis-

covered, and some that are discovered but not reported. There is also some question about the "recoverable" part of the recoverable reserves. What is referred to as "recoverable" today is what we think we can mine out of the reserve with today's technology. However, future technology may offer much greater recoverability, hence much greater recoverable reserve.

Rate of consumption also directly affects the remaining number of years of world coal supply. As world population increases, the demand for energy, including coal, will increase. And, as developing countries go through the process of industrialization the demand for energy and coal will increase. On the other hand, new technological innovations will allow us to maintain our style and standard of living while using less energy. At the same time, new technologies will help us achieve much greater efficiency in our energy conversion. Today, on the average, we burn 10,080 BTU (0.84 lb. of 12,000 BTU per pound of coal) to generate one kwh of electricity which has 3,413 BTU. In other words, in the process of conversion we lose 6,667 BTU or 66.1 percent and end up with 33.9 percent of the energy used. By the turn of the century, many of our energy conversion units will have a heat rate of 6,800 BTU/kwh or slightly more than 50 percent. This, in reality, means that by

the turn of the century we should be able to use the same amount of coal to generate 50 percent more electricity than we do today, meaning our reserves will last much longer than 229 years. This leads to the conclusion that the world has a vast coal reserve, and it is the vastness of this reserve that will ultimately keep the supply up and the price down.

In spite of this backdrop of continued, decreasing average coal prices in Utah and even lower prices looming on the horizon, there are those companies that through vision and insightful business acumen, employing newer technology and innovative processes and wise and timely investments have managed to post record profit in 1993, looking at even higher profit in 1994.

Production

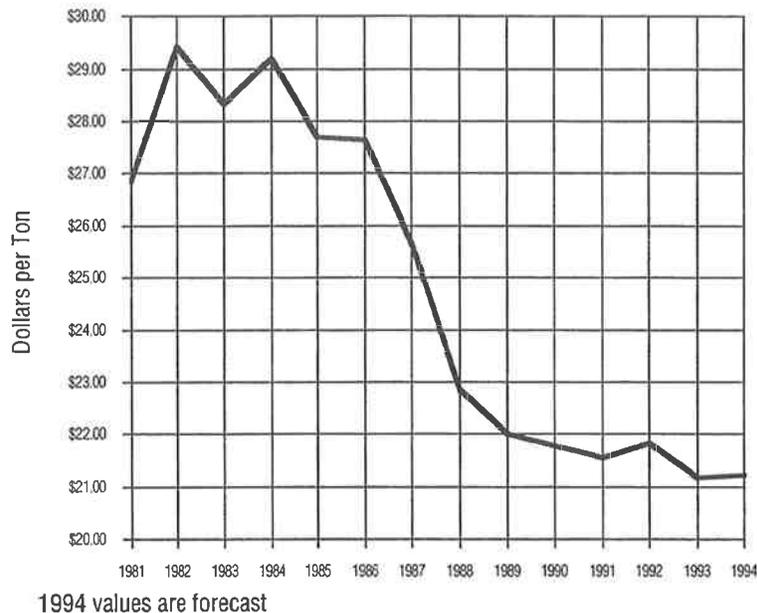
Utah coal production for 1994 will surpass 24 million tons. This will be the first time in the 125-year history of recorded coal production in Utah that this much coal will be produced. Steam coal use by the electric utilities in the East as well as greater level of exports will account for this.

Electric utilities in the East will continue using greater amounts of Utah coal in years to come and the expectation of the Pacific Rim countries using more of the Utah coal is anticipated with the \$180 million expansion of the Port of Los Angeles Dry Bulk Terminal (POLADBT), the construction of which has already begun and is expected to be

completed and operational by 1997. The success of this terminal is guaranteed by the diversity of shareholders representing every facet of the coal market from coal producers to coal consumers.

in mind that the forecast for Utah's coal distribution to the Pacific Rim countries is anticipated to increase to more than 5 million tons by the end of the decade.

Utah Coal Prices



If this project were just another expansion of a facility financed through the traditional investors there would be room left for doubt of its success. However, this project is supported and financed by the coal operators that produce the coal, by the railroad companies that transport the coal from mine to port, by the port authority that loads it onto the vessel, by the ship owner that transports the coal on the high seas, and finally by the coal consumers that buy the coal through their trading companies. The participation of all of these players places a high probability on the terminal being of success. It is with this

Distribution

During 1994, distribution as well as production of Utah coal will top 24 million tons. Distribution of electric utility coal to out-of-state customers will increase by as much as one million tons.

In 1995, we are expecting that the Utah coal consumption of states other than Utah, California and Nevada would once more double.

In 1984, American Electric Power (AEP), the parent company of Indiana Michigan Power Company, was ordered by the Federal Energy Regulatory Commission (FERC) to limit the cost of

delivered coal to its Indiana utility plants. As a result of this order, AEP decided to close its wholly owned subsidiary, the Price River Coal Company in Helper, Utah because the delivered cost of coal to the Indiana utility plant was much more than \$48 per ton (pt). Ten years and 30 percent inflation later, Utah coal is flowing eastward for just over \$30 per ton delivered.

The expectation of Utah coal moving to electric utilities in the eastern market was not expected until the year 2000 when the second phase of the Clean Air Act Amendments of 1990 (Public Law 101-549) become effective. However, numerous events have coincidentally influenced the interest of the eastern electric utilities in Utah coal. The first, and most important is the fact Utah coal operators have substantially lowered their cost of coal production. In 1984, the average price of Utah coal stood at \$29.20 per ton. This average price was the combination of term price that was usually \$3 to \$5 per ton more than the average price and the spot price that was \$5 to \$8 per ton less than the average price. This made the average price of term coal \$32.20 per ton. Today, two Utah coal operators are on the verge of signing coal contracts with the Tennessee Valley Authority (TVA) offering coal at less than half the price of ten years ago. The importance of this cost reduction feat should be weighed in light of the fact that more than 30 percent inflation has accrued in the

past ten years. The signing of these contracts is almost assured as the terms of the agreements have been reached in principal and only the details remain to be worked out.

The second factor is the merger of the Denver and Rio Grande Western (D&RGW) railroad with the Southern Pacific (SP) railroad in 1989. This merger created a direct line from the coal fields of Utah which were on D&RGW to the outreaches of SP in the east.

The third factor that may be just as important as the first is the Geneva Works decision to bring in taconite from Minnesota creating a great backhaul opportunity for Utah coal to go eastward. Geneva Steel originally used the iron ore from the mines near Cedar City, Utah. Part of the iron ore still comes from two mines near Cedar City, namely the Comstock and the Mountain Lion which Geneva owns. The fifty-four percent grade of iron ore was satisfactory, but there were some negative chemical and physical properties associated with this iron ore that made it advantageous to mix it with other ores.

Geneva Steel started buying taconite in 1962 from the Atlantic City mine in Lander, Wyoming. This operation continued until 1983 when Geneva switched to Minnesota taconite. The Minnesota taconite was also pelletized and concentrated to contain 64 percent iron instead of the usual 27 percent. The trans-

portation contract from Minnesota was first with Union Pacific (UP) railroad which annually brought in 2.4 million tons of taconite from Minnesota to Orem, Utah and then went to Wyoming to pick up Wyoming coal for eastern utilities. UP's contract ran out at the end of August 1994. At the beginning of 1994 Southern Pacific started to put a transportation package together. The first leg of this package consists of bringing in taconite from Minnesota to Orem. Taconite originates from the U.S.S. Minntac mine located between Virginia City and Hibbing, Minnesota. DM&IR (Duluth, Missabee and Iron Range) takes it over a 62 mile distance to Duluth and Steelton switchyard in Wisconsin. From there, Wisconsin Central takes it over a distance of 473 miles to Chicago where SP takes it to Orem, Utah through Kansas City, Pueblo and Grand Junction, a distance of 1,672 miles for much less than \$20 per ton. The second leg of this package consists of shipping Utah and Colorado coal to utilities in the east. SP began contacting Utah and Colorado coal producers to ship coal to seven electric utilities in the east that it had developed contacts with. Most of the coal will go from Price, Utah or Grand Junction, Colorado. The backhaul price - amounting to less than the value of the coal - to St. Louis was held constant for both Utah and Colorado coal producers. SP contacted Wisconsin Electric Power (Genwal is now closing on the deal), Illinois Power

(Coastal is selling on the spot market, but may sign a long term contract), Detroit Edison, and other electric utilities and major industrial coal consumers. SP's main interest is to have the backhaul going either to Chicago or to St. Louis in order for the coal to be put on the Mississippi river to be barged south or eastwards to nearby utilities. To accomplish this, SP allocated 1,400 steel cars carrying one hundred tons each for a turn-around time of seven days each way or a complete turn-around time of 14 days. This would enable SP to send $26 \times 1,400 \times 100 = 3,640,000$ tons of taconite to Orem, Utah and carry back the same amount of coal to the Chicago/St. Louis area.

The fourth factor was the influence of nature. SP had contacted TVA as early as 1992 to create a possible interest in western coal, but TVA was not interested until the flood of 1993. This flood left some of the TVA electric utility plants that were using bituminous coal cut off from their traditional source of coal supply. TVA decided to look into the source of coal supply from the west more seriously.

The fifth factor creating this environment was the passage of the Clean Air Act Amendments of 1990 whereby electric utilities were given SO₂ emissions credit for emitting less SO₂ than the allowable level, which would be saleable to other high emission coal consumers. TVA, by consuming Utah coal, can

actually generate emissions credit it can sell to offset the high delivered cost of Utah coal to its Allen plant near Memphis, Tennessee.

The sixth and the final factor is TVA itself. TVA is a very large electric utility organization with 44 electric utility plants in the south central and south atlantic region; 29 plants in Tennessee, six in Alabama, two in Georgia, three in Kentucky and four in North Carolina. Two of these plants, one in Alabama and one in Tennessee, with total generating capacity of 5,896 MW are nuclear, ten plants with total generating capacity of 18,130 MW use bituminous coal, and the remaining 32 are hydroelectric. The ten plants using bituminous coal could consume as much as 50 million tons of coal per year. In 1993, TVA plants burned 37 million tons and by 1999 they will be burning 42 million tons. This great consuming sector creates a monopsony within its own region and to some extent can dictate the regional price of coal as well as the transportation cost. This, in addition to the concept of backhaul, is exactly why TVA has been able to negotiate a low freight rate for the haulage of 3.75 million ton per year of coal from Utah and Colorado. TVA purchased-coal from Utah and Colorado could soon top five million tons per year in addition to the purchases of other utilities in the east.

To keep its cost down and handle this large volume of coal transportation SP has

ordered 920 aluminum cars with 117 tons of carrying capacity. This allows SP to save 17 percent on its cost and therefore still offer an attractive rail rate to its electric utility coal customers in excess of the backhaul tonnage.

It is expected that two contracts for delivery of 1.5 million-tons-of-coal-per-year for the duration of ten years will be signed between TVA and White Oak Mining and Construction Company, Inc., and another coal contract for delivery of one half million tons-of-coal-per-year for the duration of ten years will be signed between TVA and Genwal Coal Company. This is the first time in ten years that Utah coal will begin to flow to electric utilities in the East on a long term basis even though numerous spot sales have been made to that sector of the country. It is also expected that within the next few months other coal operators will follow the same path.

This two million tons of additional coal sale from 1995 onwards is a great boost to Utah's coal production. It will lead to more jobs in Utah's coal industry as well as many indirect jobs in local communities.

Distribution of Utah coal to electric utilities within the state should show very little fluctuation from one year to the next, only a slight decrease, unless new facilities are built or some of the older units are retired. Older units experience more down time due to maintenance and repair, so a slight

decrease in distribution is expected. The only unit that could affect the electric utility coal consumption within the state is the IPA plant of the Los Angeles Department of Water and Power. During years with higher precipitation in the Pacific Northwest, more hydropower becomes available at lower cost compared to burning coal. This will, to some extent, curtail the operation of IPA units resulting in less consumption of Utah coal. For 1994, this unit will burn more than it did in 1993.

Consumption of Utah coking coal will be limited to the 172,000 tons that was delivered to Geneva Works through the end of March, 1994. It is doubtful that any more coking coal will come from Utah under present circumstances.

Distribution of Utah industrial coal within and outside the state during 1994 will remain the same as 1993 at 2.7 million tons per year, decreasing only slightly in the future as some of the units get older.

Distribution to the residential and commercial sector will also remain steady, increasing slightly from one year to the next as the price of natural gas rises and some commercial operations begin switching from natural gas to coal.

During 1994, distribution to the export market will increase in excess of 20 percent, or more than half a million tons.

The general outlook for Utah coal industry is bright

despite some coal operators having moved their operations to other states, sold, or otherwise disposed of their Utah coal properties. Still we have seen a number of companies expand operation and double in size within three or four years. We also have seen many companies apply for new federal coal leases, indicating continuing interest in Utah's coal reserves. And this activity bodes well for the future of Utah coal.

Coal production in Utah has enjoyed a steady growth since the mid-1980s and has doubled in size in less than a decade. Despite coal prices that have declined steadily for a decade, coal production in Utah has doubled. This is indicative of a strong and healthy coal industry.

In 1995, we are expecting this portion of electric utility coal consumption to double once more over the previous year. This large increase will have a more permanent basis than the spot sale of previous years, for this increase will be the result of long term contracts.

Federal Programs and Legislative Issues

Clean coal technology, without doubt, will move into the commercial sector worldwide and by doing so it will bring in sizable profit for the participants in the clean coal technology programs as well as reimbursing the federal government for its share of participation in these programs. In doing so, it will

bring into the country billions of dollars in foreign exchange.

There are of course conditions that could stimulate the propagation of the clean coal technology or stifle its growth on the national as well as the international market.

The national market has some similarities with the international market although some dissimilarities exist. On the national market, inter-fuel price competition is a determining factor, on the international market it is even more so. We have not seen high oil prices since 1986. There has been some fluctuation in crude oil prices as a result of the oil embargo on Iraq and labor problems in Nigeria, but these were of a temporary nature and did not have a long lasting effect. Production of over 8 million barrels per day (bpd) of crude oil by Saudi Arabia, which traditionally produced 4.5 million bpd in the 1970s and through the first half of the 1980s, has helped to keep the price of crude oil low. This, in itself, may be a temporary situation since most of the members of the Organization of Petroleum Exporting Countries (OPEC) are not amenable to this arrangement and may in the not too distant a future, take the necessary corrective action.

Natural gas prices that were on the rise and were further affected by the Energy Policy Act of 1992 (Public Law 102-486 or EPACT) will receive an additional boost by increasing crude oil prices. So when

crude oil prices start going up we will see more genuine interest in the fruits of the clean coal technology programs than we have seen to date, both in the U.S. and the international market.

The Clean Air Act Amendments of 1990, the first phase of which will go into effect on January 1, 1995, while quite useful, and definitely a positive step forward, are not stringent enough to lead electric utility companies to procure the new technologies developed by the clean coal technology programs. If it occurs, adoption of the clean coal technology will likely not take place until the year 2000 when the second phase of the Clean Air Act Amendments go into effect.

However, there appears to be more potential for clean coal technologies on the international scene. Section 1332 — Innovative Clean Coal Technology Transfer Program — of the Energy Policy Act of 1992 directs the U.S. Department of Energy to market these technologies to developing countries.

While the intention is not to force other governments or owners of electric utilities to utilize the innovative measures provided them through the implementation of clean coal technology programs we can encourage these countries to adopt this technology to meet their baseload generation needs by providing them with technological as well as financial assistance.

The increase in the number of people consuming electricity, if not offset by the efficiencies brought about by better use of coal burning, energy conversion and consumption, will have to be met by adding new generating units. On the national level, this may not be a difficult task. Since our population growth is not as rapid as it is in some developing nations and we may be able — through some innovative energy efficiency measures — to postpone the construction of new electric generation units that will allow us to use the fruits of our clean coal technology programs. This, however, will not work the same way in most developing nations. In those countries, innovative energy efficiency measures could only be a marginal source of additional supply, as it will be in the developed nations. Increased demand of the developing nations will not be marginal, however, but substantial.

In developed countries, the average electrical demand per household is about 20 kwh per day. Consumption of electricity for the foreseeable future will be about this much. The only increase in demand will come from the population growth which is less than two percent per year. This can be offset with higher consumption efficiency and the addition of cogeneration units or units using renewable resources.

In the developing countries, the average consumption of electricity per household (if

a meaningful average really exists) would be about one to five kwh per day (many households do not even have electricity). At most, it would be one quarter of that of the developed countries. As the productivity and income level in the developing nations increases we will witness a doubling of electrical demand and electric generation.

This is where we can best provide technical assistance to developing countries to ensure the best use of our efforts in the clean coal technology programs as well as assuring that the new demands are met with environmentally acceptable methods.

Appendix

- Table 1 **Historical Production, Distribution and Consumption of Coal in Utah**
- Table 2 **Utah Coal Production by Coal Field**
- Table 3 **Utah Coal Production by County**
- Table 4 **Utah Coal Production by Landownership**
- Table 5 **Distribution of Utah Coal 1993**

Table 1
Historical Production, Distribution and Consumption of Coal in Utah
 Thousand Short Tons

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
PRODUCTION	13,808	16,912	11,829	12,259	12,831	14,269	16,521	18,164	20,517	22,012	21,875	21,015	21,723	24,135
DISTRIBUTION	14,627	15,397	12,188	12,074	14,361	13,243	16,989	18,244	20,289	21,680	21,673	21,339	21,935	24,164
E U OUTSIDE UTAH	2,688	3,643	3,404	3,730	3,746	2,989	3,182	2,797	2,623	3,373	3,608	4,000	3,914	4,981
E U IN UTAH	4,837	6,153	5,220	4,912	7,385	7,614	11,677	12,533	12,963	14,053	13,472	13,136	13,343	14,344
C P OUTSIDE UTAH	779	859	0	0	0	0	0	0	0	0	0	0	0	0
C P IN UTAH	1,297	831	886	1,392	1,328	868	291	1,259	1,277	1,296	1,310	1,182	1,089	1,261
IND OUTSIDE UTAH	1,645	1,349	1,091	1,542	1,866	1,745	1,813	1,996	2,401	2,327	2,158	2,006	2,146	2,062
IND IN UTAH	591	812	664	551	450	374	349	739	810	619	624	497	614	637
R/C OUTSIDE UTAH	180	233	292	311	312	81	83	88	84	59	76	81	134	155
R/C IN UTAH	197	177	191	258	252	191	204	236	323	382	320	347	228	250
OVERSEAS EXPORTS	3,472	2,177	1,346	849	625	551	555	1,044	2,175	1,708	2,112	2,245	2,567	3,075
TOTAL IMPORTS	1,136	797	937	1,539	1,580	1,145	1,165	2,448	2,367	2,137	2,007	2,155	2,100	2,621
IMPORTS E U	8	18	0	224	193	659	905	1,300	1,400	1,449	1,310	1,517	1,501	1,522
IMPORTS C P	1,030	695	854	1,229	1,289	383	160	1,088	922	679	695	629	579	1,089
IMPORTS IND	98	84	83	85	98	103	100	60	45	7	2	9	20	10
IMPORTS R/C	0	0	0	1	0	0	0	0	0	2	0	0	0	0
COAL OPERATORS	16	16	15	15	15	16	16	14	14	13	12	12	11	10
ACTIVE MINES	28	29	25	21	21	21	18	21	20	18	16	16	15	14
EMPLOYEES	4,166	4,296	2,707	2,525	2,563	2,881	2,650	2,559	2,471	2,791	2,292	2,106	2,161	2,333
PRODUCTIVITY, T/MH	1.99	2.05	2.59	2.94	2.8	3.08	3.25	3.69	4.42	4.22	4.79	5.13	5.43	5.61
AVERAGE PRICE \$/TON	\$26.87	\$29.42	\$28.32	\$29.20	\$27.69	\$27.64	\$25.67	\$22.85	\$22.01	\$21.78	\$21.56	\$21.83	\$21.17	\$21.23
TOTAL VALUE \$1,000,000	\$371	\$498	\$335	\$358	\$355	\$394	\$417	\$415	\$451	\$479	\$472	\$459	\$460	\$512

Values for 1994 are forecast.
 All distributions include imports. EU=Electric Utilities. CP=Coke Plants. IND=Industrial. R/C=Residential and Commercial.

Table 2

Utah Coal Production by Coal Field

Thousand Short Tons

	Wasatch Plateau	Book Cliffs	Emery	Sego	Coalville	Others	Total
1870-1981	166,404	234,547	5,723	2,654	4,262	2,332	415,922
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	21,817	2,318	0	0	0	0	24,135
Cumulative Production	363,084	268,039	9,545	2,654	4,330	2,332	649,984

1994 values are forecast

Table 3

Utah Coal Production by County

Thousand Short Tons

	Carbon	Emery	Sevier	Summit	Iron	Kane	Others	Total
1870-1959	211,028	49,166	4,046	4,012	521	45	2,846	271,664
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	4,533	16,266	3,336	0	0	0	0	24,135
Total	372,738	218,964	50,219	4,272	821	70	2,901	649,985

1994 values are forecast

Table 4

Utah Coal Production by Landownership

Thousand Short Tons

	Federal Land		State Land		County Land		Fee Land		Total
	Production	Percentage	Production	Percentage	Production	Percentage	Production	Percentage	
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	20,949	86.8%	1,762	7.3%	193	0.8%	1,231	5.1%	24,135

1994 value are forecast

Table 5

Distribution of Utah Coal 1993

By Destination and End-Use, Thousand Short Tons

Destination	Electric Utilities	Coke Plants	Other Industrial	Residential & Commercial	Total
Arizona	0	0	87	0	87
California	1,257	0	1,604	63	2,924
Colorado	0	0	0	2	2
Florida	155	0	10	0	165
Idaho	0	0	16	41	57
Illinois	196	0	21	0	217
Indiana	204	0	0	0	204
Minnesota	17	0	0	0	17
Missouri	381	0	0	3	384
Montana	0	0	39	0	39
Nevada	1,570	0	246	2	1,818
Oregon	111	0	14	0	125
Tennessee	21	0	0	0	21
UTAH	11,842	510	594	228	13,174
Washington	2	0	87	23	112
Wyoming	0	0	22	0	22
Pacific Rim	2,567	0	0	0	2,567
Total	18,323	510	2,740	362	21,935