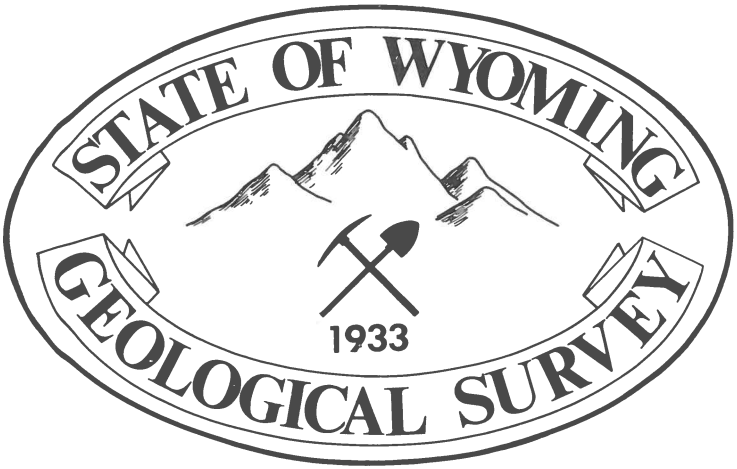
GEOLOGICAL SURVEY OF WYOMING
Gary B. Glass, State Geologist

# MINERALS OUTLOOK FOR WYOMING
# SEPTEMBER, 1983




Laramie, Wyoming
1983

INFORMATION CIRCULAR

Published for free distribution by

The Geological Survey of Wyoming
P.O. Box 3008, University Station
Laramie, Wyoming 82071



*Cover illustration: The Geological Survey of Wyoming celebrated its 50th Anniversary in 1983. To commemorate the event, this emblem was adopted as the Geological Survey's logo. Colored versions have gold ribbons on a blue background. The "1933" indicates the year the Geological Survey was created. Prior to 1933, geological and mineral resource activities were handled by Territorial Geologists (1881-1890) or the Office of the State Geologist (1901-1932).*

# MINERALS OUTLOOK FOR WYOMING

## SEPTEMBER, 1983

## OVERVIEW

by Gary B. Glass, State Geologist

The Fall quarter marked the first encouraging sign of a possible upturn in the State's mineral industry. Oil and gas drilling activity had begun a long awaited increase. By early September, the rig count in Wyoming had actually exceeded 1982 levels for the first time this year. Although the number of rigs was nowhere near the peak counts of 1980-1981, it is nearly twice the count in May of this year. Obviously this increase in activity will not have an immediate effect on declining income and revenues, but without some new drilling, the future would look very gloomy indeed.

Unfortunately, just as the rig count increased, the effects of a nationwide natural gas glut (the "gas bubble") were again brought home. In August, a major gas contract in the Powder River Basin was cancelled by Colorado Interstate Gas Company (CIG). This cancellation affected about two percent of the State's gas production at a time when 20 percent of the State's gas wells are already shut-in.

Although the supplier has sued CIG over the matter, the cancellation prompted numerous operators to seek permission to flare casinghead gas (gas produced along with oil produc-

tion). An estimated 26 million cubic feet of gas per day were suddenly without a buyer. Emergency flaring orders were issued by the Oil and Gas Conservation Commission (O&GCC) which limited the flaring to about 13 million cubic feet per day. In dollars, the flared gas amounted to about $40,000 per day. Without the flaring order, some 8,200 barrels of oil per day would be shut in at a value of almost $240,000 per day.

In mid-September, the O&GCC issued an interim order whereby CIG was ordered to take 70 percent of the shut-off casinghead gas in the Powder River Basin and cut back their takes of gas well gas to 48 percent. This order followed the temporary suspension of an emergency rule which set guidelines for purchasers to follow if they were cutting back on gas takes. In effect the rule would require purchasers to cut back takes of gas from gas wells before reducing takes of casinghead gas.

CIG had challenged the Commission's authority to issue such a rule, but were apparently complying with the latter order. By late September, the Commission's interim order had to be revoked, and the O&GCC issued a no flare order. At about the same time as the no flare order was issued, the Federal Energy Regulatory Commission entered a ruling that prompted CIG to resume takes on their contract. Gas was still flowing under the ruling in early October.

The outlook for Wyoming's other mineral industries was little changed in the Fall quarter nor expected to improve much in the last quarter. Coal production looked very much

like it would fall short of the previous year's production of 108 million tons - something that hasn't happened in 17 years. Equally important, coal prices were reportedly still falling.

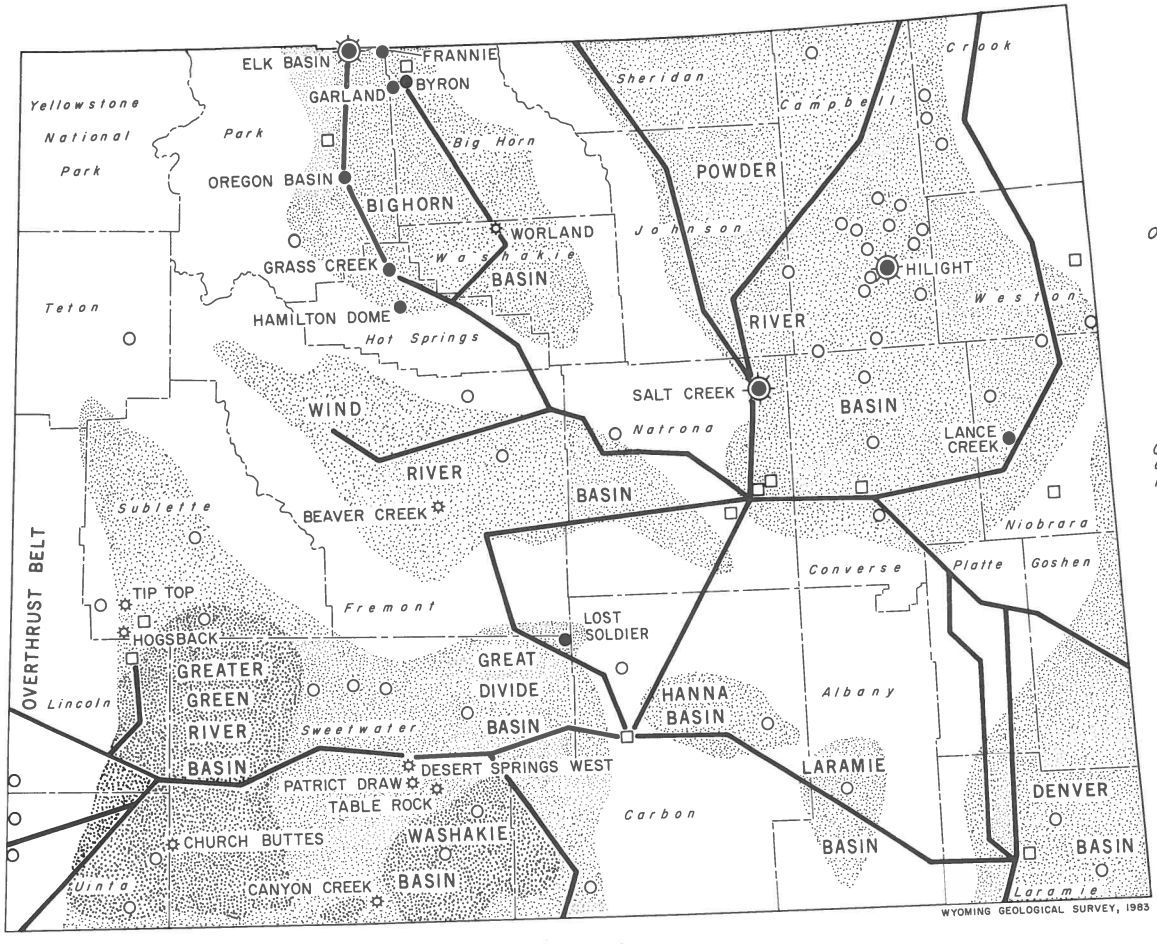
The uranium industry foundered more, and trona, gypsum, and limestone are still expected to do little more than hold their own. With renewed drilling activity, the outlook for bentonite improved slightly. The State's only remaining iron ore operation unfortunately closed in early October.

As an indication of the recessionary effects on Wyoming, Governor Herschler had to call a special session of the Legislature to seek more funds for unemployment compensation. In addition, lagging sales tax and mineral tax revenues prompted the Governor to order a four percent cut in all agency budgets. Budgets for the next biennium do not include any pay increases and are expected to show no growth over the present funding levels.

## OIL AND GAS UPDATE

by Alan J. VerPloeg, Staff Petroleum Geologist

Things appear to be looking up for the State's oil and gas industry. After a low of 58 active rigs in May of this year, the total had jumped to 113 in early September. Much of this increased activity is centered in the Powder River Basin and reflects an increased interest in oil, as well as the incentive of lower drilling costs. Gas exploration continued on the downswing due to the current gas surplus.




EXPLANATION

Major Wyoming Basins

Oil shale occurrences

Oil and gas pipeline corridors

Refineries

1981 Oil and gas field discoveries

Oil field with cumulative production[1] greater than 100 million barrels

Gas field with cumulative production[1] greater than 200 billion cubic feet

Oil and gas field with cumulative production[1] of oil greater than 100 million barrels and cumulative production of gas greater than 200 billion cubic feet

[1] CUMULATIVE PRODUCTION IS THROUGH 1981

[2] CUMULATIVE OIL PRODUCTION OF HILIGHT FIELD WAS 70 MILLION BARRELS THROUGH 1981

GENERALIZED OIL AND GAS INDEX MAP OF WYOMING

Woods Petroleum recently announced that a major new oil field (Powell Field) will come into production this fall in the Powder River Basin. Peak yearly production is estimated at 3.6 million barrels, a total that would nearly offset the natural production decline the State has been experiencing during the last few years. A unit agreement was recently approved by the Oil and Gas Conservation Commission, thus making production possible.

Davis Oil Co. recently announced the discovery of a huge new oil field in the Powder River Basin. The field is believed to be the largest discovered since 1970 in the basin, with estimated total production between 100 and 200 million barrels of oil equivalent. The field is located in the Powder River Basin, about 15 miles west of Gillette. Davis Oil Co. indicated it will drill as many as 30 additional wells in the field along with its one year, 100-140 well drilling program announced earlier for the Powder River Basin. The producing formation, in the field, is the Lower Cretaceous Muddy Sandstone.

## COAL UPDATE

by Richard W. Jones, Staff Coal Geologist

The transportation of coal out of Wyoming continues to be a major factor in the future of Wyoming's coal industry. The existence of competition for coal transportation out of the Powder River Basin was demonstrated recently when Arkansas Power and Light Company (AP&L) awarded a long-term (20 years with a 15-year renewal option) coal delivery contract to a

joint venture between the Chicago and North Western (C&NW) and Union Pacific railroads. Competition for this contract came from Burlington Northern (the only company transporting coal out of the Powder River Basin) and Energy Transportation Systems, Inc. (ETSI), the coal slurry pipeline company. The contract calls for shipment of ten million tons of coal per year from Peabody's North Antelope mine (under construction) and Kerr-McGee's Jacob's Ranch mine to AP&L generating plants. The utility claims that competition for this haulage contract resulted in a savings to consumers of a total of about $16.5 billion in transportation costs through the year 2016.

The award of AP&L's new contract to C&NW and Union Pacific railroads follows this July's start of construction of their new 107-mile long, $445 million railroad line in eastern Wyoming and the Nebraska panhandle. The rail line is scheduled for completion in late 1984 and should be in operation in 1985.

The loss of AP&L as a potential ETSI customer has forced the company to look elsewhere (especially Texas) for customers. ETSI is still planning construction of the $3.8 billion coal slurry pipeline, but will have to reroute the pipeline from its original destination to any market(s) they can secure. Evidently, several Texas utility companies now served by Burlington Northern Railroad are interested in possible transportation alternatives.

Markets for Wyoming coal continue to be newsworthy. Although many long-term contracts

have been signed for coal deliveries to electric utilities, the large quantities of inexpensive coal available on the marketplace is even having an effect on these contracts. This has resulted in renegotiation of contracts (at lower coal prices as controlled by the market conditions), sudden cancellation of contracts, and reduction of coal shipments to either the minimum allowed by the contract or to less than minimum (resulting in deferred deliveries). For example, an Oklahoma utility has been renegotiating their contract with Carter Mining Company for new prices on coal from the Rawhide mine under a reopener clause (which allows for renegotiation of the contract with changing market conditions) in their current contract.

On a more negative note, Peter Kiewit Sons, which operates the Big Horn mine in the northwest Powder River Basin, was recently cut back 400,000 tons of coal under their contract with Commonwealth Edison. Evidently, this Illinois utility company has an oversupply of coal and could face penalties from an Illinois regulatory agency for having excessive stockpiles of coal. In July, Big Horn Coal Company laid off 20 employees, probably permanently.

Southern Wyoming coal mines continued to have difficulties. Despite the rehiring of 12 laid-off employees and the hiring of 5 additional supervisory positions, and despite the mine going back to a five-day production schedule, Bridger Coal Company's production is still expected to remain below normal for the rest of the year. The Jim Bridger generating plant supplied by Bridger Coal Company has operated at less than half its capacity during the year and has also been plagued by large coal stock-

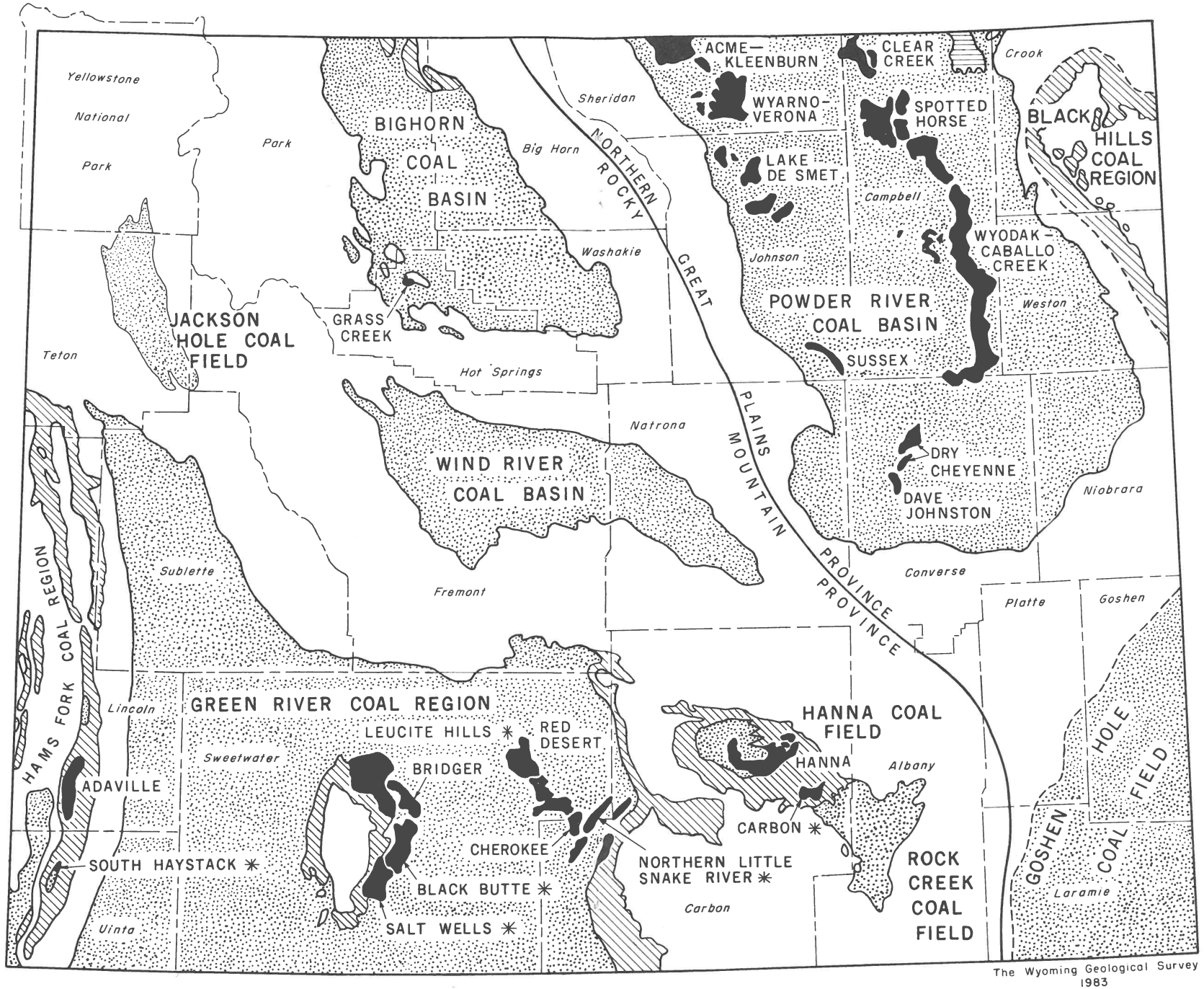
piles. In the Hanna Basin, the late July announcement by Carbon County Coal Company that they would be hiring as many as 25 workers at their underground mine was offset by news in late August that Omaha Public Power District had cancelled a 450,000 tons per year coal contract with Rosebud Coal Sales because of excess coal stockpiled at their generating plants in Nebraska. This tonnage represents about half of Rosebud's annual production.

On the positive side, competition for new coal contracts in existing markets and in new markets appears to be heating up between traditional coal suppliers and the newer Powder River Basin coal companies. Kansas City Power and Light Company's contract with Arco for over two million tons of coal per year expires at the end of this year; three coal companies that have Powder River Basin mines, in addition to Arco, are in the running for a new 20-year contract. Mobil Coal recently signed a contract with the Grand River Dam Authority in Oklahoma for 1986 coal deliveries to new generating units currently under construction; Carter Mining Company currently supplies the existing units at the plant. At least nine companies are competing for a contract to supply coal to a new generating plant operated by Southwestern Public Service; two companies with Powder River Basin mines are listed among the finalists, while Arco, the current supplier of 6 million tons of coal per year to the utility, is not.

A Minnesota utility is looking to Powder River Basin coal companies for 2.8 million tons of coal per year for their recently announced Sherco Unit 3 generating plant and a Florida based utility company has invited over 100 coal

companies, including many western subbituminous producers, to bid on a coal supply contract for new generating units at Crystal River Station. Wyoming coal producers have been unsuccessful in the Minnesota electric utility market, which is dominated by Montana coal. Although some Wyoming coal is used in Minnesota for residential/commercial heating, none is currently being used in generating plants. The current low coal prices and the competition for coal contracts will hopefully increase the amount of Wyoming coal used in Minnesota. Sometime ago the Florida market for Wyoming coal was mentioned by Wyoming coal companies as a possible or potential market, but until now, Wyoming coal has not been competitive. If western coal were used at Crystal River Station (on the west side of the Florida peninsula), it would be transported by rail to St. Louis, barged down the Mississippi River to New Orleans, and then shipped across the Gulf of Mexico to Crystal River Station. Delivered costs of western coal are expected to about equal the costs for low sulfur eastern coal from the Appalachians. The higher transportation costs for western coal would be offset by a FOB mine price much lower than that for eastern low sulfur coal.

On the Federal coal leasing scene, the Bureau of Land Management recently released a draft Environmental Impact Statement (EIS) for round two of leasing in the Green River - Hams Fork region, tentatively scheduled for the summer of 1984. The draft EIS recommends a high leasing alternative of 759.3 million tons of recoverable coal in 19 tracts, 11 in Wyoming and 8 in Colorado. The release of this EIS evi-




Subbituminous | Bituminous | Lignite | Strippable Deposits

* Preliminary: based on company data

COAL-BEARING AREAS OF WYOMING

dently reflects the Department of the Interior's decision to go ahead with their planned leasing activities despite Congressional resolutions proposing suspension of funds to continue the leasing effort. The U.S. Dept. of Interior recently announced that a coal lease sale for Fort Union tracts in Montana and North Dakota would go ahead as scheduled this September despite a resolution passed by the House Interior Committee forbidding the sale.

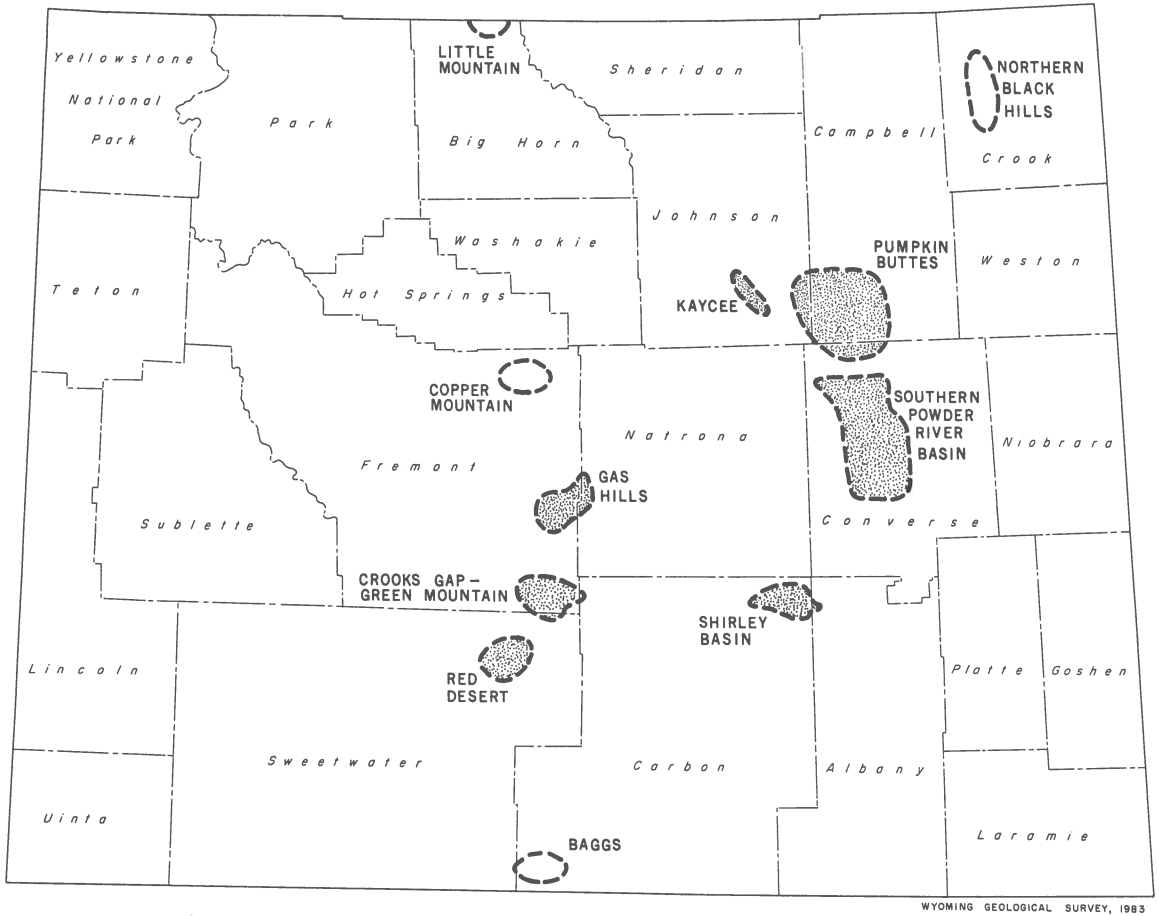
## URANIUM AND INDUSTRIAL MINERALS UPDATE

by Ray E. Harris, Staff Minerals Geologist

### Uranium

Hearings were held in Riverton (August 29) and Casper (August 30) regarding the status of the uranium industry. Governor Herschler submitted testimony calling for restrictions on foreign uranium imports. Independent uranium companies also called for the easing of "unnecessary regulations" as an aid to making domestic uranium more competitive with foreign uranium. Hearings in Riverton were for Senator Simpson's information; those in Casper were for the U.S. Department of Energy's proposed methods of assessing the viability of the domestic uranium industry. Wyoming produced 20 percent of the nation's uranium in 1982 (2,700 tons $U_3O_8$).

Uranium exploration continued at a slow pace, with only 13 exploration drills reportedly operating in July in the State. These drills included those used for annual claim assessment work.




MAJOR ACTIVE AND INACTIVE URANIUM DISTRICTS

The spot market price of uranium increased from $23.75 to $24.00 per pound at the end of August, up from $23.25 at the end of the last quarter.

Wyoming currently has only 6 active uranium mining operations.

## Trona

Wyoming's soda ash production is currently 15 percent behind 1982. With the trend toward plastic rather than glass bottles, and the failure of the domestic soda ash industry to establish export markets in countries using more expensive foreign Frasch Process soda ash, Wyoming's trona industry apparently will show a significant decrease in production in 1983. Allied Chemical, however, did rehire 23 employees previously laid off although their current work force of about 870 is down from past levels of about 1,200.

## Bentonite

Bentonite production continued at levels similar to those of 1982. With the economic recovery underway, bentonite production will increase with increases in taconite mining (for which bentonite is used in producing iron from taconite), foundry castings, and petroleum exploration.

## Gypsum

Gypsum production in Wyoming should increase

in the last half of 1983 as housing starts increase, requiring more gypsum for wall board.

## Limstone

Limestone production should increase slightly in the last half of 1983 as its use in cement and industrial aggregates increases. However, lower sugar production could offset any increase in total limestone production. Several companies were exploring for limestone and dolomite in Wyoming this summer.

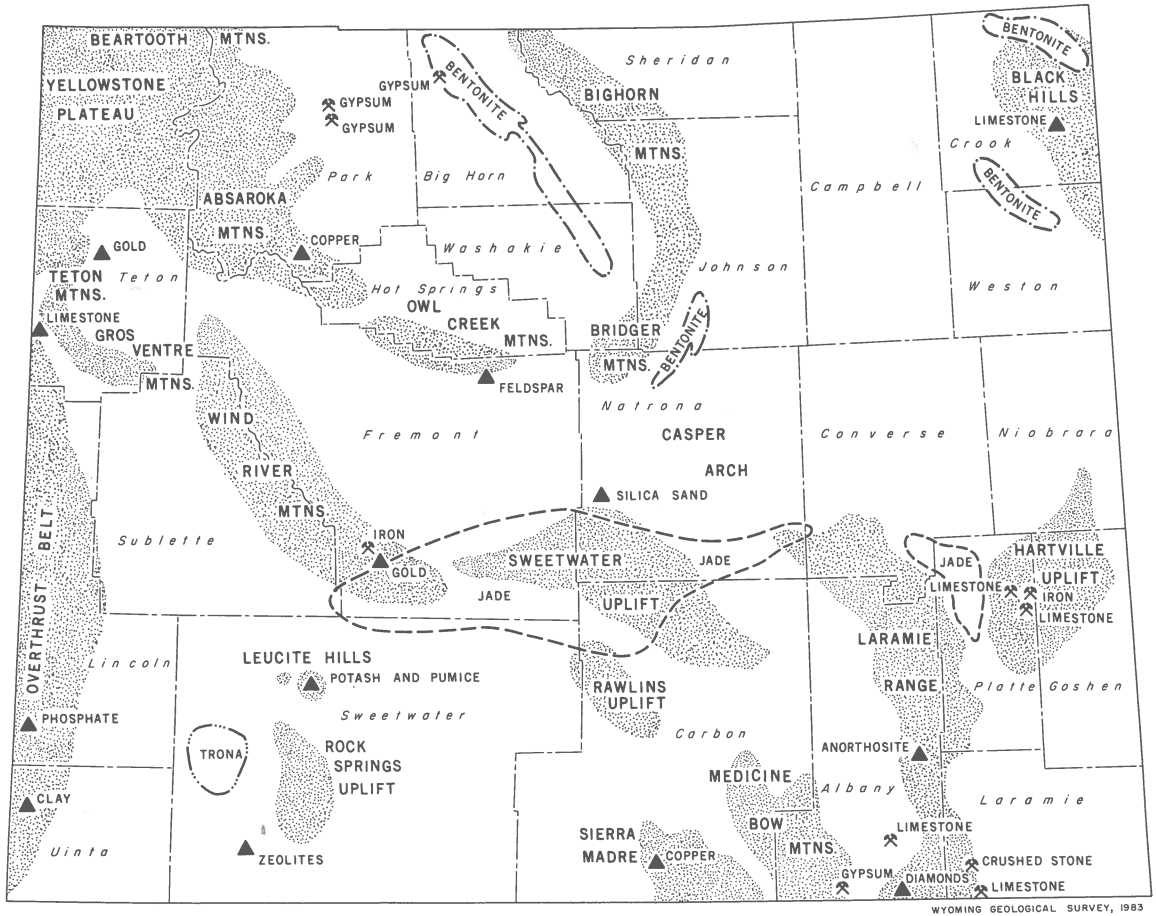
## Others

Nontaxable aggregate production increased in the third quarter of 1983 as highway construction reached its annual peak.

The U.S. Bureau of Mines has successfully tested concrete made with by-product sulfur produced from oil and gas operations in Wyoming. Sulfur concrete is advantageous over ordinary concrete due to its resistance to acids and corrosion. Its use is expected to increase as commerical production of sulfur concrete begins.

There has been some industry interest this summer in natural zeolites. The ion-exchange capacities of zeolites make them valuable for use in water softeners, uranium and other metal milling and refining, and agriculture.

The worst news in this last quarter was U.S. Steel's decision to close their Atlantic City iron ore mine and mill. Only 120 employees out of 500 were still employed in early October.




EXPLANATION

- Mines and quarries
- BENTONITE — Bentonite mining district
- TRONA — Trona mining district
- Localities
- JADE — Jade collecting areas
- Uplifted areas

SELECTED MINERAL AND ROCK OCCURRENCES

Once the remaining inventories of iron ore are shipped out, only 18 employees will be retained for mine and plant security.

## METALS AND PRECIOUS STONES OUTLOOK

by W. Dan Hausel, Deputy Director/Minerals Geologist

Although exploration activities for metals and precious stones in Wyoming appeared to be at low levels, recent copper price increases and stabilization of gold and silver prices should cause a moderate increase in activity.

Reported activity for strategic metals exploration included Exxon Minerals' exploration of the historic Ferris Haggarty copper mine area in the Sierra Madre. Exxon is conducting exploration to determine available copper reserves in case the copper market makes significant improvements in the near future.

Nearby, in the Fletcher Park area, to the south of Exxon, Timberline Minerals staked a large region for massive sulfides (zinc-copper-lead-silver).

The Bradley Peak area of the Seminoe Mountains remained the focal point of exploration for gold by Kerr-McGee and Timberline Minerals Inc. The Bradley Peak mineralized area was discovered by Wyoming Geological Survey geologists in 1981. The discovery led to Wyoming's first major gold rush in over fifty years. Timberline Minerals is conducting detailed mapping studies as well as exploration drilling to de-

termine the extent of the gold occurrences. The gold is reported in veins and in an exhalite, as well as lesser amounts in gabbros, amphibolites and iron formation.

Other gold activity was reported at South Pass and at Oregon Buttes. At South Pass, some limited underground activity has been reported at the Carrisa, Mary Ellen, and St. Louis mines, and several small placer operations were winding down for the upcoming winter. At Oregon Buttes, Searle Brothers Construction Company is reportedly preparing for some limited exploration of dry gold placers.

An additional amount of gold may have been unknowingly produced by some sand and gravel operators in the State. Because of its potential occurrence in many sand and gravel deposits, Rocky Mountain Energy Company (a subsidiary of Union Pacific Railroad) has advised many of its leaseholders to consider setting up gold extraction units to process sand and gravel in order to recover gold as a by-product. Several operators in the State of Wyoming could benefit from such a secondary recovery system. In particular, sand and gravel operations in historic gold placer districts may be ignoring a valuable resource.

At Copper Mountain, north of Shoshoni, the Wyoming Geological Survey currently is investigating the geology and related mineral deposits. Of particular interest is the historic DePass copper-gold-silver mine. This property was developed by more than 11,000 feet of underground workings and appears to still host large metal resources. U.S. Borax

and Timberline Minerals are conducting exploration in the Copper Mountain region.

Cominco American Incorporated formed a joint venture with Chevron Minerals to again resume exploration for diamond-bearing kimberlite in the Laramie Range of Wyoming. The Geological Survey of Wyoming also continued with efforts to locate and outline diamond deposits in the southern Laramie Range. Some exploration for diamond deposits was reported in the Medicine Bow Mountains.

## WYOMING OIL AND GAS PRODUCTION FORECAST TO 1987

| Calendar Year | Natural Gas production (billions of cubic feet) | Oil Production (millions of barrels) |
|---|---|---|
| *1980 | 450.6 | 126.4 |
| *1981 | 455.4 | 122.1 |
| *1982 | 465.1 | 118.7 |
| 1983 | 474.0 | 117.5 |
| 1984 | 500.0 | 118.0 |
| 1985 | 526.0 | 118.6 |
| 1986 | 553.0 | 119.1 |
| 1987 | 579.0 | 117.5 |

*These are actual values for comparison

## WYOMING COAL PRODUCTION FORECAST TO 1990

| Calendar-Year | Production forecast (millions of tons) | Increase per year | Estimated contracted production (millions of tons) | Below contracts |
|---|---|---|---|---|
| *1981 | 102.7 | 9% | 110.0 | 7% |
| *1982 | 108.0 | 5% | 119.0 | 9% |
| 1983 | 108.0 | 0 | 122.6 | 12% |
| 1984 | 114.0 | 5% | 128.6 | 11% |
| 1985 | 125.8 | 9% | 137.1 | 8% |
| 1986 | 134.4 | 6% | 142.6 | 6% |
| 1987 | 141.8 | 5% | 147.6 | 4% |
| 1988 | 149.6 | 5% | 149.6 | 0 |
| 1989 | 150.9 | 1% | 150.9 | 0 |
| 1990 | 151.9 | 1% | 151.9 | 0 |

*These are actual values for comparison

## WYOMING URANIUM PRODUCTION FORECAST TO 1987

| Calendar Year | Gross Uranium Production (millions of tons) |
|---|---|
| *1981 | 4.6 |
| *1982 | 2.1 |
| 1983 | 1.6 |
| 1984 | 1.25 |
| 1985 | 0.75 |
| 1986 | 0.5 |
| 1987 | 0.9 |

*These are actual values for comparison.

## WYOMING TRONA PRODUCTION FORECAST TO 1987

| Calendar Year | Gross Trona Production (millions of tons) |
|---|---|
| *1981 | 11.8 |
| *1982 | 10.1 |
| 1983 | 8.7 |
| 1984 | 8.9 |
| 1985 | 9.2 |
| 1986 | 9.5 |
| 1987 | 10.0 |

*These are actual values for comparison