

MBMG 262

**Mining and Mineral
Developments in
Montana-1992**

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Mining and Mineral Developments in Montana-1992

Introduction

This 1992 summary of mining and mineral developments in Montana would not have been possible without the assistance of the many mining companies, and state and federal agencies that have freely contributed information on exploration and current mining activities in the State. The Montana Department of Revenue provided data on taxes. The U.S. Bureau of Mines, U.S. Forest Service, U.S. Bureau of Land Management and the Montana Department of State Lands added significant information on mineral activities. Finally, information on energy resources was obtained from the Montana Oil Journal, Oil and Gas Conservation Division of the Department of Natural Resources and Conservation, the Montana Coal Council, and the Petroleum Association.

Overview

General production continued while companies found new ways to cut costs and increase recovery in the face of depressed commodity prices. Most heap-leach gold operations have increased up to 10,000 oz/yr over expected production rates. Pegasus Gold's Zortman-Landusky operation discovered tremendous cost savings by self mining, while their Montana Tunnels mine increased production with a gravity circuit in the mill.

Developing projects were progressing through the permitting process, with hope for success beginning in the fall, as EISs were being completed and some permits were being granted. The Montanore project made the most progress and continued development is expected in early 1993.

Industrial minerals remained stable, but were weak as markets responded to a depressed world economy. A challenge for the future exists in the talc industry as Cyprus Industrial Minerals was sold to Rio Tinto Zinc. Talc and chlorite operations are operated under the French company, Luzenac, which has taken a very aggressive approach in bringing Montana mines to the world market.

Exploration activity in metallic minerals continued to decline through 1991 as companies either reduced budgets or discontinued their operations. The number of active projects dropped another 50 percent from 1990, while expenditures were 3 to 6 percent of 1989 (\$28.6 million). Many of the major companies have closed their offices in Montana; some have moved their operations to Russia and South America. Although the depressed commodity prices have hurried the exodus, the rapid and continuous change of environmental regulations have had the most impact, along with proposed changes to the federal mining law. Many companies indicate that some third world countries present a more favorable business environment than the United States.

Grassroots projects are nearly nonexistent, while some late-stage programs (listed below) have continued in a cautious manner.

- 1) Garnet - Pegasus Gold
- 2) Southern Cross - ASARCO
- 3) Elkhorn - Goldfields

- 4) 7-UP Pete - Phelps Dodge/Canyon Resources
- 5) Miller Mountain - Pegasus Gold
- 6) Sheep Creek - Cominco-American Resources
- 7) Checkerboard - Kennicott/BHP Utah International
- 8) Emigrant Creek - Pegasus Gold
- 9) Crevice - American Copper and Nickel

[These projects will be discussed in more detail in the exploration sections.]

As shown in **Table 1**, claims peaked in 1990 with totals averaging in the mid-to upper 60,000 range for the previous three years. New claims remained stable through 1992. As of September 30, 1992, Montana had an annual increase of 4,437 unpatented claims.

Table 1—Unpatented claims (from Bureau of Land Management).

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
New claims	2,013	13,084	8,434	5,745	5,718
Continuing claims	<u>40,199</u>	<u>46,575</u>	<u>60,341</u>	<u>56,932</u>	<u>61,396</u>
Total	42,212	59,659	68,775	62,677	67,114

Claim patenting rebounded to near 1990 levels (**Table 2**). The acreage has remained small as is common with the patenting of placers or individual lode claims. Patent application activity is anticipated to increase as changes in the mining law appears imminent. However, the increased number of patent applications (**Table 3**) rarely are equivalent to patents granted.

Table 2—Patented claims (from Bureau of Land Management).

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
Patents granted	11	5	2	0	2
No. of claims	97	118	13	0	7
Total acres	1669.66	2645.982	230.16	0	121.77
Commodities	platinum, bentonite, limestone	iron, copper- silver, gold, bentonite	bentonite	None	gold, silver lode & placer

Table 3—New mineral patent applications filed during fiscal year.

	<u>4</u>	<u>12</u>	<u>2</u>	<u>24</u>	<u>13</u>
No. of applications	4	12	2	24	13
No. of claims	18	9	3	132	54
No. of acres	unknown	unknown	unknown	2290.0	unknown
Commodities	placer gold, gold, 1 millsite	unknown	placer gold	platinum, palladium limestone, copper silver, gold	bentonite, talc, platinum, palladium, gold, copper, chrome, stone, garnet, silver

In fiscal year 1991 (October 1, 1991-September 30, 1992), the federal government paid the State of Montana \$19,053,824.37 for mineral leases and right-of-way funds. **Table 4** shows a

reduction in revenues of \$4,164,640.89 since 1991. This reflects decreases in oil and gas production and prices, as well as lower coal prices.

Table 4—Government payments to the State of Montana (from Bureau of Land Management).

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
Rents, minimum royalties, production royalties and bonuses collected from federal lands through the minerals management services.	\$26,317,769.00	\$19,871,031.00	\$20,318,356.41	\$23,218,465.26	\$19,053,824.37
Mineral leases and permits from grasslands and right of ways.	unknown	unknown	\$259,833.00*	\$232,542.17	\$193,176.34

* Overpayment of \$200,000 occurred in 1990 thus number shown here reflects the correct payment.

All mineral activity, whether on private, state, or federal land is regulated by the Department of State Lands under three classes of permits - Small Miner Exclusion Statements (SMES), Exploration Licenses, or Operating Permits. A total of 230 exploration licenses are active in the State, including 26 which are new. However, there are only 433 projects (**Table 5**) current in the State, with many of those in the reclaiming stage. The majority of exploration projects consist of private individuals expending time rather than money on properties. The number of mines functioning under operating plans declined by one with the closure of W.R. Grace's Zonolite operation.

Table 5—Metallic and industrial mineral activity.

<u>Year</u>	<u>Exploration Project</u>	<u>Operating Plan mines</u>	<u>Operating SME mines</u>
1988	480	96	31
1989	1,000	95	41
1990	700	87	36
1991	845	90	21
1992	433	89	23

Of the small operations functioning under the Small Exclusion Statement, all but three of the hardrock operations were lost, with the majority confined to placer mining activities. Of those, two were lost and four were gained, which is somewhat unusual considering low gold prices. Most of these operations are family or individually owned rather than company operations.

Table 6 represents the gross value of production for the last five years. Production has been relatively static. However, lower commodity prices are reflected in the lower gross values of both metallic and industrial minerals. The increase in coal values reflects increases in production rates.

Table 6—Gross value per calendar year.

<u>Commodity</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Coal	406,985,744	429,088,977	365,146,698	394,213,258	397,254,427
Metal ores	262,179,011	424,693,471	339,820,036	407,951,362	362,506,405
Industrial minerals	43,651,088	29,582,910	31,934,528	29,212,556	27,718,327

As shown in **Table 7**, cement and gypsum tax and license fees had a slight increase which corresponds to increased production. Coal license and severance taxes decreased, which was due to decreased commodity prices and tax rate. Metalliferous mines taxes decreased due to the continuing depression of commodity prices. Micaceous mineral taxes were reduced to zero with the closure of the last vermiculite operation in the State. Oil and gas severance taxes were reduced somewhat in line with our aging and depleting petroleum fields. The Resource Indemnity Trust tax increased slightly, which reflects changes in the tax structure.

Table 7—Five-Year summary of State mineral tax statistics.

(from Natural Resource and Corporation Tax Division of the Montana Department of Revenue)

<u>Type</u>	<u>* FY 88</u>	<u>* FY 89</u>	<u>* FY 90</u>	<u>* FY 91*</u>	<u>FY 92</u>
Cement & gypsum tax & license fee	126,650	130,406	131,592	122,935	129,787
Coal license & Severance tax	84,638,332	58,565,576	67,870,544	50,457,839	43,434,110
Metalliferous mines license tax	4,248,913	6,355,005	6,306,356	6,958,815	6,584,664
Micaceous mineral license tax	7,689	6,212	4,067	4,067	- 0 -
Natural gas severance tax	1,491,523	1,724,735	1,057,277	1,275,331	1,117,070
Oil producers severance tax	16,484,059	13,234,516	14,510,149	18,879,759	16,349,547
Resource indemnity trust tax	4,979,333	4,782,042	5,961,949	3,452,851	4,185,872
TOTAL (mineral taxes)	111,976,499	84,798,492	95,841,934	81,149,486	71,801,050
Total Department of Revenue Tax Collection	**567,593,597	**581,622,023	**635,470,333	**657,366,390	***598,522,700
Percentage of total taxes produced from mineral resources	19.7%	14.6%	15.1%	12.3%	12.0%

* Montana Fiscal year ends on June 30th of the year indicated.

** Numbers have been changed to more closely resemble gross collections.

*** Excludes aviation and motor fuel taxes: \$335,000 aviation fuel, \$2.3 million diesel, \$87 million gasoline), including \$52,036,186 in one time aircraft taxes.

Metals

Metal mining activity has remained relatively static, as was expected with mature projects. Most of the heap-leach gold mines have increased their annual production, but some mines have encountered recovery problems relative to metallurgy and geology. Molybdenum production declined, as did the price (by a factor of nearly 3) near the close of the year. Platinum and palladium prices showed a minor recovery late in the fourth quarter, but not soon enough to alter the lower prices on production. Although copper prices have been relatively strong, precious metal prices have dropped, caused by the overall effect of a depressed world economy. The U.S. Bureau of Mines commodity experts are predicting continued depressed prices for the foreseeable future. Most commodities are reacting to a supply and demand market with precious metals responding like an industrial mineral. Gross production value of metallic and non-metallic minerals in Montana is listed in **Table 6**.

Western region

Mining and development (Figure 1)

In the northwest corner of Montana, ASARCO's Troy mine continued production in the face of continued low silver prices and depressed copper prices. Employment remained stable with miners working 11 1/2 hour shifts, for 3 1/2 days with 3 1/2 days off.

The company started a new east portal for ventilation and services, but discovered adverse depths of glacial till and suspended surface excavations. Surface drilling for further reserves was anticipated, however, U.S. Fish and Wildlife Service biologists have determined that portal excavations and mining and surface drilling constituted excess amounts of surface activity for Grizzly bear habitat and refused the request for permits. Drilling will be rescheduled for 1993 as the company will resume their search for deeper reserves below existing operations.

Southeast of Libby, Noranda Minerals' Montanore project has lain dormant for nearly a year. Voluntarily closed in December of 1992 for perceived violations of the water nondegradation policy, the company has dedicated 1991 to the permitting process. They completed both the draft and final EIS and have received an air quality permit, a water nondegradation variance (which allows them to place nitrates in Libby Creek, but only to the EPA limits of 10 ppm), and an operating permit from the State. Discussion over wetland mitigation of the powerline construction sites continues. An operating permit from the U.S. Forest Service is not expected before mid-1993. The U.S. Fish and Wildlife Service continues to request that Noranda purchase a large block of private land for a Grizzly bear habitat.

Excavations are expected to resume in the exploration adit early this spring as the company still needs to complete the last 2,000 feet to procure bulk metallurgical samples and geologic data through diamond drilling. Construction is expected at the proposed mill and mine site in late 1993 or mid-1994.

Activity at ASARCO's Rock Creek project near Noxon remains stalled. The company has proposed construction of an exploration incline which is presently being considered by the U.S. Forest Service (USFS). However, USFS and ASARCO remain in gridlock over the proposed tailings facility on the flats near the mouth of Rock Creek. Until USFS agrees to the proposed plan, it is deemed incomplete and the draft EIS will not be initiated. This impasse has continued since 1984.

The Mustang mine on Standard Creek (one of the last three operating small lode mines in the State) did not operate this year because of low gold prices, distance to processing facilities, and delays in permit releases from the U.S. Forest Service and the U.S. Fish & Wildlife Service.

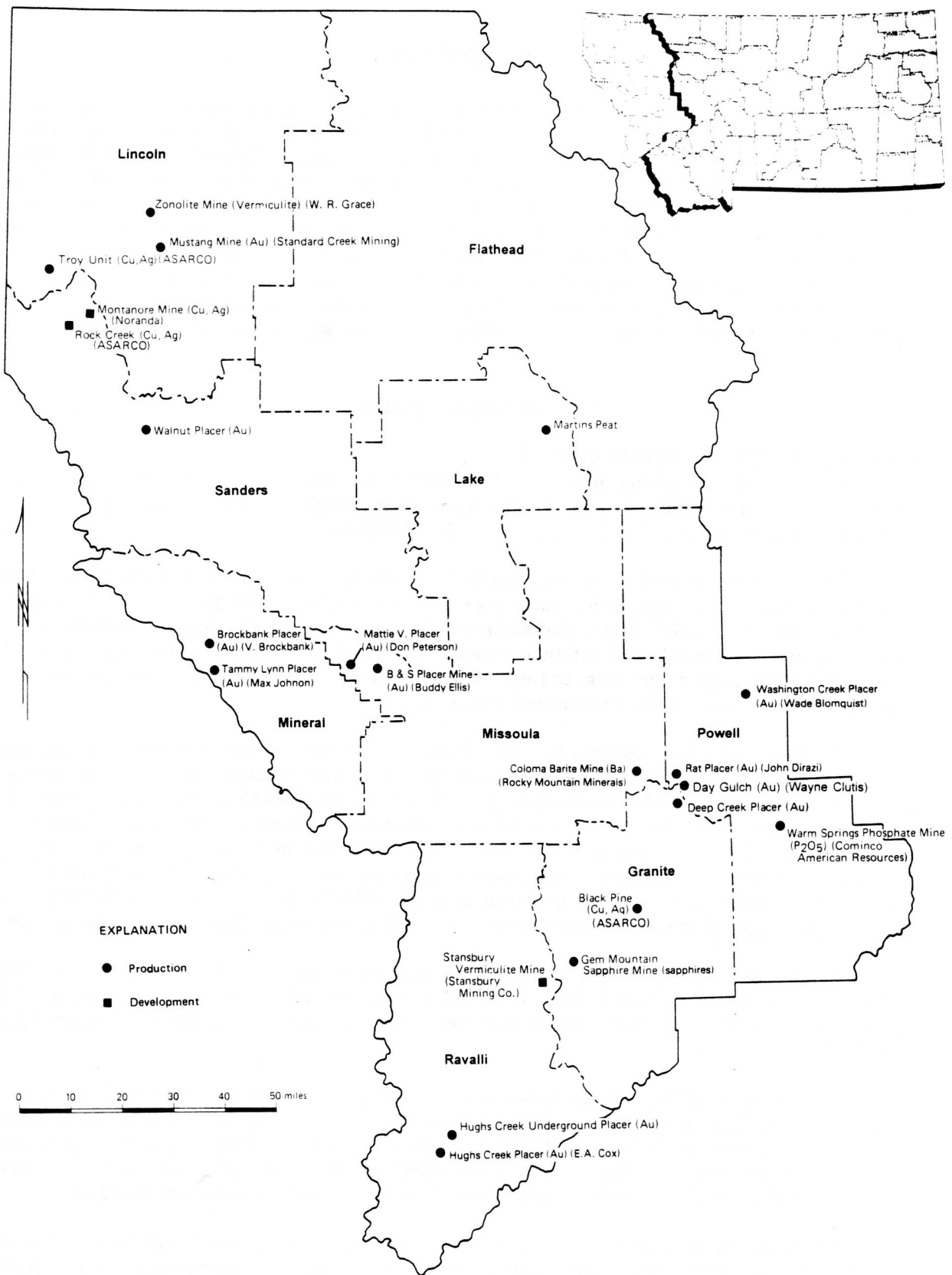


Figure 1 — Mines and mineral development in the western region.

On the Vermillion River, near Trout Creek, the Walnut placer operated intermittently on a small scale throughout the summer.

In Mineral County, the Brockbank placer on Cedar Creek was closed by the Department of State Lands for a land disturbance greater than five acres. [The operator spent the summer reclaiming ground to return to compliance.] On Quartz Creek, Max Johnson continued mining on the Tammy Lynn placer. Although gold values were good, they remained spotty and covered with large boulders; operations have been difficult and slow.

Don Peterson continued operations on Mattie V Creek. Working in 57-foot ground, he spent a difficult summer with broken equipment and material handling problems, while undergoing negotiations with the U.S. Forest Service and Department of State Lands.

Buddy Ellis continued operations at the mouth of Favorite Gulch on McCormick Creek. Although the activity was limited, production appears to be rewarding. On several occasions the sluice riffles not only contained small nuggets but samples of subrounded quartz and galena. Pay gravels lay on a false bedrock clay which may be fault gouge.

In Ravalli County, Wade Cox continued mining on Hughs Creek south of Darby. Production was steady with relatively consistent values. Underground production at the Larrigon property also continued, but operators have indicated that values have recently dropped off. They were continuing to follow the indurated placer and bedrock contact while backfilling old workings with waste. They hoped to find values as soon as bedrock flattened or dipped to the south.

Near Phillipsburg, the Black Pine mine continued producing flux for ASARCO's East Helena smelter. Starting in May, production commenced in the Tim Smith vein at 1,000 tons per month. Other than mixed sulfide and oxide copper, the vein averages 10 to 14 ounces of silver. Presently the ore is crushed at the Contact mill and trucked to East Helena.

ASARCO is driving a development heading to break out on the north end for increased ventilation and a secondary escapeway. Previous exploration programs indicate silver values up to 30 ounces may be encountered with this activity. Any major changes in the present operations are wholly dependent on a considerable increase in silver values.

East of Missoula, on Elk Creek, placer projects are continuing. Small-scale production at John Diraze's Rat placer was showing some coarse gold as operators continued mining the bottom of an alluvial fan. In upper Elk Creek, Wayne Clutis washed both alluvial and residual placer material in Day Gulch. The oversize product consisted of limestone talus, while pay gravel more closely resembled fault gouge or weathered skarn. Although the present washing facilities are scheduled for reclamation in 1993, mining activity appears to have promise for a number of years.

On the south side of the Garnet Range, intermittent placer activities continued on Deep Creek. The yardages moved appear to be small and recoveries are unknown.

In the Finn district (north of Avon), Wade Bloomquist completed an operating plan for middle Washington Creek and spent the fall constructing a stationary wash plant. This will be a fairly large placer operation utilizing 35-ton articulated trucks. The Department of State Lands has collected over \$200,000 in bond and is requiring concurrent reclamation of 7,000 feet of drainage during mining operations. Full production is anticipated by mid to late June of 1993.

Exploration (Figure 2)

North of Troy, Charles Deter put in a series of trenches on Ruby and Star creeks in search of a lead prospect.

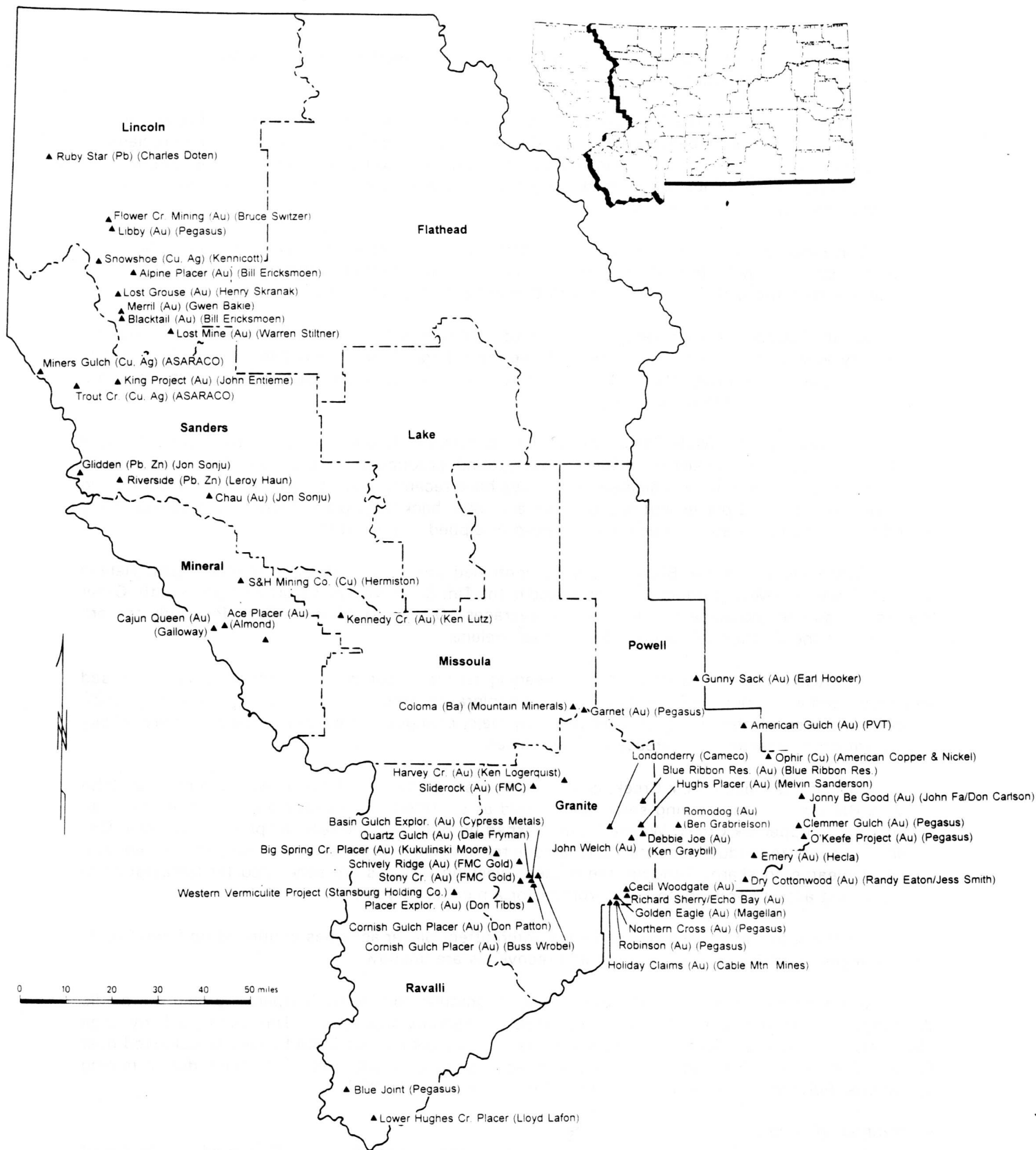


Figure 2—Exploration projects in the western region.

South of Libby, Bruce Switzer commenced the sinking of a shaft in search of gold in the Flower Creek drainage. Pegasus took an option on Orvana's Libby Gold project and drilled 15 to 20 RVC holes from 13 sites. Kennecott drilled one diamond drill hole near the Snowshoe mine. Bill Ericksmoen tested placer gravels on his Alpine placer in Libby Creek. Henry Skranek permitted 10 diamond drill holes on his Last Grouse claims near the Montanore project in Libby Creek. George Shaw continued with a bulk sampling program on his Raven claim in Snowshoe Creek. Bill Ericksmoen bulk sampled his Blacktail project for gold in Bramlet Creek, as did Gwen Bakie on her Merrill property in the West Fisher drainage. Warren Stiltner and family drove a 15-foot adit near lower Houghton Creek to explore a possible gold-bearing quartz vein .

In the Trout Creek area, exploration was confined to assessment work by ASARCO in both the Trout Creek drainage and the Miners Gulch drainage on the Vermillion River. Both projects were deepening of existing diamond drill holes. John Enteine continued exploration for gold in an adit on the lower Vermillion River. Permitting delays did not allow project completion, however, activity will continue in 1993.

Near Thompson Falls, Jon Sonju reopened adits on Glidden and Cherry creeks. Both properties have yielded a base-metal suite of copper, lead and zinc ores. Leroy Haun drilled two diamond drill holes and reopened an adit on the Riverside lead zinc property.

Near St. Regis, S & H Mining has continued their five-year quest of permission to reopen an old adit along the Clark Fork River.

Near Superior, in the Cedar Creek drainage, Mr. Almond planned a series of placer test holes on his Ace placer. Mr. Galloway worked on his mill at the Cajun Queen mine; additional work is scheduled in the drainage. Roy Seymour tested placer gravels in Meadow Creek near the old town of Quartz.

In the Ninemile area, Ken Lutz was unsuccessful in testing placer ground in Kennedy Creek.

East of Missoula, Pegasus Gold continued their long-range drilling program near Coloma and Garnet. The company requested permission for 20 to 40 reverse circulation RVC holes. Mountain Minerals drilled one diamond drill hole at the Coloma barite deposit.

South of Bearmouth, FMC drilled gold deposits in Brewster Creek on their Sliderock project. They also had a ten-pad project in Stony Creek, and a ten-drill hole program in Juneau Gulch. On Big Spring Creek, Mr. Kukulinski tested placer ground for sapphires and gold. West of Phillipsburg, in the Rock Creek drainage, Don Tibbs put in ten test pits for sapphires in the West Fork of Rock Creek. In Cornish Gulch, Don Patton and Buss Wrobel tested for placer gold. Dale Fayram continued placer testing in Quartz Gulch, while Ken Logerquist tested placer ground in Harvey Creek.

Cyprus Metals conducted a drilling and trenching program for gold in volcanic deposits on Basin Gulch.

South of Darby, in the West Fork of the Bitterroot River, Loyd Lafon tested placer ground on lower Hughs Creek. Pegasus Gold Corporation drilled a number of helicopter support holes in the Blue Joint drainage.

South of Phillipsburg, COMECO drilled from 13 drill pads on their Londonderry project. John Welch continued testing placer ground in Princeton Gulch.

In the Georgetown Lake area, ASARCO drilled 36 holes on the Southern Cross property that they recently optioned from North Lily. Pegasus Gold Corporation continued drilling on the Hidden Lake,

Northern Cross, and Robinson properties. Dick Sherry of Echo Bay opened two adits on their Showers Lake project. Magellan Resources drilled the Golden Eagle property in the Red Lion district. Cable Mountain Mines drilled one hole on the Holiday claims on the North Fork of Flint Creek.

On upper Gold Creek, Blue Ribbon Resources permitted 33 RVC and diamond drill holes, along with 600 feet of trenches; drilling continued into November. Melvin Sanderson and Ken Graybill tested placer ground in Gold Creek.

On Willow Creek, west of Deer Lodge, Ben Gabrielson continued testing placer ground on his Romodog project. T & B Mining also tested placer ground in Willow Creek.

East of Race Track, Mark Bielenberg dug three trenches in Dry Cottonwood Creek in search of a gold/silver deposit. Randy Eaton and Jess Smith dug four test pits in the same drainage looking for platinum.

East of Deer Lodge, Hecla drilled 12 RVC holes in the Emery district.

South of Elliston, Pegasus Gold drilled on their O'Keefe project in Telegraph Creek and their Clemmar Gulch Project in Clemmar/Mary Ann Creek.

North of Elliston, Skip Neader tested placer gravels on Carpenter Creek. American Copper and Nickel drilled copper/gold skarn mineralization on the south side of upper Ophir Creek.

North of Avon, placer exploration continued on American Gulch. West of Lincoln, placer exploration continued on the Moose Creek drainage, while lode-gold exploration continued in underground properties.

Butte-Anaconda region

Mining and development (Figure 3)

West of Butte, Pegasus Gold Corporation's Beal Mountain mine had a substantial year. They have completed the Stage III construction, which has resulted in a life-of-mine pad and a new crushing facility. Production remains at more than 50,000 oz. of gold. Production costs have been reduced from \$251/oz to \$209/oz gold. The company has completed exploration on the South Beal ore body (Sharon Steele) and has listed reserves at 1 million tons at 0.055 oz/ton gold. An EIS is expected on that project in early 1993. Reserves for the Beal deposit are 6 million tons at 0.05 oz/ton gold (proven, probable and permitted). In 1993, the company will initiate a new EIS on pit expansion to further develop the Deep Beal orebody.

Exploration for additional targets has been very successful. To the east, there are 2 to 3 targets containing 40 to 60 feet of ore grade. Possibilities exist for expansion south of the South Beal orebody. Southeast of the Beal orebody, 15 holes have yielded 50 ore-grade intercepts. Viable targets remain in American Gulch, North Beal and American Creek and southwest of the Beal orebody. In current operations, the strip ratio is decreasing from 1:1 to .5:1 to 0:1. Ore grade is increasing and will progress from 0.03 to 0.044 to 0.05 + oz/ton gold.

In Butte, Montana Resources leased a nitrogen plant to decrease the sodium hydrosulfide consumption in the mill; they have also purchased 4 used Wabco 170-ton trucks. A 170-ton unit rig truck was converted into a 21,000 gallon water truck for dust control. Production remained at 48,000 tons of ore per day with a stripping ratio of .7:1. Operations were altered in 1992 when molybdenum

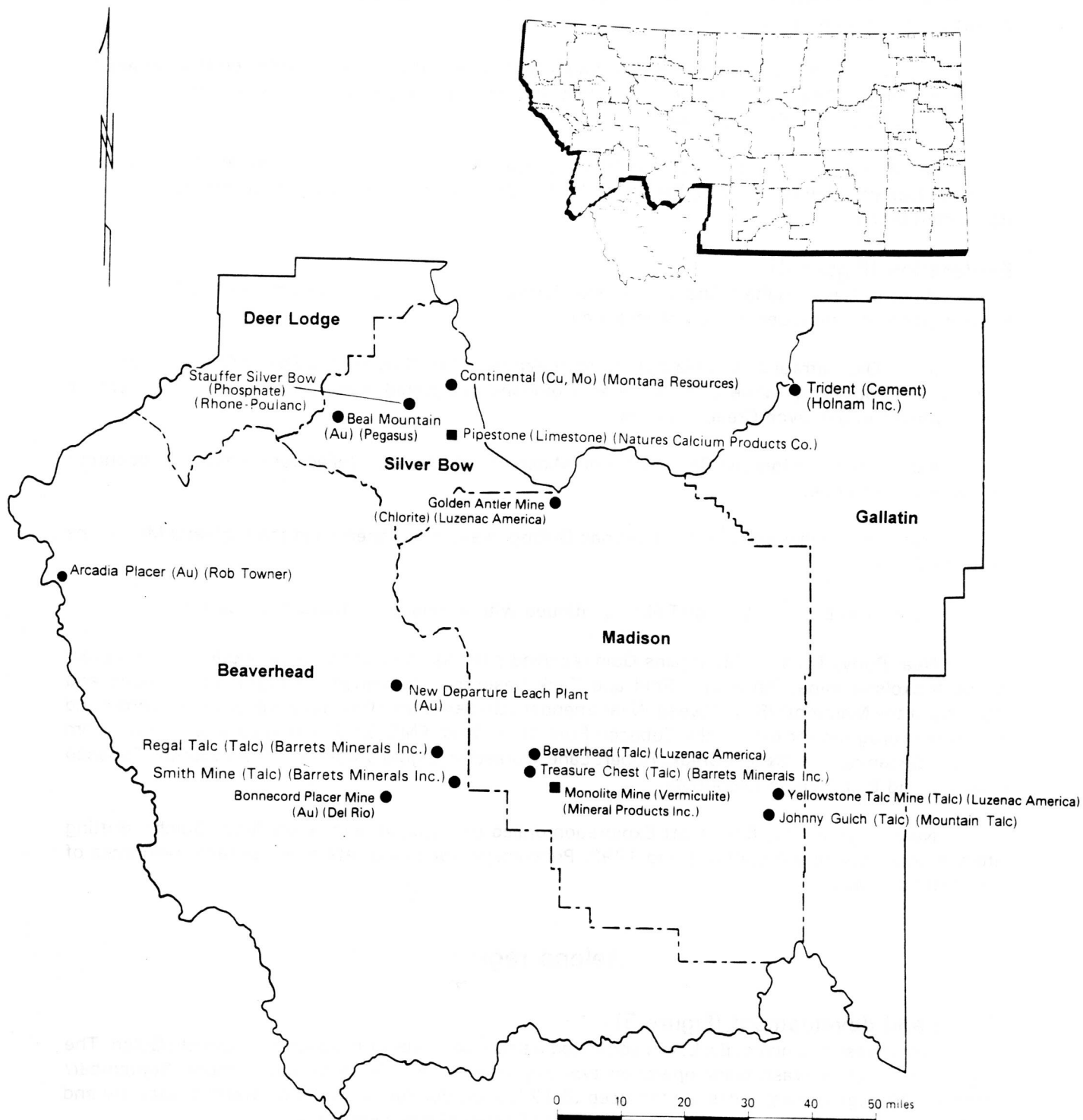


Figure 3—Mines and mineral development in the Butte—Anaconda region.

prices dropped to a record low. The company has apparently solved metallurgical problems on one of their orebodies, as recoveries have changed from the mid-30 percentile to nearly 70 percent. They have recently reclaimed numerous slopes near the plant and pit areas. [Butte has never seen such a wheat crop in its entire history.]

Rob Towner mined gold on the Arcadia placer southwest of Wisdom between Nugget and the Pioneer drainages. The ground had about 12 feet of overburden and 4 to 6 feet of pay gravels. Values range from \$10/yd³ to 65 cents /yd³.

North of Bannack, Carl Brown continued operation of his small cyanide vat leach operation at the New Departure mine. East of Bannack, Del Rio Corporation continued placer operations on the Bonnacord placer.

Exploration (Figure 4)

West of Dillon, Robert Chastin and Karl Truman conducted a trenching program for gold. Bill Hand worked on properties in the Argenta area.

In the Old Faithful mining district, north of Bannack, Rob Towner and Foster Chandler removed a dump for processing, while Cyprus Metals Company completed a drilling program. Elliott Larson tested gravels in the Dyce Creek drainage.

East of Dillon, Montana Resources and Mineral Products, Inc. drilled for vermiculite resources on Sweetwater Ridge.

Mike Garverich worked with Batterman Drilling to explore properties in the Highland Mountains south of Butte.

Near Twin Bridges, Snyder/Talbot continued with a trenching program for garnets.

Near Pony, Tobacco Mountains Gold received permission to continue an exploration program at the Nickolson mine. Pathfinder Gold and Teck Resources continued underground sampling and mapping at the Mammoth/Boss Tweed. Near Sheridan, Golden Chalice mines continued an underground exploration program for gold in the Tobacco Root Mountains. FMC Gold continued a drilling program (through December) on Bevins Creek. Robert Lane worked on a gold property in the southern Tobacco Roots, as did Blue Ribbon Resources.

Near Virginia City, Kennecott Exploration drilled the Kearsarge mine on Alder Gulch; drifting into the underground will continue into 1993. Preliminary results indicate open, pitable resources of 300,000 oz of gold.

Helena region

Mining and development (Figure 5)

Northwest of Lincoln, Bill Lewis continued a small-scale placer production in Lincoln Gulch. The dragline and mobile wash plant operation typically washes gravels from July through September/October. Although the ground is not too deep (6-12 ft.), production is limited by water availability and spotty values. The deposit may be a combination of residual and alluvial placers.

South of Lincoln Gulch, on Sauerkraut Creek, Clay Lewis produced and stockpiled pay gravels from the lower portion of the drainage. Lewis is planning to wash gravels during the spring of 1993.

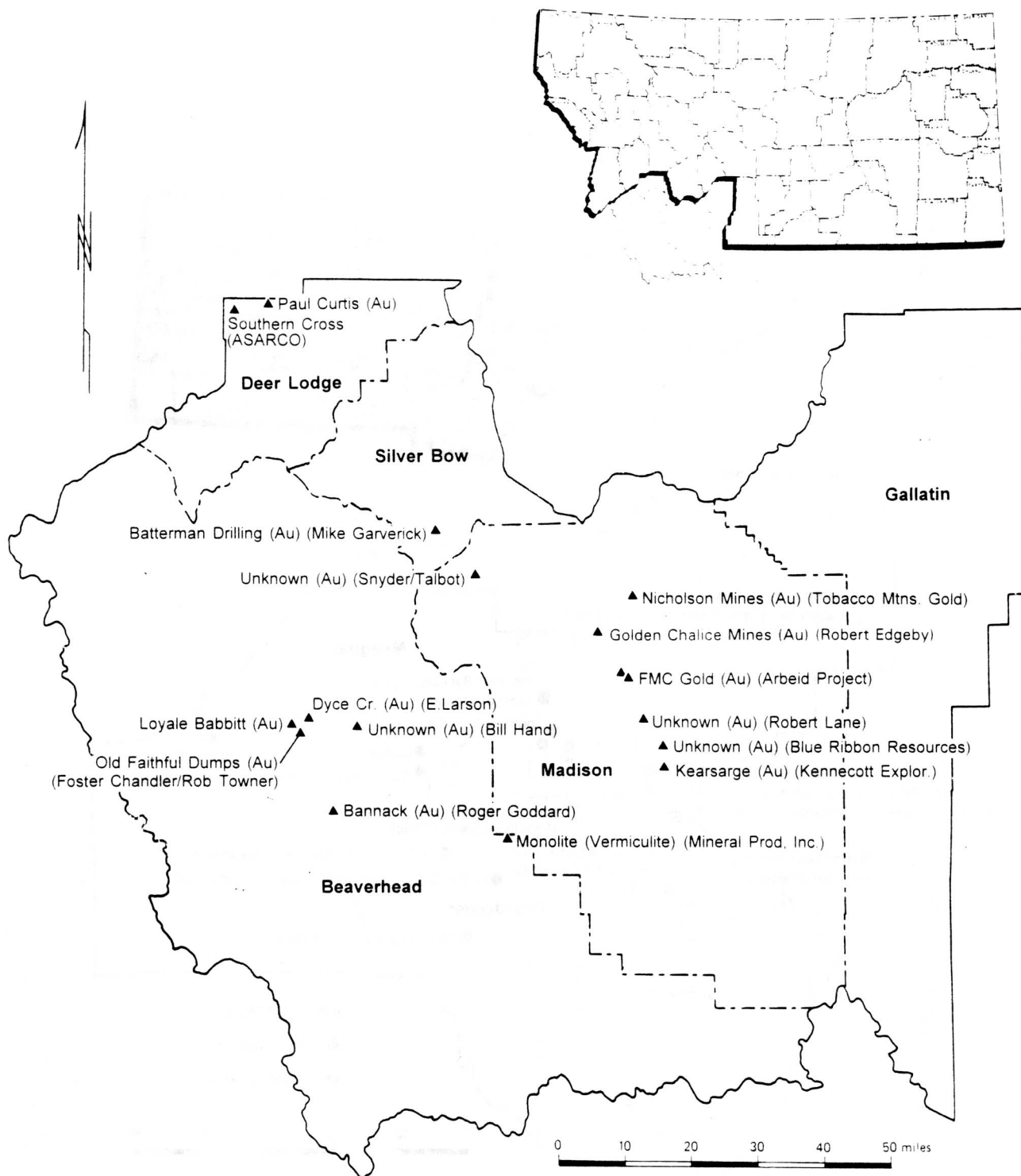


Figure 4—Exploration projects in the Butte-Anaconda region.

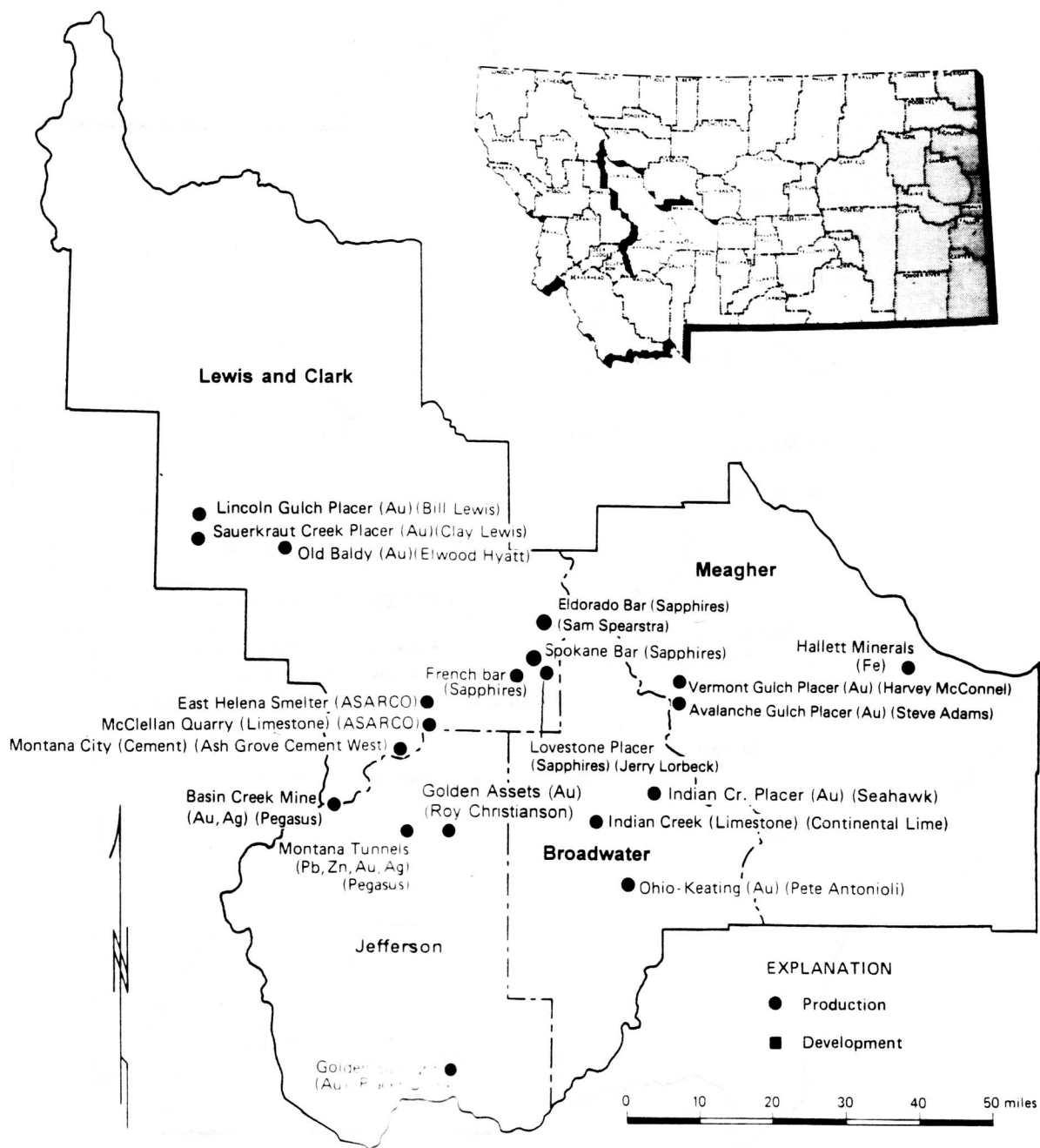


Figure 5 – Mines and mineral development in the Helena region.

Data indicates that the values in the lower Sauerkraut drainage to be derived directly from faults and shear zones, which trend southeasterly across the valley. The expected total movement of the gold, in many cases, is less than 150 feet from the source.

In the Poorman drainage, south of Lincoln, Elwood Hyatt continued intermittent production from a very small lode-gold property. Free milling gold from a shallow-dipping, quartz-calcite vein is liberated by a gravity mill.

North of Basin, Pegasus Gold Corporation continued to pump cyanide solution on the heap at their Basin Creek mine. Early in the year, the company conducted column tests to determine if the ore was amenable to leaching of mine-run rock. With favorable results in hand, the company mined 15,000 to 20,000 tons of ore and placed it on a new pad for bulk testing. Full results of that experiment will be known in the spring of 1993. In addition to mining, the company initiated an extensive reclamation program on the property. If all tests are successful, the company plans to resume production on the property during the driest parts of the year. Management of the mine is being undertaken as collateral duties by the Beal Mountain mine staff.

West of Jefferson City, production continues at another Pegasus property, the Montana Tunnels mine. On completion of their first full year of self mining, the company is experiencing tremendous cost savings, increased production, and nearly one million hours of no-lost-time accidents. Production costs decreased again this year with gold equivalent cash costs at \$133/oz. The company also placed a gravity circuit in their mill, which has resulted in mill recovery improving from 85 to 86 percent. Since this gold was previously lost to the tailings pond, the overall gold production of the property has increased significantly. Reclamation research at the mine continued to show favorable results. Revegetation plots demonstrated the viability of reclamation programs, even though final results are not expected for a few years.

East of Jefferson City, Roy Christianson purchased the Golden Assets property and has sprinkled the heaps; further mining is anticipated in 1993.

Near Whitehall, Placer Dome had a disappointing year—a combination of layoffs, hard rock and poor recovery, all of which had been anticipated for a number of years. Operations completed most of the tasks in the fourth quarter and recovery started to increase towards the end of the year. On a positive note, production increased slightly to 35 million tons; the recovery rate of the mill is up; ore grade is holding at 0.051 oz/ton gold; and reclamation tests are good. The company has completed a new tailings facility and will initiate reclamation of the previous facility in one year.

Southeast of Helena, Steve Adams continued production of a small gold bench placer on Avalanche Creek. Work has continued on a new wash plant for a proposed project in the valley bottom. A complete mining of the bench, using a floating wash plant, is planned in 1993. Northwest of White Sulphur Springs, Harvey McConnel leased his claims to Randy Sewall. Harvey spent the summer exploring placer ground on private property, while Randy mined the colluvial (residual) placer on Vermont Gulch. During operations, numerous quartz veins were observed in the bedrock.

Northwest of Townsend, Seahawk is sustaining work on a bench placer on Indian Creek; gold values are discontinuous.

Near Radersburg, Pete Antonioli resumed gold production with heap-leach facilities at the Ohio-Keating mine.

Exploration (Figure 6)

ASARCO is maintaining their long-term assessment program at their Heddleston project (east of Lincoln) by deepening drill holes.

Phelps Dodge continued exploration of their 7-Up Pete project. Geologic reserves are presently listed at 300 million tons at 0.025 oz/ton gold. The company has maintained a brisk drilling program and has a good land package and many targets yet to be explored. They have initiated baseline studies necessary for permitting, but as yet are not in the permit acquisition phase. Their partner in the project is Canyon Resources Corporation.

Southwest of Lincoln, Bruce Cox continued work on the portal of the Sunshine lode on Sauerkraut Creek.

West of Helena, in southern Lewis and Clark County, placer interest increased. Richard Screeves tested placer ground on Butcherknife Creek; Bud Guthrie tested on Iowa Gulch; Sana Minerals tested on Greenhorn Creek; and Gary Murdock tested on Hope Creek. Marvin Ratcliff also tested ground on Hope Creek, while John Fee and Don Carlson investigated placers on Mike Renig Creek.

In the Boulder area, Pegasus Gold Corporation constructed eight drill pads on their Jack Creek Ridge project on Basin Creek. Don Self and John Hilderman reopened the portal of the Plymouth mine. Earthworks, Inc. and Pegasus Gold Corporation drilled on their Silver Star project in Cataract Creek. Goldfields continued exploration of their gold-skar deposit in the Elkhorn Mountains east of Boulder.

Near Pony, Pathfinder Gold and Teck Resources continued exploration of the Boss Tweed, Clipper and Mammoth properties.

Near Whitehall, Leigh Freeman drilled two RVC holes on the Black Butte project in the Little Whitetail drainage. Golden Sunlight Exploration drilled 22 RVC holes in the Bull Mountains.

In the Elkhorn Mountains, west of Townsend, Pegasus Gold Corporation sampled the underground workings at the Diamond Hill mine. Virgil Sells continued driving an adit on a gold property, and United Minerals drilled 13 DD holes at the Graphite mine in the Indian Creek drainage.

In the Big Belt Mountains, northeast of Townsend, Tracy Fortner dug six test pits in the placer ground of upper Vermont Gulch. Thomas Ferguson tested placer ground on Beaver Creek. Mike Collins bulk tested portions of a placer bench at Diamond City on Confederate Gulch. Emmett Smith and Rueben Saylor bulk tested placer ground on Cement Gulch. Pegasus Gold Corporation continued exploration of a structure between the Miller mine on Greenhorn Creek and Vermont Gulch. John Zawada tested placer gravels on remnant benches on Benton Gulch. Don and Ann Shearer tested placer gravels on Thompson Gulch. Harvey McConnell tested placer gravels on Elk Creek.

North of White Sulphur Springs, Cominco American Resources drilled 13 DD holes as part of their continuing long-term Sheep Creek exploration project. Kennicott/BHP Utah International continued geologic and geophysical work in the Checkerboard area. David Baker tested for sapphires on Belot Creek of Cascade County.

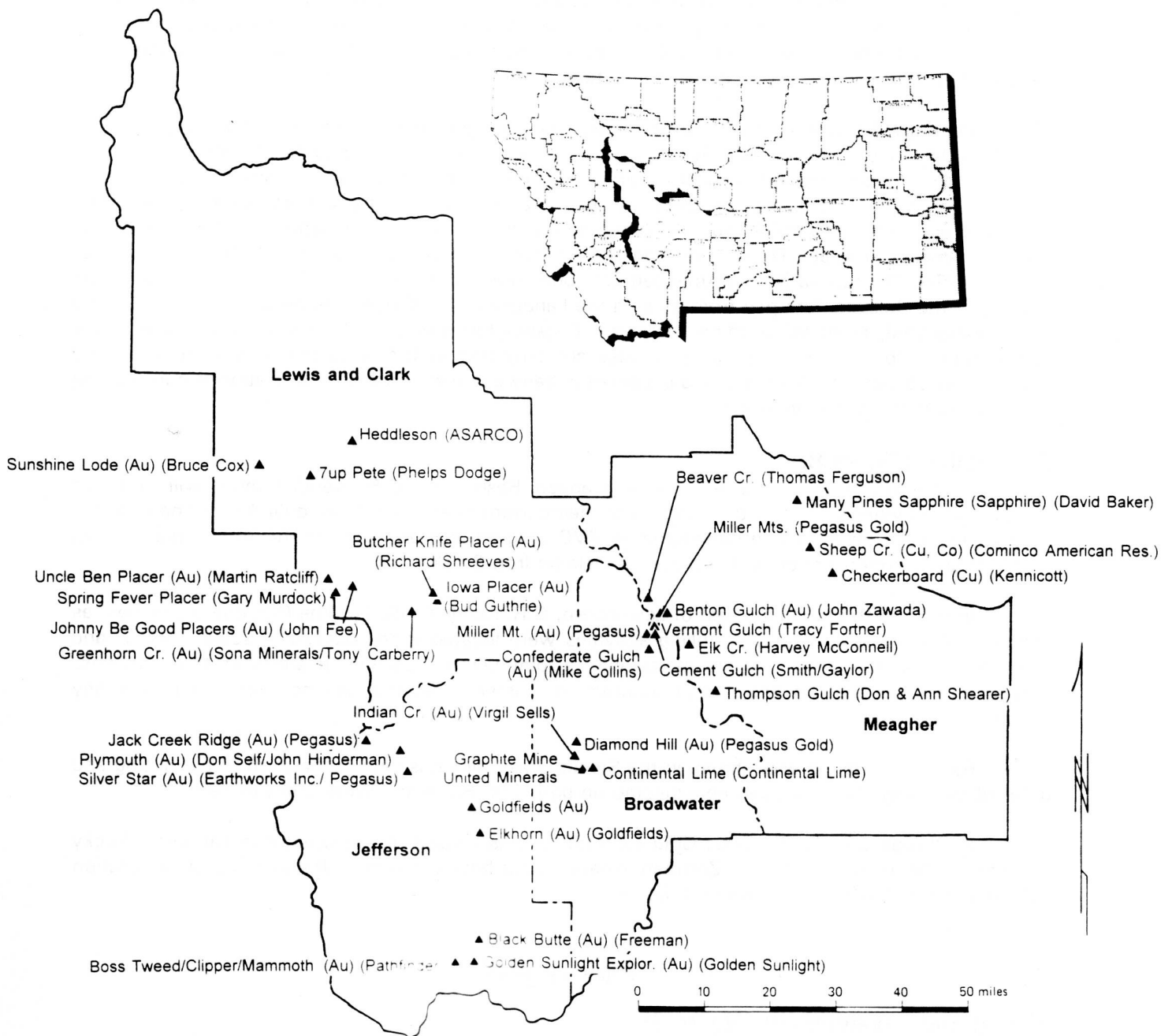


Figure 6 Exploration projects in the Helena region.

North central region

Mining and Development (Figure 7)

Production continued at Canyon Resources' C.R. Kendall mine. In 1992, they completed a pad section and construction of a pond. In June of 1993, they will have completed the first phase of a leach-pad construction lift. They have one deposit left to mine. If further reserves are not discovered, mining is scheduled to be completed in 1994, leaching in 1996. The mine produced over 59,000 oz of gold, which is greater than original production estimations. Difficulties encountered during processing included separating numerous mine timbers from ore in the Kendall pit and clearing of new ground. The company also reclaimed 42 acres of backslopes, roads and waste rock dumps. The revegetation of those areas was an incredible task.

Pegasus Gold Corporation's Zortman-Landusky operation maintained a high level of production with 115,000 oz of gold and 900,000 oz of silver produced in 1991. Production levels for 1992 are expected to surpass those figures. Operating costs were reduced during the first full year of self mining. The company had sufficient cost savings to pay off much of the new equipment investment. They also completed one million hours of production with no-lost-time accidents, which is a tribute to their new safety program. During the year, the Interior Board of Land Appeals (IBLA) discounted an appeal by Red Thunder (a Native American environmental group), which will result in the continued loading of the Sullivan Park pad from ores on the Landusky side. Oxide ores on the Zortman side are nearly exhausted, however leaching continues. Pegasus has a proposal to move sulfide ores to the valley bottom for continued leaching. Grades are projected at 0.019 oz/ton gold with recoveries expected at 65 percent. A draft EIS is expected in early summer of 1993. Exploration is currently on hold until permitting is completed.

Exploration (Figure 8)

In the North Moccasin Mountains, Canyon Resources' C.R. Kendall mine will continue exploration activities to extend the mine life of their current operations. They drilled a few holes in the area adjacent to the mine and conducted an RVC program in Iron Gulch at the Abbey mine. In an adjacent area, Robert Snook tested placer gravels on Iron Creek.

In the Judith Mountains east of Lewistown, C.R. Kendall drilled on the Giltedge properties, as well as the New York mine. The drilling activities were located in the Jackson Coulee, Oxbow and Giltedge drainages. Coeur d'Alene mines was a joint venture partner in some of the activities. Independence outlined an exploration program at Linster Peak, but has not yet undertaken any activities.

Renewed interest was shown in the Sweet Grass Hills this year in the form of permitting and detailed sampling. Activities can be expected on both East Butte and West Butte in 1993.

In Phillips County, Pegasus Gold Corporation has ceased all exploration in the Little Rocky Mountains until permitting for the Zortman expansion has been completed. It was felt that exploration activities were clouding the permitting issue.

Park region

Mining and development (Figure 9)

TVX Gold's Mineral Hill mine continued production east of Gardiner with few of the challenges seen earlier in the year. They increased gold production by the end of 1992, while decreasing both mine and mill operating costs. The sag mill trunion started to fail early in the year but was ultimately

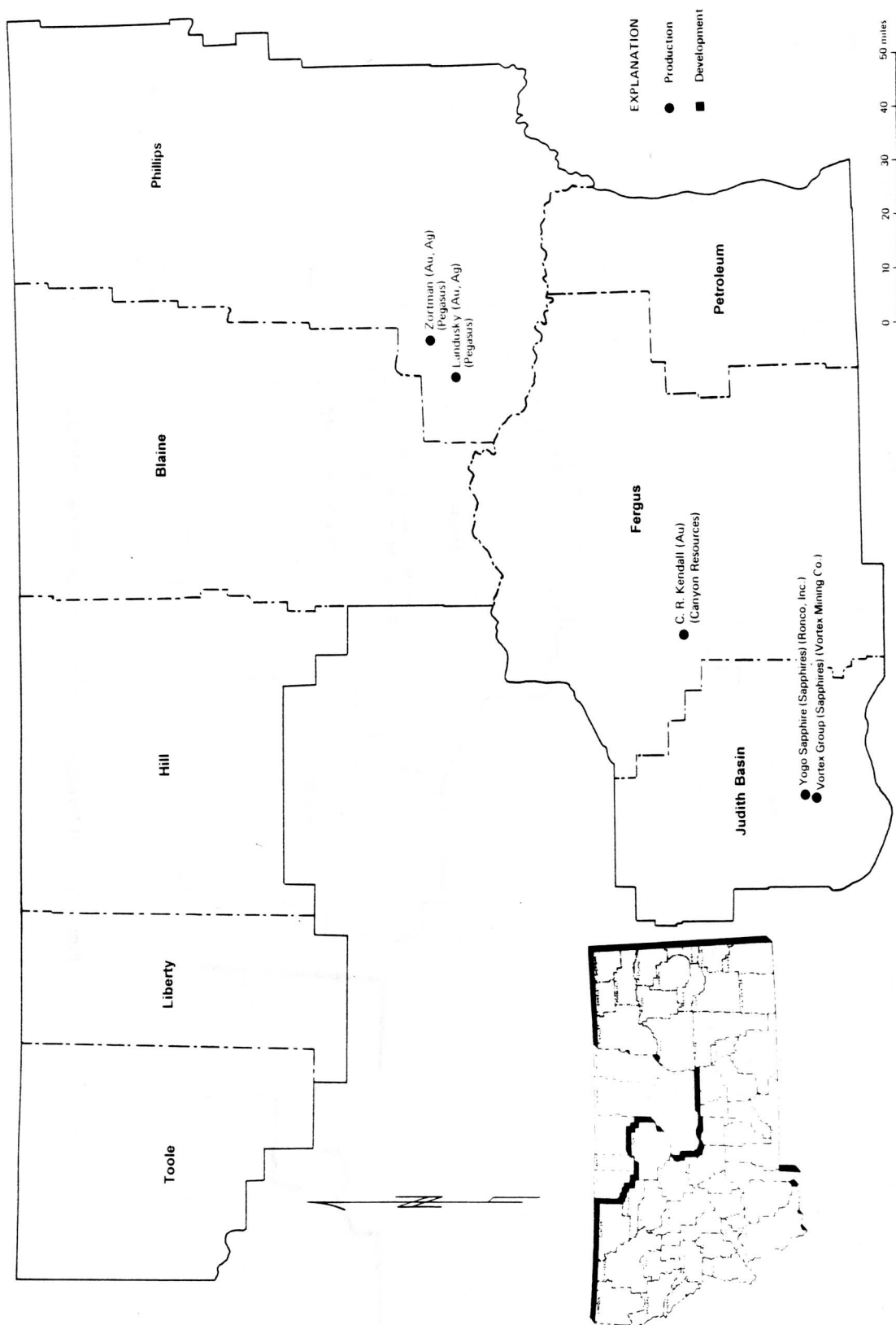


Figure 7—Mines and mineral development in the north-central region.

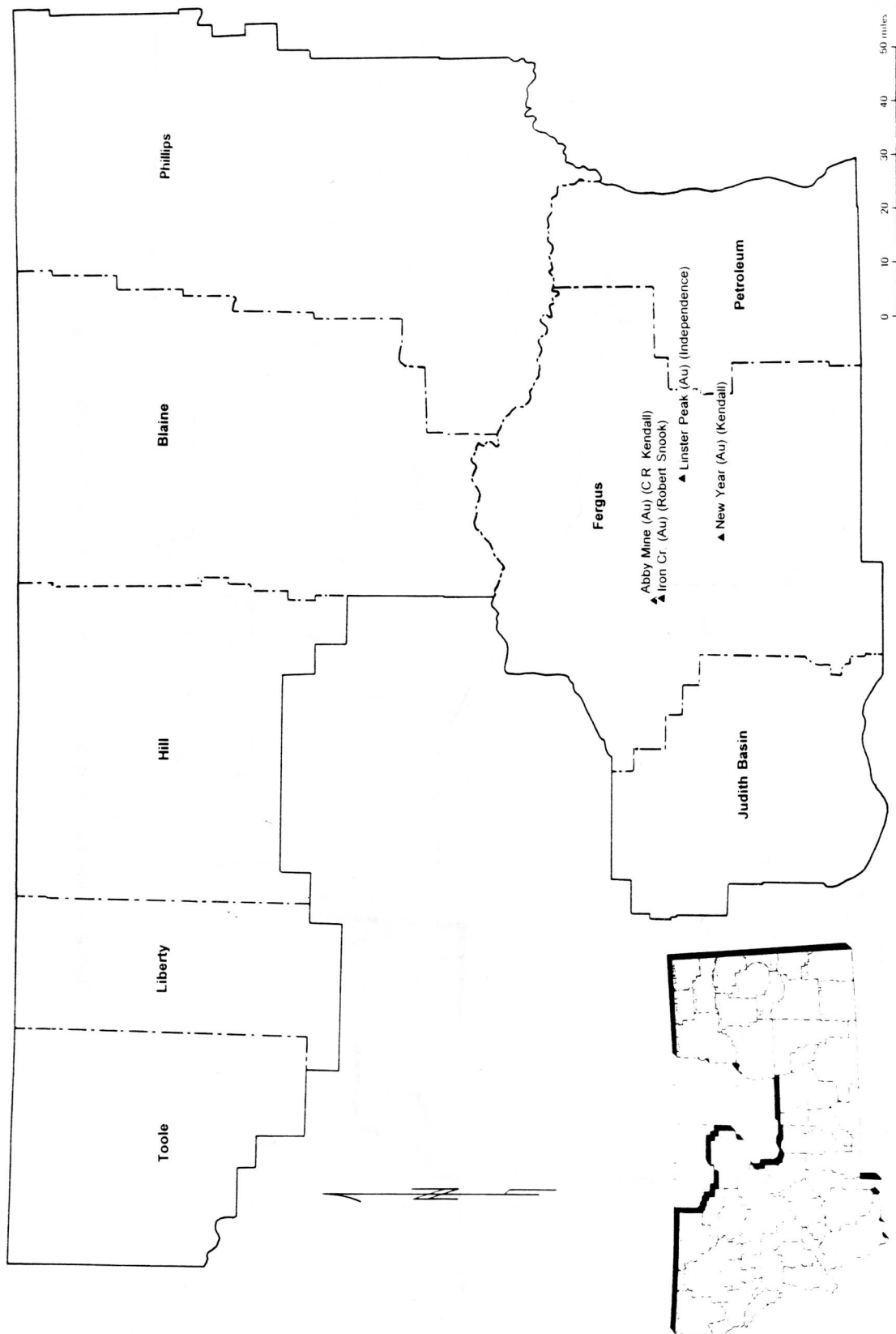


Figure 8—Exploration projects in the north-central region.

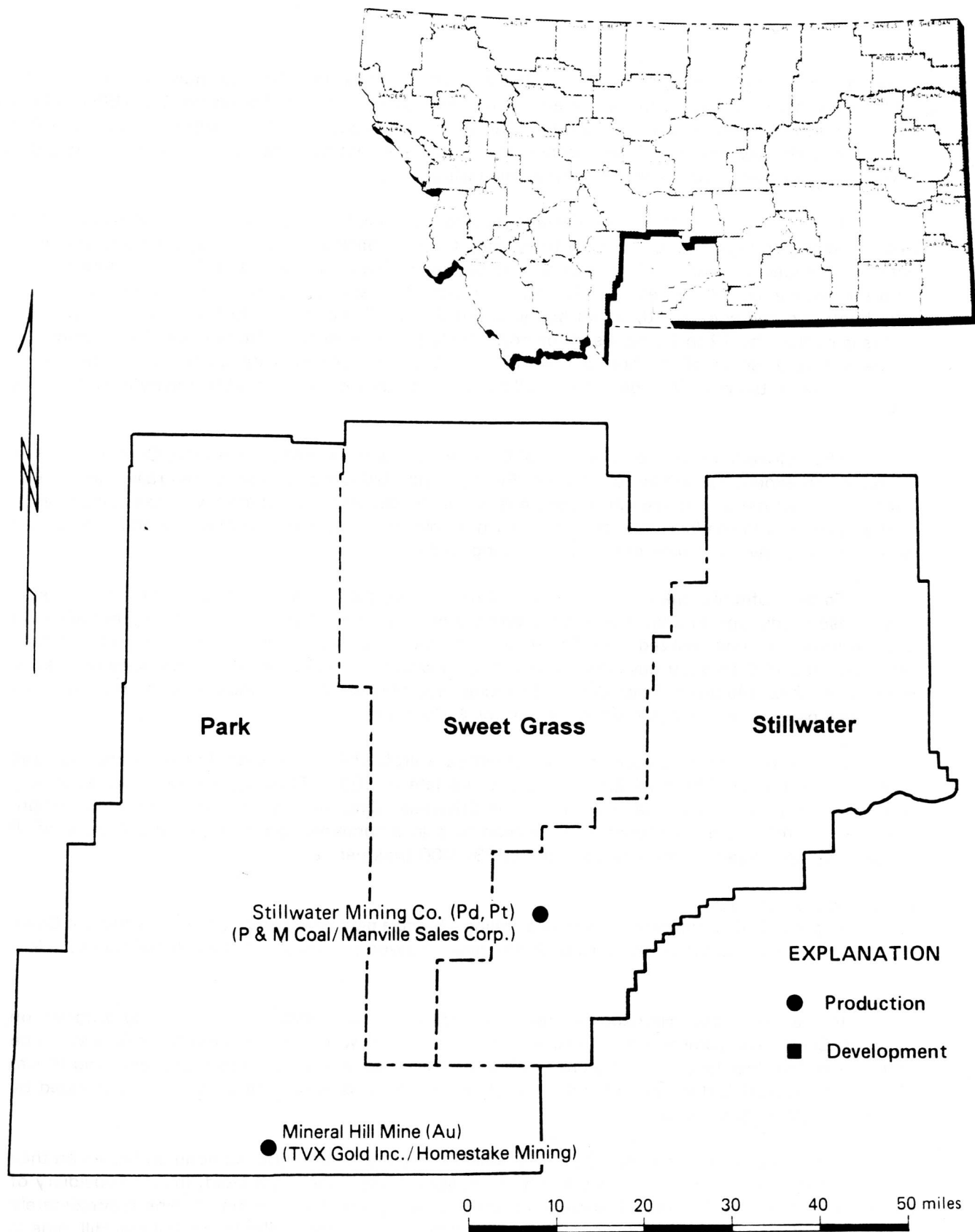


Figure 9—Mines and mineral developments in the Park region.

repaired. They added a new drum filter at the mill which served to lower the moisture content (20-21%) of the dry tails. They also completed a land exchange with the U.S. Forest Service (USFS) where five acres of their tailings facility was traded for undisturbed acreages on the property. As with most mines, once the ownership of land is consolidated, management becomes much easier. In this case, USFS ended up with virgin land rather than mill tailings.

The mine initiated reclamation of their first tailings cell. In normal sequence, the gravel is first excavated and transported to the mine to be used for mine backfill. The excavated hole is first lined with an amended soil (clay) followed by a synthetic liner. The facility is then filled with mine tailings until the original contour is reached. During the reclamation stage, the top of the tailings are mixed with bentonite and compacted, a root barrier is put down followed by 12 to 13 inches of gravel. All of this is overlain by 12 to 13 inches of top soil, which is then reseeded. The next cell [upgradient and connected] is a repeat of the first cell. All effluent from the tailings is deposited in a sump and is pumped back to the mill. The company is still conducting research on a possible gravity circuit for the mill.

The Stillwater mine, a joint venture of Chevron Resources and Mansville Sales Corporation, has continued to experience market difficulties. Even though platinum-palladium prices rallied in the last quarter of 1992 it was not enough to compensate for the decrease in commodity prices since startup of the operation. In the last year, the company has sold their tunnel boring machine and has not yet developed any new programs to reduce operating costs.

To be profitable, the company must either increase the commodity price (which is unlikely), or increase production to a level where the profit is made up by volume of material processed—with a small profit per unit realized. The Stillwater mine has calculated that the level of profitability is estimated at 2,000 tons per day. They are continuing with their EIS to permit that production rate. At the end of 1992, Mansville Sales Corporation exercised their option and undertook the management of the company. Chevron's portion is for sale for \$100 million.

At the same time, Stillwater PGM submitted a draft EIS for the East Boulder project located south of Big Timber. The final EIS was completed late in 1992. They applied for a water-quality variance on the project, as well as one for the Stillwater Mine; both variances are under litigation. Reserves for the project are listed at 15 million tons at a combined platinum-palladium grade of .8 oz/ton. The scheduled mine life is 25 years at 730,000 tons per year.

Exploration (Figure 10)

Pegasus Gold Corporation continued drilling a breccia pipe in volcanics on upper Emigrant Creek (north of Gardiner). Caprock and Phelps Dodge have showed an interest, but have maintained a low profile.

In the same area, Harrison Western Corporation is maintaining a placer drilling program on Emigrant Creek. The company is utilizing a modified sonic drill which allows them to retrieve wire-line cores up to five feet long and 24 inches in diameter. The sonic drill is capable of recovering *in situ* cores with minimal disturbance of the material (solid rock or gravel). The core barrel, described by operators, is a unique product.

East of Gardiner, American Copper & Nickel Company drilled eight diamond drill holes on their Crevice project, which is 2 1/2 miles south of the Mineral Hill mine. TVX Mineral Hill, Inc. has applied for an underground exploration permit to further define approximately eight years of reserves in the Crevice district. If a mine is developed it will be very similar to the Mineral Hill mine in operation, and the ore will be trucked on the surface to the existing mill at the Mineral Hill mine. The present facilities have only four years reserves remaining without further drilling. However, many drill targets exist.

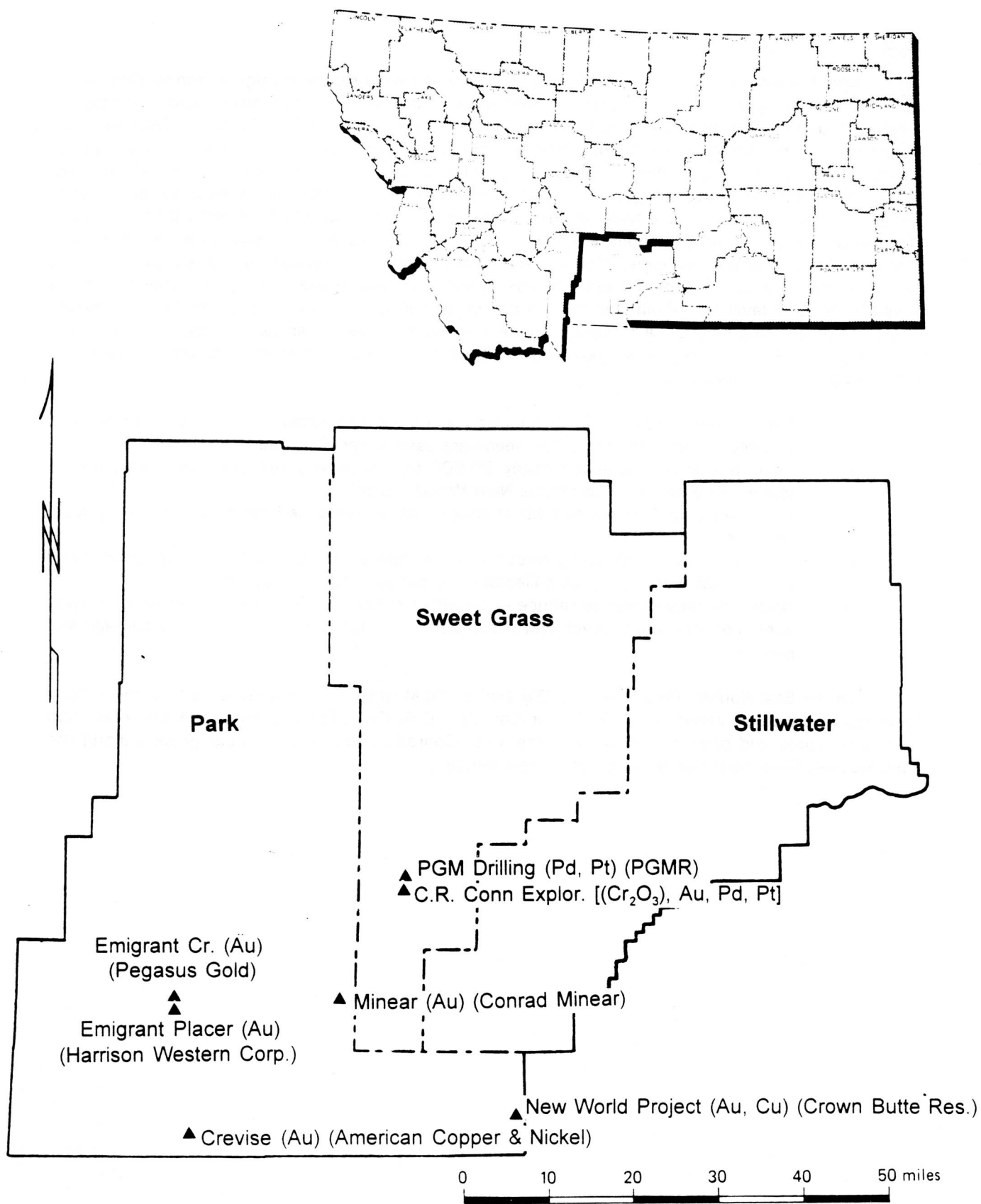


Figure 10—Exploration projects in the Park region.

Near Cooke City, Crown Butte Resources continued exploration through Noranda Minerals on their New World project. The company drilled eight diamond drill holes, but devoted the majority of time conducting geotechnical evaluations for ground support and surface facilities. Early in 1992, the company rehabilitated the old Gold Dust adit and drilled the orebody from below. Late summer activities were confined to reclamation research, reclamation of a pre-1900s mine and mill site, and exploration roads. The ore is found in a replacement of Cambrian Meagher Limestone adjacent to Tertiary intrusive complexes and lying within a breccia pipe. The limestone has been replaced by gold-copper-silver in pyrite and chalcopyrite mineralization. All deposits contain some skarn environment, in addition to replacement orebodies. The access of the orebodies will be achieved by a 2,800-foot adit and mined by a variety of underground methods, which will include chamber and fill (modified room and pillar) and sub-level, long-hole stoping. The ore will be milled using gravity and flotation techniques prior to shipment to a smelter. A thorough review has been completed and a draft EIS is expected in the spring of 1993. The project has received the Northern Regional Foresters Excellence Award for reclamation activities listed below:

- 1) Planted five acres of native species, which are harvested by hand with shears and shipped for seed removal. The seeds are used to reclaim road and mine sites.
- 2) Recontoured and reseeded nearly 30,000 feet of access and drill roads, only half of which were constructed for the New World project.
- 3) Improved county roads to help drainage and decrease sediment from reaching local streams.
- 4) Reduced water pollution by rerouting water flows around several old mine shafts and dumps that were acting as collectors and conduits for surface flows.
- 5) Used innovative ideas to reduce environmental impacts such as walking drill rigs over sheets of plywood to reach wet sites, with the result of eliminating willow damage and erosion.

On the East Boulder River, south of Big Timber, PGM Resources permitted ten DD holes along the platinum-palladium trend in the Stillwater Complex. C.R. Conn Exploration drilled 15 percussion holes for chrome and base metals in the same area. Conrad Minear tested placer gravels along the upper Boulder River near the old town of Independence.

Industrial minerals

Although markets were soft, interest remained high in most of the industrial minerals. Sapphires continued to be of interest in overseas markets. Burnt lime continued to be a strong market, but the competition increased from new plants in surrounding states. Talc markets remained soft but steady. Vermiculite sales were good in spite of mine shutdowns. Coal markets were steady in fierce markets.

Barite

Rocky Mountain Mineral (Dillon Exploration, Inc.) maintained production of small amounts of high-grade barite from their State lease on Elk Creek (**Figure 1**). The company is in the permitting stage to reopen the Coloma mine as an underground property. This production will hopefully bolster the diminishing reserves at the Elk Creek property, and prepare for a potential market increase anticipated with the lowering of royalty rates in Alberta, Canada. Increased oil exploration in Canada would certainly have an impact on the local barite market. In general, the barite market has continued to decline since 1991. Present sales have been confined to the high brightness additive market.

Garnets

Cominco American Resources has received all of the necessary permits from appropriate agencies for the remaining Alder Gulch dredge gravels between Virginia City and Alder (**Figure 3**). The reclamation bond will exceed \$200,000, and production is anticipated to start shortly after payment of the bond.

Another factor was inserted into the feasibility of the operation as the U.S. Environmental Protection Agency requiring that all products containing more than 0.1 percent crystalline silica must be labeled as a potential carcinogen and have the appropriate warning. The market is still too delicate to predict the impact of this requirement, which may reduce the market share and possibly eliminate the profitability of the project. The company is presently restudying their options.

Limestone

Limestone continues to be mined for a number of uses although markets may be starting to approach saturation. In 1993, new burnt lime plants have opened in southern Idaho and at Frannie, Wyoming. These new facilities will soon test the market demand.

South of East Helena, Maronick Construction (**Figure 5**) continued to supply the lime needs for the ASARCO smelter. The demand is light (but steady) in comparison to the rest of the industry.

Near Townsend, Continental Limestone (**Figure 5**) produced for a full year with their new doubled capacity. They submitted a life-of-mine permit application in October of 1992, which resulted in a conflict between the BLM and the Montana National Guard. Much of the mine reserves exist in the National Guard firing range and currently contains some live ordinance. The conflict exists in determining who will disassemble the range before mining will be allowed. The company continued exploration with 17 holes. Purity is maintaining throughout the drill targets. The operation is running at a capacity (800,000 - 1,000,000 tons per year of raw limestone), although the market is softening slightly. The company is installing process control automation, which will allow automated startup and shutdowns along with computer control of feed rates and general facility operations.

The Pipestone mine (Whiskey Gulch) near Butte (**Figure 3**) is continuing a small production of raw calcite products. The production rate being expanded to 500 tons/hr as markets are steadily growing. The company can presently produce seven products of high- purity calcite (92-98% CaCO_3):

- 1) 6" to + 2 1/2"
- 2) 2 1/2" to + 3/4"
- 3) 3/4" to + 4 mesh
- 4) -4 mesh to + 16 mesh
- 5) -16 mesh to + 30 mesh
- 6) -30 mesh to + 60 mesh
- 7) -60 mesh

South of Billings, Montana Limestone continued to produce crushed limestone for the burnt lime plants owned by Western and Holly Sugar companies (**Figure 11**). The company has moved from Laurel, Montana to Warren, Wyoming, and has expanded to produce limestone for the new burnt lime plant in Frannie, Wyoming, which is owned by Basin Electric of North Dakota. That plant is expected to produce nearly 60 percent of its product for the pollution control equipment at its North Dakota coal-fired power generation facilities. The remainder will be sold in the burnt lime market. Mining operations at Warren are expected to more than double when full production is attained.

Cement

The cement industry in Montana has had continued steady markets and have been producing at near capacity for several years. Production ranged between 90 and 100 percent of capacity in 1992. However, the markets are confined to Spokane, Washington, Canada, and the West Coast. Montana markets are insignificant. Newer and larger capacity plants (nearly three times the size of the Montana plant) have been constructed and are operating in those market areas. The competition is intensifying and the market share is diminishing for smaller, older, less efficient plants. All of the Montana cement plants fit this category. These plants are designed to burn toxic wastes to reduce fuel consumption and lower production costs. Montana plants, Trident (**Figure 3**) and Montana City (**Figure 5**) have been prohibited from burning wastes and have very little competitive edge other than having amortized most of their capital investments. Product demand has been reduced by 60 percent in late 1992 and early 1993. Should this continue, both cement plants are in jeopardy of closing.

Phosphate

The only underground phosphate mine operating in the United States is at Warm Springs (northwest of Garrison) (**Figure 1**). The property is operated by Cominco American Resources. Production is dependent on the sulfuric acid production at the smelter in Trail, British Columbia, Canada. The production has been limited because of two factors: 1) the failure of a new furnace, and 2) lower lead/zinc production on a world-wide basis. The decline in production is a function of a diminished demand, which depresses prices and is directly related to a struggling world economy. The overall effect was a surplus of phosphate rock production and increased stockpiles. The company responded to the decline by a two-week layoff in June, a three-week layoff in September, and a month-long layoff in February of 1993. Cominco American Resources does not expect an improvement in the market in the near future.

Sapphires

The Montana sapphire industry is comprised of both commercial and hobbyist activities. The hobbyist sector continued to enjoy the popularity of years past and is directly related to Montana's

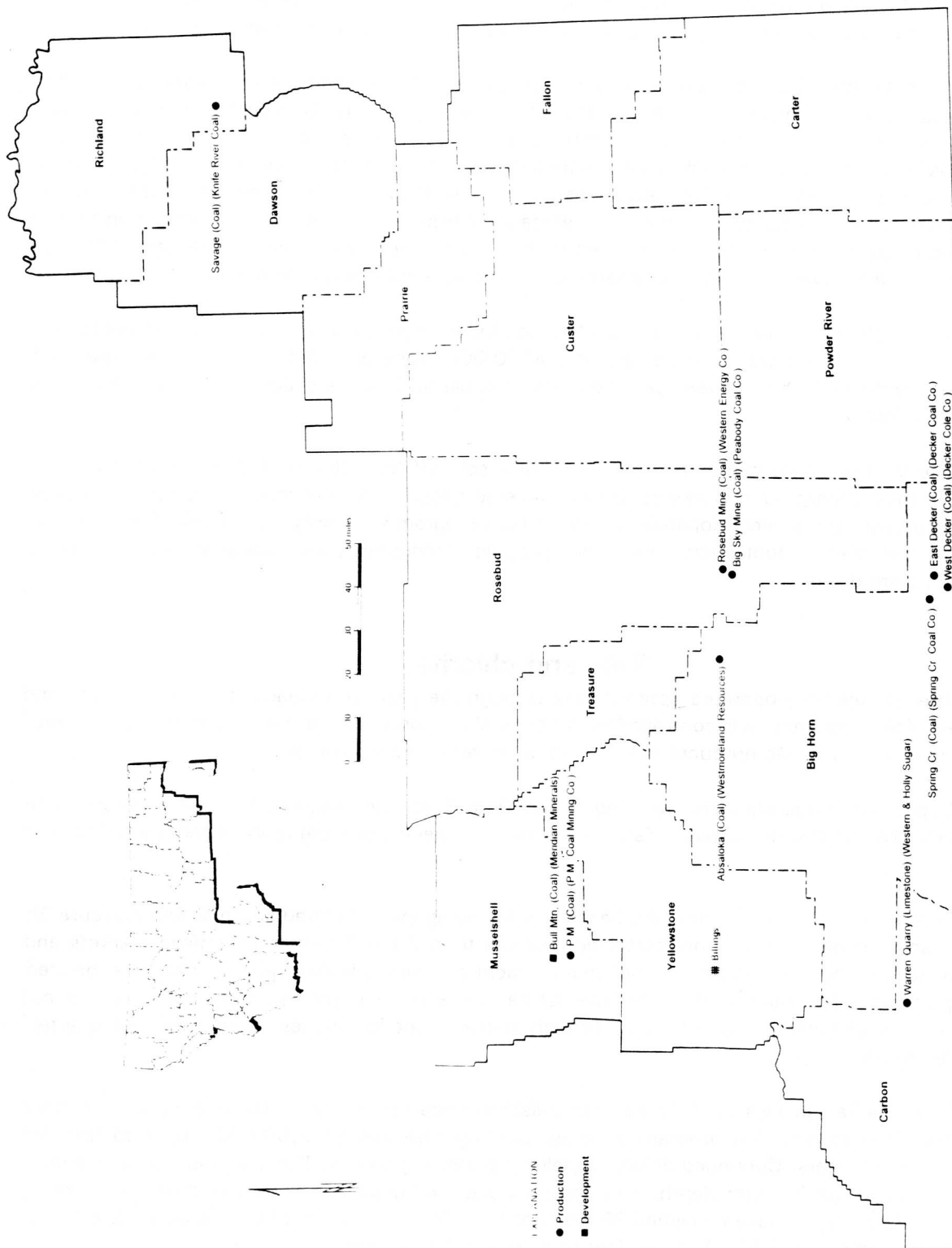


Figure 11. Mines in the southeastern region.

tourist industry. The commercial sector remains in a difficult market with limited domestic outlets and limited access to international markets. The Gem Mountain sapphire mine west of Phillipsburg (**Figure 5**) had a strong summer hobbyist season with most days operating at capacity. Commercial sales were steady (but limited) on the local market. The upstream deposit, at the Skalkaho Grazing Association sapphire mine was inactive. The new floating wash plant bobbed idly for another season.

Near Helena (**Figure 5**), recreation activities continued at French Bar and Spokane Bar. Both facilities sold washed concentrates, but do not allow fee digging. The Lovestone mine continued to produce commercial concentrates on a contract basis. Adjacent properties were sold to private individuals who anticipate a small-scale production on a commercial basis for the 1993 season. Eldorado Bar continued to produce sapphires during the 1992 season. Sam Spearstra produced concentrates for an international market. The recreational aspect of the operation is presumed to have functioned under a fee digging status. A potential may exist for a new commercial management of the bar. A preliminary dowser survey has generated considerable enthusiasm among potential operators.

In the Utica area (**Figure 7**), Roncor, Inc. continued to process remnant-dike material located near the surface. A late season discovery of a \$100,000 stone provided for short-lived optimism. Continued production showed reserves were inaccessible with surface equipment; few additional stones were found.

The Vortex Group continued exploration of a split-off from the Yogo dike. Having depleted reserves in their underground workings, they completed geophysical and other prospecting methods of locating additional reserves. Hopefully, a 1993 drilling program will clarify results, which may require a deepening of their 75-foot shaft. The drilling program encountered dike material favorable to the original sapphire discovery.

Talc and chlorite

The talc industry operated optimistically through the year with steady, but soft markets and low prices. Talc consumption is controlled by the general economy, which is now generally depressed. Marketing and sales in talc products also present a challenging proposition.

Cyprus Industrial Minerals was sold to Rio Tinto Zinc who assigned their talc operations to International Talc Company-Luzenac Talc. The American operations were reorganized under Luzenac America.

Luzenac's Yellowstone mine, the flagship of the company, is located south of Ennis (**Figure 3**). The company has concentrated on increasing reserves from 20 to 50 years, increased markets and market structure, and has readdressed their management philosophy from local to global. An expanded stripping program has readied them for the future, while mine personnel have continued to cut operating costs and increase productivity through management techniques. During the last quarter, they raised prices.

Montana Talc (a division of Costain Minerals) has undertaken an exploration program to further define deposit reserves. The program enlarged existing reserves by 5,000,000 tons to last for approximately 20 years. Continued drilling is yielding promising results. The ore grade is good with a slight increase in quality with depth. The company has produced and marketed their products at capacity for 1992. They have reclaimed 25 acres at their Cadillac orebody; they reclaimed 2 acres at the plant; and have built 18,000 square feet of new warehouse space.

East of Dillon, Luzenac produced high-grade talc from their Beaverhead mine. This facility utilizes underhand techniques with cement backfill of borrow material. The company drilled for additional reserves utilizing underground techniques. Production has remained stable. Luzenac is in the process of transferring the majority of its facilities at Alder to the Beaverhead and Antler mines.

Near Silver Star, Luzenac maintained production at the Antler mine. This property produces chlorite. They have developed a stripping program and are expanding their exploration program. During 1993, a crushing and sorting facility will be constructed.

Pfizer, Inc. has assigned the Treasure Chest mine to Minerals Technologies, Inc. (MTI), which in turn manages the talc mine under Barretts Minerals, Inc. Pfizer, Inc. has retained stock in MTI.

The Barretts Minerals operation sold a total of 125,000 tons of product. The flotation plant has reached a maximum recovery rate of 80 percent. A higher recovery rate is not possible because of compatibility of reagents and talc uses. The mine is maintaining quality, while production costs have been declining since 1989. The company has expanded production with the addition of a 6 1/2 yd³ shovel. In 1993, production will be expanded to the nearby Regal property.

Vermiculite

The W.R. Grace Company (**Figure 1**) has completed reclamation of their Zonolite mine, except for the settling pond and the final channel on the face of the dam. All other buildings have been removed and completion is anticipated in June 1993. Final stockpiles were shipped in November; shipping facilities were sold to Noranda Minerals. All outcrops were covered with soil and 40,000 trees were planted on the orebody, while the coarser tailings were recontoured and hydromulched.

Stansbury has continued with the EIS process on their vermiculite property east of Hamilton.

East of Dillon, Mineral Production, Inc. maintained production through the first half of 1992. The mine is now inactive and offered for sale. Potential purchasers continue to evaluate the property as feasibility studies look promising. However, vermiculite, as with most industrial minerals, is 20 percent mine operation and 80 percent marketing and supply facilities.

Coal

Coal regained its position as the most valuable mineral in the State (gross value = \$397,254,427) (**Figure 11**). Markets were intensely competitive as demand is slightly less than production, and the utility companies retain the advantage to control prices. Production is up slightly to 38,892,636 tons in 1992 from 38,030,108 tons in 1991. Demand for coal is declining, and what few long-term contracts remain are being bought out, further driving the price down. Most present contracts are less than two to three months in duration. Prices are \$3.60 - 3.65/tons, while costs in the Powder River basin are: 1) federal royalty at 12 1/2% = \$1.50/ton, 2) State severance tax of \$.50/ton and, 3) general operating costs of approximately \$1.50/ton. This provides a general profit margin of \$.10/ton before shipping. The proposed energy tax is anticipated to increase the price by \$4.50/ton, or more than double the price. Industry specialists fear the price increase will make higher BTU fuels more economic and will eliminate the western coal markets.

Western Energy's joint venture with Northern Power on a coal drying unit at Colstrip was completed at a cost of \$38 million. They are presently calibrating the unit and expect the complete investment to reach \$65 million. The unit is necessary to make Colstrip coal conform under the parameters of the Clean Air Act.

Oil and gas

Oil and gas exploration in Montana is almost non-existent. Low prices with respect to deposits, and the relatively high tax structure, prohibit any significant investment in the industry. Activity has lessened to four to six exploration rigs operating per week during the peak season. A total of four to five major companies have continued to operate in the State with activities confined to existing fields. Fields are currently being sold to independents and mid-sized operators as major companies tend to consolidate their holdings. The smaller companies do not have the cash-flow to pay the necessary overhead costs. Oil field development is limited to horizontal wells and the preparation for water flooding as fields are depressurized, which usually represents the final stage of existing fields.

Gas fields are still of interest to the independents, but the resource is typically confined to low-head, low-pressure fields. Activity is primarily in Daniels County, as well as in the Lake Basin area west of Billings. Wells are confined to 10,000 feet, with most wells averaging 7,500 feet in depth. Current activity, as with oil, is confined to further development of existing fields.