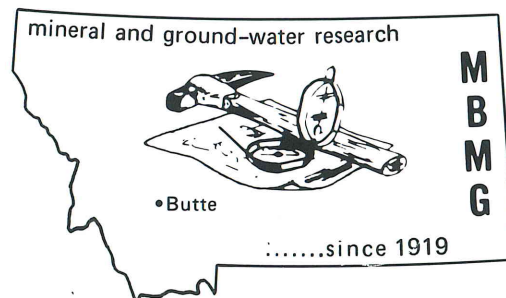


MBMG 236

**MINING AND MINERAL DEVELOPMENTS
IN MONTANA—1990**

by
Robin McCulloch



MONTANA BUREAU OF MINES AND GEOLOGY

1990

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ACKNOWLEDGEMENTS

This 1990 summary of mining and mineral developments in Montana, although principally the work of the author, 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 activities and current mining in the State. The Montana Department of Revenue provided data on taxes. The U.S. Bureau of Mines, U.S. Forest Service, and the Bureau of Land Management plus the Montana Department of State Lands added mining information significant to our perspective on the mineral industry in Montana. And 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, and the Montana Coal Council and the Petroleum Association.

INTRODUCTION

Highlights for 1990 in mining and mineral developments include major construction at four mines in addition to exploration of three major discoveries. During the summer of 1990, leach pad construction was undertaken at Pegasus' Zortman-Landusky and Basin Creek operations and Canyon Resources' C. R. Kendall operation. Pfizer Inc. initiated an \$8.6 million construction project for a talc beneficiation plant south of Dillon in March. Phelps Dodge Corp. is continuing development drilling on their 7-Up Pete Project while Crown Butte Resources and Noranda continued drilling out reserves at their New World Project after doubling them in

1989. Noranda continued driving toward their 18,000 ft target at the Montanore Mine and were in nearly 5,100 ft on November 1.

As all good things have to come to an end, W. R. Grace announced the forthcoming closure of their Libby Vermiculite operations. The company is planning on having reclamation started by the first of the new year.

Exploration in 1989 resulted in Company expenditures of more than \$26 million. 1990 exploration investments probably will be less than in 1989 as the companies seemed to trend toward smaller projects but more of them. Major companies appeared to be regrouping in their effort, while the small and medium sized companies seemed to be experiencing a resurgence.

Again, the primary exploration target of choice was gold, however, the companies are continuing to show interest in copper. Mineral activity in the state remained strong in both development and exploration for the third year. By November 1990, 339 plans of operation had been filed with the U.S. Forest Service for Montana compared with 391 for 1989. The distribution of these plans of operation by the ten National Forests in Montana and comparisons with 1988 and 1989 are as follows:

<u>FOREST</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Beaverhead	16	76	38
Bitterroot	1	2	6
Custer	4	4	4
Deer Lodge	62	130	85
Flathead	0	0	0
Gallatin	13	14	25
Helena	60	60	47
Kootenai	10	15	56
Lewis & Clark	10	10	11
Lolo	49	80	67
TOTAL	246	391	339

As of September 30, 1990, Montana had *73,879 active unpatented mining claims. Of these *6,692 were new, *55,463 had assessment work filed on them or had filed a notice of intent to hold. In 1989, Montana had 59,659 active unpatented mining claims. Of those claims, 13,084 were new, 39,912 had assessment work filed on them, and 6,663 had filed a notice of intent to hold. In 1990 the Bureau of Land Management reported granting 2 patents for 13 claims containing 230.16 acres in Montana. As of October 1, 2 applications for patent of 3 placers had been filed. Patents granted were for bentonite claims. The B.L.M. state office reports a 10-fold increase in inquiries about patenting of claims. This most likely related to proposed legislative changes in the 1872 Mining Laws.

In fiscal year 1990, (October 1, 1989 to September 30, 1990) the Federal Government paid the state \$20,318,356.41 for the state's share of the mineral leases and right of way funds. In fiscal year 1989 (October 1, 1988 to September 30, 1989) the state was paid an estimated \$19,871,031. In addition to that, specific counties were paid a total of \$459,833 for oil and gas leases by authorization of the Bankhead-Jones Act.

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. As of August there were a total of 994 SMES with 59 new permits issued (a decrease of 506 from 1989). Since the new legislation in 1989, there have been 10 new placer and 1 new cyanide SMES permits issued. A

* Approximately (Sums of these numbers do not match the total due to a computer improvement by the Bureau of Land Management.)

total of 202 exploration licenses have been issued in the state, 26 of these are new and the remainder are renewals. According to the Department of State Lands, there are approximately 600-700 active exploration projects in the state as of October. This difference exists because an exploration license may have many individually bonded projects under it. The following table shows past and present levels of exploration activity:

YEAR	EXPLORATION PERMITS		TOTALS
	NEW	RENEWALS	
82	12	44	56
83	16	41	57
84	28	59	87
85	29	52	81
86	30	64	94
87	36	75	111
88	21	171	192
89	35	175	210
90	26	176	202

There are 87 operating permits in the state, 3 are new and 10 required amendments to existing licenses. Last year the state had 95 operating permits.

REVENUE

As shown in Table 1, license tax revenues from metalliferous mines have shown a slight decrease from fiscal year 1989. This is due largely to a decrease in gold prices between 1989 and 1990 which were in turn partly offset by increased gold production. Coal taxes met with a reverse situation having a slight decrease in annual production and an increase in unit price. Cement and gypsum tax results show a slight increase due solely to growth in cement sales as the gypsum industry ceased to exist in 1989. The micaceous mineral license tax showed a decrease, influenced by legislative tax changes for the talc industry and decreased vermiculite production.

TABLE 1

Five-Year Summary of State Mineral Tax Statistics

(From Natural Resource and Corporation Tax Division

of the Montana Department of Revenue)

Type of Date	* FY 86	* FY 87	* FY 88	* FY 89	* FY 90
Cement & gypsum tax					
& license fee	115,057	107,519	126,650	130,406	131,592
Coal license &					
severence tax	84,217,213	76,546,601	84,638,332	58,565,576	67,870,544
Metalliferous mines					
license tax	1,479,993	1,756,121	4,248,913	6,355,005	6,306,356
Micaceous mineral					
license tax	8,001	5,269	7,689	6,212	4,067
Natural gas					
severence tax	2,890,666	2,492,465	1,491,523	1,724,735	1,057,277
Oil producers					
severence tax	34,728,749	16,143,592	16,484,059	13,234,516	14,510,149
Resource indemnity					
<u>trust tax</u>	5,892,267	3,821,977	4,979,333	4,782,042	5,961,949
TOTAL Mineral Taxes	129,431,946	100,873,544	111,976,499	84,798,492	95,841,934
TOTAL Dept of Revenue					
Collections	472,052,435	447,752,293	541,342,995	556,668,742	605,020,146
Percentage of total					
mineral producers	27.4%	22.5%	20.7%	15.2%	15.8%

* Montana Fiscal Year ends on June 30 of the year indicated

Gross production value of metallic and nonmetallic minerals in Montana is:

Gross Value per Calendar Year

<u>Commodity</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Coal	406,985,744	429,088,977	365,146,698
Metal ores	262,179,011	424,693,471	339,820,036
Industrial minerals	43,651,088	29,582,910	31,934,528

METALS

Metal mining activity in the state continued to increase. Full production has been attained at all facilities, however, falling metal prices have resulted in a lower gross value even though levels of production surpassed 1989 at most mines. The difference in gross value of ores between 1988 and 1989 was \$84,873,435 with 1989 having a lower amount. The most significant reason for the difference is a \$53.31/troy ounce average annual lower price for gold in 1989. That same difference sharply curtailed placer operations in 1990. Although most other commodity prices increased, platinum fell \$13/troy ounce while silver fell \$1.00/troy ounce.*

MINING, MINERAL DEVELOPMENT, AND EXPLORATION ACTIVITIES

Western Region

Metal Mining and Development (Figure 1)

Asarco continued to operate their Troy unit at 8,500 tons per day (tpd). The room and pillar, mechanized, copper-silver mine operated smoothly with none of the union problems of the previous year. Production was primarily from the southern part of the main ore body, however, development and production continued on the lower grade ore body located below the main ore

* Mineral commodity Summaries 1990 - U.S. Bureau of Mines.

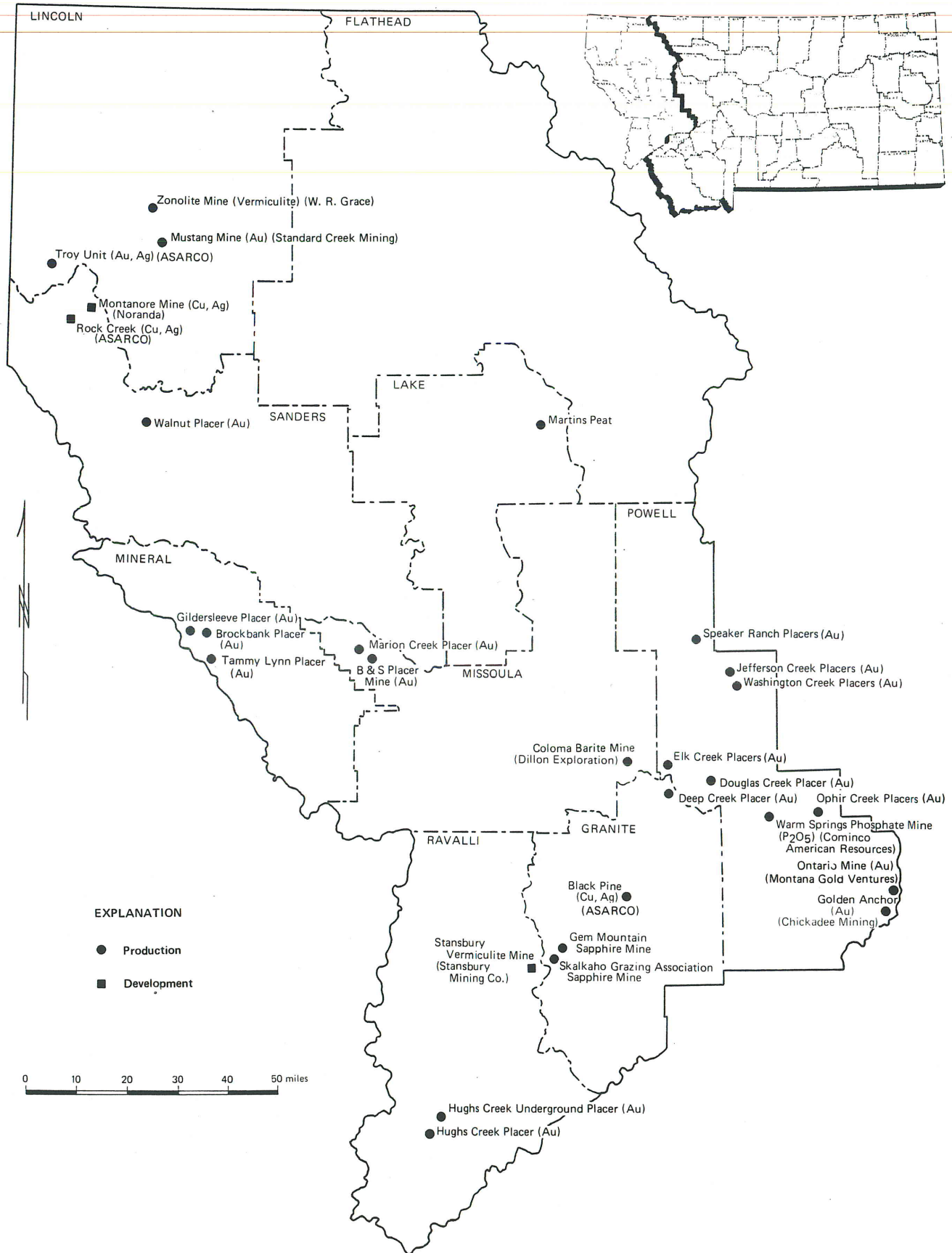


Figure 1. Mines and mineral development in the western region.

body. The operation typically produces 4,200,000 ounces of silver and 20,000 tons of copper a year and provides an annual payroll of \$10.5 million for 355 employees. The company expanded their efforts to discover additional reserves adjacent to the mine. Although no major discoveries have been announced, work is continuing.

Standard Creek Mining produced gold from the Mustang Mine in the Fisher River drainage. Producing ore at a rate of 2 tons per day with a 2 man operation, the company concentrated gold - quartz ores with a small portable gravity mill.

Noranda Minerals Corp. of Canada has continued to drive a decline towards Montanore ore body. Having made progress of 5,100 ft since starting the project a year ago, the company still projects interception of the ore body, 18,000 ft from the surface, by 1991. A draft environmental impact statement has been completed and is out for review. The company anticipates mine permitting completed by 1992 and hopefully production by 1995. The ore body was purchased from U.S. Borax and Chemical Corporation in 1988 by Montana Reserves Co. which then sold the operating share to Noranda. The mine is expected to annually produce over 14 million ounces of silver and over 50,000 tons of copper. Peak employment is projected at 450 with a payroll of \$12 million.

Sunshine Mining Company proposed a purchase of Montana Reserves Company in 1989 but declined the opportunity in the Spring of 1990.

Another project in the Cabinet Mountains is continuing at a snails pace. The Rock Creek project (proposed by ASARCO) after years of negotiations

with the U.S. Forest Service over the tailings impoundment design has progressed into yet another year's negotiations with the U.S. Forest Service over the impoundment facility. The proposed mine is expected to produce up to 10,000 (tpd) for 30 years and employ approximately 355 with an estimated annual payroll of \$12.5 million. Silver prices significantly above the present prices may be necessary before a major effort in bringing this project on line is attempted.

Production continued on an intermittent basis at the Walnut placer on the Vermillion River east of Trout Creek in Sanders County.

In Mineral County production was limited to placer activity. Both the Brockbank placer on Cedar Creek and the Tammy Lynn placer on Quartz Creek produced at or near capacity for the summer months. The Gildersleeve placer in Upper Cedar Creek was reclaimed.

The Ninemile placers were very quiet. Many mines did not operate at all. The only significant production was at the B&S Placer Mine at McCormick Creek. Many were amending their operating plans; others chose to not operate at gold prices under \$400/ounce.

South of Darby on Hughs Creek, placer production continued with a two man, 75 yd³ per day operation. Utilizing a floating wash plant and vibrating screens, the company continues to process gravels reconcentrated from a paleoplacer located north of the drainage. The deposit is one of two operating placers in the state containing cassiterite.

On top of the north ridge above Hughs Creek, a small company is mining indurated paleoplacer gravels. The ore is broken by blasting and then washed with a trommel. Operations are controlled by the available water supply. The deposit constituents are identical to the deposit in Hughs Creek including the character of the gold and the cassiterite.

Placer mining continued in the Garnets with small scale production on 2 properties in Elk Creek, 1 in Deep Creek and 1 on Douglas Creek.

In Granite county, placer production continued on the Eureka Gulch placer located in upper Quartz gulch.

The Black Pine Mine, northwest of Philipsburg, was purchased by ASARCO from Inspiration Consolidated Copper Co. to provide a steady source of flux for the East Helena smelter. Seasonal production has been proposed at 6,000 ton per year which represents about 50% of the smelter's needs. Production of flux from local sources has not been available at a steady rate in recent years which prompted the company to acquire their own source.

Placer production in north Powell County was nearly nonexistent. Weekend activities continued east of the Speaker Ranch (east of Helmsville) however, Jefferson and Washington Creek had no indications of any activities other than some reclamation of the Lower Washington Creek Canyon. Placer production in Washington Creek is being proposed for summer of 1991.

Minor placer activities continued in Ophir Creek and adjacent drainages north of Avon and Elliston. South of Elliston, production continued at

Chickadee Mining's Golden Anchor heap leach operation on Negro Mountain. Montana Gold Ventures hauled the Ontario Mine tails to the Basin Creek Mine for processing.

Exploration (Figure 2)

In the Libby area of Lincoln and Sanders counties, Asarco drilled 15 holes in the Ross Creek drainage in an effort to outline additional reserves for the Troy mine. Frank Bache drilled 3-4 Winkie holes on Cuckoo Cuckoo Boyd. Copper Creek Mining explored lead-zinc veins on Grouse Mountain (southwest of Troy) as well as gold anomalies. Orvana continued working in the area around the Lukins/Hazel Mine with additional drilling and trenching.

In the Trout Creek area, Asarco continued long term exploration projects by drilling one hole on each of the Clear Peak, Minton Peak, and Miners Gulch projects. Kennecott drilled one hole in Copper Gulch, 2 holes in the East Fork of Bull River, and one hole in Dry Creek, all of which were targeted towards stratabound copper-silver mineralization.

Dave Ott drilled 2 holes up Dry Creek (a tributary of Bull River). While Mountain Chief, Inc. put in 2 test pits for placer in Lyons Gulch (Vermillion River drainage).

Near Thompson Falls, Leroy Hahn conducted a bulk sampling and core drilling program (Riverside project) on a property north of the Montana Standard lead/zinc mine.

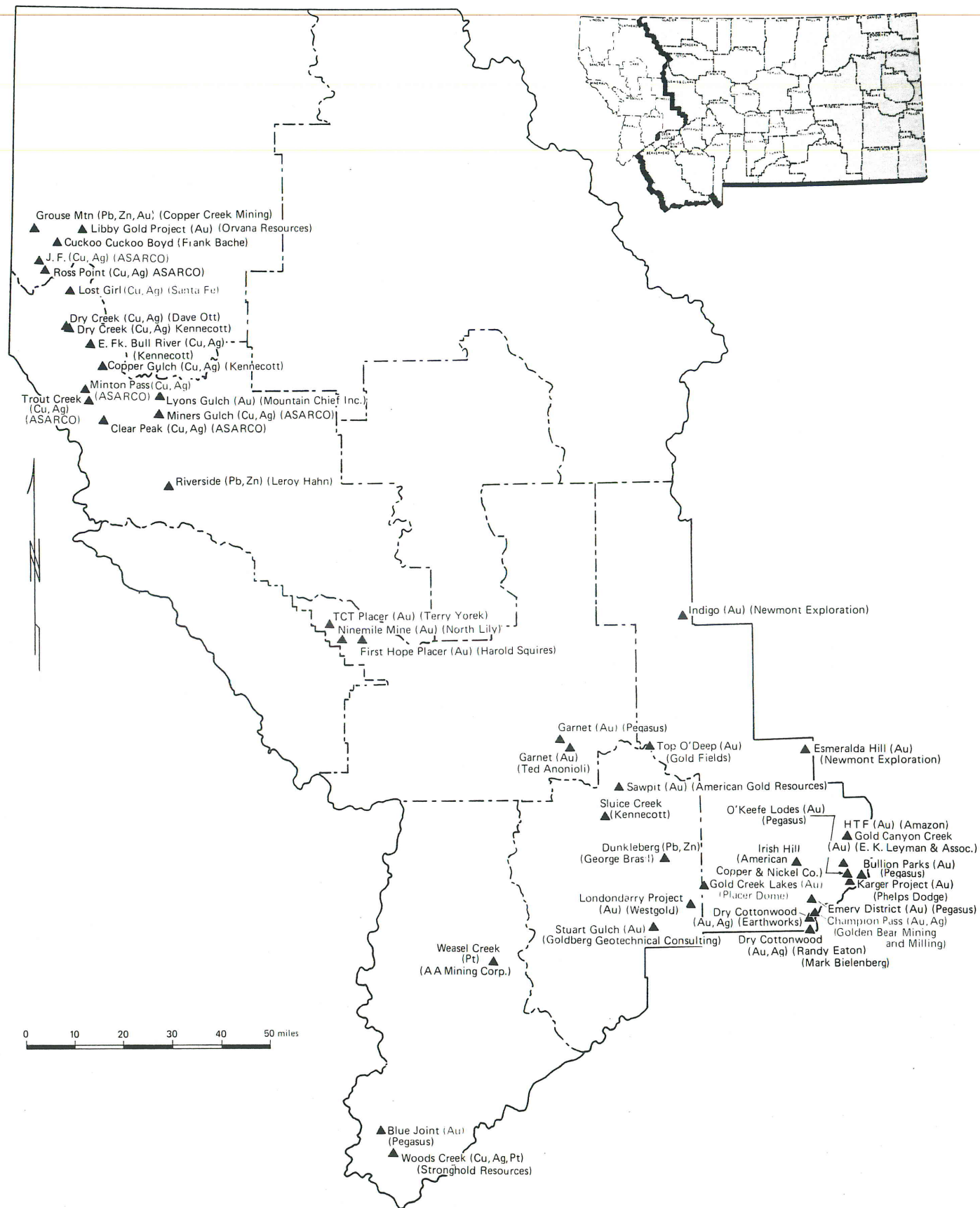


Figure 2. Exploration projects in the western region.

In the Ninemile drainage, northwest of Missoula, Terry Yorek trenched the 'TCT' claims in search of a gold placer deposit as did Harold Squires on the First Hope claims on Little McCormick Creek. North Lily Mining trenched 4,400 ft of strike length on their Nine Mile Mine property. Pending results, a drilling program is planned to explore the wide vein system.

South of Darby, Stronghold Resources is driving a drift to explore copper and gold mineralization in the lower Woods Creek drainage. East of Hamilton, in the Weasel Creek area, AA Mining Corporation has proposed a small scale mining operation to recover platinum group metals from pyrite crystals.

In northern Granite County, American Gold Resources proposed 319 auger sites between Sawpit and Niles Gulch. Westgold completed more than 35 drill sites and 10 trenches on their Londondarry Project in Ham Gulch, Smart Creek and Henderson near Maxville. Kennecott drilled 2 holes plus some trenching on their Silver King project in Sluice Creek (a tributary of the Rock Creek drainage). Goldberg Geotechnical Consulting drilled two holes in Stuart Gulch near Philipsburg.

In the Garnets, Pegasus continues a sizable drilling and trenching program between Garnet and Coloma. Ted Antonioli has a combined development and exploration program on a property southeast of Garnet. All of the projects are on property controlled by Garnet Mining Corporation.

Early in the year, Gold Fields Mining Corporation drilled more than 40 holes on Top O'Deep and dropped the property.

In Powell County, Earthworks did drilling and trenching in Dry Cottonwood Creek drainage east of Galen. Pegasus did some trenching in the Emery District east of Deer Lodge. Placer Dome dug two trenches near Gold Creek Lakes. Golden Bear Mining and Milling dug two trenches east of Champion Pass and opened up two adits. Mark Bielenberg did some trenching on Dry Cottonwood Creek for sapphires as did Randy Eaton. George Brazill did some drifting on a zinc property in the Dunkleberg drainage.

In the Avon-Elliston area, Amazon Mining Company drilled one hole near Blackfoot City and Carpenter Creek. Phelps Dodge Corporation continued drilling on their Karger Project on Negro Mountain. Pegasus drilled 12 holes on their Bullion Parks Project on Ryan and Telegraph Creeks. Newmont Exploration Limited drilled 23 holes on Esmeralda Hill. Leyman & Associates drilled 7 holes with helicopter access in Gold Canyon and Trout Creek. Pegasus dug 6 trenches on their O'Keefe Lodes project in Clemmer Gulch. American Copper and Nickel Corporation drilled on Irish Hill early in the year and dropped the property.

In northern Powell county, Newmont Exploration, in a joint venture with Mines Management, Inc., conducted a drilling program on their Indigo project. The property is located southwest of Lincoln on Ogdon Mountain and is currently available.

Butte-Anaconda Region

Mining and Development (Figure 3)

In Silver Bow County, Pegasus continued production at their Beal Mountain operation. Producing in excess of 37,000 oz of gold per year from a skarn hosted gold deposit, the property is expected to continue a minimum of 8 years. Further exploration indicates additional reserves in a second unrelated (geologically and physically) ore body south of the discovery.

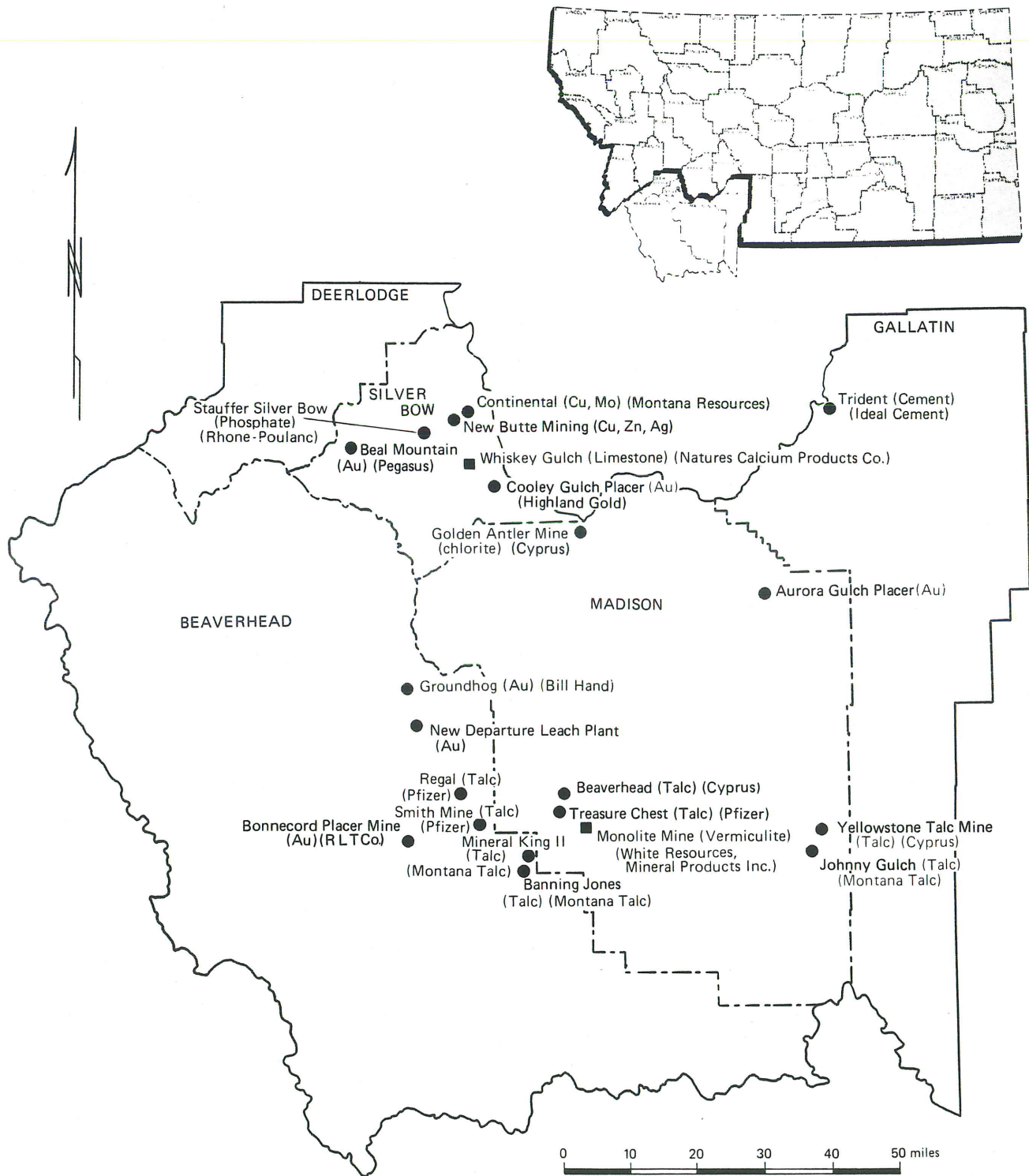


Figure 3. Mines and mineral development in the Butte-Anaconda region.

Present stripping ratio is 1.3:1. The leach pad was enlarged last year with Stage II to 40 acres and 3 lifts were completed in 1990. The company is anticipating construction for Stage III in the coming year.

Reclamation of the waste dump and leach pad dike has been successfully completed on a 2:1 slope while additional reclamation is planned congruent with the project development. The mine presently employs 120 with an annual payroll of \$3.5 million.

Montana Resources, Inc. operated their Continental Pit for another successful year. Employing 333 with an annual payroll of \$8.1 million, the company produced 87.5 million pounds of copper, 15 million pounds of molybdenum and 877,030 oz of silver. Ore production has continued throughout the year at a rate of 38,000-50,000 tons per day. The lower rate occurs infrequently when mining the hard portion of the deposit which affects grindability of the ore. The stripping ratio has remained at or less than .78:1 (waste to ore). The deposit mine life (design) is presently at 24 years with additional reserves yet to be evaluated.

In the upper part of the Butte Hill deposits, New Butte Mining Company developed and produced from multiple lead/zinc veins containing silver and gold. At peak production in midwinter, the company employed 135 and had a payroll of \$1.5 million while producing 450 tpd. The ore was in turn trucked to the contact mill in Philipsburg for processing. Although the mine has not returned to full production following a temporary closure due to the labor difficulties at Cominco's smelter; the company has continued with permitting plans to develop the Moose shaft into a production shaft and build a 1,500 tpd flotation mill. The project is expected to cost \$15

million and employ 170 additional employees. The company is presently exploring possible joint ventures as well as sources of international capital.

Highland Gold Properties had a successful stock offering and purchased sufficient equipment to increase their production to 250 yd³ per hour. The operation mined out available reserves in Cooley Gulch during this operating season and initiated permitting to move operations to Flume Gulch. Activity beyond production included a substantial exploration program to further delineate potential reserves in addition to fine tuning equipment and production techniques for the new project. The company hopes to start work in the main Fish Creek drainage in 1991.

In Beaverhead County, the custom vat leach operation at the New Departure Mine continued to process mine dumps from the Bannock area. Production remained at 700 tons/month.

RLTCO completed reclamation of the Grasshopper Creek placers near Bannock and moved their equipment to bench gravels on the Bonnacord placer in the lower portion of the Grasshopper Creek drainage.

In the Argenta area, Bill and Don Hand continued to produce from their heap leach at the Ground Hog Mine. Further production is planned at the site to utilize available resources in existing mine waste dumps of the Golden Era mine.

In the Madison County, Chicago Mining Corporation is continuing to work on their mill at Pony. Production included processing waste dumps from the Revenue Mine area west of Norris.

Production from Eldorado Gold's placer mine in Browns Gulch (west of Virginia City) was not resumed in 1990. However, production continued in the Aurora Gulch placer north of Ennis.

Exploration (Figure 4)

In Deer Lodge County, Cable Mountain Mining drilled two holes on the Holiday Lode in the North Fork of Flint Creek. While Clint Degenhart drilled at the Golden Eagle property; Chevron, Bar Gold and Magellan Resources continued drilling on their long term exploration program at the Southern Cross property. Cable Mountain is in negotiations with the State to reopen the Cable Placer while the lode portion of the property is available.

West Gold proposed 34 drill pads on the Northern Cross property in Warm Springs Creek but did not initiate the project. They also dropped the Hidden Lake property.

In Silver Bow County, Golden Sunlight Mines drilled 2 sites in the Fish Creek drainage. Placer Dome, in a joint venture with BHP-Utah International, drilled in the Camp Creek/Soap Gulch area. Highland Gold Properties put in 10 churn drill holes in the Fish Creek Placer deposit. FMC had a drilling and trenching program in Rochester Basin. Gexa Gold drilled a single hole one mile south of Moose Town.

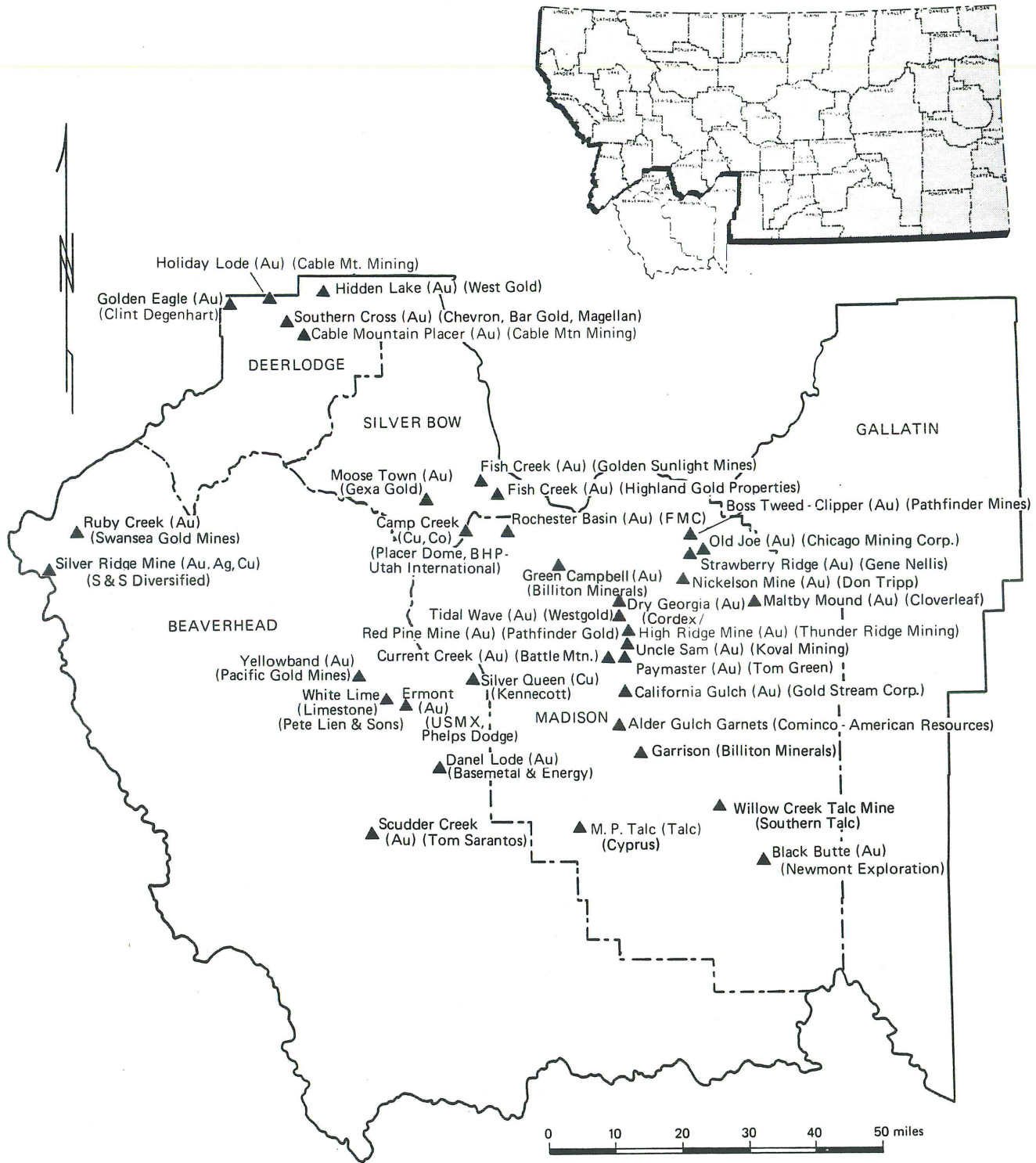


Figure 4. Exploration projects in the Butte-Anaconda region.

In Beaverhead County, S&S Diversified continued work on the Silver Ridge Mine which is located southwest of Wisdom.

In the lower Ruby Creek drainage, Swansea Gold Mines has optioned Sandhurst Mining's Ruby Creek project and spent the summer exploring the property with bulk and auger samples. The deposit is identified as containing 28 million yd³ grading 0.12 oz/yd³ with a depth of 33 ft.

West of Argenta, Pacific Gold Mines, Inc., drilled and is sampling the Yellowband Mine. Proven reserves are listed at 143,400 tons grading .244 oz/ton gold. Probable reserves are listed at 436,000 tons grading .33 oz/ton gold. The company is presently involved in an underground bulk sampling program to explore some drill intercepts. Metallurgical tests indicate 90% recovery using cyanide. The zone of interest has been traced by company geologists a distance of seven miles with a width of several hundred feet.

Billiton Minerals drilled and trenched a property on McCartney Mountain. In the Scudder Creek area (near Grasshopper Creek), Tom Sarantos carried out a trenching program. Phelps Dodge completed a trenching program at the Ermont Mine west of Argenta. Base Metal and Energy drilled the Danel Lode.

East of Dillon, Kennecott drilled 3 holes and reopened portals on the Silver Queen property in Jake Canyon.

In Madison County, Billiton Minerals had a 27 hole drilling and trenching program on the Green Campbell and adjacent properties. On the west side of

the Tobacco Root Mountains, Cordex Exploration drilled 10 holes in Dry Georgia Gulch. Thunder Ridge Mines did development work on the High Ridge mine also in Dry Georgia Gulch. In Wet Georgia Gulch, Westgold drilled 16 holes on their Tidal Wave project.

Pathfinder Gold sampled the underground workings of Red Pine Mine in Indian Creek. Koval Mining had a 3 hole drill program at the Uncle Sam Mine in the Middle Fork of Mill Creek. Repair work was also done on the lower portal. In Bivens Creek, Tom Green and a crew worked in the Pay Master and Pay Master Heir mines doing development work.

Battle Mountain drilled four holes on their Current Creek project. Gold Stream Corporation started a placer testing program on California Creek in October.

West of Virginia City in Alder Gulch, Billiton Minerals drilled 36 holes plus trenching on and around the Garrison Mine.

On the east side of the Tobacco Root Mountains, Pathfinder Gold continued work on the Boss Tweed, Clipper and Mammoth properties near Pony. Chicago Mining Corporation worked on the Old Joe project. Gene Nellis did some bulk sampling and trenching on the Strawberry Claims on Strawberry Ridge northwest of Pony.

Don Tripp and George Smitz conducted a sampling and mapping program on the Nickelson Mine. Plans were being made to collect a bulk sample for metallurgical sampling however snow curtailed their project in the fall.

West of Norris, Cloverleaf Gold (once known as Pangea Resources and now a subsidiary of Wounded Bull Resources), purchased the Maltby's Mound project from Newmont Exploration. The deposit is projected to contain 8.9 million tons grading .03 oz/ton gold. Mineralization appears to be confined to a shear within the quartz monzonite, has 3 separate ore zones or pods and is hydrothermal. The Company indicated many good targets exist within the project boundary and are continuing the search for additional reserves. Present expected mine life is 3-5 years. Cloverleaf spent the field season doing ore reserve studies and gathering data in preparing their environmental assessment for permitting. The property is presently available.

South of Ennis, Newmont Exploration completed a drilling program on their Black Butte project in Standard Creek.

Helena Region

Mining and Development (Figure 5)

West of Lincoln, Bill Lewis continued placer production in Lincoln Gulch. Bob and Clay Lewis started the last stage of their placer operation in Sauerkraut Creek. Reserves were substantially reduced when a fault was discovered that diagonally divided the valley into two thirds of barren clay bedrock and one third rough shaley bedrock which contains gold values. The operations are expected to be completed either this fall or next spring with final reclamation to be completed by 1991 or 1992.

Inland Gold and Silver Corp. and N.A. Dagerstrom, Inc. have put the Big Blackfoot project on hold because of instability in the gold market. Due to the small size (100,000 recoverable oz of gold) of the deposit, the

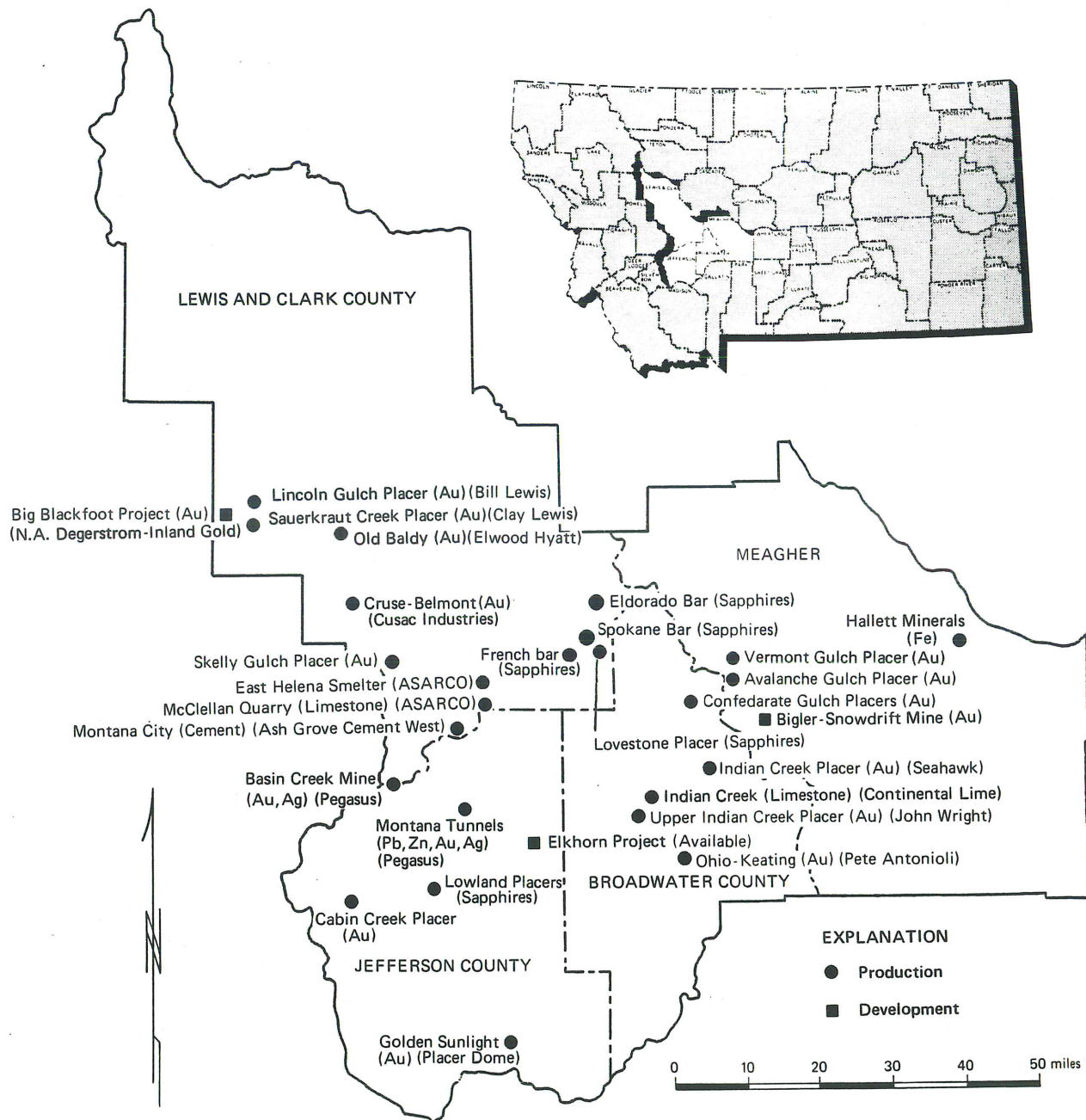


Figure 5. Mines and mineral development in the Helena region.

company is waiting for an optimum time in the gold prices to develop the property.

Production continued at the Old Baldy claims south of Lincoln. Normal production averages less than 5 tons per day.

In the Marysville area, Cusac Industries purchased Gulf Titanium Ltd's 50% interest in the Cruse-Belmont gold mining project. A total of \$7 million has been spent on the project while more than 40,000 tons of ore grading .4 to .6 oz/ton gold has been shipped to the smelter for flux. Production was halted following poor recovery of gold values from the mill the company was using in Basin. The estimated proven reserves presently stand at 41,000 oz of gold and the geologic reserve is listed at 140,000 oz of gold above the 900 level. The grade averages .5 to .6 oz/ton gold with a range of .4 to .7 oz/ton and a 3:1 silver/gold ratio.

The company has reopened the East Belmont mine and is preparing to conduct a drilling program which is planned to expand mine reserves and develop geologic data. The company is entertaining joint venture offers and is hoping to bring the property into production in the near future.

West of Helena, small scale placer operation continued in Skelly Gulch. ASARCO's East Helena smelter had a grand opening for their new ore handling facilities in March. The \$15.5 million project was initiated a year before and will eliminate blowing dust from concentrates which were placed in the plant yard after the old facilities burned in 1988. The project represents just one of the many and continuing investments the company has made in Montana this century.

West of Helena, Pegasus' Basin Creek mine continued operations while expanding leaching facilities, reserves and exploring geologic targets in the mine area. After purchasing the property in 1989 from Pangea Resources for \$26 million, Pegasus has dropped production costs from \$750 per ounce of gold to just over \$300. The company has built an 11 million-ton heap leach pad and is enlarging its mining operation. The investment was projected to cost \$10.5 million and will extend the mine life for five to seven years. The project is anticipated to employ up to 100 with an annual payroll of \$2.7 million. The project is also anticipated to produce 35,000 to 40,000 ounces of gold per year. A unique situation exists at this operation where the environmental concerns and economics work together for waste rock handling. Waste rock sites are at a premium so the completed pits are backfilled with the waste rock from the next pit wherever possible. At the end of the project only one pit will remain.

In Jefferson County, south of Helena, Pegasus also operated the Montana Tunnels mine. Following a drilling program in 1989 which resulted in a reduction of both grade and reserves at the mine, the company has adopted a new mining plan which will mine a slightly smaller amount of gold while reducing the stripping ratio from 3.3:1 to 1.4:1. Modification of the mill has resulted in increased recoveries, and plans are being made to fine tune the mill in the future for even more efficiency and higher recovery. The annual gold production of 65,000 to 80,000 ounces is expected to be reduced by 10% while the cost of production will be reduced by 40%. An added benefit of this plan is that the mine life will expand from 8.5 to 9.1 years.

Activity in the Lowland Creek placers north of Butte was reduced to only minor handwork. North of Lockhart Meadows in the same area, the Cabin Creek placers showed small scale production on a seasonal basis.

Near Boulder, Gold Fields' Elkhorn project has been stalled. In 1989, the company started gathering base line data for the permitting process and had proposed driving a decline to explore the ore bodies. This year the company changed its decision to produce and is offering the 500,000+ ounce gold deposit for sale. Final bids are expected to be received prior to 1991. Company officials have indicated the decision was strongly influenced by the environmental opposition in the area.

Near Whitehall, Placer Domes' Golden Sunlight Mine proposed an expansion which will extend the mine life till 2006. The bond for the expansion came to \$38,000 per acre or \$38.6 million. Increased production of the main ore zone continued through part of 1990 as high wall instability dictated slope modification. Increased stripping ratios are planned for the next few years during the expansion project.

Controversy erupted over the companies ability to reclaim the waste dumps to 2:1 slopes. In the ensuing discussions an agreement was reached allowing the company to run test plots to prove the viability of 2:1 reclamation, however, the bond was calculated to allow for 3:1 slopes.

Production at the mine is at 140,000 tpd (ore and waste) while employing 250 and an annual payroll of \$8 million. The mill has an operating capacity of 6,700 tpd operating at an average grade of .044 oz/ton gold.

Production of gold in 1989 exceeded 100,000 oz, however, in 1990 and the next three years the company is anticipating lower gold production.

Pete Antonioli completed permitting of his vat leach operation at the Ohio-Keating mine near Radersburg.

In the Big Belt mountains, along the Meagher and Broadwater county boundary, placer mines of all sizes operated. In Avalanche Gulch, Steve Adams spent a frustrating summer trying to put in a drain in a narrow canyon. With the deposit successfully dewatered, full production is anticipated for 1991 season.

On the east side of the divide, the Vermont Gulch placer continued small scale production while two placer exploration projects examined production potential above and below the existing operation.

In Confederate Gulch, small placer operations developed deposits on Rattlesnake Bar and Greenough Gulch. Four or five small pick and shovel placer mines produced minor amounts of gold from various sources in the gulch while similar sized hobby-type operations existed in at least half of the drainages throughout the mountain range.

On the east side of the Big Belts, (due west of White Sulphur Springs), development continued on the Bigler-Snowdrift mine. Sampling indicated high grade gold values, however, adequate tonnage is yet to be proven.

In the Indian Creek drainage, the Seahawk arose from the ashes of B&B mining and resumed operations on the alluvial fan. It is still the only

placer mine in the state operating on well water. In the upper part of the creek below the ghost town of Hassel, John Wright, while exploring a placer deposit with an excavator, produced some values.

Exploration (Figure 6)

East of Lincoln on the 7-Up Pete Property, Phelps Dodge and Canyon Resources Corporation, announced discovery of a gold deposit of more than 700,000 ounces. Phelps Dodge having completed a drilling program of 267 holes in 1989, drilled 250 holes in 1990 for a total of 120,000 ft as well as 64 trenches. The ore is an open-pitabile epithermal vein deposit hosted in andesite. The companies are presently at the predevelopment/post exploration stage and are gathering baseline data necessary for permitting. The proposed mine is anticipated to be very similar in size to the C.R. Kendall operation near Lewistown.

North of there, Phelps Dodge drilled 75 holes in a rhyolite hosted target in McDonald Meadows.

South of Rogers Pass, the Korneck Brothers conducted a drilling program on the White Hope property. Noranda Exploration had a trenching project in Cadotte Creek while Asarco continued their long term presence at their Heddleston Project with some assessment drilling.

South of Helena, Sindor Resources and Westmont Gold, Inc. conducted a 7 hole drill program on the Big Indian mine. Intercepts ranged from 22 ft of .113 oz/ton gold to 10 ft of .441 oz/ton gold which is fairly typical of the skarn deposits in that area.

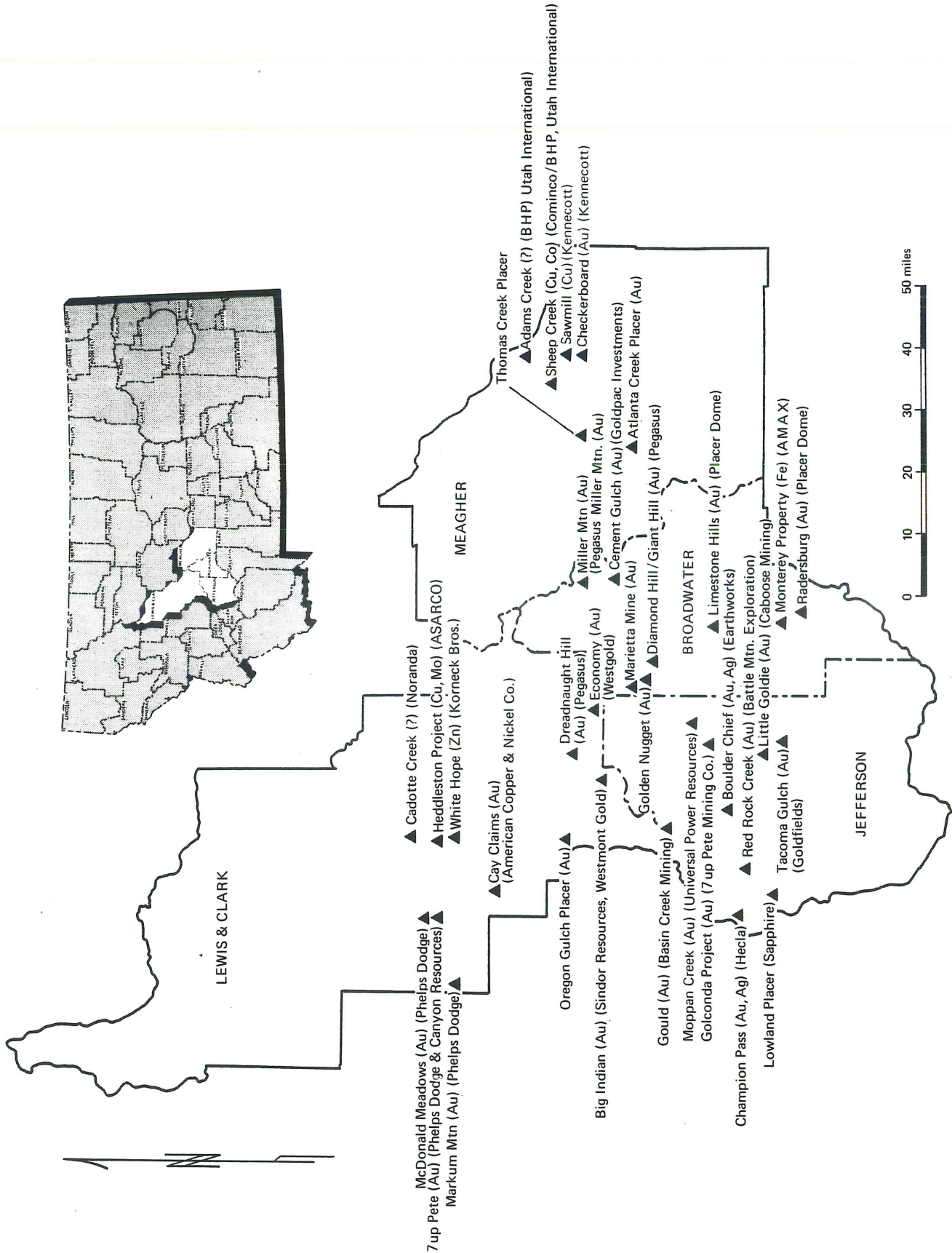


Figure 6. Exploration projects in the Helena region.

Cherhil Resources Limited conducted a trenching and bulk sampling program on placer deposits in Oregon Gulch west of Helena. Basin Creek Mining Co. dug three trenches and drilled 5 holes on a property near Gould Reservoir.

American Copper and Nickel Co. conducted a drilling program of the Cay claims in Seller and Olgivie Gulch. Phelps Dodge drilled properties on Marcum Mountain and Mineral Hill. Pegasus completed a 5-6 hole drill program on Dreadnaught Hill northwest of Helena. South of Helena, Westgold drilled 3 holes on their Economy Project in T.9N., R.2W.

In Jefferson County, Universal Power Resources conducted a drilling, trenching and bulk sampling program on the P.K Lodes in Moppen Creek.

Gold Fields conducted drilling programs in Tacoma Gulch and on a ridge south of the South Fork of Queens Gulch.

West of Boulder, Earthworks, Inc. completed a hand auger sampling program of Boulder Chief Meadows. Battle Mountain Exploration drilled 9 sites in Red Rock Creek. Hecla Mining Co. excavated eleven trenches in the Champion Pass/Lockhart Meadows area.

Caboose Mining shipped ore from the Little Goldie Lode and East Goldie properties in T.6N., R.4W section 13.

North of Boulder, 7-Up Pete Mining Co. drilled 3-4 holes on their Golconda project in lower Golconda Creek.

North of Townsend, Pegasus completed a 35 hole program on the Miller Mountain project following an agreement with Curator and FMC on the property. Goldpac Investments Limited drilled 2 holes on their Irish Gulch project in Cement Gulch. Roy Kinney and Dan Dinsdale tested placer ground in Atlanta Creek.

West of Townsend, Pegasus completed an extensive drilling program on the Diamond Hill and Giant Hill properties. The company is presently evaluating the results of the program and looking at the viability of a mining operation. Harry Anders opened adits at the Marietta mine in upper Indian Creek while John Plymale drilled one hole on the Golden Nugget claims in the West Fork of Indian Creek. Mike Power reopened an adit on the Silver Wave property in the same area. Exploratory drill holes were also completed on the Easton property north of Indian Creek.

Placer Dome drilled 10-12 holes in the Limestone Hills near Radersburg, in addition to 3 holes on a property south of Radersburg. AMAX Gold drilled and dropped the Monterey property.

In the White Sulphur Springs area, Fred Knoper completed testing of placer gravels in Thomas Creek. Cominco American Resources, with their partner BHP Utah International, continued drilling for stratabound massive sulfides on their Sheep Creek project. The companies completed 20 holes for a total of 35,000 ft of drilling with mixed results. The project has revealed some very complex geology. Kennecott is drilling for copper in Geis and Sawmill Creeks and has an additional project near Checkerboard exploring for gold targets in the Newland formation. In the Adams Creek area, BHP Utah International plans to drill 18 holes sometime in the near future.

North Central Region

Mining and Development (Figure 7)

In North Central Fergus County, the Kendall Venture ownership was consolidated to Canyon Resources and was renamed C.R. Kendall. During the same period of time the mine built a new pad capable of handling 9 million tons and nearly doubled their processing capacity from 600 gallons-per-minute. Production for 1990 is anticipated to be 26,000 ounces of gold and an equivalent amount of silver. Gold production is expected to increase to 45,000 ounces by 1991. Cash operating costs are estimated to range from \$215-\$220 per ounce of gold produced.

Reserves identified in two of the four available deposits (the Kendall and Muleshoe) are listed at 6.1 million tons grading 0.050 oz/ton gold. That value translates to 305,000 oz of gold in the rock.

South of Maiden in the Judith Mountains, Blue Range Mining Co. continued production and development of the Geis Mine. Producing off of two levels, development continued on the third level. The company continues to drive their decline towards the fourth level and are currently down about 200 ft. Employment had grown in the last year from 59 to nearly 100.

This summer the company amended their operating plan to include a cyanide circuit in the mill to accomodate ores from the Giltedge district.

Construction of the circuit was complete by Thanksgiving and production commenced shortly thereafter. The ore is from multiple sources in the district and while the circuit is mainly for the Giltedge district, the tails of the Geis ores are planned to be processed through the circuit to increase recovery.

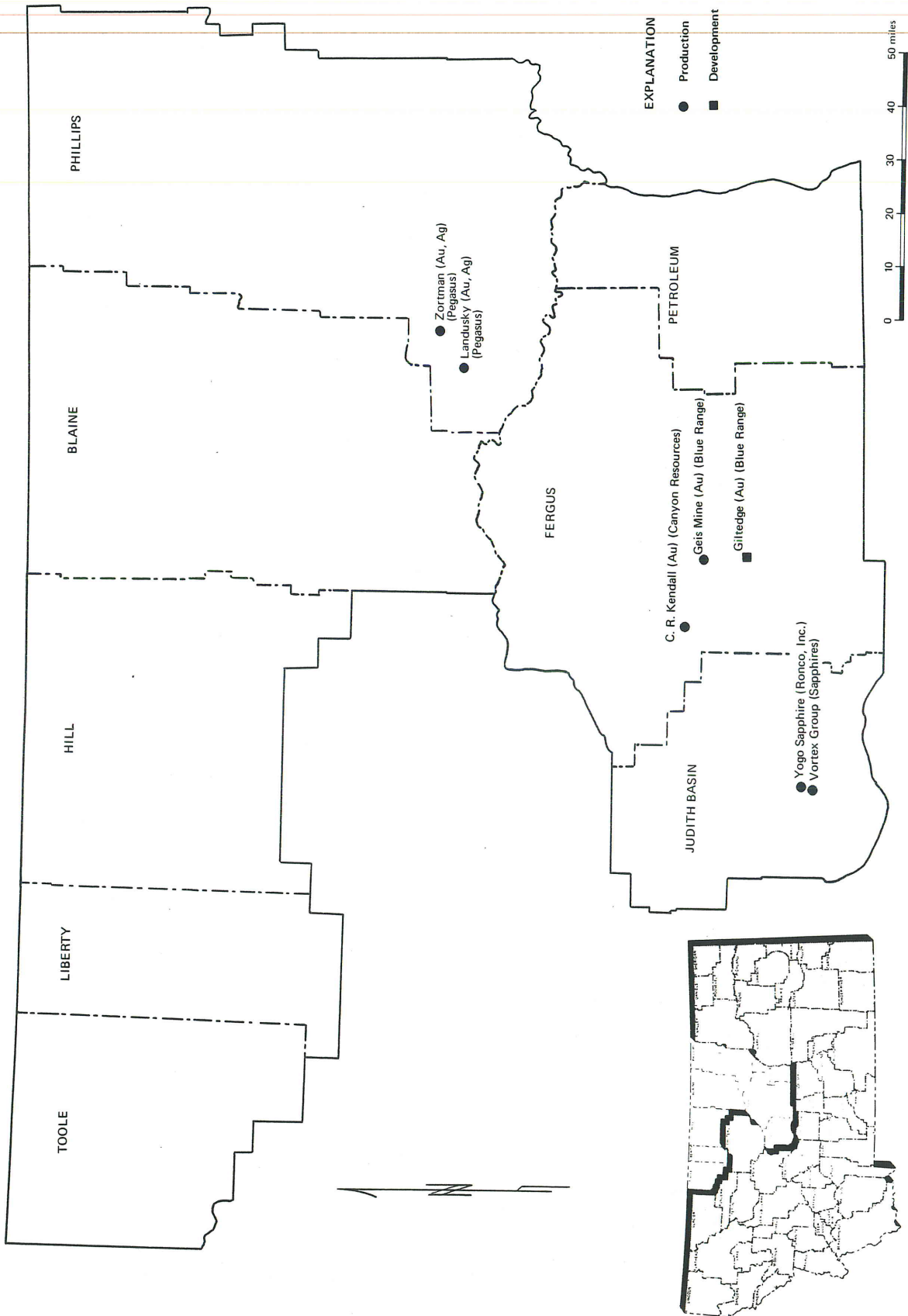


Figure 7. Mines and mineral development in the north central region.

Production of the two mine areas will total between 400 and 500 tpd. In keeping with Blue Range Mining's techniques, the tailings will be disposed in the abandoned Shoemaker gypsum mine as backfill. This process will not only eliminate the need for surface reclamation but will eliminate any subsidence of underground openings.

Pegasus continued gold production at their Zortman/Landusky operations in Phillips County. Having nearly filled their Mill Creek pad, the company submitted a proposal to construct their Sullivan Park pad which is projected to contain 50 million tons of ore when fully loaded. The project was approved and construction commenced but was appealed through the Bureau of Land Management. Construction is continuing and full use of the pad is anticipated by Spring of 1991. The Pegasus operation, normally the largest gold producer in the state, produces approximately 100,000 oz of gold per year and nearly twice that amount of silver. The operation employs about 240 with a payroll of \$7 million. Rock production is typically about 100,000 tpd: reserves are greater than 49.3 million tons grading 0.017 oz/ton gold.

Exploration (Figure 8)

Near Kendall, C. R. Kendall continued work on their Abbey project near the mine site. Cominco and C.R. Kendall conducted a drilling project in the North Mocassins.

In the Judith Mountains, Pathfinder Gold conducted a drilling project on AMAX's Linster Peak project and has since dropped the property. A group of individuals conducted a trenching program on targets on and near the Tailholt mine.

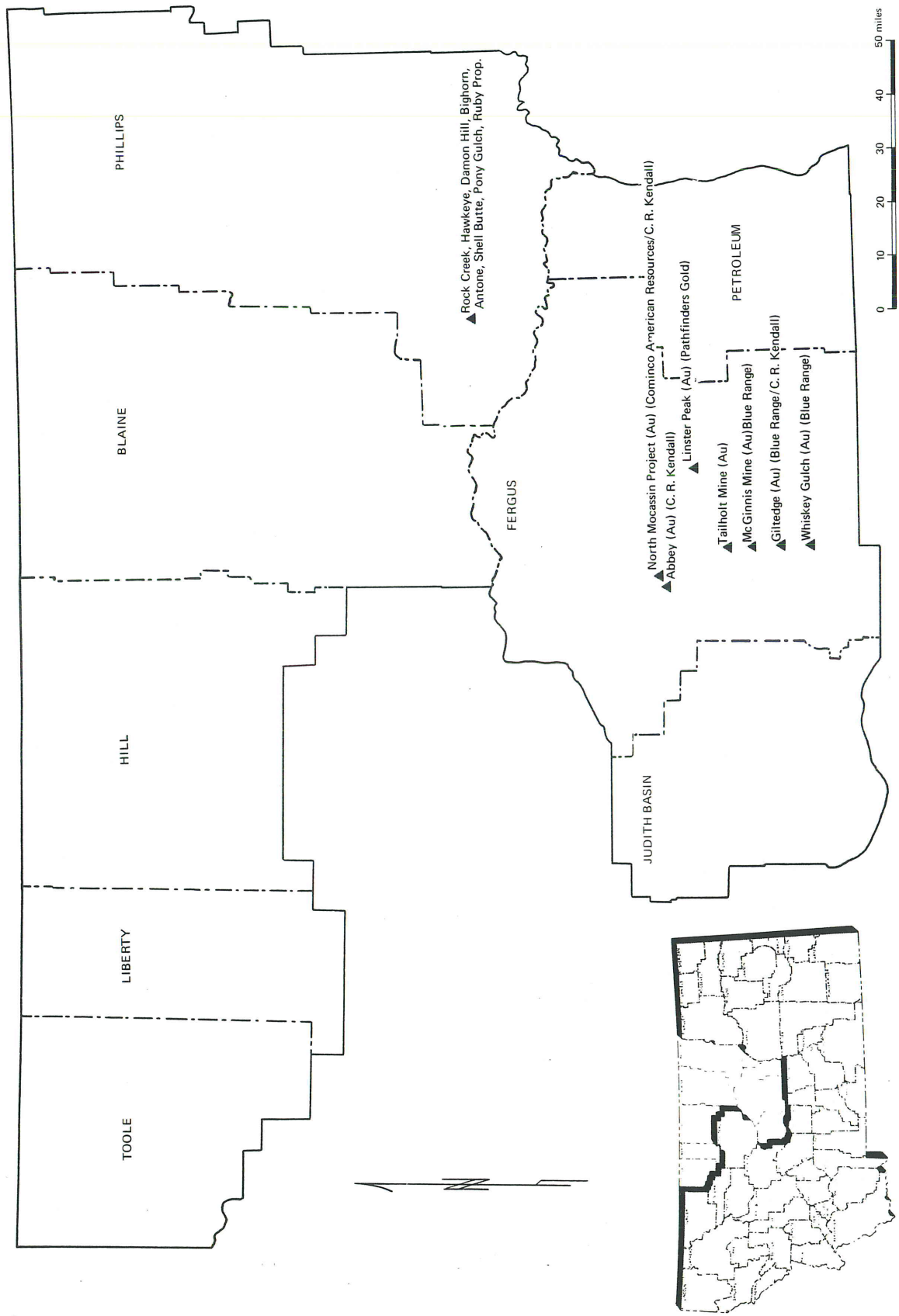


Figure 8. Exploration projects in the north-central region.

At Giltedge, Blue Range continued work on targets in the district. C.R. Kendall is acquiring a significant land package in the Judiths and conducted exploration on targets within the Giltedge district following agreements with Blue Range Mining. Blue Range drilled on properties in Whiskey Gulch and also drove a decline to the bottom of the McGinnis workings near the Spotted Horse property. The company plans to conduct a sampling program as well as some minor development work on some structures along the limestone and porphyry contact.

In Phillips County, Pegasus has followed an aggressive exploration program in the little Rockies. Drilling programs were conducted on the Rock Creek, Hawkeye, Damon Hill, Big Horn, Antone, Shell Butte, Pony Gulch, and Ruby properties.

Park Region

Mining and Development (Figure 9)

In the fall of 1989, American Copper and Nickel Co., in a joint venture with Homestake Mining Co., celebrated the grand opening of their new mine, Mineral Hill, at the town of Jardine. Now at the end of a full years production, a year full of the normal problems encountered during the maiden voyage of new mines, the project is well on its way to success.

This summer saw the planned enlargement of their tailings facilities as they continue being the only company in the state depositing dry tails. The mine modified emplacement of those tails from thick lifts to thin (6") lifts and have seen a significant decrease in their already low cyanide level in the effluent. Mine production costs have been significantly less than estimated as production and efficiency levels have achieved goals

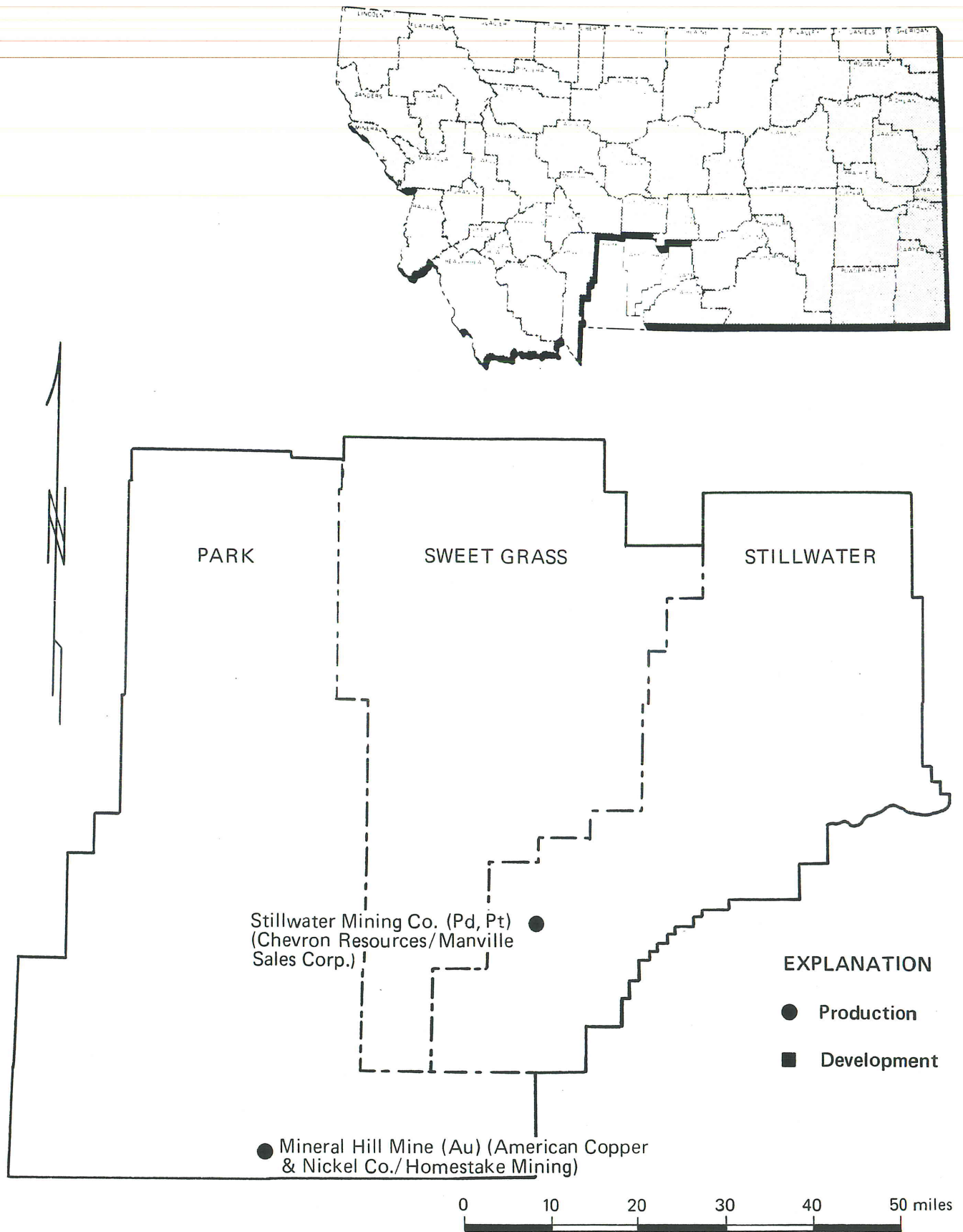


Figure 9. Mines and mineral developments in the Park region.

beyond expectations. The mill, although running smoothly, is the focus of the staff as the company anticipates forthcoming improvement and additional cost reduction.

The mine annually produces 42,000 oz. of gold, employs 92-102 with an average annual payroll of \$2.3 million.

Another exciting feature of this operation is the company's dedication to the local business environment. At the end of the first year of production, employment has remained at 70-80% local hire.

In southern Stillwater County, Stillwater Mining Co. (a joint venture of Manville Corp. and Chevron Resources) completed another year of exciting progress. Internally, Chevron Resources was restructured under P&M Coal, however, the Stillwater Mining Co. has remained intact.

On August 25, 1990 the company celebrated the grand opening of their mini-smelter in the Columbus industrial park. The present facility has the capacity of processing up to 30 tons of concentrates per day. The mine generates 7 to 10 tons per day, however, the company is showing interest in opening a second mine south of Big Timber which would provide additional concentrates for the facility.

A unique aspect of the facility is the company's ability to design a facility nearly waste free. In addition to the platinum, palladium, gold, rhodium, copper and nickel dore which is shipped to Belgium for refining, the SO₂ scrubber turns SO₂ into gypsum which can be sold as a co-product for a variety of uses. The only waste product is the slag which is returned to the mine tailings pond after being rerun through the mill. The

new smelter provides 20-25 local jobs to go along with 450-480 presently employed by the company.

The mine has continued to develop reserves and increase production as they follow their long range plans. Present operations produce 1,000 tons of ore per day from 30 stopes. Much of the major development work is done with a 13.5' ft-diameter tunnel Boring Machine. The company has proposed doubling production in the near future.

The life of the existing mine is estimated at 30 years. The operations generate annual payroll of \$13 million and contribute approximately \$33 million to the state's economy annually. The operation annually produces 40,000 oz. of platinum, 140,000 oz. of palladium, along with rhodium and gold credits.

The company is presently looking at the opportunity to develop a second mine called the East Boulder project. The operation is expected to employ 600 and produce 730,000 tons of ore annually. An environmental impact statement is expected to be completed by September 1991. Full production is not likely before 1995, depending on economics and environmental concerns.

Exploration (Figure 10)

In Southern Park County, Mineral Hill Mining Co. drilled 6-14 holes on their Crevasse project. Results are promising but not definitive at this time. North of there in the Emigrant Creek drainage, Kennecott Exploration (joint ventured with Fisher-Watt Gold) has a small drilling program to explore gold sulfide occurrences. This project was leased from Montana Mining and Reclamation which had programs in the area with Sandhurst Exploration.

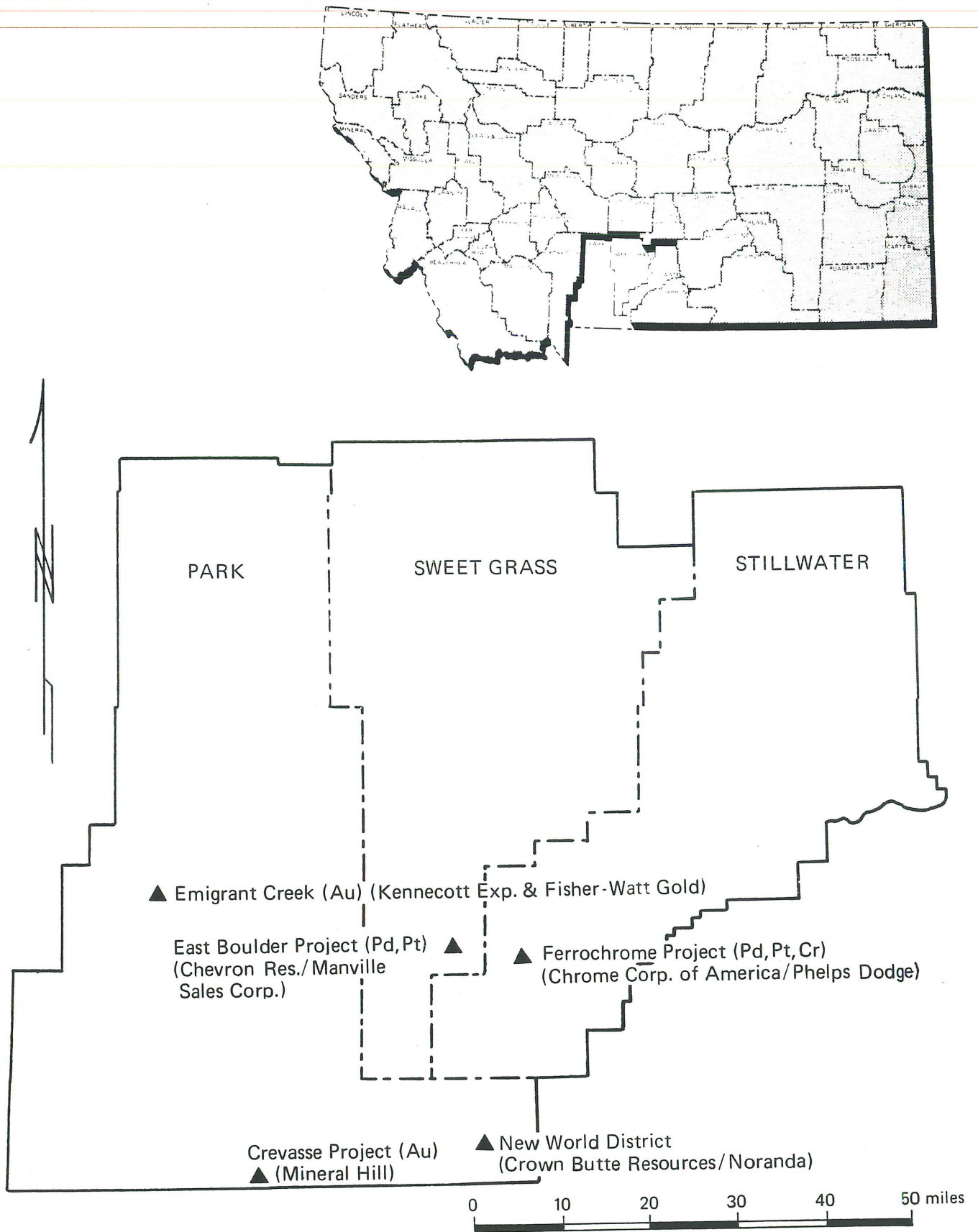


Figure 10. Exploration projects in the Park region.

North of Cooke City, Noranda Minerals Corp. and Crown Butte, Inc. continued exploration in the New World district. Drilling results of 1989 doubled the reserves to 4.64 million tons grading 0.17 oz/ton gold, 0.72 oz/ton silver, and 0.81% copper. The district contains 2 open pitable deposits and an underground reserve. Drilling activity in October, 1990, exceeds 168 holes summing 67,000 ft. The companies plan drilling programs into February. Results will be inconclusive until that time, however, the best guess of industry experts is that a 1.5 to 2.0 million ounce reserve would not be particularly surprising. Many targets are yet undrilled and many deposits are open ended.

The project proposal indicates a 1,000 to 1,500 tpd production rate for 2 open pits and an underground mine. Employment is anticipated to be near 150 with an annual payroll of \$3.5 million. The project is projected to be in permitting for the next two to three years followed by 1.5 years of development. Production is not likely before 1993 or 1994. Mine life is anticipated at 8 to 12 years.

In Stillwater County, Phelps Dodge Mining Co., in a joint venture with Chrome Corp. of America, explored platinum and chromite reserves in the Stillwater Complex. The agreement allows Phelps Dodge the opportunity to explore and develop platinum group metal reserves and/or continue Chrome Corp's Ferrochrome project. Activities included drilling at the Mountain View Mine and Benbow mine as well as Crescent Creek.

INDUSTRIAL MINERALS

Activity increased in the industrial mineral sector within the state. Strong demand for cement and limestone as well as a steady talc market provided incentive for capital investment and exploration.

Barite

Dillon Exploration had limited production of barite from their Coloma Barite mine (Fig. 1). Stockpiles on hand from last years precluded large amounts of production. The product from the property is used primarily as a high brightness additive during these times of low barite prices and decreasing demand.

Diamonds

The tale of an \$80,000 diamond being discovered in the Craig area has certainly gotten the rumor mill running. Following reports have indicated a previous unreported discovery of an 8 carat stone in the same area. No detailed information is presently available, nor have any stones been discovered in place in either a lode or placer deposit.

Garnets

Cominco American Resources has acquired a 60 percent interest in a garnet property in Alder Gulch (Fig. 6). Reserves are estimated at 16 million yd³ at 4.5% garnet (assuming 2,500 lbs. per yd³). The garnets are contained in the old dredge tails. Any mining operation will result in reclamation of the land disrupted by dredging operations near the turn of the century. Cominco's operations were largely qualitative. Bulk samples were processed to test recoverability of the garnet by various equipment and methods. Garnets recovered will be tested to see how they compare to market standards.

Further market studies are yet on the horizon, however, a potential does exist for the development of a new industry in the state.

Mining continued around the state for limestone with market demand on the sharp increase. EPA investigations on mine reclamation, as well as clean air standards have resulted in a growth industry.

South of East Helena, small scale production continued by Maronick Construction for lime needed for Asarcos' smelter (Fig. 5). Near Warren, Montana Limestone Company mined 300,000 tons for the Western and Holly Sugar Companies (Fig. 11). Various products are produced at the site to meet the multiple needs of sugar industry.

Near Townsend, Continental Lime, Inc. (a subsidiary of Graymount Mining) broke ground for a project which will double their capacity for producing burnt lime (Fig. 5). The present operation employs 40 with an annual payroll of \$400,000. The mine currently mines 500,000 tons of limestone per year.

The cement industry in Montana has shown only a modest market growth in state. However, coastal and Canadian markets have been strong with increases up to 41%. Both Ideal Cement in Trident (Fig. 3) and Ash Grove Cement (Fig. 5) at Montana City have produced at capacity for the last two years.

Development of a new property (Whiskey Gulch Mine) (Fig. 3) is taking place between Homestake and Pipestone passes, east of Butte. Natures Calcium Products Company is developing a marble roof pendant between two intrusives. The resultant crystalline calcite ore body has very high purity and substantial tonnage. The company is developing reserves and is open to joint venture opportunities.

purity and substantial tonnage. The company is developing reserves and is open to joint venture opportunities.

Near Dillon, Pete Lien & Sons (Fig. 4) is drilling marble on their White Lime project.

Phosphate

The state has two phosphate operations, both of which have operated continuously for a number of years. Rhone-Poulanc's Stauffer Silver Bow plant (Fig. 3) operated at capacity during 1990 with ore mined at the Wooley Valley deposit in southern Idaho. In 1989, the company's leases south of Butte were dropped. Reclamation has continued on the properties during 1990 with completion expected in the near future.

Cominco American Resources continued production at their Warm Springs Creek operation (Fig. 1). As the last remaining vestige of underground phosphate mines in the nation, Cominco produced phosphate rock to ship to their Trail British Columbia smelter in Canada. At that facility, the phosphate rock is combined with the sulfuric acid which is produced as a by-product at the smelter, to form phosphoric acid and other phosphate based products. Production at the mine is controlled largely by the needs of the facilities in Trail.

Sapphires

Montana's sapphire industry has remained somewhat static for the past two years. The majority of production is confined to hobby and recreation activities while commercial production for sapphire concentrates exist on a number of properties.

West of Philipsburg, Gem Mountain (Fig. 1) produced both on a recreational scale for the tourist industry as well as a bulk concentrate sales. The company also produces cut stones for sale on a small scale. Adjacent to that operation, Joe Higgens with the Skalkaho Grazing Association Sapphire Mine (Fig. 1) has completed test production of gravels that were stockpiled on the property in the seventies. The company has spent the year constructing a floating wash plant preparing for production in 1991.

Production along Lowland Creek (Fig. 4), north of Butte, was largely subdued. Operations were confined to exploration with little development activities seen.

Near Helena (Fig. 5), recreational activities continued at French Bar and Spokane Bar. Lovestone continued production only on a commercial 'run' basis. Eldorado Bar had two operations. One is strictly recreational with all work except reclamation done by hand. The other activities on the bar are controlled by Sam Speerstra who is a commercially processing gravels and producing sapphire concentrates.

In the Utica area, RONCOR, Inc. and Vortex Mining continue production on the Yogo dike (Fig. 7). Roncor's production is confined to surface exposure of the weathered dike while Vortex has sunk a shaft and is mining a split off of the main dike system.

Talc

Legislative changes in the tax rate that were passed in the last legislature, plus slowly increasing prices have resulted in a number of new

investments by the companies. The market demands are remaining steady at approximately 1.2 million tons per year.

Cyprus Industrial Minerals Company has initiated a new management system which has increased productivity and decreased production costs at all operations.

Ore discovered at the Cyprus' Yellowstone Mine (Fig. 3) in 1989, has proven to have dimensions of 300' wide x 150' thick x an unknown length. Quality is increasing with depth. Reclamation has been initiated at the North Main pit.

Cyprus has completed permitting the MP project (located east of Dillon) (Fig. 4) but has no plans for immediate development. Exploration by the company has been limited this year to furthering reserves at the Antler Chlorite Mine (Fig. 3).

Montana Talc has shown major improvement over the last year. At the close of 1989, the Johnny Gulch operation (Fig. 3) was for sale without substantial reserves, and not profitable. Pegasus took an option on the property and started drilling. Present reserves stand at 3 million tons of crude ore with a recoverability factor of 67% in the Johnny Gulch area. Additional reserves totalling 600,000 tons exist at the Mineral King II and Banning Jones (Fig. 3) properties southeast of Dillon which have both been permitted. Neither is scheduled for production in the near future.

Following discovery of additional reserves, Pegasus dropped the property and Montana Talc started working on their own problems. The company

rearranged and replaced many of their professional and management staff and replaced the 35 ton trucks in the pit with 65 ton trucks and modified their mine plan. Starting the second quarter of 1990, Montana Talc has been a profitable operation.

Conflicts between Cyprus and Montana Talc over their common high wall have been resolved and the agreement has resulted in cost savings for both companies. Cooperative road maintenance agreements on common use roads have also reduced costs.

Pfizer, Inc. (Fig. 3) invested \$8 million in Montana with a fully-automated beneficiation plant that utilizes wet grinding and flotation technology. Presently in a testing and debugging state, the company expects to have the grand opening after the first of the year and full production commencing at about the same time. The company continued production this year at 140,000 tons of finished product and plans to produce an additional 80,000 tons per year with the new facility. By being able to utilize lower grade ores it will effectively double the life of the operation to 32 years. The operation is anticipated to provide 20 new jobs by the end of the decade.

Current operations continued smoothly with costs having leveled out in the last few years. The new plant is expected to process some of the waste from current mining operations which will result in a reduced cost product. Pfizer also constructed an automated packaging facility for their existing mill as well as undertaking heavy mining equipment modernization program.

Field work was confined to delineating further reserves at the Smith mine which was the ore source for Pfizers original operation. Operations ceased

due to low grades many years ago. Other reserve work was done on the Regal property which is located east of Dillon.

Exploration on raw talc prospects was minimal as companies concentrated finances on capital investments and known reserves.

Southern talc purchased the inactive Willow Creek mine (Fig. 4) from Conagra early this spring. Plans had been formulated to explore additional reserves with seismic techniques while shipping crude ore to their plant in Georgia. Currently the company is in a holding position with an unknown future.

Vermiculite

The vermiculite industry represents both a level of discouragement and encouragement. After 30 years of production W.R. Grace & Company announced in May they would close their vermiculite mine (Fig. 1) near Libby. Citing a decreasing demand for their product, the company has chosen to abandon their operations. The resultant will be a loss of 80 jobs for Lincoln County as well as \$900,000/yr. in taxes and a \$2.5 million payroll.

To offset that discouraging note, Stansbury is continuing with its plans to open a vermiculite mine near Hamilton (Fig. 1). The company continued development of an EIS for the project and is enthusiastically pursuing their development objectives.

East of Dillon, White Resources and Mineral Products, Inc. have been developing the Monolite mine (Fig. 3) on Blacktail Ridge. Present operations have identified 2 million tons of reserves certified free of

asbestiform fibers and are testing equipment as well as the deposit. The present production rate is 2.5 tons per hour with a initial target production rate of 50 tpd (finished product). The companies hope to eventually permit and construct facilities capable of processing 300 tpd (finished product).

COAL DEVELOPMENT (Figure 11)

Coal is still the dominant mineral in the state with the 1989 (calendar year) gross value at \$365,146,698. Production is from 9 mines (Fig. 11) based on 1989 figures.

<u>COMPANY</u>	<u>MINE NAME</u>	<u>TONS PRODUCED</u>
Decker Coal	East Decker	3,582,885
Decker Coal	West Decker	6,495,027
Western Energy	Rosebud	13,677,238
Peabody Coal	Big Sky	3,715,325
Westmoreland Resources	Absaloka	4,011,156
NERCO, Inc.	Spring Creek	5,979,405
Meridian Minerals	P.M.	15,760
Knife River Coal	Savage	295,089
Blaine Warburton	Black Jack II	96

Production in 1990 ceased at the Black Jack II Mine as administration costs and federal/state obligations exceeded the profitability of the operation. Markets remained flat as has the price which has been lurking in the basement in the last few years.

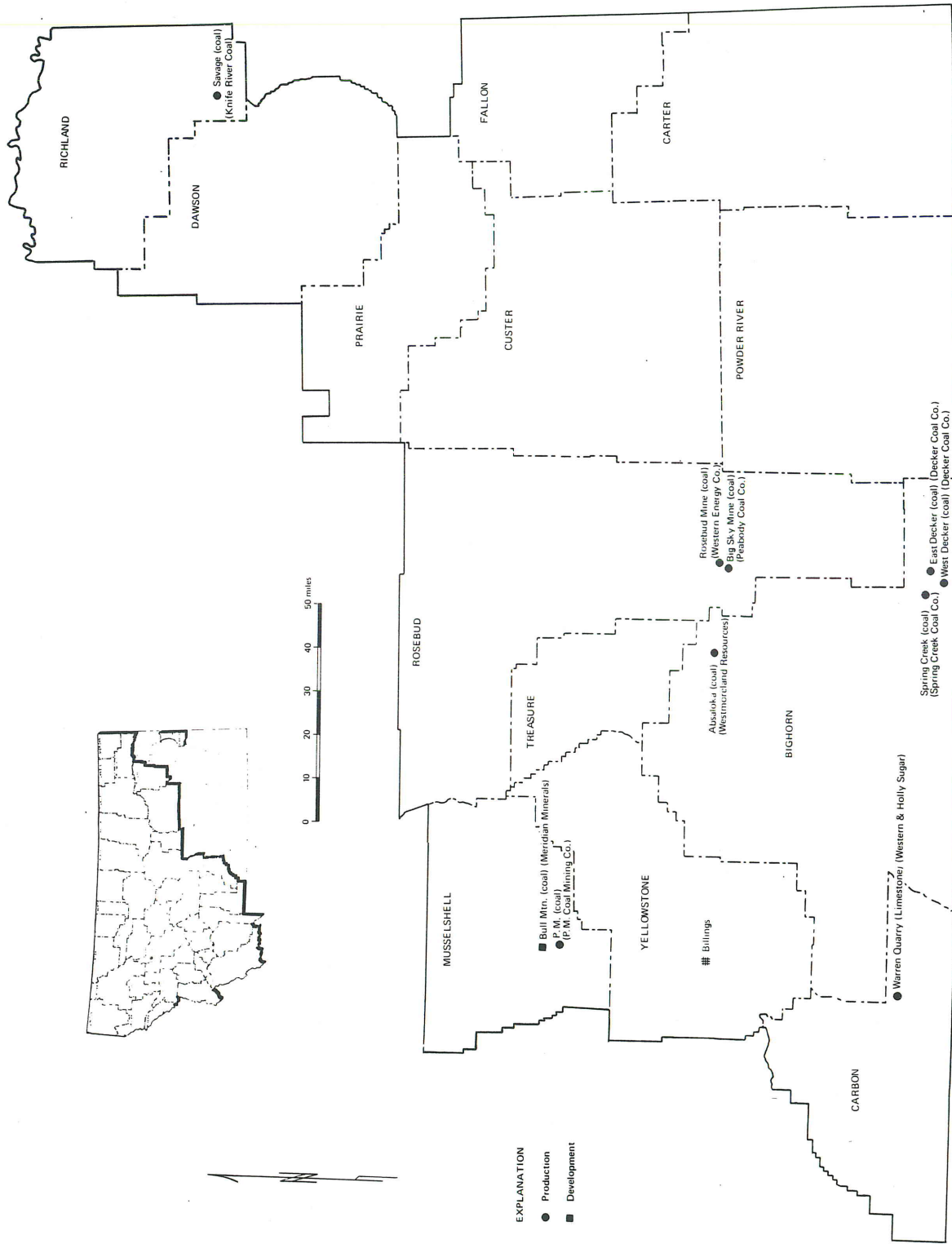


Figure 11. Coal mines in the southeastern region.

The clean air bill, passed this year, is not expected to have any significant effect on Montana coal production. The level specified in the bill is 1.2 lbs sulphur/million BTU's. Other than the Spring Creek deposit, Montana coal ranges from 1.5 - 1.8 lbs sulphur/million BTU's. A drive is also being organized to stop the legislated reduction of the coal severance tax which will reduce the total state taxes to 20% from 25.4%.

For comparison, Wyoming coal taxes total 15% - 17% on coal below the compliance rating for sulphur, which occurs in thicker beds with lower stripping ratios. Typical coal bids (producers to consumers) in Wyoming are \$3.80 to \$4.00 per ton. Montana's companies operate in the \$6.00 to \$8.00/ton range to compensate for taxes and deposit handicaps.

Planned capital investments in the State include a \$30 million coal drying plant at the Rosebud Mine which will hopefully increase the marketability of Montana coal. Meridian Minerals is planning an underground coal mine in the Bull Mountains north of Billings. The company has completed a test burn on a bulk sample and currently working on permits.

OIL AND GAS

The oil and gas industry finishes 1990 with yet another depressing year. Production in the State continued to decline at a rate of 9% while the national average is 4% (Petroleum Association). Production incentives for new wells ended (as directed by the legislature) when oil prices exceeded \$25 per barrel while incentives on stripper wells disappeared in the special legislative session.

Activity in the State has shown a slight increase with the rig count increasing from 7 to 10. Drilling permits increased from 280 in 1989 to 370 by October of 1990. Completed wells show an increasing trend as the total for 1989 was 128 and in the nine months of 1990, 111 have been completed. In the same 9 months of 1989, only 72 were completed.

The majority of activity has centered around the drilling of shallow gas wells in northern Phillips County (Petroleum Association) and in the Sweetgrass Hills. Most of that activity is infill drilling in known fields and minimal wildcat activity (searching for new gas fields).

In oil well activity, a 400 barrel per day wildcat was drilled in Daniel's County by a new company in the state. The lease was originally reported to have a very low potential for discovery let alone production. So now industry specialists speculate that the new discovery only represents an isolated small volume field. Only the future holds the answer to this puzzle.

The State continues to be known by the oil companies as "the first state you leave and the last you return to". The annual report from the IPAA titled "Petroleum and Natural Gas Industry in your State" indicated the reluctance of companies to operate in Montana may originate partially in the State's tax structure. The following table from data in that publication shows Montana to be less than competitive with other states.

1989 Gross Value of Oil & Gas Production and Taxes by State

<u>State</u>	<u>Gross value of Oil & Gas</u>	<u>Taxes paid</u>	<u>% Tax Rate</u>
Montana	\$433 million	56 million	12.9%
Kansas	\$1.8 billion	171 million	9.5%
Wyoming	\$2.5 billion	152 million	6.1%
North Dakota	\$682 million	59 million	8.6%

Landmen along the North Dakota border indicate leases on the Montana side average \$6/acre while averaging \$400/acre on the North Dakota side.