should be in production by early 1995. The gold production at the Cripple Creek Mine is scheduled to be between 4.6 to 5.6 t/a (150,000 to 180,000 oz/year).

In 1993, Phelps Dodge Mining Co. completed more than $240,000 (195,000 ft) of new core drilling at Cripple Creek district, mostly on the Cripple Creek deposit. Exploration plans for 1994 include 13,700 ft (45,000 ft) of rotary and core drilling on exploration target areas.

Base metals

The Black Cloud Mine near Leadville is still the state's sole significant base metal producer. The mine has a capacity of 816,000 tons/year and produces two underground shafts. Staffing at the mine will remain at 135 to 150 employees as long as metal prices remain at current levels.

The ore body is a complex massive sulfide replacement deposit in the Mississippi Valley Limestone. The ore grade is 7% to 9% lead, 3% to 5% zinc, 70 g/t (2.2 oz/t) silver and 2.8 g/t (0.08 oz/t) gold.

Construction materials

Industrial minerals

The sand, gravel and aggregate industries enjoyed another good production year. In 1993, about 43 Mt (47 million t) of sand, gravel and aggregate were produced at the state, valued at about $130 million. That is up about 15% from the 37 Mt (41 million t) of production in 1992. The increase is due to the substantial expansions of the new Denver International Airport, new home and commercial construction, and highway maintenance projects.

Production in 1994 is projected to remain at these same high levels. However, some slowdown is expected for 1995.

The Colorado Yule Marble Co. is mining white marble from the historic Yule Marble Quarry near Marble. In 1993, the company produced 1415 m (50,000 cu ft) of salable marble.

About two-thirds of the production went overseas, primarily to Italy and Japan, where it is fabricated into consumer products. In 1994, a new chain saw and other development work will allow a production increase to 2265 m (80,000 cu ft).

Granite production came from the Eagle Mine near the town of Eagle in Eagle County. Production there was 305 t (337,090 lb) up 20% from 254 t (280,000 lb) produced in 1992. About 60% of the wallboard produced at the plant goes to the Colorado construction industry. In 1994, production is projected to be 360 t (400,000 lb).

The White River Natickitite Minerals Ltd. Liability Co. substantially increased production of NaHCO₃ in lieu of mined silver and gold.

The company spent $4 million on plant improvements to enter the food grade bicarbonate market.

Exploration

In 1993, American Copper and Nickel Co. conducted a stream sediment sampling reconnaissance program in various parts of the state for Potosi-vein-hosted, massive sulfide, base metal deposits.

Challenger Gold continued exploration programs on the Baca Land Grant property along the foothills of the Sangre de Cristo Mountains in Saguache County.

Mapping and sampling as well as 19.30 m (600 ft) of reverse circulation drill holes were completed on the property. The geology and alteration found in the drilling program is similar to that found at the San Lucas Gold Mine 55 km (34 miles) to the south.

Hendrick's Minerals of Canada Ltd., a new public company, consolidated several properties in the Cripple Creek district, Boulder County. The company completed 107 m (350 ft) of new bulk samples of the Cross Mountain Mine and have drilled several large holes from underground stations. In September, Hendrick's Minerals conducted an aeromagnetic and scientific survey over the district. Several 365 to 915 m (1000 to 3000 ft) core holes are planned for 1994 on targets developed from the geomagnetic survey.

St. Mary Minerals Inc. conducted a drilling program on a gold placer prospect in the Tarryall district of Park County. The gold is thought to have been derived from a Precambrian metasedimentary sequence. St. Mary also completed mapping and sampling at a sandstone-hosted copper deposit in the Wingate Sandstone at its recently acquired Cashin Mine property in Montrose County. A drilling program is planned for the summer of 1994.

The Powderhorn district of Gunnison County is estimated to contain about 450 Mt (500 million t) of uranium ore.

Most of the titanium resource is in the Robertson Mountain deposit.

TECK RESOURCES has been evaluating the Powderhorn titanium resources since 1980. In 1993, Teck continued its economic evaluation.

Colorado Diamond Co., a subsidiary of Redstone Red Lakes Mines Ltd. of Toronto, announced encouraging results from a bulk sampling program on its Kelso Lake kimberlite properties in the State Line district of Lander County. About 1.8 t (2000 st) of bulk samples taken over the past two years have yielded more than 600 diamonds of gem and industrial quality. The recovered diamonds weigh more than 60 carats and range in weight from 0.1 to 6.2 carats. The 6.2 carat gem quality diamond is the largest diamond yet recovered from the State Line district. Continued bulk sampling is planned for 1994.

Churchill Resources of Vancouver acquired three kimberlite properties within the State Line district: the George Creek, Sand Creek and Powell Creek prospects. About 89,000 diamonds weighing 1817 carats were recovered from the George Creek prospect in the mid-1980s. Additional bulk sampling is planned for 1994.

Royalstar Resources Ltd. reached an agreement with Dia-Met Minerals to evaluate the diamond potential of the Sheep Creek kimberlites in the State Line district. Current operations include a 45-t (50-t) bulk surface sample and a 2.7-t (3000-st) underground bulk sample from a newly driven test adit.

Idaho

V.S. Gjiljerman and E.H. Bennett, Idaho Geological Survey

Though environmental issues overshadowed actual mining and exploration developments in Idaho in 1993, there were several projects in the state. Lower commodity prices, particularly in the first half of the year, plus legislative uncertainty and foreign opportunities, fueled a decline in the number of exploration projects (Fig. 1). The amount of reconnaissance work decreased as well, except for work in the Idaho copperbelt near Salmon.

Hecla Mining began building its Citizen Creek Mine in Custer County. The open pit mine has reserves suffi-
did some exploratory drilling on its property between Idaho County and the Blackbird Mine. Hecla also drilled a 35-hole program, which included multiple intercepts in the Humbug Formation (17 million ft) of ore-grade gold. The Blackbird Mine is owned by Hecla Mining Company, a subsidiary of Hecla Minerals, and is located in Idaho County. The company has spent over $10 million on the project, which is expected to be completed in late 1994.

Boise Basin and southeast Idaho

In the Boise Basin, several companies have focused on the exploration of gold deposits. Black Pine Gold, a subsidiary of Black Pine Minerals, has continued its exploration efforts in the Boise Basin. The company has drilled multiple holes in the Boise Basin, with the primary focus on the Black Pine deposit. Black Pine Gold is currently spending over $15 million on exploration, with plans to expand its activities in the Boise Basin.

Coeur d'Alene district and northern Idaho

The Coeur d'Alene district has experienced a significant amount of exploration activity. Several companies, including Newmont Exploration, have focused on the exploration of gold deposits in the district. Newmont has drilled multiple holes in the district, with the primary focus on the exploration of gold-grade mineralization. The district has experienced a significant amount of exploration activity, with the potential for new discoveries.

In northern Idaho, the economic activity is expected to continue in the near future. The Idaho County area has experienced a significant amount of exploration activity, with the potential for new discoveries.

Southwest Idaho

In southwest Idaho, the exploration activity has continued to be focused on the exploration of gold deposits. The area has experienced a significant amount of exploration activity, with the potential for new discoveries.

Overall, the exploration activity in Idaho has continued to be focused on the exploration of gold deposits. The potential for new discoveries remains high, with the economic activity expected to continue in the near future.
STATE ACTIVITIES 1993

**Industrial minerals**

Idaho's only diamond prospect is located west and north of McCall. Golconda Gold, a Canadian company, drilled about 20 shallow test holes for diamonds in the Bear Basin and Ecks Flats areas, 6.5 km (4 miles) north of McCall on land owned by Boise Cascade. In 1993, Golconda reported the discovery of indicator minerals for kimberlite and lamproitic pipes in bulk samples from trenches. Idaho's only rumored diamond find was three diamonds found in the Rocky Flat placer west of McCall in the 1920s.

More common in industrial minerals had a tough year due to a sharp drop in prices for phosphate fertilizer during the first part of 1993. Idaho's phosphate mines continued full production except for NuWest's Conda Partnership Mountain Fuels Mine, which is exhausted. NuWest signed a seven-year agreement with Rhone-Poulenc to supply NuWest's fertilizer plant at Conda by increasing production at Rhone-Poulenc's Rasmussen Ridge Mine from 544 kta to 1.8 Mta (600,000 to 2 million tpy).

Demand for construction-related materials continued strong throughout the year. The value of industrial minerals outpaced metals.

**Illinois**


Industrial minerals production and value in Illinois remained relatively high in 1993, but showed a slight decrease from 1992. Exploration continued to be at a low level, with most activity restricted to developing new reserves adjacent to existing operations. Construction aggregates, including crushed stone (limestone and dolomite), sand, gravel, accounted for 61% of the total nonfuel mineral value of $732 million.

Construction aggregate companies in Illinois had a good but spotty production year, with an overall gain of 5%. They produced about 1.0 Mt (1.1 million t). A few operations along the Mississippi River were flooded. Most were not, however, and they experienced increased demand for material to aid in flood control and to repair flood damage to the area's infrastructure. However, producers that ship material by barge were adversely affected because the Mississippi was closed to barge traffic for up to six weeks.

Aggregate exploration activity was relatively low. Several producers in the greater Chicago area were looking for reserves that could be mined underground rather than moving over greater distances from the city. Also, aggregate producers in south central Illinois increased their exploration activities because reserves in relatively small deposits of Pennsylvanian-age limestone are being depleted. Sand and gravel serves are also difficult to replace in part of the state.

Commercial deposits of high-calcium limestone continue to be an exploration target to supply the chemical, glass and agricultural industries. Union Pacific Minerals completed exploration work on its high-calcium limestone prospect in Alexander County.

Exploration drilling continued for fluorite, lead-zinc and rare earths, but at an even lower rate than in previous years. The primary target in Hardin County is fluorite, while lead-zinc and rare earths are secondary.

Lead-zinc mineralization is the primary target in Carroll County, where galena and sphalerite were mined for more than 100 years in the northwest Illinois lead-zinc mining district. Illinois has not had an active metal mine since 1973. Small amounts of lead, zinc, copper and silver were recovered in 1993 as byproducts of fluorite production.

Ozark-Mahoning, the leading US producer of fluorite, continued operating its three mines and one mill in Hardin County. However, one of its mines, nearly depleted and may be closed soon. As in 1992, only two rigs were needed for exploration drilling. Most of that...