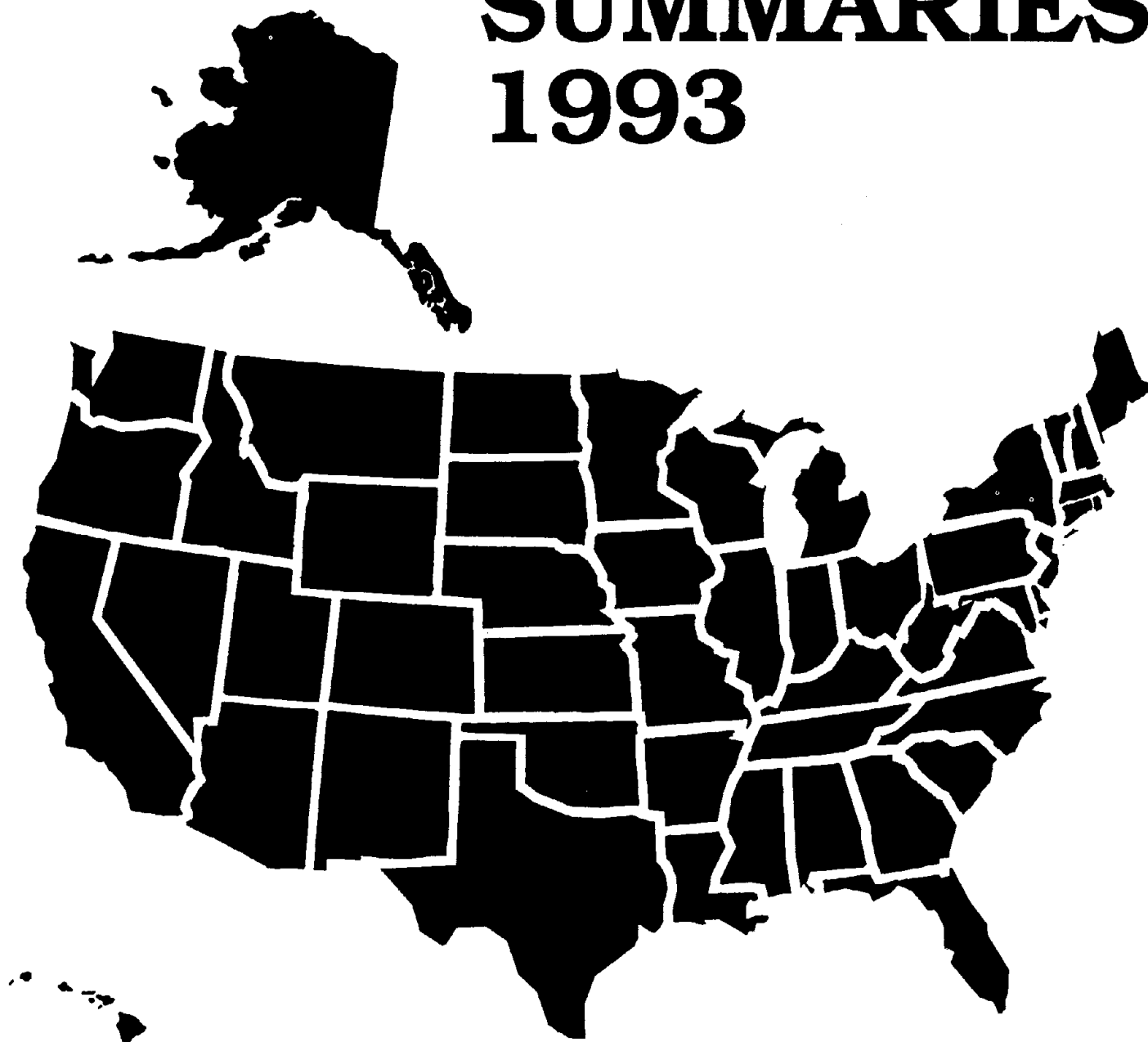




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STATE MINERAL SUMMARIES 1993



UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

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STATE MINERAL SUMMARIES 1993

Bureau of Mines

The STATE MINERAL SUMMARIES publication provides estimated data and summaries of mineral activities at the State level for 1992. Most of the estimates are based on nine months data. Individual State summaries are published separately as State Mineral Industry Surveys and copies can be obtained from the appropriate State mineral officer or Bureau field office specified in each State summary.

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STATE RANKING AND PERCENT OF U.S. TOTAL
1992 Estimated Data

State	Value (thousands)	Rank	Percent of U.S. total
Alabama	\$603,648	17	1.90
Alaska	530,877	21	1.67
Arizona	3,121,733	1	9.84
Arkansas	286,950	33	0.90
California	2,466,582	2	7.78
Colorado	388,509	26	1.23
Connecticut	94,922	44	0.30
Delaware 1/	16,301	49	0.05
Florida	1,424,617	5	4.49
Georgia	1,540,545	4	4.86
Hawaii 1/	148,636	40	0.47
Idaho	338,614	30	1.07
Illinois	677,419	16	2.14
Indiana	465,212	23	1.47
Iowa	387,653	27	1.22
Kansas	368,886	28	1.16
Kentucky	412,475	25	1.30
Louisiana	272,232	35	0.86
Maine	52,848	46	0.17
Maryland	323,321	31	1.02
Massachusetts	156,930	39	0.49
Michigan	1,424,219	6	4.49
Minnesota	1,365,883	8	4.31
Mississippi	109,460	43	0.35
Missouri	924,610	11	2.92
Montana	603,273	18	1.90
Nebraska	111,231	42	0.35
Nevada	2,431,173	3	7.67
New Hampshire 1/	42,367	47	0.13
New Jersey	213,663	37	0.67
New Mexico	866,110	12	2.73
New York	715,026	14	2.25
North Carolina	572,997	20	1.81
North Dakota	17,730	48	0.06
Ohio	679,869	15	2.14
Oklahoma	284,263	34	0.90
Oregon	199,451	38	0.63
Pennsylvania	862,628	13	2.72
Rhode Island 1/	14,501	50	0.05
South Carolina	347,282	29	1.10
South Dakota	298,097	32	0.94
Tennessee	579,854	19	1.83
Texas	1,380,022	7	4.35
Utah	1,344,374	9	4.24
Vermont	67,932	45	0.21
Virginia	415,962	24	1.31
Washington	478,277	22	1.51
West Virginia	123,743	41	0.39
Wisconsin	218,146	36	0.69
Wyoming	934,955	10	2.95
Undistributed	7,737	—	0.02
TOTAL 2/	31,714,000	XX	100.00

XX Not applicable.

1/ Partial total, excludes values that must be concealed to avoid disclosing company proprietary data.

Concealed values Undistributed" figure.

2/ Rounded.

ALABAMA

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Annual, Estimated

THE MINERAL INDUSTRY OF ALABAMA IN 1992

In 1992, Alabama's nonfuel mineral industry mined and processed an estimated \$604 million of mineral commodities according to statistics released by the Bureau of Mines. This was an increase of \$64 million over the value reported by the State's 300+ mineral producers in 1991. Values increased for cement, clay, sand and gravel, and stone, the mineral commodities used in construction. Value declined for bauxite, salt, and talc; however, the decline for the three commodities was less than \$3 million below the values reported by the producers in 1991. The State ranked 17th nationally in total mineral production, 11th in industrial mineral output, and 24th in metal production.

Employment. According to the U.S. Mine Safety and Health Administration, the State's metals and nonmetals mining industry sector employed 3,290 workers in 1992. The coal industry employed 5,188 workers; 3,690 were associated with underground coal mining and 1,498 were employed by surface mines. When this survey was prepared, parallel data were not available for the petroleum and natural gas sector.

Regulatory. Early in the year, Interstate Lead Co., Leeds, declared bankruptcy and ceased operations. Five thousand tons of lead slag and an unreported amount of lead sludge and battery casings remained on site, and cleanup could be "one of the most complicated and costly ever undertaken by the EPA in the Southeast." Officials have estimated that a long-term plant cleanup could cost as much as \$100 million. The plant and ground underlying the plant site will have to be removed to a hazardous waste landfill.

Legislation and Government Programs. The only legislation passed by the 1992 legislature that impacted the mineral industry affected the petroleum sector. Act No. 92-658 replaced the State's unconstitutional hazardous waste disposal fee schedule with a sliding scale tax of \$21 to \$113 a ton, based on toxicity levels.

The University of Alabama Metal Casting Technology Center was designated one of two National Metal Casting Research Institutes by the U.S. Department of Energy. The center will use the \$919,000 of a cooperative agreement contract to conduct research with practical applications in the U.S. foundry industry.

During the year, the Geological Survey of Alabama, Tuscaloosa, published county mineral resource reports on Lowndes and Marshall Counties. Resource studies were ongoing on two other counties. Also published were reports on the silica resources of the Alabama Piedmont, zeolite resources in the Tallahatta Formation, mineral resources of the Valley and Ridge province, and a guide for landowners concerning mineral rights.

Staff members of the U.S. Bureau of Mines field center in Denver, CO, conducted onsite reviews on three Federal or State projects in Alabama. The field investigations were to insure that mineral resources or

NONFUEL MINERAL PRODUCTION IN ALABAMA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	262	\$15,462	*238	*\$14,042	348	\$20,532
Portland do.	3,585	165,344	*3,937	*181,102	4,474	205,804
Clays ² metric tons	2,049,776	27,747	2,124,380	22,103	2,023,012	27,203
Gem stones	NA	W	NA	W	NA	622
Lime thousand short tons	1,526	70,816	1,510	75,506	1,665	83,268
Sand and gravel:						
Construction do.	14,103	50,243	*12,700	*45,700	12,600	46,200
Industrial do.	878	9,075	531	6,133	554	6,521
Stone:						
Crushed and broken ³ do.	*36,100	*202,400	27,145	161,843	29,000	178,100
Dimension short tons	W	W	9,552	2,449	W	W
Combined value of bauxite, clays (bentonite, kaolin), salt, stone (crushed dolomite and granite [1991], crushed granite [1990], unidentified [1992]), talc and pyrophyllite, and values indicated by symbol W						
	XX	19,493	XX	31,037	XX	35,398
Total	XX	560,580	XX	539,915	XX	603,648

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" data.

3/Excludes certain stones; kind and value included with "Combined value" data.

existing mining and/or processing facilities would not be negatively impacted by the proposed projects.

Fuels. In fiscal year 1992 (October 1991 - September 1992), Alabama's coal producers mined 25.6 million tons of coal. Underground mines accounted for 15.5 million tons and surface operations produced 10.1 million tons.

Early in the year, Drummond Coal Co. began work on a 3.6 million-metric ton-per-year underground longwall coal mine that will underlie parts of Tuscaloosa, Jefferson, and Walker Counties. Limited production is scheduled for late 1993. Reserves, in two coalbeds, are estimated at 204 million metric tons.

In March, the discovery well for a new petroleum and natural gas field was drilled near Frisco City, Monroe County, in southwest Alabama. Industry sources have estimated field reserves in the 10-million-barrel range.

Review by Nonfuel Mineral Commodities. In the industrial minerals sector, ACME/Borden of Westchester, IL, began operation of a resin-coated sand manufacturing plant in Birmingham. Resin-coated sand is the primary core-making media in metal casting. In addition to resin-coated sand, the firm is a leading supplier of foundry binders for all principal core and molding processes, refractory coatings, and specialty products for the metal casting industry.

Several additions or expansions to existing facilities were announced during 1992. Georgia Marble Co. announced plans for the construction of a bagging calcium carbonate operation at the plant at Gantt's Quarry. National Cement Co. of Alabama Inc. announced plans to use coke and a tire-derived fuel in their cement kiln. An electrostatic precipitator would be added to minimize particulate emissions. Elk Corp. of Alabama, a Tuscaloosa asphalt roofing company, announced plans to construct a calcium carbonate fines storage and transfer system at its west Alabama plant.

Alabama-based Vulcan Materials Co. had an "anti-dumping" petition filed with the U.S. Department of Commerce. The petition accuses Vulcan of selling stone at "below fair market value." Vulcan and Grupo ICA of Mexico have developed a crushed limestone quarry in Mexico's Yucatan Peninsula, and Vulcan is moving crushed stone to Gulf Coast ports by ship. The complainants were Texas Crushed Stone Co. of Georgetown, Parker Lafarge Inc. of Houston and a crushed stone distributor, Gulf Coast Limestone Inc. of Seabrook.

In the metals sector, Birmingham Steel Corp. began operation of its new continuous caster. The new caster increases the plant's steelmaking capacity to approximately 400,000 tons per year. U.S. Steel's Fairfield Works increased its cold-rolled sheet product capacity with the addition of six new single-stack annealing furnaces. The \$1 million project allowed the plant to produce an additional 5,000 tons of cold-rolled sheet products per month. Tuscaloosa Steel Corp., a subsidiary of British Steel Corp., broke ground for a \$7.5 million expansion. The capacity of the existing strip mill plate facility will be increased by 33%. Gulf States Steel Corp., Gadsden, offered about 185 employees early retirement as part of a restructuring plan implemented at the plant.

ALASKA

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Annual, Estimated

THE MINERAL INDUSTRY OF ALASKA 1992¹

The Bureau of Mines estimated the 1992 value for Alaska nonfuel mineral production at \$530.9 million, about 7 percent more than the \$494.1 million reported in 1991. Most of the increase was due to gains in the values of crushed stone, gold, lead, sand and gravel, silver, and zinc. The State ranked 21st nationally in the value of mineral production. Its ranking among the States for specific minerals was: zinc (1st), lead (2nd), silver (3rd), and gold (9th).

Preliminary 1992 exploration and development expenditures totaled \$60 million, compared with \$65.4 million in 1991. Grassroots exploration declined somewhat because of continued weakness in commodity prices. Such a trend affects the amount of high-risk capital a producing mining company can spend on exploration projects. However, development expenditures to bring mines into production increased by about 16 percent from 1991. The total number of State and Federal claims in 1991 was 57,666; in 1992 the total was 50,049. Of these, 29,116 are State and 20,933 are Federal claims. During 1992 about 3,180 new State and Federal claims were staked and 7,617 were relinquished.

NONFUEL MINERAL PRODUCTION IN ALASKA 1/

Mineral	1990		1991		1992 ^e	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	W	NA	\$5	NA	W
Gold ² kilograms	3,232	\$40,200	3,196	37,331	3,954	\$44,493
Sand and gravel (construction)						
thousand short tons	15,100	41,800	*14,000	*39,200	15,000	42,200
Stone (crushed and broken) do.	*2,700	*19,800	*1,085	*4,688	3,000	13,400
Combined value of cement (portland), lead, silver, stone (crushed sandstone [1991]), tin (1990-91), zinc, and values by symbol W	XX	474,781	XX	412,840	XX	430,784
Total	XX	576,581	XX	494,064	XX	530,877

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Recoverable content of ores, etc.

3/Excludes certain stones; kind and value included with "Combined value" data.

Employment. State estimates show that 3,494 people were employed in all aspects of the mineral industry during 1992, compared to about 3,646 employed in 1991. The 4 percent decrease was caused mainly by lower exploration levels.

Exploration and Development. Exploration continued to focus on gold prospects and formerly producing gold mines. However, there is renewed interest in both porphyry copper-molybdenum and volcanogenic massive sulfide base-metal exploration in several Alaska metallogenic belts. This interest arises in part in anticipation of steady demand for industrial metals in the 1990s.

In northwest Alaska, NANA Corporation conducted grassroots exploration for both base and precious metals in the Candle and Inmachuk districts of the northeastern Seward Peninsula. North Pacific Mining continued to expand geological reserves at its Illinois Creek deposit near Kalskag; the most current exploration indicates reserves (in all categories) at about 3.7 million metric tons grading 2.4 grams metric tons gold and 16 grams per ton silver. Newmont Exploration Ltd. and its joint venture partner Aspen Exploration drilled low-sulfide gold vein and shear-zone deposits in the Nome district, but withdrew from the region at season's end. Kennecott Exploration explored Gold Hill and the Sinuk River district for both bulk minable gold and base-metal massive sulfide deposits.

In the eastern interior region companies again explored for bulk minable gold properties, particularly in the Fairbanks Circle Rampart, and Richardson districts. At the Ryan lode on Ester Dome near Fairbanks, La Teko Resources Ltd. completed the State's largest exploration drill program (114,000 feet; 34,747 meters), and by yearend had outlined proven and probable reserves of 47,220 kilograms of gold in about 10.5 million metric tons of ore in both shear zones and quartz porphyry. American Copper and Nickel continued an aggressive exploration program that evaluated a 36 square-kilometer area on Ester Dome and in the Eagle-Treasure Creek drainage east of Ester Dome. Freegold Recovery Ltd. explored schist-hosted, shear-zone deposits near Cleary Summit, a major focus of historical hardrock gold mining in the Fairbanks mining district. Late in 1992, Freegold reached an agreement in principle with Amax Gold Inc. to continue exploration in the Cleary Hill area in 1993.

Fairbanks Gold Ltd., an operating subsidiary of Amax Gold Inc., continued to develop the Fort Knox gold deposit, which is situated almost entirely on land owned by the State of Alaska. The company completed 20,420 meters of reverse circulation drilling, conducted geotechnical and hydrologic studies, and prepared a comprehensive environmental assessment of the project. The mine is expected to cost \$220 million to develop, produce about 9,330 kilograms of gold annually, and employ about 250 workers for 16 years. Fairbanks Gold Ltd. has projected a 1995 startup date.

Montague Gold NL, in a joint venture with ASA Inc., explored several blocks of land owned by Doyon Ltd. in the Rampart, Livengood, and McGrath districts. Placer Dome U.S. Inc. also explored the bulk minable gold potential of these areas, and both companies reported encouraging prospects in monzonite pluton target areas. Verdstone Gold Corporation optioned claims on Crooked Creek in the Circle mining district, where three alluvial diamonds were discovered in the mid-1980s. A Noranda-Hemlo joint venture initiated an exploration program near the Canadian Border at the Taurus copper-molybdenum porphyry deposit in the Fortymile district. Inferred reserves in the East Taurus deposit are estimated to be 126 million metric tons grading 0.30 percent copper, 0.02 percent molybdenum, and 0.34 grams per ton gold. Noranda/Hemlo is also in partnership with Watts, Griffis, and McQuat Inc. (WGM), Convoy Petroleum, Natural Resources Ltd. of Ireland, and Sumitomo Metal Mining of Japan. This joint venture is exploring the Stone Bay Creek area about 150 kilometers northeast of Fairbanks for bulk minable gold and sedex-base metal environments.

In southcentral Alaska, Hunt, Ware, and Proffett continued to explore the Johnson River gold-zinc deposit on the west side of Cook Inlet, where cumulative reserve estimates are 126,980 metric tons zinc and 16,800 kilograms gold in high-grade ore.

In southwest Alaska, Cominco Alaska Exploration continued to explore the Pebble Copper porphyry deposit near Lake Iliamna. After about 2,000 meters of 1992 drilling, reserves continue to be about 450 million metric tons of ore grading 0.35 percent copper, 0.41 grams metric tons gold, and 0.03 percent molybdenum.

In southeast Alaska, Echo Bay continued its seven year effort to reopen the historic Alaska-Juneau (A-J) gold mine, the State's largest past lode producer of gold. Proven and probable reserves are estimated to be 60.8 million metric tons grading 1.75 grams per ton gold. Echo Bay also worked on the Kensington Project near Berners Bay north of Juneau, where proven and probable reserves amount to 11.4 million metric tons grading 5.07 grams per ton gold. The 1992 work at the A-J Mine focused on permitting and environmental studies, whereas the Kensington work continued to be geotechnical work such as drilling, mapping, drifting, and raising.

Other notable exploration projects in southeastern Alaska include (1) the Lac Minerals Niblack Anchorage massive sulfide deposit on Prince of Wales Island; (2) Greens Creek Mining Company's Greens Creek deposit on Admiralty Island; and (3) Cominco's Trocadero Bay massive sulfide prospect, which is also on Prince of Wales Island.

Environment. During the year new Alaska Department of Environmental Conservation (DEC) water quality regulations were formulated in response to new Federal guidelines promulgated by the U.S. Environmental Protection Agency (EPA). The regulations include new criteria for natural characteristics of water, bacteria, sediment definition, petroleum-hydrocarbon contaminants, and risk levels for heavy metal concentrations. Of concern to the Alaskan placer gold mining industry is the new 0.18 parts-per-billion arsenic limit; the previous limit was set at 2.0 parts per billion. The 0.18 parts-per-billion limit is not detectable by most commercial analytical methods.

The comprehensive environmental assessment prepared by Amax Gold Inc. for the Fort Knox deposit near Fairbanks was criticized by several environmental groups. The Sierra Club Legal Defense Fund has asked the U.S. Army Corps of Engineers to do a formal environmental impact statement on the project. This requirement could delay the project by at least a year. At yearend the Corps had not made a decision concerning the request.

The U.S. Bureau of Land Management (BLM) began to prepare an environmental impact statement regarding changes in the 1872 mining law. The BLM proposal would require plans of operations for sensitive areas, which are identified in Alaskan land-use plans, where occupancy takes place or where chemicals are used in the mining process. BLM would also establish a deadline for duration of active notices and plans and would revise current on-site inspection provisions.

Legislation and Government Programs. On October 5, 1992, the U.S. Department of Interior Appropriation Act of 1993 was signed into law. The new law mandates a new rental fee of \$100 for each Federal mining claim and \$200 per claim for individuals or companies owning more than 10 Federal mining claims that were located prior to October 5, 1992. Details of final BLM procedures for the new Act were still in process at yearend.

Late in 1992, the Alaska Department of Natural Resources began to select its final 8 million hectares of land from the Federal government as part of the 1959 Alaska Statehood Act. When Alaska became a State it was awarded 42.6 million hectares of land; in 1991 and 1992 State government diligently researched natural resource values in order to make its final decisions by a January 1994 deadline. The U.S. Bureau of Mines provided a computerized Mineral Availability System (MAS) data file and claim status information to the Alaskan Division of Geological & Geophysical Surveys (DGGS), the lead State agency determining mineral and energy potential data for the project. In December, 1992 initial land nominations were transmitted to

BLM. These nominations included 14 million hectares selected for high mineral and energy potential.

Planning for the \$200 million high-technology, Healy Clean Coal Project continued during 1992. About half of the project is federally financed through a Federal research grant, which is administered by the U.S. Department of Energy. The rest of the funding is supplied by various Alaska public and private sources. When completed by 1995, the project will supply state-of-the-art coal burning technology that will generate 58 megawatts of power in interior Alaska.

Resolution of the 1985 Alaska Mental Health Lands Trust lawsuit (Weiss vs. State of Alaska) was addressed by the executive and legislative branches of the Alaska State government, which is attempting to satisfy provisions of the Alaska Supreme Court. The original 1-million-acre (408,000 hectares) territorial land grant enacted in 1956 was confirmed by the 1959 Alaska Statehood Act but dissolved by the 1978 Alaska legislature. About 55 percent of the original lands were sold or otherwise relinquished. The Chapter 66 settlement, preferred by the Governor, would reconstitute the remaining trust lands and add new hypothecated (pledged as security) lands judged to be of equal value to the original relinquished lands. Resolution of the Mental Health Lands issue is important to the mining industry because the settlement includes coal lands in the Healy and Susitna Valley coal provinces as well as promising metallic deposits in the Interior.

Municipal taxation of in-place mineral resources within various municipality borders in Alaska has been possible since statehood. In May 1991, the Alaska Legislature passed SB330, which provides a permanent exemption from municipal taxation of in-place mineral resources.

Review by Nonfuel Mineral Commodities. Zinc was again Alaska's most valuable mineral commodity with Greens Creek Mine on Admiralty Island and Red Dog, northeast of Kotzebue, the major producers. Kennecott-Greens Creek Mining Company enhanced and modified its water containment facility, completed a regrind-flotation expansion project, installed a state-of-the-art waste-water treatment facility and built two tower mills and three additional column flotation cells. By implementing technology that separates different ore types for individual mill processing, Cominco Alaska significantly improved the quality of concentrate produced at the Red Dog Mine, North America's largest producer of zinc.

Gold was the second most valuable commodity produced in Alaska and the volume increased from 3,196 kilograms in 1991 to 3,954 kilograms in 1992. Production took place from 197 placer mines and one lode mine, compared to 1991 activity levels of 202 placer mines and two lode mines. Most of the increase in production can be attributed to the success of the Cambior Inc.'s Valdez Creek placer mine east of Cantwell and the operations of Polar Mining Inc. in the Fairbanks district. The Cambior operation recovered 86.052 ounces (2.676 kilogram) of gold making it Alaska's largest gold producer for seven of the last eight years. Rounding out the top five gold producers were: the Greens Creek Mine (southeast Alaska), Polar Mining (Fairbanks district), the dredges of Alaska Gold Company (Nome district) and Alaska Placer Development (Livengood district).

Sand and gravel was the third most valuable commodity produced in Alaska; the 15 million short tons produced was used mainly in State and Federal highway construction projects throughout Alaska and logging road improvements in Southeast Alaska.

Silver production was recovered from concentrates derived from the Greens Creek and Red Dog Mines.

¹The Alaska Division of Geological & Geophysical Surveys had significant input in the preparation of this summary.

ARIZONA

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Annual, Estimated

THE MINERAL INDUSTRY OF ARIZONA IN 1992

Arizona continued to lead the Nation in nonfuel mineral production value, thanks to the State's copper industry. According to U.S. Bureau of Mines estimates, nonfuel mineral production in Arizona during 1992 was valued at \$3.12 billion, up \$292 million from 1991. Twelve commodities registered value gains, five posted losses, and two retained about the same value. The largest gainer was gold, which jumped 187%. More modest, but significant, gains in value occurred for pumice (up 47%), gem stones (23%), and silver (17%). Portland cement sales dropped 12%.

NONFUEL MINERAL PRODUCTION IN ARIZONA 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	140,162	\$2,318	228,411	\$3,830	217,922	\$4,708
Copper ²	do.	978,767	2,657,649	1,024,066	2,468,255	1,123,439	2,707,763
Gem stones		NA	2,098	NA	3,173	NA	4,502
Gold ²	kilograms	5,000	62,191	2,068	24,159	6,156	69,272
Iron oxide pigments (crude)							
	metric tons	W	W	18	22	220	61
Sand and gravel (construction)							
	thousand short tons	27,915	92,166	*22,500	*79,400	26,000	93,600
Silver ²	metric tons	173	26,836	148	19,212	141	18,133
Stone (crushed)	thousand short tons	*5,300	*13,500	7,060	32,842	6,000	28,700
Combined value of cement, diatomite (1990), gypsum (crude), iron ore (usable, [1991-92]), lead (1991), lime, molybdenum, perlite, pumice, pyrites, salt, sand and gravel (industrial), stone (dimension), tin (1992), and value indicated by symbol W							
		XX	207,591	XX	198,230	XX	194,994
Total		XX	3,064,349	XX	2,829,123	XX	3,121,733

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Recoverable content of ores, etc.

Employment. According to the State Department of Economic Security, employment in the mining sector for November 1992 was 14,200, compared with 13,900 for the same period last year. Employment in the copper sector alone during November 1992 was 11,800 people, up slightly from 11,400 people so employed during November 1991.

ASARCO Incorporated and unions reached a agreement on a new 3-year contract that affected employees at the Hayden copper smelter and at the company's Silver Bell and Mission Mines.

Exploration. Interest is growing in copper, especially in leachable copper deposits, on the part of both junior and major companies. Magma Copper Co. acquired from Conoco Inc. a copper deposit 3 miles northwest of Florence in Pinal County which could replace the nearly depleted open-pit portion of the San Manuel Mine. Preliminary estimates indicate the Florence deposit has reserves of 270 million metric tons (300 million short tons) of oxide ore containing 0.37% copper and 470 million metric tons (500 million short tons) of sulfide ore containing 0.39% copper. Pending successful feasibility studies and permitting, plant construction could begin as early as 1995. The mine would employ about 300 people. Magma continued evaluation of the Lower K deposit at San Manuel. According to the State Department of Mines and Mineral Resources, other companies are acquiring exploratory copper projects in Pinal, Santa Cruz, and Cochise Counties.

Silverspar Minerals Co. reported that results of 1992 drilling in the Silver District near Yuma indicate a reserve of 2.05 million metric tons (2.26 million short tons) of acid-grade fluorspar with a grade of 14.5%. Pending additional feasibility studies, the company hoped to begin production of fluorspar and silver in early 1994.

Environment. DMI Aviation of Tucson was fined \$1.6 million and ordered by the State and Federal agencies to clean up 450 metric tons (500 short tons) of aluminum dross on its property. The dross, generated between 1976 and 1982, was a byproduct of a process in which aircraft parts were melted to recover aluminum.

Legislation and Government Programs. Arizona's past violations of the Clean Air Act plus the threat of a cut in Federal highway funds pressured the 40th Legislature to pass Senate bill 1430, the Air Quality Act. The enacted bill will conform Arizona's air pollution laws to the 1990 Clean Air Act, clarify State and county roles in air quality enforcement, and reduce permitting steps.

The legislature also passed the State-Lands Private-Property Rights Protection Act, Senate bill 1053, a landmark and controversial bill that requires State agencies to determine if new anti-pollution regulations devalue property, and, if so, to compensate land owners.

The Stream and Riparian Resources Act, House bill 2404, died in the House. The bill would have extended legal recognition to riparian ecosystems and established a ladder for preference water use: municipal needs first, followed by irrigation and stock watering, power, mining, groundwater recharge, and, finally, riparian protection.

The Radiation Exposure Compensation Act provided \$30 million to compensate Navajo uranium miners and others who were exposed to radiation during the height of the government's program to develop nuclear weapons, between the 1940's and 1970. Each eligible person or family received \$100,000 and a formal apology. The Navajo Nation is also doing surface reclamation of abandoned uranium mine tailings.

The U.S. Supreme Court refused to hear a case brought by Havasupai tribal members against uranium mining near Grand Canyon. The tribe claimed that Energy Fuels Nuclear Inc.'s Canyon Mine is in an area

the Havasupai regard as sacred. The Canyon Mine remained on standby pending an increase in uranium prices which hovered around \$8 a pound.

The Arizona Department of Mines and Mineral Resources published its annual directory of active mines in Arizona (D39), updated Status of Industrial Minerals Consumed in Arizona and California ((OFR92-9), and the Arizona Mining Update (C37). The Department also published "Copper Oxide Resources" (OFR92-10) which lists over 800 properties with significant oxide copper resources and "Arizona Copper Reserves" (OFR92-11) which reviews 75 major copper properties. The agency closed its Tucson office in 1992, retaining its Phoenix headquarters and remaining a separate State agency from the Arizona Geological Survey. The Arizona Geological Survey released several publications of interest to the minerals industry, including the following: CR-92-B entitled "Location, Geologic Setting, and Production History of the Harvey Blackwater Nos. 1, 3, and 4 Uranium Mines, Apache County, Arizona, and San Juan County, Utah;" OFR-92-1 entitled "Mineral Deposits of the Bullard Mineral District, Harcuvar Mountains, Yavapai County, Arizona;" and the revised OFR-92-6 "Index to Published Maps of Arizona."

Review by Nonfuel Mineral Commodities. A \$224 million expansion at ASARCO's Ray Mine was completed in 1992 and will increase the mine's annual copper yield more than 58%. Although the keystone piece of the project was installation of a new concentrator, improvements also included the addition of a tailings impoundment, an in-pit crusher, a conveyor system, and an expanded haulage truck fleet. Expansion allowed the company to add 300 new employees and absorb laid-off workers from the Tyrone and Questa Mines in New Mexico. ASARCO announced a new reserve total for Ray: 1.1 billion short tons (998,000 metric tons) of 0.63% copper, a two-thirds increase. The new reserve estimate adds Ray to U.S. copper mines in the billion-ton-plus class, the only other two such mines being Kennecott Copper Corp.'s Bingham Canyon operation and Phelps Dodge Corp.'s Morenci complex.

The Arizona Copper Co. (AZCO Mining Inc.) issued draft and final environmental impact statements in 1992 for the Sanchez Mine, a proposed open-pit copper mine 10 miles northeast of Safford. Plant construction should begin in March 1993 and mine startup could be as early as 1994. Sanchez will yield 12 million metric tons annually of leachable ore over a 17-year mine life. The mine will employ 210 people with an annual payroll of \$8.15 million.

Cyprus Copper Co. relocated its office from the Denver headquarters of parent company Cyprus Minerals Co. to Tempe. Cyprus restarted its Miami smelter in April after a disastrous fire in November 1991 idled the installation. The fire hastened smelter modernization which cost \$100 million. An ISAMELT furnace began operation at Miami and will achieve full capacity by July 1993. The new furnace will reduce copper production costs \$0.05 per pound, increase smelting capacity 50%, and make Cyprus self sufficient in smelting.

About 9,000 feet of drilling completed during the summer on Cambior Inc.'s Carlota Project in Gila County resulted in greatly increased copper reserves. According to the Arizona Department of Mines and Mineral Resources, about 91 million metric tons (100 million short tons) of reserves have been identified. The company announced plans to develop the mine, which is 4 miles west of Miami and adjacent to Cyprus Minerals' Pinto Valley Mine. Production could begin in 1994 and add 225 new jobs to the area over a 15-year mine life.

In December, Magma Copper announced plans to expand its copper smelter at San Manuel. Magma received permits for a third converter and third acid plant which, together, could increase smelter capacity by 20% or 54,000 metric tons (60,000 short tons) per year.

Phelps Dodge began preparing an environmental impact statement and filed permits for a 154-million-metric-ton (170-million-short-ton) leachable copper deposit at Bisbee. According to the State Department of

Mines and Mineral Resources, Phelps Dodge also reported a 1.5-billion-metric-ton (1.6-billion-short-ton) copper resource on its Lone Star property in Graham County near Safford.

Arimetco International Inc. completed construction of a 7,300-metric-ton-per-day (8,000 short-ton-per-day) SX-EW plant and began shipping cathode copper from its Emerald Isle Mine 30 miles northwest of Kingman in Mohave County.

Fischer-Watt Gold Co. Inc. announced first production of mill ore from the Mystic Mine northwest of Phoenix and shipped 12 kilograms (367 troy ounces) of dore gold for refining and sale. The Mystic was shut down during the fall of the year and was on standby at yearend. Pima Mining Co. filed a draft environmental assessment for the Newsboy Mine, their proposed gold mine north of Wickenburg. The company has faced intense local opposition. Republic GoldFields Corp. shut down the Congress Mine in April, citing declining gold prices. The action affected about 50 employees. The mill closed in August after milling stockpiled and custom ore on hand.

During late December 1991, Pfizer Inc.'s Mineral Division acquired Calcium Products Co.'s Santa Rita quarry and marble filler mill in the Santa Rita Mountains south of Tucson. After passing through a corporate readjustment, Pfizer now operates the mine and plant as Specialty Minerals Inc., a subsidiary of Minerals Technologies Inc. During 1992, about half of a \$6 million expansion project was completed at the quarry and plant.

ARKANSAS

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Annual, Estimated

THE MINERAL INDUSTRY IN ARKANSAS IN 1992

The U.S. Bureau of Mines estimate of the value of mineral production in Arkansas in 1992 was \$287 million, a decrease of \$74 million from the figure reported by the State's 200+ mineral producers in 1991. Mineral sales were almost \$95 million below the record high of \$382 million established in 1989. A significant decline in the value of bromine production overshadowed minor sales gains in cement, gypsum, and stone. It is anticipated that the bromine value will be revised upward when final figures are released.

NONFUEL MINERAL PRODUCTION IN ARKANSAS 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Abrasives ² metric tons	W	W	W	\$154	NA	NA
Bromine ³ thousand kilograms	177,000	\$97,350	170,000	167,000	158,145	79,073
Clays metric tons	989,383	21,578	³ 856,582	³ 8,048	³ 816,651	³ 9,934
Gem stones	NA	1,503	NA	1,846	NA	1,429
Sand and gravel:						
Construction thousand short tons	9,663	35,475	³ 8,300	³ 31,100	8,100	30,900
Industrial do.	742	7,209	746	7,738	661	6,889
Stone:						
Crushed and broken ⁴ do.	³ 17,800	³ 76,900	22,140	101,427	23,100	109,000
Dimension short tons	W	W	13,932	1,128	W	W
Combined value of bauxite (1990), cement, clays (fire, [1991-92]), gypsum (crude), lime, stone (crushed dolomite and traprock [1991], crushed slate and dolomite [1990], unidentified [1992]), talc and pyrophyllite (1990), tripoli (1990-91), vanadium (1990), and values indicated by symbol W	XX	62,625	XX	42,543	XX	49,725
Total	XX	302,640	XX	360,984	XX	286,950

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data.
XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

3/Excludes certain clays; kind and value included with "Combined value" data.

4/Excludes certain stones; kind and value included with "Combined value" data.

Environment. Several past, current, and/or future mining related environmental concerns were in the news during the year. The amount and origin of mercury in fish in the Ouachita River were under investigation by personnel of the State Department of Pollution Control and Ecology, the Game and Fish Commission, the Health Department, and Ouachita Baptist University. One geologist speculated that the contamination could be natural; mercury deposits were discovered in the area in 1931 and mined until 1946.

Exploratory drilling in the Crater of Diamond State Park resumed in June following a ruling by the 8th U.S. Circuit Court of Appeals reversing a 1990 injunction against drilling. Exploration began in 1990, but was halted by a lawsuit and Federal court ruling. Twenty-six holes were drilled by August and a report was prepared and submitted to a State Technical Advisory Committee in December. The report identified 78 million tons of potentially diamond-bearing rock and termed the deposit as "world class", ranking it as the world's eighth largest.

A Missouri lead company's plans to drill 20 exploratory holes for lead mineralization 30 miles north of the Arkansas border prompted the Arkansas Attorney General to file a formal protest with the U.S. Bureau of Land Management (BLM). The drilling site is in the Mark Twain National Forest, and the BLM regulates activity on Federal lands; the U.S. Forest Service approved the drilling. Citizens groups contend that the drilling could cause contamination of subsurface water under northern Arkansas.

Legislation and Government Programs. The Arkansas abandoned mine land program contractors began or completed six projects during the year. The total area reclaimed or under reclamation was 568 acres.

The Booneville Plant Materials Center, established in 1987 by the U.S. Soil Conservation Service, evaluates plants for specific natural resource problems. During the year, the Center worked on projects (1) to find more productive grasses and legumes to support livestock grazing on mine sites, (2) to develop best-management practices for berry and grape production on previously mined sites, and (3) to select superior fruit and nut trees to grow on reclaimed lands.

Review by Nonfuel Mineral Commodities. Crushed stone was the leading mineral commodity, in terms of value, surpassing bromine for the first time in several decades. Bromine and sand and gravel were second and third, respectively. These three accounted for approximately 76% of the Arkansas mineral value.

In the bromine sector, despite the estimated \$88 million decline in value, Great Lakes Chemical Corp., Arkansas's largest bromine producer, announced record earnings of \$172 million for the first 9 months of 1992. A company report noted, "The flame retardant business grew in domestic markets and exports were significantly better. An improved electronics industry ...impacted positively our core accounts...." The 1990 value was an anomaly due to a large increase in unit value; the 1992 estimated value was only \$18 million below that reported for 1990.

Crushed stone production increased by almost a million tons and value was up about \$7.5 million. This was the third consecutive year that crushed stone production and value increased. Despite the positive economic impact the stone sector makes to the State's economy, new quarries faced a barrage of citizens complaints. Through most of the year, Benton County citizens opposed a new quarry between Gravette and Sulphur Springs. In an October meeting of the Environmental Committee of the Benton County Quorum Court, a citizens group voiced opposition, but quarry plans were unaffected.

Construction sand and gravel production and value were estimated at slightly lower levels than those reported by industry in 1991. Despite the decline, sales by the sand and gravel producers accounted for almost 11% of the State's mineral value. Declining reserves were one problem faced by the sand and gravel

producers and consumers. Hot Springs officials, in a controversial search for a long-term source of gravel, were considering an area along Highway 7. The proposed gravel mine faces opposition from area property owners who had succeeded in defeating a proposed mobile home park in the area and said that they definitely would fight a mining operation. The city's former mine was depleted, which forced the city to purchase aggregate.

In the metals sector, Nucor Corp. completed the construction phase of its new flat-rolled steel facility at Hickman. The plant's capacity was raised to 1.2 million tons per year. During the year, Nucor's Hickman mill began operating a ladle metallurgy station at the thin-slab casting facility. The Nucor-Yamato joint venture in Blytheville was undergoing a \$300 million expansion, which would increase the production of I-beams and other structural steel from 1 million to 1.8 million tons per year.

In other metal sector news, Reynolds Metals Co. announced plans to sell its Hot Springs County aluminum cable plant. The buyer was British-owned BICC Cables Corp. of West Nyack, NY. Rohr Inc. announced plans to build a \$25 million "superplastic forming of aluminum" facility. The new plant was planned for a 65-acre tract 5 miles south of Arkadelphia. The plant will include fabricating facilities for titanium, Inconel, and steel nacelle system components.

In June, following a 6-month closure, the Sequoyah Fuels Corp. uranium processing facility near Gore began a phased restart of operations. The plant was closed in October 1991 until it could submit an acceptable health, safety, and environmental plan to the Nuclear Regulatory Commission. Prior to the shutdown, uranium contamination was discovered at several locations within the plant grounds.

CALIFORNIA

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Annual, Estimated

THE MINERAL INDUSTRY OF CALIFORNIA 1992

According to data compiled by the U.S. Bureau of Mines, California was the 2nd leading State in the Nation in the value of nonfuel minerals produced during 1992, accounting for nearly 8% of the U.S. total. The value of the nonfuel mineral commodities produced in the State during the year was estimated to be \$2.47 billion, a 2% drop from the \$2.53 billion of 1991. The value of industrial minerals produced in the State remained steady at about \$2.0 billion. California led all other States in the production of boron minerals, portland cement, diatomite, calcined gypsum, construction sand and gravel, rare earth concentrates, natural sodium sulfate and tungsten.

More than 20 industrial minerals were produced in the State accounting for nearly 83% of California's total 1992 nonfuel mineral production value. Portland cement was the most valuable commodity produced followed in order by construction sand and gravel, gold, boron, crushed stone, soda ash, and diatomite.

Employment. According to the California Department of Economic Development, the nonfuel mining industry in the State employed 8,100 workers in October 1992, dropping about 9% from October of the previous year. Metal mining employment remained essentially the same at 2,200 workers, but nonmetallic mining employment declined to 5,900 workers.

Exploration. The continuing drop in gold and silver prices led to declines in precious metals exploration throughout the State. However, exploration continued in the mother lode areas of the Sierras and in the desert areas of southern California. Additional gold reserves were discovered at the 16 to 1 underground gold mine in Sierra County, using new exploration techniques with a metal detector. Viceroy Gold Corp. reported additional gold reserves near the southern boundary of its Castle Mountain mine in San Bernardino County.

Legislation and Government Programs. The first payments required of all active surface mining operations in the State became due July 1 for the 1991 calendar reporting year. Fees were assessed according to a new schedule effective May 1 under the amended Surface Mining and Reclamation Act. Fees were based on production by weight and ranged from \$100 to \$2,000 for aggregate products, industrial minerals, and precious metals.

The Federal Environmental Protection Agency began cleanup of the Sulphur Bank mercury mine superfund site in Lake County in May. The \$1.25 million project was the first stage in a long-term effort to stabilize the Sulphur Bank site where waste rock piles near the inactive mine are eroding into Clearlake.

NONFUEL MINERAL PRODUCTION IN CALIFORNIA 1/

Mineral	1990		1991		1992 ^e	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Boron minerals thousand metric tons	1,094	\$436,176	1,240	\$442,531	1,020	\$332,720
Cement (portland) thousand short tons	10,032	604,080	*8,702	*522,120	9,145	548,700
Clays ² metric tons	2,163,515	40,217	2,074,707	27,464	1,975,828	33,800
Gem stones	NA	1,501	NA	10,450	NA	10,119
Gold ³ kilograms	29,607	368,300	29,873	348,919	37,160	418,152
Lime do.	345	19,425	307	20,389	351	23,310
Mercury metric tons	(⁴)	(⁴)	(⁴)	1	(⁴)	1
Pumice do.	71,739	5,088	61,237	4,372	W	W
Rare-earth metal concentrates do.	W	W	16,465	W	16,000	W
Sand and gravel:						
Construction thousand short tons	132,214	626,000	*101,900	*489,100	96,600	473,300
Industrial do.	2,452	48,055	2,104	41,690	2,010	40,572
Silver ³ metric tons	21	3,209	W	W	15	1,929
Stone:						
Crushed thousand short tons	*42,500	*200,600	45,816	216,156	41,200	200,200
Dimension short tons	*30,077	*5,213	44,757	5,254	23,292	4,148
Combined value of asbestos (1990-91), barite (1990), calcium chloride (natural, [1990-91]), cement (masonry), clays (fuller's earth), copper (1990-91), diatomite, feldspar, gypsum (crude), iron ore (usable), magnesium compounds, mica (crude, 1991), molybdenum, perlite, potash, salt, soda ash, sodium sulfate (natural), talc and pyrophyllite, titanium concentrates (ilmenite), tungsten ore concentrates, and values indicated by symbol W						
	XX	421,820	XX	403,592	XX	379,631
Total	XX	2,779,684	XX	2,532,038	XX	2,466,582

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" data.

3/Recoverable content of ores, etc.

4/Less than 1/2 unit.

Cleanup plans were also announced by EPA in October for the Iron Mountain mine in Shasta County. The plan called for an effluent-processing plant that will use lime to neutralize the acidic runoff from two of the mine's largest pollution sources, the Richmond and Lawson tunnels, and for expansion at the Spring Creek Debris Dam.

The San Francisco Earth Science Information Office of the U.S. Geological Survey was shut down in August.

Review of Nonfuel Mineral Commodities. Viceroy Gold Corp. poured its first gold dore from the open-pit, heap leach Castle Mountain mine in San Bernardino County in February. Under an agreement with the Nature Conservancy, Viceroy established a 60,000 acre desert tortoise preserve at the

adjoining Walking Box Ranch. The 1,000 acre Hayden Hill gold mine project north of Susanville in Lassen County was dedicated in August. Included in the project are a 256 acre surface gold mine, ore processing plant, gold processing plant and cyanide heap leach facility.

Siskon Gold Corp. proposed in November to develop an underground gold mine on a 22 acre San Juan Ridge property near North Columbia in Nevada County. Rand Mining Company received construction and operating permits for its Baltic Mine Project near Randsburg in Kern County in December. Cut backs in personnel were announced at the State's two largest gold mines, Homestake Mining Co.'s McLaughlin mine in Napa County and Gold Fields Operating Co.'s Mesquite mine in Imperial County.

Despite numerous complaints from citizens groups, several sand and gravel operations received permits for expansions or new operations. Quality Rock Company received a new permit to construct a new sand and gravel processing facility north of Moor Park's city limits in Ventura County. Granite Rock Company received approval from the San Benito County planning commissioners to use three canyons in the Anzar Hills as a dump for unusable mining waste. North Star Rock Products received approval in December for the proposed expansion of its Birchville Rock Quarry near Grass Valley. Tarmac California sold its aggregate operations in Riverside, Imperial and San Bernardino Counties to Granite Construction Inc. in August. American Rock and Asphalt Inc. received clearance from Lake County to mine gravel along Putah Creek near Middletown. Syer Industries was allowed to continue mining gravel along side the Russian River by a Sonoma County Superior Court in July. Butte County board of supervisors approved the extension of the use permit of Green Rock Quarries near Oroville, in March.

The Amador County Board of Supervisors approved use permits for North American Refractories Co.'s new clay mine and tile manufacturing plant in the Carbondale area, six miles northwest of Ione. The process will include mining, crushing and screening clay, forming it into shapes for floor and roof tiles and baking in a gas-fired kiln.

American Steel, a division of Portland, Oregon based American Industries Inc., entered into a joint venture with Los Angeles based Reliance Steel and Aluminum Co. to construct a \$7 million steel distribution center in West Sacramento. Construction was begun on the 110,000 square foot center in September.

COLORADO

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Annual, Estimated

THE MINERAL INDUSTRY OF COLORADO IN 1992

According to U.S. Bureau of Mines estimates, the value of 1992 nonfuel mineral production in Colorado was about \$388.5 million, up \$50 million from the \$338.4 million reported in 1991. The major factors in the significant increase in Colorado's nonfuel mineral value were the increases in production of construction sand and gravel, up \$48 million, and crushed stone, up nearly \$17 million. Continued low metal prices offset some of the increased value of mineral resources produced for use in construction activities. Increases were noted in the production of cement, lime, crude gypsum, peat, crushed stone, and construction sand and gravel, which comprise nearly two-thirds of the nonfuel mineral total value in Colorado. Declines were noted in both quantity and value for all metals produced in the State. Colorado ranked second in the Nation in production of molybdenum and construction sand and gravel. The State ranked 28th among the 50 States producing industrial minerals, 14th among the 25 States producing metals, and 26th in total nonfuel mineral production value with 1.23% of the national total.

Led by a construction industry growth of nearly 16%, Colorado's economy outpaced the Nation's economy in 1992 with a 5% rate of unemployment, lower than the National average of 6.7%. Growth in construction industries was attributed to activities at the new Denver airport, numerous highway projects, and a 6-year high in homebuilding.

Employment. Mining employment in 1992 was estimated at about 16,300 people, down more than 12% from 1991. Of that number, 3,100 were working in metal mines, 3,200 in coal and nonmetal operations, and 10,000 in oil and gas related activities. State employment projections for 1993 indicate a continuing decline in mining employment.

Environment. ASARCO Incorporated agreed to spend up to \$38 million to clean up a century's worth of soil and groundwater contamination at the Globeville smelter in northern Denver and test lawns in the area for lead, zinc, and cadmium contamination.

Water treatment plants for acid mine drainage were completed by the U.S. Bureau of Reclamation at the Leadville Mine Drainage Tunnel and by the Resurrection/Newmont Mining Co. and ASARCO joint venture at the Yak Mine Drainage Tunnel, both in Lake County. As the last major active mining company in the area, the Resurrection-ASARCO joint venture was identified as a "responsible party" although their mining operation, the Black Cloud Mine, does not impact Yak Tunnel drainage into California Gulch.

NONFUEL MINERAL PRODUCTION IN COLORADO 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	262,292	² \$1,864	² 263,866	² \$1,964	251,674	\$2,410
Gem stones		NA	66	NA	287	NA	36
Gold ³	kilograms	2,357	29,176	3,181	37,154	2,073	23,327
Peat	thousand short tons	W	W	W	396	42	571
Sand and gravel (construction)							
	thousand short tons	24,938	86,541	² 26,400	² 88,200	40,000	136,400
Silver ³	metric tons	23	3,557	20	2,565	12	1,543
Stone:							
Crushed	thousand short tons	⁴ 7,600	⁴ 36,100	8,401	41,022	11,500	57,800
Dimension	short tons	⁴ 8,490	⁴ 1,394	W	W	6,454	252
Combined value of cement, clays (bentonite), copper (1990-91), gypsum (crude), helium (Grade-A), lead, lime, molybdenum, perlite, sand and gravel (industrial), stone (crushed traprock, [1990]), vanadium (1990), zinc, and values indicated by symbol W							
		XX	227,586	XX	166,817	XX	166,170
Total		XX	386,284	XX	338,405	XX	388,509

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" data.

3/Recoverable content of ores, etc.

4/Excludes certain stones; kind and value included with "Combined value" data.

Disagreements continued over how, or what, should be done at the Smuggler Mine Superfund site near Aspen, Pitkin County. Atlantic Richfield Co. and the U.S. Bureau of Mines each agreed to pay the U.S. Environmental Protection Agency (EPA) \$1.6 million for cleanup at the site and three residential developers agreed to pay a total of \$78,675. After 9 years of litigations, reclamation plans for Idarado Mining Co. properties in the Red Mountain and Telluride areas were approved in court. The \$15 million, 5-year phased reclamation plan will be followed by a 10-year evaluation period. Idarado Mining Co., a subsidiary of Newmont Mining Corp., produced gold, silver, copper, lead, and zinc from the Idarado Mine until 1979.

Summitville Consolidated Mining Co., subsidiary of Galactic Resources Ltd., Vancouver, operators of Colorado's largest cyanide heap-leach gold mine, began reclamation work at the Summitville Gold Mine after cyanide spraying ended in March. About 9,330 kilograms (300,000 troy ounces) of gold was recovered during the 5-year mine life. The company, however, lost \$70 million because of environmental problems and failures in basic design. Reclamation is expected to take longer than the mine was operated and from \$9 to \$14 million will be needed to detoxify the mining site. In December, Summitville Consolidated filed for Chapter 7 bankruptcy and announced plans to lay off all workers and EPA assumed maintenance work at the site. Late in December, a State court ordered the operating and parent companies to resume cleanup at the mine.

Umetco Minerals Corp. continued work on plans to store radioactive waste from sites across Colorado at a former uranium mill site near Uravan, Montrose County. The company had operated a mill at Uravan and hoped to offset cleanup costs by importing radium wastes from elsewhere in the State and charging for the storage.

Legislation and Government Programs. Colorado voters approved a tax limitation bill during the November election. Under provisions of the amendment, a vote of the people would be necessary to approve most tax increases. Possible impact on government funded construction projects is not yet known, but contractors are expecting a significant drop in State-funded projects. Decreased production of construction sand and gravel and crushed stone likely will follow any decrease in highway construction activity in the future.

Early in 1992, the U.S. Congress passed and the President signed Senate bill 2552 which authorized a hard rock mining reclamation demonstration project to facilitate the expedient cleanup of acid mine drainage. A site near Breckenridge, Summit County, was being considered for the demonstration project.

After 12 years, the Federal Highway Administration and Colorado Department of Highways completed the \$490 million construction project to get Interstate 70 through Glenwood Canyon in Mesa County. The 19.3-kilometer (12-mile) stretch of road completes Interstate 70 between Baltimore, MD, and Cove Fort, UT.

Review by Nonfuel Mineral Commodities. Production of construction sand and gravel, which constitutes nearly 35% of the total value of nonfuel mineral production in Colorado, was up nearly 50% in 1992. Production of crushed stone also showed a significant increase.

Continued public concerns about environmental problems remained a major stumbling block to opening or expanding gravel or crushed stone mining operations. A much publicized controversy over a proposed gravel quarry along Clear Creek Canyon, west of Denver, finally ended in defeat for the project. After 7 months of testimony, Jefferson County Commissioners rejected a rezoning request for a proposed 55-hectare (137-acre), 68-million-metric-ton (75-million-short-ton) gravel quarry near the canyon. The decision is illustrative of the difficulty in siting sand and gravel or crushed stone operations near metropolitan areas.

Rocky Mountain Asphalt was ordered by the 4th Judicial District Court to immediately stop mining in Waldo Canyon, near Colorado Springs, and restore the property to its original condition. Rocky Mountain had been operating under a 1974 permit that was declared invalid. The company must apply to the El Paso County Commissioners for a special use permit to continue mining. The Boulder City Council bought the mining right to the Conda Mine on Eldorado Mountain, Boulder County, in order to stop mining at the 23-year-old mine owned by Wesley D. Conda Inc. The city paid \$1.48 million to acquire the 168-hectare (415-acre) property, and the mining rights, and provide for some reclamation at the site. Gravel operations near the towns of Ouray, Pueblo, Gunnison, Greeley, and Thornton encountered similar obstacles during the year.

During the year, Climax Molybdenum Co.'s Henderson underground molybdenum mine reached the 100th million-short-ton production milestone since opening in 1976. At the company's Climax Mine, more miners were laid off in a cost cutting measure brought on by continued low demand for molybdenum. About 118 people work at the mine, down considerably from the historic high employment of 3,000 during peak years.

Cement output in the State continued to grow to meet the demands for concrete at major construction projects now underway, or scheduled to start in 1993. Construction at the Denver International Airport has contributed significantly to the increased demand for cement in the State.

Despite falling gold prices, at least one mining operation in Colorado was actively conducting exploration and expanding ore reserve estimates. Cripple Creek and Victor Gold Mining Co., a joint venture of Golden Cycle Gold Corp. and NERCO Inc., completed over 140,208 meters (460,000 feet) of drilling in the Cripple Creek mining district in 1992. As of October, the joint venture had inferred geologic gold resources of 1 million kilograms (3.3 million troy ounces) of contained gold. Teller County Commissioners

approved a permit to mine and heap leach the Cresson deposit and State approval was expected by yearend. Late in the year, financially strapped NERCO was attempting to sell the minerals subsidiary that controls the Cripple Creek mining district operations. Battle Mountain Gold Co., Colorado's largest gold producer, continued operations throughout most of the year. Battle Mountain was fined for allowing excessive amounts of cyanide concentrations in the tailings ponds at the San Luis Mine in Costilla County. Ice on the tailings ponds was blamed for the cyanide buildup. The company expected to produce 2,177 kilograms (70,000 troy ounces) of gold from the mine in 1992.

Homestake Mining Co. announced plans to decommission and reclaim the Bulldog Mountain silver mine near Ouray, Ouray County. From 1969 through 1985, about 786,830 kilograms (25.3 million troy ounces) of silver and 22 million kilograms (48.6 million pounds) of lead were produced from the mine.

Eagle-Gypsum Products acquired 57 hectares (140 acres) of patented claims at its gypsum mine near Eagle, Eagle County, from the U.S. Bureau of Land Management. The Eagle-Gypsum wallboard plant and mine reached operating capacities of 362,800 metric tons (400,000 short tons) per year.

A proposal to quarry marble on privately held mineral rights inside the Maroon Bells-Snowmass Wilderness was stalled late in the year when Pitkin County Commissioners denied a special-use permit for the mine.

CF&I Steel Corp. negotiated with a Portland, OR, steel mill for the possible sale of the bankrupt steel company. The 120-year-old Pueblo steel mill laid off 10% of its work force of 1,800 in 1992 under reorganization actions and an anticipated summer downturn in rail orders.

Larimer County Commissioners approved a permit for diamond exploration along the Colorado/Wyoming border. Diamond Co. N.L. estimated that about 90,700 metric tons (100,000 short tons) of material will be processed over the next 2 years. Kimberlites on the Colorado side of the border apparently have yielded about 0.2 of a carat per short ton.

CONNECTICUT

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Annual, Estimated

THE MINERAL INDUSTRY OF CONNECTICUT IN 1992

The value of nonfuel mineral production in Connecticut in 1992 was estimated by the U.S. Bureau of Mines to be nearly \$95 million. This value was \$4.1 million greater than the value in 1991, primarily because of slight increases in the sales of crushed stone and construction sand and gravel, the State's two leading mineral commodities produced. Other commodities produced included clays, industrial sand, and dimension stone.

NONFUEL MINERAL PRODUCTION IN CONNECTICUT 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$2	NA	\$62	NA	\$1
Sand and gravel (construction)						
thousand short tons	8,542	37,943	*5,400	*24,800	5,500	25,700
Stone:						
Crushed ² do.	*10,200	*70,600	5,873	52,701	6,000	55,500
Dimension short tons	W	W	17,326	1,739	W	W
Combined value of clays (common), feldspar (1990-91), mica (scrap, [1990-91]), sand and gravel (industrial), stone (crushed dolomite and other [1991], crushed granite [1990], unidentified [1992]), and values indicated by symbol W	XX	9,348	XX	11,531	XX	13,721
Total	XX	117,893	XX	90,833	XX	94,922

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; kind and value included with "Combined value" data.

Demand for virtually all of the State's mineral output is dependent on a healthy construction industry, the main consumer of aggregates. Effective August 1, the Associated General Contractors of Connecticut (AGC) agreed to affiliate with the Connecticut Construction Industries Association (CCIA). The AGC chapter became a division of CCIA. This was the second recent affiliation of a major organization in the State with the CCIA. The Utility Contractors Association of Connecticut affiliated with the CCIA in 1991 to become a new division of CCIA. The newest affiliation makes the CCIA the State's leading construction industry organization, which now represents horizontal, vertical, and sewer and utility construction. CCIA will now have seven divisions including the

Connecticut Road Builders Association; Connecticut Ready-Mixed Concrete Association; Connecticut In-Plant Operators Association; and the Connecticut Equipment Dealers Division. The association also includes the State's bituminous plant operators, crushed stone and sand and gravel operators, excavators, and a wide variety of associate members involved in the construction industry.

Employment. The average number of workers in the mineral extractive industries in Connecticut during the first 9 months of 1992 was estimated to be 692. This included 483 workers at surface operations about equally split between sand and gravel and crushed stone operations. About 209 workers were employed at mineral-related mills and preparation plants in the State.

Environment. Connecticut's local chambers of commerce began working in conjunction with the State Department of Environmental Protection (DEP) in setting up regional business recycling councils to help private enterprise establish individual recycling programs. The councils, which serve as information clearing houses, are concerned primarily with recycling nine items mandated by law. That list includes metal and food beverage containers, scrap metal, and lead-acid batteries. Under State law, Connecticut businesses and certain residential areas were to begin recycling those items in January 1991. The chambers are acting as a communications link to the businesses and do not have enforcement authority. The individual towns where the recycling occurs has the enforcement authority.

Legislation and Government Programs. Several bills that would affect mineral producers were introduced in the 1992 legislative session. House bill 5611 would require quarry owners or operators to conduct a preblast survey. H.B. 5230 would give the local fire marshall the authority to stop any excavation, demolition, or discharge of explosives. Both of these bills died in committee. Another bill, which never made it out of committee, was Revised Bill 5699, "An Act Adopting the Model Surface Use and Mineral Development Accommodation Act."

Review By Nonfuel Mineral Commodities. In April, a Superior Court judge upheld a 1991 zoning board decision that limited excavation at the Burgundy Hills crushed stone quarry in Tolland to 10.5 acres. The quarry owners had sued the zoning board in March 1991, arguing that 42 acres of the 142-acre property should be eligible for excavation because those acres had been mined before 1957, when local zoning regulations were enacted. In the judge's decision, he said that the quarry owners had been given a "full and fair hearing" by the board. The company intends to appeal the decision.

Near yearend, the Prospect Planning and Zoning Commission was considering passage of an ordinance that would ban all new sand and gravel mining operations in residential areas. Existing mining operations were expected to be grandfathered into the regulations. In October, the Commission rejected a proposal by O&G Industries of Torrington to mine gravel from water on company land. O&G had proposed to excavate 275,000 cubic yards of sand and gravel from 10 acres of land owned by the South Central Connecticut Regional Water Authority.

Although Connecticut has been for many years one of the Nation's leading producers of feldspar, operations at the State's only feldspar mine ceased at yearend 1991. No feldspar production was reported in 1992. Byproduct mica and silica sand had also been produced at the mining operation.

DELAWARE

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Annual, Estimated

THE MINERAL INDUSTRY OF DELAWARE IN 1992

The value of nonfuel mineral production in Delaware in 1992 was about \$16 million, according to estimated data compiled by the U.S. Bureau of Mines. Production and value of construction sand and gravel was more than three times greater than the total reported for 1991. This significant increase in output was attributed to a major highway construction program in the Dover area. Delaware also produced magnesium compounds for use in chemical and pharmaceutical manufacturing. The State was one of only six States that produced magnesium compounds in the United States.

NONFUEL MINERAL PRODUCTION IN DELAWARE 1/

Mineral	1990		1991		1992e	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$1	NA	\$1	NA	\$1
Sand and gravel (construction)						
thousand short tons	2,184	6,967	*1,600	*5,100	5,000	16,300
Total ²	XX	6,968	XX	5,101	XX	16,301

e/Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Partial total, excludes values which must be concealed to avoid disclosing company proprietary data.

Legislation and Government Programs. During the year, the Department of Natural Resources and Environmental Control reassigned the responsibility for developing extractive use regulations to the Division of Soil and Water Conservation (DSWC). The regulations were required by enactment of House bill 368 in 1990 and were to protect the waters of the State from adverse environmental impacts relating to extractive use operations. The regulations were expected to be finalized in early 1993 and will apply Statewide to the mining of clay, sand, silt, gravel, and rock (stone).

Offshore sand resources were the subject of a cooperative study by the Delaware Geological Survey, Maryland Geological Survey, and the Minerals Management Service of the Department of the Interior. The loss of beach sands, with the potential for a loss of beach areas, would diminish tourism, a major industry in Delaware. The study was expected to provide information on the cost and feasibility of replacing sand lost by erosion.

Construction began for an advanced materials research and development facility near the University of Delaware at Newark. The Delaware Technology Park was expected to become an international center for development of composite materials technology. Composite materials are seen in the future as providing

longer life cycles for materials under high temperatures and have a myriad of applications in the transportation, energy, environmental, and aerospace areas.

Review by Nonfuel Mineral Commodities. Production of construction sand and gravel estimated at about 5.0 million short tons in 1992 was the highest amount ever reported for the State. The previous high was 3.4 million tons recorded in 1973. Demand for sand and gravel was at an alltime high because of a \$770 million State highway construction program. A major part of the 6-year program includes construction of a bypass highway around Dover and Smyrna.

Other mineral commodities used in Delaware were received from both foreign and domestic sources primarily at the Port of Wilmington. In 1992, shipments totalled nearly 5 million tons of which about 20% were nonfuel minerals. Imports received at the Port included **chrome ore, gypsum, ilmenite, manganese, salt, and titanium slag.**

FLORIDA

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Annual, Estimated

THE MINERAL INDUSTRY OF FLORIDA IN 1992

According to the U.S. Bureau of Mines, Florida's estimated nonfuel mineral production in 1992 was valued at \$1.4 billion. This was \$29 million more than that reported by the State's 200+ mineral producers in 1991. The increase was due to a strong demand for and production of cement, fuller's earth, sand and gravel (construction and industrial), magnesium compounds, and titanium concentrates. Although common clay, phosphate rock, and crushed stone tonnages declined, their values increased. Output increased, but value declined for zircon compounds; both value and tonnage fell for peat and rare earths.

NONFUEL MINERAL PRODUCTION IN FLORIDA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	442	\$27,777	214	\$13,482	221	\$13,923
Portland do.	3,954	186,404	3,023	142,081	3,334	156,698
Clays ² metric tons	391,334	39,625	363,253	39,150	345,692	48,182
Gem stones	NA	W	NA	6	NA	1
Peat thousand short tons	252	4,381	244	3,991	W	W
Sand and gravel:						
Construction do.	18,472	59,123	16,000	51,400	15,900	52,200
Industrial do.	520	7,024	551	5,989	619	6,133
Stone (crushed) do.	74,000	317,400	59,132	260,901	59,000	268,100
Combined value of clays (common), magnesium compounds, phosphate rock, rare-earth metal concentrates, staurolite (1990-91), stone (crushed marl, [1991]), titanium concentrates ilmenite and rutile), zircon concentrates, and values indicated by symbol W	XX	924,788	XX	879,164	XX	879,380
Total	XX	1,566,522	XX	1,396,164	XX	1,424,617

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data.

XX. Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" data.

3/Excludes certain stones; kind and value included with "Combined value" data.

The increase in the tonnage and value of cement, sand and gravel, and crushed stone, the raw materials of the construction industry, signaled a reversal in the multiyear downward spiral experienced by the State's construction industry. While phosphate rock output declined slightly from the tonnage produced in 1991, the increase in value was the result of the end of a trend of declining prices in the phosphate rock sector of the industry.

The State maintained its 5th place ranking in U.S. mineral production. Florida continued to lead the Nation in phosphate rock, mineral sands, and peat output and ranked among the top three States in crushed stone and masonry cement production.

Environmental. The Department of Environmental Regulations proposed a \$30,000 fine against U.S. Agri-Chemicals Corp. for a 175-million-gallon water spill into the Peace River in 1991. The spill, caused by a failure of two spoil containment structures, also released sand and clay into the waterway.

Legislation and Government Program. The Florida Legislature passed Senate Bill 2122, which revised the permitting requirements for mining activities in wetlands. Wetland reclamation performed in accordance with Department of Natural Resources (DNR) reclamation requirements must be accepted by DNR as mitigation when certain conditions are met.

In October, the Bureau of Land Management, a U.S. Department of the Interior agency, conducted a public hearing on the development of a Federal land-use plan for selected Florida lands. A team of land management specialists was preparing a "Resource Management Plan" with an environmental impact statement for selected public lands administered by the agency. The land-use plan will guide the Bureau's mineral-leasing and permitting responsibilities on about 270,000 acres of split estate land where Federal ownership is limited to the mineral interests. Included are about 6,700 acres in Polk County where the Bureau has phosphate mineral rights and about 124 acres with oil and gas rights.

Review by Nonfuel Mineral Commodities. Phosphate rock was again the leading mineral commodity, in terms of value, accounting for over 50% of the estimated value in 1992. Crushed stone, sales of which were estimated at \$268 million, was the second leading mineral commodity, accounting for almost 19% of Florida's mineral value. Portland and masonry cement ranked third; the \$170 million in sales accounted for approximately 12% of the State's total mineral value. Sand and gravel and clays rounded out the top five commodities in terms of reportable value.

During 1992, Florida's phosphate industry was rocked by layoffs. The decline in demand for U.S. fertilizer by foreign consumers led to the termination of over 700 workers in the central Florida phosphate district. IMC Fertilizer Inc., Piney Point Phosphates Inc., Oxychem, and Mobil Mining and Minerals were all involved in the layoffs.

Consolidated Minerals Inc. abandoned plans to construct a \$1 billion industrial complex in De Soto County and announced that it would focus on developing a new phosphate mine at the site of the proposed complex. Consolidated was unable to reach an agreement with Florida Power & Light Company to purchase excess electricity that the industrial complex would have produced.

In the metals sector, Florida Steel Corp. solved the problem of melting failures in its newly installed direct current furnaces by modifying the hearth refractory lining. The company replaced the original carbon-magnesia refractory bricks with magnesite powder. In midyear, Kyoei Steel Ltd., Osaka, announced plans to purchase Florida Steel Corp.'s parent company, FLS Holdings Inc., in a stock purchase deal valued at \$53.5 million.

GEORGIA

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Annual, Estimated

THE MINERAL INDUSTRY OF GEORGIA IN 1992

Statistics released by the U.S. Bureau of Mines, Department of the Interior, indicated that the estimated value of nonfuel minerals produced in Georgia in 1992 was \$1.54 billion, an alltime record high and an 18.6% increase over the value produced in 1991. Georgia's estimated production in 1992 was also \$45.4 million or 3% more than the previous record high of \$1.5 billion recorded in 1990.

A 23% increase in the estimated value of clays, Georgia's foremost mineral, was primarily responsible for the total increase. Other minerals increasing in value included crushed and dimension stone, barite, cement, gemstones, and mica. Mineral commodities showing decreases in value in 1992 included construction sand and gravel and feldspar.

NONFUEL MINERAL PRODUCTION IN GEORGIA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays metric tons	9,855,248	\$1,060,539	9,518,026	\$949,737	9,069,048	\$1,168,081
Gem stones	NA	20	NA	10	NA	W
Sand and gravel (construction)						
thousand short tons	5,158	16,644	*4,700	*14,500	4,500	14,200
Stone:						
Crushed do.	*53,000	*317,300	*41,339	*222,900	*43,600	*242,100
Dimension short tons	*147,068	*12,483	*173,892	*14,167	W	W
Combined value of barite, bauxite (1991-92), cement, feldspar, iron oxide pigments (crude), mica (scrap), peat (1990), sand and gravel (industrial), stone (crushed marble and other [1991], crushed unidentified [1992], dimension marble [1990-91]), talc and pyrophyllite (1990), and values indicated by symbol W	XX	88,138	XX	97,307	XX	116,164
Total	XX	1,495,124	XX	1,298,621	XX	1,540,545

c/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; kind and value included with "Combined value" data.

As a result of the increase, Georgia rose from sixth in 1991 to fourth in the total value of minerals produced and from third to second in the value of industrial minerals produced. The State accounted for 4.86% of the total estimated value of minerals produced in the country in 1992. Georgia continued to lead the Nation in the quantity and value of total clay mined and in two specific types of clay, kaolin and fuller's earth. It also led the Nation in the value of natural iron oxide pigments and in the volume of granite dimension stone. There were no metals produced in Georgia.

Major developments in the minerals industry in 1992 included two corporate changes. The assets of Coggins Granite Inc. and Coggins Quarries Co. were acquired by Royalty Granite Corp., a subsidiary of Swenson Granite Co., Concord, NH. Kemira Inc., the Savannah based subsidiary of Finland's Kemira Oy, signed a letter of intent to purchase a 20% interest in Nord Kaolin Co. based in Jeffersonville, Twiggs County. Closing of the transaction, which was originally scheduled for August 15, was still pending at yearend. Kemira also announced plans to construct an \$18 million research and development center at its Savannah plant. Cyprus Industrial Minerals Co.'s barite operations at Cartersville, Bartow County, were reported to be for sale at yearend.

E. I. du Pont de Nemours & Co. purchased 15,400 acres in Charlton County from Union Camp Corp. The site forms an extension to Du Pont's new heavy mineral sands operation north of Highland in adjoining Florida.

Developments affecting the crushed stone industry were primarily related to permitting new quarries along the route of the proposed outer-perimeter highway scheduled to be built around Atlanta in north-central Georgia. The Georgia Environmental Protection Division (EPD) granted mining permits to Vulcan Materials Co. and Florida Rock Industries for planned crushed stone quarries in Bartow County. The quarries will provide stone for the Atlanta outer-belt perimeter highway. Florida Rock also applied for a permit for a quarry, asphalt plant, and cement batch plant in Jefferson County.

Employment. The U.S. Department of Labor estimated that 8,400 workers were employed in Georgia's mining industry at the end of August 1992, the last month for which data are available. This represented a .4% decrease from the 7,600 mineral workers employed at the beginning of the year.

Exploration. Exploration activity in Georgia continued to be very sluggish because of cuts in exploration budgets predicated by an economy that was recovering only moderately from the recession impacting the State. ECC International continued exploratory drilling to reevaluate properties acquired from Georgia Kaolin Co. Other kaolin producers continued drilling programs to evaluate unmined properties and areas currently being mined.

Environment. EPD set a precedent in 1991 when it denied Davidson Minerals Properties a permit to quarry granite because of the historic value of the adjacent ground. The quarry would have been built within 1,500 feet of the 167-year-old Casulon Plantation, a National Historic Site. However, in February 1992, an administrative law judge with the Georgia Department of Natural Resources issued an order

overturning the EPD decision. The judge ruled that EPD misinterpreted the law when it ruled that the mined land-use plan was not compatible with land use in the area. In the order he stated that the land-use consistency requirement is applicable only to post-mining activities.

GNB Inc.(GNB), St. Paul, MN, announced plans for a new secondary lead smelter in Waynesboro, Burke County, GA. Company officials declared that the smelter, expected to be completed in early 1994, will offer an environmentally acceptable alternative to the incineration of lead-acid batteries. They also criticized the U.S. Environmental Protection Agency's 1989 decision to drop its ban on incinerating batteries, contending that smelting batteries is an environmentally superior method of disposing of the batteries and has the added advantage of recovering the lead. The new plant is designed to recycle 9 million batteries annually. GNB's existing smelter at Columbus will be phased out when the Waynesboro smelter becomes operational. However, new batteries will continue to be manufactured at the Columbus site.

New legislation requiring scrap recyclers to keep records of all purchases of nonferrous metals was enacted in April. The legislation was designed to reduce the theft of metal ranging from brass fittings and copper wire to aluminum bridge railings and stocks of used beverage cans.

Legislation and Government Programs. New legislation affecting the minerals industry was not enacted during 1992. Funding for the first phase of the Georgia Ports Authority's \$319 million FOCUS 2000 Savannah River channel deepening and landside ports improvements program was approved by the Georgia General Assembly. The \$88 million first phase of FOCUS 2000 includes funds for deepening the Port of Savannah channel from 38 feet to 42 feet, completion of an existing container berth, additional warehousing and storage areas, a container crane upgrade program, and improvements to the Port of Brunswick's Mayor's Point Terminal. The \$43 million channel deepening will allow the port to accommodate the next generation of containerships. Federal reimbursement will be available for part of the project.

On July 1, the Georgia Department of Natural Resources shifted responsibility for portions of the Erosion and Sedimentation Control Program related to mine permitting and reclamation from the Land Protection Branch to the Water Protection Branch. A new 10-year plan proposed by the Georgia Geologic Survey emphasized a shift from mineral and academic studies to environmental technical investigations and regulatory support. The Accelerated Economic Minerals Program was terminated and other geologic mapping and mineral studies were canceled.

Review by Nonfuel Mineral Commodities. Clays, valued at almost \$1.2 billion, accounted for 75.8% of the total estimated value of minerals produced in Georgia and for over 63% of the value of all the clays produced in the United States. **Kaolin, fuller's earth, and common clay and shale** were mined. The State once again in 1992 was the national leader in both the quantity and value of both kaolin and fuller's earth. Georgia also led the Nation in the value of **iron oxide pigments** and in the quantity of **granite dimension stone**. Overall, the estimated quantity of dimension stone produced increased to 169,383 short tons. The data cannot be compared with 1991 production data, which included only granite dimension stone.

Crushed stone, Georgia's second leading mineral commodity, increased 5.5% to 43.6 million short tons valued at \$242.1 million, an 8.6% increase.

Georgia ranked second nationally in the quantity and value of **barite** produced. Production data were withheld because only two companies, Cyprus Industrial Minerals and New Riverside Ochre Co. (NRO), mined barite in 1992. NRO was also one of the country's leading producers of natural iron oxide pigments, mining both **ochre** and **umber** in Bartow County.

Other mineral commodities produced in Georgia that increased in both tonnage produced and value over that of 1991 included **bauxite, industrial sand and gravel, masonry and portland cement, gemstones,** and

scrap mica. Mineral commodities decreasing in quantity and value from that of 1991 included construction sand and gravel and feldspar.

Several other mineral commodities were manufactured into higher value products from minerals that are mined in Georgia or shipped into the State. These value-added commodities are not included in table 1 but are important to the State's mineral economy. Included are the following industrial minerals: aragonite, bentonite, brucite, high-brightness marble, celestite, gypsum, iodine, perlite, rutile, salt, and vermiculite. Metals in this category included aluminum, copper, gold, iron ore, lead, manganese, pyrite, silver, steel, and zinc. Gypsum and steel slag were produced as byproducts from other mineral processing operations.

HAWAII

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Annual, Estimated

THE MINERAL INDUSTRY OF HAWAII IN 1992

The value of Hawaii's nonfuel mineral production in 1992 was estimated by the Bureau of Mines, U. S. Department of the Interior to be \$148.6 million, a 5% increase from the \$141.1 million reported in 1991. The State ranked 40th nationally in the value of 1992 nonfuel mineral production. Crushed stone, construction sand and gravel, and portland cement were the principal mineral commodities produced. Small amounts of masonry cement and gemstone production were also reported.

NONFUEL MINERAL PRODUCTION IN HAWAII 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	12	\$1,870	*10	*\$600	8	\$1,280
Portland do.	532	46,311	*547	47,589	598	52,026
Gem stones	NA	55	NA	60	NA	130
Sand and gravel (construction)						
thousand short tons	438	2,459	*400	*2,300	300	1,800
Stone (crushed) do.	*7,000	*55,400	*10,486	*90,563	*10,500	*93,400
Total ³	XX	106,095	XX	141,112	XX	

e/Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; data excluded to avoid disclosing company proprietary data.

3/Partial total, excludes values that must be concealed to avoid disclosing company proprietary data.

Mineral production in Hawaii is mainly for local construction usage. The rapid growth in construction throughout the State slowed somewhat in 1991 and was expected to be even less in 1992, but government policy aimed at expanding the housing effort and at raising public construction levels in general offset the anticipated drop in private construction, resulting in a moderate rise in total completion numbers and a modest increase in mineral production.

Legislation and Government Programs. The University of Hawaii christened the Kaimikai-o-Kanaloa (Heavenly Searcher of the Sea) in July to be used to gather information on undersea mineral resources. The 220-foot oceanography vessel will serve as the mothership for the Hawaii Undersea Research Laboratory's two submersibles; the 20-foot, three-person Pisces V and the 16-foot, two-person Makali'i. The

ship will be used for investigations within Hawaii's 200-mile Exclusive Economic Zone and elsewhere in the Pacific. One of its missions will be to determine the distribution of potentially valuable mineral resources on the sea floor.

The Windward, Oahu City Council adopted a regulation that mandated the use of crushed glass in the asphalt mix of all city road construction and paving. It will serve as a partial substitute for crushed stone aggregate which is said to be in short supply and to help ease the filling of Oahu's landfill spaces, which are projected to reach their limits in about 14 years.

The State's Department of Transportation sold stockpiled coral material at the Kawaihae Harbor for use in agriculture and the manufacture of concrete products on the Island of Hawaii.

Review by Mineral Commodities. Ameron HC&D applied for a special use permit to develop a quarry to mine rock, produce ready-mix and asphaltic concrete material and sell crushed aggregate on 153 acres near Waialua Oahu. The site contains a basalt deposit locally known as "blue rock" which is especially suited for cement production. The proposed quarry would include a plant capable of processing 500,000 tons of basalt per year.

IDAHO

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Annual, Estimated

THE MINERAL INDUSTRY OF IDAHO IN 1992

The estimated value of nonfuel mineral production for Idaho in 1992 was \$338.6 million, an increase of 14% from that of 1991, according to the U.S. Bureau of Mines. Increased production value for portland cement, gold, phosphate rock, and crushed stone more than offset a drop in the value for lead and silver. Industrial minerals, led by portland cement, lime, phosphate rock, construction sand and gravel, and crushed stone, accounted for almost 61% of the State's nonfuel mineral production value. Idaho ranked 30th nationally in that value.

NONFUEL MINERAL PRODUCTION IN IDAHO 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	W	W	2967	W	2913	W
Gem stones		NA	\$320	NA	\$426	NA	\$314
Gold ³	kilograms	W	W	3,348	39,107	4,759	53,552
Lime	thousand short tons	W	W	150	9,124	229	13,930
Phosphate rock	thousand metric tons	4,380	67,978	5,921	86,328	5,700	95,190
Pumice	metric tons	31,333	220	36,868	267	37,830	522
Sand and gravel:							
Construction	thousand short tons	9,222	25,590	11,600	31,300	12,000	33,000
Industrial	do.	552	6,234	W	W	W	W
Silver ³	metric tons	442	68,418	337	43,807	284	36,523
Stone:							
Crushed	thousand short tons	4,300	12,900	3,230	15,057	4,400	21,100
Dimension	short tons	W	W	3,596	W	W	W
Combined value of antimony, cement, clays, (common, kaolin), copper, feldspar, garnet (abrasive), lead molybdenum, perlite, vanadium ore, zinc, and values indicated by symbol W							
		XX	195,977	XX	71,632	XX	84,483
Total		XX	377,637	XX	297,048	XX	338,614

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Recoverable content of ores, etc.

The value of Idaho's industrial minerals rose more than 23% from that of 1991. The State's construction materials--portland cement, construction sand and gravel, and crushed stone--led the way with the largest increase in absolute value and by percentage. Although the amount of phosphate produced, Idaho's highest valued mineral commodity, dropped slightly, overall value increased by more than 10% owing to higher estimated prices.

Idaho's metal production did not fare as well as the industrial minerals, with aggregated value essentially unchanged. The one bright spot was gold, which had an estimated increase of 42% in quantity and 37% in value from that of 1991. On the downside, in the Coeur d'Alene Mining District, another silver mine was put on a care-and-maintenance basis, making a total of four major metal mines closed to date; two others have cut back exploration and development, and reduced production. At yearend, the State's only molybdenum mine was temporarily shut down and placed on care-and-maintenance status.

Exploration. Exploration activity, particularly for metallics, decreased slightly during 1992 according to the Idaho Geological Survey (IGS). Over 40 advance projects, mostly for gold, were recorded, but there were fewer projects overall and less reconnaissance activity. Fully permitted development projects like Idaho Gold's Buffalo Gulch and FMC Gold Co.'s Beartrack remained on hold due to lower gold prices. Delays caused by new rulings on anadromous fish and historical resources hampered some projects. Exploration for limestone and phosphate reserves in southeastern Idaho increased.

North Idaho exploration activity was sparse. Golden Chest and Kennecott Exploration had modest programs at Murray and Wallace, respectively. At the Shale Mountain discovery announced last year by a U.S. Bureau of Mines, IGS, and U.S. Geological Survey team, crews from Wilson Exploration Co. conducted helicopter-supported mapping and sampling of a gold-bearing breccia zone near the Idaho-Montana line. In the Coeur d'Alene Mining District, Hecla Mining Co. began development of a new silver discovery beneath the old Gold Hunter Mine.

In the Salmon area, American Gold Resources did additional drilling and metallurgical studies near the Haidee Mine, and Formation Capital was active on its gold properties. Formation also signed a lease on the Blackpine Mine, a copper-cobalt occurrence similar to the Blackbird Mine. Atlas Precious Metals sold its interest in the Musgrove Creek property to Newmont Exploration.

Several gold projects dotted central Idaho. At Warren, CSC Mining drifted along a gold-quartz vein at the New Rescue decline. Cambior USA Inc. drilled south of Yellow Pine. Kennecott had a new project at the Dewey Mine in Valley County, and at Stibnite, a joint venture of Hecla and American Barrick drilled and evaluated a sulfide resource. Independence Mining had a program at the Lucky Boy Mine at Custer.

Farther south, Western Mining continued work at the Bayhorse District in Custer County, Biomyne worked at Warm Springs Creek west of Ketchum, and Atlanta Gold drilled the West Pit zone at Atlanta. In eastern Idaho, Placer Dome drilled the Kilgore prospect in Clark County. Atlas and Gold Fields Mining had small projects in southern Idaho. NERCO Exploration cut back its exploration program near the DeLamar Mine. J. L. Carroll drilled the Consolidated Mercury property and AMAX Exploration had a substantial drill program at the Idaho-Almaden mercury mine in Washington County.

Environment. At its Yellow Pine Mine, east of McCall, Hecla used cyanide-eating bacteria to detoxify a heap-leach pad. According to the company, the new method was quite successful. The bacteria ate the cyanide and broke it down into carbon dioxide, water, and nitrogen. The 1.3-million-ton heap was nearly

neutralized after five months of application compared with the two years it would take with a traditional chemical neutralization process.

Ash Grove Cement West Inc. was seeking State permission to burn scrap tires in the kilns at its cement plant at Inkom. The plant has been burning about 9,000 gallons of waste oil annually, about 25% of its total fuel consumption. The proposed 300,000 to 1 million tires could account for an additional 20% of the fuel burned. According to an Ash Grove engineer, there would be no appreciable change in plant emissions; no black smoke or smell of rubber.

Legislation and Government Programs. The Idaho Department of Parks and Recreation opened a new mining interpretive center near Challis, at the intersection of U.S. 93 and State Highway 75; it includes interpretive displays and audio-visual programs on Idaho's mining history. A circle road tour was developed with a number of posted stops, including the historic Yankee Fork gold dredge.

Review by Nonfuel Mineral Commodities. Idaho continued as the second-ranked State in the quantity of marketable phosphate rock output. None of the Idaho producers marketed phosphate rock as a saleable commodity. FMC Corp. and Monsanto Co. produced elemental phosphorous; J.R. Simplot Co. and NuWest Industries Inc. made various grades of phosphoric acid; and Rhone-Poulenc Basic Chemicals Co. shipped ore to its elemental phosphorous plant in Montana. Owing to dwindling reserves at Simplot's Gay Mine, the source of phosphate rock used by FMC at its elemental phosphorous plant, FMC continued development of a new mine in the Dry Valley, about 25 miles northeast of Soda Springs. Also near Soda Springs, NuWest opened a new plant that extracts silica from waste generated in the making of phosphate fertilizer. In addition to the silica, vanadium, fluorine salts and yttrium also are recovered.

In January, Pegasus Gold Inc. made its first gold pour at the Black Pine Mine, a heap-leach operation about 10 miles from the Utah border in Cassia County. Beginning with the Tallman pit, the company plans to mine three separate open pits. Project startup was delayed slightly after Pegasus agreed, for environmental reasons, to use a central valley-fill leach pad as opposed to the original plan of several smaller pads at each of the three pits. Idaho Gold Corp. completed mining at its Champagne property 20 miles west of Arco, Butte County. The company, a subsidiary of Bema Gold Corp., continued secondary leaching of the low-grade ore and initiated its reclamation efforts. East of McCall, Hecla completed mining the oxide portion of the Yellow Pine Mine and began reclamation of the site. Barrick Gold Exploration Inc. signed a letter of intent to explore and develop the refractory sulphide gold deposit on the property. Barrick Gold, a subsidiary of American Barrick Resources Corp., has an option to earn a 70% interest in the mine.

Full production continued at Nerco Minerals Co.'s DeLamar Mine east of Jorden Valley, OR, in Owyhee County. The property includes a countercurrent decant mill, a vat-leach plant, and a heap-leach facility. Nerco detoxified a tailings pond and completed construction of an acid volatilization plant that will allow Nerco to recover and reuse cyanide and prevent it from entering the pond water. Other gold producers included MinVen Gold Corp.'s Stibnite Mine near Yellow Pine in Valley County and U.S. Antimony Corp.'s Yellowjacket Mine, southwest of Cobalt, Lemhi County.

In lieu of a debt payment, Canyon Resources Corp. transferred its 15% ownership holdings in the Beartrack property to Meridian Gold Co., a wholly owned subsidiary of FMC Gold. Beartrack, an open-pit, heap-leach project west of Salmon, Lemhi County, has been put on hold. Hecla's Grouse Creek project received all its State and Federal permits, including the 404 or wetlands permit. Hecla continued with an active drill program and announced high grade gold and silver intercepts from holes drilled outside the delineated Sunbeam and Grouse Creek ore bodies at the Custer County project.

The Galena silver mine near Wallace, operated by Asarco Incorporated, was placed on care-and-maintenance status. Coeur d'Alene Mines Corp. acquired Hecla's 12.5% net-profit interest in the existing

lease for \$1.5 million. The transaction increased Coeur d'Alene Mines' interest to 62.5%, with Asarco retaining a 37.5% interest. Reportedly, if silver reaches \$11 a ounce, Hecla would be entitled to a net profit interest. Hecla's Lucky Friday and Sunshine Mining Co.'s Sunshine Mine are the only mines still operating in the Coeur d'Alene Mining District. The Sunshine silver mine operated at a reduced capacity, and with a refinery and mint, was the Nation's only vertically integrated silver producer. Citing low metal prices, Hecla laid off 20 employees at the Lucky Friday lead mine at Mullan. The miners worked in an underground silver and lead-bearing stope that no longer was being mined.

Idaho's only cement producer was Ash Grove Cement West at Inkom, Bannock County. Limestone and quartzite used in cement production was quarried from nearby the plant. Chemstar Lime Co. dedicated its new \$24 million Tenmile Pass lime mine and plant near Bancroft. A conveyor belt, about 5,300 feet in length, was installed between the quarry and plant. Operating 24 hours per day, the plant used a 171-foot-tall high-efficiency Maerz kiln. The finished product is trucked to Bancroft and then shipped to customers by rail.

In the spring, Cyprus Minerals Co. laid off 56 workers at its Thompson Creek molybdenum mine west of Challis. The company later announced that the mine and mill would be temporarily closed and put on a care-and-maintenance basis at yearend. Cyprus cited low prices as a cause. Kerr-McGee Chemical Corp. operated a vanadium recovery plant at Soda Springs. The operation recovered vanadium from ferrophosphorus slag, a waste product generated by Monsanto's elemental phosphorous plant. Copper was recovered as a byproduct at three mines--Galena (before closure), Lucky Friday, and Sunshine.

Emerald Creek Garnet Milling Co., now owned by Hawkeye Development Ltd. of Canada, operated the State's only commercial garnet mine near Fernwood and was the Nation's largest garnet producer. In addition to gem-quality stones, including star garnets, the mine was one of the world's largest producers of garnets used for industrial abrasives.

Placer Mining Co. acquired the mineral rights to the Bunker Hill Mine, formerly Idaho's largest zinc producer, from the Bunker Hill Mining Co. During 1992, Hecla's Lucky Friday Mine was the only property reporting zinc production. Sunshine Mining produced antimony as a byproduct at its Sunshine silver mine. Idaho was the only State reporting antimony production.

Unimin Corp., near Emmett, was the State's sole producer of feldspar. The company produced a feldspar-silica sand mixture used mainly in glass production. Pumice was produced by three companies--Amcor Inc. and Producers Pumice, a subsidiary of Builders Masonry Products, in Bonneville County; and by Hess Pumice Products in Oneida County. National Perlite Products Co., a subsidiary of Oglebay Norton, produced perlite from an operation north of Malad City in the Caribou National Forest. The company continued road development to new mining claims. National Perlite signed a consent order to correct some Federal air pollution violations at its plant.

ILLINOIS

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Annual, Estimated

THE MINERAL INDUSTRY OF ILLINOIS IN 1992

According to statistics released by the U.S. Bureau of Mines, the value of nonfuel mineral production for Illinois in 1992 was estimated to be \$677 million. The value increased about 0.6% from the \$673.3 million reported in 1991. Increased sales of sand and gravel, crushed stone, masonry cement, lime, peat, clay, and zinc offset decreased sales of portland cement and fluorspar.

Illinois was a leader nationwide in production of fluorspar, industrial sand and gravel, and tripoli; and ranked third in the production of crushed stone. Nationally, the State continued to rank 16th in nonfuel mineral production value in 1992.

NONFUEL MINERAL PRODUCTION IN ILLINOIS 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland) thousand short tons	2,842	\$116,781	2,651	\$108,814	2,349	\$96,309
Clays metric tons	2598,479	2,516	935,154		891,186	47,792
Gem stones	NA	W	NA	547	NA	562
Sand and gravel:						
Construction thousand short tons	32,380	104,728	26,300	90,400	26,800	94,100
Industrial do.	4,486	62,531	4,146	57,210	4,421	58,953
Stone (crushed) ³ do.	262,700	283,100	68,586	295,362	70,800	314,000
Combined value of barite, cement (masonry), clays (fuller's earth [1990]), copper (1990), fluorspar, lead (1990), lime, peat, silver (1990), stone (crushed sandstone [1990], crushed sandstone and limestone [1991], dimension), tripoli ([1990-91]), zinc, and value indicated by symbol W						
	XX	95,478	XX	82,081	XX	65,703
Total	XX	665,134	XX	673,291	XX	677,419

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" data.

3/Excludes certain stones; kind and value included with "Combined value" data.

Employment. The U.S. Department of Labor reported 18,300 workers employed in the Illinois mining industry at the end of October 1992. This represented a 5% decrease from last year's average.

Continued recession in the Nation's domestic iron and steel industry was reflected in company cutbacks and closures in Illinois. At least 4,000 steel company employees were out of work on Chicago's South Side and in northeastern Indiana. Net losses forced Inland Steel Industries Inc. to restructure and adopt cost-cutting practices. U.S. Steel closed its South Works plant, and Thomas Steel Corp., a Lemont mini-mill, claimed bankruptcy in June and has offered the company for sale. Acme Metals Inc., based in the south Chicago suburb of Riverdale, announced it will cut its salaried workforce by 10% before the end of the year. Iowa Malleable Iron Co. announced it will close its Galesburg foundry.

Environment. In November, the State accepted bids for reclamation work on five abandoned fluorspar mines in Pope and Hardin Counties. This is the final step in the Abandoned Mined Lands Reclamation Council's ongoing efforts to eliminate the most hazardous mine openings in the two-county area. The Council will concentrate future noncoal reclamation efforts on the lead and zinc mining areas of northwestern Illinois. Federal production fees on active coal mines provide funding for noncoal mine reclamation projects permitted by 1994.

Soil samples from the abandoned New Jersey Zinc and Mobil Mining operations near the town of De Pue, Bureau County, showed high concentrations of cadmium. State environmental and health officials are concerned over possible long-term health risks from extended exposure to the cadmium and are in the process of conducting additional tests. Exposure to high concentrations of cadmium over time can cause kidney disorders.

The Elmhurst-Chicago Stone Co. quarry was sold to DuPage County for \$39.9 million. The Elmhurst quarry will be used as a stormwater reservoir.

Legislation and Government Programs. Senate bill 326 (Public Act 87-0830), approved in January, amends the Oil and Gas Act creating a six-member Oil and Gas Board in the Department of Mines and Minerals. Senate bill 1716 (Public Act 87-0886), approved in July, amends the Natural Resources Act to give the Department of Natural Resources the power to participate in Federal geologic mapping programs.

The Illinois State Geological Survey (ISGS) continued research programs in the fields of coal, oil and gas, minerals, and subsurface mapping. The Survey's coal program focused efforts on identification of the State's remaining minable reserves and on methods of making Illinois coal more environmentally acceptable.

Oil and gas research was focused on methods of getting better recovery from existing fields. Historically, the recovery rate from the State's existing fields has been only 35%, leaving about 5.9 billion barrels in the ground. Recent studies in the King field identified 1 to 2 million barrels of oil, producible by a combination of water flooding and strategic-reservoir-management techniques.

Geologists of Illinois, ISGS, and the U.S. Geological Survey completed an extensive 5-year geologic study of Southern Illinois. It is hoped that the study will boost economic development and lessen the risk factors involved in mineral exploration in the area. Information from 75 maps, 500,000 feet of core samples, oil well logs, and measuring instruments were incorporated in the resulting computerized map that covers 7,500 square miles of southern Illinois.

In order to head off a loss of more than one-third of the State's coal business by 1995, because of 1990's Clean Air Act amendments, the Illinois Coal Development Board (ICDB) has been funding research projects aimed at ways of cleaning up high-sulfur coal. Coal researchers at Southern Illinois University in Carbondale received a \$717,000 grant from ICDB for funding five ongoing and four new projects. Nearly all the funded projects deal with reducing the sulfur content in coal. Another type of project, involving the blast-furnace injection process used in making raw materials for steel, may lead to new markets for Illinois coal.

Review by Nonfuel Mineral Commodities. Of the State's five leading nonfuel mineral commodities (crushed stone, portland cement, construction sand and gravel, industrial sand, and clay), only portland cement decreased in value compared with 1991 figures. Attendant value of these five commodities accounted for over 90% of the State's nonfuel mineral value. Crushed stone, the State's leading nonfuel mineral commodity, accounted for about 46% of Illinois nonfuel mineral value in 1992. Production and attendant value of crushed stone increased about 3% and 6%, respectively, compared with 1991 figures.

Conco-Western Stone Co. will be allowed to continue mining limestone from its quarry that was recently annexed by the village of North Aurora. Conco assured city officials that noise and dust levels would decrease when the company moves their mining operations underground. Underground room-and-pillar mining methods are expected to keep the operation viable for another 40 years.

The Ogle County Board and Byron City Council denied Robert Rogers request to expand his existing quarry by 56 acres. County health officials believed that bacterial contamination in some area wells was related to water runoff from the quarry and that quarry expansion would increase water contamination in area wells. The Will County Board denied the owner of a quarry in Wheatland Township, just outside the newly annexed Bolingbrook village limits, a special use permit for quarrying and related blasting operations. A suit against the county is not expected to go to court until early next year.

Laclede Steel Co. started a new facility in Vandalia as part of a long-term plan to lower production costs of semifinished steel. Part of the company's long-term plan included buying new plants to shift labor-intensive work out of its mill at Alton. Alton will eventually lose about 50 steelworker jobs. Lukens Inc., the third largest maker of steel plate in the Nation, acquired Washington Steel Corp. for \$280 million. Washington Steel was the Nation's third largest stainless steel producer.

U.S. Steel closed its southeast Chicago South Works steel mill in April. Built in 1880 to supply railroad companies with steel rails, the integrated mill employed as many as 22,000 people during World War II. Competition and shrinking structural steel markets forced the company out of business. At least part of the South Works facility may be sold to a mini-mill operator.

General Motors (GM) announced in February that it would try to sell its Powertrain Foundry in Tilton in order to save about 1,200 jobs. GM intends to contract for work currently done at the plant.

Shareholders of Northwestern Steel and Wire Co. (NSW), based in Sterling, approved a recapitalization transaction with Kohlberg & Co., a New York merchant banking concern. Kohlberg will invest \$35 million for improvements needed to improve NSW's competitive edge against foreign competition. Company officials announced they intend to phase out the John Deere Foundry in Silvis over a 2-year period and will close the facility in 1993.

Reynolds Metals Co. completed a \$27 million expansion at its McCook, Cook County, sheet and plate plant. The expansion project, which started in 1990, will increase the company's aluminum plate capacity by 50%.

Zeigler Coal Holding Co. purchased Shell Oil Co.'s coal mining subsidiary, Shell Mining Co. in October. Shell operated coal producing complexes in Illinois, Kentucky, Ohio, West Virginia, and Wyoming. In August, Amax Coal Industries reduced their workforce at the Wabash Mine near Mt. Carmel by about 290 hourly employees. Amax was forced to cut production by about 30% because PSI Energy refused to accept contracted shipments of coal from the Wabash Mine. Peabody Coal Co. closed its River King Mine near Marissa as coal reserves were exhausted. The remaining 65 workers will be involved in reclamation work for about 2 more years. About 100 million tons of coal was produced from the mine, which began operating in 1957.

INDIANA

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Annual, Estimated

THE MINERAL INDUSTRY OF INDIANA IN 1992

The value of nonfuel mineral production in Indiana in 1992 was about \$465 million, according to data compiled by the U.S. Bureau of Mines. Nonfuel value in 1992 was the highest ever recorded in the State. Crushed stone and cement production in 1992 accounted for about \$54 million of the \$62 million gain in the State's nonfuel value over that of 1991. After a slowdown in 1991, mineral production in Indiana resumed a growth pattern that showed an increase in nonfuel mineral value each year from 1983 through 1990. Once again, improved demand for industrial minerals used primarily in construction resulted in increased production.

NONFUEL MINERAL PRODUCTION IN INDIANA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	368	\$27,813	*317	*\$24,092	363	\$27,588
Portland do.	2,417	114,414	*2,252	*105,844	2,867	134,749
Clays ² metric tons	1,051,703	3,273	929,964	3,516	884,834	4,320
Gem stones	NA	W	NA	561	NA	568
Peat thousand short tons	37	W	26	W	24	599
Sand and gravel (construction) do.	23,879	76,886	*18,100	*60,400	19,700	67,000
Stone:						
Crushed do.	³ *36,700	³ *147,700	37,924	152,489	42,000	173,900
Dimension short tons	³ *194,728	³ *29,504	³ 187,580	³ 27,491	190,412	26,767
Combined value of clays (ball), gypsum (crude), lime, sand and gravel industrial, stone (crushed marl and miscellaneous stones [1990], dimension limestone and dolomite [1991], dimension sandstone [1990]), and values indicated by symbol W						
	XX	32,176	XX	28,902	XX	29,721
Total	XX	431,766	XX	403,295	XX	465,212

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Excludes certain stones; kind and value included with "Combined value" figure.

Operation of scrubbing systems that may become a prototype for reducing sulfur dioxide emissions at coal burning powerplants using high-sulfur coal started up in Indiana during the year. In June, Northern Indiana Public Service Co. (NIPSCO) began operating a \$150-million flue gas desulfurization system at its Bailly Generating Station in Porter County. Air Products & Chemicals Inc. and Mitsubishi Heavy Industries America Inc. owns and operates the desulfurization system under a 20-year agreement with NIPSCO. The scrubbing system absorbs sulfur dioxide emissions by mixing wet limestone with burning coal. In this process, a reusable gypsum byproduct is produced, which is sold to U.S. Gypsum Co. for use in wallboard manufacturing. The operation was expected to require about 128,000 tons of limestone per year and generate about 237,000 tons of byproduct gypsum annually.

Employment. Indiana's mining and mineral-related industries showed a decline in employment in 1992. The number of workers in the State's steel, coal, and industrial minerals industries totaled about 42,100 through September of 1992, the latest month for which statistics are available. In 1991, these three industries employed about 1,200 more workers. Of the 1992 employment total, about 90% were employed in steel, 7% in coal, and 3% in industrial minerals. The construction industry, which used most of the industrial minerals produced in Indiana, employed about 122,000 workers as of September 1992, a decline of about 2,500 workers from yearend 1991.

Review By Nonfuel Mineral Commodities. Nationally, Indiana ranked 23d in value of nonfuel mineral production. The State's top two mineral commodities, **crushed stone** and **cement**, each accounted for approximately 35% of Indiana's total nonfuel value. Indiana was among the Nation's top 10 States in output of both of these commodities. Indiana was also among the Nation's top 10 States in production of **crude gypsum**, ranking 7th in 1992.

Once again in 1992, Indiana was the leading producer of **dimension stone** in the United States. Nearly 20% of the Nation's dimension stone was quarried in Indiana. During the year, plans for a highway from Indianapolis to Evansville were under consideration by the State Department of Transportation (DOT). Construction of the proposed highway was expected to overlay dimension limestone resources in Greene, Monroe, and Daviess Counties. The DOT and Indiana Limestone Institute were studying the potential effect on these resources before determining the final route for the highway.

The State's **steel** industry reported improved production at about 17 million short tons through October of 1992, the latest month for which statistics were available. Through the first 10 months of 1991, output was about 15.9 million tons.

IOWA

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Annual, Estimated

THE MINERAL INDUSTRY OF IOWA IN 1992

The value of nonfuel mineral production in Iowa was estimated by the U.S. Bureau of Mines at \$387.7 million in 1992. This was an increase of nearly \$43.7 million over the \$344 million reported in 1991. Estimated sales increased in 1992 for clay, crushed stone, portland cement, crude gypsum, construction sand and gravel, and gem stones. Increases in crushed stone production were the most substantial, followed by portland cement and crude gypsum. Crushed stone continued as the State's leading mineral commodity, accounting for almost 47% of the estimated total nonfuel mineral value. Combined values of crushed stone, portland cement, and construction sand and gravel accounted for over 92% of the total mineral value produced in 1992. Iowa ranked 27th nationally in nonfuel mineral value and continued to rank second in the production of crude gypsum.

NONFUEL MINERAL PRODUCTION IN IOWA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	53	\$5,054	*34	*\$3,264	40	\$3,840
Portland do.	2,525	122,466	*2,301	*112,749	2,471	121,079
Clays metric tons	423,227	1,376	530,477	2,226	505,990	2,741
Gem stones	NA	14	NA	8	NA	W
Gypsum (crude) thousand short ton	2,192	14,243	2,162	12,285	2,280	12,966
Peat do.	W	W	W	W	20	796
Sand and gravel (construction) do.	14,953	46,432	*17,400	*55,800	17,100	55,900
Stone (crushed) do.	*29,000	*118,600	*31,057	*147,815	37,000	181,300
Combined value of other industrial minerals and values indicated by symbol W	XX	8,185	XX	9,885	XX	9,031
Total	XX	316,370	XX	344,032	XX	387,653

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data.
XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; value included with "Combined value" data.

Employment. Employment in the mining industry in November 1992, the last month for which data are available, totaled 2,200 workers, the same as was reported for November 1991. The stone, clay, and glass products sector also remained stable at 5,900 workers. The primary metals sector decreased 200

workers to 7,600 in 1992. Employment in the construction industry decreased 3.4%, from 47,400 in 1991 to 45,800 in 1992.

Legislation and Government Programs. Enacted House bill 2356, Clean Air Act, provides the necessary authorization for the Iowa Department of Natural Resources to administer the Federal Clean Air Act. The legislation gives the Department authority to issue general permits for air contaminant sources, change air quality standards to reduce acid rain, implement rules regarding sulfur dioxide emissions, and establish a small business compliance program. The provision was eliminated that would have granted permits by default if the Department did not act on an application within 120 days.

The U.S. Environmental Protection Agency (EPA) issued two regulations to implement air pollution controls required by the Clean Air Act. These included regulation of a number of mineral-products industries for toxic air pollutants and the implementation of permitting requirements for all major sources of air pollution. New standards also were set for visibility and particulate matter that apply to calciners and dryers at plants processing or producing construction products, including lightweight aggregate. EPA anticipated that product price increases resulting from the new standards probably would be less than 0.5%, but could be as much as 1.75% for the lightweight aggregate industry. EPA also studied the process of using wastes as fuel in cement kilns, in an effort to reduce regulatory burdens on industry and to redefine what is considered a waste. EPA determined that there was no data to indicate that emissions from burning wastes in cement kilns threaten human health or the environment, and that there was no measurable increase in the level of toxic metals in the cement product.

Scientists with the Iowa Geological Survey Bureau continued to evaluate drill core and seismic data from the Midcontinent Rift in western Iowa for base and precious metal resource potential.

Review by Nonfuel Mineral Commodities. Crushed stone continued as the State's leading mineral commodity, accounting for almost 47% of the estimated total nonfuel mineral value. In 1992, Iowa ranked 2nd of 20 States producing crude gypsum, which constituted 3.3% of the State's estimated total nonfuel mineral value, an increase of about 5.5% over that produced in 1991.

The largest increases in 1992 were for crushed stone. Estimated production and value increased about 19% and 23%, respectively, over reported 1991 totals. While the production of clay decreased almost 5% in 1992, the value increased over 23%.

Holnam Inc. received a \$220,000 grant from the Iowa Department of Natural Resources to assist in the conversion of the company's Mason City cement plant to utilize tires as fuel in the cement kilns. Up to 14% by weight of the coal and coke used in the kilns was expected to be replaced with shredded tires by mid-March 1993. The company hopes to be ready to use whole tires by mid-summer 1993. Holnam, in Cerro Gordo County, will be the first company in the State to use tires for fuel in cement kilns.

Martin Marietta Aggregates Inc. acquired a 50% interest in Kaser Corp. Both companies produce limestone, agricultural lime, and sand and gravel in the State.

Jim Huyser, owner of Star Coal Co. in Lovilia, settled with Monroe County and dropped his long-running lawsuit. Huyser had received approval from the Iowa Department of Natural Resources to use land at his defunct coal strip mine for a regional landfill. The county rezoned the area and thereby forced Huyser out of business.

Canada Tungsten Mining Corp. Ltd. (CMTC) lowered the carrying value of its long-term leasehold interest in its Fort Madison ammonium paratungstate plant to salvage value. CMTC sold the plant's leasehold interest to AMAX Inc., a subsidiary of its parent company. If CMTC develops a use for the plant,

such as reopening its Canada Tungsten mine in the Northwest Territories, the company has retained the right to repurchase within 7 years, for a nominal amount. The Lee County plant was shut down, but is capable of processing 200,000 tons per year of ammonium paratungstate. The tungsten mine has a capacity to produce 400,000 tons per year of WO_2 .

KANSAS

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Annual, Estimated

THE MINERAL INDUSTRY OF KANSAS IN 1992

The value of nonfuel mineral production in Kansas was estimated by the U.S. Bureau of Mines at \$368.9 million in 1992. This was a \$3.2 million increase over the \$365.7 million reported in 1991. Estimated sales increased in 1992 for producers of 6 of the 13 mineral commodities produced in the State. Increases in industrial sand and gravel production were the most substantial, followed by grade-A helium, crude gypsum, and portland cement. Increases also occurred in the production of salt from brines, and crushed stone. Salt continued as the State's leading mineral commodity, accounting for almost 26% of the total nonfuel mineral value. Combined values of salt, grade-A helium, crushed stone, and portland cement accounted for almost 86% of the total mineral value reported in 1992. Kansas ranked 28th nationally in nonfuel mineral value and continued as the Nation's leading producer of crude and refined helium.

Employment. Employment in the mineral industry in October 1992, the last month for which data are available, totaled 9,600 workers, the same as was reported for 1991. Approximately 1,500 workers were employed in the nonfuel sector of the industry, an increase of 100 above 1991 totals. The oil and gas extraction sector decreased from 8,200 in 1991 to 8,100 in October 1992. The stone, clay, and glass products sector increased from 6,000 in 1991 to 6,300 in 1992. The primary metals sector increased 100 workers to 2,900 in 1992. Employment in the construction industry increased from 43,100 in 1991 to 47,500 in 1992.

Legislation and Government Programs. The State of Kansas was awarded three grants, totaling \$702,127, from the U.S. Department of the Interior's Office of Surface Mining Reclamation and Enforcement. The funds will be used to administer the State's abandoned mine lands reclamation program, to fund anticipated emergency projects at abandoned coal mines, and to assist with State regulation of the surface effects of coal mining. The State also received \$200,000 from the U.S. Department of Agriculture to help fund the Rural Abandoned Mine Reclamation Project.

Enacted House bill 2801 modified and made additions to the solid waste management statutes of the State. More stringent requirements were established regarding the disposal of solid wastes, including such things as the submittal of detailed waste management plans, the formation of waste management committees, and the imposition of waste tonnage fees.

Senate Concurrent Resolution 1633 extended the date from January 31, 1992, to January 31, 1993, for the Commission on Natural Gas Policy to submit its written report to the Governor and the Legislature with regard to State and National energy policies affecting natural gas. The Commission was established in 1991 by Resolution 1626.

NONFUEL MINERAL PRODUCTION IN KANSAS 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	39	\$2,011	30	\$1,530	27	\$1,377
Portland do.	1,707	76,564	1,466	65,970	1,525	68,625
Clays metric tons	625,969	4,056	607,419	2,828	578,644	3,470
Gem stones	NA	W	NA	527	NA	W
Helium (Grade-A) million cubic meters	W	W	39	76,540	42	83,603
Salt ² thousand short tons	2,390	92,119	2,316	97,713	2,183	94,192
Sand and gravel (construction) do.	10,863	24,170	9,600	22,100	9,200	21,600
Stone:						
Crushed do.	³ 20,800	³ 79,200	³ 16,802	³ 67,249	17,000	70,100
Dimension short tons	W	W	19,651	2,171	W	W
Combined value of gypsum (crude), helium (crude), pumice, salt (brine), sand and gravel (industrial), stone (crushed quartzite [1991], crushed sandstone and quartzite [1990]), and values indicated by symbol W						
	XX	67,999	XX	29,051	XX	25,919
Total	XX	346,119	XX	365,679	XX	368,886

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes salts in brines; value included with "Combined value" figure.

3/Excludes certain stones; kind and value included with "Combined value" figure.

The U.S. Environmental Protection Agency (EPA) issued two regulations to implement air pollution controls required by the Clean Air Act. These included regulation of a number of mineral-products industries for toxic air pollutants and the implementation of permitting requirements for all major sources of air pollution. New standards also were set for visibility and particulate matter that apply to calciners and dryers at plants processing or producing construction products, including lightweight aggregate. EPA anticipates that product price increases resulting from the new standards probably would be less than 0.5%, but could be as much as 1.75% for the lightweight aggregate industry. EPA also studied the process of using wastes as fuel in cement kilns, in an effort to reduce regulatory burdens on industry and to redefine what is considered a waste. All cement kilns in Kansas used waste material as part of their fuel input. EPA determined that there was no data to indicate that emissions from burning wastes in cement kilns threaten human health or the environment, and that there was no measurable increase in the level of toxic metals in the cement product.

Scientists with the Kansas Geological Survey continued to evaluate drill core and seismic data from the Midcontinent Rift in north-central Kansas for base and precious metal resource potential. The mineral resource potential of Permian red-bed deposits in the western part of the State also was evaluated. The study is part of a cooperative program with the U.S. Geological Survey to study the relationship between copper deposits in the red-beds and the major evaporite sequences in Kansas. Studies continued on alkaline igneous intrusions in the Rose and Silver City domes in the southeastern part of the State.

The U.S. Bureau of Mines was involved in a cooperative reclamation study with EPA in Galena. Galena is a subsite of the Cherokee County Superfund site. The project began in 1987 and is expected to continue through 1993.

Review by Nonfuel Mineral Commodities. Salt continued as the State's leading mineral commodity, accounting for almost 26% of the total nonfuel mineral value. Kansas ranked 4th of 14 States producing salt in 1992.

Lyons Salt Co. considered the storage, in unused parts of its Rice County the mine, of non-toxic ash from metropolitan generating plants that use municipal debris for fuel. The company hoped to attract a railroad with the increased transportation provided by bringing ash into the mine as well as carrying salt out. Unused mine space was offered for document or information storage but, by yearend, the company had no customers.

Kansas continued to rank first of two States producing crude helium. The State also ranked first of four States producing grade-A helium, which constituted 22.7% of the State's total nonfuel mineral value in 1992, an increase of about 9% over that produced in 1991.

The largest increases in 1992 were for industrial sand and gravel. Estimated production and value increased 15% and 17%, respectively, over reported 1991 totals.

BJ Services Co., as part of a company restructuring plan, sold its cement interests at three locations in the State to Allied Cementing Co. Inc. in Russell County.

Republic Gypsum sold most of the equipment and machinery at its plant in Kansas City, Wyandotte County, to Stone Container Corp. Republic planned to discontinue manufacturing corrugated containers and become a supplier of recycled liner board to corrugated container manufacturers.

AFG Industries Inc., located at Spring Hill in Wyandotte County, was acquired by foreign interests. AFG said the acquisition was not expected to affect their management or operations. The Kansas plant employs about 300 people in the production of glass for residential doors and windows.

KENTUCKY

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Annual, Estimated

THE MINERAL INDUSTRY OF KENTUCKY IN 1992

The value of nonfuel mineral production in Kentucky in 1992 of about \$412 million was an alltime high, according to estimated data compiled by the U.S. Bureau of Mines. Value increased by nearly \$70 million compared to 1991 primarily because of 25% gain in the production of crushed stone. Nationally, Kentucky improved its position to 25th in nonfuel value from 29th the year before.

In contrast to the State's nonfuel industrial minerals sector, the coal and steel industries reported weaker market conditions in 1992. Kentucky remained the Nation's third leading coal production with output of about 145 million short tons through November, according to the U.S. Energy Information Administration. In 1991, the State had produced about 159 million tons of coal. In steel, a decline in demand resulted in layoffs and cutbacks in that industry.

NONFUEL MINERAL PRODUCTION IN KENTUCKY 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ² metric tons	826,205	\$8,282	707,587	\$2,942	674,653	\$3,626
Gem stones	NA	W	NA	548	NA	W
Sand and gravel (construction)						
thousand short tons	8,802	29,581	7,700	27,200	9,800	35,300
Stone (crushed) do.	³ 50,100	³ 182,900	46,266	191,893	58,000	247,700
Combined value of cement, clays (ball), lead (1990), lime, sand and gravel (industrial), silver (1990), stone (crushed dolomite [1990]), zinc (1990), and values indicated by symbol W	XX	138,101	XX	120,541	XX	125,849
Total	XX	358,864	XX	343,124	XX	412,475

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Excludes certain stones; kind and value included with "Combined value" figure.

Employment. The number of workers in the State's mining industry dropped in 1992. Coal mining employment decreased from about 25,000 in 1991 to 22,500 through September of 1992, the latest month for

which statistics were available. Employment in industrial minerals declined from about 1,500 in 1991 to 1,450 as of September 1992. Generally, employment in mining reflected market conditions, but improved technology and equipment also lowers the number of production workers needed by industry.

Legislation and Government Programs. The Kentucky General Assembly enacted two bills aimed at retaining and expanding the State's manufacturing industries. The Industrial Revitalization Authority was created under Senate bill 315 to provide incentives to companies forced with imminent closure because of problems with outdated equipment. The Industrial Development Authority created with enactment of House bill 812 provided tax incentives for 10 years to manufacturing companies that locate in the State.

The amount of coal-severance tax redistributed to counties where coal is produced or where it has an impact, such as in counties with primary coal-haulage roads, was increased. Under Senate bill 205, 15% of the severance tax will be returned to these counties in 1993 and 18% in 1994. In 1992, 12% of the tax was returned to the counties. Coal severance tax collections in 1992 totaled about \$210 million.

The Kentucky Geological Survey continued studies on carbonate rocks used by the construction and coal-related industries. Limestone and dolomite from the High Bridge Group was analyzed from core drilling in Mason County. In southeastern Kentucky, the Newman Limestone was sampled to determine the availability of low-silica limestone, which is typically used for rock dust in underground coal mining.

Review By Nonfuel Mineral Commodities. Crushed stone accounted for about 60% of Kentucky's value of nonfuel mineral production in 1992. Nationally, the State ranked fifth in output advancing from ninth a year ago as production increased by nearly 12 million short tons. The estimated output of 58 million tons was the highest ever reported for the State. State highway construction work and an airport improvement project in Louisville contributed to the improved demand for crushed stone. Output of construction sand and gravel and cement also increased during the year.

Kentucky ranked fifth nationally in lime production as output dropped slightly during the year. About 250,000 tons of lime was used in desulfurization systems at electric utility and industrial plants in the State, according to the Kentucky Geological Survey. A slight decline in production was also reported for common clay and shale and ball clay.

The State's steel industry was adversely affected by weak sales in automobiles and appliances. Armco Steel Co., Kentucky's leading steel producer, closed a hot-strip mill at its Ashland Works. The mill had employed about 700 workers before it was closed in July. Armco, which continued to employ about 2,900 workers at the Ashland Works, cited the 40-year-old age of the mill and reduced efficiency for the closure.

LOUISIANA

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Annual, Estimated

THE MINERAL INDUSTRY IN LOUISIANA IN 1992

The U.S. Bureau of Mines' 1992 estimate of Louisiana's nonfuel mineral value totaled \$272 million, \$80 million below the figure reported by the State's mineral producers in 1991. This was less than half of the record \$584 million produced in 1980 and the fourth consecutive year that mineral value declined. Although sales of clay, gypsum, stone, and sand and gravel rose modestly over the 1991 levels, the demand for and sales of lime and salt declined and sulfur output and value plummeted. The dramatic decline in sulfur output was due, in part, to the closure of two depleted Frasch sulfur operations in 1991. The four leading mineral commodities, in terms of value, were salt, construction sand and gravel, crushed stone, and sulfur. Despite the decline, the State's national ranking in mineral value rose one position to 35th.

NONFUEL MINERAL PRODUCTION IN LOUISIANA 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	368,322	\$1,066	360,154	\$3,646	372,516	\$4,476
Gem stones		NA	7	NA	27	NA	535
Salt	thousand short tons	14,348	120,827	14,595	130,587	13,443	124,548
Sand and gravel:							
Construction	do.	14,589	55,902	*13,300	*48,900	13,900	52,100
Industrial	do.	559	10,003	W	W	W	W
Stone (crushed)	do.	*2,100	*16,800	W	W	W	W
Sulfur (Frasch)	thousand metric tons	1,337	W	1,063	W	W	W
Combined value of gypsum (crude), lime, stone (crushed miscellaneous [1991], crushed unidentified [1992]), and values indicated by symbol W							
		XX	163,313	XX	168,642	XX	90,573
Total		XX	367,918	XX	351,802	XX	272,232

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data.
XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Environment. A State appeal court made a "landmark" environmental decision, according to a State attorney, when it upheld the Department of Environmental Quality's (DEQ) ruling that terminated shell dredging in Lake Pontchartrain. The ruling allows DEQ and environmentalists to oppose a permit based on the impact of a company's entire activity rather than on the impact of the specific activity for which a permit

was sought. The shell dredging industry maintained that DEQ's decision to deny water discharge permits should be limited to the discharge from shell dredges and not to the overall impact of shell dredging.

A sand and gravel company sued a residents group for "complaining to local, State and Federal officials" about the firm's dredging operations in Bayou Sara. The Feliciana Sand and Gravel Co. charged that the defendants intentionally campaigned to interfere with its contract to supply sand and gravel to the U.S. Army Corps of Engineers mat-casting plant at St. Francisville.

Opposition was voiced to the U.S. Fish and Wildlife Service adding the Louisiana quillwort to the Endangered Species list. The quillwort is an aquatic plant related to the fern and looks like small grass clumps. If added to the Endangered list, gravel mining and timber operations in Washington Parish could be damaged.

Legislation and Government Programs. The U.S. Fish and Wildlife Service completed its \$13.6 million National Wetlands Research Center on the University of Southern Louisiana campus in Lafayette. The center will employ a staff of approximately 70 scientists and 50 support people.

The National Association of Dredging Contractors charged that it could save the country \$20 million a year on dredging work done by the U.S. Corps of Engineers. A U.S. Senator from Louisiana stated that the dredging industry should get a year to prove its claim.

The Louisiana State University's Institute for Recyclable Materials (IRM) conducted studies on artificial habitats. In past years the State's oyster industry used dredged shells to provide a bay bottom conducive to oyster growth. The ban on shell dredging forced the industry to use out-of-State rock. IRM's habitat research has touched on the use of phosphogypsum mixed with other materials such as fly ash and kiln dust for replenishing oyster substrate.

The Louisiana Office of Conservation (OC) received notice that a proposed amendment to the permanent regulatory program for coal was approved by the U.S. Office of Surface Mining. The OC continued plans to regulate the mining of noncoal minerals. If such a law were passed by the legislature, regulatory responsibility would fall under the Abandoned Mine Lands Section.

A preliminary investigation by the U.S. Department of the Interior's Mineral Management Service indicated that "more than" 100 offshore Gulf of Mexico oil and gas drilling and production platforms were "severely damaged" by Hurricane Andrew. At least a dozen onshore oil refineries in the coastal area were forced to close or curtail production, eliminating almost 15% of the Nation's daily refining capacity.

Review by Nonfuel Mineral Commodities. Salt was the leading mineral commodity, value-wise, mined in-State during 1992. During the year, Cargill Salt increased its salt exports through the port of West St. Mary. Both Cargill and Barclay Chemicals Inc. were producing solar salt for water softeners, chlorine, and other chemical production.

In February, three salt mines were temporally closed when a collision between two tows on the Intercoastal Waterway caused a closing of the Waterway. Morton Salt Co., Week Island, Carey Salt Co., Cote Blanche Island, and Akzo Salt Co., Avery Island, closed because of a lack of barges.

In March, one salt company furloughed employees and a second reduced the work week from 5 to 4 days. The actions were blamed on a mild winter in the Midwest and elsewhere that lowered the need for salt for ice and snow removal.

In May, a fire at the Morton Salt Co. mine forced the evacuation of underground employees. The engine compartment on a front-end loader caught fire and was allowed to burn itself out. The mine was reopened after a short period of time.

Sand and gravel was the second leading commodity, in terms of value, mined in Louisiana in 1992. During the year, the East Baton Rouge Parish Planning and Zoning Commission was considering tighter local control over sand and gravel mining. Under the proposed control, mine operation would be restricted to "Natural Resource Overlay Districts" and mining would be banned within 1,000 feet of residences. A land reclamation plan would be required before a mining permit was issued.

The production of crushed stone, the third leading commodity value-wise, increased significantly over the tonnage reported in 1991. Value increased \$9 million.

Sulfur was the fourth leading mineral commodity, value-wise. Freeport-McMoRan Resource Partners, L.P., an affiliate of Freeport-McMoRan Inc., New Orleans, offshore Gulf of Mexico sulfur platforms suffered no structural damage during Hurricane Andrew. Sulfur operations were temporarily suspended because of the hurricane but were back in production by the end of August.

Allied-Signal Inc. announced plans to build a \$40 million plant in Baton Rouge to produce HFC-134a, a chlorofluorcarbon alternative. The new plant is scheduled to be in operation by 1994.

MAINE

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Annual, Estimated

THE MINERAL INDUSTRY OF MAINE IN 1992

The value of nonfuel mineral production in Maine in 1992 was estimated by the U.S. Bureau of Mines to be \$52.8 million. This value represents an increase of \$11.5 million over that of 1991. Increases were reported for all the mineral commodities produced in the State. Leading mineral commodities, in terms of value, were cement, construction sand and gravel, and crushed stone. Other mineral commodities produced included clay, peat, dimension stone, and gem stones.

NONFUEL MINERAL PRODUCTION IN MAINE 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	W	NA	\$174	NA	\$500
Sand and gravel (construction)						
thousand short tons	7,865	\$29,349	*3,900	*14,800	4,800	18,600
Stone:						
Crushed do.	*1,700	*8,700	1,706	9,899	1,800	10,800
Dimension short tons	W	W	73	88	W	W
Combined value of cement, clays (common), peat, and values indicated by symbol W	XX	24,495	XX	16,343	XX	22,948
Total	XX	62,544	XX	41,304	XX	52,848

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment. The average number of workers in the mineral extractive industries in Maine during the first 9 months of 1992 was estimated to be 498 individuals. Of this total, 310 worked at sand and gravel pits and 98 at stone operations. About 90 individuals worked at mineral-related mills and preparation plants in the State.

Exploration. BHP Minerals International Inc. postponed a \$7 million ore sampling project in northern Somerset County that was seen as a prelude to a \$40 million to \$60 million copper and zinc mine. The company indicated that a drop in world metal prices and rising development costs contributed to the decision. Although the company received the last of three State environmental permits necessary for massive sampling operations at the Alder Pond deposit, the company indicated that it was re-evaluating the 68 cores already drilled into the ore body. The Alder Pond deposit is believed to contain 3.5 million short tons of zinc, some copper and lead, and traces of silver and gold.

Legislation and Government Programs. In April, L.D. 2400, "An Act Concerning Site Protection at Former Mining Operations," was signed into public law as Chapter 883. The bill sets up a mining corrective action fund, which may be used by municipalities for corrective action necessary to address problems that occur at metal mining sites following termination of mining operations and closure of the mine. Corrective action includes, but is not limited to, remedial action related to contaminated groundwater; disposition of mining wastes; reclamation defects on or surrounding the site; and pollution control at the site.

In June, citizens of the town of Warren approved controversial local mining regulations by a vote of 651-534. Knox Nickel Corp., a Canadian mining firm, is seeking to mine a nickel-copper-cobalt deposit near Crawford Pond within the town's borders. When the company first announced it wanted to mine the deposit, the town responded by enacting a moratorium on any mine activity within its borders. The moratorium is allowed under State law. Although the Warren mining ordinance copies 95% of the State's Metallic Mining Regulations (Chapter 13, effective August 26, 1991), the new law establishes additional restrictive setbacks for mine tailings than the State's metal mining law allows. It also sets stricter financial responsibility requirements for mining companies. Near yearend, Knox Nickel was consulting with corporation lawyers to determine what options and recourses the company might have.

In the adjoining town of Union, mining regulations were being written by a special town committee. The new rules will be closely based on the regulations approved by Warren voters in June. Although Knox Nickel said it has no plans to mine nickel in Union, the committee hopes to finish writing the regulations in time for voters to act on the rules at a March 1993 town meeting.

Review By Nonfuel Mineral Commodities. Dragon Products Co.'s plan to establish a crushed stone quarry on Madison Mountain ended in September when the company agreed to sell the 107-acre parcel of land to a private individual. The sale appears to end a 16-month battle between a citizens group (Neighbors of Madison Mountain) opposing the quarry and Dragon Products. Dragon, the State's largest supplier of ready mix concrete, had proposed using 15 acres of the parcel as a source of crushed stone for its cement products.

Dragon Products Co. received the go-ahead from the State Department of Environmental Protection to burn oil-contaminated soil at its cement plant in Thomaston. The petroleum in the soil will replace a minimal amount of coal or oil typically burned during operation and the soil would replace a portion of the materials used in the cement mix.

In September, Tilcon Maine Inc. agreed to drop its lawsuit against the State after winning permission to remove sand and gravel from a strip in North Belgrade that previously had been ruled off limits to mining. In May, Tilcon received permission from the Department of Environmental Protection (DEP) to mine 485,000 cubic yards of sand and gravel from 8.6 acres of a 133-acre tract the company owns in Belgrade. In granting the permit, the DEP denied the company permission to remove another 40,000 cubic yards along a property line shared with Blue Rock Industries, another sand and gravel company. That same month, the company sued the DEP to allow them to mine in the buffer zone. Following a change in State regulations, the DEP allowed the mining to take place in the buffer zone.

MARYLAND

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Annual, Estimated

THE MINERAL INDUSTRY OF MARYLAND IN 1992

The value of nonfuel mineral production in Maryland in 1992 was about \$323 million, according to estimated data compiled by the U.S. Bureau of Mines. Value decreased by about \$25 million and for the second year in a row as the demand for minerals used in construction remained weak. Lower output was reported for each mineral commodity produced in the State.

About three-fourths of Maryland's mineral value was attributed to the production of sand and gravel and crushed stone. In 1992, output of these two commodities totaled about 35 million tons, a moderate decline of about 4 million tons from the 1991 total. However, compared to 1990 data, production declined by about 14 million tons and was more indicative of the downturn in construction and resultant decline in the State's mineral industry.

NONFUEL MINERAL PRODUCTION IN MARYLAND 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland) thousand short tons	1,798	\$91,172	*1,580	*\$80,580	1,488	\$74,400
Clays metric tons	338,775	1,712	*258,760	*1,141	246,508	1,405
Gem stones	NA	3	NA	3	NA	1
Peat do.	3	W	—	—	—	—
Sand and gravel (construction) do.	18,271	104,023	*13,000	*72,800	10,700	61,100
Stone:						
Crushed do.	*30,500	*163,900	25,545	188,001	24,000	181,900
Dimension short tons	*24,102	*1,751	12,090	967	11,365	1,024
Combined value of other industrial minerals and value indicated by symbol W	XX	6,053	XX	4,720	XX	3,491
Total	XX	368,614	XX	348,212	XX	323,321

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment. Employment in the State's industrial minerals industries remained about the same during the year. Mining employment in nonfuel minerals totaled about 910 persons in September 1992, the

latest month for which statistics are available. Employment in coal mining also remained about the same at approximately 540 workers.

Legislation and Government Programs. The Maryland General Assembly enacted House bill 1263, Chapter 605, for treatment of acid mine drainage. The legislation authorizes the Department of Natural Resources to establish a fund for treatment of previously mined areas affected by acidic water. Coal was produced in Maryland in Allegany and Garrett Counties. Output through the first three quarters of 1992 was about 2.6 million tons, about the same as in 1991, according to the Maryland Bureau of Mines.

Also enacted in 1992 was House bill 1227, Chapter 197, requiring the Maryland Department of the Environment (MDE) to study health and safety issues for the burning of hazardous waste in cement kilns. The legislation required the MDE to delay or suspend the issuance of permits for the burning of hazardous waste in cement kilns. The study is to be completed by Oct. 1, 1994.

Offshore sand resources were the subject of a cooperative study by the Maryland Geological Survey, Delaware Geological Survey, and the Minerals Management Service of the Department of the Interior. The loss of beach sands, with the potential for a loss of beach areas, would diminish tourism, a major industry in Maryland. The study was expected to provide information on the cost and feasibility of replacing sand lost by erosion.

Review by Nonfuel Mineral Commodities. Despite a slowdown in production of crushed stone and sand and gravel during the past 2 years, these industries have expanded considerably since a decade ago. Industry expansion and strong demand for these construction aggregates has increased land use conflicts in the State. During the early 1980's, an average of about 25 to 30 million short tons of sand and gravel and crushed stone was produced at about 70 pits and quarries. Production of these two commodities peaked in 1988 with output of about 52 million tons. From 1990 through 1992, output averaged about 41 million tons per year from approximately 100 pits and quarries.

A decision on the opening or expansion of mining operations in Maryland requires local government approval. Typically in the State, County government approval is required for development. In 1992, Charles County, which leads the State in sand and gravel production, completed a detailed report on that industry. A committee made up of representatives from residential communities, the sand and gravel industry, and county government compiled the report. Recommendations from the report included a survey of sand and gravel resources in the county, as well as a ranking system to prioritize the mining of sand and gravel.

MASSACHUSETTS

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Annual, Estimated

THE MINERAL INDUSTRY OF MASSACHUSETTS IN 1991

The value of nonfuel mineral production in Massachusetts in 1992 was estimated by the U.S. Bureau of Mines to be \$157 million. This value represents an increase of \$45.3 million, the highest value since 1988. The increase was largely attributable to greater sales of crushed stone and construction sand and gravel, the State's two leading mineral commodities. Other mineral commodities produced included common clay, industrial sand, dimension stone, lime, and peat. Nationally, the State ranked 39th in the production of nonfuel minerals, up from 40th place in 1991. It ranked fourth of 34 States that produced dimension stone. Industrial minerals processed or manufactured in the State included abrasives, graphite, gypsum, perlite, and vermiculite.

NONFUEL MINERAL PRODUCTION IN MASSACHUSETTS 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$1	NA	\$1	NA	\$1
Sand and gravel:						
Construction thousand short tons	12,774	51,466	*10,100	*39,400	13,400	53,300
Industrial do.	30	401	30	401	30	401
Stone:						
Crushed do.	*9,200	*54,500	7,131	51,362	11,100	82,300
Dimension short tons	*56,254	*10,992	69,332	11,646	65,836	9,292
Combined value of clays (common), lime, and peat	XX	10,138	XX	8,787	XX	11,636
Total	XX	127,498	XX	111,597	XX	156,930

e/Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment. The average number of workers in the mineral extractive industries in Massachusetts during the first 9 months of 1992 was estimated to be 876. This included 592 workers at surface operations, primarily for sand and gravel and stone. A total of 284 workers were employed at mineral-related mills and preparation plants in the State.

Environment. In May, Engelhard Corp. indicated that portions of its Plainville gold and silver fabricating plant were contaminated. Both groundwater and soil is contaminated by heavy metals, including cadmium, that were used in the manufacture of alloys produced at the plant. Engelhard reported the contamination to authorities and is proceeding with an Environmental Protection Agency approved cleanup

plan. Cleanup efforts are expected to cost the company an upfront capital investment of \$1.5 million and an additional \$100,000 to \$150,000 over several years. When the cleanup of the Plainville facility is completed, the plant is expected to be sold.

Recontek Inc., a San Diego-based company, shelved plans to build a metallic hazardous waste recycling plant in Orange, about 40 miles northwest of Worcester. Plans for the plant faced stiff local opposition and were withdrawn near midyear when Recontek's request for a 90-day extension for submitting its preliminary project impact report was denied by a State environmental panel vote of 8 to 7. The Orange plant was one of eight such plants Recontek plans to build in the United States to reclaim metals from waste discarded by companies in the electronics, metal finishing, and aerospace industries.

Legislation and Government Programs. The town of Grafton was awarded a \$100,000 Federal grant to develop an abandoned sand and gravel pit into a 55-acre park with an athletic field and hiking trails. The \$100,000 grant came from the Federal Land and Water Conservation Fund of the U.S. Department of Interior. The proposed park site was once a sand and gravel pit owned by the Dauphinais family and was donated to the town many years ago.

In November, Massachusetts voters decisively defeated a hotly debated packaging and recycling initiative that pitted environmental groups against manufacturers and business organizations. "An Act To Promote Packaging Reduction and Recycling" would have required that by July 1996 a wide variety of packaging used in Massachusetts either be reusable at least five times or contain increasing amounts of recycled or recyclable materials--50% by the year 2002. While environmental groups generally supported the proposed act, most manufacturers and business organizations were against it.

Review By Nonfuel Mineral Commodities. Output of crushed stone and construction sand and gravel, the State's two leading mineral commodities in terms of value, both increased for the first time since 1988. Output of both of these mineral commodities had declined each year since 1988 because of the lackluster building industry in the State. There were signs of improvement in most categories of construction in 1992, which benefited the State's mineral industry, because most of the State's output is used by this industry.

Locally, several towns in the vicinity of Boston's "Big Dig" project have benefited from the project. The clay from the project, known as "Boston Blue Clay," had been tested and approved by the State Department of Environmental Protection as suitable for use to cap landfills. O'Donnell Sand & Gravel, the company that is removing the clay, made available to the town of Revere, a total of 7,000 cubic yards of clay at no cost. Thus, the city, which is capping a local landfill, saved \$700,000 to \$1.1 million, the estimated cost of its purchasing the clay.

The 200 employees of Pfizer Inc.'s Adams limestone quarry and lime processing plant were apparently assured of continued employment despite the company's decision to sell 60% to 70% of the plant ownership to a new, publicly owned company called Minerals Technologies Inc. Pfizer would retain an ownership interest of up to 40%. The Adams plant produces lime and mines a vein of limestone that is expected to last well into the next century. The ground up limestone, much of it precipitated calcium carbonate, has a variety of applications in such products as ceiling tiles, animal feed, scouring cleansers, glazing compounds, paint, and packaging for food products.

MICHIGAN

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Annual, Estimated

THE MINERAL INDUSTRY OF MICHIGAN IN 1992

Michigan's estimated nonfuel mineral production was valued at \$1.4 billion in 1992, according to statistics released by the U.S. Bureau of Mines. This was a \$79 million decline from the \$1.5 billion produced in 1991. A significant decrease occurred in the value of construction sand and gravel, down about 10% from last year's estimate. Decreased values for crushed stone, industrial sand, lime, crude iron oxide pigments, and peat were also reported for 1992. The State dropped from 5th to 6th rank nationally in value of nonfuel minerals produced during the year. Michigan continued to lead the Nation in the quantity and value of crude iron oxide pigments, magnesium chloride, and peat produced, and ranked second in the Nation in the production of bromine, iron ore, and industrial sand.

Employment. According to the Michigan Employment Security Commission, Bureau of Research & Statistics, mining employment totaled 9,000 persons in September 1992, the same as in September 1991. Mining employment in the Upper Peninsula totaled 3,500 persons in September 1992, representing an increase of 100 workers over September's figures in 1991.

Exploration. In May, the Michigan Department of Natural Resources (DNR) offered nearly 60,000 acres for mineral lease. Bids on 10,420 acres were received. Successful bidders were Terence W. Quigley (5,447 acres), Crystal Exploration Inc. (2,869 acres), BHP Minerals (960 acres), John Dziedzic (504 acres), Western Mining Corp. USA (480 Acre), and Noranda Exploration Inc. (160 acres).

Diamond, copper, and gold exploration continued in the Upper Peninsula. Crystal Exploration Inc. continued into the 5th year of its diamond exploration venture. Ashton Mining Ltd. of Australia joined Crystal in the search for diamonds by acquiring a 51% interest in Crystal's Great Lakes Diamond Exploration Joint Venture. Over the next 3 years, Ashton anticipates spending \$3.75 million in exploration and development of microdiamond-bearing kimberlite pipes. Examin Corp., also conducting exploration for diamonds, nominated an area for next year's State lease auction. Western Mining Corp. continued its precious metals exploration efforts.

Natural gas exploration, centered in Crawford, Montmorency, Oscoda, and Otsego Counties, continued at a frenzied pace since the boom started 3 years ago. Over 2,700 wells have been drilled in the four-county area, with about 1,000 more predicted within the next 2 years.

Environment. In August, the National Wildlife Federation and Michigan United Conservation Clubs filed a lawsuit against Copper Range Co. alleging that the company's smelter violates the Federal Clean Air Act. According to a U.S. Environmental Protection Agency official, the company could be fined up to \$25,000 per day for exceeding State and Federal air pollution standards. In October, the State Attorney

NONFUEL MINERAL PRODUCTION IN MICHIGAN 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Bromine thousand kilograms	—	—	—	—	8,323	\$4,162
Cement:						
Masonry thousand short tons	272	\$23,880	*225	*\$22,440	265	23,320
Portland do.	5,906	263,607	*4,935	*222,075	5,052	227,340
Clays metric tons	1,201,542	4,094	2,061,861	8,770	1,964,279	10,773
Gem stones	NA	11	NA	10	NA	1
Gypsum (crude) thousand short tons	2,000	11,511	1,721	13,052	1,815	13,777
Iron ore (usable)						
thousand metric tons	10,034	W	*12,741	W	12,741	W
Lime thousand short tons	622	30,898	613	30,959	610	30,805
Peat do.	280	6,264	249	6,442	W	W
Sand and gravel:						
Construction do.	53,729	153,057	*44,800	*132,200	39,400	118,600
Industrial do.	2,310	19,285	2,093	18,464	2,051	18,317
Stone (crushed) do.	*43,100	*129,000	40,989	129,490	39,000	126,900
Combined value of calcium chloride (natural, [1990-91]), copper, iron oxide pigments (crude), magnesium compounds, potash, salt, silver, stone (dimension), and values indicated by symbol W	XX	796,516	XX	919,366	XX	850,224
Total	XX	1,438,123	XX	1,503,268	XX	1,424,219

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

General and the Michigan DNR filed a plea to intervene in the lawsuit against the company. Copper Range operates the only working copper mine in the Upper Peninsula. About 1,050 workers are employed at the White Pine Mine, the region's largest employer.

Legislation and Government Programs. A bill approved by the U.S. House of Representatives and U.S. Senate, and signed by the President, created the Nation's newest park, commemorating the mining industry in Michigan's Keweenaw Peninsula. The park includes parts of the city of Calumet and the Quincy Mine steam hoist 10 miles south of Calumet.

A \$134,500 grant was awarded to the Great Lakes Protection Fund for biologists at Michigan Technological University (MTU) to study the effects of copper mining on flora and fauna of Portage Lake Waterway and Lake Superior.

MTU's experimental mine in Hancock was closed in March. Rising costs, diminishing benefits, and lower enrollment in their mining program were cited as reasons for the closure.

Studies performed at MTU indicate that bioleaching, the use of microorganisms to dissolve unwanted material in valuable minerals, or to produce acids which dissolve the material, is technically feasible. It has not been determined if the bioleaching process developed by MTU researchers is economically feasible for large-scale commercial operations.

Review by Nonfuel Mineral Commodities. Iron ore, portland cement, magnesium compounds, crushed stone, and construction sand and gravel were the State's five leading nonfuel mineral commodities produced, in terms of value, during 1992. Shipments of iron ore were estimated to be about the same as in 1991. Michigan continued as the Nation's second leading producer of iron ore.

Cleveland-Cliffs Inc. continued to manage Michigan's only active iron ore mines, the Tilden near Ishpeming and the Empire near Palmer. Although reserves at the two mines are estimated to last at least another 30 years, continued recession in the steel market could change what is currently considered ore. Sharron Steel Corp., a customer for about 8% of the 13.6 million tons of iron ore produced in 1992, filed for Chapter 11 bankruptcy protection in September. The company employs about 2,200 workers between the two mines and related facilities. About 10 years ago, close to 4,000 people were employed in Michigan's iron mining industry when the Republic Mine and associated Humbolt plant were still operating, along with the Empire and Tilden Mines. The Republic Mine, near Republic, remained on standby status during the year.

Specialty Minerals Inc., a subsidiary of Minerals Technologies Inc., formerly a division of Pfizer Inc., completed its modernization project at the Port Inland operation near Gulliver. Production reported for 1992 amounted to about 7,000 tons of dolomite and 2.7 million tons of high calcium limestone.

The Berlin Township Board approved an operating license for Thompson-McCully Co. to open a limestone quarry near the village of Estral Beach in Monroe County. The company is planning a 90-acre quarry which would have a life expectancy of 35 years.

Overruling residents concerns, the Whiteford township approved a 22-acre rezoning request allowing expansion of Michigan Stone Co.'s quarry in Monroe County. The quarry operation is expected to last about 40 years and then it will become a lake and picnic area.

France Stone Co. announced that it's 186-acre quarry on East Dunbar Road in Monroe township will close by year's end and become a lake with development around it. France's new limestone mining operation, also in Monroe township, will commence next year.

A controversial mining permit was approved by the Caledonia Township Board allowing a 54-acre expansion of the Jousma-Den Hartigh sand pits west of Alaska in Kent County.

Thompson-McCully Co. was allowed to resume production after the Plainfield Township Board conditionally approved its controversial sand and gravel mining permit. Although mining had been going on at the site for over 35 years, the township recently required permits for such operations. Other sand and gravel mining permits were approved for Sandman Inc. in Oxford township, 3-Way Sand and Gravel Co. in Imlay township, O.E. Bieri & Sons in the city of Lowell, Burroughs Materials in Groveland township, and Mathews Gravel Co. in the Genesee County Park.

Great Lakes Minerals Co. originally planned to begin chalcocite copper mining late in the year, however, DNR asked the company to do an environmental review on the proposed mining site (543-S) near the former Calumet Air Force Station and Gariot Lake. The company expects permits to be approved early next year. The deposit at the 543-S site is estimated to have 5 to 8 years of reserves and will create about 40 new jobs.

Governor John Engler authorized a \$5 million loan to McLouth Steel in order to save its 1,650 jobs through the end of the year. Earlier in the year, McLouth agreed on a partnership with Thyssen Steel, a German-based world-class steel company. In the agreement, McLouth would get Thyssen's technical marketing expertise and Thyssen would sell McLouth steel to fill out the low-end of its orders. The partnership, which would not start until 1993, was dependent on McLouth making it through the year.

MINNESOTA

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Annual, Estimated

THE MINERAL INDUSTRY OF MINNESOTA IN 1992

The value of nonfuel mineral production in Minnesota in 1992 was estimated to be about \$1.4 billion, according to statistics released by the U.S. Bureau of Mines. The value increased about 6% from the \$1.3 billion reported in 1991. Increased sales were realized in nearly all of the State's mineral commodities, only sales of building stone were reported down from 1991 levels. The State dropped from 7th to 8th rank nationally in value of nonfuel minerals produced during the year. Minnesota ranked third nationally in the production of metals and continued to lead the Nation in quantity and value of iron ore (usable) produced.

NONFUEL MINERAL PRODUCTION IN MINNESOTA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$46	NA	\$62	NA	W
Iron ore (usable)						
thousand metric tons	45,139	1,308,920	*42,966	*1,157,920	42,886	\$1,216,084
Peat	48	2,972	35	1,910	W	W
thousand short tons						
Sand and gravel (construction)	33,869	77,502	*24,500	*58,800	28,000	68,600
do.						
Stone:						
Crushed	*9,100	*31,900	8,378	30,624	10,500	39,500
do.						
Dimension	*60,195	*20,836	45,795	13,962	36,192	11,436
short tons						
Combined value of clays (common, kaolin), lime, sand and gravel (industrial), and values indicated by symbol W	XX	27,746	XX	25,607	XX	30,263
Total	XX	1,469,922	XX	1,018,950	XX	1,365,883

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment. According to the Minnesota Department of Jobs and Training, Research and Statistics Office, mining employment totaled 8,200 workers in October 1992. This was about a 1% increase over the same month in 1991. Employment in metal mining increased from 6,100 workers in October 1991 to 6,200 in October 1992.

About 760 mine workers lost their jobs with the closure of the Eveleth Taconite Mine in November. Many of the miners will lose their jobs permanently when the mine reopens next March as production will

beat least 16% lower.

Exploration. The Minnesota Department of Natural Resources (DNR) held its 16th and 17th sale of metallic mineral exploration and mining leases in April and October. Areas under consideration for the lease sales covered portions of Aitkin, Beltrami, Cass, Crow Wing, Itasca, Koochiching, Lake of the Woods, Morrison, Roseau, St Louis, and Todd Counties. Cominco American Resources Inc., Newmont Exploration Ltd., and American Shield Co. were the three successful bidders for the 16th lease sale, which covered a total of 7,599 acres in Aitkin, Koochiching, St Louis, and Todd Counties. Phelps Dodge Exploration East, Giants Range Minerals, and Exmin Corp. were the three successful bidders for the 17th lease sale.

Exploration in Minnesota during the year was reported by DNR to be very slow. Much of the current interest has shifted from gold to base metals such as copper and nickel. BHP Minerals was in the process of evaluating the Long Nose hardrock ilmenite deposit north of Duluth near the Mesabi range. Several companies have shown interest in the Red River kaolin deposits, apparently for use in the manufacture of paper.

Legislation and Government Programs. The Legislature approved a \$14 million low-interest loan fund for the State's iron ore mining companies. Each of the seven mining companies will be able to borrow \$2 million for capital improvements or research and development, with a condition that the projects are developed jointly by labor and management. The \$14 million loan and grant program will be funded by a portion (10.4 cents per ton) of the \$2.05-per-ton iron ore production tax.

Near the end of the year, the Governor announced plans for creating a task force to examine the problems in the State's taconite industry. The task force will be put together by the commissioner of the Iron Range Resources and Rehabilitation Board.

Hearings were conducted at year's end on proposed rules that would affect mineland reclamation. The rules proposed by DNR would regulate the extent of reclamation required of operators of metal mines, where the predominant metals mined are those other than iron ore and taconite. Currently, the only active metal mines in the State are mining iron ore and taconite and are regulated by existing reclamation regulations.

The U.S. Bureau of Mines, in cooperation with the Minnesota Geological Survey, University of Minnesota, and DNR, conducted research to determine the suitability of in situ mining to recover manganese from Minnesota's low-grade deposits. Minnesota has demonstrated manganese resources of 9.1 million metric tons and inferred resources of another 9.4 million metric tons in the Cuyuna range and Emily district.

Review by Nonfuel Mineral Commodities. Iron ore, Minnesota's leading mineral commodity, accounted for nearly 90% of the State's total mineral value. Although the quantity of iron ore shipped was estimated to have decreased slightly, the value increased about 5% over 1991 estimates. The combined value of construction sand and gravel and crushed stone, the two other leading mineral commodities produced, accounted for less than 8% of Minnesota's mineral value in 1992. The estimated value of construction sand and gravel and crushed stone increased about 17% and 29%, respectively, over values reported in 1991.

Trends in Minnesota's iron ore industry portend considerable change in that industry. Lower demand for iron ore has caused companies to lower production, reduce employment, and temporarily shut down operations at most of the State's seven taconite operations. Some experts are saying this year's downturn may be an indication that the taconite pellet industry is becoming obsolete and that the industry needs to start converting to new or improved technology before the end of this century. LTV Steel Mining Co. shut down operations at the Hoyt Lakes taconite operation, which is currently under bankruptcy protection, for a month during the summer to reduce inventories and planned to reduce production by a million tons. In June, Cyprus

Northshore Mining Co. laid off workers from its operations in Babbitt and Silver Bay for a 3-month period. National Steel Pellet Co. in Keewatin announced that it would have to close if its costs could not be cut by 20%. Hibbing Taconite shut down operations for 2 weeks at the end of September in order to reduce inventory. In October, U.S. Steel Corp. reduced production by shutting down one of its five pellet production lines at the Minntac plant in Mountain Iron. Eveleth Mines shut down for at least several months in November, as Armco Steel Co. purchased 600,000 tons of iron ore pellets from Brazil and ordered its 1993 pellets from Cyprus Northshore Mining, rather than from its own Eveleth plant. The production costs of iron ore pellets at the Eveleth plant was reportedly the highest in the Mesabi Range, and Cyprus operated a nonunion plant. In December, Inland Steel Mining Co. announced plans to lay off 60 workers over the next 18 months at its Minorca plant in Virginia.

Cyprus Northshore Mining announced plans to build a direct-reduction facility at its Silver Bay plant. The direct reduction process removes oxygen from iron ore (taconite) pellets upgrading the iron content from 65% to 95%. The new product will be marketed directly to steel mills which produce steel from scrap. When the new facility is completed, the Cyprus Northshore plant will be the only U.S. plant producing a direct-reduced iron product.

U.S. Steel completed installing a \$12 million scrubber system at its Minntac taconite plant in Mountain Iron. The new scrubber is designed to limit the amount of dust created when iron ore is converted into pellets. The Minnesota Pollution Control Agency gave the company until March 1993 to install the scrubbers.

Eveleth Mines completed a \$7.5 million reconstruction of its primary crusher in February. After the extensive upgrade, the crushers capacity increased from 38,000 to 60,000 tons per day.

LTV Steel Mining's McKinley Extension shipped a total of 507,338 gross tons of iron ore concentrate in the final full year of activity at the Deanery Mine, a natural ore property in Hoyt Lakes. In September 1991, the company announced that the ore reserves of the Deanery Mine were exhausted. Crude ore stockpiles were depleted in July 1992, and the remaining concentrate stockpiles will be shipped in 1993.

Nerco Minerals Co. was considering opening a 50,000-ton-per-day copper, nickel, gold, and platinum open pit mine 6 miles south of Babbitt. Although, copper and nickel deposits had been identified in northern Minnesota in the late 1970's, the State placed a moratorium on such strip mining. Requests for a mining permit cannot be made until DNR issues rules, which will include cleanup requirements, for this type of mining.

Cold Springs Granite Co. evaluated three possible dimension stone sites in northern Minnesota. The company conducted drilling operations and extracted large granite blocks for test marketing. Cold Springs was awarded an exploration contract in October 1991 on the three sites. Depending on favorable test results, the company planned to open quarries at all three sites.

The Le Sueur County Board approved an expansion request for Unimin Corp.'s silica sand operation. The company would be allowed to work within 65 feet of County Highway 23.

Four construction sand and gravel mining permits were approved during the year. The Washington County Planning Commission granted gravel mining permits to BTG Property Co., Northern Con-Ag. Co., and the Washington County Public Works. The Wright County Planning Commission approved Maurice LaTour's gravel mining permit.

In August, the Redwood County Planning Commission recommended approval of a conditional use permit for Ochs Brick and Tile to continue its kaolin mine in Horner Township.

MISSISSIPPI

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Annual, Estimated

THE MINERAL INDUSTRY OF MISSISSIPPI IN 1992

Mississippi's nonfuel mineral production in 1992 was valued at \$109 million according to estimates by the U.S. Bureau of Mines. This was an increase of \$7 million over the \$102 million reported by industry in 1991. An \$8 million increase in the value of clay (bentonite, common clay, and fuller's earth) and a \$3 million increase in the value of stone overcame declines in the value of ball clay, cement, and sand and gravel. The State maintained its 43d ranking nationally in mineral value.

NONFUEL MINERAL PRODUCTION IN MISSISSIPPI 1/

Mineral	1990		1991		1992 ^e	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ² short tons	817,828	\$16,196	1,172,213	\$34,382	1,116,694	\$42,284
Gem stones	NA	1	NA	1	NA	1
Sand and gravel (construction)						
thousand short tons	13,032	45,817	9,900	33,000	9,300	31,600
Stone (crushed) do.	1,400	5,500	1,632	6,603	2,200	9,200
Combined value of cement (masonry [1990], portland), clays (ball, fuller's earth [1990], kaolin [1991-92]), and sand and gravel (industrial)	XX	44,799	XX	27,873	XX	26,375
Total	XX	112,313	XX	101,859	XX	109,460

e/Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

Employment. Mining employment, excluding the oil and natural gas sector, totaled 1,364 according to the U.S. Mine Safety and Health Administration.

Legislation and Government Programs. In February, a bill was introduced in the Mississippi Legislature that would tax mineral interests separated from the surface land estate. A provision in the bill would cause severed mineral interests to revert back to the original surface estate if owners failed to pay tax assessments. The bill would tax mineral interests severed from the original estate at a rate of \$1 per acre. Royalty interests would be taxed at \$.25 per acre. The bill did not pass, but may be reintroduced in the 1993 legislative session.

An exploratory gas well, partially funded with Federal moneys, was drilled in Clay County to test the potential of extracting methane from coalbeds. The well intersected about 6 feet of coal with a low gas content and was noncommercial.

Review by Nonfuel Mineral Commodities. Much of the news of the industry concerned the State's industrial mineral producers.

Holnam Inc.'s Artesia cement plant celebrated 10 years without a lost time accident. The Portland Cement Association, a major cement industry trade association, acknowledged the 10-year record as the best among its member companies.

Calgon Carbon's Hancock County plant manufactured its first activated carbon in March. The facility produces an activated carbon product used to purify water, chemicals, and "all kinds of liquids." Plant capacity is 27 million metric tons per year.

In June, American Colloid Co., Aberdeen, a specialty clay (bentonite) producer, was host to the Japanese Clay Science Society. The society members, leaders from both Japanese industry and universities, toured the company's mines and plants. American Colloid exports calcium bentonite from Aberdeen and sodium bentonite from its plant in Wyoming to Japan.

Southern Ionics, a Mississippi-based corporation, announced plans to build a \$1.3 million distribution facility at Lowndes County's Riverside Industrial Park. The park is on the Tennessee-Tombigbee Waterway. The new facility will be a new wholly-owned corporation called Tenn-Tom Tank, Inc. Southern Ionics manufactures sodium hydroxide, magnesium sulfate, titanium dioxide, sodium aluminate, and iron free aluminum sulfate, chemicals used in the manufacture of cement, detergent, and paper.

A sand company, A & A Excavating Contractors, received permission from the Madison County Planning and Zoning Commission to resume mining at a pit near Deerfield. The original permit holder, A & A Construction Co., filed for bankruptcy and sought to have the permit transferred to A & A Excavating. The County Supervisors ruled that the Commission's permission was needed prior to resuming operations.

E. I. du Pont de Nemours & Co. Inc. began production with its second new line at its De Lisle titanium dioxide plant. The new line increased plant capacity to approximately 218,000 metric tons per year. The company completed construction of three new ilmenite storage tanks at Gulfport. The ilmenite, raw material for titanium dioxide production, is obtained primarily from Australia with a minor amount from Asia. Ilmenite tonnage shipped through Gulfport will increase from around 227,000 metric tons per year to approximately 363,000 metric tons per year.

In the metals sector, a leading steel producer, Birmingham Steel Corp., announced plans to modernize its 50 ton electric furnace and continuous caster at Jackson. The project will expand the melt shop's capacity at a cost of between \$35 and \$45 million.

A joint venture between Bethlehem Steel Corp. and National Steel Corp., Double G Coatings Inc., will invest \$100 million for a new plant in Jackson. Cold-rolled, semi-finished coils of steel will be shipped to the new plant and manufactured into 249,000 metric tons of galvanized sheet steel per year.

MISSOURI

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Annual, Estimated

THE MINERAL INDUSTRY OF MISSOURI IN 1992

The value reported nonfuel mineral production in Missouri was estimated by the U.S. Bureau of Mines at over \$924.6 million in 1992. This was a \$44.2 million increase over the \$880.4 million reported in 1991. Estimated sales increased in 1992 for nine of the mineral commodities produced in the State. The increase in portland cement production was the most substantial, followed by construction sand and gravel, dimension stone, and crushed stone. Increases also occurred in the production of masonry cement, industrial sand and gravel, and zinc. Lead continued as the State's leading mineral commodity, accounting for almost 26% of the estimated total nonfuel mineral value. Lead, crushed stone, and zinc accounted for over 52% of the estimated total mineral value reported in 1992. Missouri ranked 11th nationally in nonfuel mineral value and continued as the Nation's leading producer of lead, lime, and fire clay.

Employment. Employment in the mining industry in September 1992, the last month for which data are available, totaled 4,700 workers, a decrease of 100 workers below September 1991. The stone, clay, and glass products sector decreased from 10,600 in September 1991 to 10,300 in 1992. The primary metals sector increased 300 workers to 12,400 in 1992. Employment in the construction industry increased from 93,300 in 1991 to 94,500 in 1992.

Legislation and Government Programs. Enacted House bill 1006 provided appropriations for the Missouri Department of Natural Resources. In February, the State Legislature began consideration of a proposal to eliminate the Division of Geology and Land Survey from the budget. However, the Missouri Limestone Producers Association, the Mining Industry Council of Missouri, and numerous other organizations and individuals were instrumental in insuring that the Division was funded, and also assisted in preventing two geologist positions from being deleted from the budget.

Enactment of Senate bill 468 increased the fuel tax by \$0.06, increasing \$0.02 per year every other year until the full \$0.06 is implemented. The funds will contribute to the planned 15-year highway construction program and nearly double the available Federal matching funds.

Senate bill 544 revised Missouri's clean air law to meet new Federal requirements. The bill established emissions fees of \$25 per ton, required 5-year operating permits, and specified that the provisions of the State air quality compliance regulations be no stricter than Federal requirements.

The U.S. Senate Finance Committee rejected a House-passed proposal to abolish the depletion allowance for producing lead, mercury, asbestos, and uranium. The elimination of the depletion allowance would have cost Missouri lead producers millions of dollars annually and resulted in a loss of many jobs.

NONFUEL MINERAL PRODUCTION IN MISSOURI 1/

		1990		1991		1992*	
Mineral		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland)	thousand short tons	4,481	\$180,090	*4,276	*\$171,040	W	W
Clays ²	metric tons	1,347,558	12,864	2,001,537	11,060	1,907,057	\$13,640
Gem stones		NA	W	NA	W	NA	680
Iron ore (usable)							
	thousand metric tons	1,002	W	*224	W	224	W
Lead ³	metric tons	380,781	386,345	351,995	259,841	300,901	238,814
Sand and gravel (construction)							
	thousand short tons	9,243	25,097	*7,400	*20,100	8,700	24,100
Silver ³	metric tons	42	6,434	35	4,483	24	3,086
Stone (crushed)	thousand short tons	*53,100	*190,900	47,938	167,233	52,000	186,700
Zinc ³	metric tons	48,864	80,355	42,506	49,453	43,415	56,471
Combined value of barite, cement (masonry), clays (fuller's earth), copper, iron oxide pigments (crude), lime, sand and gravel (industrial), stone (dimension), and values indicated by symbol W		XX	222,968	XX	197,141	XX	401,119
Total		XX	1,105,053	XX	880,351	XX	924,610

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Recoverable content of ores, etc.

The U.S. Environmental Protection Agency (EPA) issued two regulations to implement air pollution controls required by the Clean Air Act. These included regulation of a number of mineral-products industries for toxic air pollutants and the implementation of permitting requirements for all major sources of air pollution. New standards also were set for visibility and particulate matter that apply to calciners and dryers at plants processing or producing construction products, including lightweight aggregate. EPA anticipates that product price increases resulting from the new standards probably would be less than 0.5 %, but could be as much as 1.75 % for the lightweight aggregate industry. EPA also studied the process of using wastes as fuel in cement kilns, in an effort to reduce regulatory burdens on industry and to redefine what is considered a waste. EPA determined that there was no data to indicate that emissions from burning wastes in cement kilns threaten human health or the environment, and that there was no measurable increase in the level of toxic metals in the cement product.

Scientists with the Missouri Department of Natural Resources, Division of Geology and Land Survey, continued an evaluation of the Pea Ridge, Boss-Bixby, and nearby iron, copper, rare-earth, and gold deposits in the St. Francois Mountains of southeastern Missouri. The study is a cooperative program with the U.S. Geological Survey and private industry to identify and quantitatively assess new subsurface targets for polymetallic (Olympic Dam-type) deposits in the Midcontinent Region. Geologic conditions at Olympic Dam, Australia, are nearly duplicated in this part of the State.

In a cooperative program with the U.S. Geological Survey (USGS) and the State Geological Surveys of Kansas, Iowa, and Nebraska, the Missouri Division of Geology and Land Survey is the lead agency in a proposed 4-year study of coalbed methane in the Forest City Basin, in the northwestern corner of the State. If commercial quantities of coalbed methane occur, the possibilities for production will be evaluated. A six

month pilot study was approved by the U.S. Congress in October.

Under the sponsorship of the USGS Conterminous United States Mineral Assessment Program, the Paducah 2° Quadrangle study was completed. The project, the fifth quadrangle in Missouri, was completed through the cooperation of the State Geological Surveys of Missouri, Illinois, Kentucky, and Indiana. Lead, other metallic minerals, fluorspar, limestone, coal, sand and gravel, clay, and oil have been produced from the quadrangle. Research indicated the presence of large quantities of undiscovered resources of these and other minerals, including barium, cobalt, copper, natural gas, zinc, silver, sand and gravel, and clay.

The U.S. Bureau of Mines hosted a meeting on August 28 with representatives of the Missouri Division of Geology and Land Survey, the Missouri Limestone Producers Association, and the Mining Industry Council of Missouri. The purpose of the meeting was to learn about the interests and needs of the mining industry in the State and to obtain ideas for future Bureau research projects.

Review by Nonfuel Mineral Commodities. Lead continued as the State's leading mineral commodity, accounting for almost 26% of the estimated total nonfuel mineral value. Missouri ranked 1st of 11 states producing lead in 1992. The State also ranked 1st, in **lime** and **fire clay** production.

After nearly 10 years of controversy aimed at blocking mining in Mark Twain National Forest, The Doe Run Co. was cleared in October to drill 20 exploratory holes for **lead** near Winona in southeastern Missouri. Drilling began in late 1992. In addition to the drilling controversy, the Teamsters union went on strike at the Herculanum smelter in Jefferson County on July 30. The Fluor Corp., owner of Doe Run, announced on November 30 the decision to sell Doe Run rather than shutting down. Operations continued as usual at yearend.

Cominco American Inc. reduced production to about 60% and laid off 35 employees from the **lead-zinc-copper** mine and mill near Bixby, in Iron County. The cutbacks resulted from the depletion of ore reserves. The mine has produced over 25,000,000 tons of ore during 25 years of operation.

Mid-America Lime Co. was formed as a joint venture between Chemical Lime Co. of Fort Worth, Texas, and Marblehead Lime Co. of Chicago, Illinois. The new company will produce **lime** at a facility to be constructed near Ste. Genevieve, in Ste. Genevieve County. The facility, scheduled to be operational in 1994, will supply the large emerging flue gas desulfurization lime markets along the Mississippi, Missouri, and Ohio Rivers.

Development continued in the use of mined out portions of underground **limestone** mines for office, storage, and manufacturing use. A number of mines already host secondary development, and several continued to be mined. Other companies were in various stages of evaluation, obtaining permits, and bringing their space into use.

A zoning request for **limestone** quarry 2 miles northeast of Garden City, submitted by Limpus Quarries Inc., was unanimously approved by Cass County in December. The company had been operating the quarry near its crusher and scale/office when it was discovered that the land was not properly zoned. The company will mine the 120-acre parcel in four phases, with each phase estimated to last 10 to 15 years.

West Lake Companies continued to divest their holdings, and in late 1992 sold the Grays Point **crushed stone** quarry, in Scott County, to Tower Rock Stone Co. Southeast Missouri Stone Co., Cape Girardeau, was sold to COLAF, a French company. The sale included properties in four states.

Controversy continued throughout the year over a permit request by Medusa Aggregates Co. to locate an asphalt and/or concrete plant at the **limestone** quarry it operates in Columbia, Boone County. Zoning

conflicts and interpretation, along with objections raised by residents, were intertwined with a complicated mixture of land ownership and mineral rights on the property in question.

Martin Marietta Aggregates Inc. acquired a 50% interest in Kaser Corp., of Des Moines, Iowa. Both companies produce limestone, agricultural lime, and sand and gravel.

After a year of continued controversy, Associated Electric Cooperative Inc. developed a plan of action to bring its Thomas Hill Energy Center into compliance with new Clean Air Act requirements. Beginning in January 1995, low-sulfur western coal will be used in two of the three generating units at the Center. Coal from the Thomas Hill Mine will be blended with western coal in the third unit. In 1997, the decision will be reevaluated to determine whether to continue using Missouri coal or to close the mine and switch completely to western coal. The decision could be made prior to 1997, if warranted by annual evaluations.

Cyprus Minerals Co. shut down its Warrentown refinery for 5 days to allow the supply of copper scrap to catch up with production demands. Aggressive buying by China created a strain on the copper scrap market. The Warren County plant operated about 2 million pounds below capacity because of a shortage of scrap.

MONTANA

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Annual, Estimated

THE MINERAL INDUSTRY OF MONTANA IN 1992

The estimated value of nonfuel mineral production for Montana in 1992 rose to \$603.3 million, an increase of more than 2% from that of 1991, according to the U.S. Bureau of Mines. Increases in the estimated values for cement, lime, phosphate, and construction sand and gravel more than offset decreased values estimated for copper, gold, and molybdenum. Metallic minerals--copper, gold, iron ore, lead, molybdenum, platinum group metals, silver, and zinc--accounted for 77% of the State's total nonfuel mineral production value. In 1992, Montana ranked 18th nationally in the value of these minerals, compared with 17th in 1991.

NONFUEL MINERAL PRODUCTION IN MONTANA 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	² 29,741	² \$193	362,635	\$11,332	346,694	\$13,934
Gem stones		NA	3,692	NA	2,796	NA	1,081
Gold ³	kilograms	13,012	161,861	18,511	216,211	18,410	207,163
Palladium metal	do.	5,930	21,735	6,050	16,923	6,050	16,445
Platinum metal	do.	1,810	27,176	1,730	20,635	1,730	19,801
Sand and gravel (construction)							
	thousand short tons	5,114	14,319	⁴ 4,800	⁴ 13,700	6,500	18,900
Silver ³	metric tons	220	34,114	222	28,893	198	25,463
Stone (crushed)	thousand short tons	⁴ 4,000	⁴ 15,300	2,107	5,725	2,100	5,900
Talc and pyrophyllite	metric tons	430,125	18,883	W	W	390,765	18,498
Combined value of barite, cement, clays (bentonite [1990]), copper, iron ore (usable), lead, lime, molybdenum, peat, phosphate rock, sand and gravel (industrial), stone (dimension), vermiculite, zinc, and value indicated by symbol W							
		XX	275,944	XX	274,082	XX	276,088
Total		XX	573,024	XX	590,297	XX	603,273

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data, value included with "Combined value" data.
XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Recoverable content of ores, etc.

Prices for many of the metallic minerals produced in Montana remained depressed. The total value of production in this category dropped by more than 4%, although molybdenum was the only metal that had a significant drop in quantity produced. On the plus side, the value of zinc production rose 14%. A variety of industrial minerals continued to be produced by the State. Led by portland cement, total production value of industrial minerals increased 32% from that of 1991.

Exploration. There was a significant downturn in mineral exploration activity in 1992, by as much as 50% and with much of it confined to later-stage projects and the reclamation of previous activities, according to the Montana Bureau of Mines and Geology. The primary target continued to be gold and other precious metals; however, some interest was directed to massive sulfide deposits of copper, lead, and zinc.

In the northwest region, at the Montanore, a massive silver-copper prospect near Libby, Noranda completed its Environmental Impact Statement (EIS) and received a water-quality variance. Final operating permits are expected in July 1993. Pegasus Gold Inc. entered into a joint venture agreement with Orvana Resources Co. to explore Orvana's Lukens-Hazel project. Reportedly, Pegasus may acquire up to 70% of the property through exploration expenditures before September 1995. The property is four miles from Libby and is considered ideally suited for heap leaching. Near Missoula, Pegasus did exploration work in the Garnet Mountains, identifying six small ore bodies. In Rock Creek drainage, Granite County, FMC Corp. explored its Sliderock, Shively Ridge, and Stony Creek properties. Cyprus Metals drilled volcanics in the Basin Gulch area. Pegasus drilled inside the proposed Blue Joint Wilderness Area, Ravalli County. Cameco U.S. Inc. continued exploration at the Londonderry property, Blue Ribbon Resources drilled in the upper Gold Creek area, and Pegasus worked at its Hidden Lake, Robinson, and Northern Cross properties. American Copper & Nickel Co. explored a copper skarn in Ophir Creek and Pegasus searched south of Elliston, Powell County.

In the Helena region, the joint venture of Canyon Resources Corp. and Phelps Dodge Corp. began permitting work at its Seven-Up Pete project, which includes the Seven-Up Pete and McDonald prospects, a 44-square-mile land package near Lincoln. Estimated reserves of the sizeable McDonald deposit are 270 million metric tons at 0.73 kilograms gold per ton; Seven-Up Pete is the smaller of the two. Elsewhere in the region, Pegasus and Earthworks Inc. drilled north of Basin on their Silver State project, Goldfields continued exploration on its Elkhorn property, Pegasus sampled underground at the Diamond Hill Mine and continued a large drilling program at Miller Mountain. Cominco American Resources Ltd. and Kennecott/BHP Utah Int. continued exploration for massive sulfides northeast of White Sulphur Springs.

In the Butte region, Magellan Resources drilled and trenched its Southern Cross property west of Anaconda, Deer Lodge County. The property was later optioned by Asarco Incorporated. FMC drilled its Arbeide project, and Kennecott explored the Kearsarge and other Alder Gulch properties near Virginia City.

In the southwest region, exploration and permitting continued at the New World property by the joint venture of Noranda Exploration Inc. and Crown Butte Resources Inc. The venture has completed the "completeness" review and is expected to submit a draft EIS in July 1993. The property, in the Beartooth Mountains near Cooke City, Park County, includes an underground reserve and two smaller open-pit deposits of gold with associated copper and silver. Reportedly 88% of the project's gold and 76% of the tonnage are classified as underground. At this time, the joint venture plans to only mine underground and has eliminated the use of cyanide in their mill. They expect a 97% recovery using gravity and flotation methods only. Reclamation of environmental damage from previous mining activity continued.

Also in the southwest, Fischer-Watt Gold optioned its Emigrant Gulch property, a gold-silver-copper prospect, to Pegasus Gold, which proceeded to explore the gold-bearing breccia pipe. In the northcentral region, CR Kendall Corp. and Coeur d'Alene Mines explored in the Judith Mountains and CR Kendall looked for additional reserves in the North Moccasins. Independence Mining drilled in the Linster Peak area.

Environment. Montana's two cement manufacturers applied for State and Federal permits to burn hazardous waste. Holman Ideal Inc. proposed to burn hazardous waste at its cement plant at Trident, near

Three Forks and Ash Grove Cement West Inc. at its plant near Helena. A citizens group wants a moratorium on burning hazardous waste and laws passed to require a Statewide vote before a company is allowed to import and burn waste. Holman says one cannot compare cement plants with hazardous waste incinerators because the kilns would not burn the same chemicals as incinerators, and the higher temperatures of the cement kiln are more effective in destroying the chemicals.

A number of mining companies have applied to the Montana Department of Health for exemption to the State's water non-degradation regulations. Included were the Stillwater Mining Co. at its Stillwater platinum-palladium properties and Noranda at its proposed New World project. The 1982 State law forbids any discharge that would lower the quality of the stream. An exemption would allow a mining company to add discharge into State waters as long as the water retained or exceeded all water quality standards.

Review by Nonfuel Mineral Commodities. Gold mines operated by Pegasus Gold Inc. included the Zortman-Landusky, Montana Tunnels, and Beal Mountain. At Basin Creek, Pegasus did tests on possible heap leach production on a seasonal basis using run-of-mine-ore. Permission was received to load the new leach pad at the Zortman-Landusky Mine, an open-pit heap-leach operation in the Little Rocky Mountains, Phillips County. Pegasus also was seeking regulatory approval to mine the sulfide portion of the Zortman orebody. At Beal Mountain, an open-pit heap-leach operation about eight miles south of Fairmont, near Anaconda, Silver Bow County, Pegasus was in the process of permitting, including preparing an environmental impact statement, an expansion to encompass newly discovered ore from two small pits on the south side of German Gulch. The pits would be mined in one operating season and backfilled with waste from the main Beal pit. The company wants to amend its operating permit to extend a haul road from the pits to heap leach pads, all located within the company's mine permit area. Pegasus received permission to explore the east slope of Beal Hill, east of the main Beal pit and south of the proposed South Beal Pit.

Montana Tunnels produced gold and silver as a byproduct of lead and zinc production. The lead concentrates, which contain most of the precious metals, were processed at the Asarco smelter in East Helena; zinc concentrates were sent to Cominco's smelter at Trail, British Columbia. A gravity circuit was installed at Montana Tunnels, which significantly increased gold recovery and lowered operating costs.

The earth work and liner for a new tailings facility were finished at Placer Dome Inc.'s Golden Sunlight Mine near Whitehall, Jefferson County. Two years after a permit was approved allowing the mine's continued operation--a permit that was reviewed for 28 months and includes a reclamation bond of \$25 million that will eventually reach \$38 million--five environmental groups sued Placer Dome and the State Lands Department, claiming unlawful granting of the permit.

Canyon Resources produced gold and silver from the Kendall Mine. The company recently built a new leach pad, expanded its processing facilities, and was seeking permission to mine its final orebody.

The underground Mineral Hill Mine, operated by TVX Gold Inc., a joint venture of American Copper & Nickel Co. and Homestake Mining Co., produced gold at Jardine, Park County. Mineral Hill was the only mine in the State depositing dry tailings. Permitting was initiated for a new ore body in the Crevice district to the south of the mine.

The joint venture of Montana Resources Inc. (MRI) and Asarco, with MRI the operator, produced copper and molybdenum from the Continental Pit in Butte. The bulk of the copper concentrates was shipped to Asarco's facilities in Texas and Arizona. Asarco also operated its Troy Unit, an 8,500 mt/d copper-silver mine in Lincoln County.

Stillwater Mining produced platinum-palladium near Nye, Stillwater County. The underground mine was the Nation's only producer of platinum group metals. The company also operated a smelter at Columbus,

40 miles away. Stillwater Mining proposed doubling mine production from 1,000 tpd to 2,000 tpd. The company petitioned the State Board of Health to grant an exemption under a law that prevents degradation of State water. If granted, the company would be allowed to increase the amount of discharge from the mine, but would still not be allowed to exceed State water-quality standards. Stillwater Mining also was seeking permits to begin construction of a new mine, its East Boulder project, south of Big Timber, Sweet Grass County.

Columbia Falls Aluminum Co. operated a 168,000-metric-ton-per-year **aluminum** reduction plant in Flathead County. **Portland cement** was produced by Ash Grove Cement at Montana City, Jefferson County, and by Holman Ideal at Trident, Gallatin County; both companies sold small amounts of masonry cement. **Talc** was produced by Barretts Minerals Inc., a subsidiary of Mineral Technologies Inc., which is 40% owned by Pfizer Inc., at its Treasure Chest Mine, south of Dillon in Madison County; Luzenac America Inc. at its Yellowstone and Beaverhead Mines, and from Montana Talc's Johnny Gulch Mine. Luzenac America produced high-purity **chlorite** at its Golden Antler Mine near Silver Star, Madison County.

Lime was produced near Townsend, Broadwater County, by Continental Lime Inc., a subsidiary of Graymount Mining, by Great Western Sugar Co. in Yellowstone County, and Holly Sugar Co. in Richland County. The limestone was mined at the Warren quarry in Carbon County. Although processed **vermiculite** from stockpiles continued to be shipped, W. R. Grace was close to finishing reclamation of the Rainy Creek Mine and plant facilities near Libby. The Monolite Mine near Dillon, owned and operated by Mineral Products Inc., suspended operations and the property was for sale. Cominco American Resources produced **phosphate** rock at its Warm Springs operation, the last underground phosphate mine in the Nation. Cominco shipped the phosphate to its smelter in Trail, British Columbia, where it was made into phosphoric acid and other phosphate-based products. The mine was shutdown in the fall because of production problems at Trail. Rhone-Poulenc Basic Chemical Co. operated an elemental phosphorus plant at Silver Bow.

Several **sapphire** mines continued both commercial and hobbyist production, including the Gem Mountain Sapphire Mine in Granite County; at Eldorado Bar and French Bar Placer in Lewis and Clark County; and the famous Yogo Dike, Judith Basin County. Rocky Mountain Minerals Co., formerly Dillon Exploration Inc., produced high-grade **barite** from its Elk Creek property. The ore was transported to Lethbridge, Alberta, for further processing. United States Antimony Corp. produced **antimony** at its refinery near Thompson Falls.

NEBRASKA

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Annual, Estimated

THE MINERAL INDUSTRY OF NEBRASKA IN 1992

The value of nonfuel mineral production in Nebraska in 1992 was approximately \$111 million, an increase of nearly \$22 million from the 1991 value of \$89 million, according to estimates by the U.S. Bureau of Mines. Five of the eight minerals produced in Nebraska increased, or stayed the same, in output and value compared with 1991 levels. Nebraska accounted for about one-third of one percent of the national total value of nonfuel minerals produced in 1992. All nonfuel minerals produced in Nebraska, with the exception of gem stones, were basic construction materials and production continued to reflect construction trends in the State. Industrial sand was used in the production of glass and had some applications outside of construction activities. Uranium production in Nebraska is not included in the Bureau of Mines statistics. Nebraska ranked 24th nationally in the production of nonfuel mineral resources.

NONFUEL MINERAL PRODUCTION IN NEBRASKA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays metric tons	227,292	\$1,685	198,319	\$909	189,422	\$1,110
Gem stones	NA	7	NA	1	NA	W
Sand and gravel (construction)						
thousand short tons	11,453	30,056	*10,100	*27,300	11,800	32,600
Stone (crushed) do.	*4,000	*21,200	4,861	23,328	5,800	28,700
Combined value of cement, lime, sand and gravel (industrial), and value indicated by symbol W	XX	37,381	XX	37,854	XX	48,821
Total	XX	90,329	XX	89,392	XX	111,231

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data, value included with "Combined value" data.
XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment. The unemployment rate in Nebraska remained below 4% for most of the year. Mining employment in August was 1,500, down 6.5% from the same month in 1991.

Environment. Ferret Exploration Co., operators of Nebraska's only commercial uranium mine, agreed to pay \$3,500 to settle a case involving the discharge of radioactive water at the in situ Crow Butte Mine near Crawford, Dawes County. Ferret completed uranium recovery in Unit 1 and began recovery in

Unit 2 during the year. In September, Imperial Metals Corp., Vancouver, increased its interest in the mine from 35.5% to 52.8%. The additional interest was acquired from Sedimex Mineralexplorations GmbH.

A controversial \$50 million incinerator planned near Kimball was still on hold after 2 years of construction. Waste-Tech Services Inc. of Colorado began construction in 1988 on a facility that would burn 29,930 metric tons (33,000 short tons) of waste a year. Under proposed tighter State control, the plant might be able to burn 40,815 metric tons (45,000 short tons) per year. A State hearing on permits for the facility was held during the year but two private lawsuits opposing the project were awaiting hearings by the Nebraska Supreme Court.

University of Nebraska-Lincoln researchers started a 2-year study of ways to use fly ash from Nebraska's two major power producers in lightweight concrete blocks. The two utilities produce more than 272,100 metric tons (300,000 short tons) of fly ash each year.

Exploration. Interest in what may be one of the world's largest carbonatite bodies was revitalized in 1992 when Molycorp Inc. (subsidiary of Unocal Inc.) turned over some 1,200 boxes of drill core samples to a Nebraska land owner when the company terminated exploration leases. A clause in one of the drilling leases held by Molycorp required the company to give core samples to the surface owners if the company decided against mining the area. The Elk Creek carbonatite, in Johnson and Pawnee Counties, southeastern Nebraska, was discovered by geologists with the Nebraska Geological Survey in 1970. The deposit was first identified by a large area, 9.6 kilometers (6 miles) in diameter, of unusually high gravitational pull. The Nebraska survey did some initial drilling on the carbonatite and with some financial help from the U.S. Bureau of Mines was able to drill to depths of 290 meters (952 feet) without finding the base of the formation. Analysis of the core samples obtained in the drilling showed the presence of several rare earth elements including niobium (the primary ore mineral), and minor amounts of cesium, cerium, europium, lanthanum, and yttrium.

Over the last 20 years two mining companies, Cominco-America and Molycorp, explored the carbonatite and drilled to a depth of 762 meters (2,500 feet) while drilling some 115 test holes in the area. Exploration company representatives indicated the carbonatite body is 3.23 kilometers (2 miles) in diameter, covered by about 183 meters (600 feet) of Paleozoic sediments, contains lots of apatite, and is the largest resource of niobium in the United States (1.0% to 1.5% Nb₂O₅). Surface owners receiving the core turned it over to the Nebraska Geological Survey in Lincoln. Staff members of the State survey plan to study the core and issue a report on their findings.

The Nebraska Geological Survey Division worked on plans to explore for coalbed methane in the southeastern corner of the State and parts of Iowa, Kansas, and Missouri. The agency also completed updating publications on mineral resources in the State, including the Crow Butte uranium deposit being worked by Ferret.

Review by Nonfuel Mineral Commodities. The question of production of sand and gravel along the Platte River at Lincoln was taken on by the State Legislature in 1992. Two Lincoln companies, Concrete Industries Inc. and NEBCO Inc., donated two 65-hectare (160-acre) tracts of land along the Platte River in Saunders County to the Nebraska Game and Parks Commission the day before a condemnation hearing was filed by the Omaha Metropolitan Utilities District (MUD) against the two companies. MUD wanted the land for a water well field but the two companies purchased the land for sand and gravel mining before MUD could acquire the land. Under the donation agreement, the companies would be allowed to extract some 10.89 million metric tons (12 million short tons) of high-quality sand and gravel from the land. The State Legislature adjourned without voting to accept the land. The Nebraska Geological Survey Division completed an inventory of all mine and quarries operating in the State in 1992.

Kerford Limestone Co. started production at Nebraska's fourth underground limestone mine near Weeping Water. The company produces 1.18 million metric tons (1.3 million short tons) of limestone annually from mines in the Weeping Water area for use in asphalt and concrete. Although limestone underlies most of the State, it is mined only in the eastern part of the State because of the higher quality and shallower depth of the limestone there.

Nebraska's only cement manufacturer, Ash Grove Cement, operated its Louisville plant at a rate of about 635,040 metric tons (700,000 short tons) in 1992. The plant has an operating capacity of 907,200 metric tons (1 million short tons). Ash Grove fuels two 49-meter (160-foot) kilns with coal, natural gas, fuel oil, and waste-derived fuels.

NEVADA

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Annual, Estimated

THE MINERAL INDUSTRY OF NEVADA IN 1992

According to data compiled by the U.S. Bureau of Mines, 1992 nonfuel mineral production in Nevada was estimated to be valued at \$2.4 billion, an increase of about \$39 million from that reported in 1991. Gold production continued to increase to 187,109 kilograms (6,015,685..troy ounces) a 5.5% rise over 1991's production and silver increased by 23 metric tons (739,466 troy ounces) to 601 metric tons as it reflected its relationship to gold as a byproduct. Nevada remained the leading State in the production of gold, silver, mercury and barite, second in the production of diatomite and lithium; and was the sole producer of mined magnesite. Nevada ranked third among the States in 1992 production value of nonfuel minerals.

Gold remained Nevada's most valuable mineral commodity accounting for more than 85% of the State's total nonfuel value, about \$2.1 billion. Silver and construction sand and gravel were the State's next most valuable minerals, followed in order by cement, diatomite, lime,lithium, gypsum, clay, copper, industrial sand and gravel, zinc, magnetite and barite.

Employment. According to the Nevada Employment Security Department, mining industry employment in Nevada totaled 13,800 workers in October 1992, compared with 13,500 workers in October 1991.

Exploration. Atlas Corporation completed drilling of the Gold Canyon deposit near Eureka in May. In Lander County, Royal Gold continued drilling in the Crescent Valley; Santa Fe Pacific Inc. drilled in Mill Canyon adjacent to the Cortez mine; and Central Gold Corp. explored the Battle Mountain Trend near Cortez. Western Mining Corp. explored the Cloverdale area of the Toiyabe Mountain Range in Nye County. Rio Algom Exploration Inc. also explored in Nye County in the Toquima mountain range. Several mining companies explored south and southwest of Hawthorne in Nye County near the old Aurora mining camp. U.S.M.X Inc. explored its White Pine County Yankee Project at Alligator Ridge.

Legislation and Government Programs. The Nevada legislature did not meet during 1992. The U.S. Bureau of Mines, Reno Research Center was recipient of Research and Development Magazine's "R & D 100" award for 1992. The award was received for the development of a process to recover flake graphite from kish (a steel making waste mixture of iron, slag and graphite).

Review by Nonfuel Mineral Commodities. U.S.M.X. poured its first gold on June 24th at its open-pit, heap leach, carbon adsorption Yankee mine in the Alligator Ridge Trend of White Pine County.

NONFUEL MINERAL PRODUCTION IN NEVADA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Barite thousand metric tons	337	\$5,884	374	\$11,933	318	\$6,144
Clays ² metric tons	34,625	4,098	15,553	3,204	14,719	3,948
Gem stones	NA	407	NA	958	NA	242
Gold ³ kilograms	179,078	2,216,233	177,312	2,071,009	187,109	2,105,490
Lead ³ metric tons	830	842	W	W	—	—
Mercury do.	W	W	57	202	60	313
Sand and gravel:						
Construction thousand short tons	18,377	59,008	*20,300	*69,000	20,700	71,800
Industrial do.	607	W	546	W	515	W
Silver ³ metric tons	646	100,146	578	75,050	601	77,290
Stone (crushed) thousand short tons	*1,600	*5,000	1,199	6,527	1,300	7,300
Zinc ³ metric tons	7,889	12,973	W	W	—	—
Combined value of brucite, cement (portland), clays (fuller's earth, kaolin), copper, diatomite, fluorspar (1990), gypsum (crude), lime, lithium minerals, magnesite, molybdenum (1990-91), perlite, salt, and values indicated by symbol W	XX	216,820	XX	155,018	XX	158,646
Total	XX	2,621,411	XX	2,392,901	XX	2,431,173

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Recoverable content from ores, etc.

St. George Metals Inc. completed construction and began heap leaching operations at its underground Dean mine near Battle Mountain.

In May, Newmont Gold Co. announced plans for the expansion of its Eureka County Gold Quarry mine through the year 2002. Operations at the Newmont South Area would lower the pit another 800 feet and require dewatering operations, peaking at 50,000 gallons per minute sometime after 1993. American Barrick Resources completed its mill expansion in April and finished work on its second and third autoclaves in June. Construction began in August on the sixth and final autoclave at the Barrick Goldstrike project. The Santa Fe Pacific Gold Corporation's Lone Tree mine near Stonehouse in Humboldt County was dedicated in May, after reaching a production rate of 120,000 ounces of gold per year. Atlas Corp. completed mining its Gold Ridge South and Gold Pick West deposits and began preproduction work on the Gold Pick East deposit in Eureka County.

Magma Nevada Mining Co. ceased gold mining operations at its Robinson project near Ely in August. Atlas Corp. reduced its personnel at the Gold Bar mine in Lander County by 46 employees or 24% of the workforce.

A decline in aerospace related business caused the closure of Howmet Corp.'s Reno titanium plant in June. The plant had a capacity of 5 million to 6 million pounds a year and employed 34 people.

NEW HAMPSHIRE

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Annual, Estimated

THE MINERAL INDUSTRY OF NEW HAMPSHIRE IN 1992

The value of nonfuel mineral production in New Hampshire in 1992 was estimated by the U.S. Bureau of Mines to be \$42.3 million. This value represents an increase of nearly \$12 million from that of 1991. The increase in value was attributed to greater sales of most of the State's mineral commodities. Increases were reported for construction sand and gravel and crushed and dimension stone. Common clay and gem stones, collected by hobbyists, accounted for the remainder of the State's mineral value. Crude gypsum, imported into the State, was calcined at two plants to manufacture wallboard.

NONFUEL MINERAL PRODUCTION IN NEW HAMPSHIRE 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$38	NA	\$31	NA	\$7
Sand and gravel (construction)						
thousand short tons	7,901	26,599	*4,700	*16,200	6,800	23,900
Stone:						
Crushed do.	*600	*2,500	1,542	9,148	2,000	13,000
Dimension short tons	*45,073	*6,029	34,803	5,013	37,647	5,460
Total ²	XX	35,166	XX	30,392	XX	42,367

e Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Partial total, excludes values which must be concealed to avoid disclosing company proprietary data.

Employment. The average number of workers in the mineral extractive industries in New Hampshire during the first 9 months of 1992 was estimated to be 353, a total of 20 less than that of 1991. This included 229 workers at sand and gravel pits and 111 workers at stone quarries. A total of 13 workers were employed at mineral-related mills and preparation plants in the State.

Legislation and Government Programs. Senate bill 332 was introduced into the 1992 legislative session to help in the cleanup of municipally owned toxic waste sites. The bill was to provide \$80 million to help municipalities in the cleanup of U.S. Environmental Protection Agency (EPA) designated Superfund waste sites. One such site is in Londonderry, where a former town dump, septic lagoon, and landfill was closed in 1980 after the State found hazardous materials in soil and groundwater. The site has been on the Federal Superfund list since 1986 and cleaning it up could cost more than \$23 million. The town had operated the landfill on the 200-acre parcel and was found by the Federal Government to be responsible for at least \$5 million in cleanup costs. The EPA also determined in 1990 that eight private parties were

responsible for the cleanup. One of the eight parties was the Derry Sand & Gravel Co., which had operated a sand and gravel pit at the site. However, the bill, as introduced, was killed by the Senate in May.

Review By Nonfuel Mineral Commodities. The Barretto Granite Corp., a family-run dimension stone operation for more than 40 years, was purchased by a Chelmsford, MA, company. In recent years, Barretto had cut its work force in half due to financial problems and a decrease in business. Fletcher Granite Co., a subsidiary of the Australian building materials conglomerate, Pioneers International Limited, bought the company after a consulting firm negotiated with the Federal Deposit Insurance Corp. The company is now going by the name of Barretto-Fletcher Granite Corp., but the basic business operation is not expected to change.

Swenson Granite Co. Inc., Concord, signed an agreement with Rock of Ages Asia Corp., a new corporation formed by Rock of Ages Corp., Barre, VT, and a Japanese firm. The new corporation will engage in the sale of granite supplied by Swenson Granite, Rock of Ages, Royalty Granite Corp. of Carleton, GA, and other granite suppliers to Japan, Taiwan, Korea, and other potential markets in Asia. Estimated sales for Rock of Ages Asia's first year of operation are in excess of \$7.5 million.

After nearly 5 years of trying to obtain permission to open a quarry in the town, the Eliot Planning Board finally gave its approval to the Barletta Co. Inc. to open a \$1.8 million crushed stone operation. Approximately 125 acres of a 300-acre parcel is expected to be mined over the next 50 years. Earlier in the year, the company had received final approval from the New Hampshire Department of Environmental Protection.

NEW JERSEY

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Annual, Estimated

THE MINERAL INDUSTRY OF NEW JERSEY IN 1992

The value of nonfuel mineral production in New Jersey in 1991 was estimated by the U.S. Bureau of Mines to be \$213.7 million. This represents an increase of \$8.7 million over that of 1991. The increase was largely attributable to an increase in output of construction sand and gravel, the State's second leading commodity in terms of value. Other mineral resources mined or recovered included crushed stone, industrial sand, common and fire clays, greensand, peat, titanium, and zircon concentrates. New Jersey continued to be the only State that produced greensand. The State ranked fourth of 37 States that produced industrial sand and seventh in exfoliated vermiculite output.

NONFUEL MINERAL PRODUCTION IN NEW JERSEY 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$3	NA	\$3	NA	\$1
Peat thousand short tons	W	527	W	541	15	321
Sand and gravel:						
Construction do.	13,862	64,245	*10,300	*47,900	12,000	56,900
Industrial do.	1,762	26,190	1,634	23,738	1,719	25,548
Stone (crushed) do.	*21,200	*131,700	*16,680	*119,287	*16,400	*120,800
Combined value of clays (common, fire), greensand marl, stone (crushed sandstone and other [1991]), crushed unidentified [1992]), titanium concentrates (ilmenite and rutile, [1991-92]), zircon concentrates, and values indicated by symbol W	XX	6,805	XX	13,519	XX	10,093
Total	XX	229,470	XX	204,988	XX	213,663

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; value included with "Combined value" figure.

During the first 9 months of 1992, overall construction activity in New Jersey remained sluggish. The slight recovery at yearend 1991 seemed to indicate an upcoming improvement, but by the first quarter of 1992, all categories of construction had weakened and continued to do so during most of 1992. The value of overall construction contracts

through September 1992 were down nearly 20% from the same period in 1991. Since aggregate producers rely heavily on a healthy construction industry, the continuing slump in this industry was reflected in the stagnant growth of the State's mineral industry.

However, there was one bright spot for New Jersey's construction industry. During the year, the New Jersey Department of Transportation proposed a \$1.5 billion transportation program for 1993, the largest in the State's history. The program should provide thousands of construction jobs, while improving mass transit and repairing many of the State's deteriorated roads. However, passage of the program depends on the New Jersey Legislature's removing the statutory cap on the State's Transportation Trust Fund.

Employment. The average number of workers in the mineral extractive industries in New Jersey during the first 9 months of 1992 was estimated to be 1,689. This included 1,367 workers at surface operations, primarily for sand and gravel and stone and crushed stone, and 322 working at mineral-related mills and preparation plants in the State.

Environment. The Nuclear Regulatory Commission (NRC) announced that the owner of the Heritage Minerals Inc. tract in Lakehurst had until 1995 to remove radioactive minerals from a 7,000 acre parcel in the township. Between 1987 and 1991, Heritage Minerals had recovered zircon and lecontite from tailings piles at the former ASARCO Inc. titanium plant operations. Radioactive minerals in the monazite-rich sands on the site are thorium and uranium.

In October, the U.S. Environmental Protection Agency (EPA) and the Department of Justice asked a bankruptcy court to approve a \$27-million settlement with CF&S Steel Corp. and its subsidiaries for cleanup costs associated with the Roebling Steel Superfund Site in Roebling. CF&S owned and operated the now defunct steel mill from 1954 to 1972. The facility ceased operations in 1982, and in 1988, the site was placed on EPA's national priorities list for hazardous waste cleanups. According to the EPA, total cleanup costs are expected to reach \$100 million. The 250-acre site is contaminated with PCB's, baghouse dust, lead-contaminated soil, and slag piles.

Legislation and Government Programs. The State Department of Transportation's proposed \$1.5 billion transportation program in 1993 depends on the New Jersey Legislature removing the statutory cap on the Transportation Trust Fund. Senate bill 510, which would remove the restriction, remained in committee near yearend.

Review By Nonfuel Mineral Commodities. Genstar Stone Products Co. of Maryland is appealing the Millville Planning Board's rejection of Genstar's application for a conditional use permit for its industrial sand mining proposal in the township. Genstar was proposing to mine 1,500 acres during a 100-year period in 17 phases, with each phase lasting several years.

In July, the Egg Harbor Township Committee approved an ordinance that restricts sand and gravel mining in the township. In addition to barring any new operations, new restrictions were placed on mining below the water table. At least one sand and gravel operator was suing the township because the company contends that the restrictions will put them out of business. The company has been mining sand and gravel at the site for the past 40 years.

In September, members of the Hopewell Township Committee declared that they will not give any more consideration to the rezoning proposals by Trap Rock Industries Inc. Earlier in the year, Trap Rock had

expressed interest in expanding its 166-acre quarry zone off Route 29 into part of the other 940 acres the company owns on nearby Kuser Mountain.

In April, a new rail facility was opened in Camden that will provide crushed limestone for ready-mix concrete and asphalt operators in southern New Jersey. The terminal, opened at an investment of \$1 million by Wimpey Minerals Inc. has a 75,000-short-ton ground storage capacity.

NEW MEXICO

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Annual, Estimated

THE MINERAL INDUSTRY OF NEW MEXICO IN 1992

In national standing, New Mexico dropped from 10th to 12th in total nonfuel mineral value. According to U.S. Bureau of Mines estimates, New Mexico's 1992 nonfuel mineral production was valued at \$886 million, down 12% from 1991. Copper and potash again led other mineral commodities. Value totals of masonry cement, copper, gold, salt, silver, and dimension stone fell, while all other mineral commodity totals increased or remained about the same.

NONFUEL MINERAL PRODUCTION IN NEW MEXICO 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ²	metric tons	27,994	\$74	27,794	\$74	25,948	\$87
Copper ³	do.	262,815	713,622	252,859	609,454	W	W
Gem stones		NA	225	NA	100	NA	22
Gold ³	kilograms	888	11,041	W	W	W	W
Lead ³	metric tons	W	W	193	142	—	—
Perlite	short tons	501,000	13,181	W	W	W	W
Potash	thousand metric tons	1,451	245,571	1,469	250,900	1,465	255,000
Sand and gravel (construction)							
	thousand short tons	10,362	39,708	*9,200	*35,900	12,800	50,900
Silver ³	metric tons	48	7,431	W	W	W	W
Stone (crushed)	thousand short tons	*2,400	*12,800	2,801	13,089	3,000	14,400
Combined value of cement, clays (fire), gypsum (crude), helium (Grade-A, [1990-91]), iron ore (usable, includes byproduct material), mica (scrap), molybdenum, pumice, salt, stone (dimension), zinc (1990-91), and values indicates by symbol W							
		XX	59,828	XX	75,851	XX	545,701
Total		XX	1,103,481	XX	985,510	XX	866,110

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; value included with "Combined value" figure.

3/Recoverable content of ores, etc.

Employment. Employment in New Mexico's mining sector for October 1992 was 15,500, down from 16,100 for the same period in 1991. The good news in the New Mexico job market was a turnaround in

home construction, which rose 4.2% during the first quarter of the year. Unemployment rose, however; the seasonally adjusted rate in September was 7.2%, up from the 6.5% September 1991 rate.

Phelps Dodge Corp. laid off about 500 people in February as the era of copper milling ended at the Tyrone Mine. The company will continue production from its SX-EW plant for at least another decade.

In January, 200 people lost their jobs at Questa as Molycorp Inc. placed the mine on standby. A skeleton staff remained to perform reclamation and maintenance in the event that the molybdenum mine reopens.

The U.S. Department of Labor provided \$400,000 for workers laid off last year at Molycorp's Questa Mine and at Phelps Dodge's Tyrone Mine. Funds are targeted for reassessment, reemployment, job development and placement, relocation assistance, on-the-job and classroom training, and support services for the unemployed.

Exploration. On October 31, Pegasus Gold Corp. pulled out of its joint venture with LAC Minerals Corp. on the Ortiz Project. Pegasus had faced intense local opposition to its proposed open pit gold mine and was unsuccessful in renegotiating terms of its agreement with LAC.

Vera Cruz Minerals Corp. announced that FMC Gold Co. encountered extensive gold-bearing breccia in two core holes drilled on the Vera Cruz project near Carrizozo. FMC is earning a 51% interest on the property.

Champion Resources recently bought the volcanic massive sulfide Jones Hill deposit near Pecos from Santa Fe Mining Co. and failed to close a joint venture deal with Western Mining Corp. of Australia to fund deep drilling. Champion is seeking a partner to continue development of the property originally drilled by Conoco Inc.

Environment. Heavy September rains brought another fish kill at Lisboa Springs Fish Hatchery near Pecos and, again, the culprit was believed to be metal contamination washed down from the inactive Tererro Mine. The loss amounted to 15% of the hatchery's fish.

The U.S. Environmental Protection Agency (EPA) sought more than \$4 million in penalties from 38 oil and gas producers, nine of which are based in New Mexico, who allegedly released oil field brine into a salt playa near Hobbs in Eddy County. The oil companies had contracted with Carlsbad waste contractor B&E Inc. to dispose of the water.

Legislation and Government Programs. During the 1992 short session, the New Mexico legislature tried and failed to pass House bill 312 (Minerals Equalization Tax Act) that would have required mining companies to pay a severance tax for hard rock mining on Federal lands. Also halted was a mine reclamation bill, House bill 40, the New Mexico Mining Act, opposed by industry because of an attached moratorium on new mine starts until reclamation regulations were in place. The bill was aimed at blocking startup of the Pegasus Gold and LAC Minerals open pit mine in the Ortiz Mountains.

Enacted House bill 69, the Coal Surtax Exemption Act, provides more lenient requirements for total or partial exemptions from the surtax imposed on coal sales. The tax reduction improves the competitive position of coal producers in New Mexico enabling them to capture new contracts for coal sales and expand production.

On October 30, after years of delays, the U.S. Department of Energy finally obtained title to land near Carlsbad for the Waste Isolation Pilot Plant. President Bush signed land withdrawal legislation that paves the

way for a 5-year test of the site's suitability for storing low-level radioactively contaminated waste. For at least 15 years, New Mexico will receive \$20 million a year for road improvements and citizen safety measures. The bill also requires EPA to adopt regulations governing permanent waste storage on the site.

Representative Bill Richardson, D-NM, failed to get a House vote on legislation approved earlier by the Senate that would have created a 57,000-acre Jemez Recreation Area. Copar Pumice Co. has filed a patent application for additional land surrounding its existing mine inside the proposed recreation area.

The New Mexico Occupational Health and Safety Bureau sought \$660,400 in penalties against Agronics Inc. alleging 123 violations of the law. Agronics and the State agency have locked horns since an Agronics worker died in February when a load of humate fell on him as he was clearing a hopper. All enforcement actions concern the production facility: bagging, warehouses, the blending plant, and the maintenance shop. The company declared it would fight the citations. In August, a State district judge in Santa Fe ruled that the Federal Mine Safety and Health Administration had final jurisdiction over the mine.

The New Mexico Division of Mines and Mineral Resources released several mineral-related publications including Circular 201 entitled "Developments in Uranium During 1990;" Mines, Mills, and Quarries in New Mexico;" and OF-353 entitled "Uranium Mines and Deposits in the Grants District, Cibola and McKinley Counties, New Mexico."

Review by Nonfuel Mineral Commodities. After 8 years of continuous operation, Phelps Dodge shut down the Hidalgo copper smelter for major repairs. The 8-year period without shutdown was the best record achieved by the facility's Outokumpu flash furnace, which came on stream in the mid-1970's. Hidalgo accommodated half the concentrate produced each year by Phelps Dodge, a total of half a billion tons of contained copper. Originally built to accommodate concentrates from Tyrone, the facility was now the main outlet for Morenci concentrates. Chino, the company's other copper smelter, also went down for a month while the Hidalgo facility was down.

Cobre Mining Co., a subsidiary of Metallic Ventures Inc., purchased at yearend a portion of the assets of Bayard Mining Corp., including the Continental copper mine near Hanover. The company planned to begin mining in the Continental pit by spring 1993, and began rehabilitating the No. 2 mill.

A Federal judge dismissed a lawsuit filed in 1989 by several environmental groups opposed to further mining of **pumice** in the Jemez Mountains. The environmental groups contended that the U.S. Forest Service erred when it decided not to prepare an environmental impact statement for Copar Pumice Co.'s proposed mining of an additional 135 acres on the east side of the Jemez River. Copar Pumice filed a mine plan for an extra 135 acres of Federal land east of an existing 33-acre pumice mine which will be exhausted next year.

Western-Ag Minerals slated the startup of a new compaction plant for late 1992. The plant will use a new process developed and tested by the Carlsbad potash company to produce a coarser product in demand by the fertilizer industry.

In February, Horizon Gold Corp. completed acquisition of Amax Potash Corp. assets for \$6 million. Announced over a year earlier, the deal had been stalled until Horizon completed financing. The corporate name of Amax Potash was changed to Horizon Potash Corp. During November, the company laid off 275 workers, about 75% of their work force, because of a glutted potash market.

Four of the six potash producers have agreed to allow potash giant Potash Corp. of Saskatchewan Inc. to market at least part of the local product. The New Mexico companies include Mississippi Chemical Corp., New Mexico Potash, Eddy Potash, and Horizon Potash. A 5-year agreement that halted Canadian potash

dumping expires in January 1993, and the industry is lobbying to extend the agreement for another 5-year term.

Franklin Limestone Co., a subsidiary of Franklin Industries Inc. (formerly Mineral Industrial Commodities of America), changed its name to Franklin Industrial Minerals. The company mines mica in Taos County.

Perlite operations of Grefco Inc. were transferred to another wholly owned company called Dicaperl Corp. No changes in operations occurred other than the name change.

NEW YORK

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Annual, Estimated

THE MINERAL INDUSTRY OF NEW YORK IN 1992

The value of nonfuel mineral production in New York in 1992 was estimated by the U.S. Bureau of Mines to be \$715 million. This represents an increase of \$16.7 million from that of 1991. This increase was largely the result of higher sales of cement, crushed stone, and zinc. Leading mineral commodities in terms of value were crushed stone, salt, portland cement, construction sand and gravel, zinc, and wollastonite. Other commodities produced included masonry cement, clays, garnet, gypsum, peat, industrial sand, dimension stone, talc, and byproduct lead and silver.

Nationally, the State ranked 14th overall in the value of nonfuel minerals produced. It ranked 10th nationally in industrial minerals value and 17th in the value of metals output. New York was the only State in the Nation that produced wollastonite and one of only two States where garnet was mined.

NONFUEL MINERAL PRODUCTION IN NEW YORK 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	490,552	\$2,906	421,003	\$2,417	402,197	\$2,967
Gem stones		NA	365	NA	125	NA	128
Peat	thousand short tons	W	W	1	21	W	W
Salt	do.	5,401	162,900	4,998	173,837	5,197	168,053
Sand and gravel (construction)	do.	29,750	121,525	*23,700	*95,500	20,600	84,700
Stone:							
Crushed	do.	*39,900	*207,600	34,871	195,639	35,900	207,500
Dimension	short tons	*23,437	*3,589	18,624	2,978	18,217	2,779
Combined value of cement, garnet (abrasive), gypsum (crude), lead, sand and gravel (industrial), silver, talc and pyrophyllite, wollastonite, zinc, and values indicated by symbol W							
		XX	273,954	XX	228,142	XX	248,899
Total		XX	772,839	XX	698,659	XX	715,026

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data.
XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment. The average number of workers in the mineral extractive industries in New York during the first 9 months of 1992 was estimated to be 4,365 individuals, about 555 less than the same period of 1991. Of the total, 2,430 individuals worked at surface mine operations and 510 worked in underground mines. A total of 1,425 employees worked at mineral-related mills and preparation plants in the State.

Environment. In October, the U.S. Environmental Protection Agency (EPA) placed Li Tungsten Corp.'s defunct tungsten and molybdenum processing plant in Glen Cove, Long Island, on the Superfund National Priorities List. The priorities list identifies uncontrolled hazardous waste sites that warrant further investigation to determine if a long-term cleanup project is necessary. From the 1940's to 1985, Li Tungsten smelted imported tungsten ores at the facility to produce tungsten-carbide powder, tungsten wire, and welding rods. Groundwater at the site is contaminated with chlorides, sulfates, lead, cadmium, tungsten, chromium, arsenic, barium, silver, and polychlorinated biphenyls (PCB's).

The Aluminum Company of America (Alcoa) and Reynolds Metals Co. will jointly spend almost \$200 million to clean up hazardous waste contamination near the companies' Massena, NY, primary aluminum smelters. The cleanup may take a decade to complete. Alcoa and Reynolds are under separate EPA orders to investigate and remediate stretches of the St. Lawrence and Grasse Rivers where PCB releases from the plants have accumulated in river sediments. The New York State Department of Environmental Conservation (DEC) also is pursuing a natural resource damage claim for the Massena area.

Legislation and Government Programs. In October, the DEC assessed a \$1.5 million fine against the owners and operators of a sand and gravel operation in the town of Dover. The fine against Ten Mile River Holding Ltd., a company based in Switzerland and the Long Island-based MAC Sand & Gravel Inc., was one of the largest ever against a gravel mining operation. DEC's ruling, accepting the findings of a department enforcement hearing in 1991, settled hundreds of violations brought by the department. DEC also ordered Ten Mile River Holdings Ltd. to post a performance bond of \$285,000 to ensure reclamation of 75 acres of mined land, and ordered the owner to submit a plan for reclamation within 2 years.

A joint task force, comprised of members of the Empire State Concrete and Aggregate Producers Association Inc. and the New York State Asphalt Pavement Association, worked through the spring of 1992 on the issue of dolomite "polishing." It started after the New York State Department of Transportation (NYSDOT) published a technical report entitled, "Performance of Dolomites as High Friction Aggregates." NYSDOT concluded that upstate dolomites exhibited adequate friction properties, but took action to exclude the Wappinger dolomite formation from all NYSDOT surface coarse mixes due to poor friction characteristics in certain high-volume pavements. The task force negotiated with NYSDOT officials and reached the consensus that Wappinger dolomites will be restricted only in certain mixes designed for high-volume pavements. The restriction means that Wappinger dolomite now will have to be blended with a noncarbonate aggregate for these mixes. Since affected stone producers mining the Wappinger dolomite must now develop new mixes and operations, the task force also negotiated with NYSDOT on the implementation of these changes.

Review By Nonfuel Mineral Commodities. Early in the year, the DEC gave the final approval needed for sand and gravel mining to begin on a hill in Sidney that Native Americans believe to be an ancient Indian burial ground. Burton F. Clark Inc. of Delhi received its mining permit in February from the DEC. The permit ends 4 years of battles for the company, which hopes over the next 20 years to mine gravel from 10 acres of land. The State granted the permit after three archeological studies since 1988 turned up evidence of Indian presence, but no hard signs of Indian burials.

The AKZO Salt Corp. reported that it is investigating a process that would use incinerator ash to backfill mine chambers in and around Retsof, in Livingston County. The proposed backfill operation would involve making a slurry of 90% ash and 10% portland cement at the surface. The slurry would then be

pumped down a 14-foot-diameter shaft--probably at Cuylerville, NY, several miles from the company's active mining operations--so it would not interfere with the health and safety of the miners. Once at mine depth, a large sprinkler system, as described by the company, would transport the slurry to desired locations within the mine. AKZO indicated that backfilling the mine with the cement-hardened material would improve mine stability and reduce seepage of saline water into the mine. The company also indicated that it will create a citizens advisory panel to address community concerns.

Near yearend, work was nearly completed on the final environmental impact statement for a major development on a 288-acre site in Amherst. Since 1988, three developers have been seeking rezonings for construction of 440 homes, 280 multifamily dwelling units, and possibly a nursing home on the 288-acre site. However, controversy continues at the site because a large portion of the area is believed to be over abandoned gypsum mines, which could potentially cause subsidence problems. The magnitude and the exact locations of the mine's workings are not accurately known since there are no reliable and accurate maps that show the mine's extent.

NYCO completed a \$14.4 million rehabilitation and expansion at its Willsboro plant. The company, which mines wollastonite, indicated that the rehabilitation and expansion at the plant will increase productivity of the plant by 50% over the next 5 years. Improvements included installing new primary and secondary crushers and adding a statistical process control.

NORTH CAROLINA

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Annual, Estimated

THE MINERAL INDUSTRY OF NORTH CAROLINA IN 1992

Statistics released by the U.S. Bureau of Mines indicate that the estimated 1992 value of minerals produced in North Carolina increased 3.6% over that of 1991. The value rose from \$552.9 million in 1991 to \$573.0 million in 1992, suggesting a moderate recovery from the recession that has impacted the Nation in recent years. The recovery was led by significant increases in the value of the State's leading mineral commodities, crushed stone and phosphate rock, along with smaller increases in clays, gemstones, scrap mica, industrial sand and gravel, olivine, and pyrophyllite. The increases more than offset decreases in the value of lithium minerals, scrap mica, construction sand and gravel, dimension stone, and peat.

NONFUEL MINERAL PRODUCTION IN NORTH CAROLINA 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ²	metric tons	2,179,428	\$9,356	2,063,875	\$9,015	1,966,873	\$11,086
Feldspar	do.	418,402	14,460	402,448	13,027	402,448	13,027
Gem stones		NA	1,057	NA	785	NA	1,252
Mica (scrap)	thousand metric tons	65	3,796	64	3,747	61	3,642
Peat	thousand short tons	13	W	21	W	W	W
Sand and gravel:							
Construction	do.	11,733	44,872	*9,900	*35,000	8,600	31,000
Industrial	do.	1,177	15,338	1,174	15,565	1,187	16,091
Stone:							
Crushed	do.	*52,900	*276,200	*46,514	*243,920	*49,000	*264,700
Dimension	short tons	*66,531	*11,551	32,489	10,128	25,369	7,469
Combined value of clays (kaolin), lithium minerals, olivine, phosphate rock, stone (crushed volcanic cinder [1991], crushed unidentified [1992]), talc and pyrophyllite and values indicated by symbol W							
		XX	213,112	XX	221,711	XX	224,730
Total		XX	589,742	XX	552,898	XX	572,997

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; value included with "Combined value" figure.

3/Excludes certain stones; value included with "Combined value" figure.

Despite the increase in total mineral value, North Carolina failed to achieve the record-high value of \$589.7 million recorded in 1990. North Carolina's national ranking also dropped from 18th in the value of all mineral commodities produced in 1991 to 20th in 1992. However, the State continued to lead the Nation in the quantity and value of feldspar, lithium minerals, scrap mica, olivine, and pyrophyllite produced. The State also led the Nation in the production of clay used for the manufacture of bricks and ranked second in the production of phosphate rock and in the quantity of common clay mined.

For the first time in several years, no changes in the ownership of minerals companies in North Carolina were reported. Major news related to the State's minerals industry involved the construction of new plants, the expansion of existing facilities, and the announcement of an agreement that may extend the life of North Carolina's lithium industry well into the 21st century.

Vulcan Materials Co. began site work at a new crushed stone quarry and crushing plant at High Shoals, Gaston County, in August. The 15-acre quarry is scheduled to open in mid-1993. The Balfour Granite Quarry, near Granite Quarry, Rowan County, which has been inactive since 1969, was reopened as the Pink Camellia Quarry in June. North Carolina Granite Co. began construction of a new finishing plant to cut stone for buildings and monuments. The 34,000-square-foot structure will house existing equipment as well as \$700,000 worth of new equipment. Total cost of the project was estimated at \$2 million. KMG Minerals Co. began reconstruction of its Patterson mica processing plant in Kings Mountain, Cleveland County, after a fire on June 16 caused more than \$1 million damage. A malfunctioning compressor apparently started the blaze. ECC International constructed a 40,000-ton-per-year capacity precipitated calcium carbonate plant at the Champion International Paper Co. mill in Canton, Haywood County.

Several companies that do not actually mine minerals in North Carolina, but use large amounts of minerals in their manufacturing processes, announced major plant construction plans. Timken Co. continued construction of a carbon and alloy bar and tapered bearing plant, begun in late 1991. The \$135 million, 45,000-square-foot facility in Asheboro is scheduled to come on-stream in 1993. Cormetech Inc., a joint venture formed by Corning Inc., Mitsubishi Heavy Industries Ltd., and Mitsubishi Petrochemical Co. Ltd., began production of ceramic-based catalysts for control of air pollution from power generation, chemical manufacturing, and other industrial sources at its new manufacturing facility and corporate headquarters in Durham. RSR Corp. announced plans to build a secondary lead smelter in either North Carolina or South Carolina. The proposed smelter would employ 150 permanent workers and process more than 6 million automotive and industrial batteries, each containing an average of 20 pounds of lead. The project will cost an estimated \$60 million and is anticipated to take 3 to 5 years for permitting and construction.

FMC Corp., Lithium Division, headquartered in Gastonia, Gaston County, announced the signing of a contract with the Bolivian Government in February. The contract gives FMC the exclusive right to explore and develop what is considered to be the world's largest

lithium reserve. The deposit, located in the Andes Mountains of southern Bolivia, is estimated to contain almost 9 million metric tons of lithium metal. Pending ratification of the contract by the Bolivian Congress, FMC expects to invest \$50 to \$90 million on exploration and production facilities. Company officials indicated that the Gastonia operations could be phased out by the end of the next decade as reserves at its local Cherryville Mine are depleted. However, FMC's chemical processing plant at Bessemer City would continue to operate as the main processor of the Bolivian ore after mining at the Cherryville Mine is completed.

Exploration. Exploration of ancient beach sands containing titanium-rich heavy minerals diminished during the year because of a softening of demand for titanium products and delays experienced by companies applying for mining permits. Southeast Tisand Co., a joint venture of Becker Minerals Inc. (U.K.) and Consolidated Rutile Ltd. (Australia), was in the permitting stage of the planned development of its prospect near Roanoke Rapids. RGC (USA) Minerals Inc., a subsidiary of Renison Goldfields Consolidated Inc. (Australia), was also preparing a mining permit application for property it had leased in the Aurelian Springs area.

Gold exploration in North Carolina remained at a minimal level because of the continued recession and the continued depressed price of gold. Piedmont Mining Co. announced that exploration on the Russell-Coggins property in Montgomery County resumed in early August with soil and rock-chip sampling and trenching. Core drilling resumed in early October and was scheduled to continue to yearend.

The Secretary of the Interior submitted to Congress his recommendation to conduct additional studies prior to permitting the drilling of an exploratory well for natural gas offshore North Carolina by Mobil Oil Co. The action served to delay consideration of Mobil's request for permits to drill the well at least until 1993.

Environment. Carolina Stalite Co. received a permit to annually treat up to 329,000 tons of contaminated soil derived principally from leaking underground petroleum storage tanks. The soil will be processed in two rotary kilns at Stalite's lightweight aggregate facility at Gold Hill, Rowan County. The soil will be heated to 2,000°F to volatilize the contaminants, which are then treated in the plant's emission control system and released into the atmosphere as harmless gasses. The treated soil will be used to manufacture lightweight aggregate and as horticultural products or fill material. The cost of new construction required for the process was estimated at over \$350,000. Carolina Solite Co. began construction of four baghouses in September. The first of the baghouses is expected to be completed no later than June 1, 1993, at a cost of \$1 to \$1.5 million. The company plans to resume burning its hazardous waste to fire kilns at its lightweight aggregate facility at Aquadale, Stanly County, after construction of the baghouses and required compliance testing is completed.

Texasgulf Inc.'s (Tg) applications for permits to extend its phosphate mining operations in Beaufort County were pending at yearend. The Beaufort County Board of Commissioners on September 2 sent a letter to State officials stating that the county's land-use plan does not prohibit Tg from mining approximately 700 acres near its existing Aurora mining operation. The commissioners' decision followed the denial by the NC Coastal Management Commission (CMC) of a mining permit sought by Tg. CMC refused to approve the permit on the grounds that the application violated provisions of Beaufort County's 1987 Land-Use Plan.

Legislation and Government Programs. The North Carolina Legislature did not enact any laws directly affecting the minerals industry in 1991. A consortium of government, academic, and mineral industry organizations cooperated in presenting a program for earth science teachers at the regional National

Association of Science Teachers annual meeting in Charlotte in December. The program included an oral presentation in which members of the group discussed resource materials available to earth science teachers and distributed resource materials and sample rock kits containing more than 20 economic mineral samples. Members of the group included the U.S. Bureau of Mines; U.S. Geological Survey; National Association of State Geologists; NC Geological Survey; NC State University Minerals Research Laboratory; Society of Mining, Metallurgy, and Exploration; National Stone Association; NC Aggregates Association; NC Mining Association; and several private minerals companies.

Review by Nonfuel Mineral Commodities. Crushed stone, valued at \$264 million (8.5 % more than that of 1991), was the State's leading mineral commodity. Production was estimated at 49 million short tons and accounted for over 46 % of the total value of mineral production. Phosphate rock, mined by Texasgulf Inc. in Beaufort County, and lithium minerals, mined in the Kings Mountain area of Gaston and Cleveland Counties, were the next most valuable mineral commodities mined. Data on the quantity and value of these commodities are considered proprietary and must be withheld. Clay production dropped 4.7 % to slightly under 2 million metric tons after exceeding 2 million tons in each of the 3 preceding years. However, the value of clay mined increased 23 % to slightly more than \$11 million, a record high. Two categories of clay, common clay and shale and kaolin, were produced. The kaolin was produced as a byproduct of feldspar and mica operations in Avery and Cleveland Counties. Production of feldspar, North Carolina's sixth leading mineral, remained unchanged from 1991, while mica declined 4.7 % in quantity and 2.8 % in volume.

Other mineral commodities produced in 1991 included gem stones, industrial sand and gravel, olivine, and pyrophyllite, all of which increased in value. Construction sand and gravel, dimension stone, and peat decreased in value.

Several industrial minerals mined in other States or countries were marketed or processed into higher value products. Included in this group were titanium minerals and zircon, cement, iodine, perlite, sodium sulfate, and steel slag. Although no metals are mined in North Carolina, metals refined from ore shipped into the State or recycled materials have an important role in the State's mineral industry. Included in this group are aluminum, chromium, cobalt, copper, ferroalloys, steel, and tungsten.

NORTH DAKOTA

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Annual, Estimated

THE MINERAL INDUSTRY OF NORTH DAKOTA IN 1992

According to U.S. Bureau of Mines estimates, the value of nonfuel minerals produced in North Dakota in 1992 was about \$17.7 million, up slightly from the \$17.4 million reported in 1991. The State ranked 48th nationally in nonfuel mineral value, accounting for less than 1% of the Nation's total. Construction sand and gravel accounted for more than 70% of the value of North Dakota's nonfuel mineral output. Production and value for lime fell nearly 25% from that reported in 1991. Elemental sulfur was recovered from natural gas processing but is not included in Bureau of Mines estimates.

NONFUEL MINERAL PRODUCTION IN NORTH DAKOTA 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	50,485	W	27,825	W	25,948	W
Gem stones		NA	\$10	NA	\$6	NA	W
Lime	thousand short tons	82	4,623	98	5,360	75	\$4,102
Sand and gravel (construction)	do.	7,644	17,219	*5,000	*12,000	5,300	13,000
Stone (crushed)	short tons	*1,000	*4,600	11	W	10	W
Combined value of other industrial minerals and values indicated by symbol W							
		XX	116	XX	(?)	XX	628
Total		XX	26,568	XX	*17,366	XX	17,730

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Value excluded to avoid disclosing company proprietary data.

3/Partial total, excludes values that must be concealed to avoid disclosing company proprietary data.

Employment. North Dakota's mining industry experienced an employment boom throughout the early part of the 1980's, fell steadily from 1986 to 1988, rose slightly from 1989 through 1991, and again suffered a decline in 1992. Projected mining employment figures for both 1992 and 1993 are 3,900 people, down from 4,350 in 1991. Mining employees are among the highest paid workers in the State and any loss of mining jobs could be reflected in a lower overall average salary figure for all workers in North Dakota.

Environment. A recent U.S. Environmental Protection Agency decision that municipal incinerator ash is not hazardous waste has helped clear the way for a landfill near Sawyer, Ward County, to accept ash. The Public Service Commission requested bids for reclamation of abandoned mines near Wilton, Burleigh

County; Beulah, Mercer County; and, Elgin, Grant County. All work was scheduled to be completed by the end of 1992.

Legislation and Government Programs. The North Dakota Geological Survey was evaluating the geology, hydrogeology, and hydrology of active landfills throughout the State. The 3-year program was directed by North Dakota House bill 1060 for comprehensive solid waste management.

The North Dakota Geological Survey participated in a multi-State industrial minerals conference during the year from which an open-file report on the proceedings was produced. The report included a section on State regulations affecting the mining of industrial minerals in the State.

Review by Nonfuel Mineral Commodities. Production of construction sand and gravel rose only slightly in 1992, but still accounted for over 50 % of the total value of nonfuel mineral production in the State.

Although not included in Bureau of Mines statistics, recovered elemental sulfur is the second most important mineral produced in North Dakota, in terms of value. Production in 1992 increased about 26 %, and value increased about 38 %. Sulfur is recovered during natural gas processing at five plants in the western part of the State.

Crushed stone production fell slightly, a continuation of falling production for this commodity seen since 1990. Neither crushed stone or construction sand and gravel production have approached the levels achieved in 1990.

After a slight recovery in production in 1991, lime production fell about 25 % in 1992. Lime is produced from limestone mined outside the State and primarily used in sugar beet refining.

Peat production was reported from Bottineau County after a 1-year absence from Bureau of Mines reports.

OHIO

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Annual, Estimated

THE MINERAL INDUSTRY OF OHIO IN 1992

The value of nonfuel mineral production in Ohio in 1992 was \$680 million, according to estimated data compiled by the U.S. Bureau of Mines. Output from the State's mineral industry was essentially the same as that of a year ago. Declines in production of cement, clays, sand and gravel, salt, and dimension stone were, for the most part, offset by gains in lime, industrial sand, and gypsum. Crushed stone, the State's leading mineral commodity, showed a production total of about 47 million tons, the same as reported in 1991. Nationally, Ohio ranked 15th in the value of nonfuel mineral production, accounting for slightly more than 2% of the U.S. total.

NONFUEL MINERAL PRODUCTION IN OHIO 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	124	\$10,880	*109	*\$9,591	105	\$9,240
Portland do.	1,426	72,883	*1,356	*69,156	1,323	67,473
Clays metric tons	2,546,151	13,334	2,204,635	11,015	2,100,694	13,559
Gem stones	NA	W	NA	57	NA	10
Lime thousand short tons	1,884	92,817	1,783	85,976	1,809	87,230
Peat do.	12	182	9	222	W	W
Sand and gravel:						
Construction do.	44,552	165,394	*42,300	*160,100	39,800	153,600
Industrial do.	1,349	24,205	1,294	23,462	1,367	24,537
Stone:						
Crushed do.	*48,400	*190,900	*47,310	*184,177	*47,100	*188,900
Dimension short tons	*61,783	*3,468	*42,355	*2,279	35,059	2,244
Combined value of abrasives (1990-91), gypsum (crude), salt, stone (crushed limestone and dolomite [1991], crushed unidentified [1992], dimension limestone [1991]), and values indicated by symbol W						
	XX	154,777	XX	137,550	XX	133,076
Total	XX	728,840	XX	683,585	XX	679,869

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; kind and value included with "Combined value" data.

Employment. The mining of nonfuel minerals in Ohio employed about 2,630 workers in September 1992, the latest month for which statistics are available. That was about 70 employees more than the 1991 total. Employment in coal mining declined from about 4,650 in 1991 to 4,115 by September of 1992. The drop in coal miners reflected a decrease in coal production to about 26 million short tons through November of 1992, according to preliminary data collected by the Energy Information Administration. In 1991, Ohio produced about 30.6 million tons of coal.

Legislation and Government Programs. In November, Ohio voters, by about a 4 to 1 margin, defeated the Toxic Labeling and Notification Issue (Issue-5). If enacted, the State's mineral aggregate producers would have been required to label materials such as crystalline silica, radon, lead, cadmium, diesel exhaust, gasoline, and solvents, and must notify residents within a 2-mile radius of use of these items every 6 months.

Brush Wellman Inc. in October received a contract extension from the Defense Logistics Agency for 26,000 pounds of beryllium billets to be processed at the firm's Elmore facility. The contract had a value of \$7 million with completion scheduled for June of 1994. Since 1990, Brush Wellman has processed 134,000 pounds of billets delivered to the Strategic Materials Stockpile.

Review By Nonfuel Mineral Commodities. Ohio was again among the Nation's top States in the production of nonfuel minerals. In 1992, Ohio ranked second in lime production, accounting for about 10% of the U.S. total.

In salt output, the State was fifth among the 14 producing States. Late in the year, Akzo Salt Co. was examining sites for a proposed salt extraction plant. A site in North Jackson, near Youngstown, was reportedly under consideration by the company.

Sand and gravel and crushed stone were the leading mineral commodities produced in Ohio. The combined production of these two commodities of about 87 million tons accounted for 50% or about \$340 million of the State's nonfuel value. Nationally, Ohio ranked eighth in crushed stone and third in sand and gravel production.

OKLAHOMA

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Annual, Estimated

THE MINERAL INDUSTRY OF OKLAHOMA IN 1992

The value of nonfuel mineral production in Oklahoma in 1992 was estimated by the U.S. Bureau of Mines at \$284.3 million. This was an almost \$8.8 million increase over the \$275.5 million reported in 1991. Sales increased in 1992 for most mineral commodities produced in the State. Increases in masonry cement, salt, and construction sand and gravel production were the most substantial, followed by crude gypsum, feldspar, and lime. Increases also occurred in the production of iodine, crushed stone, and portland cement. Crushed stone continued as the State's leading mineral commodity, accounting for over 35% of the total nonfuel mineral value. Combined values of crushed stone, portland cement, crude iodine, and construction sand and gravel accounted for almost 76% of the estimated total mineral value reported in 1992. Oklahoma ranked 34th nationally in nonfuel mineral value and continued as the Nation's leading producer of iodine and crude gypsum.

Employment. Persons employed in the mineral industry in October 1992, the last month for which data are available, numbered 35,600, 14.6% fewer than in October 1991. Approximately 1,900 workers were employed in the nonfuel sector of the industry, a decrease of 200 from October 1991. Employment in oil and gas extraction decreased 14.9%, from 39,600 in October 1991 to 33,700 in October 1992. Workers in the stone, clay, and glass products sectors increased to total of 3.1% to 10,000 in 1992. The 5,100 persons employed in the primary metals sector were 100 fewer than in 1992. Employments in the construction industry remained stable at 39,100 workers.

Legislation and Government Programs. House bill 1662 required the Oklahoma Department of Mines to accept written comments from local soil conservation districts and other public entities on the environmental effects of proposed mining operations. In addition, any person who may be adversely affected by any permitted mining activity may request the Department of Mines to hold an informal conference on the matter.

Enacted Senate bill 663 establishes seasonal restrictions on production from natural gas wells and grants the Oklahoma Corporation Commission the authority to increase or decrease the amount of gas that may be produced, for the purpose of preventing waste and more closely following market demand. The legislation is expected to help stabilize natural gas prices and to increase the number of nationally competitive Oklahoma producers.

Senate Joint Resolution 42 extended the existence of the Commission on Natural Gas Policy through February 15, 1997, so that the Commission may continue to address issues of importance to the State's oil and gas industry.

NONFUEL MINERAL PRODUCTION IN OKLAHOMA 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland)	thousand short tons	1,544	\$60,457	*1,620	*\$63,180	1,627	\$63,180
Clays	metric tons	631,302	3,156	*824,176	*4,178	786,230	5,135
Gem stones		NA	W	NA	W	NA	711
Gypsum (crude)	thousand short tons	2,184	11,154	2,356	12,925	2,485	13,642
Iodine (crude)	kilograms	1,972,849	30,486	1,998,914	31,389	2,041,500	26,619
Sand and gravel:							
Construction	thousand short tons	9,235	21,993	*9,000	*22,300	10,200	25,800
Industrial	do.	1,258	22,984	1,241	20,918	1,225	21,637
Stone:							
Crushed ²	do.	*25,300	*89,500	25,678	95,509	26,100	100,000
Dimension	short tons	*8,138	*684	*3,836	*596	5,182	706
Tripoli	metric tons	18,801	155	15,885	141	NA	NA
Combined value of cement (masonry), feldspar, lime, salt, stone (crushed dolomite [1990-91], crushed unidentified [1992], dimension sandstone [1991]), and values indicated by symbol W		XX	19,608	XX	24,389	XX	26,833
Total		XX	260,177	XX	275,525	XX	284,263

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; kind and value included with "Combined value" figure.

House bill 2278 established the Oklahoma Independent Energy Education and Marketing Act to educate the general public on the importance of independent oil exploration and production, encourage efficient energy usage, promote environmentally sound production methods, develop oil resources, and support research and education benefitting independent petroleum producers. The Oklahoma Independent Energy Resources Board was created to coordinate the program.

House bill 2227 (Oklahoma Environmental Quality Act) provided a framework for reorganizing the State's environmental agency structure. Provisions of the bill address agency overlap and duplication of effort, public confusion about agency regulatory responsibilities, lack of timeliness and definitive response to questions and complaints, and the elimination of dual water discharge permits from both the State and Federal governments.

Enactment of House bill 2445 sets fees for dumping hazardous waste in the State and contains a provision capping Health Department fees charged to Zinc Corp. of America in Bartlesville, Washington County. Without the cap, the company anticipated closure or layoffs. Zinc Corp. produces about 60,000 tons of zinc a year.

The U.S. Bureau of Land Management reduced royalty rates for coal on Federal leases in nine eastern Oklahoma counties to encourage development of the coal. The rate for underground coal was reduced from 8% to 2% and that for surface mined coal was reduced from 12.5% to 4%. The new rates are expected to make mining costs for Federal coal more competitive with those for State and private coal, and are retroactive to December 17, 1990.

The U.S. Environmental Protection Agency (EPA) issued two regulations to implement air pollution controls required by the Clean Air Act. These included regulation of a number of mineral-products industries for toxic air pollutants and the implementation of permitting requirements for all major sources of air pollution. New standards also were set for visibility and particulate matter that apply to calciners and dryers at plants processing or producing construction products, including lightweight aggregate. EPA anticipates that product price increases resulting from the new standards probably would be less than 0.5%, but could be as much as 1.75% for the lightweight aggregate industry. EPA also studied the process of using wastes as fuel in cement kilns, in an effort to reduce regulatory burdens on industry and to redefine what is considered a waste. EPA determined that there was no data to indicate that emissions from burning wastes in cement kilns threaten human health or the environment, and that there was no measurable increase in the level of toxic metals in the cement product.

Scientists with the Oklahoma Geological Survey studied the mineral resource potential of Permian and Triassic red-bed deposits in the western part of the State.

A workshop on Industrial Minerals Development in Oklahoma was held in December at the University of Oklahoma in Norman. The workshop was co-sponsored by the Oklahoma Geological Survey, the Oklahoma Department of Mines, and the U.S. Bureau of Mines. The purpose of the workshop was to improve the development and use of Oklahoma's industrial mineral resources.

Review by Nonfuel Mineral Commodities. Crushed stone continued as the State's leading mineral commodity, accounting for over 35% of the total nonfuel mineral value in 1992. Oklahoma remained the only state producing crude iodine, which constituted almost 9.5% of the State's total nonfuel mineral value. The State remained first of 20 States producing crude gypsum, with an increase of about 5.5% over the production and value in 1991.

The largest increases in 1992 were for masonry cement, salt, and construction sand and gravel. Estimated production and value of masonry cement increased nearly 18% over reported 1991 totals. Salt production increased about 17%, while the value increased over 32% from amounts reported in 1991. Production and value increases of about 13% and almost 16%, respectively, were reported for construction sand and gravel.

After reopening in April, the Sequoyah Fuels Corp. uranium processing plant at Gore, Sequoyah County, experienced two more incidents of chemical leaks, resulting in further investigation by the Nuclear Regulatory Commission and increased controversy. The plant was shut down in November. In late December, the company received permission to operate on a limited basis, to fulfill current contracts for uranium tetrafluoride. The contracts expire during the summer of 1993, at which time uranium tetrafluoride production also will cease. At yearend, controversy arose as to who will pay for the cleanup, anticipated to cost as much as \$20 million and take up to 12 years to complete. Sequoyah is a subsidiary of General Atomics of San Diego, CA.

Ball-InCon Glass Packaging Corp. closed its glass plant in Sand Springs, Tulsa County, and another its owns in southern California, primarily because of the excessive cost to upgrade equipment and bring the plants up to industry standards. The company's other plants in 10 states, including one in Okmulgee, Okmulgee County, will take over production from the closed plants. Ball leads the Nation in the production of glass containers for the food industry and is third in the production of commercial glass bottles and jars.

Conoco developed a reclamation process for fluorinated alumina waste generated at its Ponca City refinery in Kay County. Kaiser Aluminum & Chemical Corp. will use the waste as a high quality additive in manufacturing aluminum. Conoco expects to reclaim about 260,000 pounds of alumina from this plant each year. Activated alumina is used in the production of high octane gasoline. The alumina draws out unwanted

fluorides from propane and butane products. The first shipments of waste were sent to Kaiser's Mead, WA, plant in December.

Soil, contaminated by lead, zinc and cadmium from the former Blackwell Zinc smelter, was removed from the Washington School and Beatty-Rodgers Park in Blackwell, Kay County. The soil contained bound lead, not considered a danger, and was removed from the sites under the direction of EPA.

In Bartlesville, Washington County, EPA removed soil from schools and day-care facilities that was contaminated by lead and cadmium. In 1991 and 1992, the Health Department took blood samples from residents and the soil was tested by EPA. About 10% of those tested contained high levels of lead in their blood.

Muskogee Bridge Co. Inc. obtained a court order allowing the company to temporarily continue operating, despite an order to shut down issued by the Oklahoma Department of Mines. Two workers were killed when lightening set off an explosion of dynamite in October. The company was operating the limestone quarry for its own construction use, but was mining without a permit.

OREGON

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Annual, Estimated

THE MINERAL INDUSTRY OF OREGON IN 1992

The estimated value of Oregon's nonfuel mineral production in 1992 was \$199.5 million, essentially unchanged from that of 1991, according to the U.S. Bureau of Mines. The value of the State's nickel production, estimated at between \$65 and \$75 million based on published company reports, was not included in the total. Gains in the production value of portland cement offset a drop in the value of construction sand and gravel and crushed stone. The State's nonfuel mineral production value ranked 38th in the Nation. Industrial minerals accounted for the bulk of the total production value. Oregon was the Nation's sole producer of nickel. It ranked first nationally in the quantity of pumice produced, third in the quantity of diatomite, and was a significant producer of processed natural zeolites.

NONFUEL MINERAL PRODUCTION IN OREGON 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland) thousand short tons	W	W	*249	*18,675	576	\$43,200
Clays metric tons	223,452	\$1,390	213,356	1,086	202,222	1,114
Copper ⁴ do.	—	—	W	W	223	537
Gem stones	NA	1,683	NA	2,758	NA	1,673
Nickel ore ² metric tons	330	NA	5,523	NA	5,500	NA
Sand and gravel (construction) thousand short tons	15,785	60,928	*15,600	*62,800	13,600	55,900
Stone (crushed) do.	³ *18,000	³ *86,600	*20,608	*89,322	16,600	74,100
Talc and pyrophyllite metric tons	105	10	63	67	64	68
Zinc ⁴ do.	—	—	751	873	729	948
Combined value of cement (masonry [1990-91]), diatomite, emery, gold (1990), lime, pumice, silver (1990), stone (crushed dolomite and quartzite crushed slate [1991]), and values indicated by symbol W	XX	53,984	XX	22,347	XX	21,911
Total	XX	204,595	XX	197,928	XX	199,451

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Data series revised to exclude non-nickel ore.

3/Excludes certain stones; kind and value included with "Combined value" data.

4/Recoverable content of ores, etc.

Construction materials--portland cement, construction sand and gravel, and crushed stone--continued to be the most valuable minerals produced, accounting for nearly 87% of the State's total mineral production value. Copper, nickel and zinc were the only metals reportedly produced in significant quantities. A highlight of the year was the opening of Glenbrook Nickel Co.'s new port facilities at Coos Bay. The company will use the facilities to import New Caledonian ore for feed at its nickel smelter at Riddle.

Exploration. According to the Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon mineral exploration activity in 1992 was somewhat mixed. Exploration and permitting activities continued at a number of established sites, the number of small-scale operators in eastern Oregon requesting environmental assessments rose, and in southwest Oregon, many smaller operators attempted to patent their projects. On the downside, U.S. Forest Service officials reported that exploration by major mining companies in the Wallowa-Whitman, Umatilla, and Malheur National Forests was down, and U.S. Bureau of Land Management (BLM) officials in eastern Oregon districts reported generally little exploration activity.

A major event occurred with Newmont Mining Corp.'s acquisition of Atlas Precious Metals Inc.'s Grassy Mountain gold project. The open pit site is about 25 miles south of Vale near the Owyhee Reservoir in Malheur County. Reportedly, the Grassy Mountain project has probable reserves of 31,000 kilograms of gold and 76,700 kilograms of silver. The 35-year lease includes both Grassy Mountain and the Musgrove Creek property in Idaho.

In Baker County, Cracker Creek Gold Mining Co. and Cable Cove Mining Co. continued small-scale exploration efforts at their Bourne and Herculean projects, respectively. Golconda Resources Inc. drilled at the Gold Hill Mine.

In Malheur County, ICAN Minerals Ltd. drilled at the Racey gold property, Western Mining maintained its Freeze property, and Battle Mountain Gold kept its Freezout claims. Cyprus Metal Exploration and Development Co. retained interest in the Red Butte and Mahogany projects. Drilling was done by Carlin Gold in the Stockade area, and Western Epithermal at its Shell Rock Butte property. Malheur Mining continued work on its Kirby property although a suit was filed against the BLM for its environmental assessment of the project. Earth Search Sciences conducted surface studies at Shasta Butte.

In Grant County, Formation Capital Corp. reduced the size of its Mammoth project claim block by 50%. The Mammoth property is a copper-gold and gold-silver prospect. After leasing the Copperopolis and Standard prospects, Placer Dome conducted surface surveys late in the year. Noranda drilled its Flag prospect in Harney County. Carlin Gold continued work at Buck Mountain in Harney and Malheur Counties. In Lake County, Pegasus Gold recommitted itself to the Quartz Mountain prospect.

In western Oregon, Plexus Resources Corp. continued exploration and development work on its Bornite copper-gold-silver project near Mill City in the North Santiam Mining District, Marion County. Permitting was continued and the preliminary environmental impact statement was distributed for public review. In Coos County, Oregon Resources Corp. continued to acquire necessary permits while evaluating onshore black sands for chromite, garnet, titanium, and zircon. The project is in the prefeasibility stage. After further evaluation, Cominco American Resources Inc. returned its interest in the Turner-Albright copper-zinc-gold prospect near O'Brien, Josephine County, to Savanna Resources Ltd.

Legislation and Government Program. Implementation of Oregon House bill 2244, sometimes referred to as the chemical process mining or cyanide heap leaching bill, came closer to reality. The final set of rules pertaining to cyanide heap leaching were approved by the Oregon Environmental Quality Commission. Regulations of DOGAMI and the Oregon Department of Fish and Wildlife had been finalized

earlier. Enacted House bill 2244 overhauls the State's mining regulations by proposing a number of administrative changes. The bill specifies that DOGAMI would have the lead coordination role in rewriting the rules and that multiple permits from several State agencies will remain necessary.

Review by Nonfuel Mineral Commodities. Reynolds Metals Co.'s 121,000-metric-ton-per-year aluminum facility at Troutdale, Multnomah County, remained closed. The company cited low prices and depressed demand as reasons for the temporary shutdown. Northwest Aluminum Co. maintained production at its tolling smelter near The Dalles in Wasco County. The company operated the 82,000-metric-ton-per-year plant under a lease-purchase agreement with Martin Marietta Corp.

Glenbrook Nickel Co., a subsidiary of Cominco American Resources, opened its new port facilities at Coos Bay. The facilities are capable of off-loading, crushing, and drying both wet and dry nickel ore from New Caledonia. The ore is trucked to the company's smelter at Riddle, the Nation's only operating nickel smelter. During 1992, ore from Glenbrook Nickel's Nickel Mountain Mine provided the bulk of its smelter feed. In November, the company announced that because of worldwide nickel markets, it will temporarily close its facilities for at least five weeks at yearend.

Crushed stone and sand and gravel for use in construction were produced from many pits and quarries throughout the State. The counties of Klamath, Lane, Multnomah, Washington, and Yamhill were among the leading crushed stone producers. Reflecting the predominantly volcanic nature of Oregon's geology, most of its crushed stone was trap rock (basalt). Major sand and gravel-producing counties included Columbia, Lane, Marion, and Multnomah.

Ash Grove Cement West Inc., the State's only cement producer, operated a dry-process plant and limestone quarry near Durkee, Baker County. The plant, equipped with a preheater kiln, is considered state-of-the-art. The bulk of the cement was used by ready-mixed companies. Quicklime accounted for most of Oregon's lime production. Ash Grove sold both quicklime and all of the State's hydrated lime. The company produced the hydrated lime at a kiln in Portland. Amalgamated Sugar Co. at Nyssa, Malheur County, purchased high-purity crushed limestone from Ash Grove's Durkee pit for use as "sugar rock" feedstock at its plant. The company calcined the limestone to produce quicklime for use in the processing of beet sugar.

Diatomite was mined by Eagle-Picher Industries from Miocene lake sediments at a surface operation in the Juntura Basin, along the Malheur-Harney County line. The diatomite was trucked 70 miles to the company's Celatom processing facility west of Vale. Oil-Dri Production Co. operated both an open pit and diatomite processing facility in Christmas Valley, Lake County. The company shipped worldwide in both bags and in bulk.

Cascade Pumice Co. and Central Oregon Pumice Co. produced pumice from surface mines and operated crushing and screening plants in the Bend area, Deschutes County.

Although not actually a gem, the thunderegg, Oregon's State rock, may be the State's most well known gem material. Gem-quality calcium plagioclase, commonly referred to as sunstone or heliolite, was a large contributor to the State's gem stone production value. Several small firms reportedly extracted sunstones from the Rabbit Hills of Lake County. Other gem stones produced include opal, various picture and scenic jaspers, agates, and petrified wood.

Two types of clay were produced in Oregon--bentonite and common clay. Central Oregon Bentonite Co. and Evergreen Bentonite Inc. produced bentonite from adjoining properties on Camp Creek, 40 miles southeast of Prineville, Crook County. Also, Teague Mineral Products Co., south of Adrian, mined bentonite from deposits in northern Malheur County. Common clay was mined by three companies in Baker, Jackson, Klamath, Lane, and Multnomah Counties. Formosa Resources Corp. mined copper and zinc ore from its

Silver Peak Mine, a Kuroku-type massive sulphide deposit 10 miles south of Riddle. Concentrates were trucked to Vancouver, WA, then shipped to Japan for further processing. The Bonanza placer mine on Pine Creek near Halfway, Baker County, mined gold through the end of July. The company began reclamation at the site and extended exploration efforts into nearby properties.

Oregon Emery Co. of Halsey, produced emery from a deposit in eastern Linn County. Steatite of Southern Oregon Inc. produced high-grade variegated-colored soapstone (talc) from deposits on Elliott Creek Ridge in the Klamath Mountains at the southern edge of Jackson County. Teague Mineral Products mined zeolites from deposits in the Succor Creek Formation in Malheur County. Along with ore from deposits in southwest Idaho, the mine output was processed at the company's mill near Adrian.

PENNSYLVANIA

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Annual, Estimated

THE MINERAL INDUSTRY OF PENNSYLVANIA IN 1992

The value of nonfuel mineral production in Pennsylvania in 1992 was about \$863 million, according to estimated data compiled by the U.S. Bureau of Mines. Value increased slightly as production levels remained about the same as those of a year ago. Pennsylvania ranked 13th among the States in value of nonfuel minerals accounting for 3% of the U.S. value.

NONFUEL MINERAL PRODUCTION IN PENNSYLVANIA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	303	\$22,594	*253	*\$18,975	249	\$18,675
Portland do.	5,621	286,185	*4,881	*248,931	4,675	238,425
Clays ² metric tons	840,646	2,900	701,399	2,890	669,463	3,556
Gem stones	NA	5	NA	5	NA	1
Lime thousand short tons	1,626	92,557	1,695	95,328	1,741	97,914
Peat do.	18	730	10	207	W	W
Sand and gravel (construction) do.	20,883	97,348	*18,300	*87,800	18,000	88,000
Stone:						
Crushed ³ do	*95,800	*502,700	70,334	362,306	72,700	385,700
Dimension short tons	*43,952	*9,898	38,493	10,077	41,728	10,822
Combined value of clays (fire [1990], kaolin), mica (scrap), sand and gravel (industrial), stone (crushed granite [1990], crushed limestone, dolomite, and quartzite [1991], crushed unidentified [1992]), tripoli, and value indicated by symbol W						
	XX	15,125	XX	17,482	XX	19,535
Total	XX	1,030,042	XX	844,001	XX	862,628

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Excludes certain stones; kind and value included with "Combined value" figure.

The State's coal and steel industries also reported comparable production to that of 1991. Steel production through September was about 7 million short tons and coal

production was 59 million tons through November. Pennsylvania, however, retained its position as the Nation's 3d leading producer of steel and 4th in coal.

Employment. Mining employment, including coal mines, totaled 24,600 persons in October 1992, the latest month for which statistics are available. This was 900 fewer workers than in October 1991. Employment in construction for the same period dropped from about 210,000 to 200,000. The primary and fabricated metals industries also showed a decline in employees from 166,000 to 159,000.

Legislation and Government Programs. The Pennsylvania General Assembly enacted House bill 2196 amending the State's Air Pollution Control Act of 1960. The legislation was enacted in order for the State to meet the Federal Clean Air Act Amendments (CAAA) of 1990. The Department of Environmental Resources estimated that 265 new employees will be required to develop and enforce stipulations in the CAAA.

In a decision that affected all noncoal mining operations, Pennsylvania Commonwealth Court ruled that these operations are subject to "unsuitable for mining" petitions, which previously only applied to coal operators. The decision allows a citizen to file an unsuitable for mining petition with the State Environmental Quality Board if a mining operation applies to expand or revise mining plans outside its permit zone. Once a petition is filed, the State has up to 10 months to process the application.

A joint study on blasting by the U.S. Bureau of Mines, Pennsylvania Department of Environmental Resources, and Villanova University began during the year. The objective of the work was to determine how the impact of blasting changes based on geology and weather conditions, as well as the effect on local residents. The study conducted at a dolomite quarry in Montgomery County was expected to provide information that could be applied to similar sites in Pennsylvania and nationwide.

Review By Nonfuel Mineral Commodities. Pennsylvania again ranked first nationally in production of crushed stone. About 45% of the State's value of nonfuel mineral production was attributed to crushed stone. The State also was among the Nation's top five producers of lime and cement.

U.S. Steel Group of USX Corp. completed construction and began operating a continuous caster at its Mon Valley Works in September. The \$250 million caster has the capacity to produce 2.6 million short tons of steel per year.

Bethlehem Steel Corp. in November signed a letter of intent to sell its Bar, Rod, and Wire Division operations in Bethlehem to the Ispat Group of India. The operations have a capacity to produce 1.2 million tons of steel per year. The facility, which employed 2,200 workers, was shut down in September. The intended sale was another indication of a trend in expanding foreign acquisition and investment in the U.S. steel industry.

PUERTO RICO

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Annual, Estimated

THE MINERAL INDUSTRY OF PUERTO RICO IN 1992

Preliminary statistics released by the U.S. Bureau of Mines, Department of the Interior, indicated that the estimated 1992 value of nonfuel mineral commodities produced in Puerto Rico was \$125.2 million in 1992. The 1992 figure cannot be compared to the 1991 value because the value of crushed stone, which accounts for approximately 30% of the Commonwealth's mineral value and is the island's second leading mineral commodity, was not available and was not included in the 1992 value. Even with crushed stone being excluded, Puerto Rico mineral value was greater than that of 10 mainland States. Cement, the most valuable mineral commodity produced, increased 8.3% in value from \$110,560 in 1991 to \$119,769 and accounted for almost 96% of the preliminary mineral value reported in 1992. Only 8 of the 38 States manufacturing cement produced more than Puerto Rico. Production data on Puerto Rico's second leading mineral commodity, crushed stone, and on construction sand and gravel, another important mineral commodity, were not available. Lime, industrial sand and gravel, and clay, the only other contributors to the Commonwealth's reported mineral production in 1992, posted changes of 4.0%, -56.4%, and 17.2%, respectively, from the values reported in 1991. Data on dimension stone was withheld and not included in the total value to protect proprietary data of the island's lone producer. The value of another important mineral commodity, construction sand and gravel, was not reported because of poor response to the Bureau's survey.

NONFUEL MINERAL PRODUCTION IN THE COMMONWEALTH OF PUERTO RICO 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland) thousand short tons	1,486	\$122,027	*1,382	*\$110,560	1,443	\$119,769
Clays metric tons	W	W	145,483	355	137,526	416
Lime thousand short tons	29	3,483	30	4,440	31	4,616
Sand and gravel (industrial) do.	55	825	55	825	60	360
Stone:						
Crushed do.	NA	NA	8,828	49,839	—	—
Dimension short tons	—	—	—	—	W	W
Total	XX	*126,335	XX	166,019	XX	125,161

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; not included in "Total."

XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Total does not include value of item withheld.

The minerals industry was helped in 1992 because the Commonwealth Government accelerated its election year public works spending to nearly \$2 billion in an effort to speed up the island's slow economic recovery. One of the principal projects was the 2-mile long San Juan Lagoon bridge, a \$150 million project that began in July. Despite the public works spending, the Commonwealth's economy faced severe challenges due to uncertainty over the future of Section 936 tax benefits. Section 936 of the U.S. Internal Revenue Code allows U.S. mainland firms to repatriate profits generated by their Puerto Rican subsidiaries to the mainland 100% free from Federal taxes. For years, Section 936 has been one of the pillars, along with local tax legislation, of the Commonwealth's economic development strategy. In recent years, however, a growing number of U.S. legislators have been pushing for a repeal of Section 936 or a reduction in its tax benefits. The pro-statehood New Progressive Party (NPP) won impressive victories in November's election, winning more than two-thirds of the seats in both the Commonwealth Senate and House, in addition to the Governor's office. The victory prompted the newly-elected governor to press for a political status referendum in 1993. Granting the Commonwealth statehood would probably make the status of Section 936 a moot issue.

The Puerto Rico Economic Development Administration (Fomento), the island's promotor of manufacturing jobs, also faces a major challenge over the issue of so-called runaway plants from the States to Puerto Rico. Section 936 companies establishing or expanding operation in Puerto Rico are under increasing pressure from labor unions on the mainland who claim these companies are exporting jobs to the island at the expense of workers on the mainland. In the area of investment promotions, Fomento has been facing increasing competition from countries offering similar incentive packages. In more labor intensive industries, Puerto Rico is expected to continue losing investment and jobs to low-wage countries such as Mexico, the Dominican Republic, Costa Rica, and Honduras.

Another external factor affecting manufacturing investment in Puerto Rico is the North American Free Trade Agreement (NAFTA) recently negotiated between the United States, Canada, and Mexico. Although NAFTA had not been ratified as of yearend, there were indications that it is already diverting investment in new plants and expansion of existing plants away from Puerto Rico toward Mexico. The average manufacturing wage in Mexico remains near \$1 per hour, compared to about \$6.50 in Puerto Rico. Mexico also shares a 2,000-mile border with the United States, and the countries' proximity greatly reduces transportation costs for raw materials and finished products.

Exploration. In June, a 3-day meeting was conducted jointly by the PR Department of Natural Resources, the University of Puerto Rico at Mayagüez, and the U.S. Geological Survey to outline the results of a multi-year study of the island's known and undiscovered mineral resources. Meeting officials noted that the scientific data obtained from the study should aid the public and private sectors in long-range land use and economic planning in Puerto Rico and provide a better understanding of the Commonwealth's mineral potential. The study indicated that at least 11 different types of metallic mineral deposits, including copper, iron, gold, manganese, silver, molybdenum, zinc, lead, and other minerals, occur on the island in addition to the industrial minerals (cement, stone, clay, and sand and gravel) currently being produced.

Environment. Plans by North Carolina-based Cogentrix to build a \$540 million coal burning energy plant in Mayagüez remained on hold at yearend pending the issuance of more than 30 permits and approvals needed from both Commonwealth and Federal Governments. Cogentrix' plans, first announced in 1989, were to have the first 300 megawatt unit operational by March 1993. Opposition by local residents, environmental groups, and the municipal and newly elected Commonwealth Governments have cast doubt upon the project being built.

Legislation and Government Programs. Numerous changes in regulations for the use, vigilance, conservation, and administration of territorial waters submitted by the Department of Natural Resources were approved in December. Under the new regulations, the definition of maritime zone public domain was expanded from rivers, beaches, and other waterfront property influenced by waves and tides to include "zones of deposit of loose materials, such as sand, gravel, etc., with or without vegetation formed by action of sea, wind, or other natural or artificial causes." The new regulations will not only increase the number of sand and gravel operations required to pay royalties to the Commonwealth, but will also regulate future and existing commercial developments in areas covered by the new regulations.

Fuels. Arochem Corp. Filed for Chapter 7 bankruptcy liquidation in August. The company closed its 80,000-barrel-per-day refinery at Penuelas in December 1991 after Federal Bureau of Investigation and Internal Revenue Service officials began investigating allegations that top company executives illegally channeled large amounts of money from the firm. In December 1992, the company's chief executive officer was convicted of 21 counts of conspiracy, bank fraud, wire fraud, and money laundering. At yearend, Arochem's principal creditors were attempting to recoup their losses by finding a buyer for the closed refinery. Prior to the Federal investigations, Arochem had announced plans to build, in a joint venture with Texaco Corp. and General Electric Corp., a multimillion dollar electrical power and steam generating (cogeneration) plant at the Penuelas' site.

Review by Nonfuel Mineral Commodities. Cement production increased in both quantity produced and in value, to 1.4 million short tons and \$119.8 million, respectively. The increase resulted largely from the increased spending on public works by the Commonwealth Government. As noted earlier, data on Puerto Rico's second most valuable mineral commodity, **crushed stone**, were not available at publication time. Production of **lime**, the islands third most valuable commodity, increased 3.3% to 31,000 tons with a value of \$4.6 million, a 4% increase over the 1991 value. Although **clay** production declined 5.5% to 137,500 metric tons, its value increased 17.2% to \$416,000. All of the clay production reported to the Bureau of Mines was used in the manufacture of cement. Production of **industrial sand and gravel** increased 9.1% to 60,000 short tons, although its estimated value decreased 56.4% to \$360,000. **Salt** was recovered during the desalinization of seawater at two plants in southwestern Mayagüez. **Sulfur** was recovered by the Sun Oil Co. at its Yubacoa oil refinery. Production data on salt and sulfur were not available.

Developments affecting the minerals industry in 1992 included Owens Illinois' (O-I) announcement in December of plans to expand its Puerto Rican operations by investing \$10 million in new production facilities, machinery, and equipment. O-I operates a glass container production facility at Vega Alta using locally mined industrial sand. It also manufactures plastic containers for the pharmaceutical market at Las Piedras. The San Juan Cement Co. inaugurated its new dry process production process in August. The project was started in August 1988 with an original completion date of October 1990. However, a series of delays caused by mechanical and electrical contractors held up the start of clinker production until 1991, and full production of more than 700,000 tons per year was not achieved until 1992. The new system achieved stricter quality control and increased energy efficiency in the quarry, grinding, and pyroprocessing systems.

Although no metals are mined in Puerto Rico, several are imported and manufactured into higher-valued products. Companies in this category that announced new operations or major plant expansions in 1992 included Du Pont Electrical Materials Inc., Coral Can Co., Bayamon Steel Products Inc., and Servimetal Inc.

RHODE ISLAND

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Annual, Estimated

THE MINERAL INDUSTRY OF RHODE ISLAND IN 1992

The value of nonfuel mineral production in Rhode Island in 1992 was estimated by the U.S. Bureau of Mines to be \$14.5 million, a \$1.2 million increase over that of 1991. Crushed stone and construction sand and gravel accounted for virtually all of the State's production. A small amount of industrial sand was also mined.

In October, the total construction value in the State in 1992 was up slightly (3.4%) from the same period in 1991. The largest increase in value was in new nonresidential building contracts which rose 81% from 1991. The value of new residential construction contracts rose 4.2% while additions, alterations, and conversions fell nearly 17%. As a result of the slight overall increase in the mineral-dependent construction industry, the State's mineral output remained somewhat stable in 1992.

NONFUEL MINERAL PRODUCTION IN RHODE ISLAND 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$2	NA	\$1	NA	\$1
Sand and gravel (construction)						
thousand short tons	1,969	9,042	*1,300	*6,000	1,200	5,700
Stone (crushed) do.	² *1,600	*8,800	1,187	7,262	1,400	8,800
Total ³	XX	17,844	XX	13,263	XX	14,501

e/Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes crushed traprock.

3/Partial total, excludes values which must be concealed to avoid disclosing company proprietary data.

Employment. The average number of workers in the mineral extractive industries during the first 9 months of 1992 was estimated to be 97. This included 72 workers at sand and gravel pits and 16 workers at stone quarries. A total of 9 workers were employed at mineral-related mills and preparation plants in the State. Employment in the mineral-dependent construction industry was about 12,000, which was 10% lower than that of 1991.

Environment. Residents living within about a half-mile of the contaminated Western Sand & Gravel Superfund site were informed by the State Department of Environmental Management that their households would be hooked up to new underground wells. Between 1953 and 1975, an active sand and gravel pit was operated at the site. Liquid chemical and septic wastes were dumped into the open pits between

1975 and 1979, where they soaked into the soil and contaminated the groundwater. The Environmental Protection Agency has been involved in cleaning up the site since 1980 and is continuing to monitor the levels of contaminants in the affected groundwater.

The State of Rhode Island has thus far received \$570,000 from the Johns-Manville Property Settlement Trust to reimburse it for the cost of removing asbestos from State-owned buildings. The payments, which may reach a total of \$1 million, were agreed to under a settlement after Rhode Island and 34 other States filed a lawsuit several years ago against Johns-Manville, once the world's largest manufacturer of asbestos. Still pending are cost-reimbursement suits Rhode Island and 21 other States brought against two other asbestos manufacturers, the National Gypsum Corp. and Celotex Corp.

Legislation and Government Programs. The Portsmouth Town Council was informed by a private consultant that abandoned coal mines along the west shore of town do not reach under the site of a proposed oil-fired powerplant at Arnold's Point. The presence of the old coal mines in the Arnold Point area had been of concern to council members and local residents, who feared that the land could subside under the weight of the plant and its 400,000 gallon oil storage tank and 200,000 gallon water tank. The council, sitting as a Board of License Commissioners, is considering Aquidneck Power Limited Partnership's proposal to build an 85 megawatt power facility on 32 acres. The council was also asked by the State Facilities Siting Board to determine whether the developer's proposal to build the oil storage tank and to store and process oil on the site is allowable under the town's zoning ordinances. The Siting Board will have final say on the matter. The topic of mine subsidence was investigated because between 1808 and 1913, numerous coal companies mined coal in the area, called the Narragansett Basin.

Review By Nonfuel Mineral Commodities. A dispute, which began in 1990, between neighbors fighting to limit the quarrying operations at the Lynch & Sons Inc. crushed stone quarry in Cumberland continued throughout 1992. Neighbors for a Better Environment (NBE), have been seeking to halt the quarrying operations from encroaching closer to their properties and have been urging the town council to enact an ordinance restricting noise and air pollution at the quarry site. About 30 NBE member residents have contended that the quarry has illegally expanded from its original parcel where it held grandfathered rights onto agriculturally zoned land where quarrying is not permitted. Lawyers for the quarry contend that the entire lot should be considered an industrial zone since the quarry predates the agricultural designation on the town's zoning map, which was adopted in 1952. In a decision handed down by the Superior Court and upheld by the State Supreme Court in July, the Zoning Board was directed to rehear the case. No decision by the Board was rendered by yearend.

Controversy continued in the towns of Coventry and South Kingston regarding soil erosion and sediment control ordinances. In 1991, the Coventry town council approved an amendment to the town's 1990 soil erosion and sediment control ordinance, which required sand and gravel operators to submit plans to the town for controlling erosion and settlement within a given time period. Several companies have not complied with the ordinance and legal action was taken against them by the town. In the town of South Kingston, a proposed soil erosion and sediment control ordinance was being debated between the town council and developers and gravel companies who believe that the proposed ordinance is unfair and over regulatory because of the very nature of their businesses.

SOUTH CAROLINA

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Annual, Estimated

THE MINERAL INDUSTRY OF SOUTH CAROLINA IN 1992

Preliminary statistics released by the U.S. Bureau of Mines, Department of the Interior, indicated that the estimated 1992 value of nonfuel mineral commodities produced in South Carolina increased by 2.7% from \$338.1 million in 1991 to \$347.3 million. The modest increase marked a slight recovery from the recession that impacted both the State and the Nation in 1991. However, the 1992 value was well below the record high value of \$449.9 million set in 1990. The turnaround was led by modest increases in the value of South Carolina's two leading mineral commodities, portland cement and crushed stone.

NONFUEL MINERAL PRODUCTION IN SOUTH CAROLINA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland) thousand short tons	2,464	\$109,644	*2,215	*\$99,675	2,377	\$106,965
Clays metric tons	2,062,824	44,486	1,709,205	25,662	1,629,494	31,540
Gem stones	NA	10	NA	10	NA	W
Sand and gravel:						
Construction thousand short tons	8,627	24,941	*6,600	*18,900	7,000	20,400
Industrial do.	844	15,972	822	16,348	841	16,732
Stone:						
Crushed ² do.	*26,200	*135,400	18,216	84,260	17,800	84,800
Dimension short tons	W	W	8,829	854	W	W
Vermiculite do.	W	W	W	W	119,748	8,800
Combined value of cement (masonry), gold, manganiferous ore, mica (scrap), peat, silver, stone (crushed shell [1990], crushed dolomite [1991], crushed unidentified [1992]), and values indicated by symbol W	XX	119,400	XX	92,436	XX	78,045
Total	XX	449,853	XX	338,145	XX	347,282

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; kind and value included with "Combined value" figure.

Portland cement increased 7.3% from \$99.7 million in 1991 to \$107.0 million, while crushed stone increased 0.6% from \$84.3 million to \$84.8 million in 1992. The value of the State's third leading mineral, gold, remained virtually unchanged from 1991. Other

mineral commodities that showed increases in value from 1991 to 1992 included clays, both construction and industrial sand and gravel, peat, and silver. Commodities showing decreases included masonry cement, scrap mica, dimension stone, and vermiculite.

South Carolina continued to lead the Nation in the quantity and value of vermiculite produced and ranked second in kaolin. It was also the only State east of the Mississippi River that produced gold. As a result of the slight increase in mineral value, South Carolina's national ranking improved from 32d in 1991 to 29th in 1992. The State also ranked 25th in industrial mineral value and 18th in the value of metals produced.

Developments affecting the mineral industry included the suspension of mining at the Brewer Gold Co. Jefferson Mine in early November. Processing mined ore was expected to continue at least through mid-1993. Brewer's parent company, Costain America, formerly Westmont Mining Corp., indicated that a decision to permanently close the mine depended upon the price paid for gold and mining costs, as well as the results of exploration that will continue on adjoining properties. Earlier in the year, the Lancaster County Planning Commission denied a request by Brewer to mine gold from a site near Buford. Brewer indicated that it planned to extract 18,000 ounces of gold valued at \$2.7 million from the site over a 2-year period. Ore would have been processed at Brewer's existing heap leach facility in nearby Jefferson County. The Jefferson Mine has produced approximately 40,000 ounces of gold each year since it opened in 1988.

Closing of the Jefferson Mine left South Carolina with only two operations actually mining gold at yearend, Kennecott's Ridgeway Mine in Fairfield County and Consolidated Nevada Goldfields Corp.'s (CNG) Barite Hill Mine in McCormick County. CNG announced that gold for its first full fiscal year of production, which ended on June 30, 1992, totaled 15,700 ounces. Amax Gold Inc. announced in May that it purchased a 62.5% interest in the Haile Gold Mine near Kershaw by exercising its option with Piedmont Mining Co. Under terms of the agreement, Amax paid Piedmont \$1.75 million plus 1 million shares of Amax Gold restricted common stock. Amax and Piedmont will form a joint venture under which a subsidiary of Amax will be the operator.

Piedmont Mining Co. announced in early August that it had sold the assets related to its sericite mica mining operation near Kershaw to MMC Inc. of Kershaw Inc. Assets included a 561 acre tract, bagged inventory, mining and processing equipment, and vehicles. The sale price was \$909,250. These assets are used in the mining, processing, and sale of a mineral assemblage known as sericite and sold under the trademark Mineralite, primarily to the paint industry. A granite dimension stone quarry in Kershaw County owned by Coggins Granite Inc. of Elberton, GA, was acquired in February by Swanson Granite Co. of Concord, NH. Swanson is one of the Nation's leading dimension stone producers. J. M. Huber Corp. applied for a permit to mine kaolin from a 31-acre pit site on a 2,500-acre tract south of Leesburg, Lexington County.

Exploration. Exploration activity in South Carolina was concentrated on the gold segment of the mineral industry. Existing producers conducted programs to increase reserves and develop new ore bodies at or near their current operations. CNG reported that exploration projects, which are continuing at the Barite Hill Mine, resulted in replaced reserves equal to 20% of the year's production. Proven and probable reserves as of June 30, 1992, were placed at 127,700 ounces. Through a drilling program begun in 1991, Amax identified over 800,000 ounces of gold reserves on the 3,675-acre property at the Haile Mine. Preliminary studies indicated that the mine has the potential to produce approximately 100,000 ounces of gold annually with production costs in the \$200-per-ounce range.

Environment. In June, The U.S. Supreme Court announced its decision in LUCUS V. SOUTH CAROLINA COASTAL COMMISSION. In the decision, the court ruled that South Carolina may have to compensate a property owner who was denied the economic use of his property. This could have a significant effect on mineral producing companies and other property owners, nationally as well as in South Carolina, that have been denied the right to develop or expand their operations because of zoning ordinances or environmental laws. Editorially, the American Mining Congress stated: "The decision will force government to work harder to justify land use and environmental regulations that deprive property owners of the right to develop and use their land. Especially important for mining, the case is directly relevant to the current fierce debates on wetlands regulation, Endangered Species Act reauthorization, and Mining Law reform. All involve placing severe limits on access to and use of private and public lands to protect certain physical attributes of land or to preserve certain species."

Legislation and Government Programs. Four bills affecting the mining industry were enacted in 1992. HB 4571 provided that the State must assess the economic impact of proposed regulations. H. 3907 provides that charges by the Department of Health and Environmental Control for environmental permits must conform with the appropriations bill. H. 1287 approved changes in mining regulations requested by the SC Land Resources Division. In the fourth bill, the SC General Assembly overruled a SC Department of Highways (DOT) decision to purchase only crushed stone for asphalt road-paving material by passing an ordinance requiring DOT to purchase rounded gravels where available. The ruling affects mainly eastern South Carolina where the only aggregate available is from sedimentary or rounded sand and gravel deposits.

The U.S. Bureau of Mines in Denver, CO, conducted an assessment of potential mineral deposits that could be affected by construction of the proposed bypass around Anderson. Mineral resources occurring in the 75,000-acre corridor investigated included crushed stone, sand, corundum, gemstones, heavy mineral sands, and pegmatite minerals.

Laurens County officials announced in October that royalty revenue paid by W. R. Grace and Co. for vermiculite mined from the Laurens County Park would exceed the original estimates of \$50,000. Mining is expected to be completed by spring 1993. In addition to paying the royalty money, Grace is grading land at the park for tennis courts and for two more ball fields.

Review by Nonfuel Mineral Commodities. Cement was the leading mineral commodity produced in South Carolina again in 1992. Almost 2.4 million short tons, a 7.3% increase over tonnage estimated for 1991, was produced. Two companies in Orangeburg County and one in Dorchester County produced cement. Its estimated value of \$107 million, \$7.3 million more than that of 1991, accounted for 30.8% of the total value of nonfuel mineral produced.

Crushed stone, which accounted for 24.4% of the total mineral value, continued to lead gold as the second most valuable commodity produced. Although production decreased 2.3% from 18.2 million short tons in 1991 to 17.8 million tons in 1992, its value increased 0.6%, from \$84.3 million to \$84.8 million. The

crushed stone consisted primarily of granite and limestone with minor amounts of dolomite, marl, and shell. The quantity of gold produced and its value are withheld to avoid disclosing proprietary company data. Gold was produced by four companies in Chesterfield, Fairfield, McCormick, and Lancaster Counties.

Clay was the fourth most valuable mineral commodity produced, accounting for 9% of the total value produced in 1991. Although the quantity produced decreased 4.7% from 1.7 million metric tons in 1991 to over 1.6 million tons in 1992, its value increased 22.9% from \$25.7 million in 1990 to \$31.5 million in 1991. Common clay and shale, fuller's earth, and kaolin were the varieties of clay mined. South Carolina continued to be the second leading State in the production of kaolin. Vermiculite, the only other mineral for which data was not withheld, was valued at \$8.8 million with almost 120,000 short tons mined in 1992. Vermiculite data for 1991 was withheld. Both construction and industrial sand and gravel showed modest increases in tonnage produced and value. Construction sand and gravel increased 6.1% in quantity and 7.9% in value, while industrial sand and gravel recorded a 2.3% increase in both quantity and value.

Data on all other nonfuel minerals produced in South Carolina was withheld to protect proprietary company data in 1992. These included masonry cement, gem stones, manganiferous ore, scrap mica, peat, silver, and dimension stone.

Several other minerals were produced or used in South Carolina from materials shipped in from out-of-State. These included the industrial minerals, calcium borate, graphite, feldspar, iodine, and steel slag. Metals in this class included aluminum, copper, ferroalloys, and steel.

SOUTH DAKOTA

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Annual, Estimated

THE MINERAL INDUSTRY OF SOUTH DAKOTA IN 1992

According to the U.S. Bureau of Mines, the estimated value of nonfuel mineral production for South Dakota in 1992 was \$298 million, an increase of over \$8 million from the \$289.9 million reported in 1991. In terms of value, gold remained the leading commodity followed by portland cement, construction sand and gravel, and crushed stone. Increases in value of production were noted for portland cement, crude gypsum, gold, silver, and construction sand and gravel; all other values decreased. South Dakota ranked in the top six nationally in the production of gem stones, gold, mica, and dimension stone. The State ranked 32d in the country in terms of the value of nonfuel mineral production, accounting for slightly less than 1% of the national total. The State ranked 42nd in production of industrial minerals and 11th in production of metals.

NONFUEL MINERAL PRODUCTION IN SOUTH DAKOTA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$110	NA	W	NA	W
Gold ² kilograms	17,870	221,157	16,371	\$191,217	W	W
Sand and gravel (construction)						
thousand short tons	9,689	23,689	*8,700	*20,800	10,900	\$26,600
Silver ² metric tons	10	1,566	7	944	W	W
Stone:						
Crushed thousand short tons	*4,800	*16,800	4,824	19,657	4,400	18,500
Dimension short tons	*50,688	*12,871	W	W	52,365	9,440
Combined value of cement, clays (common), feldspar, gypsum (crude), iron ore (usable), lime, mica (scrap), and values indicated by symbol W	XX	34,310	XX	57,304	XX	243,557
Total	XX	310,503	XX	289,922	XX	298,097

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Recoverable content of ores, etc.

Employment. About 2,800 people were employed in the mining sector in July, the same as in July of 1991. Enrollment in the Mining Engineering Department of the South Dakota School of Mines and

Technology increased and all 1991-1992 mining graduates were placed in jobs, primarily in the energy and base-metal industries.

Environment. Bond Gold (LAC Minerals Ltd.) was ordered to stop dumping waste rock at the Richmond Hill Mine when State officials discovered elevated Ph levels in water coming off the waste piles. State officials determined the company would have to obtain a new mine permit that would lay out plans for control of the acid mine drainage.

Exploration. The State issued 10 exploration permits through September 14, for precious metals and manganese. Newmont Mining Corp. acquired lands around Rochford, Pennington County, where Noranda Exploration Inc. had been exploring for gold. Western Mining also was exploring in the Rochford area. Cyprus Gold Co. and Texas Star Resources pulled out of the Keystone area of Pennington County leaving Harrison Western looking for new joint venture partners. BHP Minerals International and Addwest Minerals acquired State exploration permits for manganese in Clark, Miner, and Spink Counties, eastern South Dakota.

Legislation and Government Programs. The 1992 State Legislature passed a bill imposing a temporary 2,428-hectare (6,000-acre), and a September 1, 1997, limit on surface gold mining permits. When either limit is reached, no mining permits will be issued or amended until 202 hectares (500 acres) are reclaimed. The bill reflected procedures developed upon recommendations of the Cumulative Environmental Evaluation Task Force. Despite the new law, an environmental group successfully petitioned to add an initiative to the November ballot that proposed to lower the acreage limit on mine expansions. The initiative passed by a 59% to 41% margin. Expansion plans at Homestake Mining Co.'s Open Cut Mine and Brohm Mining Corp.'s Gilt Edge Mine may be affected by the new law. Because of unclear wording in the law, State regulators were studying the new law to determine what effect it will have on gold mining in the Black Hills.

The Legislature took an historic step in 1992 when it reduced the State tax on mining companies with gross sales over \$50 million from 2% to 1%, effective July 1, 1992, and scheduled to expire June 30, 1993. All mining companies will continue to pay a precious metals tax of 8% on net earnings. Homestake was the only company expected to benefit from the taxbreak.

The Board of Minerals and Environment decided that most of the 3,238 hectares (8,000 acres) of land in the Dome Mountain-Lost Gulch area of Lawrence County, near Brohm's Gilt Edge Mine, was not eligible for designation as "special and unique." The designation would have placed additional restrictions on mining proposed for the area.

Review by Nonfuel Mineral Commodities. Homestake got State approval for expansion of the Open Cut gold mine in Lead. An estimated 3.99 million metric tons (4.4 million short tons) of ore and 38.5 million metric tons (42.4 million short tons) of waste rock will be mined from the expansion area. Homestake continued work on the 4.8-kilometer-long (3 miles) North Drift to connect the Homestake underground mine with a recently outlined ore body 1,935 meters (6,350 feet) below Sheeptail Gulch.

In July, it was announced that Homestake shareholders had approved issuance of common shares to raise funds to acquire International Corona Corp., a major Canadian gold producer. Most of Corona's mines and reserves are in Canada and the western United States. The merger was expected to make Homestake the largest gold producer in North America, at about 56 metric tons of gold in 1992, and the third largest holder of gold reserves with a combined reserve of approximately 622 metric tons of gold. The two companies have four of the world's most productive gold mines: Homestake in South Dakota, Hemlo in Ontario, Round Mountain in Nevada, and Kalgoorlie in Australia.

Bond Gold announced plans to close the Richmond Hill Mine 6 to 9 months earlier than originally planned because of low gold prices, lack of ore reserves, and a State ordered shutdown of mining activities. The State ordered the mine operator to cease most mining activity at the mine in July because of high Ph levels in water draining from waste ore piles. The problem was apparently the result of mining ore not fully oxidized. The waste ore, when exposed to air, released sulfides that were leached from the pile by surface runoff.

Brohm (subsidiary of MinVin Gold Corp.) decided to place all plans for expansion of its Gilt Edge Mine on hold. Brohm had planned a large sulfide ore expansion project at the existing oxide ore mining facility. Falling gold prices were cited as the reason for suspending the expansion effort. Oxide ore reserves at the mine were expected to be mined out late in 1992 or early in 1993.

MinVin Gold Corp. of Denver, CO, acquired the remaining interest of United Coin Mines Ltd. of Toronto, Canada, in the Golden Reward Mining Joint Venture. After selling part of the interest, MinVin controls a 40% interest and Wharf Resources Ltd., operator of the nearby Annie Creek and Foley Ridge Mines, has a 60% interest. The two companies formed a joint venture with Wharf designated to manage the Golden Reward Mine.

Wharf applied to the State to amend existing mine permits for the Annie Creek Mine to increase production from 3.2 million metric tons (3.5 million short tons) to 4.1 million metric tons (4.5 million short tons) annually. Wharf also filed a request for determination of "special, exceptional, critical, or unique lands" and "Notice of Intent to Operate" for a proposed 99-hectare (245 acre) expansion of the Annie Creek Mine.

Tinton Partners, Lake Forest, IL, applied for a determination of "special, exceptional, critical, or unique lands" and filed a "Notice of Intent to Operate" with the State for a proposed gold, **tin**, **tantalum** **placer** operation near Tinton, Lawrence County. Mine plans include use of a hydraulic excavator to remove mineral-bearing materials from stream beds.

Dakota Granite Co. applied to the State to convert a small-scale mining permit to a large-scale mining permit for a **dimension stone** granite quarry in Grant County. Approval of the conversion was expected early in 1993. Production of dimension stone was estimated to have fallen slightly from 1991 levels.

Pete Lien & Sons Inc. (Dakota Block Co.) received a small-scale mining permit for a **shale** mine in Pennington County. The company planned to produce about 21,773 metric tons (24,000 short tons) per year during the 30-year life of the mine. The clay will be used primarily in production of concrete blocks.

Production of **feldspar**, **gems stones**, and **mica** all fell during the year. One exploration permit was issued for pegmatite minerals and one notice of intent to mine a pegmatite in Custer County was posted.

TENNESSEE

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Annual, Estimated

THE MINERAL INDUSTRY OF TENNESSEE IN 1992

The 1992 value of nonfuel mineral production in Tennessee increased by over \$32 million from that of 1991, to \$579.9 million, according to estimated data released by the U.S. Bureau of Mines, Department of the Interior. The 5.9% increase marked a turnaround in the State's mineral-related economy, which posted a 17.6% decrease in 1991. However, Tennessee's mineral value was still well below the record high of \$664.6 million established in 1990. Nationally, Tennessee continued to rank 19th in the total value of nonfuel minerals produced in 1992 despite the marked increase over 1991.

NONFUEL MINERAL PRODUCTION IN TENNESSEE 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ² metric tons	1,060,662	\$25,776	828,635	\$44,572	788,693	\$54,828
Gem stones	NA	W	NA	W	NA	19,033
Sand and gravel (construction)						
thousand short tons	7,619	23,474	*6,700	*21,100	7,700	24,700
Stone:						
Crushed do.	*54,600	*268,600	44,088	223,561	46,500	246,000
Dimension short tons	*10,108	*2,051	3,460	260	3,400	320
Combined value of cement, clays (common [1991-92], fuller's earth [1990], kaolin [1991-92]), copper (1990-91), lead (1990-91), lime, phosphate rock (1990), sand and gravel (industrial), silver (1990-91), zinc, and values indicated by symbol W	XX	344,627	XX	258,294	XX	234,973
Total	XX	664,528	XX	547,787	XX	579,854

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value indicated with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

Significant growth in the value of five of the eight nonfuel mineral commodities for which preliminary production was reported in 1992 was responsible for the increase. Mineral commodities that increased in value included crushed stone, the State's leading mineral commodity, (10% to \$246 million); clays (23% to \$54.8 million); construction sand and gravel (17.1% to \$24.7 million); dimension stone (23.1% to \$320,000); and cement

(data withheld to protect proprietary company data). The following commodities, for which data were also withheld, decreased both in quantity produced and in total value: gemstones, lime, and zinc. Production data for barite, copper, lead, and silver were not available. Tennessee led the Nation in the value of gemstones produced and ranked second in zinc production.

The increase in Tennessee's mineral production signaled a gradual improvement in the recessive economic conditions that had been impacting the Nation. Improvement in the economic climate was also indicated by a number of mineral-related companies that began plant expansions or new plant construction. Included in these were Linotex Corp., Eritech Inc., Metal Resources Inc., Kentucky-Tennessee Clay Co., J. M. Huber Corp., Chemetals Inc., Mi-Tech Steel, Imco Recycling Inc., Copperweld Corp., and Insteel Industries Inc. On the negative side were a cutback in production and employees by the Aluminum Co. of America at its aluminum can stock operation in Alcoa, the closing and announced intention of the sale of its dimension stone quarry and finishing plant near Friendsville by the Luck Stone Co., and the closing of several coal mines.

Exploration. Exploration activity was greatly curtailed as a result of the recession impacting the Nation. Only one company contacted the Bureau requesting information regarding the exploration of zinc and base metal deposits in Tennessee.

Environment. In an effort to encourage recycling, Metal Resources Inc. of Loudon agreed to pay the Loudon County Beautification Board \$0.70 per pound, more than twice the current market value, for used beverage cans (UBC) when sold to the aluminum producer in 40,000-pound lots. The company processes nearly 2 billion UBC annually. Of the total aluminum produced, approximately one-half comes from UBC.

The Environmental Protection Agency (EPA) spent over \$75,000 to clean up a silver recycling facility at Coalfield, Morgan County, that had discontinued operations over 10 years ago. National Priorities List (Superfund) funds were used to pay for the cleanup although the site was not on the Superfund list. EPA planned to recover the money spent by establishing the liability of the owner of the property at the time the recycling facility was operating and of anyone who can be shown to have brought film to the site for processing.

The Chattanooga Quarry operated by Vulcan Materials Co. received "highest habitat" certification under the corporate wildlife habitat program of the Wildlife Habitat Enhancement Council (WHEC). WHEC is a nonprofit conservation group dedicated to creating wildlife habitat on public lands. Vulcan, one of 21 firms recognized in 1992, was chosen for its management of 80 acres of its 400-acre quarry site as wildlife habitat.

Legislation and Government Programs. The Tennessee Division of Geology relocated its Nashville offices as a result of the reorganization of the Department of Environment and Conservation (DEC). The relocation allowed many of the divisions of DEC to be located in the same building at 401 Church Street in Nashville. The Bond Forfeiture Reclamation Program (BFRC) was combined with the Abandoned Mine Land Program on July 1. The final BFRC project, which consisted of the restoration of a 20-acre site in Pickett County, was completed before yearend.

Bankruptcy court authorized the sale of retained mineral and mining rights to individuals who had earlier purchased Tennessee Chemical Co. properties that included only surface rights. A three-member arbitration panel ruled in favor of landowners seeking royalty payment for germanium recovered from zinc

mining operations in Smith County conducted by Union Zinc Co., a subsidiary of Belgium's ACEC Union Minière SA. Mineral leases signed by the landowners specified that the mining company would pay 4% royalty on the value of ore taken from their property. Royalties were not paid on the germanium residue, which was recovered when the ore concentrate was refined at the company's smelter in Clarksville. The germanium residue was then shipped to Belgium where it was refined to pure germanium to be used in fiber optics, infrared devices, detectors, and semiconductors.

Review by Nonfuel Mineral Commodities. Crushed stone has been the leading nonfuel mineral commodity produced in Tennessee since 1981. In 1992, production was 46.5 million short tons, 5.5% more than the 44.5 million short tons produced in 1991. The value of crushed stone produced represented 42.4% of the total value of nonfuel minerals produced. Major rock types quarried to produce crushed stone were limestone, dolomite, and sandstone.

Zinc, the State's leading nonfuel mineral commodity until 1981, remained the second leading mineral produced. Zinc was mined by two companies in 1991. ASARCO Inc. operated the Coy, New Market, and Young Mines in Jefferson County and the Immel Mine in Knox County, all in east Tennessee. In November, Asarco Inc. announced a reorganization that company officials said reflects the completion of the company's redirection from a custom smelter and refiner to an integrated producer of nonferrous metals. Effective in April 1993, Asarco will form two organizations, one composed of its copper operations and the second of its lead/zinc and aggregates operations. The latter will include Asarco's Tennessee Division of Mining, headquartered in Strawberry Plains, Jefferson County, and American Limestone Co., headquartered in Knoxville.

In middle Tennessee, the Jersey Minière Zinc Co. Division of Union Zinc Co. operated the Elmwood-Gordonsville Mine in Smith County and the State's only zinc refinery at Clarksville, Montgomery County. In east Tennessee, two divisions of Union Zinc, the Jefferson City Zinc Co. (JCZ) and the Clinch Valley Mining Co. (CVM), were active. JCZ operated the Davis Mine and mill in Knox County, and CVM operated the Idol Mine and mill in Grainger County.

Estimated clay production decreased by almost 40,000 metric tons to 788,700 metric tons. Despite the 4.8% decrease in production, the estimated value of clay produced climbed by 23% to \$54.8 million. Production data for Tennessee's most valuable clay commodity, ball clay, were not available. Clay estimates do not include data on common clay, fuller's earth, and kaolin, which were withheld to protect proprietary company data.

Dimension stone production decreased an estimated 1.7% to 3,400 short tons, although the estimated value increased 23.1% to \$320,000 in 1992. The production of construction sand and gravel increased from 6.7 million short tons valued at \$21.1 million in 1991 to 7 million short tons valued at \$24.7 million in 1992. The quantity of industrial sand and gravel produced increased almost 3% from 1991 to 1992, although its value showed a 6% decrease. Exact production data for industrial sand and gravel were withheld to protect proprietary company data. Also withheld were data on cement, gem stones, lime, and zinc. Preliminary estimates were not made for barite, copper, lead, and silver.

TEXAS

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Annual, Estimated

THE MINERAL INDUSTRY OF TEXAS IN 1992

According to U.S. Bureau of Mines estimates, 1992 nonfuel mineral production in Texas was valued at \$1,380 million, higher by \$11.5 million than the 1991 total. Declines in value occurred only for sales of crude helium, Grade-A helium, and Frasch sulfur; all other nonfuel mineral commodities posted gains or held steady. Texas continued to rank seventh in overall mineral value.

Employment. According to the State Employment Commission, Texas employment in the mining sector during November 1992 was 173,500, down 7,200 from the same period last year. Employment in the "oil and gas extraction" subcategory for November 1992 was 164,200, down 7,100 compared with November 1991; that for the "other" subcategory was 9,300, down 100.

Environment. Despite strong local opposition, the Texas Low-Level Radioactive Waste Disposal Authority approved an area in Hudspeth County as a new low-level radioactive waste dump site. The first of its kind in Texas, and the fourth in the United States, the site is about 7 miles southeast of Sierra Blanca and 90 miles east of El Paso.

Legislation and Government Programs. During April, the Texas Water Commission issued an emergency order that basically instituted a takeover of the Edwards Aquifer. The "Edwards" - the Central Texas water supply for cities such as San Antonio, for important cement and lime plants, and for crop irrigation - has never been regulated. In October, a State judge ruled that the Edwards was not subject to the water commission's control, a decision that came less than 48 hours after the commission had approved final pumping rules for the aquifer. Pending the introduction of several bills in the 1993 Texas Legislature, a U.S. District judge has tabled a lawsuit filed by the Sierra Club under the Endangered Species Act that would curtail pumpage from the aquifer by 50%.

In a remarkable turnaround for a project that, a few months earlier, had seemed doomed to extinction, the U.S. Congress agreed in September to fund the Texas supercollider \$517 million for the 1993 fiscal year. In October, the U.S. Department of Energy (DOE) awarded contracts to Martin Marietta Astronautics Group and Westinghouse Electric Corp. to develop prototypes of key components of Texas' atom smasher. Supercollider construction south of Dallas will require huge quantities of aggregate, steel, and other mineral products and be a major boost to the Texas economy.

The University of Texas at Austin and Texas A&M University were selected by the Aggregates Foundation for Technology, Research, and Education as the headquarters for the new Center for Aggregate Research (CAR). The Texas universities were selected among 11 formal proposals involving 25 colleges and universities. The National Aggregates Association and the National Stone Association raised \$4 million to endow CAR. The center will be an applied research institute and also will act as a repository and source for information concerning the entire aggregates industry.

NONFUEL MINERAL PRODUCTION IN TEXAS 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Masonry thousand short tons	142	\$10,106	W	W	W	W
Portland do.	7,678	296,680	7,498	\$289,341	8,169	\$318,591
Clays ² metric tons	2,162,095	14,652	2,265,746	13,247	2,158,890	16,290
Gem stones	NA	W	NA	W	NA	719
Gypsum (crude) thousand short tons	1,868	10,166	1,609	9,240	1,697	9,753
Lime do.	1,337	76,181	1,373	69,400	1,518	76,735
Salt do.	8,212	75,149	8,935	73,117	8,860	77,769
Sand and gravel:						
Construction do.	46,083	158,080	38,800	135,800	38,600	137,800
Industrial do.	1,849	40,880	1,557	27,002	1,531	28,940
Stone:						
Crushed do.	81,800	285,700	65,813	226,836	71,400	257,000
Dimension short tons	84,500	12,600	W	W	W	W
Sulfur (Frasch) thousand metric tons	2,340	W	2,056	W	1,900	W
Talc and pyrophyllite metric tons	227,138	4,844	212,887	4,561	225,889	4,768
Combined value of clays (ball [1991-92], bentonite, fuller's earth, kaolin) helium (crude and Grade-A), iron ore (usable), magnesium compounds, magnesium metal, sodium sulfate (natural), and values indicated by symbol W						
	XX	472,187	XX	416,117	XX	451,657
Total	XX	1,457,225	XX	1,264,661	XX	1,380,022

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

The Texas Railroad Commission ruled to allow natural gas producers a bigger say in how much gas is produced; now, producers will tell the Commission how much gas they can sell, following which, the Commission will set allowable production.

In an action that streamlines permitting, The U.S. Environmental Protection Agency announced the transfer of clean air permitting authority from the Federal government to the Texas Air Control Board.

A study coordinated by the Texas Bureau of Economic Geology and DOE's National Institute for Petroleum Energy Research, came to an encouraging conclusion regarding the Nation's remaining recoverable crude oil reserves. The 54-page study indicated that the country's total recoverable crude oil reserves could be from four to eight times higher than currently accepted figures for producible reserves.

The Texas Bureau of Economic Geology released Mineral Research Circular 82 concerning the Texas dimension stone industry. The circular documents the occurrence and distribution of materials quarried in Texas, contains a market forecast, and analyzes product price and value. The Bureau also published MRC 83

entitled "Texas Portland Cement Industry and Cement Resources," a new four-sheet, full color geologic map of Texas at a 1:500,000 scale, and a page-size, full color Texas geologic map at a scale of 1 inch = 100 miles.

Review by Nonfuel Mineral Commodities. On May 20, an antidumping duty petition was filed with the U.S. Department of Commerce and the International Trade Commission against **crushed stone** imports from Mexico. Filed by three Texas companies: Parker Lafarge Inc., Texas Crushed Stone Co., and Gulf Coast Limestone, the petition alleged that Calica was selling Mexican crushed limestone in southeast Texas at less than production cost. Calica is a joint venture of the Ingenieros Civiles Asociados and Vulcan Materials Co. Although the International Trade Commission ruled that the imports were not injuring the U.S. industry, the Texas companies appealed the ruling in August to the Court of International Trade in New York.

The Ceramics Division of Southern Clay Products, acquired last year by Laporte PLC, was sold to United Clays of Texas Inc., a subsidiary of Watts Blaik Bearne & Co. Assets transferred include **ball clay** reserves at Troup in east Texas, **talc** reserves near Van Horn, and ball clay and talc storage and processing facilities at Troup. Laporte kept Southern Clay's Gonzales facility, which produces organophilic clays and high-grade bentonite.

Mesa Petroleum Corp. began expanding the existing Fain Plant, north Amarillo, and in early 1993, the plant will start producing **crude helium**. Maxus Energy Corp. began construction of a crude helium plant at Sunray; their plant startup is scheduled for the first quarter of 1993.

Frustrated by difficulties in obtaining permits and by opposition from environmental groups, Mitsubishi Materials Corp. scrapped its plans for a new **copper** smelter at Texas City. The company spent \$11 million on the project through its subsidiary Texas Copper Co. The plant would have produced 200,000 metric tons of copper and 600,000 metric tons of byproduct sulfuric acid per annum.

ASARCO Incorporated began construction of a new ConTop furnace to replace its reverbaratory furnace at the El Paso copper smelter in 1992. The ConTop will allow flash smelting of concentrates. Modernization will be finished in the first quarter of 1993 and will boost smelter capacity from the 70,000 metric tons (80,000 short tons) per year produced in 1985 to 100,000 metric tons (110,000 short tons) by 1994. Including processed scrap, total annual smelter capacity will be 120,000 metric tons (130,000 short tons). The new furnace also will be more environmentally friendly, cutting sulfur dioxide emissions from 37,000 metric tons (40,776 short tons) down to 2,740 metric tons (3,024 short tons) per year; lead emissions will fall from 18 to 13 metric tons (20 to 14 short tons) per year.

Nine months behind schedule, the new **aluminum** rolling mill in San Antonio was, at yearend, still being readied by ACX Technologies Inc., a recent spinoff of Adolph Coors Co. The mill was scheduled to begin operation by the first half of 1993.

In May, Aluminum Co.'s of America's (Alcoa) Sandow Mine, near Rockdale, won an Excellence in Surface Mining Award from the Office of Surface Mining for its success in reclaiming coal mine sites as new pasture and wildlife habitats. The 12,764-acre lignite mine fuels an on-site generating plant for Alcoa's aluminum smelter.

LTV Steel Corp. relocated its Dallas corporate headquarters to Cleveland, OH. The company's Energy Products Division will stay in the Dallas suburb of Garland.

Uranium Resources Inc. put its in-situ-leach Rosita Mine on standby in April. On May 7, employees at Rio Grande Resources Corp.'s Panna Maria mill processed the last ton of **uranium** ore. Decommissioning of the mill and reclamation activities at the company's Rhode Ranch Mine should be completed in 1995.

On April 7, a huge explosion rocked a liquified petroleum gas (LPG or propane) storage facility at Brenham. The explosion, felt 130 miles away in Galveston, killed 3 people and injured 18. The worst in history, the accident was caused by overfilling of the 350,000-barrel facility which is in a salt dome cavern. Total damage to the facility, owned by Seminole Pipeline Co., exceeded \$10 million.

UTAH

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Annual, Estimated

THE MINERAL INDUSTRY OF UTAH IN 1992

According to estimates by the U.S. Bureau of Mines, the total value of nonfuel mineral production in Utah was approximately \$1.3 billion in 1992. This amount reflects an increase from the previous year of about 17%. The State maintained its ninth-place ranking nationally, however, in the output of nonfuel minerals.

NONFUEL MINERAL PRODUCTION IN UTAH 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Beryllium concentrates metric tons	4,548	\$5	7,339	\$5	6,000	\$7
Clays ² metric tons	277,795	1,774	210,382	1,028	199,801	1,266
Gem stones	NA	713	NA	489	NA	1,428
Lime thousand short tons	354	18,878	325	18,634	354	20,298
Salt do.	1,171	50,436	1,326	29,959	3,443	55,900
Sand and gravel:						
Construction do.	13,601	44,881	*14,400	*48,200	15,600	53,200
Industrial do.	2	42	—	—	—	—
Silver ³ metric tons	147	22,750	W	W	W	W
Stone (crushed) thousand short tons	*4,600	*20,200	4,450	18,259	5,300	22,400
Combined value of cement, clays (bentonite), copper, fluorspar (1990), gold, gypsum, (crude), iron ore (usable), magnesium compounds, magnesium metal, mercury (1990), molybdenum, phosphate rock, potash, sodium sulfate (natural), vanadium ore (1990), and values indicated by symbol W	XX	1,174,213	XX	1,032,493	XX	1,189,875
Total	XX	1,333,892	XX	1,149,067	XX	1,344,374

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Recoverable content of ores, etc.

Approximately 75% (\$1.0 billion) of the value of production in the State was attributed to the metals sector that included copper, gold, iron, magnesium, molybdenum,

and silver. In addition, Utah mines produced significant quantities of beryllium, cement, magnesium compounds, sand and gravel, and salt.

Exploration. American Consolidated Mining Co. and Goldstack Resources made significant copper and gold discoveries at their Goldhill project. The property is a porphyry environment capable of hosting multi-million ton oxide copper and gold heap-leachable type deposits.

Atlas Corp. was obtaining permits on their Gold Canyon deposit and doing preproduction work on the Goldstone North deposit. They hoped to begin mining these deposits by the spring of 1993.

Centurion Mines announced a gold discovery on its Sunbeam properties in the Tintic mining district. A large gold and silver bearing zone approximately 4,000 feet by 5,000 feet was found. They also defined a disseminated gold target in the Dugway mining district and were planning a drilling program in August.

As a result of a settlement with Sunshine Mining Co., Chief Consolidated Mining Co. took back full control of 6,400 acres of Burgin area properties located in the East Tintic mining district. Over 1 million tons of ore containing an estimated 23.9 million ounces of silver, 550.2 million pounds of lead, and 180.4 million pounds of zinc have been delineated in the area of the Burgin Mine.

Environment. A \$2.5 million treatment plant was built to reduce arsenic concentrations in water from the Spiro Mine tunnel that supplies water for Park City. Magnesium Corp. of America has reduced chlorine emissions by over 44% the last 2 years with new pollution control equipment. Hecla Mining Co. has been doing research with recovering metals from recyclable materials at its Apex hydrometallurgical processing plant.

A Draft Environmental Impact Statement was being prepared on the proposed underground Andalex Resources Inc. coal mine, located on the Kaiparowits Plateau about 15 miles north of Big Water. At the proposed Warm Springs Project, Andalex planned to mine 75 million tons of coal over the next 30 years.

A U.S. District Judge rejected Kennecott Utah Copper Corp.'s offer of \$12 million to the State for water damage from decades of mining. Kennecott has been negotiating with the State and the U.S. Environmental Protection Agency over a study to analyze the damage to local water supplies and had agreed in principle to a cleanup program for its copper operations.

Legislation and Government Programs. "The Comprehensive National Energy Act" was signed by President Bush on October 24 and provides \$270 million to pay for cleanup of contaminated uranium mill tailing sites in Utah and six other states. The bill also sets up a program to promote geothermal energy production.

President Bush asked Congress to designate nearly 2 million acres of new wilderness lands in 66 areas, while excluding another 1.3 million acres from wilderness protection as not suitable.

In 1992, the Federal Government gave Utah nearly \$2 million as part of a long-range effort to seal abandoned mines. The task could cost \$174 million to seal the nearly 17,000 abandoned mines. A coal tax funds this program which is due to end in 1995.

The U.S. House approved a land swap that would give the State coal leases in Carbon and Emery Counties in exchange for school sections that have been in the Navajo and Goshute reservations, national forests, and national parks. The bill would give Utah the unleased coal in the Soldier Creek tract,

Cottonwood Canyon, Crandall Canyon, and Winter quarters, plus royalties received from coal leases in Quitchupah.

A U.S. District Court judge, in *National Resources Defense Council versus Jamison*, upheld the U.S. Bureau of Land Management's (BLM) rules that expedite coal leases. The ruling is seen as a major victory for the industry.

Utah State Land Board officials asked for an increase in long-term coal lease rates from \$4 per year to \$21 per year per acre. The industry claims that the prices are extremely high and companies will avoid mining on State lands, turning to Federal lands.

In September, public hearings were held for drafting the Resource Management plan for 2.5 million acres in the Escalante and Kanab Resource Areas. This area included the Andalex coal mine. The plan was expected to be completed in 1995.

The Utah legislature passed and the Governor signed House bill 31, Reclamation of Abandoned Oil and Gas Wells, that states a portion of oil and gas fees will be used for reclamation. Also enacted was Senate bill 93, Compulsory Pooling of Oil and Gas Interests, which allows owners to recover from production estimated plugging and abandonment costs.

The Governor and U.S. Department of Commerce started an initiative to make Commerce resources available to Utah's economic development planners. The proposed program involves evaluating the commercial potential of the State's resources. The first study will concentrate on tar sand deposits, of which Utah has 95% of the U.S. deposits.

The Bureau of Mines Research Center in Salt Lake City, in cooperation with the U.S. Forest Service and local regulatory agencies, operated two BIO-FIX bead circuits to treat water emanating from the Columbus Rexall Tunnel near Alta. The circuits lowered the levels of cadmium, copper, iron, lead, and zinc to meet all drinking water standards and most aquatic standards.

Fuels. Mountain Coal Co., a subsidiary of ARCO, sold its Trail Mountain Mine in Emery County to PacifiCorp. The Sun Co. has announced that it is considering selling its coal operations, which include Soldier Creek Coal in Carbon County.

Review by Nonfuel Mineral Commodities. In 1992, Utah was second in the Nation in the output of copper. Kennecott purchased 5,700 acres of mining properties in the Oquirrh Mountains from Royal Minerals Inc., a subsidiary of Centurion Mines Corp.. Centurion Mines sold 20,000 acres in the North Oquirrh Mountains to Kennecott. Kennecott announced that it would spend \$800 million for a new smelter and modernized refinery at its Utah copper operations. Construction was set to begin in 1993, with completion in 1995. The fourth mill line at Kennecott's Bingham Canyon copper mine started up in January and can process 35,000 tons per day.

Gold output by Utah mines was third in the Nation. BLM approved a Tenneco Minerals proposal to expand its Goldstrike Mine Operation and extend the mine life through mid-1995.

Utah was the only U.S. source of mined beryllium during the year. The Defense Logistics Agency extended its contract with Brush Wellman Inc. for an additional 26,000 pounds of beryllium billets worth \$7 million to be delivered to the Strategic Materials Stockpile through June 1994. This brought the contract total to \$46 million for 160,000 pounds of billets.

The State ranked third domestically in the production of **iron ore**. Geneva Steel was building a \$7.5 million sophisticated biological waste water treatment plant.

Other important commodities produced in Utah were **molybdenum, salt, construction sand and gravel, and silver**. The production of **magnesium compounds** rose about 14% over that of the previous year.

North American Salt Co. (NAMS) and Great Salt Lake Minerals (GSLM) developed a new solution mining technique at their operation west of Ogden. NAMS leases its salt plant from GLSM and receives the salt from GSLM's evaporation pond. The plant lacked access to raw materials. To alleviate this, the company constructed an 8-mile-long dike which traps the lake brines and acts as a 19,500-acre preconcentrator. GSLM then dredged a 21-mile-long open, underwater canal to transport the brine, using gravity and lamellar flow, across the lake to the point where it is extracted. The company expected no more than a 10% loss of brine in canal transit.

VERMONT

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Annual, Estimated

THE MINERAL INDUSTRY OF VERMONT IN 1992

The value of nonfuel mineral production in Vermont in 1992 was estimated by the U.S. Bureau of Mines to be \$67.9 million, an \$8.1 million increase over that of 1991. Leading mineral commodities, in terms of value, were dimension stone, crushed stone, and construction sand and gravel. Asbestos and talc were also produced in the State. Nationally, the State ranked second among nine States that produced talc. It ranked third in quantity and first in value of dimension stone, and was the only State that produced asbestos.

NONFUEL MINERAL PRODUCTION IN VERMONT 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	\$10	NA	\$5	NA	\$1
Sand and gravel (construction)						
thousand short tons	3,675	11,948	3,000	9,900	4,100	13,800
Stone:						
Crushed do.	3,700	35,000	2,685	12,666	2,900	14,100
Dimension short tons	99,243	28,950	92,676	31,013	125,000	34,639
Combined value of other industrial minerals	XX	6,046	XX	6,236	XX	5,392
Total	XX	81,954	XX	59,820	XX	67,932

e/Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment. The average number of workers in the mineral extractive industries in Vermont during the first 9 months of 1992 was estimated to be 931 individuals. This included 513 workers at surface mine operations and 23 workers at underground mines. About 395 employees worked at mineral-related mills and preparation plants in the State.

Legislation and Government Programs. House bill 678 was introduced into the 1992 legislative session in order to officially designate the State's gem, rock, and mineral. The bill was signed into law in May as Act 221. It was determined that the State gem shall be grossular garnet. The State rock was designated to be marble, granite, and slate, while the State mineral was defined to be talc.

Review By Nonfuel Mineral Commodities. In July, Rock of Ages Corp. of Barre and Oshio Inc. of Osaka, Japan, announced the formation of Rock of Ages Asia Corp. Rock of Ages Asia Corp. is a Japanese joint venture company formed under the laws of Japan by Oshio and an indirect affiliate of Rock of

Ages. The new company will engage in the sale of granite supplied by Rock of Ages, Royalty Granite Corp. of Carleton, GA; Swenson Granite Co. Inc. of New Hampshire; and other granite suppliers to Japan, Taiwan, Korea, and other potential markets in Asia. Although Oshio has been Rock of Ages' distributor in Japan since 1974, the new venture is expected to strengthen the bond between the company for the long term.

In June, a new cogeneration facility was dedicated at Pluess-Staufer Industries' marble plant operations in Florence. The powerplant will burn either oil or natural gas. The heat will be used to dry ground marble, or calcium carbonate, while generating 8 megawatts of electric power. About 90% of the power will be used to meet the need of the company's rock crushing plant in Florence and marble cutting and finishing plant in Proctor and related facilities. The other 10% in the company's grid will serve the Proctor area residents.

Faced with slumping sales and the desire of its foreign owner to get out of the marble business, the future of the 122-year-old Vermont Marble Co. was in doubt at yearend. Pluess-Staufer, the Swiss-based owner, was reportedly negotiating to either sell or lease Vermont Marble's Danby quarry, the world's largest marble reserve, to another foreign company. Red Graniti, an Italian marble and granite company, was reportedly behind a deal to purchase the operations.

VIRGINIA

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Annual, Estimated

THE MINERAL INDUSTRY OF VIRGINIA IN 1992

The value of nonfuel mineral production in Virginia in 1992 was about \$416 million, according to estimated data compiled by the U.S. Bureau of Mines. The value of mineral production declined in the State for the second year in a row after having exceeded \$500 million in 1989 and 1990. In 1992, the combined output of crushed stone and sand and gravel of about 56 million tons was nearly 21 million tons lower than the 1989 total. A slowdown in construction during the past 2 years resulted in the reduced production and the corresponding decline in value.

NONFUEL MINERAL PRODUCTION IN VIRGINIA 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ² metric tons	882,383	\$3,741	723,495	\$3,248	690,222	\$3,990
Gem stones	NA	34	NA	70	NA	W
Lime thousand short tons	846	39,784	825	39,612	810	38,888
Sand and gravel (construction) do.	13,096	48,950	*9,700	*36,900	9,800	38,000
Stone:						
Crushed do.	*59,400	*320,000	48,861	260,966	46,100	253,600
Dimension short tons	W	W	11,046	3,061	W	W
Combined value of aplite ³ (1990-91), cement, clays (fuller's earth), feldspar ³ , gypsum (crude), iron oxide pigments (crude), kyanite, sand and gravel (industrial), talc and pyrophyllite, vermiculite, and values indicated by symbol W	XX	94,766	XX	84,188	XX	81,484
Total	XX	507,275	XX	428,045	XX	415,962

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

3/Begining in 1992 alpite is combined with feldspar.

Employment. The State's mining industry showed a slight drop in employment during the year. Employment in nonfuel mineral totaled about 1,650 workers in September 1992, the latest month for which data was available. That was about 105 persons fewer than in 1991. Coal mining employment also decreased from about 9,105 to 8,820 for the same time periods.

Exploration. The continued slowdown in the economy again slowed exploration and development plans of titanium sand mineralization in southeastern Virginia. Weak demand for titanium dioxide resulted in mining companies indefinitely delaying plans for mine development from acreage leased from landowners in parts of Dinwiddie, Sussex, and Greensville Counties.

A special-use permit was approved for a small gold mining operation at a 200-foot by 1,000-foot area near Danville. The Pittsylvania County Zoning Administration approved the project with provisions excluding the use of explosives or chemicals for the work. The area, once known as the "Kentuck Prospect," was first explored in the 1800's.

Legislation and Government Programs. The Virginia General Assembly enacted legislation authorizing the reorganization of the State's environmental agencies. The new Department of Environmental Quality will be responsible for the functions of the State Water Control Board, Department of Waste Management, Department of Air Pollution Control, and Council on the Environment effective April 1, 1993.

Review By Nonfuel Mineral Commodities. Crushed stone was the leading mineral commodity produced in Virginia, accounting for about 60% of the State's value of nonfuel mineral production. In 1992, the State ranked ninth nationally in output.

In 1992, crushed stone production had declined by nearly 20 million short tons from the State's highest output of 66 million tons in 1988. However, some producers expected demand to increase based on estimated Federal highway funding allocations of \$350 million for the State in 1993. During the year, plans to open quarries in Nokesville in Prince William County, Danville in Pittsylvania County, and Lexington in Rockbridge County were denied or delayed by local government, primarily because of opposition by area residents. Because of this type of opposition, some producers have purchased existing operations to avoid, in some cases, up to 5 years of work in attempting to open a quarry. In 1992, Chantilly Stone Co. purchased the Mecklenburg Rock Quarry near Boydton, which had started up in 1988. Martin Marietta Aggregates Corp. purchased the Culpeper Stone Quarry and the Spotsylvania Quarry from the Culpeper Stone Co. Inc.

Virginia remained second among three States in the Nation in production of crude vermiculite. Late in the year, Virginia Vermiculite Ltd. sought a conditional-use permit from Louisa County to expand operations onto an adjoining 15-acre site. The permit is necessary for the company to maintain its current level of production. The company began mining vermiculite in 1978 at a site near Boswell Tavern.

WASHINGTON

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Annual, Estimated

THE MINERAL INDUSTRY OF WASHINGTON IN 1992

The estimated value of nonfuel mineral production for Washington in 1992 was \$478.3 million, a slight decrease from that of 1991, according to the U.S. Bureau of Mines. Decreases in the production values of gold, magnesium metal, construction sand and gravel, and zinc more than offset the gain estimated for portland cement and crushed stone. Washington ranked 22nd nationally in nonfuel mineral production value in 1992, unchanged from 1991.

NONFUEL MINERAL PRODUCTION IN WASHINGTON 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	158,257	\$1,357	263,374	\$2,633	251,698	\$3,244
Gem stones		NA	281	NA	85	NA	12
Gold ²	kilograms	9,620	119,671	9,954	116,260	W	W
Sand and gravel (construction)							
	thousand short tons	40,251	133,067	40,200	140,700	38,400	137,100
Stone:							
Crushed	do.	*12,700	*41,900	13,126	59,588	13,300	62,200
Dimension	do.	W	W	W	W	125	19
Combined value of cement, diatomite, gypsum (crude), lead (1991), lime, magnesium metal, olivine, peat, sand and gravel (industrial), silver, zinc (1991), and values indicated by symbol W		XX	176,953	XX	163,393	XX	275,702
Total		XX	473,229	XX	482,659	XX	478,277

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Recoverable content of ores, etc.

Led by portland cement, the 1992 value of industrial minerals produced increased by almost 6% from that of 1991. Industrial minerals accounted for 61% of the State's total nonfuel mineral production value. The aggregated production value of Washington's metallic minerals--gold, magnesium metal, silver, and zinc--dropped nearly 10% from that of 1991. Decreases in production were largely responsible for the drop in value--a

magnesium metal plant curtailed sales on the open market and reduced production accordingly; a gold mine reduced production because of dwindling reserves; and a lead-zinc property operated only late in the year, a result of low prices. Although not included on Table 1, Washington was the Nation's largest producer of aluminum, accounting for more than 30% of total production capacity.

Exploration. Exploration continued at a relatively active pace, especially in the northeastern and northcentral parts of the State.

The joint venture of Battle Mountain Gold Co. and Crown Resources Corp. continued exploration and permitting of the Crown Jewel gold project on Buckhorn Mountain, east of Chesaw, Okanogan County. During the year, Battle Mountain, the project manager, did geologic mapping, condemnation drilling, and engineering studies in preparation for mining.

Also in Okanogan County, Crown Resources, in a joint venture with Lac Minerals (USA) Inc., did geochemistry, geophysics, and drilling at the Ida and Molson gold properties. The joint venture of Crown Resources and Teck Exploration Ltd. drilled and mapped the Strawberry Lake project. In agreement with the Colville Confederated Tribes, Santa Fe Pacific Mining Inc. explored the Wasco Ridge property, Echo Bay Exploration Inc. mapped Agency Butte, and the Parmenter Creek property was being offered by the Tribes. Centurion Mines Corp. did geologic mapping and extensive computer analysis of the Mazama porphyry copper deposit, 18 miles northwest of Winthrop; Strongbow Resources Corp., a subsidiary of Consolidated Ramrod Corp., explored the Crystal project, a property optioned from Keystone Gold Inc.; Hunter Mine Inc., a subsidiary of Waseco Resources, did underground development at the Say Energy property; and Weaco Resources Ltd. drilled the Kelsey property.

In Ferry County, the joint venture of Echo Bay, Crown Resources, and Pathfinder Gold Corp. drilled the K-2 prospect; Santa Fe Pacific and Pathfinder Gold drilled and mapped the Golden Harvest and Franson Peak properties; Equinox Resources explored its Wardlaw property, adjacent to the Lamfoot gold deposit; Phelps Dodge Mining Co. drilled the Copper Mountain and Toroda properties; Orvana Resources did exploration work on the Kelly Camp, Goosmus Creek, and Long Alec Creek properties; Westmont Gold Inc. explored Manhattan Mountain; and the Gold Mountain Mine, a joint venture of Gold Express Corp. and N. A. Degerstrom Inc., is permitted and on hold, with start up dependent on gold prices.

In Stevens County, Homestake Mining Co. and Pathfinder Gold drilled and mapped the Big Iron-McNally gold property; David Robbins and Associates did shaft reclamation on the Cleta Group; and the Vanhorn and Watson Mining Co. drilled and drifted underground on the Copper Penny project. Resource Finance Corp. (RFC) with Minnova Inc., both subsidiaries of Kerr Addison Mines Ltd., continued the exploration program at the Pend Oreille zinc-lead property north of Metaline Falls, Pend Oreille County. Later, Minnova exercised an option and bought a controlling interest in the mine by purchasing a stake of RFC from Kerr Addison. The underground drilling program was directed at further delineating the Yellowhead orebody.

In Chelan County, Asamera Minerals (U.S.) Inc. drilled at its Simon-Cumbo and Wallace sites. In agreement with Island-Arc Resources Corp. and Formosa Resources Corp., Kennecott Exploration Co. drilled then later dropped the Lockwood massive sulphide project near Everett, Snohomish County. In Whatcom County, exploration work was done by Double Dragon Exploration Inc., Seattle-St. Louis Mining Co., and the Jackpine Mining Co. In Skamania County, Plexus Resources Corp. drilled, mapped, and conducted baseline studies at its Silver Star base metal property, and Champion International Corp. drilled the Polar Star project. CSS Management Corp. did development work at the Apex-Damon project in King County, and in Yakima County, Ardic Exploration drilled the Morse Creek property.

Environment. Demolition plans for ASARCO Incorporated's copper smelter at Rushton, including the landmark 171-meter-tall smokestack, have become a little more complicated. Endangered peregrine falcons have been hanging out on top of the chimney, using the vantage point for spotting prey. When the company razes the smokestack, demolition experts will have to use either warning sirens to scare off the birds or they may use pigeons to lure the peregrines away. The old smelter property, sometimes referred to as the Tacoma smelter, was contaminated with arsenic and other heavy metals and is a Superfund site.

Review by Nonfuel Mineral Commodities. With a rated capacity of 274,000 metric tons, Kaiser Aluminum & Chemical Corp., a subsidiary of Maxxam Inc., was the State's largest **aluminum** producer. Kaiser's Spokane County operations included a smelter at Mead and a rolling mill at Trentwood; the company also has a smelter in Tacoma, Pierce County. Intalco Aluminum Corp., a subsidiary of Alumax Inc., operated the largest single plant, with a rated capacity of 220,000 metric tons, at Ferndale, Whatcom County. Others operating smelters included Aluminum Co. of America (Alcoa) in Wenatchee, Chelan County; Columbia Aluminum Co. in Goldendale, Klickitat County; Reynolds Metals Co. at Longview, Cowlitz County; and Vanalco Inc. in Vancouver, Clark County.

Northwest Alloys Inc., a wholly owned subsidiary of Alcoa, produced **magnesium metal** from locally mined dolomite at its plant at Addy, Stevens County. Owing to low magnesium prices worldwide and a decrease in demand, Northwest Alloys operated the plant at a reduced rate, apparently just enough to supply Alcoa's requirements. Alcoa uses the magnesium metal in the production of aluminum alloys.

Asamera Minerals, a wholly owned subsidiary of Gulf Canada Resources, operated the Cannon **gold** mine in joint venture with Breakwater Resources Ltd. Owing to dwindling reserves, the company cut back production and reduced output. The operation, at Wenatchee, Chelan County, and the second largest underground gold mine in the Nation, also produced **silver**. Hecla Mining Co. mined gold and silver at its Republic Unit at Republic, Stevens County; the mine was the State's top-ranked silver producer. The new decline tunnel was used to remove ore primarily from the Golden Promise vein system. Mill capacity was expanded from 245 to 295 metric tons-per-day. Hecla also operated an onsite refinery where ore was processed into gold and silver bullion consisting of about 90% precious metals.

Echo Bay Minerals Co. continued to operate its Kettle River project in Ferry County. Echo Bay's joint venture partner, Crown Resources, withdrew from the project, saying it did not provide sufficient cash flow. Production was suspended at one of the two original deposits, the Overlook, because of low grades and high development costs, and the Kettle deposit was mined out. All of the ore now comes from the Key East and Key West deposits. Echo Bay was developing a production drift on the Lamfoot property, east of Curlew Lake. The ore was trucked to the nearby Key mill which contains a carbon-in-pulp vat-leach system and uses the Merrill-Crowe process to recover precious metals.

Aggregate production accounted for almost 42% of the State's mineral production value. The bulk of the **construction sand and gravel** output came from the aggregate-rich, ice-margin deposits in the Puget Sound region of Clark, King, Pierce, and Snohomish Counties and from late Wisconsin Lake Missoula flood deposits near Spokane. Reflecting the volcanic nature of the State's geology, most of Washington's **crushed stone** production was traprock (basalt). Holman Ideal Inc. produced **portland cement** at its wet-process facility in Seattle, King County. The company barged limestone to the plant from Texada Island, British Columbia, and clay from its Twin River quarry in Clallam County. Also in King County, Ash Grove Cement West Inc. completed construction of a \$65 million cement manufacturing plant. The company mined silica from the Superior Quarry, operated a grinding facility, and maintained a bulk cement distribution center from where it sold portland cement. In Spokane, Ash Grove completed expansion of its cement distribution plant to nearly double storage capacity, and gave it the ability to load two trucks simultaneously.

Northwest Alloys produced quicklime as a byproduct of its magnesium metal production at Addy. Quicklime and hydrated lime were produced by the Tacoma Lime Div. of Continental Lime Inc. at its Tacoma plant in Pierce County.

Celite Corp., a subsidiary of The Allegheny Corp, produced diatomaceous earth from three pits in the Frenchman Hills in Grant County. The ore was processed and calcined at the company's plant in Quincy. Industrial sand was produced by Lane Mountain Silica Co., a division of Hemphill Brothers Inc., at a mine and plant near Addy. In King County, cement-grade silica was mined by Reserve Silica Corp. from the Ravensdale pit and by Ash Grove Cement from its Superior quarry.

In Whatcom County, Olivine Corp. continued to mine and mill olivine from the Swen Larsen quarry in the Twin Sisters dunite. Part of the production was used to make modular refractory slabs for waste incinerators. Applied Industrial Materials Corp. (AIMCOR) purchased olivine from Olivine Corp. and produced a crushed product at its plant near Hamilton, Skagit County.

In August, and after being closed less than a year, Equinox Resources Ltd. reopened the Van Stone zinc-lead mine near Onion Creek, north of Colville, Stevens County. The company shipped concentrates by truck for smelting at Cominco Ltd.'s zinc smelter at Trail, British Columbia.

WEST VIRGINIA

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Annual, Estimated

THE MINERAL INDUSTRY OF WEST VIRGINIA IN 1992

The value of nonfuel mineral production in West Virginia in 1992 was about \$124 million based on estimated data compiled by the U.S. Bureau of Mines. Conditions in the State's nonfuel mineral industry remained about the same as in 1991. The greatest changes in output were in the 15% range. Increased production was reported for lime, cement, and crushed stone. Output of sand and gravel, salt, and clays declined. Peat and industrial sand production was the same.

West Virginia remained the Nation's second leading producer of coal with output of about 167 million short tons, according to the Energy Information Administration.

NONFUEL MINERAL PRODUCTION IN WEST VIRGINIA 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays	metric tons	164,257	\$384	134,262	\$322	127,147	\$399
Gem stones		NA	1	NA	2	NA	1
Sand and gravel (construction)							
	thousand short tons	3,208	14,950	3,100	14,300	2,600	12,200
Stone (crushed)	do.	² 12,000	² 45,200	10,255	50,505	11,200	56,800
Combined value of cement, lime, peat salt, sand and gravel (industrial), and stone (crushed granite [1990])							
		XX	75,803	XX	51,802	XX	54,343
Total		XX	136,338	XX	116,931	XX	123,743

e/Estimated. NA Not available. XX Not applicable.

1/Production as measured by mine shipments, or marketable production (including consumption by producers).

2/Excludes certain stones; kind and value included with "Combined value" data.

Employment. The number of workers employed in mining nonfuel mineral declined slightly in 1992 to about 415. Employment in the coal industry dropped by nearly 3,000 through September of 1992, the latest month for which statistics were available. In 1991, the industry had employed about 25,230 workers.

Legislation and Government Programs. Enactment of Senate bill 362, the Abandoned Mine Lands and Reclamation Act, provides additional funding for reclamation work. The act increases from 15% to 30% the amount of Federal funding under certain provisions to be used at facilities such as treatment plants. Administration of the act is reauthorized to the Division of Environment Protection from the Department of Energy, which was dissolved in 1991.

A 2-year controversy over the development of a limestone quarry remained unresolved at yearend. In mid-December, the West Virginia Supreme Court returned an appeal concerning the permitting of a quarry in Kearneysville, Jefferson County, to Kanawha Circuit Court. Earlier in the year, Francis O. Day Co. Inc. had apparently gained permission to develop the quarry when the State Reclamation Board of Review ruled by a 3-2 vote to overturn the State's Division of Environmental Protection (DEP) denial of the permit. The State Supreme Court, however, ruled that the seven-member Reclamation Board was one vote short of the four needed to overrule the DEP decision.

Review By Nonfuel Mineral Commodities. Crushed stone was the leading nonfuel mineral produced in West Virginia. In 1992, crushed stone accounted for about 45% of the State's total value of nonfuel minerals.

Although lime was produced by only one company in West Virginia, output has increased by nearly 30% since 1990. Demand for lime and limestone in the State has increased because of an expanding market for these commodities in environmental applications. Construction of a \$726 million sulfur dioxide scrubber system at a powerplant in Shinnston by Allegheny Power Systems Inc. continued during the year. The plant, scheduled to be completed in 1995, was expected to require approximately 500,000 tons of lime per year to remove sulfur during coal burning at the powerplant.

United Steelworkers union members ratified a labor contract with Ravenswood Aluminum Corp. in June ending a 20-month contract dispute. During the dispute, the company hired replacement works to operate the State's only primary aluminum smelter. With the settlement, a total of 1,700 union workers regained their jobs. It was expected that this dispute could again prompt demands by organized labor for Federal legislation banning the employment of replacement workers.

WISCONSIN

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Annual, Estimated

THE MINERAL INDUSTRY OF WISCONSIN IN 1992

Statistics released by the U.S. Bureau of Mines indicated that the estimated value of nonfuel mineral commodities produced in Wisconsin rose 2% from \$213.8 million in 1991 to \$218.1 million in 1992. Increased sales of crushed stone, the State's leading mineral commodity, offset decreased production and sales of sand and gravel, lime, and dimension stone. Large increases in peat sales also were estimated for 1992. Wisconsin ranked 36th nationally in nonfuel mineral production value in 1992, compared with 37th in 1991.

NONFUEL MINERAL PRODUCTION IN WISCONSIN 1/

Mineral	1990		1991		1992*	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Gem stones	NA	W	NA	\$542	NA	\$7
Lime thousand short tons	461	\$24,608	536	23,225	506	21,925
Peat do.	12	256	9	227	W	W
Sand and gravel (construction) do.	29,572	73,750	29,600	77,500	27,700	74,000
Stone:						
Crushed do.	26,600	91,000	23,676	80,475	25,500	89,300
Dimension short tons	31,316	3,811	37,470	4,347	36,166	4,227
Combined value of other industrial minerals and values indicated by symbol W	XX	18,622	XX	27,533	XX	28,687
Total	XX	212,047	XX	213,849	XX	218,146

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data.
XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain stones; value included with "Combined value" figure.

Employment. According to U.S. Department of Labor estimates, 2,400 workers were employed in the mining industry at the end of November, the last month for which data are available. This represents a 9% increase over last year's average.

Mining activities at the Flambeau Mining Co.'s mine currently under development near Ladysmith accounted for up to about 185 employees during the peak of the construction phase. After the construction phase is completed next year and the mine is in full production, Flambeau's operational workforce is expected to be between 65 and 70 workers.

Exploration. Extensive mineral exploration activities were conducted in northern Wisconsin's green stone belt during 1992. Exploration activity in this area has been intense over the last few years as several massive sulfide deposits containing copper, zinc, lead, gold, and silver have been discovered. Phelps Dodge Exploration East Inc. drilled in Lincoln County near Harrison and Pine River, and south of Merrill in Marathon County. E. K. Lehman & Associates conducted mineral exploration north of Prentice in Price County, near Enterprise in Oneida County, at the Bend project in the Chequamegon National Forest in Taylor County, and at the Horseshoe project west of Tomahawk in Lincoln County. Exxon Coal & Minerals Co. and Phelps Dodge Mining Co. agreed to conduct a joint evaluation of the Crandon deposit south of Crandon in Forest County, but after completing the study, Phelps Dodge dropped any continuing interest in the property. Cominco American Inc. conducted mineral exploration north of Mercer in Iron County. BHP Minerals International exploration efforts centered in the Marinette County area south of Goodman. Noranda Exploration Inc. explored areas in the vicinity of their Lynne deposit in Oneida and Price Counties, southwest of Florence in Florence County, and south of Phelps in Vilas County. In September, Noranda announced it will halt mineral exploration efforts in Wisconsin and focus its exploration activities in States that encourage mineral development.

Terra Energy Ltd. was unsuccessful in drilling for oil and gas west of Ashland in Bayfield County.

Environment. Governor Thompson approved funding for the consolidation and capping of roaster (toxic) and flotation (nontoxic) tailings piles south of Mineral Point in Iowa County. The toxic waste piles were generated between 1840 and 1930 from zinc roaster operations.

Legislation and Government Programs. Three pieces of legislation affecting mining were signed into law during the year. Assembly bill 661 (Act 259) requires mining companies to pay up to \$150,000, through the State Mining Impact Board, to support early involvement of local governments in the negotiating process with mining companies. Senate bill 240 (Act 260) prohibits companies guilty of environmental violations in other States from obtaining a permit to mine in Wisconsin. Assembly bill 701 (Act 262) gave the Department of Natural Resources (DNR) authority to regulate oil and gas exploration and production.

The Private Water Section of DNR initiated a program to eliminate hazards of open and caved mine shafts, vents, and drill holes.

Review by Nonfuel Mineral Commodities. Crushed stone continued to be the leading mineral commodity produced in Wisconsin, followed by construction sand and gravel and lime. These three commodities accounted for an estimated 85% of the State's total mineral value. Crushed stone alone accounted for over 40% of Wisconsin mineral sales in 1992.

Owing to much local opposition, expansion was approved at only four quarries in the State. The Daanen and Janssen quarry was granted a request by the town of Glenmore, Brown County, for rezoning 58 acres from agriculture for the purpose of operating a quarry. Halquist Stone Co. was given permission by the Lisbon Town Board to expand its quarry operation onto 80 acres that borders the town of Pewaukee in Waukesha County. The town planning commission of Ottawa, Waukesha County, voted in favor of rezoning 40 acres of land south of the Vulcan Materials Plant to a quarry district for that company. The Payne & Dolan quarry was granted approval by the Pewaukee planning commission, Waukesha County, to expand operations onto an 11.9-acre tract to the east of the current operation.

Lembzedder Sand and Gravel, of Hartland, was purchased by Cretex Sand and Gravel, a subsidiary of the Cretex Co. of Elk River, MN. The portable crushing equipment acquired will be used to provide custom-crushing services for customers in eastern Wisconsin and northern Illinois.

Valders Stone & Marble was acquired by Mankato-Kasota Stone Inc., of Mankato, MN, after the former owners filed for bankruptcy. Mankato plans no major changes other than possible equipment purchases. The company hopes to boost the workforce and financial health of the operation.

Construction resumed in May at the Flambeau Mining Co's. copper, gold, silver mine near Ladysmith in Rusk County. The company had been granted a permit to mine in January 1991 and started construction in May 1991; however, in August 1991, a Dane County judge stopped mining activities for a period of 30 days after the release of a Supplemental Environmental Impact Statement (SEIS) addressing the affects of mining on endangered species found in the Flambeau River near the mine site. As a result of the SEIS, more stringent wastewater restrictions could be required. Production is anticipated by June 1993. The Flambeau Mine will be the first metal mining operation to operate in the State since 1982, and the first to initiate production since the mid-1970's.

Noranda filed a Notification of Intent (the first step toward obtaining a mining permit in Wisconsin) for its Lynne project in Oneida County west of Rineland. Noranda's proposed 500-foot-deep open pit mine would include an area up to 80 acres. The massive sulfide deposit is estimated to contain 6.5 million tons of mostly zinc ore with lesser amounts of lead, copper, silver, and gold. In August, Noranda announced it was reevaluating the economics of its Lynne deposit as the economics were being affected by the prolonged permitting process and regulatory concerns regarding the extent of lake beds and wetlands in the area. In September, Noranda suspended all environmental baseline studies on the Lynne project owing to a controversy over the legal definition of a lake or stream in Wisconsin. Several small lakes and streams were identified on the site. Noranda indicated it intends to continue its 10-year lease with the county.

WYOMING

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Annual, Estimated

THE MINERAL INDUSTRY OF WYOMING IN 1992

According to the U.S. Bureau of Mines, the estimated value of nonfuel mineral production for Wyoming in 1992 was nearly \$935 million, an increase of about \$6 million over the \$926 million reported in 1991. Gains in the production value of clays, gypsum, helium (Grade-A), and crushed stone more than offset declines in the value of portland cement, gem stones, and construction sand and gravel. No metal production was reported during 1992. Wyoming ranked 10th nationally in the value of nonfuel mineral production and 5th in industrial minerals production.

Wyoming led the Nation both in soda ash and bentonite clay production. All of Wyoming's soda ash producers continued to operate at near capacity, were in the process of expanding and modernizing, or had completed some phase of expansion. Several companies were looking at starting new operations. Grade-A helium production increased slightly; of the four States that produced Grade-A helium, Wyoming ranked 2nd. Three commodities--clays, Grade-A helium, and soda ash--accounted for over 90% of the State's nonfuel mineral production.

NONFUEL MINERAL PRODUCTION IN WYOMING 1/

Mineral		1990		1991		1992*	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays ²	metric tons	2,523,573	\$76,082	2,496,361	\$81,573	2,379,596	\$100,540
Gem stones		NA	151	NA	61	NA	30
Lime	thousand short tons	W	W	37	2,729	49	3,614
Sand and gravel (construction)	do.	4,329	14,446	3,500	11,900	3,100	10,800
Stone (crushed)	do.	2,200	14,000	2,946	12,645	4,400	19,500
Combined value of cement (masonry [1990], portland), clays (common), gypsum (crude), helium (Grade-A), soda ash, and value indicated by symbol W							
		XX	806,169	XX	820,268	XX	800,471
Total		XX	910,848	XX	929,176	XX	934,955

e/Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/Excludes certain clays; kind and value included with "Combined value" figure.

Employment. Mining employment in Wyoming fell 6.8% from October 1991 to October 1992 when approximately 18,000 people were employed. Coal and nonmetallic mining employment accounted for about 8,700 of the jobs and oil and gas extraction accounted for the other 9,300 mining related jobs.

Exploration. Exploration for base and precious metals was again reported throughout the State in 1992. Areas examined included the Medicine Bow Mountains, the Hartville Uplift of eastern Wyoming, Rattlesnake Hills in the Granite Mountains, the South Pass region of the Wind River Range, and the Seminole Mountains in the greenstone belt of central Wyoming. Noranda Exploration did some drilling in the Hayden District of the Medicine Bow National Forest looking for copper, lead, zinc, gold, and silver. At least five companies were in the State to examine deposits of granite, quartzite, flagstone, and sandstone for potential development.

Environment. Universal Equipment Co. will have to post a \$4 million bond with the State Department of Environmental Quality to assure reclamation at the Atlantic City iron mine. A Wyoming Supreme Court ruling apparently will require Universal to demolish all buildings at the mine site.

Legislation and Government Programs. New mineral valuation methods were expected to lower State revenues from mine operators in the State. Mineral taxes are the third leading source of money for the State with \$508 million collected in 1991-92. The controversy over the Bessemer Mountain limestone quarry is headed for court again. The Wyoming Environmental Quality Council designated part of Bessemer Mountain as "rare and uncommon." Rissler-McMurry Co., which operates a limestone mine on the mountain, is challenging the designation. Rissler-McMurry has applied for a mining permit to expand the aggregate quarry from the current 4-hectare (10-acre) limit.

Review by Nonfuel Mineral Commodities. Wyoming's oldest soda ash producer, FMC Wyoming Corp., recently added two new "value added products," sodium cyanide and sodium bicarbonate, to its line of products. Tg Soda Ash Operations is nearing completion of the State's third and largest caustic soda plant. The plant will initially produce 90,700 metric tons a year and have a capacity of 136,000 metric tons per year. Belgian based Solvay Soda Ash's joint venture with Asahi Glass of Japan completed expansion of its soda ash plant by 544,300 metric tons, and added a 68,000-metric-ton capacity caustic soda plant and a 45,350-metric-ton sodium sulfite plant. Solvay acquired the soda ash facilities from Tenneco Minerals Co. in May. In July, Tosoh Wyoming Inc. (a subsidiary of Tosoh America Inc. and parent company Tosoh Corp. Japan), purchased a 24% interest in the General Chemical Soda Ash Partners joint venture. Tosoh made the purchase from the Andover Group (subsidiary of Australian BTR Nylex Limited), which previously owned 49% of the joint venture. General Chemical Co. retains a 51% controlling interest in the operation.

Evergreen Enterprises proposed a drilling project north of Green River to explore, assess, and delineate a possible mine site. In June, the U.S. Bureau of Land Management approved the company's proposal for prospecting on public lands.

Bentonite Corp. started construction of a \$1 million bentonite processing facility at its Colony bentonite plant. The expansion will give the company a capacity of 127,008 metric tons (140,000 short tons) per year of composite binder products.

J. R. Simplot Co. and Farmland Industries Inc. completed purchase of the Chevron Chemical Co. phosphate fertilizer operations in Wyoming and Utah. Wyoming operations include a phosphate manufacturing plant at Rock Springs with a capacity to produce up to 453,500 dry and liquid metric tons (500,000 short tons) of fertilizer a year.

In addition to producing black granite for dimension stone, Sunrise Stone also shipped blocks of pink, granitic migmatite to Chicago for processing into decorative stone facing.

Groundbreaking ceremonies were held at Frannie, Park County, for Wyoming's only lime processing plant. The \$10 million Dakota Coal Co. facility is expected to be operational in January 1993. Ironically, environmental regulations restricting emissions from coal-fired power plants resulted in an increased demand for lime and provided the market demand that led to the building of the plant. The plant will produce lime for scrubbers used to remove sulfur dioxide from exhaust gases at two power plants owned by Basin Electric Power Cooperative (parent company of Dakota Coal). Over the next 30 years, about 363,000 metric tons of lime will be produced from limestone quarried in the Pryor Mountains, near Warren, MT. Between 22,675 and 27,200 metric tons of coal will be used annually to fire the lime kiln. Pete Lein & Sons Inc., operator of the Frannie plant, had proposed a similar operation near Laramie but plans are on hold pending additional development of lime markets.

**TAKE
PRIDE IN
AMERICA**

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural and cultural resources. This includes fostering wise use of our land and water

resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. Administration.



U. S. DEPARTMENT OF THE INTERIOR



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