

MINERAL, MINING AND ENERGY RESOURCES DEVELOPMENT TRENDS

IN IDAHO

by

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The value of Idaho's mineral production, according to the most recent U.S. Bureau of Mines Annual Advance Summary for 1975 was a little less than 234 million dollars (Appendix, Fig. 1B). This represents an annual increase of slightly more than 12 per cent over the 1974 figure of more than 208.5 million dollars, but less than the 53 percent increase experienced in 1973. The major percentage increase in 1973 resulted from an increase in commodity prices. The following remarks give some hint about the apparent trends in 1976.

U.S. Bureau of Mines Annual Preliminary Summary data on mineral production released in early January 1977, includes the corrected production figure for 1975 (noted above). The release also includes a preliminary estimate for Idaho mineral production in 1976. This 1976 figure, 220 million dollars, is 6.2 percent below the 1975 total mineral production in the state.

It is difficult to forecast what 1977 production figures will be because of so many economic variables affecting both commodity prices and production. Also the effects of slow-downs and shut-downs, resulting from environmental and legal constraints and from labor contract negotiations are difficult to assess. If some of these restraining problems are solved and/or mitigated, the mineral industry should experience a reasonably good upswing during 1977.

The present outlook is as follows....in 1975, some 21 mineral commodities were responsible for the 12 percent upturn of the state's mineral economy. (Appendix, Figure 1A is a location map of the State of Idaho.) Nine of these were metallic commodities and 12 were nonmetallics, including industrial-use rock, rock materials and ore minerals. Traditionally, of course, some mineral production is not reported. In the case of construction materials, such as sand, gravel and rock, this is especially true. It is notable that in the last few years architects and builders have

turned to using more natural stone, especially premium-priced construction stone, such as facing, trim and so forth.

For 1975, the U. S. Bureau of Mines reports that 52 percent of the total mineral value represents metals, and phosphate rock 32 percent, leading all other nonmetallic minerals. However, if the value of the phosphate industry's production is calculated after processing the ore, for example, as in the case of metals, then phosphate commodities plus other industrial rock and mineral values, would represent nearly two-thirds of Idaho's total mineral commodity value.

Silver is the leading metallic mineral produced in the state. Production of silver, zinc, copper, vanadium, phosphate rock and cement, all increased. However, the price of copper sagged in 1975.

It is too early to comment on specific mineral commodity production in 1976 (Appendix, Fig. 1B). Optimistically, 1977 might experience as much as 22 percent growth in commodity sales, in spite of the fact that the U.S. Bureau of Mines cautiously predicts that final 1976 totals will be 6.2 percent down from 1975 totals. In December 1976 and January 1977, both state and federal economists noted that the state and federal economic situations were not as grim as predicted. In fact, 1976 year-end national economy reportedly showed a marked strengthening trend within many industries and markets. If such a trend continues, then the important supportive mineral industry should begin to feel the stimulus of any such potential economic gains.

Energy Sources

Although interest in fossil fuels has picked up, such commodities have yet to be proved in Idaho in sufficient quantity to constitute a viable economic resource or reserve. Re-examination of known coal deposits and evaluation of their potential has resulted in negative assessments. Some underground coal may be available in the Driggs area north of Victor in southeastern Idaho (Appendix, Fig. 1A), however, previous investigations have been pessimistic about the presence of any major reserves for commercial production.

Optimism over the presence of natural gas and/or petroleum has bloomed again. Two areas of interest are noteworthy: the Western Snake River Plain, with its poorly consolidated fluvial and lacustrine surface deposits, ranging from 12 to 22, and up to 40 million years in age; and the older rocks consisting of upper Paleozoic limestones and shales in eastern Idaho, lying north and south of the Snake River Plain and ranging back to 345 million years in age. The newly generated enthusiasm for exploring the oil and gas potential of such lithologies has resulted in leasing of hundreds of acres or tracts from southwestern Idaho to the state's eastern borders.

Considerable money and time have been expended in these areas conducting surface investigations, including seismic surveys. More than one company has expressed enthusiasm over preliminary assessments in the eastern area, that is, in the Utah-Wyoming-Idaho-Montana overthrust belt. At least three great overthrust sheets characterize this zone. One must remember

that the region is still tectonically earthquake prone.

Apparently in response to an AMOCO well that recently struck commercial quantities of gas, only eight miles east of the Idaho border in Wyoming, the Department of Lands has been inundated by oil and gas leasing activity. Since December of 1975, approximately 1,050 applications, representing 595,000 acres have been filed with the Department of Lands in Boise. During this same period the Bureau of Land Management Land Office has received approximately 1,600 applications for oil and gas on federal lands. Almost all applications have been for lands in the "thrust belt" area of southeastern Idaho.

In 1946 the biennial report of the Idaho Department of Lands specifically discussed oil and gas leasing activity for the first time. Then only 960 acres of state land were under lease. In subsequent years there have been four periods of high leasing activity:

1.	High - 1952	124,426 acres under lease
	Low - 1954	18,778 acres under lease
2.	High - 1958	59,366 acres under lease
	Low - 1968	7,396 acres under lease
3.	High - 1974	549,003 acres under lease
	Low - 1975	389,967 acres under lease
4.	High - 1976	1,000,000 acres under lease and application

The present number of acres under lease or application is almost twice that existing in any previous period of high activity. Although it might be expected that a period of intense drilling activity will follow the current leasing activity, historically this has not been the case. After careful comparison of drilling and leasing records, there appears to be no apparent correlation between leasing activity and drilling activity.

Periodic gas "booms" have waxed and waned in southwestern Idaho, ever since a few small stratigraphic and structural traps first yielded short-lived natural gas production many years ago, but never has gas been produced in commercial quantities. In 1976, a 14,006 foot well, the deepest to date in this state, was completed and plugged near Meridian, just west of Boise. Standard Oil of California, with the drilling right, farmed out the project to Halbouty Oil Company, a Dallas independent. The result of this drilling is confidential, however, it seems likely word of any major success would have reached the press. Also, *May Petroleum Company* of Dallas joined *Phillips Petroleum* in a joint wildcat effort this year in Elk Valley, Caribou County; and *American Quasar Petroleum Co.*, of Fort Worth have started a well on Black Mountain, Bonneville County.

Although there has been no commercial production of oil and gas in the State of Idaho; however, there is some basis for optimism relative to future production in southeastern Idaho. In general, most wells drilled in this sector have been far too shallow to have achieved their goal. Also, by all exploration standards, the southeastern region has yet to be extensively explored by drilling and the use of other exploration techniques.

Only 18 wells in the state have reached a depth greater than 5,000 feet and only six wells were drilled deeper than 10,000 feet. The deepest recorded was the above Halbouty well (1976) in southwestern Idaho.

Oil and Gas Wells Drilled and Abandoned in 1976

- 1. Well - J. N. James #1
Operator- Halbouty
Location- Ada County, near Meridian,
southwestern Idaho
Status - 14,006 feet deep (record in
Idaho) plugged and abandoned

- 2. Well - Elk Valley No. 1
Operator- May Petroleum
Location- Southeastern Idaho
Status - 3,919 feet, plugged and
abandoned

Oil and Gas Wells Being Drilled as of November 27, 1976

- 3. Operator - American Quasar
Location - Bonneville County, southeastern Idaho
Status - Over 6,000 feet deep,
drilling continues

- 4. Operator - Dunford
Location - Bearlake County, southeastern Idaho
Status-Shallow test

Geothermal Resources

Although two successful geothermal wells were drilled in the Raft River Valley, the recent, vast interest in Idaho's geothermal prospects for power development seems to have waned. This is reflected by the following sequence of events in the past two years. On May 1, 1975, the

Department of Lands issued 536 geothermal leases in Idaho, representing 213,350 acres to 12 different leasees. As a result of this leasing program, \$214,408 were received in advance rentals and \$22,750 were received in filing fees for a total of \$237,158.

On March 1, 1976, the first anniversary date of the leases, 398 of the original 536 leases were surrendered. This mass relinquishment of leases is apparently in response to a combination of problems, including an unfavorable tax situation, difficulty in acquiring permits and leases and for reasons discussed below.

As for the status of federal geothermal resource leasing in Idaho in 1976, the Idaho State Bureau of Land Management Land Office still has 373 pending applications for geothermal resources. They have thus far issued 57 noncompetitive leases representing 93,485 acres, of which 44 leases are in Owyhee County in southwestern Idaho. Ten competitive leases embracing 20,964 acres have been approved. The bonus bids on these leases have ranged from a low of \$2.13 per acre to a high of \$63 per acre.

There are now eight "Known Geothermal Resource Areas" (KGRA's) as designated by the U.S. Geological Survey representing 172,462 acres of private, state and federal land. These KGRA areas are:

- | | | |
|-------------------------|-----------------------|--------------|
| 1) Raft River | 30,219 Acres | |
| | 2) Yellowstone | 14,164 Acres |
| 3) Bruneau | 5,120 Acres | |
| 4) Mountain Home | 9,520 Acres | |
| 5) Castle Creek | 79,722 Acres | |
| | 6) Vulcan Hot Springs | 3,836 Acres |
| 7) Crane Creek (Weiser) | 4,342 Acres | |
| 8) Island Park | 25,539 Acres | |

Heat flow studies by the Idaho Department of Water Resources indicate that almost anywhere in the Snake River Plains temperatures exceed 200° C at a depth of 10,000 to 12,000 feet. The problem is not to find the temperature in Idaho, but to find the right reservoir characteristics.

Serious problems in geothermal leasing exist which oil and gas leasing does not share. These include ownership problems. For example, in the case of a severed title the question arises, are geothermal resources owned by the surface owner or by the mineral owner? This is a particular problem in Idaho where geothermal resources are defined in Section 47-1602 of the Idaho Code: "Geothermal resources are found and hereby declared to be sui generis, being neither a mineral resource nor a water resource". This poses a question that perhaps only a court of law can decide.

Other difficulties concern (1) the appropriation of all water for agricultural use; (2) leasing delays because of geographically conflicting applications and EPA environmental impact requirements; (3) the need to fulfill drilling regulations and to obtain drilling permits; (4) the lack of tax

advantages, for example, the Tax Reduction Act of 1975 (Public Law 9412) only allows a percentage depletion where the geothermal resource is a gas. This is unfortunate for Idaho because we do not expect to find the hot dry stream necessary to take advantage of this percentage depletion; and finally (5) the competition for exploration money which could otherwise go to oil and gas investigations. For all these reasons, in 1976 the geothermal resources programs in this state are less likely to be initiated or even attractive.

Mining Activity and Mineral Production

As was the case last year, 1976 has been a time of mine expansion, of joint mining efforts among different companies, or reactivation of idle mine workings and a great deal of mineral exploration activity all over Idaho. Price fluctuations have stimulated renewed investigations for some minerals and slowed the search for others. In 1976, as in 1975, the Idaho mineral resource industry might be described as experiencing a time of cautious optimism.

Mineral production in Idaho's two major producing areas in 1976 might be described as reasonably good. In the Coeur d'Alene district, there is optimism for increased production in the future. Such an observation is based upon the fact that there is an ever increasing knowledge of the nature of the district's mineralization, announcements of new ore body discoveries and reactivation of old mines (either actual or proposed), among other things. Unfortunately, the district as with others in the state, is still enmeshed in solving environmental problems which, though important, require time and much money to solve. A prime example is *Bunker Hill's* 11 million dollar investment in mill and plant stack pollution controls, currently under construction, in an attempt to conform to EPA and state agency air pollution regulations.

The phosphate district in southeastern Idaho seems likely to experience expanded production because of the growing worldwide requirement for food and hence for fertilizer produced from phosphate rock. Particularly to be noted is the United State's need to maintain a leading role in the overseas sales of agricultural products to insure a positive balance of payments. Some representatives of the phosphate industry in Idaho have expressed the belief that future growth is ahead, but it will not come by "leaps and bounds". In this industry, questions related to growth and environmental impact are paramount. It seems possible to solve foreseeable problems, but again the tasks are expected to take time and to be costly.

Whatever occurs as Idaho's mineral industry moves into the next decade, it seems unlikely that this important segment of the state's economy will decline because our minerals are badly needed, are of importance to the national economy and they exert a strong influence on global well-being. Because of this reality and the pressure to proceed in these tasks, there is increased need for accommodation between industry and its environmental antagonists, as well as effective cooperation between industry and state and federal environmental agencies.

Commodity Highlights for 1975-76

Peat

While production of peat in Idaho is relatively small and limited to occasional recovery from one plant near Downey, Idaho, there are other known peat resources within the state. Potential commercial supplies of this commodity have increased inquiries about production and marketing. For example, at least two private land owners in Bonner County have expressed interest in development of peat occurring on their property.

1. Mineral location maps, appendix - Figures 3 - 14

Sand and Gravel

Over 150 statewide sand and gravel recovery sites are reported. Some are active operations and others intermittently active or inactive. Undoubtedly, too, some recovery operations have not been reported. Activity in this important commodity market is largely dependent upon all kinds of construction. Recently, Washington economists have predicted that building will increase in 1977, based on projected trends. The value of most sands depends upon type, accessibility and specific needs.

Rock or Stone

At least 10 rock recovery operations are reportedly active. These include quarrying of rough stone, carbonate rock for special uses, and premium trimstone. Some recovery sites are known but not reported. Increased recovery of carbonate and high silica rock appear to be a current market trend. Demand should increase for carbonate rock materials used to control or neutralize the effects of liquid and gaseous effluents, which are considered environmental pollutants.

Gold, Silver, Copper, Lead and Zinc

Gold, silver, copper, lead and zinc minerals are being recovered from over 31 active operations in Idaho. Concentration of major production is in the Coeur d'Alene district, but other operations are scattered around the state. At least 50 sites in the state are undergoing exploration for minerals bearing these metals. Assessment work is being kept up at other mineralized localities.

Significant new developments include the *Coeur Mine*, a silver-copper operation of ASARCO at Osborn. The Coeur has 450 ton per day capacity and probable reserves of 880,000 tons of Ag-Cu vein ore averaging 21 ounces of silver per ton and 0.78 percent copper. The mill was completed in 1976 at a cost of 10 million dollars, added to 10 million dollars development cost for the mine. Approximately 130 men will be employed when the mine reaches full production this winter, with an annual payroll of 2 million. It is expected that 2.2 million ounces of silver will be produced annually plus 1.6 million pounds of copper. Also *Earth Resources Corporation* (ERC)

continues to explore stratabound Cu-Ag property in Belt rocks north of Murray, and *Noranda* is pursuing underground exploration of the Atlas property in the eastern Coeur d'Alene.

Development work underway at the *Atlas mine* itself near Mullen, was expected to reach the target areas by late in 1976. Crews are driving a drift west from the Atlas shaft, 6,500 feet in from the portal to find the downward projection of the Boulder and Central veins. Average assays indicate four ounces of silver and nine percent lead per ton.

U. S. Antimony Corp. of Thompson Falls, Mont., now has a half interest in a joint venture with *Intermountain Mineral Engineers* in the rehabilitation of the *Nabob*, *Sidney*, and *Little Pittsburg* properties southwest of the Bunker Hill mine. The Nabob mill has been operated intermittently since June 1975. Also, development work to the east on the 4,600 level at the *Galena mine* has exposed a new vein not yet developed on any other level. The vein carries high lead values in addition to silver.

General mineral exploration...as opposed to actual onsite exploration... is difficult to assess. It is of interest, however, that the number of visits by company geologists to the Idaho Bureau of Mines and Geology in Moscow increased markedly in 1975 and 1976. This appears to indicate renewed interest in metal commodities, as well as other minerals.

Although the price of gold has sagged in recent months, interest in Idaho's old gold campsites has been revived. A suction dredge continues to operate on the Salmon River near Riggins. Small portable washing plant and sluice box operations were reportedly active in several locations during 1975-76.

Only recently, ERC reported that their *DeLamar Mine*, west of the Silver City district in Owyhee County, should be operating by April, 1977. It was announced that earlier estimates of the silver resources in this district have doubled. The widely disseminated silver and gold values in the ore are now expected to warrant open pit recovery over a period exceeding 20 years. Exploration is still being carried on, and it has been stated that 19.8 million dollars have been invested so far by ERC and its partners, Superior Oil Co. and Canadian Superior Oil Mining Ltd.

A recent report indicated that a major Coeur d'Alene mining company is seriously considering taking up leases on many claims established to the east of the ERC operations and west of Silver City. The claims occupy a considerable acreage. Also the Clayton Silver Mine in Custer County is still an active silver producer.

A so-called "gold rush" was reported near Kuna, Idaho in mid-November. More than 200 claims have been filed recently in this area. The potential involves typical "flour gold", generally too fine to pan, present in alluvial sediments along the entire length of the Snake River. The Kuna flour gold, including transported, volcanic materials among the sedimentary deposits, undoubtedly accumulated at elevations above the present river flood plain during the floods from Pluvial Lake Bonneville. High water, spillovers from this ancient lake, is known to have poured

downstream along the general Snake River drainage. The flour gold was, no doubt, deposited in silt, sand, volcanic cinder, cobble and boulder materials extending westward from Pocatello, along the Snake River Plain. It seems questionable that techniques can be developed to recover this fine gold at a profit.

Reactivation of the old *Talache Silver mine*, and possibly others in the Sandpoint - Pend Oreille Lake region, appears to be in the offing. *Silver Butte Mining Co.*, operating adjacent to the former Talache mine, reported the acquisition of the Talache property, thus expanding Silver Butte's holding to almost 3,000 acres of patented, unpatented, or leased claims. Some Talache ground has been leased to an independent operator.

The president of Silver Butte concurs with an opinion expressed in the Idaho Bureau of Mines and Geology's County Report No. 6, released in 1967.. Geology and Mineral Resources of Bonner County. This report predicts that the many indications of mineralization, widespread over the panhandle region suggest that several profitable mines eventually will be developed in both Bonner and adjacent Boundary Counties.

Activity continues at the *Copper Cliff mine* north of Council near the old Cuprum mining camp, in the Seven Devils district. Also, exploration is continuing at the *Red Ledge mine* in the same district. These mines contain copper resources, although some molybdenum has been found.

To the south, *Anglo-Bomarc Mines Ltd.* and Canadian Superior Mining (U.S.) have agreed to join in development and feasibility studies in the *Hercules mines*. This is a silver-lead-zinc property in the Cuddy Mtn. district, northwest of Cambridge in Adams County, east of the Snake River. It has been announced that a total minimum of 1.5 million dollars will be expended in this exploration project. The project will include considerable drilling work in low grade disseminated silver ore of volcanogenic origin.

Barite

Some production of barite is likely, but only a small quantity was reported and produced in and since 1975.

Cement

Oregon Portland Cement Company's plant at Inkom, south of Pocatello, continues to produce a modest tonnage of cement from nearby carbonate rock occurrences.

Clay

Clay is being produced from at least seven Idaho sites, but only in moderate quantities. Pullman Brick Co. of Boise utilizes clay from pits located in Ada, Elmore and Owyhee Counties. Intermittent production of clay from north of Helmer in Latah Co. supplies the needed raw

materials for the *A. P. Green Co.* Refractories Plant at Troy. Also, the *J. R. Simplot Co.* recovers clay from two sites in Latah County.

Small quantities of clay for pottery and other ceramic uses, are still being recovered from a source east of Clark Fork, Idaho, on the south side of Clark Fork River. Also a clay deposit on the Coeur d'Alene Indian Reservation near Tensed is reportedly being developed, presumably for use in the fabrication of tile and related items.

Fluorspar

Production of fluorspar has fluctuated, but four active operations were reported last year. The volume of production is not known, but it is probably small. At least one former production site was deactivated in 1976.

Garnet

Two placer operations, located in the Emerald and Carpenter Creek districts of northern Idaho in Benewah County, are reportedly active. A relatively new development could enhance this production. The new use of a garnet product as a filter sand in tertiary stage sewage treatment has been reported as very successful. This new use of a premium sand, sized to specifications and bagged for shipment, could result in an increase in future garnet production. Use as an abrasive has provided the common market for garnet sand in the past.

Gemstones

Gemstones, including a wide variety of minerals and rock products, are largely sought, purchased and/or sold by rockhounds, and also some finished stone is retailed by gift shops and at novelty counters. It is virtually impossible to evaluate these materials, however, it seems there is a general growth in annual sales of such commodities in Idaho because of a noteworthy increase in the number of people involved in rockhounding.

Kyanite

The traditional use of kyanite has been its amenability for production of high temperature ceramic products. It has been publicly reported that Ethyl Corporation has patented processes for producing metallic aluminum and an aluminum silicon alloy. The latter has been called a "space age" metal. Kyanite ore commonly ranges from 13 to 20-percent aluminum oxide; if associated with other minerals, such as sillimanite and andalusite, aluminum percentage may range up to 25 percent. Woodrat Mtn. ore is considered somewhat low grade (percentage of Al_2O_3) by at least one authority. This corporation's holdings on state and federal lands at Woodrat Mtn. north of the Clearwater River, near Syringa in Idaho County, have been under exploration for many months. Full scale development of an open pit recovery operation, at last report, awaits completion of an environmental impact study. This operation has been confidential.

Within the last year, the Wallace Miner reported claims described as being in a locality "25 miles south" of the St. Joe River's south watershed. The claims were recorded in the name of the *Ethyl Corporation*. The location, if correct, suggests that there is some interest in the large anorthosite body in southern Shoshone County. This rock mass, mapped by the U. S. Geological Survey, is on the order of cubic miles in volume. Past experiments by the U. S. Bureau of Mines at a pilot plant in Wyoming, using a Wyoming source of anorthosite, might lead to the conclusion that the feasibility of aluminum production from Idaho anorthosite rock may be under consideration. Anorthosite tends to range from 25 to 28 percent, or slightly more, in aluminum oxide content.

Phosphate Rock

Phosphate production, mentioned earlier, should have a good future in Idaho, provided that environmental constraints are reasonable, and that other problems resulting from a future increase in production of phosphate rock can be solved.

Seven companies allegedly were active in 1975 and 1976. The results of a federal environmental impact statement and legal rulings resulting from this statement; are being awaited. Presumably some new production sites soon may be developed, if the political and legal situations permit increased production of phosphate rock.

Pumice

Two intermittently operated pumice production sites and one actively producing pit are located in southeastern Idaho. In the late fall of 1976, word was released that *Pumice Products Company* and its subsidiary, Wholesalers, Inc., have begun construction of a new 2.5 million dollar facility at Meridian, west of Boise. Raw materials are to be obtained from eastern Idaho pits, for production of 105 different styles of pumice aggregate and construction blocks. At present, nearly 100 tons of pumice and 50 tons of cement are being used daily at the original plant. The new facility is expected to more than double production of these materials.

Antimony

The only known actual production of antimony appears to be at the Sunshine mine in Kellogg, as a by-product of other metal recovery. Four other potential producing sites are being explored in the state, and three additional mineralized areas are being assessed.

Cobalt

The *Blackbird No. 2 mine* at Cobalt in Lemhi Co., Idaho was reported active in the first half of 1975. However, latest reports indicate that the operation has closed down. The international mineral import situation may render this locale of increased interest next year because there is a good probability of African Cobalt imports being terminated by political developments. This

mine represents the only cobalt source in the U. S. The Idaho Bureau of Mines and Geology has recently completed a new geologic study of the Cobalt district not only relative to cobalt, but also including copper and gold potential.

Molybdenum

Mineral exploration for molybdenum has intensified in the state. Emphasis has been on sites in Custer County in southeastern Idaho and three northern Idaho panhandle counties, Boundary, Bonner and northern Kootenai. It has been reported that a so-called "major discovery" of molybdenum has been made in the Chilco Mtn. area of Kootenai Co. Widely occurring molybdenum showings are known to exist in Bonner and Boundary Counties.

Platinum

There have been unverified platinum occurrences reported in Bonneville, Idaho and Valley Counties. Commercial production of any platinum in Idaho is not viewed with optimism.

Thorium

Although Idaho is known to have what might be called some of the largest reserves of thorium ore in this country, the two largest occurrences are only undergoing assessment work. Prospects of major production of thorium in Idaho's Lemhi and Boundary Counties, known mineralized districts, seem poor at this time.

Tungsten

At least four different groups have been doing exploration in Idaho for commercially valuable deposits of tungsten ore.

Uranium

Recent increases in the demand for and price of uranium has sent many exploration teams, affiliated with both mining and petroleum companies, into the field. In Idaho, several districts are receiving attention. At least 12, and probably more, major companies are doing mineral exploration in northern Idaho. There is reason to believe that sources of uranium similar to those in northeastern Washington may occur in Bonner and Boundary Counties in Idaho. Widely scattered occurrences of the uranium oxide autunite have been found in Bonner County. This fact was made known in a publication by the Idaho Bureau of Mines and Geology in 1967 (above mentioned County Report No. 6). The potential for uranium occurrences, other than as oxides, also may be good in this area. However, extensive sub-surface exploration technologies, as well as newly used techniques involving the location of radon gas anomalies, probably will have to be applied before any good potential ore target areas can be examined.

In 1976, reports indicate that thousands of acres of land have been leased in the Pend Oreille Valley, Stevens and northern Lincoln Counties, as well as on the Spokane Indian Reservation in Washington. *Reserve Oil and Minerals Corporation* was one of the first to lease large tracts along the Pend Oreille River from Newport, north of Cusick (on the boundary between Washington and Idaho). This company's total holdings are estimated at about 40,000 acres. *Kerr McGee*, *Pechiney* and *Utah International* are among the companies consolidating mining claims. Many others, not listed here, are known to be involved in this uranium boom. It has been reported that exploration activities are spilling over into Idaho. It is known that one major company is investigating an autunite prospect in Idaho, on the upper reaches of Lamb Creek, west of Priest Lake. Several loads of autunite allegedly were shipped to Ford Washington by local claim owners for processing. This was before a major company took over. ERDA has employed at least one consulting firm to investigate the uranium ore potential in Idaho, and in general to investigate the reasons for its close association with carbonaceous materials of sedimentary rock materials.

Among other things, interest is strong in potential uranium deposits in lake basins, especially where carbon rich layers of clay, silt, volcanic ash and sand occur in middle and late Tertiary sequences. These sediments range in age respectively from 12 to 22 and to 40 million years, as described earlier in the discussion of natural gas and petroleum occurrences in southwestern Idaho. Similar Tertiary sediments are being examined in northern Idaho. However, the latter, for physical and chemical reasons, are of less interest as a source of uranium.

Index for 1976 Regional Developments paper

A. P. Green Co. 12,(1976)
American Quasar Petroleum Co 4,(1976)
Anglo-Bomarc Mines Ltd 11,(1976)
Antimony 14,(1976)
ASARCO 9,(1976)
Atlas 10,(1976)
Atlas mine 10,(1976)
Barite 12,(1976)
Blackbird No. 2 mine 14,(1976)
Bunker Hill's 8,(1976)
Cement 12,(1976)
Chilco Mtn. 15,(1976)
Clay 12,(1976)
Cobalt 14,(1976)
Coeur Mine 9,(1976)
Copper Cliff mine 11,(1976)
Copper, 9,(1976)
DeLamar Mine 10,(1976)

Earth Resources Corporation 9,(1976)
Ethyl Corporation 13,(1976)
Flour gold 11,(1976)
Fluorspar 12,(1976)
Garnet 12,(1976)
Gemstones 13,(1976)
Gold, 9,(1976)
Hercules mines 11,(1976)
Intermountain Mineral Engineers 10,(1976)
J. R. Simplot Co. 12,(1976)
Kerr McGee 16,(1976)
Kyanite 13,(1976)
Lead 9,(1976)
Little Pittsburg 10,(1976)
Mine 10,(1976)
Molybdenum 15,(1976)
Nabob 10,(1976)
Noranda 9,(1976)
Oregon Portland Cement Company 12,(1976)
Peat 8,(1976)
Pechiney 16,(1976)
Petroleum Company 4,(1976)
Phillips Petroleum 4,(1976)
Phosphate Rock 14,(1976)
Platinum 15,(1976)
Pumice 14,(1976)
Pumice Products Company 14,(1976)
Red Ledge mine 11,(1976)
Reserve Oil and Minerals Corporation 16,(1976)
Rock or Stone 9,(1976)
Sand and Gravel 9,(1976)
Sidney 10,(1976)
Silver Butte Mining Co 11,(1976)
Silver, 9,(1976)
Talache Silver mine 11,(1976)
Thorium 15,(1976)
U. S. Antimony Corp. 10,(1976)
Uranium 15,(1976)
Utah International 16,(1976)
Woodrat Mtn 13,(1976)
Zinc 9,(1976)