



## ALASKA MINES &amp; GEOLOGY

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\* Mining information office + Publications office

### Alaska's industrial minerals examined

By T.K. Bundtzen and T.E. Smith, DGGS geologists

In 1948, territorial assayer Art Glover wrote, "nonmetallic minerals can ill afford to be overlooked if there is to be an orderly development of Alaska....the very existence of new industry in the territory may well depend on local development of minerals previously deemed valueless."

This farsighted prophecy has come true. Surprisingly, while many Alaskans are aware of the state's contributions in supplying metals and energy, most are ignorant of the existence and importance of building stone, sand, and gravel in Alaska. Chemical- and structural-grade limestone, gypsum, garnet, graphite, asbestos, barite, pumice, and clay have also been mined in the 49th State.

The largest single component of the mineral-extractive industry---excluding oil and gas---is sand and gravel; over a dozen operations are active statewide. Nationally significant reserves of fluorite and asbestos have recently been discovered, and

development is possible for both commodities. And, if Alaska's embryonic agriculture is to expand, a key may be the development of domestic lime and phosphate fertilizers.

### Sand and gravel

Gravel is one of the most important commodities in Alaska, ranking third in value behind oil and gas. More than 700 million tons of aggregate have been mined since 1948. Peak production occurred during military- and pipeline-construction periods.

Nine-tenths of the sand and gravel produced is used in developing urban areas. In fact, the Anchorage area grew so fast that gravel must now be 'imported' from the Matanuska Valley.

Gravel in south-central Alaska was deposited by meltwater streams on or adjacent to Pleistocene glaciers. In interior Alaska, gravel consists of ancient to modern river and stream deposits overlain by reworked and wind-blown silt. Another local source for gravel in the Fairbanks area is

the tailings left from the giant gold dredges of a half-century ago.

Gravel is washed and sized for use as concrete aggregate, road-metal and petroleum-base paving, or unprocessed fill and base material. Large amounts of gravel and sand will continue to be mined for construction in urban areas. Hydroelectric projects, if developed, will also require concrete aggregate for dam construction.

#### Marble and building stone

Alaskan marble was used by Tlingit Indians of southeastern Alaska for carved utensils, art ornaments, and religious objects. The Russians largely ignored this resource, but the marble and limestone deposits on Prince of Wales Island were among the first mineral resources mentioned in late-19th-century reports of the U.S. Geological Survey.

In the 1890's, some marble from Ham Island near Wrangell was worked by natives for the tombstones that replaced the traditional carved wooden totems after introduction of the Western burial culture.

Around 1900, rapid growth of urban areas along the West Coast created a demand for ornamental and building stone. High-quality ornamental marble was shipped from quarries at Token beginning in 1902. By 1920, more than 70 prominent buildings---most of which are still in use---in the western states and Minnesota, Massachusetts, and Pennsylvania used Alaskan marble (principally from Token) for interior work. However, World War II, inflation, changes in building style, marketing, exploitation of marble in the western states, and other complex factors ended the southeastern Alaska industry about 40 years ago. But before they met their demise, the dozen quarries on Prince of Wales and Dall Islands---principally from the Token-Calder area---exported more

than 2 million tons of high-grade and one-half million tons of structural-grade limestone. Measured reserves of over 800 million tons of high-quality marble remain.

Small quantities of limestone have been quarried in other parts of the state. The U.S. Army Corps of Engineers used local marble as riprap on a seawall at Gray Cliff, about 2 miles north of Seldovia.

Limestone deposits suitable for use in concrete have been investigated and drilled by the U.S. Bureau of Mines along the Alaska Railroad near Cantwell, and several hundred million tons of reserves are known from three deposits. These deposits will become important factors if large hydroelectric dams are built in the interior. During the last several years, the Delta Barley Project has renewed interest in establishing reserves of agricultural limestone and phosphate, and the search for deposits close to inexpensive transportation continues.

#### Barite

Barite ( $\text{BaSO}_4$ ) has over 2,000 industrial uses, but more than 85 percent of world consumption involves well-drilling and mud-weighting applications, especially in high-pressure petroleum-exploration efforts. Deposits of commercial significance occur in southeastern Alaska, and minimal development of a lode on Prince of Wales Island resulted in a large bulk shipment in 1915 that tested satisfactorily as a drilling agent. Since 1963, a lode in the Castle Islands near Petersburg has been exploited. Development initially took place onshore, but after 1967, mining has been offshore; the ore is drilled, blasted, and retrieved underwater with a barge-mounted 'clam shell.' Production reached highs of 100,000 tons annually in the 1960's but in 1974, a smaller tonnage of ore was processed and bagged as a drilling mud for Alaskan oil fields. Chromalloy, the

principal operator for the last decade, closed the mine site in late 1980, and there has been no subsequent Alaskan barite production.

#### Pottery- and brick-quality clays

Structural-grade clay deposits in the south-central railbelt near Anchorage have been investigated for many years. After World War II, Clay Products, Inc. established a kiln and brick plant in Anchorage that used Bootlegger Cove Clay as its prime material source. Of the 200,000 bricks formed in the kiln, 25,000 were from clay mined at Sheep Mountain, on the Glenn Highway. However, imperfections such as exfoliation caused the company's demise a few years later. It is unclear if physical characteristics of the clay or improper burning caused the exfoliation.

A University of Alaska student, Robert Sullivan, tested the feasibility of producing bricks, ceramic tile, sewer pipe, flue tile, and clay molding from clay horizons in the Healy coal field south of Fairbanks. Sullivan proposed extracting the clay under the coal seams synchronously with the present coal mining. After preparation, the clay would be fired adequately for structural-grade products. The primary constraint in exploitation of this resource is economics. Although Sullivan believes that the present or projected consumption of brick and other clay products in the

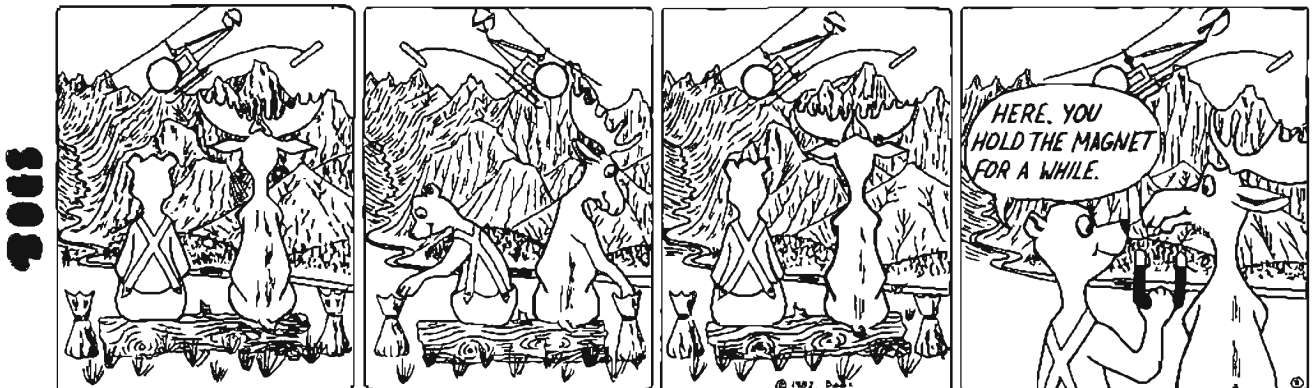
railbelt could not sustain the Healy-based industry, a future clay-based project seems possible in a state where bricks are imported at \$150/ton.

However, Alaska's clay does not go unused. The state's potters create many functional containers and objects of beauty from clay deposits. One estimate places 'wet-clay' consumption in the Anchorage area at 150 tons annually. In the Fairbanks area, one production potter and at least 20 studio potters annually use about 40 tons of clay of sedimentary origin (montmorillonite) from the coal-bearing section at Healy. Joe Usibelli of Usibelli Coal Mines has supplied carloads of clay for interior potters.

Beautiful porcelain containers have been created from clays mined near Tenderfoot, by Big Delta, but sample-preparation time makes extensive use of the resource prohibitive.

#### Gypsum

In 1902, the Pacific Coast Gypsum Company developed high-grade gypsum beds near Iyoukeen Cove on eastern Chichagof Island. When the mines closed a quarter-century later, over 500,000 tons of high-quality 'blue' gypsum had been mined from folded and tilted beds of late Paleozoic age. During World War II, Kaiser Industries acquired the property for possible exploitation in war-industry construction, but did not develop it.



### Asbestos

During World War II, the War Production Board declared chemical- and friction-grade-asbestos fiber a strategic mineral and recommended policies conducive to the development of domestic reserves. In 1942, bulk sampling of small, high-grade deposits of tremolite and chrysotile asbestos in the Kobuk valley began, and by 1943 small shipments of selected ores were freighted to the Bering Sea coast via winter trails; 50 tons of dominantly tremolite asbestos eventually found its way to a buyer. The Kobuk deposits have indicated reserves of 2,600 tons of tremolite asbestos.

In 1980, Doyon Regional Corporation announced the discovery of a major asbestos deposit at Slate Creek in the Yukon-Tanana Upland southwest of Eagle. Drilling results (Rogers, 1980) indicated reserves of 55 million tons of 6.35 percent chrysotile fiber, making this one of the largest asbestos deposits in the U.S. and probably the most important discovery of its type in North America in over 30 years. By comparison, the Clinton Creek asbestos deposit in adjacent Yukon Territory, which is about one-third the size and slightly lower in grade than those at Slate Creek, has been successfully mined for years.

### Other industrial minerals

From 1912 to 1920, high-quality almandine garnets were selectively mined from schist and migmatite near Wrangell. E.S. Dana, the famous mineralogist, completed crystallographic studies on specimens from these deposits. In addition to their value as museum-quality specimens, the physical characteristics of hardness, specific gravity, and uniform and equidimensional fracturing make these garnets suitable for high-quality abrasive applications. Although over 11,000 tons of garnet are proven in the Wrangell deposits, there has been

scant interest---except to the collector---in the resource. Even so, 'Fort Wrangell' garnets are found on display in museums worldwide. Abrasive-quality garnets are known in other regions of the state.

Zeolites, perlite, diatomaceous earth, sulfur, and pumice have been examined for production potential in south-central Alaska and on the Alaska Peninsula. Promising resources of these commodities are known, but only small amounts of pumice have been exploited for use in the Anchorage area.

### The future of Alaska's industrial minerals

Most industrial minerals are of low-unit value, and worth only a few tens of dollars per ton. Alaska's high-labor and operational costs make it difficult to envision exportation of these minerals to foreign or lower-48 consumers. Exceptions include asbestos, fluorite, and possibly abrasive-quality garnet. In southeastern Alaska, an ideal shipping situation may allow for exploitation of low-unit-value materials.

The primary importance of most of these commodities is in satisfying local needs. No matter how fast or slow Alaska grows, its people will need increasing amounts of these materials to sustain an increasingly complex society.

### Coal

Intermittent coal mining has been conducted in Alaska for longer than anybody really knows.

Coal, oil shale, and crude-oil seeps were used when convenient in the Eskimo culture. The Veechy expedition of 1826 and 1827 first reported the occurrence of coal in Alaska. Nineteenth-century whaling ships used coal from Corwin Bluff near Cape Beaufort.

The first coal mine in Alaska was opened in 1855 by the Russians at Port

Graham on the southwestern tip of the Kenai Peninsula; it was operated until 1867. Coal mining was carried on intermittently from 1880 to 1915 at places such as Unga Island, Herendeen Bay, Chignik Bay, Kachemak Bay, and at several points along the Yukon River.

In 1914, a coal-leasing law was passed, and the bill authorizing construction of the Alaska Railroad became law. With these two developments, Alaska's coal industry began to expand.

When the Alaska Railroad extended into the Matanuska coal field in 1916, coal production in that area increased. By 1918, the Alaska Railroad was extended to the Nenana coal field, and production from that area has continued to this day.

Coal production increased until the mid-1950s, when the Cook Inlet oil and gas fields were discovered. Although mining was predominantly underground prior to 1943, strip mining became dominant 2 decades later. Coal production fluctuated until 1969-70, when demand for electrical power in a growing Fairbanks area encouraged a steady increase in coal consumption.

### Peat

Estimates of potential fuel-grade peat in the state range from 27 million acres to over 100 million acres. In 1979, the U.S. Department of Energy estimated that Alaska has 741 quads of energy (1 quad =  $10^{15}$  Btu) potentially available from peat resources---a seemingly meaningless figure, until you realize that it represents slightly more than half of the total 1,443 quads of energy estimated by DOE as potentially available from peat resources in the entire U.S.

Using soils maps of the Soil Conservation Service, DGGs's Rawlinson and Hardy (1982) compiled data significantly at odds with previous estimates of peat resources in Alaska.

The DOE estimates assumed peat deposits with an average depth of 7 ft, a moisture content (when used) of 35 percent with a heating value of 6,000 Btu/lb, and a bulk density of 15 lb/ft.

On the other hand, Northern Technical Services and Ekono, Inc., of Anchorage, in a report to the Alaska Division of Energy and Power Development, estimated potentially useful peat to exceed 100 million acres; 5.5 million acres of the Kenai Peninsula and Susitna Valley were reported to have high-probability areas of fuel peat.

Rawlinson and Hardy (1982) estimated potentially useful peat at 25 million acres, of which 5 million acres are unfrozen fuel-grade peat (greater than 5 feet deep and 8,300 Btu/lb). Assuming a bulk density of 7 lb/ft<sup>3</sup>, a depth of 5 ft, and a heating value of 8,300 Btu/lb, they estimate an energy value of approximately 63 quads for the unfrozen fuel-grade peat in Alaska. The DGGs geologists speculate that if the frozen-peat deposits contain the same ratio of fuel-grade peat to peat as the unfrozen peat deposits, the fuel-grade peat will total about 14 million acres, which represents a potential of 180 quads of energy.

### References cited

- Rogers, R., 1980, Slate Creek asbestos deposit; Alaska Miners Journal, v. 8, no. 10, p. 12-13.
- Rawlinson, S.E., and Hardy, S.B., 1982, Peat resource map of Alaska: DGGs Open-file Report 152, 1 pl.



### College mining office to shorten hours

Starting October 1, the DGGs mining-information office in College, located in the Bank of the North Building at 794 University Avenue, will be open to the public from 8 a.m. till 5 p.m., including lunch hour.

### New claims rise to 4,679 during quarter

In the second quarter of 1982 the number of mining claims recorded increased by more than 70 percent, from 2,726 to 4,679. Last year, for the same period, the total number of claims was nearly the same, 4,551.

Though this might seem to indicate a normal amount of mining activity for this time of year, DGGS's Carole Stevenson said, interest in mining has dropped, especially among the larger companies. "There's still a lot of individual miners staking claims," she said, "but the larger companies aren't showing the interest that they have in the past." Stevenson attributed this to continued drops in the price of gold.

New claims filed with the Anchorage recorder increased substantially over the past 3 months, from 35 to 2,351. Nearly all of the claims were staked along several creek drainages in the Tyonek Quadrangle by one prospector. During this quarter last year, 1,140 claims were filed in the Anchorage district.

Other mining activity this past quarter centered in the Fairbanks and Talkeetna mining districts.

### Cabin-building a no-no

In a related development, Stevenson noted that the DNR Division of Land and Water Management has discovered that many people have been filing claims solely for a cabin-building site---a violation of state law. According to Statute 38.05.255, construction of surface improvements is allowed, but only in conjunction with the prospecting, extraction, or basic processing of mineral deposits. Thus, building a home or cabin on a claim where this is not the case is forbidden. "Occupying a cabin on a mining claim may be a perfectly legitimate activity in remote areas," said Jerry Brossia, district manager for Land and Water Management, "but it can rarely be justified on the outskirts of Anchorage or Fairbanks, for instance, particularly when no assessment work is being done."

A DNR spokesman said the state is beginning to crack down on abusers of state mining laws, and that violators could lose both their claims and the dwellings on it, plus be prosecuted for trespassing.

### Annual labor

Stevenson reiterated the claim-staking law. She said the state permits you to keep a claim of up to 40 acres if you do at least \$200 worth of assessment work each year and record the work with the state. This does not mean, however, that you have to produce \$200 of gold or any other mineral. It merely means that the value of the work done to improve the claim, which can include bulldozer work or your own labor at the prevailing rate, must total at least \$200.

The claims by recording district for this quarter are:

	<u>April</u>	<u>May</u>	<u>June</u>
Fairbanks	174	434	396
Manley Hot Sprgs.	2	6	-
Nulato	6	-	65
Mt. McKinley	-	17	10
Ft. Gibbon	-	2	-
Talkeetna	255	184	10
Palmer	15	16	5
Nome	2	31	83
Seward	-	38	16
Juneau	-	71	-
Ketchikan	36	31	1
Sitka	-	-	109
Anchorage	2,337	2	12
Cordova	43	-	-
Chitina	-	-	1
Valdez	32	48	-
Kuskokwim	-	155	-
Kodiak	-	2	-
Bethel	-	-	32
<b>TOTAL</b>	<b>2902</b>	<b>1037</b>	<b>740</b>

The conversion of placer gold to cash  
By James A. Madonna, UA Associate Professor of Mining

On August 14, 1974, President Gerald Ford signed a bill that permitted Americans to buy and sell gold for the first time in over 40 years. This right commenced on December 31, 1974.

At first, most Americans were completely apathetic about the entire matter. Soon some either mined gold or invested in it and began to prosper as the price rose. In the 3 years that followed, many miners and speculators enjoyed the fruit of their activities by taking lengthy, unrestricted, winter vacations to Hawaii. Yes, indeed, many Alaskans were literally basking in the sunshine of wealth.

Then the excitement began. About 3 years ago gold broke the \$200 mark. At this point the price began moving upward with \$30, \$40 and even \$50 surges. The price passed \$400 and continued upward. The gold market had become uncontrollably volatile. By 1979 the explosive fireworks had gone off and the mad, frenzied rush to buy gold by Americans had indeed occurred.

Financial wizards forecast a ceiling of \$1,000 per ounce. Some bold souls of vision even predicted a ceiling of \$2,000 an ounce and very soon.

Unlike investors in other parts of the United States who were buying gold coins, wafers, and small bars, Alaskans invested by purchasing placer fines of various purity straight from the miner.

Seemingly, everyone was investing in gold in one form or another. The price spiraled upward, passing \$700, then \$800, and finally, in January of 1980, \$850 per ounce. It was a wild, exotic period in which gold buying fever prevailed---but not for everyone.

Someone, or some group, with extremely large holdings decided to quit buying or start selling or both. Between the first week of January 1980 and the first week in February, gold

prices plummeted from a peak of \$850 to below \$700 per ounce.

As you may know, since that time there has been a general decrease in gold prices.

Many Alaskan miners and investors have chosen to sell their gold. But just where does one sell a large quantity of placer fines, especially when its true gold value has not yet been determined? Aside from another willing investor, the most likely place is the smelter.

The moment one turns his gold over to the smelter, the process of transforming the gold into cash is set into motion. The sequence of events consists of three basic steps:

- 1) The activities of the Receiving room where, among other things, the gold is weighed.
- 2) The activities of the Smelter room, where the gold is transformed into a homogeneous miners bar from which a sample is taken for analysis.
- 3) The activities of the assay laboratory, where the actual gold and silver content of the miners bar is determined.

Assuming that you have just completed this procedure and know exactly how much pure gold you have, what can you do with it? There are three possibilities:

- 1) You can sell it to the smelter.
- 2) You can leave the gold on hold at the smelter to await a more favorable price.
- 3) You can take receipt of the gold.

#### Selling to the smelter

Let's take a quick look at these possibilities. There are a number of ways you can sell to the smelter. Of course, each smelter has its own payment schedule. But generally speaking, there are three ways to sell: a) payment within 24 hours, in which pay-

ment may range, depending on the smelter, from 90 to 97 percent of the pure gold content, less smelter and assay charges; b) payment within 10 working days, in which payment may range, again depending on the smelter, between 95 and 98 percent of the pure gold content, less smelting and assay charges; and c) payment within 30 days, in which payments may range between 97 and 99 percent of the pure gold content, less smelter and assay charges. (By the way, if you have a large amount of gold, you may want to request that you also be paid for the silver.)

#### Leaving the gold on hold

The second possibility, leaving your gold on hold at the smelter, doesn't appear like such a good idea at first glance, but let's take a closer look---it has merits that you

may not be aware of. For example, if you are speculating on the rising price of gold, it is simply being stored in a very safe place without charge. Secondly, if suddenly the price rises to the level at which you choose to sell, you simply contact the smelter, and they sell. There is no significant waiting period. Payment can be negotiated, but is generally within 10 days. But if you are a long-term investor, there is a much more attractive reason for leaving your gold on deposit at the smelter: interest. For the past year or so, certain smelters have been paying interest on gold left on deposit. These interest rates, depending on how long you negotiate your agreement, may range to 8 percent or more. Thus, the investor who is waiting for the price of gold to rise can be collecting interest on it while he waits. You may be dollars ahead if you investigate this possibility.

#### Receiving your gold

Taking receipt of your gold can occur in a number of forms. You can request coins such as African Kruggerands, Austrian Karonas, or Canadian Maple Leafs; you may request wafers of various sizes; or you may want gold bars. There are certainly some advantages to taking possession of the gold, but there are also very significant disadvantages. Recognized coins or wafers can easily be sold to gold buyers if there is a sudden need for immediate money. It is a bit more difficult to do so with the larger gold bars. Gold bars range in size from 1/8 troy ounce to the 400-troy-ounce 'Good Delivery Bar,' commonly traded in the market place. The disadvantage of taking possession of the gold is, first, the premium charged for producing the coin, wafer, or bar. Second, you have to store the gold. What if you take delivery of a 400-ounce good delivery bar? Where do you put it, in a safety deposit box? Then



In the old days,  
before the discovery of eruptions, the lava  
had to be carried by hand down the mountain  
and thrown on the sleeping villagers.

This took a lot of time.

--'Borrowed' from bulletin board in UA Geology Dept.  
(HVO - USGS Hawaiian Volcano Observatory.)



you have to pay an annual storage fee. Do you hide it in your house and wait for some thief to come along and steal it? Or do you bury it in the backyard?

This brings to mind an interesting point. If you are a miner with a good delivery bar and you bury your gold in the backyard, you have done something that would be very perplexing to an observer from outer space: You will have worked like the devil to extract the precious metal from the icy grip of the frigid Alaskan streams, paid out good hard-earned money to have it purified, and then stuck it right back into the ground.

You have clearly completed the cycle from earth to earth.

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**Geoscientist salaries up**  
(from the American Institute of  
Professional Geologists newsletter,  
"The Professional Geologist")

Salaries of experienced geoscientists have risen more than 200 percent since 1973 compared to an increase of 92.5 percent in the consumer price index, according to the Scientific Manpower Commission, which has published a report on starting and advanced salaries of scientists, engineers, and technicians in industry, government, and academia for 1981.

The Commission compiled the information from 57 U.S. salary surveys.

Other Commission findings show that salaries for earth scientists as a group are the highest of any professional occupation in the U.S. Salary breakdowns show geologists with 5 to 7 years industry experience were paid \$26,800-\$40,800 in 1981; those with 7 to 10 years experience were paid \$32,800-\$52,100; and those with 10-plus years of experience were paid \$38,100-\$68,500, the report said.

In 1981, average offers to women were slightly higher than those to men in some engineering areas, but according to the Commission's findings, men were still paid more in beginning salaries in all other fields.

Women doctorates earned considerably less than men in every field, in every activity, and at every level of experience, averaging 23 percent less overall.

Among scientists and engineers working in research and development, mining and petroleum engineers topped the salary averages for all three degree levels.

The value of an advanced degree increased, it said, with the advantages in annual income of a Ph.D. over a B.A./B.S. degree, averaging \$6,146 in 1981.

Copies of the report, "Salaries of Scientists, Engineers and Technicians, a Summary of Salaries, November 1981, 10th Edition," are available for \$25 each from the Scientific Manpower Commission, 1776 Massachusetts Ave. N.W., Washington, D.C., 20036.

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**Miners tout benefits of railroad extension**  
(from Anchorage Daily News, July 28, 1982)

Alaska commercial coal production could increase more than 25-fold and the state could be producing 2.2 million tons of hard-rock minerals annually in the 1990s if the Alaska Railroad were expanded, according to a study released Tuesday by the Alaska Miners Association.

But industry is not now in a position to finance such an expansion, acknowledged Russ Babcock, Alaska manager of Bear Creek Mining Co. and one of several speakers at an association press conference.

The miners association made it clear that development of Alaska's vast mineral reserves won't be feasible without an extension of the state's present transportation network, but it stopped short of openly calling for extension of the Alaska Railroad.

Such a call came later in the day from former Gov. Walter Hickel, co-chairman of Commonwealth North, a non-profit business group that promotes industrial development.

Hickel, a longtime advocate of railroad expansion, said at a press conference that industry eventually would pay for the cost of extended transportation, "but the initial investment would have to come from a governmental unit."

Babcock quoted a state transportation study and said it would cost an estimated \$1.3 billion to extend the Alaska Railroad to the southern Brooks Range, where the Ambler District contains some of the state's most lucrative potential mineral deposits.

Promising mineral reserves have been identified in several areas of northwest Alaska, and a rail extension to Nome or Kotzebue could be used to ship supplies to the mines as well as to ship ore out, according to the association study.

The cost of building new rail spurs would vary from one geographic area to another. But preliminary estimates indicate rail expansion in northwest Alaska would cost an average of some \$2 million per mile, according to a recent study done for the state transportation department.

The mining study, conducted by the association's railroad committee, said that if 10 relatively large mineral deposits were developed into mines, they could:

- .Create 6,000 new jobs;
- .Pump \$3 billion into the Alaska economy annually in wages and purchases; and
- .Contribute \$450 million a year in state and federal income tax.

Extension of the railroad would spur mineral exploration, which in turn would increase rail use and lead to new discoveries, according to the association.

The study said there is a 'high' ---greater than 25 percent---probability that mining developments could lead to annual freight shipments of 22.7 million tons of coal and 2.2 million tons of hard rock minerals in the 1990s.

"The reason it's low is because

there are so many unknowns," said David Heatwole, president of the miners association and Alaska exploration manager for Anaconda Minerals Co., an Atlantic Richfield subsidiary. "If the transportation were there, the probability would go up quite a bit."

If the Alaska Railroad were extended, the probability of the association's scenario becoming reality would be about 75 to 80 percent, he said.

The mining development and freight forecast depends not only on expanded transportation but on world metal prices and a favorable investment climate in Alaska, according to the association report.

Heatwole said the miners association conducted its study not to push for expansion of the railroad but to stress the potential of mineral development if Alaska had an adequate transportation network. The association, he said, hopes its report will be used by legislators, planners, and private organizations that might develop more transportation in Interior Alaska.

In some instances, roads, river barges, or air service might be adequate modes of transportation for a developing minerals industry, Heatwole said.

Contributing to the study were most major minerals companies operating in Alaska, including Kennecott, a Sohio subsidiary that owns Bear Creek Mining; Cominco American; WGM Inc.; Hawley Resources Group; Noranda; and Greatland Exploration.

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#### Water-resources seminar-workshop held

In a belated note, the DGGs Water Resources section of DGGs hosted a seminar-workshop in Anchorage last April on the effects of placer mining on the aquatic environment.

Forty-two participants representing 13 state and federal agencies and the private sector attended.

On the first day of the 2-day

session, biologists Jacqueline D. LaPerriere and Jim Reynolds of the Alaska Cooperative Fisheries Research Program reviewed their research plans for the year, and Howard Metsker and Gary Wedemeyer of the U.S. Fish and Wildlife Service discussed their research on trace elements in the aquatic environment. Dave Blanchet of the U.S. Forest Service summarized procedures currently used for mitigating the effects of placer mining. Last, Janet Hall and Al Townsend of the Alaska Department of Fish and Game discussed data needs and research priorities from the perspective of those responsible for issuing of permits and enforcement.

The participants broke into five workshop groups on the second day to formulate research proposals dealing with:

- .The effects of sediment on fish
- .The effects of sediment on benthic organisms
- .The relation of sediment deposition to flow and channel characteristics
- .Trace-element contamination
- .Research and development for mining practices.

If you would like a summary of the results of the workshop or want to be placed on the mailing list for the next workshop, contact DGGs's George McCoy at the Eagle River Office (p. 1).



### Wat'r, you think?

Wouldn't it be valuable to read through a short synopsis---say quarterly---and find out what new community wells are being drilled or what specific water studies have just been started?

DGGs hydrologists are contemplating the worth of initiating a newsletter series for those who would like to stay abreast of ground-water happenings in Alaska.

DGGs's Larry Dearborn feels the time is here when hardly any engineer, driller, scientist, or water manager

can dig out, or stumble upon, recent significant developments concerning ground water. A DGGs ground-water newsletter, says Dearborn's Eagle River colleague, Jim Munter, would help to fill this communications gap. The bottom line, of course, is to disperse basic information in a timely manner.

DGGs is urging the public sector concerned with ground water to send routine contributions or comments to the DGGs 'water boys' to help them get the newsletter started.

If you think you would benefit from the newsletter or may be interested in contributing several paragraphs (with attribution, of course) now and then, call Dearborn or Munter at 688-3555 or drop them a line at the DGGs Eagle River facility (p. 1). Your contributions may even be an opportunity to enhance your business!



### 'Coffee-table' book on Fairbanks hazards highlights DGGs quarterly publishing effort

Special Report 15, 'Geologic hazards of the Fairbanks area, Alaska,' by T.L. Pêwê, is the first in a series of reports designed to provide specific information on geologic hazards in various communities in Alaska. DGGs also published four open-file reports, one new information circular, and five revised ICs.

### Special report

Hazards discussed in Special Report 15 include frozen ground, ground water, earthquakes, landslides, hillside erosion, and flooding. The report, which collates a wealth of information that heretofore had been scattered throughout various agencies and publications, will be a 'must' for collectors of books on early Fairbanks. Included in its 109 pages are numerous photos of early Interior structures and its citizens. The report sells for \$3.

### Open-file reports

Each of the open-file reports released this quarter covers a different facet of Alaska's mineralization. Two outline the geology of the McGrath B-2 Quadrangle and the underground Clipper Gold Mine in the Fairbanks mining district. Another concerns a gravity survey of the Susitna basin. A fourth AOF defines the coal deposits of the Farewell-White Mountain area in southwestern Alaska. More specifically, they are:

.AOF-149, 'Preliminary geologic map of the McGrath B-2 Quadrangle, Alaska,' by T.K. Bundtzen and others (22 p., 1 pl., scale 1:63,360). \$2.

.AOF-157, 'Geology of the Clipper Gold Mine, Fairbanks mining district, Alaska,' by T.K. Bundtzen and others (10 p., 1 pl., scale 1"=10'). \$2.

.AOF-160, 'Coal occurrences and analyses, Farewell-White Mountain area, southwest Alaska,' by D.N. Solie and D.B. Dickey (17 p., 1 pl.). \$2.

.AOF-162, 'Gravity survey of the Lower Susitna basin, Alaska,' by E.M. Wescott and W. Witte (7 p., 2 pl., scale 1:63,360). \$3.

### Information circulars

Worried about an avalanche? Tsunamis? Permafrost? If so, a new DGGs information circular directs you to the sources of information on these and other hazards you may not have been aware of.

IC-21, 'Geologic-hazards information--Sources and consultants' (27 p.), briefly describes the types of hazards encountered in the 49th State and lists individuals and agencies to contact for further information.

In addition, five revised information circulars were released. The former IC-11, 'List of all DGGs reports,' has been divided into two ICs for ease of reference. Information Circular 11A, 'List of formal reports issued by the DGGs,' is 34 pages long. Its counterpart for AOFs,

IC-11B, 'List of open-file reports issued by the DGGs,' is 36 pages long. The other circulars include:

IC-7, 'Alaskan companies and prospectors - 1982' (62 p.).

IC-8, 'Consultants available for work in Alaska - 1982' (9 p.).

IC-16, 'Alaska map information' (3 p.).

IC-23, 'Index map of DGGs publications' (1 pl., 26 p.).

All ICs are free.



### Mid-October earthquake engineering seminar set for Anchorage

Earthquake engineering and design will be the topic of a 3-day seminar in Anchorage Oct. 19-21. Cosponsored by the Earthquake Engineering Research Institute, Alaska Professional Design Council, and DGGs, the seminar will feature well-known seismologists and research scientists from the USGS, DGGs, universities, and private industry.

Each day will highlight different aspects of earthquake engineering and design. Day 1 will present an overview of earthquake engineering fundamentals in Alaska. The second day will include both presentations on data that guide design criteria and panel discussions on current design problems unique to Alaska. Activities the third day will emphasize structural design problems, earthquake-resistant design of offshore platforms, pipelines, and dams, and a presentation on near-field ground motion. The concluding paper of the conference, 'The next step for Alaska,' will be presented by DGGs seismologist John Davies.

In addition to the technical sessions, a social hour and dinner are planned for October 20 to allow distinguished visiting speakers and Alaskan design professionals to exchange ideas on seismic design and recent innovations.

The seminar will be held at Grant Hall on the campus of Alaska Pacific

University in Anchorage. Because of limited seating, early registration is recommended. The fee for the seminar is \$275; 1.8 Continuing Education Units are available to all participants completing the seminar.

Further information is available from Martha Jokela, (907) 276-8102, c/o Harding Lawson Associates, 624 W. International Airport Rd, Anchorage 99502.



### DGGS adds 10

New faces continue to appear at DGGS and the past quarter was no exception; the Anchorage and Fairbanks offices added 10 new staff members.

Anchorage now has a publications specialist in the person of Michael Armstrong. A writer by trade, Armstrong is a graduate of New College, in Florida, his home state, and has lived in Alaska for 3 years.

Also from Florida, but not so recently, is new clerk-typist Nancy Dann. Nancy, who moved to Chitina at age 10, came to DGGS from the Dept. of Environmental Conservation in Anchorage.

Joining the Petroleum Resources section as a geological assistant is Bruce Wilson. A recent graduate of Fort Lewis College in Durango, Colorado (but long-time Alaskan), Bruce enjoys fishing, hunting, soccer, and reading.

Another new geological assistant is 2-yr resident Debbie Bertossa. She graduated in 1974 from UC-Santa Barbara, with a degree in environmental studies. Debbie's interests include fishing, backpacking, x-c skiing, and running.

Helping shore up the typing is new clerk Sandra Chambers. Sandra, a 3-yr Alaskan, was recently discharged from the U.S. Air Force.

The most recent addition to the Anchorage staff is administrative officer F. Harvey Pitts, who has B.A. and M.S. degrees from UA-Fairbanks. Originally from Georgia, Harvey came to Alaska in 1970 and worked for sev-

eral state agencies and the municipality of Anchorage before joining DGGS.

The Fairbanks office has added two new geologists, Rod Combellick and John Davies, to its engineering geology section. Combellick, who is working toward his Ph.D. in geology at UA-Fairbanks, previously worked for NOAA in Juneau on the OCS Environmental Assessment program. Rod is a ham-radio operator.

Davies, hired as the State Seismologist, has M.S. and Ph.D. degrees in geophysics-seismology from UA-Fairbanks. John was affiliated with Columbia University's Lamont-Doherty Geological Observatory.

Also new to the Fairbanks office are Dan Wietchy and Steven Jacques. Wietchy, a land-management officer with the mining-information section, first came to Alaska with the Air Force in 1973. Dan worked in Fairbanks with Resource Associates of Alaska and the Bureau of Mines before joining DGGS.

Slated to transfer to Anchorage in mid-September, new mapmaker Jacques is training with the Fairbanks cartography unit. A 1-yr resident, Steve graduated from Potsdam (N.Y.) State College with a degree in geography. He likes baseball and follows the fortunes of the Boston Redsox.

In a final note, DGGS's resident 'little old lady,' Carole Stevenson, made it official: she is one. Her daughter-in-law gave birth to a girl Aug. 5, placing her in the grandmother category. At last report, mother, daughter, and grandmother were all doing fine.



### Dean Beistline, head of UA mining school, retires

Earl Beistline, dean of the UA School of Mineral Industry, retired in June, ending many years of association with the university as a student, teacher, and administrator.

Beistline entered the then-Alaska Agricultural College and School of Mines as a freshman in 1934 and, ex-

cept for 2 years in private industry and 5 years in the U.S. Army during World War II, remained there as either a student or faculty member for most of the succeeding half-century.

His professional accolades include an honorary Doctor of Laws by UA at the 1969 Commencement exercises and being named Alaska Engineer of the Year in 1971 and UA Distinguished Alumnus of the Year in 1975.

Beistline has long shared his knowledge of Alaskan mining with others. In addition to teaching for many years, he contributed to numerous scientific publications and minerals conferences. He was also instrumental in organizing the Alaskan-Taiwanese Coal Conference, held last year in Taiwan.

The robust, gray-haired retiree has no plans to go stale. "I'm going to keep very active," he said recently.



#### Arco begins two test wells in Bering Sea

(from *All-Alaska Weekly*, July 23, 1982)

Drilling is under way on two stratigraphic test wells in the Bering Sea—one in Norton Basin, 50 miles south of Nome, and the other in the St. George Basin, 20 miles northeast of Dutch Harbor.

Arco Alaska, Inc., is operator for the two Continental Offshore Stratigraphic (COST) wells, designed to provide information about the subsurface geology of the areas in advance of federal oil and gas lease sales. The wells are deliberately drilled away from traps which could contain oil and gas. Only after leases have been awarded will exploratory wells be drilled in the search for oil and gas accumulations.

The Key Singapore, a jack-up drilling rig, began drilling the Norton Basin COST well earlier this month. The rig is mounted on a deck held aloft by three steel legs which are mechanically lowered to rest on the ocean floor during drilling.

The St. George Basin COST well is

being drilled by the Sedco 708, a semisubmersible floating drilling platform.

An earlier stratigraphic test well also was drilled by Arco in Norton Sound during the summer of 1980. The federal government's first Norton Sound oil and gas lease sale is set for November of this year.



#### Our Gange....

By Frank Larson, editor

....One of the more interesting questions facing us in today's hectic, frenzied world is, 'Is there life after purple fingers?'.... Yours Truly just completed helping build a house ---my house. I say 'helping' because I had two licensed, knowledgeable, hard-working carpenters build it for me. My contribution? Not much. I tried to help, but usually ended up asking lame questions, like, 'Why is one end of the nail pointy?' and 'When do we break for refreshments?'...The carpenters would occasionally let me help, though---mainly because they felt sorry for me, standing around, looking perplexed, with bandaged, pulpy hands in pockets. So I became their chief, number-one, chop-chop 'gopher.' Man, was I good. Seems they had me on the go all the time, getting them nails, tarpaper, lumber, insulation, sealer---lots of essential stuff. The funny thing is, though, we always seemed to have tons of it lying around...Nevertheless, I was a good gopher. So good, in fact, that toward the end they had me looking all over town for items such as sky hooks and board stretchers....But the place is done, and it turned out well, despite my presence. Plus, I learned a lot of carpentry secrets in the process---like Larson's Law Number 1: Fingers always feel better when you stop hitting them with the hammer. Law 2: The color, intensity, and imagery of your vocabulary increase exponentially whenever you don't follow Law 1. Law 3: Whenever humanly possible, avoid---in fact, run from---hauling

those bales (I think they're called 'squares') of asphalt shingles up the ladder to the roof. They are heavy suckers. Law 4: Don't paint eaves with your mouth open. Law 5---and this is an important one, especially to us maladroits: Never, never, ever use---or ever even THINK about using---electric saws. (The result here, for instance, would be an Our Gangue column that LOo Ks g l IKE tHis because it would typed with my nose.) Law 6 (popular in Minnesota): Gophers are beautiful. Save your fingers and your kid's tender ears: hire carpenters.....A subcontractor to Diamond Shamrock drilled more than 50,000 ft in 200 holes to examine the extensive Wilson-Bass-Hunt coal holdings in the Beluga area, west of Anchorage. Shamrock spokesman Bob Sanders said the holes, which were begun last fall, averaged more than 300 ft deep. If market conditions are right, he said, the Beluga coal could be produced as early as 1987....Perhaps thinking along similar lines, Hyundai Corporation, South Korea's trade giant, recently opened an Anchorage office (510 L St.). Gen'l mgr J.J. Yoon says they are interested in "coal, timbers, oil, gases, and other mineral resources." ....Two Talkeetna-area miners, Phil Brandl and George Vournas, received mineral patents from the BLM for their 27 claims in June. The placer claims represent 1,655 acres. The BLM says it is evaluating 12 more patent applications representing 53 claims this summer....The Alaska Dept. of Labor predicts that mining employment will grow at an annual rate of 11.6 percent in over the next 2 yr. 'Alaska Industry' magazine says that the North Slope will be the primary source of growth; secondary employment will derive from increased coal activity and mineral exploration. Sohio and Arco alone expect to spend more than \$10 billion in Alaskan exploration and development over the next 5 yr....However, in Southeastern, a slumping molybdenum market may force U.S. Borax to cut initial production from its

Quartz Hill mine by one-third, from 60,000 to 40,000 tpd, when it opens doors in mid-1987. Moly prices have fallen from \$10/lb to what they are today (p. 16)....In DGGs news, two of our staffers had accomplishments of sorts over the summer. One, a veteran geologist who shall remain anonymous to preserve what the Orientals term 'face,' fell victim to the old 'salted-creek' ploy. While leading a DGGs field party in the Aleutians in June, it seems our intrepid earth scientist---a third-generation Alaskan whose grandfather was a REAL gold miner---found a couple nuggets in an area he KNEW couldn't possibly have placer gold. Well Sir, he got the old maldy, the gold bug. Before long he was feverishly whaling away with his shovel, blissfully ignoring the hooting and laughter of his colleagues. (For shame, J.R., for shame.)...The second DGGSer won reknown of sorts when he was named champeen beer guzzler at the annual July 4 softball tourney in Valdez....Can you keep a secret? 'Deep Throat' of Watergate fame is alive and well in Alaska. He/she now writes our new cartoon strip 'Bogs.' Like it? We do, too, but don't know who to send our compliments to. You see, we don't know Bog's identity. (State Geologist Ross Schaff surmises that the name stands for 'Best Old Geologic Survey.') Anyhow, the mailman delivers us a 'plain brown envelope' every now and then. Inside each is a tongue-in-cheek look at the world of Alaskan minerals exploration. Rumor has it that Bogs is an established member (albeit covert) of the exploration industry in Anchorage. In any event, Bogs, keep 'em coming. We like your style....In other DGGs news, we are updating another Information Circular, and need your help. This one, IC-17, 'Companies interested in Alaskan mining opportunities,' is sadly out of date. If you wish your firm's name to be included in the revision, drop us a line with your address and specialty. But hurry---we only do this in years ending in '82'..Cheers.

## Metals Market

	<u>Aug. 2, 1982</u>	<u>3 Months Ago (5/3/82)</u>	<u>1 Year Ago (7/24/81)</u>
Antimony metal per lb (NY dealer)	\$ 1.05	\$ 1.20	\$ 1.38
Beryllium ore, stu*	\$110-135	\$100-130	\$130.00
Chrome ore per long ton (Transvaal)	\$ 48-52	\$ 48-52	\$ 55.00
Copper per lb (MW-prod)	\$ 0.73	\$ 0.76	\$ 0.82
Gold per oz	\$ 347.18	\$ 354.65	\$410.60
Lead per lb	\$ 0.28	\$ 0.26	\$ 0.42
Mercury per 76-lb flask	\$ 345.00	\$ 364.00	\$440.00
Molybdenum conc. per lb (Climax)	\$ 7.90	\$ 7.90	\$ 8.70
Nickel per lb (cathode)	\$ 2.42	\$ 2.60	\$ 3.00
Platinum per oz	\$ 287.84	\$ 334.70	\$407.00
Silver per oz (H&H)	\$ 6.89	\$ 7.13	\$ 8.46
Tin per lb (MW composite)	\$ 6.04	\$ 6.59	\$ 6.44
Titanium ore per ton (ilmenite)	\$ 70-75	\$ 70-75	\$ 70.00
Tungsten per unit (GSA domestic)	\$ 99.60	\$ 92.66	\$133.00
Zinc per lb (MW-US PW)	\$ 0.38	\$ 0.35	\$ 0.46

\* - Standard ton unit (20 lb)

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