STATE OF ALASKA
Department of Natural Resources
Division of Geological & Geophysical Surveys

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Petroleum development, North Slope of Alaska

By Thomas N. Smith, DGGS petroleum geologist

The State of Alaska receives about 85 percent of its revenues from oil and gas activity. Most of these revenues come from the 1.5- million-barrel/day (bpd) production of the Prudhoe Bay field. But when North America's largest oil field begins to decline in the early 1990s, will Alaska's primary revenue source dry up with it?

Since the Prudhoe Bay discovery in 1968, exploration has boosted known oil in place on Alaska's North Slope to over 60 billion barrels; of this, about 21 billion barrels might be producible.

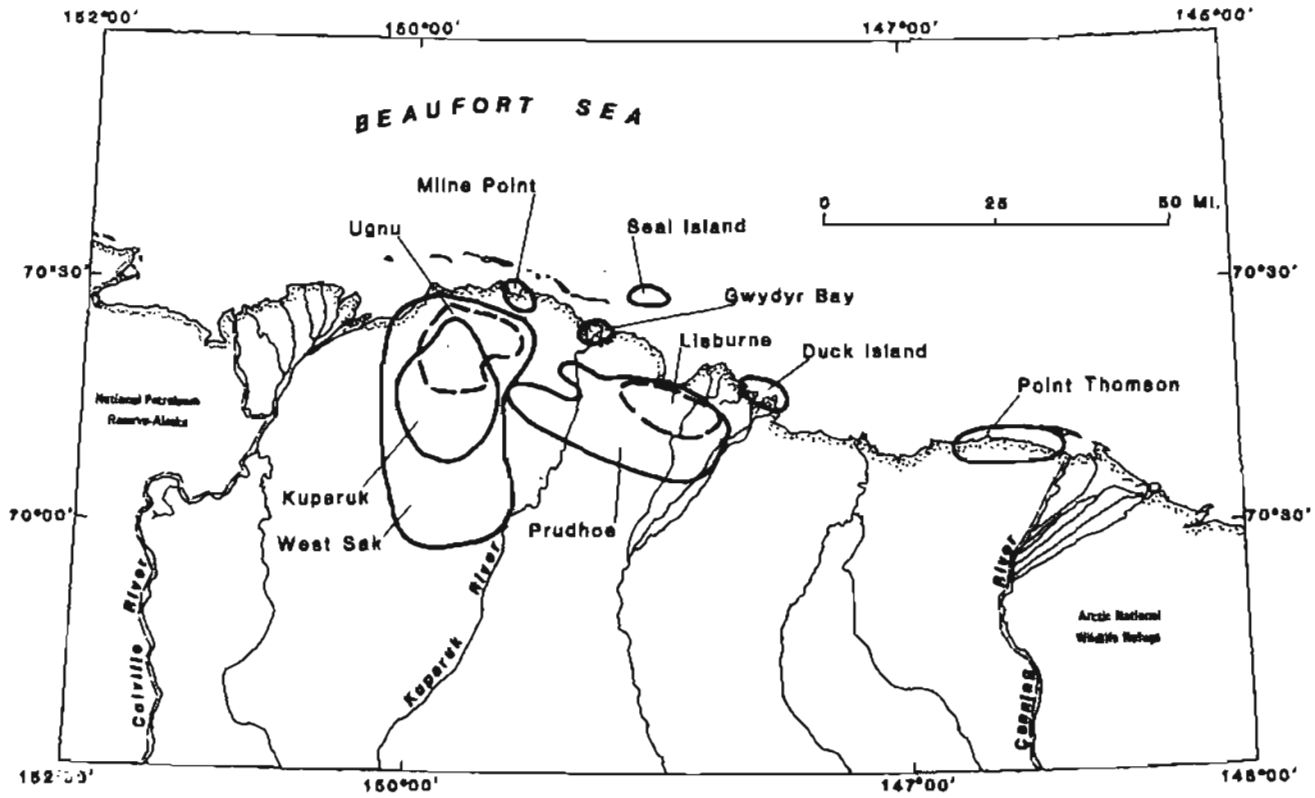
The Kuparuk field, discovered in 1969, contributes about 100,000 bpd to the Trans-Alaska Pipeline. No other fields are now producing, but the Milne Point, West Sak, Lisburne, and Duck Island fields are all slated for production within this decade.

The oil companies need production both now and in the immediate future, when Prudhoe Bay production starts declining. Operators on the North Slope are finding ways to cut costs and squeeze more oil out of existing reserves.

Plans to keep the Trans-Alaska Pipeline at full capacity through the year 2000 with existing reserves include using tertiary recovery systems, waterfloods, steam projects, and new technology to tap marginal economic production. Although new fields such as Shell Oil's Seal Island prospect in the Beaufort Sea will probably be discovered, production is still 8 to 10 years away.

Prudhoe Bay

Prudhoe Bay is North America's largest oil-and-gas field. Initial recoverable reserves are 9.6 billion barrels of oil and 26 trillion ft^3 of gas. Field operators plan to extract more oil from its 23 billion barrels of in-place reserves. Waterflooding is being used to maintain reservoir



North Slope accumulations (approximate locations).

pressure and sweep more oil from the sandstone and conglomerate reservoir. Starting in mid-1987, an enriched-gas miscible (mixable) flood could recover an additional 5 percent beyond waterflood.

Most of the Prudhoe Bay 1.5-million-bpd production comes from the Ivishak Formation. The waterflood and gas-miscible flood are designed to keep up production and slow the ultimate production decline in the 1990s.

Kuparuk River

The Kuparuk River field contains recoverable reserves of 1.5 billion barrels of oil. Also, Kuparuk Formation reservoir sands hold 5.5 billion barrels of oil in place. Begun in December 1981, the field produces 100,000 bpd. A second production facility scheduled for completion next month will nearly double the production. In late 1986, a third production facility will bring Kuparuk production to 250,000 bpd. A waterflood project is underway at Kuparuk; a tertiary recovery system would be initiated if economically favorable.

Lisburne

The Prudhoe Bay discovery well also tapped the Lisburne pool. Production from the Lisburne Group limestone and dolomite will begin in 1987, with initial production at 100,000 bpd. The Lisburne Group is thought to hold 3 billion barrels of oil in place, with 500 million barrels recoverable. A planned waterflood would increase recovery.

West Sak

The West Sak reservoir is a thin Cretaceous sandstone that overlies the Kuparuk Formation and contains 15 to

25 billion barrels of oil in place. This sandstone is shallow and has low-gravity oil, which makes production difficult. To enhance production, a pilot program that injects hot water into the oil zone has begun. If results are encouraging, commercial production could start in the late 1980s and ultimately recover 20 percent of the oil. Production could be 100,000 to 200,000 bpd.

Milne Point

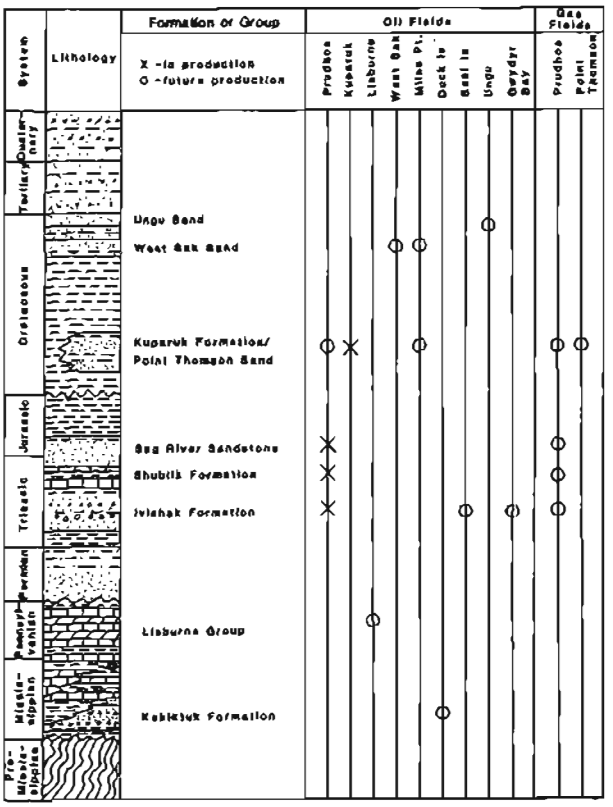
The Milne Point field holds recoverable reserves of 100 million barrels of oil in both the Kuparuk Formation and West Sak Sand. It is the smallest oil field for which commercial production on the North Slope has been attempted. Oil should begin flowing in 1986 at 30,000 bpd. The Kuparuk will be the primary reservoir target, with selective development of the West Sak oil sand.

Duck Island

The first field slated for development off Alaska's north coast is the Duck Island field. The Kekiktuk Formation, which consists of sandstone and conglomerate, contains recoverable reserves in excess of 300 million barrels. Field operators are waiting for permits to begin pipeline and production-facility construction. By the late 1980s, 100,000 bpd of oil could be drawn from the reservoir.

Seal Island

The newest commercial discovery, Seal Island, is located about 5 miles off the northern coast of Alaska. Announced last January, production of Seal Island's 300 million barrels of oil could begin in the early 1990s. Shell Oil reported stabilized flow rates as great as 5,000 bpd of 40° gravity oil from the Ivishak Formation.



North Slope producing intervals and fields.

Other Development Prospects

The Ugnu Sand, which overlies the West Sak Sand, contains 6 to 11 billion barrels of 10° to 11° gravity oil in the shallow reservoir. However, production is beyond industry's current technical capability.

Another field sitting idle is Gwydyr Bay, north of the Prudhoe Bay field. Gwydyr Bay will probably need development nearby to become commercial, because its Ivishak reserves are too small to support the cost of production facilities.

Gas

Natural gas is yet another noncommercial commodity on the North Slope. Prudhoe Bay has recoverable reserves exceeding 26 trillion ft^3. Point Thomson, the other giant gas field on the North Slope, has recover-

able reserves of 350 million barrels of condensate and 5 trillion ft^3 of gas. However, markets need to be developed and a pipeline built before these reserves can be tapped.

Future Exploration

While known reserves are being developed rapidly, low crude-oil prices have slowed exploration. New acreage in areas believed to hold large reserves continues to be offered.

The federal government has recently opened the coastal plain of the Arctic National Wildlife Refuge to exploration. In August, OCS Lease Sale 87, which offered acreage in the Beaufort Sea, drew over $877 million in bids.

Over the next 4 years, eight state lease sales are scheduled for the North Slope and Beaufort Sea. If explored and tested, these areas may provide added petroleum reserves for the nation's future.

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Diamonds are discovered in Alaska

(from Alaska Journal of Commerce, Sept. 24, 1984)

Diamonds in Alaska?

This has been a topic for speculation for a number of years, but during the summer of 1982, the existence of diamonds---or at least one diamond---was confirmed. Working his gold claim near Circle, Jim Regan discovered a small stone that has been authenticated as being the first diamond discovered in Alaska.

Most diamonds come from placers, with little bedrock production from kimberlite pipes or fissures. Exploration of diamond placers is similar to gold placers except that diamonds are even more rare and are erratically distributed.

There are at least five elements associated with diamonds. After the initial discovery near Circle, two associates from the DeBeers Group spent several days prospecting in the area. They reported finding at least four elements present that are associated with diamonds. Their assumption was that the Regan diamond had traveled a considerable distance before being discovered.

They were unable to locate the source of the diamond, either a pipe or fissure.

According to Regan, the diamond resembled a piece of quartz rock when discovered in his sluice box. However, it had an irregular shape, which caught his eye.

He took it to the University of Alaska to ascertain just what it was, and was quite surprised when the diagnosis came back---a diamond! The diamond was then sent to DeBeers, where confirmation was received.

It is possible that somewhere in the Circle District lie either the diamond pipes or fissures. However, in California there have been 16 diamond finds, but the pipes have not been found. Finding one diamond is a little like finding one nugget. You always wonder where the rest are.

But Jim Regan says, "The value on the market of this diamond is not much, as it is so small, but its historical value is priceless."

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1,630 new mining claims filed, low trend continues

The number of new mining claims filed in the third quarter of 1984 totaled 1,630. This is down 16 percent from last quarter's total of 1,923 and down over 30 percent from the 2,331 claims filed during the same period last year.

Mildred Brown, Fairbanks-based natural-resource officer, said, "Overall, this looks like a low year for mining claims."

Most new claims were made in the Fairbanks, Talkeetna, and Nome areas.

The claims by recording district are:

	July	Aug.	Sept.
Fairbanks	99	191	188
Manley Hot Spr.	20	–	4
Nulato	4	–	–
Mt. McKinley	49	15	13
Nenana	4	8	55
Talkeetna	87	129	125
Palmer	21	25	30
Nome	58	47	50
Seward	–	–	81
Juneau	–	25	5
Haines	3	18	3
Petersburg	6	–	–
Wrangell	–	9	–
Ketchikan	1	12	13
Sitka	–	3	–
Anchorage	–	72	–
Cordova	–	26	–
Chitina	–	–	57
Valdez	–	1	–
Kuskokwim	–	73	–
Total	352	654	624

The possibilities of Alaska

(excerpt from National Geographic, vol. XIII, no. 3, March 1902)

Why Alaska Is Not Settled

With such facts as to resources, why is Alaska not settled? Simply because settlers cannot get title to land.

There is much inquiry for land, but when the would-be settler learns the status of affairs he changes his plans.

To get title, the settler must first buy soldiers' additional homestead script, which can be located on unsurveyed lands. This will cost him anywhere from $5 to $15 an acre. Then he must deposit in the surveyor general's office an amount which will cover the cost of the survey. United States deputy surveyors charge $15 to $20 a day and traveling expenses in Alaska. He must also pay for the office work, entries, etc.

The result of all this is that a piece of raw land in Alaska will cost him as much as a good, improved farm in almost any state.

Such conditions are prohibitive, and Alaska will not be settled as long as they prevail. Again, a homestead of 80 acres, which the law allows, is not large enough. Stock-raising must, of necessity, become a leading branch in Alaska farming, and 80-acre stock farms will scarcely be much in demand. Three hundred and twenty acres would be more in harmony with conditions which require considerable pasture land to make farming a success.

Would it not be a wise policy to make the land absolutely free to bona fide settlers? The great expense necessary to reach the territory with work animals, implements, and all that is required for a start, and the hardships incident to pioneer life in a rigorous climate, far from civilization, entitle the pioneer to special consideration.

The development of the territory depends upon his work. He must blaze the way and bear the brunt of the battle. His courage, endurance, and self-sacrifice constitute the very foundations on which the state must be reared. The exploitation of the territory's resources by wealthy corporations will not enrich or build the state.

It is the pioneer, the settler, the home-maker, who, with ax and grubbing-hoe, subdues the wilderness and forces unwilling nature to yield him a livelihood; who nurtures a family; who rears the school-house and church.

It is he who is the state builder, and every practicable means employed to aid him in the onerous task will further the development of the territory.

---by C.C. Georgeson (Sitka, Alaska), special agent of the U.S. Department of Agriculture in Charge of Alaska Investigations.

DGGS geologists visit China

A delegation of 15 U.S. scientists and engineers from government agencies, industry, and academia specializing in problems of frozen ground visited the People's Republic of China last July 15-31. DGGS geologists Dick Reger and Stu Rawlinson were among them.

Background

The trip was organized by China's Ministry of Railways and was co-hosted by Acadamia Sinica's Institute of Glaciology and Geocryology in Lanzhou. The 16-day visit was in return for a U.S.-hosted visit of a Chinese delegation to Alaska and the West Coast in July 1983 as part of the Fourth International Conference on Permafrost, held at the University of Alaska (Fairbanks). The U.S. Committee on Permafrost of the National Research Council organized U.S. participation for the China visit.

The visit consisted of an extended train trip through the western part of the permafrost zone in northeast China and technical sessions in Lanzhou. The objectives of this dual approach were a) to ensure field visitations to view permafrost conditions and construction practices in a region comparable to interior Alaska; b) to meet with Chinese organizations responsible for frozen-ground research, design, and construction; and c) to exchange detailed technical information.

The visit to China was preceded by a visit to China by a delegation of Canadian permafrost experts in 1977 and visits by two members of the U.S. delegation in 1980, 1981, and 1982.

Itinerary

The group took three train trips (fig. 1): a) from Beijing to Harbin, b) from Harbin through northwestern China and return, and c) a return trip to Beijing.

The trip through northeastern China departed from Harbin (fig. 1), proceeded to Yakeshi, went to the end of the Yakeshi Forest Railway at Mangui in northern Inner Mongolia, and returned by the same route to Quigihar. This 1,190-mile-long segment, toured in a private, four-car train, passed through 235 railway stations and stopped at six permafrost localities.

In all, 3,000 miles in NE China were traversed during 10 days aboard various trains. The trip through northeastern China (Heilongjiang Province and Inner Mongolia) was organized by the Harbin Railway Administration.

Visits

Technical exchanges were held with several institutions and laboratories during the excursion through northeastern China:

.Heilongjiang Provincial Hydraulic Scientific Research Institute and its Frozen Ground Field Station (Harbin)

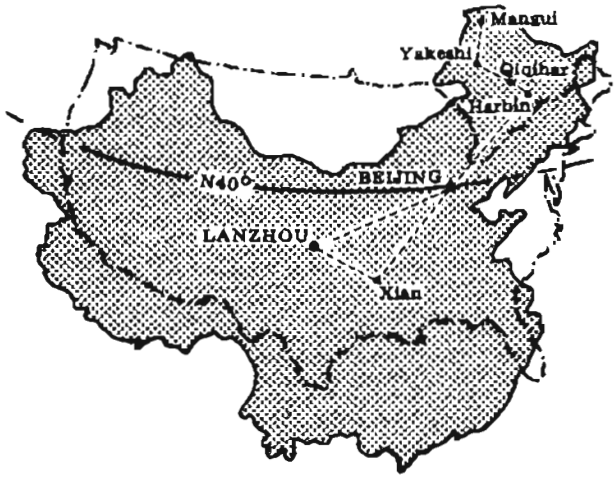
.Heilongjiang Provincial Low Temperature Construction Science Research Institute (Harbin)

.Yakeshi Forestry Survey and Design Institute (Yakeshi)

.Yitulihe Frozen Ground Observation Station (Yitulihe)

.Qigihar Science and Technology Institute of the Harbin Railway Administration and its Low Temperature Laboratory.

The trip through northeastern China provided new insights into recent Chinese frozen-ground investigations. The most recent contacts between the U.S. and China in this field were papers and reviews that were presented at the 1983 Fourth International Conference in Alaska. However, by visiting institutes, field sites, and laboratories and by holding discussions with large numbers of Chinese specialists, there was an oppor-



Map of People's Republic of China showing route taken by U.S. Permafrost Delegation, July 15-31, 1984. 'Lower-48' outlined for scale.

tunity to refine U.S. understanding of current Chinese engineering practices (and their limitations) and to better understand the distribution of railways over permafrost in northern China.

Chinese Winning Permafrost Battle

Clearly, the design and construction of railways over permafrost are well advanced in China. Generally, problems related to winter drainage, reduction in thaw settlements, damage to culverts, and frost-heave damage have been resolved. The large available labor force keeps the lengthy railbed in excellent condition. Much of the rail system in northeastern China serves the needs of the forestry industry, and specialized institutes and field stations have been established to formulate design data.

In the past decade, new approaches have been made for foundation design. Ventilated-slab and pile foundations are being used for residential buildings and other structures. However, experience in these areas seems limited.

Much of northern Inner Mongolia is underlain by permafrost. The Chinese call it the widespread permafrost zone; in U.S. terminology, it is termed 'discontinuous permafrost.' Ground-temperature observation wells were observed in disturbed areas and maps of permafrost distribution were provided; however, detailed maps of permafrost distribution were not available. The U.S. delegation had several enhanced Landsat images of parts of the route, which proved useful in the discussions and for field checking. About 100 black-and-white aerial photographs of the Mangui area were briefly studied and showed several landforms indicative of permafrost.

After a short side trip to Xian, the delegation traveled by train to Lanzhou, where it was hosted by Academia Sinica's Institute of Glaciology and Geocryology and the Academy of Railways Sciences Northwest Institute. Half a day was spent in each institution, visiting facilities and listening to briefings. The second day was devoted to concurrent sessions on general cryology and engineering cryology, in which all 15 U.S. delegates and five Chinese scientists presented talks. Numerous individual discussions took place on such topics as frost heave, remote sensing, and piles and foundations. These intensive discussions resolved many questions, particularly on foundation design and frost-heave research.

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DGGS seismologist named to national panel

DGGS geologist John N. Davies was recently appointed to a 2-yr term on the National Earthquake Prediction Evaluation Council.

DGGS State Geologist Ross Schaff said, "With Davies' appointment, Alaska will have a stronger voice in national decisionmaking regarding earthquake prediction."

As member of the council, Davies will advise the Director of the U.S. Geological Survey on the validity and interpretation of data used in seismic predictions, Schaff said.

Davies, Alaska's principal seis-

mologist, was instrumental in setting up a statewide earthquake-hazard reduction program. He holds a Ph.D. in seismology from the University of Alaska, the first such degree granted by UAF.

In other personnel matters, six new faces appeared at DGGS during the quarter. Fairbanks new employees are chemist Wendy Atencia and clerk-typists Carol Rawlinson, Richard Baird, and Tricia Hardt. Geological assistant Bill Petrik was hired in the Anchorage office.

Six employees left DGGS. Historian Judith Bittner was named chief of the DNR Office of History and Archaeology and appointed State Historic Preservation Officer by Gov. Bill Sheffield at the same time. Other terminations, all in Anchorage, were data-processing personnel L.P. 'Red' White, Barbara White, and Bob Bennett and hydrologist Jennifer East.

Promoted were clerk-typists Maggie Wright and Donna Allen, Natural Resource Officer George Dickinson, geologists Roy Merritt and Jim Clough, and geological assistants Joel Blum, Val Reger, and Karen Clautice.

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Ice dam breaks at Beluga Lake

(from Anchorage Daily News, Sept. 16, 1984)

A glacier-dammed lake 70 miles northwest of Anchorage broke through its icy barrier Saturday, prompting National Weather Service officials to issue an emergency flood watch as a torrent of water rushed along the Beluga River.

The river area west of the Cook Inlet is uninhabited except for employees at the Beluga power station, operated by Chugach Electric Association.

The utility's transmission towers connecting its main power supply to Anchorage lie in the path of the flood. But Chugach spokeswoman Bonnie Jack said Saturday that they are probably not in danger.

Water from the overflowing Strandline Lake already has flooded across an access road about 5 miles from the power plant, weather service officials said.

Strandline fills to capacity every 2 to 5 years, forcing its waters to tunnel through Triumvirate Glacier and spill into Beluga Lake and the river system that empties into the Inlet.

Three Chugach power lines that carry power from the utility's power station to Anchorage are in the river basin. While rising waters do not harm the towers, driftwood, chunks of ice, and other debris carried by the rushing water can do damage, said Jack.

This year, the floodwaters are carrying less debris than in past floods, she said.

The towers are protected by barricades built around their bases, Jack said. The barriers were erected after two towers suffered slight damage during the last flood, she said.

Chugach officials and weather service personnel flew over the area Saturday afternoon. They found flood debris building up against a service-road bridge upstream from the transmission towers.

"They said the amount of driftwood was much less than in previous years," said John Hoag, National Weather Service meteorologist. "There are also a couple of fish-camp shacks at the river mouth, but they appeared to be empty."

The weather service's River Forecast Center issued a flood warning for the area. Even though uninhabited, they warned hunters, fishermen, and others to take precautions, Hoag said.

The lake itself had almost emptied by Saturday afternoon, Hoag said. The flooding fills the Upper and Lower Beluga lakes first, then those lakes that empty into the Beluga River.

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"Go, and never darken my towels again."—*G. Marx.*

It's no ordinary epidote— it's UAF's museum piece

(from Fairbanks Daily News-Miner, Sept. 13, 1984)

A world-class epidote crystal discovered on a mining claim in southeastern Alaska has been added to the University of Alaska Museum's geological collection.

Epidote is a mineral that forms green crystals with a glassy luster. A 3-inch specimen is considered rare, but the new museum addition has a 5-inch crystal surrounded by several smaller ones.

Also unusual is that the find has hundreds of smaller quartz prisms on it. This unique crystal pattern, called "Japan law twinning," occurs three times on the specimen.

Douglas Toland and Tom Hanna, partners in the patented claim, uncovered the crystal on Prince of Wales Island's Green Monster Mountain.

A special appropriation by the Alaska Legislature provided funds to acquire the epidote for the museum.

Museum Director Basil Hedrick, in announcing the addition, said this epidote "rivals or surpasses epidotes on display in other major mineral collections."

The Green Monster epidotes are the only world-class minerals currently found in Alaska, according to Carol Allison, curator of paleontological and geological collections. Allison cites a 1977 Technological Record article that states, "This small isolated mining district is one of the great mineral localities of the world. The large, brilliant, greenish-black crystals of epidote found there are rivaled only by the epidote from the extinct locality at Untersulxbach, Austria."

(A smaller epidote crystal given to a DGGS field party in 1972 also resides in the UA Museum. The DGGS investigation, headed by former geologist Gordon Herreid, completed geologic mapping of Green Monster Mountain that summer. His findings are available in DGGS Geologic Report 48.---Ed. note.)

Judge denies restraining order on placer miner

(from Anchorage Daily News, Sept. 28, 1984)

A state judge has snagged the state's first attempt to enforce pollution controls against a placer miner.

Superior Court Judge Gerald Van Hoomissen has refused a request by state environmental officials to stop miner Jim Dale from operating his placer mine at Deep Creek until a civil action against Dale is settled.

Van Hoomissen said the state's selective enforcement of water-quality standards violated Dale's equal protection and due-process rights under the Alaska constitution.

Dale has said he thinks his is the test case in an ongoing battle between the state and Alaska placer miners. The miners have long complained that it is impossible to meet the state's strict standards for turbidity---the clarity of the water after sediments from mining are discarded.

State officials said when the lawsuit was filed against Dale that his was not a test case.

An official with the state Department of Environmental Conservation in Fairbanks said Dale had not taken elementary precautions against pollution as other miners have done.

Van Hoomissen said that while the state's water-quality criteria are specific, Dale's constitutional rights were violated in the enforcement.

The "court is bound to give great weight to the fact that the state is vitally concerned about the environmental quality of its waters," Van Hoomissen wrote. But, he said, "the state constitution clearly acknowledges the importance of mineral development."

"If it is the intention of the state to prohibit placer mining...for the protection of the waterways of the

state, that intention should be expressed clearly and unequivocally in legislative enactments," the opinion said.

And, "if the water-quality standards of the state are to be discretionarily enforced, clear and unequivocal guidelines must be established so that miners can know with some degree of certainty how the law is to be applied."

The mine in question is about 70 miles northeast of Fairbanks on Deep Creek, which eventually enters the Chatanika River, a popular recreation waterway.

This is the first suit brought by the state Department of Environmental Conservation charging a miner with water pollution and violation of turbidity and environmental standards.

Although the judge denied the state's request for a temporary restraining order, the lawsuit against Dale is pending.

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Book examines Alaska's energy resources

(from Fairbanks Daily News-Miner, Sept. 11, 1984)

Should the Susitna hydropower project be built? Is wood energy a viable long-term energy alternative? What does history have to say about oil famines and gluts, and is the United States running out of petroleum?

These and other questions are discussed in "Energy/Alaska," a book by Neil Davis, professor emeritus at the University of Alaska-Fairbanks. The book is published by the University of Alaska Press.

Davis creates a comprehensive picture of Alaska's energy past, present, and future, and brings together for the first time much of what is known about Alaska's energy resources. He then translates technical material for the general reader and includes the basic scientific information needed to understand it.

"Energy/Alaska" is written primarily for Alaskans who want to know more about the state's rich energy resources and how the use and extraction of these resources can affect their lives.

Davis discusses how Alaskans use energy and what the future may bring, giving uniform treatment to coverage of wood, biomass and peat, coal, petroleum, solar, wind, hydropower, geothermal, and nuclear energy. Chapters on each of these topics provide a perspective on current and future developments in each area by including an inventory of the resource, historical background, and elementary knowledge about the nature of each energy source.

"Energy/Alaska" provides answers---or presents the basic knowledge for readers to form answers---to such questions as:

Can any other resource give an income to Alaska's government as large as petroleum provides?

What factors are likely to determine the future use of Alaska's huge coal deposits?

Is solar energy useful in Alaska? How can it be used?

The 530-page book has 168 illustrations and 49 tables, including listings, maps, or descriptions of the state's coal fields, oil and gas fields, onshore and offshore petroleum provinces, volcanoes and geothermal springs, potential hydropower sites, forest lands, solar input data, and wind power potential.

"Energy/Alaska" is available from the University of Alaska Press, Room 101 Bunnell Building, University of Alaska , Fairbanks 99701. The retail price is $19.95. Postage and handling for a single copy mail order is $2.50.

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"True, the billiard tables were of the old Silurian period and the cues and balls of the post-Pliocene; but there was refreshment in this, not discomfort; for there are rest and healing in the contemplation of antiquities." --Mark Twain, 'Life on the Mississippi,' 1883.

'Short notes,' 1984 resource summary printed

During the past 3 months, DGGS has released its biennial report 'Short notes on Alaskan geology,' a Special Report on the status of Alaska's natural-resource inventory, 10 new Reports of Investigations, and five new Information Circulars .

The 'Short notes' booklet, Professional Report 86, incorporates eight articles of recent geological interest in its 48-page text. Among the subjects covered are the Berners Bay Group of southeastern Alaska, an iron-rich lava flow from the Nenana coal field, the use of garnets as indicators of regional metamorphism, the geology of the Miss Molly molybdenum deposit in the Tyonek Quadrangle, and glaciation in the Mount Prindle area. The report sells for $2.50.

Special Report

Special Report 36, 'Alaska's resource inventory - 1984,' was issued late in the quarter. This 62-page booklet synopsizes---with the help of 14 colored foldout maps---the status of Alaska's natural resources, including minerals, sand and gravel, water, coal, peat, geothermal energy, soil, and timber. A special edition of this report was prepared at the request of Governor Sheffield for his recent trip to Korea, Japan, and China. Special Report 36 costs $4.

Reports of Investigation

Four of the new RIs pertain to southwestern Alaska, near the Kuskokwim River. Others cover locations that range from the Aleutians to the Matanuska Valley. The new Reports of Investigations are:

.RI 84-8, 'Geologic map of the Sleetmute A-6 Quadrangle,' by John Decker, M.S. Robinson, J.M. Murphy, R.R. Reifenstuhl, and M.D. Albanese (1 sh., scale 1:40,000). $2.

.RI 84-10, 'Geologic map of the Sleetmute B-5 Quadrangle,' by M.S. Robinson, John Decker, R.R. Reifenstuhl, J.M. Murphy, and S.E. Box (1 sh., scale 1:40,000). $1.

.RI 84-12, 'Geologic map of the Sleetmute B-6 Quadrangle, ' by R.R. Reifenstuhl, M.S. Robinson, T.E. Smith, M.D. Albanese, and G.A. Allegro (1 sh., scale 1:40,000). $2.

.RI 84-14, 'Geologic map of the Healy A-2 Quadrangle,' by T.E. Smith, M.D. Albanese, and G.L. Kline (1 sh., scale 1:63,360). $2.

.RI 84-19, 'Compilation of geologic data from the Russian Mission A-3 Quadrangle,' by John Decker, R.R. Reifenstuhl, and W.L. Coonrad (1 sh., scale 1:63,360). $1.

.RI 84-20, 'Moisture-density and textural analyses of modern tidal-flat sediments, upper Knik Arm, Cook Inlet,' by R.G. Updike, Nagisa Yamamoto, and P.W. Glaesman (20 p.). $1.

.RI 84-22, 'Surficial geologic map of the Seward D-7 Quadrangle,' by R.A. Combellick (1 sh., scale 1:63,360). $2.

.RI 84-23, 'Log of core from the Makushin geothermal area, Unalaska Island,' by L.D. Queen (8 p., 1 sh.). $3.

.RI 84-24, 'Coal geology and resources of the Matanuska Valley,' by R.D. Merritt and M.A. Belowich (64 p., 3 sh., scale 1:100,000). $5.

.RI 84-25, 'Preliminary gravity data, Holitna Basin, south-central Alaska,' by J.F. Meyer and D.L. Krouskop (6 p., 2 sh., scale 1:500,000). $3.

Information Circulars

Five information circulars were revised during the quarter. They are:

.IC-12, 'Services of DGGS' (revised), 2-p. foldout.

.IC-17, 'Coal resources of Alaska' (revised), 9 p.

.IC-18, 'Amateur gold prospecting' (revised), 5 p.

.IC-20, 'State of Alaska aeromagnetic surveys' (revised), 6 p.

.IC-25, 'Information on water and water rights in Alaska' (revised), 5 p.

All Information Circulars are free.

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Anchorage in for gold revival?

(from Anchorage Daily News, Aug. 12, 1984)

Little Gussie was born when a Belfast-born linen merchant came west to look for gold and found it in the gravel of Crow Creek. He and his companies spent decades hosing down sandbars and hillsides to get it out. They dug at the Little Gussie claim, the Annex, the Alpha, and the Omega.

Long years, bad economic times, and lawsuits about dirty water downstream finally slowed and stopped the mine. The linen merchant went back to New York and then to New Jersey, where he died at age 66 in a baronial mansion called Clonaver. His claims, and the town downstream, took the name of the linen merchant---Girdwood.

But Little Gussie isn't dead yet.

Now, more than a century after the first miners came to the Turnagain Arm, three partners with a Dutch-built mining system are going to try to top James Girdwood's success on the land he staked and left behind. Within a year, the partners hope to remake the dormant mining area into what federal officials said will be the largest gold-mining operation within the boundaries of Anchorage.

At stake is as much as $34 million worth of gold Girdwood didn't get, the partners estimate.

"We're certainly not going to get all that," said Gary McCarthy, one of three partners in the mining operation.

"But it sure would be nice," replied partner Bill McLinn with a grin.

The Girdwood claims, which begin at about Mile Five of the Crow Creek Highway, sit on about 200 acres of land directly on the creek. The popular Crow Creek Trail begins next to the claims.

Although the mine will be small compared to others in the interior and northern Canada, it will dwarf the pick-and-shovel mining of many hobbyists in the area. The partners hope they can move each summer as much as 400,000 cubic yards of gravel down conveyor belts and under hoses. The operation could employ up to 12 miners and remain open for as long as 10 years, McCarthy estimated.

Cynthia Toohey, chairwoman of the Girdwood Valley Area Board of Supervisors, said the mine will be far from Girdwood and can only help the community's mostly tourism-based economy.

"This is a one-horse town," Toohey said. "And that horse is skiing."

The partners said their old mine may be one of the first totally commercial mines resurrected in Girdwood, but it probably won't be the last, particularly with the price of gold now 10 times that of its old fixed price.

"Although we are a pretty good-sized operation, we could be small potatoes compared to others that might start," McCarthy said. "It's just a matter of time."

Since the mid-1970s, when the federal government quit fixing the price of gold, renovation of American mines has become commonplace, both for commercial and recreational use, federal officials said. Some 300 gold claims exist on federal land in Turnagain Arm alone, the Bureau of Land Management estimates.

The Crow Creek Mine---whose former owners once helped close the Girdwood claims because of water-rights battles---will this summer attract at least 15,000 tourist-miners. The mine and its generations-old buildings were renovated by the Toohey family and are now a national historic site.

The attraction to Girdwood is not surprising. "In 1910, they did a study that said for every yard of material they mined, they got about 57 cents," McCarthy said. "And that's when gold was going for $16 an ounce," McLinn said.

A newly released study by the U.S. Bureau of Mines still ranks Crow Creek as the major placer-mining gold stream within the Chugach National Forest. The study estimated that at least 42,500 ounces of gold remain in the creek.

European and American miners have looked for that gold on the Kenai Peninsula since the 1840s, when the Russian-American Company started small mining operations. At the turn of the century, Turnagain Arm held dozens of claims and several large mines, including Girdwood's Crow Creek Alaska Hydraulic Gold Mining Co.

Eventually, most of the companies folded or cut down the size of the operations. World War II closed the remaining companies. Many did not reopen after the war.

The claims now owned by McCarthy, McLinn, and Ron Reynolds are different from many in the creeks, they said. In 1913, the government patented the land ---about 200 acres---and gave the miners ownership of the area as well as the right to mine there.

Unpatented claims can be mined, but the ownership remains with the government. Patented areas, federal officials said, are usually much more expensive than nonpatented ones. McCarthy and his partners won't say how much they paid for their stretch of ground.

"Let's just say it's a very sizeable investment," McCarthy said.

Oil and gas briefs....

Court upholds oil, gas lease

A federal appeals court Wednesday upheld federal oil and gas leasing on millions of acres on Alaska's North Slope, rejecting claims that the development would hurt use of the land by rural poor people.

The 9th U.S. Circuit Court of Appeals rejected challenges by two Inupiat Eskimos and the City of Barrow to Lease Sale 831, the first of a planned offering of up to 10 million acres in Alaska's National Petroleum Reserve during the next 5 years.

---Fairbanks Daily News-Miner, Sept. 13.

Sohio plans winter drilling off Prudhoe Bay

Sohio Alaska Petroleum Co. plans to drill for oil offshore near Prudhoe Bay this winter if federal and state agencies grant the necessary permits.

The proposed drilling site is within a few miles of Sohio's proposed Endicott oil field project, a field Sohio officials have termed marginally economical.

According to a permit application filed with the U.S. Army Corps of Engineers, Sohio wants to construct a 5-acre gravel island in a water depth of 3 to 5 feet.

A camp to house 60 workers would be constructed as well, the application said.

Drilling operations are scheduled for late January through April.

---Anchorage Daily News, Sept. 14.

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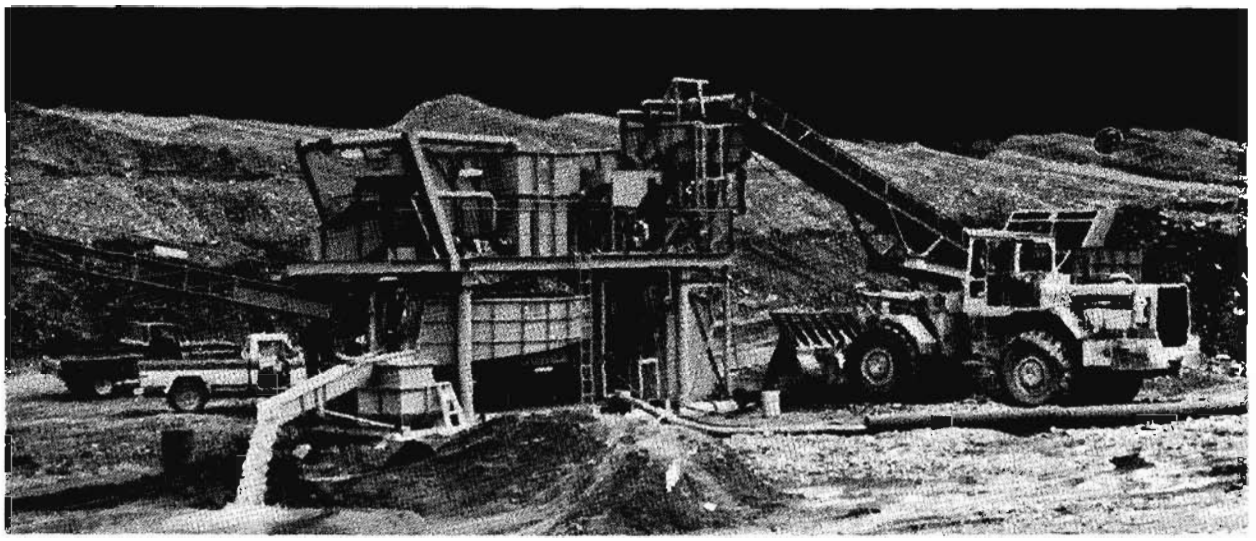
"Kaolin is a white powder that used to found in Cornwall but the Romans came and took it all away. There is none in the department, it is so rare. This is very unfair I think, because geology should be taught from specimens, and the rule should be, no specimen no question in the exam." --Geological Howlers.

Our Gangue....

By Frank Larson, editor

Del Ackels is a miner. He has claims on Gold Dust Creek, near Central. Ackels is industrious, highly intelligent, and an achiever....In fact, he has achieved what countless others have failed at for centuries. You see, Del Ackels is an alchemist. He has invented a machine that turns dirt into gold....I didn't believe it either, until I saw it in operation. (But don't tell anybody, now. Mum's the word---keep it under your arm. In fact, this article is printed on rice paper, like in the spy novels. As soon as you read this, tear the page out and eat it.)...Del, you see, has this big machine he designed. It is a large, monolithic hulk that just sits there---until you turn it on and feed it dirt, that is. Then it hums, shakes, and vibrates. Conveyor belts roll, rocks fall out everywhere, washers agitate, and water pours out one side. Best of all, though, is this little metal udder in the middle. Gold dribbles from it into a little plastic bucket. And all the while, Del the Alchemist smiles....The machine has a long technical name. As I recall, Ackels called it a mobile treatment plant. It is mobile, for it is built on sturdy steel pontoons. And it is a treatment plant, for it has all the features common to mining operations built into it---washers, rockers, jigs, and whatnot. It also has a little control room with gauges, dials, and knobs....Getting the machine, though, was not easy. You cannot walk into your nearest outfitters and buy one off the shelf. The machine is big. The machine is expensive. (This one cost three-quarters of a million bucks.) Besides, it's the only one of its kind in the world. Ackels, a graduate engineer, designed it himself. But getting it built was another story....Ackels had to go to Holland, home of Sleidrecht, makers of mining equipment used the world over. "I had to convince them that there is a market for these things," he said. "It took me over a year to talk them into making this one, which is a prototype." The mobile treatment plant is indeed large and complex (see photo). But Ackels assured me that his plant is small potatoes to the Dutch firm. "This is nothing to them," he said. "They build HUGE stuff, stuff used in mining and offshore work all over the world---in Peru, the Far East, everywhere. But getting them to build this for me was sort of like convincing Boeing to make a Cessna 180 for me." ....However, getting the treatment plant to his claim was a 'trip' in itself. Ackels ran into every snag imaginable except North Atlantic hurricanes---labor problems, dock problems, and craneless railroad yards. But he persevered. He got his treatment plant to his claims. In early August, when I visited him with an old friend, banker Dave Rogers, the plant was up and humming. Del was having minor problems with the vibrating bars atop the trammel then, muttering something about damping and resonance and abscissas---you know how engineers talk. Nonetheless, he was proud of his machine. (He has long since solved the problem, by the way.) Later, I asked him how the EPA liked his treatment plant. "Hell, they love it," he said. "They wish everyone had one."....A gracious host, Del Ackels. He and his vivacious wife, Gail, are both active in the Circle Miners Association. (He is president, she is secretary.)....On leaving, I asked for a souvenir, perhaps (fawning and drooling) a little bucket of gold? Just one? Ackels' eyes imperceptibly narrowed. (Del, you see, is one of those guys best described as lean and hard---the kind you like to have alongside when entering dark alleys.) But he smiled nonetheless and said he couldn't spare any at the moment. Gail, however, saved the day. She gave me a Circle Mines Association cap with gold braid on the brim---the type Frederic March wore when he won WW II



Ackels' mobile treatment plant (rear view). Photograph by D.G. Rogers, 1984.

from the bridge of his flattop....So I took my new cap and took my leave, bowing deeply as I backed out the door. (You see, I had realized earlier that if Del had taken it upon himself to affix my new cap to my head for me, I'd have had to open my shirt collar to take it off.)....The Ackels' are good folks, and Alaska is the better off for having them....In news around the 49th State, Dr. Don Cook was named acting dean of the UA School of Mineral Industry, replacing Dr. Nolan Augenbaugh. Cook, now director of the UA Mineral Industry Research Lab, is a UA grad ('47)....NERCO Minerals and Hecla Mining agreed to explore 14,000 acres near Fairbanks for gold and tungsten. Work on the land, which includes 300 state mining claims, began this past summer. The area is located about 15 mi NE of Fairbanks. In a separate action, NERCO Minerals acquired 52.5 percent of the DeLamar silver mine in Idaho; Pres. Lonnie Heiner said the mine is capable of producing 1.2 million oz silver and 26,000 oz gold annually....Farther south, a Colorado-based mining company wants to dredge the murky bottom of Cook Inlet for gold, primarily between Anchor Point and Ninilchik. Sportfishermen, among others, oppose it. Aspen Exploration Corp. applied for an offshore prospecting permit 5 years ago, but had not publicly specified that it intended to dredge the sea floor of one of the state's most popular saltwater fishing areas until recently. The Div. of Parks estimates that nearly 400,000 people visited state campgrounds between Anchor Point and Ninilchik---mainly to troll for salmon and bottomfish---during the last summer.... The state DNR is offering 10 tracts of Matanuska Valley land averaging 2-3 mi^2 each for coal leasing Dec. 12. The leasing is opposed by a group of Sutton residents, who believe that the state's Moose Range Management Plan, created this year by the legislature, should be put into effect first. The land in question---14,600 acres---straddles the Moose Creek-Wishbone Hill area....It may take $450 million, a lot of cooperation from environmental groups, and assistance from the state to eventually get Red Dog zinc to world markets, said Hank Giegerich, head of Cominco Alaska. Once running, the mine will have a 50-yr life, minimum, he said....Thanks again, Del and Gail, for your hospitality. I appreciate the time you took out for us rubberneckers---even if all I got out of it was this crummy little hat. (But I wear it all the time, Del. Even to bed...Honest.).....Cheers.

Metals Market

	Oct. 8, 1984	3 Months Ago (7/9/84)	1 Year Ago (10/10/83)
Antimony metal per lb (NY dealer)	$ 1.65	$ 1.54	$ 0.82
Beryllium ore, stu*	$100-120	$100-120	$100-120
Chrome ore per long ton (Transvaal)	$ 48-52	$ 48-52	$ 48-52
Copper per lb (MW-prod)	$ 0.62	$ 0.66	$ 0.73
Gold per oz (Handy & Harman)	$ 345.84	$ 364.10	$ 392.68
Lead per lb	$ 0.23	$ 0.31	$ 0.25
Mercury per 76-lb flask	$ 327.00	$ 318.00	$ 335.00
Nickel per lb (cathode)	$ 2.19	$ 2.25	$ 2.06
Platinum per oz (MW NY dlr)	$ 325.00	$ 360.00	$ 393.80
Silver per oz (Handy & Harmon)	$ 7.54	$ 7.95	$ 10.29
Tin per lb (MW composite)	$ 6.05	$ 6.33	$ 6.37
Titanium ore per ton (ilmenite)	$ 70-75	$ 70-75	$ 70-75
Tungsten per unit (GSA domestic)	$ 72.25	$ 80.74	$ 74.84
Zinc per lb (MW-US PW)	$ 0.46	$ 0.50	$ 0.47

* - Standard ton unit (20 lb).

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