



STATE OF ALASKA

Department of Natural Resources

Division of Geological & Geophysical Surveys

# MINES BULLETIN



VOL. XXII

August 1973

No. 8

P. O. Box 80007

College, Alaska 99701

*Published to Accelerate the Development of the Mining Industry in Alaska*

William A. Egan - Governor

Charles F. Herbert - Commissioner

Donald C. Hartman - State Geologist

### IN THIS ISSUE

Progress & Prospects of Marine Mining in Alaska  
AEC Issues 2 Reports on Nuclear Fuel Supply  
Bureau of Mines' Finds Prevent Pollution  
The Small Miner The Forgotten Man

White House Gives Coal Research High Priority  
Sec. Morton Announces Organization of New Mining Enforcement & Safety Administration  
New Mining Claims  
Metals Market

### PROGRESS AND PROSPECTS OF MARINE MINING IN ALASKA

(by Cleland N. Corwell, Mining Engineer)

Marine mining is defined as a commercial recovery of minerals other than oil and gas from the surface of, or below the sea bed, by operations connected only indirectly with the land (i.e., by ships or pipelines). A great deal has been said and written, particularly in the last decade, about the mineral potential of the sea bed. The demand for most minerals and mineral based commodities has continued to increase at approximately an exponential rate. A considerable and steadily increasing effort has been devoted to research and development of new technology needed for marine mining. In spite of this, the number of operations falling within the definition and the number of countries involved are remarkably limited. Indeed, as if to mirror the increasing demand for the minerals concerned, the volume of literature on marine mining seems to be increasing exponentially to the point where it is tempting to suggest that publishing is the (largest) sector of the marine mining industry.

The shores of Alaska are one area where marine mining is currently in progress and an area in which marine mining has been accomplished in the past. There are old photographs and historical records indicating that shortly after the discovery of gold in Nome, at the turn of the century, hard suit divers were employed on the beaches off of Nome during the winter time. Huts were set up on the ice, holes chopped through the ice, and the divers descended into the area working gold placers. Another interesting account of gold mining is the use of a clamshell during the winter months in Golovin Bay. When the ice was sufficiently thick to support the clamshell and trucks, holes were cut through the ice, where a clamshell was utilized to bring the sands and gravels from the ocean floor onto the ice, loaded into trucks, and transported to shore for sluicing during the summer months.

At the present time the only known recovery of a commercial mineral, barite, by hardrock mining occurs offshore from Castle Island, South of Petersburg in Alaska. In this operation an orebody has been drilled and outlined, controlled from triangulation points ashore. A continuous map is made of the mining of the orebody, which is done underwater. The drilling, blasting, and raising of the broken ore with a clamshell is done from a barge. The barite is loaded on a second barge that is towed near shore and dumped. The material is then picked up with a dragline and fed directly into a crusher. The crushed material is then stockpiled until a shipment is made. Shipments are usually made in from 10,000 to 20,000 ton lots. Part of the barite is shipped to Kenai, Alaska for processing into drilling mud material for oil wells.

At the present time this is one of the only two known marine operations for a hardrock mineral. The other mineral is sulphur. There were two facilities on the Gulf of Mexico shelf for the recovery of sulphur by the Frasch process. One at Caminada Pass was opened in 1968 but reportedly was closed in 1969 in the face of a sharp drop in the price of sulphur. The other, near Grand Isle, is reported to still be operating.

In Alaska, exploration for offshore minerals has been continuing at a fairly constant rate for the past several years. The expenditure has been approximately 1.2 million dollars per year. The State of Alaska owns the seabed out to the three-mile limit and issues, on application, Offshore Prospecting Permits.

Exploration in Alaska has been centered in four areas of the State; Southeast, Gulf of Alaska, Goodnews Bay, and Norton Sound south of Nome. To a lesser extent, exploration has taken place in the Cook Inlet, the inner Aleutian Islands, Bristol Bay, and Kotzebue Sound. All of these areas show promise for the development of offshore gold dredging operations, particularly in consideration of the recent advance in the price of gold.

In May the writer sampled offshore, in Behm Canal east of Revillagigedo Island, in by a low tide, beach sands containing .016 ounces of gold per ton. In these sands, there was very little magnetite. The heavy mineral fractions consisted of garnet, zircon and ilmenite. At the present price of gold (\$120.00 per ounce) the value would be \$1.92 per ton, and certainly within the range of an economic operation. The ilmenite, zircon and garnet offer the possibility of additional values. Slightly farther to the north in Bradfield Canal, Donald Cook, (1969, p. 63) reported obtaining a calculated value of 0.01 troy ounces per ton of sand, by amalgamation of a nonmagnetic fraction. His conclusion (p. 66), however, states that "The sample as submitted contained 68 pounds of magnetite, 6 pounds of ilmenite, 0.2 troy ounces of gold and a trace of zircon on a cubic yard basis. Radioactive tests indicate only trace amounts of equivalent uranium in the ilmenite concentrate." Farther to the north in Lituya Bay a sample contained 16 pounds of magnetite, 138 pounds of ilmenite per cubic yard, with 0.0053 ounces of gold. Even this concentration of gold with the possibility of added value from the magnetite and ilmenite should be profitable if there is sufficient sand available for processing. In the Gulf of Alaska, the occurrences of gold on the beach sands and offshore of Yakataga have been long known. These sands also contain garnet and zircon. The gold in this area, however, is often flaky. It is easily recovered by flotation but not as easily by the standard gravity methods. In Cook Inlet, near Tyonek, the mineral euxenite, a source of columbium, tantalum and thorium has been found in minor amounts. Gold was discovered on the beach sands of Togiak Bay in 1914. Further interest was developed in the deposits in 1938 but there is no record of extensive sampling of the offshore areas.

Proceeding west, the Goodnews Bay area, Security Cove, and Hagemeister Strait have been areas of a very intensive program of offshore exploration, particularly

for platinum. Berryhill (1963, p. 16) reported finding 0.0736 oz/pt gold and 0.0573 oz/pt platinum in the beach sands on the Kuskokwin Bay between Goodnews Bay and Chagvan Bay. A major platinum dredging operation occurs onshore from this area at Goodnews Bay. This is probably the reason for the intensive search for platinum in the offshore sands, particularly on the seaward side of the mountain that separates the placer platinum deposit on the Salmon River from the Bering Sea. Results of the exploration have been kept as confidential information by the companies but the offshore prospecting permits have been maintained in force. The area south and west of Nome in Norton Sound has been an area of very extensive offshore exploration, particularly by Shell Oil Company and the American Smelting and Refining Company. This area in particular has been subject to the conversion of Offshore Prospecting Permits to leases. Offshore grabs of these sands have indicated placer material containing as much as .4 ounces of gold per ton. The exploration activity here has not only included systematic drilling of the offshore sands, but bulk sampling, to determine the recovery of gold in relation to the information obtained by the drilling.

As of June 31, 1973, there were approximately 536 offshore prospecting permits covering 1,089,725.91 acres. There were also 9 offshore mining leases covering 25,400.08 acres.

In conclusion, Alaska is one of the few places in the world where marine mining is a reality at the present time, with the mining of barite near Castle Island. It is also an area containing gold in sufficient quantities to warrant offshore mining, both in the protected waters of the southeast which are open year round, and the Bering Sea which is frozen over for several months of the year.

#### References Cited

- Berryhill, R. V., 1963, Reconnaissance of Beach Sands, Bristol Bay, Alaska: U. S. Bureau of Mines, Rept. of Inv., 6214.
- Cook, P. J., 1969, Heavy Minerals in Alaskan Beach Sand Deposits, M.I.R.L. Report Number 20, University of Alaska.

#### AEC ISSUES TWO REPORTS ON NUCLEAR FUEL SUPPLY

(The Mining Record - June 27, 1973)

GRAND JUNCTION, CO - The Atomic Energy Commission has issued two reports on uranium fuel supply for the increasing number of nuclear power plants in the United States.

One report, "Nuclear Fuel Supply" Wash-1242, considers the recent AEC forecast of nuclear power growth through the rest of the century ("Nuclear Power 1973-2000" Wash-1139 (72/)) and discusses the corresponding uranium requirements, ore reserves, potential uranium resources, production capacity, exploration effort and other factors.

The AEC's most likely forecast of nuclear power growth would require about 2.4 million tons of uranium  $U_3O_8$ , through the year 2000. Current known reserves, producible at \$8 per pound or less amount to 273,000 tons. An additional 450,000 tons of \$8 uranium is estimated to be in known favorable geologic environments. Higher prices could expand the resource base. For example, at \$15 per pound, the known and estimated reserves are 1.5 million tons.

The Wash-1242 report says exploration and production capacity will have to be greatly expanded if the demand is to be met. It takes several years to discover and bring a mine into production.

By 1990, Wash-1242 estimates that a desirable resource level (ore reserves plus potential resources) would be about 40 million tons of  $U_3O_8$ . That would be in addition to the one million tons that will have to be mined between now and then.

The other report, "Nuclear Fuel Resources and Requirements," Wash-1243, is made up of slightly modified versions of three papers presented at the March 1973 uranium seminar of the Atomic Industrial Forum in Oak Brook, Illinois.

The first paper, "Uranium Reserves and Requirements," by Robert D. Nininger, AEC Assistant Director for Raw Materials, discusses uranium reserves and potential resources in the light of the recent AEC forecast of nuclear power growth through the year 2000.

The second paper, "Uranium Marketing Activities," by John A. Patterson, Chief of the AEC's Supply Evaluation Branch reviews the history of uranium marketing in the United States, future sales commitments and 1972 sales activity.

The third paper, "The Enriched Uranium Market," by Frank P. Baranowski, Director of the AEC's Division of Production and Materials Management, considers the interactions of separative work and uranium requirements, including discussion of uranium supply and such subjects as enrichment plant tails assay, plutonium recycle, lead time and capital investments.

Both reports, Wash-1242 and Wash-1243, may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Wash-1243 costs 80 cents by mail; Wash-1242 costs 40 cents.

BUREAU OF MINES' FUNDS PREVENT POLLUTION  
(Western Mining News - July 6, 1973)

Information to help prevent pollution from certain mineral processing wastes will be sought by the University of Alaska, and the South Dakota School of Mines and Technology, with research funds from the Interior Department's Bureau of Mines.

A \$15,000, 26 month research contract will enable the Alaska school to study disposal of mine tailings--finely ground waste material--in Arctic and subarctic regions. A \$15,000, one-year research grant addition will allow the South Dakota school to continue work on establishing fish tolerance levels for organic flotation reagents--chemicals used in up-grading ores.

Tailings are commonly disposed of in ponds, which, if improperly maintained, can be a source of pollution and a threat to public safety. Control of tailings has been the subject of much recent research, the Bureau said, but these studies have not provided information on special problems encountered in cold climates. These problems--behavior of tailings in the presence of permafrost, and under repeated freeze-thaw conditions--will be studied in the University of Alaska Project, the Bureau explained.

The South Dakota work is based on the awareness that seepage into drainage systems of toxic chemical wastes from flotation processes must be kept below concentrations that will cause ecological damage. Safe concentrations are currently considered to be those that can be tolerated by fingerling fish, and the South Dakota school has for two years been determining fish tolerance limits for organic flotation reagents. The one-year extension will allow more reagents to be tested, the Bureau said.

THE SMALL MINER THE FORGOTTEN MAN  
(The Mining Record - June 27, 1972)

(Editor's Note:) The following is the first of a series of guest articles submitted to the Mining Record by Arden L. Larson, geologist.

Unfortunately the average citizen fails to appreciate the importance that the small miner has played in the development of this country. Seldom does that citizen realize that if it weren't for this man and his discovery of the numerous metals so important to our society that America would not be the great country she is. Our free enterprise economy is the backbone of America and metal is the backbone of that economy. But the miner, the prospector, is the guy who started it all.

Where is that guy today? Forgotten, lost in the maze of computers, satellite prospecting, plate tectonics and the like; but very much alive. He is excited by the new gold rush, encouraged by the record high metal prices. Yet he is troubled. Troubled by the spiraling costs of labor and supplies; the environmentalists and new laws making it even more difficult to be a small miner. But now the need for him is great and growing daily, for we are facing a metal shortage much greater than our impending fuel shortage. We need new sources of metals, now. The vast majority of our present and past sources were found first by the small miner and later developed by our big brothers, the large mining companies.

So, how do we meet this challenge? How do we follow that path from the day that we load up our jackass (two legged, four legged or four wheeled) to the day the new found metal starts coming out of our mine? Where do we look, what do we do when we think we have found something, how do we prove that we have something worthwhile how do we develop it, where can we sell our product or property, and above all, how do we do this without spending much money? These questions and many others will be the subject of future articles. Hopefully, I can shed some light on them without offending anyone.

Perhaps I should let the reader know who is giving all this free advice. I am a geologist by training, have worked for several large mining companies and government agencies, and am now a small miner. I am operating a mill that I raised the funds for, designed, and built. I have been down that path and have made many mistakes in following it. I hope that I can help the small miner, particularly the individual prospector, avoid making some of the same mistakes. Even further though, I see a great need for the small miner. A need felt by each and everyone of us. I want to identify that need, to show my mining brethren where we fit in today's world. If one small miner is able to find one pound of new metal that might have gone unnoticed through something that I have said in one of my articles, then I have served my purpose.

Next: Let's Go Prospecting.

WHITE HOUSE GIVES COAL RESEARCH HIGH PRIORITY  
(Coal News - July 6, 1973)

The White House has put itself on record in a letter to NCA President Carl E. Bagge that there is "no intention" of letting coal research and development be submerged in a new nuclear-dominated Energy Research and Development Administration.

But Mr. Bagge told an energy writers press conference at the National Press Club today that despite this "very gratifying reassurance," the coal industry is pressing ahead in its intensive effort to make sure that one of the top officials in the proposed ERDA is a coal-oriented research specialist.

"We want a man who understands the full scope of the coal industry's research problems," he told the energy writers. "We want someone who understands production research as well as new uses of coal—we don't want them to become so mesmerized with research on coal gasification, liquefaction and other new uses that they ignore research on sorely needed new production techniques."

The White House reassurance of a high priority on coal research came from Richard M. Fairbanks, associate director of President Nixon's Domestic Council. The letter was in response to a telegram Mr. Bagge sent to the President June 29 in which he said the \$10 billion, five-year energy research program was "bold and logical in concept," but that research in coal production and use must not be "submerged and dominated by nuclear research."

Mr. Fairbanks replied, "We appreciate your concern and want to assure you that we have no intention of letting that happen. Under the President's proposal, the programs and personnel of the office of Coal Research and of Bureau of Mines energy R&D laboratories from the Interior Department would be transferred to the new Administration along with the R&D programs and resources from AEC."

"In addition," Mr. Fairbanks said, "ERDA will be the focal point for expanded Federal energy R&D which will be concerned primarily with coal and other non-nuclear forms of energy. In summary, the President's organization proposal and funding plans would provide a strong stimulus for coal research and development."

Meanwhile, Secretary of the Interior Rogers C.B. Morton said in endorsing the President's energy program that coal requires special attention in energy resource development.

"It is estimated that 80 per cent of our remaining fossil fuel resources in this country are in the form of coal," Secretary Morton said. "Yet, less than 20 per cent of our current energy needs are satisfied by coal. If we are to avoid severe shortages and increasing dependence on foreign energy supplies, we must develop environmentally safe ways to extract and utilize our vast coal resources."

**SECRETARY MORTON ANNOUNCES ORGANIZATION OF NEW  
MINING ENFORCEMENT AND SAFETY ADMINISTRATION**

(Department of the Interior - July 12, 1973)

Documents specifying the organization, functions, and operating procedures of the new Mining Enforcement and Safety Administration were submitted to the Federal Register today, Interior Secretary Rogers C. B. Morton announced.

MESA was established by a May 7, 1973 Secretarial Order providing for a reorganization of the Department of the Interior, to be completed within 90 days.

Secretary Morton explained his reason for creating the Mining Enforcement and Safety Administration:

"In reorganizing the Department as a whole to eliminate overlapping of functions and expenditures and to effect more responsiveness to new missions and responsibilities, it was necessary to examine each component of the Department in depth," he said. "There had been, from time to time, criticism that the Bureau of Mines organizational structure creates a built-in-conflict of interest--that, because of its mission to encourage development of the industry and of mining technologies, its policies sometimes have run at tangents with requirements under mine health and safety laws. Therefore, after weighing alternatives, it was decided to establish within the Department a separate entity to carry out enforcement of mining health and safety standards."

"By this step," Morton continued, "we will insure that decisions relating to the interests of mine workers will be insulated from decisions relating to minerals development."

Morton further stated that the Mining Enforcement and Safety Administration, "will have comparable organizational status to the Bureau of Mines as a separate operational component reporting to the Assistant Secretary for Energy and Minerals, Stephen A. Wakefield."

The health and safety functions presently carried out by the Bureau of Mines would be brought together under MESA to administer the Coal Mine Health and Safety Act and the Federal Metal and Nonmetallic Mine Safety Act.

Plans call for intact removal of all functions under the present Bureau of Mines Deputy Director for Health and Safety to make up the new MESA. These include functions of the Assistant Director for Coal Mine Health and Safety; the Assistant Director for Metal and Nonmetal Health and Safety; the Assistant Director for Education and Training; and the Assistant Director for Technical Support. In addition, MESA will assume responsibility for the Office of Assessment and Compliance Assistance, which previously functioned under the immediate supervision of the Bureau of Mines Director, Elbert Osborn.

The Bureau of Mines would retain its traditional functions of energy, metallurgical and mining research and development, as well as mine health and safety research, and mineral supply information and analysis.

Secretary Morton said he will name a MESA Administrator within 30 days, who, he said, will be responsible for "making any further changes he feels necessary to make MESA work effectively." He added: "We are engaged in a search right now to find the best person for the job."

NEW MINING CLAIMS

NUMBER OF CLAIMS	CREEK OR AREA		DATE NOTICE POSTED
16	Kugruk River	Bendeleben	Apr. 1973
40	Boston Creek	Bendeleben	May 1973
2	Tenderfoot	Big Delta	May 1973
34	Squirrel Creek	Chandalar	June 1973
34	Squaw Creek	Chandalar	June 1973
15	Sourdough Creek	Circle	June 1973
20	Preacher	Circle	May 1973
12	Porcupine & Crooked	Circle	May 1973
12	Nome Creek	Circle	Apr. 1973
7	Bottom Dollar	Circle	May 1973
1	Mastadon Fork	Circle	June 1973
27	Boulder	Circle	May 1973
3	Crooked	Circle	May 1973
8	Squaw	Circle	May 1973
187	South Fork	Eagle	May 1973
13	Walker Fork	Eagle	Mar. 1973
12	Canyon	Eagle	Mar. 1973
12	Squaw Gulch	Eagle	June 1973
10	Isle & Canyon	Eagle	Jan. 1973
15	Twelvemile	Eagle	Jan. 1973
8	Broken Neck	Eagle	Mar. 1973
5	Fortymile	Eagle	Jan. 1973
64	Ester Dome	Fairbanks	Apr. 1973
10	Goldstream	Fairbanks	May 1973

68	Valdez Creek	Healy	May 1973
1	Lucky Gulch	Healy	May 1973
3	Valdez-Roosevelt	Healy	May 1973
4	Rusty Creek	Healy	May 1973
175	Shotgun Creek	Healy	May 1973
11	Dry	Healy	May 1973
5	Newman	Healy	May 1973
12	Chute Creek	Healy	May 1973
12	Julian	Iditarod	July 1973
4	Beaver Cr.	McCarthy	June 1973
16	Denali Highway	Mt. Hayes	Apr. 1973
25	Glenn Highway	Nabesna	Mar. 1973
46	Ungalik River	Norton Bay	Apr. 1973
6	Boob Creek	Ophir	Mar. 1973
1	Steamer Bay	Petersburg	May 1973
4	Pigot Bay	Seward	Mar. 1973
4	Hummer Bay	Seward	Jan. 1973
8	Bettles Bay	Seward	Jan. 1973
4	Harrison Lagoon	Seward	Jan. 1973
4	Pigot River	Seward	Jan. 1973
30	Shovel	Shungnak	Apr. 1973
10	New York	Sleetmute	May 1973
7	Fortyseven Mile	Sleetmute	May 1973
10	Dutch & First	Talkeetna	Jan. 1973
3	Ramsdyke	Talkeetna	Jan. 1973
27	Dutch & Trib.	Talkeetna	Sept 1972
15	Cache Creek	Talkeetna	Oct. 1972
22	Tractor Fork	Taylor Mtn.	May 1973
7	Sletat Mt.	Taylor Mtn.	May 1973
9	Lewis River	Tyonek	May 1973
26	Theodore River	Tyonek	May 1973
65	Glacier River	Wiseman	May & June 1973

METAL MARKET

	July 20, 1973	Month Ago	Year Ago
<u>Metals</u>			
Antimony ore, stu equivalent, European ore	\$13.40-14.40	\$13.40-14.40	\$7.03-8.16
Barite (drilling mud grade per ton)	\$14-18	\$18-22	\$18-22
Beryllium powder, 98%, per lb.	\$54-66	\$54-56	\$54-66
Chrome ore per long ton	\$24-27	\$24-27	\$25-27
Copper per lb.	60¢	60¢	50.6¢
Gold per oz.	\$118.05	\$118.05	\$64.17
Lead per lb.	16.5¢	16.5¢	15.5¢
Mercury per 76# flask	\$260.00	\$300	\$200
Molybdenum conc. per lb.	\$1.72	\$1.72	\$1.72
Nickel per lb. (cathode)	\$1.53	\$1.53	\$1.33
Platinum per oz.	\$167.00	\$150	\$147.01
Silver, New York, per oz.	*	267.5¢	178.6¢
Tin per lb., New York	240.5¢	209¢	176.8¢
Titanium ore per ton (Ilmenite)	\$22-24	\$22-24	\$30-35
Tungsten per unit	\$55.00	\$55.00	\$55.00
Zinc per lb.	20.25¢	20.25¢	18¢

\*Handy & Harmon was not quoting silver because silver was selling above the price ceiling. Silver sold at 284.17¢ per ounce on the London Metal Exchange and 291.9¢ per ounce on the New York commodity exchange, 1st pos (c).