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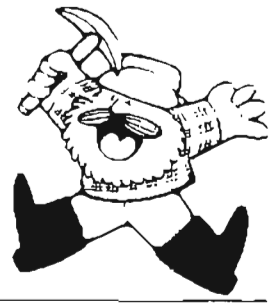
STATE OF ALASKA

Department of Natural Resources

Division of Geological & Geophysical Surveys



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Lime and Phosphate Deposits Cited for Possible Agricultural Use

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Alaska contains 25 million acres of land suitable for agriculture, three-fifths of which are suitable for farming; the rest could be productive range lands (Tomlin, 1974). Alaskan soils have a wide range in natural fertility, although nitrogen, phosphorous, and sometimes potassium are in short supply. Nevertheless, calcium and sulphur are believed to be the only secondary elements that must be added to soils for good plant growth. Strongly acid soils must be heavily limed to secure a more favorable plant growth. The lime, in addition to reducing soil acidity and supplying calcium, makes the soluble iron and aluminum less toxic. Ground limestone or marls (calcareous clays and silts) are common lime sources. Most soils requiring lime would need an initial application of 3 to 5 tons of high-grade liming material per acre (Laughlin, 1974).

Samuel Rieger (1974), soil scientist of the U.S. Department of Agriculture, indicated that an application of 225 pounds of the phosphate P_2O_5 per acre increased a yield of potatoes from 8 to 13 tons per acre. Cleland Conwell (1976a), in monitoring the application of grass and fertilizer in the reclamation of mined land at the Usibelli Mine in Healy, reported on the excellent growth of grasses with the application of fertilizer.

Of the required nutrients that must be added to Alaska soils—nitrogen, phosphorous, lime, and sometimes potassium—all but potassium are available within Alaska. The Collier-Carbon Plant near Kenai produces urea, a source of nitrogen which, though less effective as a fertilizer than ammonia nitrate, may be economically used in most applications. The phosphate rock and the lime rock or marls may be applied to the soils after being finely ground. Phosphates, however, are usually treated with acid to increase the P_2O_5 content to 50 percent or more. High-grade or commercial raw phosphate rock is generally considered to contain a minimum of 30 percent P_2O_5.

Limestone

The only preparation required for agricultural limestone is fine grinding to at least -100 mesh (-149 microns). No references to the use of Alaskan limestone for agriculture have been found.

Limestone for agriculture does not require the purity of certain other industrial uses such as cement. The limestone should be close to either currently cultivated areas or projected agricultural developments.

Moxham and Eckhart (1956) described marl deposits in the Knik Arm area, reporting small reserves and an inferred resource of probably less than 1 million tons. The marl could be used but would be inferior to limestone.

Large masses of high-calcium recrystallized limestone occur along the north side of the Matanuska

Valley in the drainage of Kings River north of the Castle Mountain fault. The Kings River area has extensive high-grade limestone deposits 6 to 8 miles from the East Fork. The deposits could supply all the foreseeable demand for cement in the Cook Inlet-Anchorage region and the railroad belt. The limestones, which are exceptionally pure, occur 8, 16, and 17 miles north of the Glenn Highway between mileposts 71 and 72 (Mihelich and Jasper, 1961).

Moxham, Eckhart, and Cobb (1959) reported on limestone in the Windy Creek area. The report, primarily concerned with limestone for cement, describes two deposits of Devonian age that are of adequate size and chemical quality; they are located 7 and 11 miles west of Alaska Railroad milepost 325. A larger limestone deposit of lesser quality but still quite suitable for agricultural use lies 1 mile east of the railroad. The three deposits, which have estimated reserves of 180 million tons, would be an excellent source of limestone and would be accessible because of their proximity to the railroad; however, they are within the boundaries of McKinley National Park.

There is a small limestone deposit at Fox, about 10 miles north of Fairbanks. The deposit is probably too small for commercial development.

Another possible neutralizing agent might be the fly ash from the power plant at Healy. The ash contains approximately 15 percent CaO, nearly 0.75 percent P_2O_5, and 1.5 percent K_2O. The coal ash was analyzed by the U.S. Geological Survey and reported by Conwell (1976b). Lu and Rao (1971) state: "The high alkali characteristics of fly ash can be utilized as a low-cost neutralizing agent." Also, the material is available in a particle size suitable for application. Very little additional research would be required to evaluate the benefits of this material for agricultural use.

Phosphates

Known and documented phosphate beds occur in the Mississippian Lisburne ground and in the Triassic Shublik Formation along the northern front of the Brooks Range and adjoining foothills. Although samples by Patton and Matzko (1959), Detterman (1970), and Tourtelot and Tailleur (1971) indicate a range of values from 12 to 30 percent P_2O_5, the actual extent and thickness of the beds are unknown.

The sequence of beds containing phosphate rock occur both east and west of the pipeline haul road and should be accessible for agricultural use. However, there would be land problems. Although some beds are on state-selected land, most are in the Arctic National Wildlife Range or in the Native regional deficiency areas. Also, access may be limited because of possible inclusion in one of the four national systems that exclude mining.

There is another recorded location of phosphate. Wedow (1948) reported phosphatic material in the Calico Bluff formation opposite the mouth of the Tatonduk River, near Eagle. The phosphate beds north of the Brooks Range and near Eagle are associated with anomalously high radioactivity. White (1951) reports anomalously high radioactivity in carboniferous black shale on the north side of the Porcupine River upstream from the Coleen. The radioactivity, by association, might indicate a third area in which to search for phosphate beds.

Legal Status

Phosphates are leasable minerals, either from the state or the federal government. If on state lands, the applications for a phosphate lease are covered by section 38.05.155 of the Alaska Statutes.

Agricultural-grade limestone would be a salable mineral, much the same as sand as gravel, on either state or federal lands.

Demand

To mine and process either of these materials, there must be a demand—and the present demand on the 17,000 acres currently under cultivation might not be adequate to justify mining and processing. Fifty thousand acres may be released in the Delta area for agriculture, and another 300,000 acres of land are being considered for agricultural development in the Nenana area. If these are developed, there would be a need for a local supply of these nutrients.

If mined, both the phosphates and limestones would have to be processed for agricultural application. The processing in either case might be grinding into a very fine powder, probably less than 100 mesh, with the phosphates being further refined to a higher grade product with sulphuric acid, such as that produced as a by-product of smelters.

Summary

Lime and phosphate are needed as nutrients to the soil in Alaska. The materials are available; limestone is close to the railroad and phosphates are near the haul road to Prudhoe Bay. However, there are deterrents to the development of some of these sources: some phosphates are located in the Arctic wildlife range, or on d-2 lands selected for inclusion in the national park system, and some limestones are found in McKinley National Park.

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New Claims Tail Off

Nome, Fairbanks, southeastern Alaska, and Talkeetna were the most active recording districts in the past three months, according to Mildred Brown, DGGS mining information specialist. There were but 2,268 new claims filed for the November 1976—January 1977 period, a sharp reduction from the 8,107 filed for the preceding 3 months.

Anchorage	50	Haines	7
Cordova	1	Seward	1
Fairbanks	436	Juneau	231
Glennallen	61	Ketchikan	265
Iliamna	7	Palmer	68
Nenana	24	Petersburg	70
Barrow	1	Kotzebue	3
Nome	789	Talkeetna	231
Mt. McKinley	3	Rampart	6
Ft. Gibbon	2	Chitina	12

Total 2,268

Miners Can Still Patent Claims on Some Native Lands

(from a BLM news release)

Miners who seek federal patent or ownership to their claims on lands selected by Alaska Natives, but missed the Dec. 18, 1976, deadline for filing applications, may still apply before the land is conveyed to Native ownership, Bureau of Land Management (BLM) State Director Curtis V. McVee said today.

McVee said that prior to Dec. 18, applications for survey leading to patent of mining claims on Native-selected or conveyed lands assured that the claims would be considered for patent under federal laws. Now, a miner may still file his application for survey with the intent of patenting his claim until lands selected by Alaska Natives are actually conveyed to them.

Although Alaska Natives have selected 105 million acres, McVee said that under terms of the Alaska Native Claims Settlement Act only 40 million would be conveyed.

A miner seeking patent or title to his claim on Native-selected lands should submit to BLM an application for mineral survey, a certified copy of the location notice, a deposit for processing the application, and the name of the authorized U.S. mineral surveyor chosen by the applicant, McVee said.

Further information and applications for mineral survey and patent are available for BLM's Cadastral Survey Office, 807 G St., in Anchorage.

Cost Data for Cleaning Mineral Processing Waste Water Summarized by Mines Bureau

(from Dept. of the Interior news release)

Costs of treating waste water to meet new Federal clean water guidelines will prompt the Nation's mineral industries to develop processes that generate less waste water and find better treatment methods for what they do generate, according to the Interior Department's Bureau of Mines.

A new Bureau publication summarizes the probable costs of aeration, addition of lime, and sedimentation as methods the mineral industry can use to meet Environmental Protection Agency (EPA) guidelines for point discharge effluent limitations—maximum amounts of pollutants in waste water at the point where the treatment facility discharges to a stream. The industry must comply with part of the guidelines by July 1, 1977 and with the rest by July 1, 1983.

While much mineral industry waste water is suitable for reuse in the process that produced it, costs for recirculation generally have been more than for new water, the Bureau said. Treating this waste to meet EPA guidelines changes the economics, however, and the report cites recycling of process water as probably the simplest and most promising way to quickly reduce