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STATE OF ALASKA
DIVISION OF MINES AND MINERALS

REPORT ON PRELIMINARY INVESTIGATION OF MOREY-QUINLAN-TENGS LIMESTONE PROPERTY NEAR MILE 39, HAINES HIGHWAY

SKAGWAY QUADRANGLE

GORDON HERREID
State Geologist
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A request for an examination of this limestone deposit was made by Martin A. Tengs in a letter dated May 15, 1961. Mr. Tengs accompanied me around the property on July 24 and I made the examination on July 25 and 26. Mr. Tengs helpfully made a car available for transportation between Haines and the property during the examination.

The claims, the Limestone Placer Numbers 1, 2, 3, and 4, (see accompanying map and aerial photos) are staked in a block on a prominently outcropping limestone exposure which lies about 1000 feet north of the Haines Highway between mile 38 and 39. The claims were located on May 16, 1958 and are held by Vern Morey, Thomas R. Quinlan and Martin A. Tengs. The upper part of the limestone escarpment which crosses the claims is at an elevation of about 1750 feet and is accessible by foot only. The lower part of the claim block is readily accessible via an old partly finished road cut which was apparently made and abandoned during the construction of the Haines Highway. This roadcut is at an elevation of about 800 feet where it crosses the claims. The situation of the claims as shown on the map was determined by a Brunton Compass Survey.

GEOLOGY OF THE DEPOSIT

The bedrock in the area has been mapped as carboniferous shale and limestone by H. E. Eakin (1919, Plate I). The limestone in the claim area is apparently interbedded with black slate which contains limy horizons. It is probable that this black slate, which crops out along the creek on the SE edge of the property, occupies most of the LP #1 claim beneath the cover of limestone slide debris. Much of the limestone in the claim area is a porous, sugary mass of white calcite crystals, many of them 0.02" or 0.03" in diameter, which shows no clearcut bedding planes. In some places, the limestone is a dense, dark gray, fine grained rock. The porous white limestone has been formed by alteration and recrystallization of the dense dark limestone.

SAMPLE RESULTS

Chemical analyses of the samples taken are shown on the attached sheet. Samples taken were of hand speciman size. Sample 18 and Samples 20 through 26 were taken across the prominent limestone scarp that crosses the claims. The analyses indicate that this body of rock is sufficiently pure for flux grade limestone. When heated to white heat by a propane torch, the porous white limestone does not decrepitate. Samples were also taken NW of the claims along the old roadbed and beyond to a small pond, 2300 feet NW of the claims. The analyses of Samples 28 through 31 in this area show them to be of flux grade chemical composition, even though there is more unaltered gray limestone present.

RESERVES

Using dimensions of 600' by 2,000' for the length and width of the limestone and assuming that the limestone runs 1 ton/13 cu. ft:

$$600 \times 2000/13 = 92{,}300 \text{ tons/vertical foot.}$$

A problem in mining this body is presented by the fact that the pure limestone dips at an angle of 73° under impure limestone (represented by Sample #19). Mining should be done so as to avoid handling the impure limestone as waste. By leaving some of the pure limestone unmined on the hanging wall side it would be possible to keep out of the waste and still maintain a proper slope on the pit wall. If, on the average, 1/3 of the surface area were left unmined, and mining were at the rate of 60,000 tons per year, the deposit would be mined down at the rate of about one foot per year. At this rate, reserves would be sufficient for at least 150 years. Due to the steep hill slope, gravity loading would be possible which should result in a low cost mining operation.

ECONOMIC OUTLOOK FOR THE DEPOSIT

It is possible that when Klukwan is mined, the concentrate will be shipped directly to Japan, or that a direct reduction process using no limestone might be used, but for the purpose of this analysis we will assume that a smelter will be set up at Haines. The potential value of limestone claims in the Haines area is as a flux to be used in smelting Klukwan iron ore. If this limestone deposit is to have any value, it must be able to provide flux grade limestone landed in Haines cheaper than other limestone can be landed from any other source along the Haines Highway or from the islands in Southeastern Alaska.

Physically, fine-grained limestone is most desirable as it is less likely to decrepitate (fly apart) in the furnace. Chemically, the ideal flux is low in silica, alumina, sulfur and phosphorus, as these elements reduce the fluxing action and increase the amounts of limestone and fuel per ton of pig iron. Most operators prefer 1.5% to 3% silica and less than 1% alumina. It is important that a large tonnage of uniform composition is available. Chemically and tonnagewise, this limestone appears to be satisfactory. Physically, simple tests suggest that the limestone will not decrepitate, even though it is crystalline. Each operator prefers particular specifications, so that while it is possible to state that a given rock is suitable as a flux, only the user can say whether it is the best for his particular operation.

Transportation

Assuming a use of 0.2 tons limestone per ton of pig iron and production of 300,000 tons per year of pig iron: the smelter would require 60,000 tons of limestone per year. A barge operation from the vicinity of Prince of Wales Island on a long term charter basis could haul limestone for an estimated 1/2¢ per ton mile or about $1.25 per ton. Loading and unloading of barges might cost

15¢ additional for a total transportation cost of $1.40 per ton of limestone delivered in Haines. This gives an estimated figure that would have to be met by a truck haul from Mile 40 on the Haines Highway. This would mean that a truck hauling a 10-ton payload would have to make the 80-mile round trip for $14.00 (17-1/2¢ per mile).

The possibility exists that a smelter would be located at Klukwan. This would greatly alter the situation in favor of the Mile 39 limestone.

RECOMMENDATIONS

This limestone deposit appears to be adequate in grade and tonnage to provide flux stone for a Haines smelter. I suggest that an investigation be made by the operators concerning the costs of shipping limestone from Mile 39 by truck relative to shipping by barge from the limestone deposits in the vicinity of Prince of Wales Island, if it appears a smelter might be established in the vicinity for smelting of the Klukwan ore.

CHEMICAL ANALYSES

Sample	%CaO	%MgO	%SiO_2	%L.O.I.*	%Fe_2O_3	%Al_2O_3	%P_2O_5	%Sulfur	%Potassium	Description
18	29.1	21.5	0.34	47.2	1.4	0.4-0.5	- .1	- .1	- .1	Light gray xtaline ls
19	11.4	3.1	54.41	11.4	4.3	0.4-0.5	"	"	"	Fine grained, dk. gray, dense ls.
20	49.1	4.4	0.48	43.6	1.0	0.4-0.5	"	"	"	Sugary,white,porous. xtaline ls w/gray s aks.
21-22	48.6	4.8	0.21	44.3	0.9	0.4-0.5		"		" " " "
23-24	50.2	5.2	0.19	42.1	1.2	0.3-0.4		"		"...w/no gray ls.
25-26	47.5	6.4	Trace	43.1	1.0	0.4-0.5		"		"..w/dk.gray streaks
27A	44.4	5.9	4.90	41.1	2.1	0.2-0.3		"		Fine grained,dk.gray,dense ls from Haines Hwy rd.cut 1/4 mi.SE of clms
28	42.6	8.6	Trace	42.8	0.5	0.4-0.5		"		Sugary,white,porous xtaline ls.
29	46.1	5.2	0.85	43.8	0.5	0.3-0.4		"		" " " " " w/few gray patches.
30	47.6	2.4	0.22	39.8	3.7	0.4-o.5		"		Fine grained, dense,dk gray ls w/sugary ls "veins".
31	44.9	6.7	0.40	43.7	0.6	0.4-0.5		"		Mixed fine grained,dense,dark gray ls and sugary,white,porous, xtaline ls.

Analyzed by Irwin W. Mitchell, Assayer, Division of Mines and Minerals, Anchorage.

* Loss on Ignition @ 900^9 C.

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GEOLOGIC SKETCH MAP

MOREY – QUINLAN – TENGS LIMESTONE PROPERTY

NEAR MILE 39, HAINES HIGHWAY

GORDON HERREID MINING GEOLOGIST JAN. 30, 1962