GEOLOGY OF THE WHITE-CLAY DEPOSITS IN SIRUMA PENINSULA, CAMARINES SUR, LUZON

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ONE PLATE

INTRODUCTION

White clay has been used for a long time in several isolated localities in Camarines Sur, Luzon, for whitewashing houses, but its occurrence in Siruma Peninsula had not been reported to the Bureau of Science until the beginning of the hectic mining boom of 1933. Mr. Abarquez was sent out to confirm this report, and in May, 1933, after a three-day reconnaisance, he found a deposit in Sitio Napu, which he estimated to contain about 1,000 tons of white clay. Tests made by the ceramic laboratory of the Bureau of Science showed that this clay was the most refractory of all the local materials submitted so far to the Bureau of Science, that it could be put easily in suspension and was well adapted for casting such objects as bowls, saucers, and floor tiles, that it could well be used as a substitute for imported fire bricks, and that it might prove to be a good material for the manufacture of various other articles that are being imported into the Philippines to the amount of hundreds of thousands of pesos every year.

On the strength of these results, a recommendation was made to His Excellency, the Governor-General of the Philippine Islands, to reserve the Siruma clay deposit in order to avoid the harmful effects of speculative manipulation of the source of raw material for a ceramic industry in the Philippines. Accordingly Proclamation No. 583 was issued by the Governor-General January 5, 1935, reserving "All that area bounded by north latitudes 13 degrees 55 minutes 30 seconds, and 14 degrees 2 minutes 30 seconds and by east longitudes 123 degrees 15 minutes 45 seconds and 123 degrees 20 minutes 00 seconds." This reservation includes most of the valuable clay deposits, but it would be desirable to move the eastern boundary about one kilometer to include the Sulpa clay deposit.

In order to secure further data on the geology of the Siruma clay, the writer made a reconnaisance of Siruma Peninsula, from April 24 to 30, 1934, inclusive. He obtained his field notes and located them through the use of traverse lines, which he ran along the coast of Sapenitan Bay, Butauanan Bay, and Butauanan Island, along the trail from Tandoc to San Vicente, thence to Sulpa, and from San Vicente to Siruma, Suguitan, Sulpo, and Cabuyuan. These traverse lines were controlled by pace and Brunton compass and adjusted to the Coast and Geodetic Survey map, which was used as a base. A few details obtained from the map of the Cadwallader Gibson Lumber Co. were incorporated.

LOCATION AND ACCESSIBILITY

Siruma Peninsula is the northwest end of Caramoan Peninsula from which it is almost entirely separated by Looc River and San Vicente Bay. It is located on the east side of the mouth of San Miguel Bay and may be reached from Manila by the Manila Railroad as far as Naga, thence by automobile or bus as far as either Calabanga or Manguirin, from which small motor boats and launches make more or less regular trips to Siruma, Tandoc, San Vicente, and some other barrios, depending on the cargo and passengers available.

The trip from either Calabanga or Manguirin to Siruma Peninsula should not take over three hours by water, but since the launches stop in many small places to collect cargo and passengers, it sometimes takes more than twenty-four hours to cover the distance.

CULTURE

In Siruma Peninsula there are no roads but there are a few open foot trails and several kilometers of railroad tracks belonging to the Cadwallader Gibson Lumber Co. These tracks are being extended to cover the company's lumber concession in Siruma Peninsula.

Siruma is the only municipality in Siruma Peninsula, but Tandoc, being the site of the sawmill of the Cadwallader Gibson Lumber Co., is the most important sitio. It has a labor population of over 1,000 people, living in a camp, or small village, built by the company along the southwestern shore of Butauanan Bay.

At the end of the railway in Tandoc a wooden pier has been built to accommodate ocean-going steamships, which carry lumber to the United States.

TOPOGRAPHY AND VEGETATION

Siruma Peninsula is covered with rolling hills separated by narrow valleys in the central part of the peninsula and by open and swampy ones near the coast. The highest hill or mountain is about 70 meters high, and the average relief is about 30 meters. The coast is deeply indented by shallow bays and sharply protruding and narrow peninsulas. It may be inferred from the outline of the coast and the occurrence of sunken valleys like that of Looc River, San Vicente Bay, and the upper portion or head of Butauanan Bay that this peninsula has recently submerged.

Near the northern and western coasts the hills are generally covered with cogon grass on their flanks, and capped with forest. In the central part of the peninsula the hills are thickly covered with virgin forest which is the source of lumber supply of the Cadwallader Gibson Lumber Co. Most of the coast is bordered with mangrove near the river mouths and with white sandy beach between them.

GEOLOGY

The country rock in Siruma Peninsula is andesitic basalt in different stages of schistosity. The trend of the schistosity varies in different places and is generally at right angle to the coast line. In the greater portion of the peninsula the original rock cannot be distinguished, partly due to its complete metamorphism into schist, and partly due to weathering. Due to the latter the hills have been rounded by erosion and from a distance the topography resembles that of a shale country.

Along the creeks and trails numerous floats of white and coarsely crystalline barren quartz occur. They look more like cavity fillings or lenses than like vein material.

Along the railroad tracks in Siruma Peninsula zones of light-colored schist that alters into white clay occur. These zones are narrow and of limited extent, but rather frequent and are probably the source of the clay deposits that have accumulated in the valleys.

In Suguitan and Cadangan Creeks, near San Vicente, there are outcrops of white crystalline limestone, which is generally green on the surface due to a thin moss growth. This limestone is confined along the channels and banks of the creeks and is probably the inland extension of the coquina beds, which are in the course of formation along the coasts of Siruma Peninsula.

Long stretches of such coquina beds may be seen, particularly along those portions of the coast of Butauanan Bay and Butauanan Island that are not exposed to strong wave action. These beds dip about 5° toward the sea, and their strike is parallel to the contour of the coast.

WHITE CLAY

Four places are now definitely known where white-clay deposits of probable commercial size occur; Napu, Suguitan, Cabuyuan, and Sulpo. They may be briefly described as follows:

The Napu clay deposit.—This deposit was visited by Mr. Ramon Abarquez in May, 1933. It consists of several small deposits located along a tributary to Bahao Creek, about one hour's walk southeast of the town of Siruma (4.68 kilometers south 56 east, to be exact). Several pits have been dug in this place, which showed a deposit of white clay covered with an overburden of reddish ferruginous soil. The white clay becomes mottled with depth. It may amount to over 1,000 tons at least, according to Mr. Abarquez's preliminary calculations.

The Suguitan clay deposit.—The deposit in Suguitan is located on the banks of Suguitan Creek, about 1 kilometer southwest of the barrio of San Vicente. The clay is white to slightly gray and plastic and contains varying amounts of fine quartz sand. The deposit from which our sample was taken is evidently alluvial and has been washed down from the nearby hills. The mud that has been smeared over the bushes and grass by the carabaos whitens on drying, suggesting that it is of the same nature as the clay found down the creek. This fact leads us to presume that the clay deposit may extend to the hills, where the carabao mud holes are located.

The Cabuyuan clay deposit.—In Cabuyuan Creek the clay deposit is found along the banks, about 200 meters from Bahao River, into which the creek flows, and about 3 kilometers west of San Vicente, near the railroad track of the Cadwallader Gibson Co. This locality is low and is frequently flooded, the average elevation being barely 5 meters above the creek. The deposit may have a lateral extension of 300 meters square covering both sides of Cabuyuan Creek.

The clay is from white to slightly gray, highly plastic, and contains a small proportion of fine white sand. The plasticity seems to decrease with the amount of sand.

The Sulpo clay deposit.—The Sulpo deposit is located about 1.5 kilometers north-northeast of San Vicente along the banks of Sulpo Creek and near the trail to Diniagan. It is in a flat country with an elevation of about 6 to 10 meters above the creek and covers an area about half a kilometer square. Our sample was obtained from pits that were dug at the bank of the creek by people who used the clay for whitewashing their houses. The deposit is an alluvial mantle covered with a loam overburden 50 to 100 centimeters thick.

The Sulpa clay deposit.—The deposit in Sulpa is located about 2 kilometers north-northeast of the Sitio of Sulpa. It is a small deposit that has been washed down from the hills and has accumulated in the valley of Mayboclod Creek, a small and narrow valley that may be reached by way of an overgrown foot trail. This clay deposit is probably of limited extent as shown by the fact that only outcrops of solid schist occur on the hill sides and along the creeks and trails. The clay is whiter than that found in Suguitan, Sulpo, and Cabuyuan Creeks, and contains fine quartz sand, which makes it gritty.

COST OF MINING AND TRANSPORTATION

The cost of digging the clay samples that we brought to Manila was 2 pesos per sack of an average weight of 93 kilos, placed in San Vicente. The freight on the Manila Railroad to the Tutuban station was 3.85 pesos for a lot of six sacks, or 64 centavos per sack. To this must be added the cost of two gunny sacks, 30 centavos, the transfer from San Vicente to Naga, 79 centavos, and truckage in Manila, 76 centavos per sack, bringing the total cost of placing a sack of 93 kilos in Manila to 4.49 pesos. Two gunny sacks were necessary to hold the clay as they rotted quickly due to the moisture of the clay and could not stand its weight.

If every item in this estimate were proportional to the weight of the clay, 1 metric ton of it would cost about 48.30 pesos delivered in Manila. However, this figure is based on the mining and transportation of a lot of six sacks, the transfer of which between San Vicente and Naga was very expensive due to the very irregular route over which the clay was carried by carabao-drawn sled from the clay deposits to the canoe landing in San Vicente, by canoe to the head of Looc Bay, by launch to Kalabanga, and by truck to Naga station. It can be seen, therefore,

that there is room for simplifying the transportation and reducing its cost. For instance, it probably would be much cheaper to transport the clay in large lots directly by water on chartered freighters or sailboats from Siruma to Manila. There is also the possibility of reducing the cost of mining, which in the case of the Siruma clay amounts to mere digging, to within 1 peso per ton. By reducing mining and transportation costs, it may be possible to reduce the cost of 48.30 pesos, which we have obtained above, to less than 15 pesos.

CONCLUSION

The clay deposits in Siruma, as stated above, are of alluvial origin and of mantle form. That the deposit may extend in depth below the level of the creeks or even below sea level in some locality is possible, as there may have been deposition of clay before the recent subsidence of Siruma Peninsula. The possibility of clay in Siruma is that of many small deposits scattered over a wide area. While their areal extent and depth are not fully determined, it is very probable that an aggregate of at least 15,000 tons of clay may be available from the different deposits which are known at present.

Actual development work by digging exploratory pits and trenches or boring holes with auger or post-hole diggers at the Napu, Suguitan, Sulpu, and Cabuyuan deposits will have to be made to arrive at definite figures. For this work an outlay of 5,000 pesos should be sufficient, excluding the salary of a supervising engineer.

ILLUSTRATION

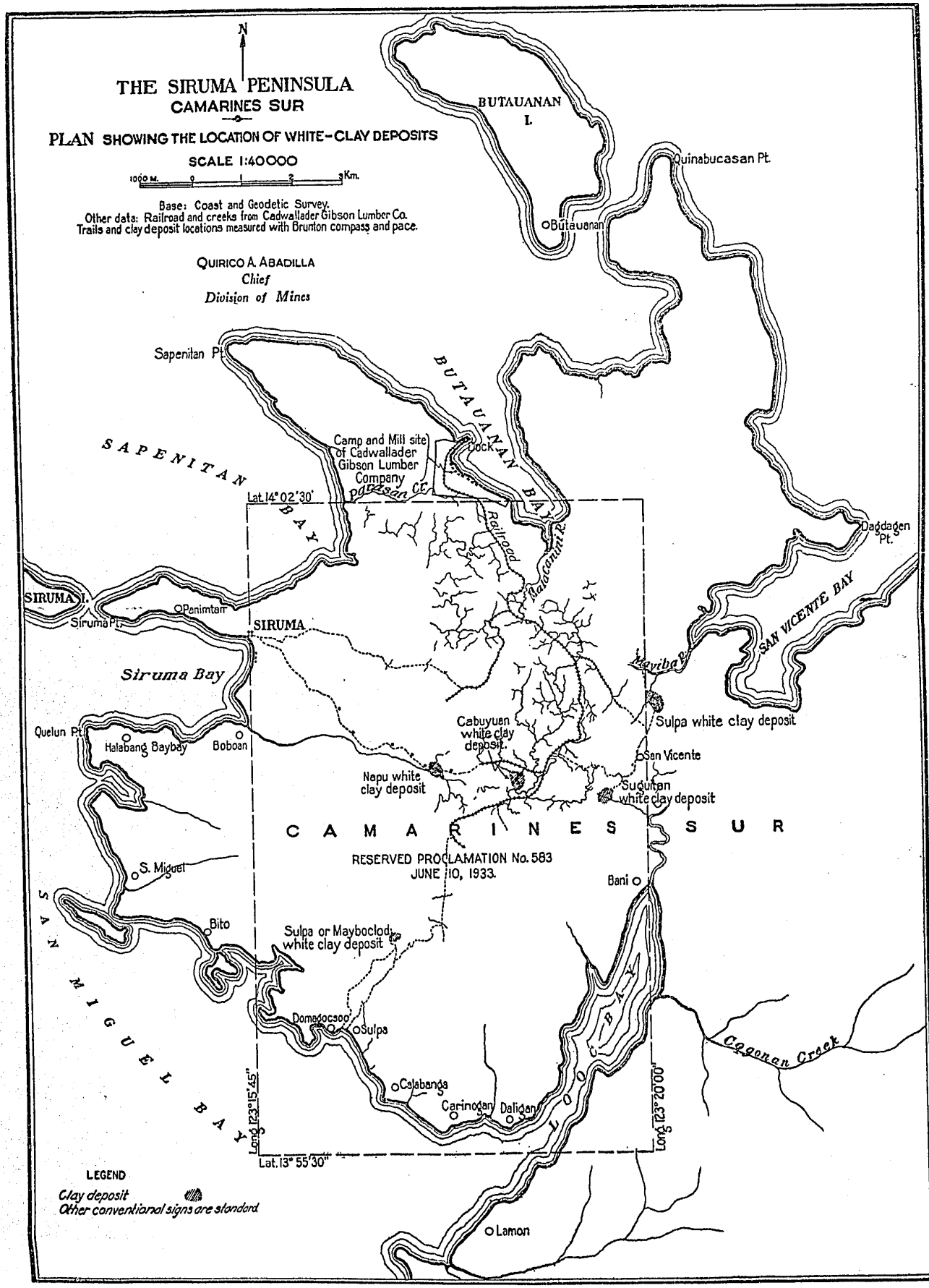

PLATE 1. SIRUMA PENINSULA, LUZON, SHOWING THE LOCATION OF WHITE-CLAY DEPOSITS.