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TERRITORY OF ALASKA

Department of Mines

B. D. Stewart, Commissioner

PRELIMINARY REPORT ON SOME PUMICE DEPOSITS

AUGUSTINE ISLAND, ALASKA

CONTENTS

Summary	Page 1
Introduction	2
Acknowledgements	4
Physical Features	4
Descriptions of the Deposit	5
Mine Workings and Present Plant Installations	10
Haulage	11
Roads	12
General	13
Mining and Treatment Suggestions	14
Recommendations	15
Conclusions	16
Appendix	18
A Sample Description and Location	
B Report of Assay	
Map of Augustine Island	

Memo:- See accomp. letter
from Dahners - 3/27/48
Tracing of map of Aug. Is.
in L.O. map file - 30w. - Thirt
ILLIAMNA PRECINCT.

PRELIMINARY REPORT ON SOME PUMICE DEPOSITS¹
AUGUSTINE ISLAND, ALASKA
October, 1947

By
L. A. Danners

SUMMARY

The easily accessible deposits that have been discovered on Augustine Island are quite thin, less than three feet on the average in the thickest areas where mining has been done. There is a possibility that those deposits might be quite extensive, but prospecting and development have not been done to the point where even the faintest idea of the reserves can be estimated. The easily accessible pumice is of an inferior grade when compared with that of a small deposit higher on the mountain that has been concentrated by stream action, and is also possibly from a better deposit originally.

The pumice must be hauled over roads of the simplest construction to the shallow lagoon which is used as a loading harbor. Even from the most accessible deposits. More than five miles of comparatively complicated, expensively constructed road would be required in order to ~~attain~~^{reach} the higher grade pumice deposit.

¹ also see, Roehm J. C., Preliminary Report on Some Pumicite Deposits, Katmai National Monument, Alaska, 1947

The harbor facilities are very shallow and can only be used by very shallow draft boats on any but the very highest of tides. A further hazard at the present time are the rocks in this lagoon that could have been removed.

As the operation is in its infancy it is easy to make many suggestions and probably those have been considered before. ~~However~~, two suggestions have been made *by me* in regard to mining equipment, several comments have been made in regard to treatment, and an urgent proposal that reserves be developed has been made.

It has been pointed out that because the pumice industry is new, it is an trial and that it therefore behooves all concerned to get the best material available in order to promote its use as a building material.

The conclusion is that it would be better to get pumice from the vicinity of the ~~Katmai~~ National Monument if possible.

INTRODUCTION

This investigation of pumice on Augustine Island during the month of October 1947, was made partially to secure information on which to base an opinion as to whether the U. S. Geological Survey would be justified in sending an expedition to the area to make more extensive and detailed examinations, including topographic and geologic mapping and also to extend help to the Alaska Katmalite Corporation. The corporation is attempting

mining of the pumice for use in the manufacture of building blocks at Anchorage, Alaska.

The pumice deposits investigated were on the southern slope of the active volcanic cone that is named Augustine Island. The deposits visited are at various elevations from 760 to 1500 feet. Although only a small portion of the island, a southwest sector, was visited it is known that pumice is present on the island from the beaches to elevations above those visited. Augustine Island is located in the lower part of Cook Inlet near the position Latitude $59^{\circ}20'$, Longitude $153^{\circ}20'$.

This trip was made by boat from the town of Seldovia. Because of the stormy weather, said to be generally prevalent during the fall of the year, and because of the lack of a sheltered harbor on the island the trip required much more time than planned. The landing was made by small boat in the small shallow lagoon on the southwestern shore of the island.

The Alaska Katmalite Corporation is the only concern that is mining on the island. It is believed that they have located some claims on the pumice deposits. They have attempted to use the lagoon, though shallow as a harbor for loading the pumice. They have been working during the summers of two years.

As far as is known no previous effort has been made to mine or utilize the pumice in this vicinity an

any scale whatsoever.

ACKNOWLEDGEMENTS

It is desired that appreciation be shown to Mr. Gus Sutherland, President of the Alaska Katmalite Corporation, of Anchorage, Alaska, for his help and courtesies that were extended during the investigation of this deposit.

Appreciation is due the Jack Andersons of Seldovia for their efforts in providing transportation.

Further appreciation is due the Commissioner of Mines and to the office staff of his department.

PHYSICAL FEATURES

The general topography of the island with the exception of the cliffs along some of the shores is rather gentle up nearly as high as the highest sample, (1500 feet elevation) but above that point it becomes quite steep. Although no actual measurements were taken it is thought that the slopes would average steeper than 20 degrees above the 1500 foot elevation and somewhat less than 20 degrees below that point. It appears as a smooth volcanic cone that has risen through the water from the bottom of Cook Inlet to the elevation 3970 feet. Even though the slopes are generally quite gentle, they are all out with extremely steep walled gullies, gorges and small canyons. These features vary in depth from a

few feet to what was estimated to be more than 50 feet in the small area of the island that was seen.

Some of the largest of these canyons contained small streams, but although freezing temperatures had been prevalent previous to the investigation making an estimate rather uncertain, it is believed that the amounts were too small to be of value except for camp use, also it is thought that the streams were subject to large fluctuations in volume.

The vegetation consists of brush and grasses. The brush is mostly alder that grows in tangled masses that are hard to walk through, in fact it is well to plan trips over the mountain to go around the alder patches if possible. While it is possible that not more than 20 percent of the island is covered with the brush the patches are arranged so that it is hard to avoid them, therefore travel is difficult. Some of it attains a height of more than 10 feet. The other smaller brush and grasses do not impede travel to any extent.

DESCRIPTION OF THE DEPOSIT

Probably most of the cone is made up of acidic lavas, a conclusion drawn because of the steepness of its sides. Certainly some of the material is fragmental and at least a part of that other than the pumice is vesicular. The material that is thought to be fragmental

varies in size up to possibly five feet in diameter.

The pumice itself may have been entirely of fragmental origin since no flows have been seen. However, it is possible that flows do exist at other places on the island or at higher elevations. The individual deposits that were visited, with the exception of one, were thin (2 to 3 feet maximum), but possibly covered large areas on the surface of the cone. For comparison, mention was noted of 12 California deposits that varied from 8 to 75 feet in thickness and averaged $31\frac{1}{2}$ feet². The deposits ^{lie} ~~lay~~ for most part in the valleys (shallow depressions) that have a slope estimated to be near 10 degrees, although the slope was not actually measured. Bedding, if present within the pumice deposit, is not readily distinguishable at the pits that served as points of observation. It is not understood ~~as to~~ how these deposits were formed, although the first explanation that comes to mind is that large portions of the island were covered with a blanket of pumice at the time of the eruption and that since that time the pumice on the intervening areas has eroded away.

The exceptional deposit noted above ^{is} ~~was~~ at an elevation of 1240 feet and is represented by sample number 5. This deposit ^{is} ~~was~~ more than 10 feet thick and

²Walter W. Bradley, State Mineralogist, Department of Mineral Resources, Div. of Mines, California. Ferry Bldg. San Francisco, Cal. Entitled "Mineral Abstracts, Pumice and Volcanic Ash"

the face that was visited ^{is} ~~was~~ in one of the numerous
canyons on the island. The deposit shows bedding
(thought to be crossbedding) and most of the individual
particles of pumice are rounded pebbles. The deposit is
much cleaner than the others, being nearly pure pumice
and containing little or no non-vesicular volcanic
glass. ^{Although} ~~While~~ it has been thought ^{by some} ~~that~~ the canyon has
been cut through a pumice deposit of large areal extent,
it is more likely that this deposit has been washed from
above by freshet action, which would carry the pumice as
long as the volume of water was large and as long as it
was possible to keep the load in motion. However as
soon as a deposit started to form ~~the~~ succeeding freshets
would drop their load in the same place, because the water
would tend to drain away through the earlier deposit.
Even though the margins of the deposit are not visible
it is estimated on the above premise that the dimensions
of this deposit will not exceed 300 feet in length in the
valley and 50 feet in width and that the average thick-
ness will be approximately 10 feet, even though the
visible face is much thicker than that. Further, it may
be deduced, if the above premise is correct, that the
supply of pumice that could be washed into this canyon
and accumulated in this deposit is now depleted; ^{Or,} less
reasonable, that the freshet or flood action is not active
now, because at present the canyon is being reopened

through the pumice deposit.

Not enough work has been done on any of the deposits to determine the amount of pumice present with the possible exception of the pit that was worked in 1946. Even in that pit it is believed that more pumice may be present but because the pumice in other pits newly opened was more easily obtainable the work has not been continued in the earlier pit.

The known exposures were sampled by taking a clean, uniform amount from a cross section of the deposit. Pits were dug where necessary to expose the true cross section. The samples are listed and described on page ~~Appendix A~~. The samples had the characteristics listed on the assay sheet, Page ~~Appendix B~~. When the samples were tested at the Anchorage Office of the Department of Mines they were considered surface dry. In that condition it was noted that they did contain much moisture internally. While the remaining moisture did not affect the screen size, it certainly did affect the specific gravity determinations. However it is believed that these determinations are of value in comparing the different deposits represented by these samples. ~~It may be noted that~~ The material from the first three samples, which were from the deposits on the lower part of the mountain, contained much glassy material that had no tendency to float. It separated and sank through the water rapidly and where it occurred alone showed a specific gravity of 2.7 to 2.8.

It is considered at least as heavy as quartz when allowance is made for possible minor inaccuracy in the specific gravity measurement. This material is characterized by its translucency and its appearance, which is similar to that of a clean quartz sand when wet. The pumice from these deposits was also different from that of the one above, represented by sample number 5, because of having a much more granular (sugary) appearance, and The deposits themselves carry ⁱ other ^e foreign matter, such as rocks, while the one above was clean.

Sample number 4 was taken on a ridge where a deposit of pumice was supposed to be available. After digging in several places it was decided that pumice in quantity was not available, but the sample was taken since there was some pumice on the mixture. It is believed that the sample tests confirm the impression while in the field that, that place should not be considered a source of pumice.

It is apparent from the tests that a much higher grade of product can be obtained from a simple screening operation and of course the tests on sample number 5, a product washed by nature, confirm what was a foregone conclusion that a simple washing program could be made to produce a very superior grade of pumice.

MINE WORKINGS AND PRESENT PLANT INSTALLATIONS

The operation has been carried on for parts of two summers. During this time two pits or more have been opened and partially depleted. The first year it is said that the overburden and vegetation was bulldozed off and then the pumice was bulldozed up a ramp for loading into a truck. It is said that this method was wasteful of the pumice and that dirt from below the deposit was mixed with the pumice. During the current year the overburden and vegetation was stripped in the same manner but the pumice was loaded directly into the truck with a catapillar^{type}/tractor equipped with a high lift bucket in place of the bulldozer blade (called a traxcavator). This method is said to have been an improvement over that of the preceeding year. As far as is known no attempt was made toward a systematic mining program either year.

The buildings present on the island during the last season consisted of two shelters of minimum construction built together. One, 12 x 16 feet was used as a messhouse and the other 16 x 18 was used as a bunkhouse. The equipment consisted of two trucks, each with a capacity of six yards, one with a capacity of seven yards, one bulldozer (Catapillar D7 it is believed) and a Catapillar type tractor, approximate size D2, equipped with a Traxcavator (a high lift bucket in place of a bulldozer blade, that could be used to lift a load into a truck). All the equipment was brought onto the island in the spring and removed in the fall.

HAULAGE

During the years 1946 and 1947 the pumice was hauled more than a mile from the pits to a stock pile on the shore of the shallow lagoon. From the stock pile it was intended to bulldoze the pumice onto the barges which would be on dry ground between tides. The method would have been successful if small barges had been used and if the channel of the lagoon had been sufficiently cleared of the large rocks to eliminate the hazard to the boats and barges while they were being moved about when going to or leaving the stockpile or lagoon itself. Of course the stormy unsheltered water outside the lagoon will always be a problem to contend with. The equipment that has been used to transport the pumice to Anchorage has been varied. One of the landing ships of war origin, thought to be a L.S.M. was used to transport the equipment to the island and also took a load of pumice to Anchorage. It is believed that a power barge has been used and also that ordinary scows have been used. In every case the pumice has been exposed to the spray from the salt water, and because it has been thought that the salt left from this spray might be injurious to the concrete, the following paragraph is quoted from a letter from the Lehigh Portland Cement Company, Allentown, Penn., to O. A. Dahners:

"Ordinarily, salts in small quantities have no"

harmful effect. As proof of this, sea water has often been used in concrete with success. The salts in sea water generally approach 3% and when such water is in concrete, the actual percentage of salts with relation to the amount of cement is approximately 1.5% by weight.

ROADS

The only roads on the island are those used in connection with the mining and transportation of the pumice. To date these have generally been constructed merely by bulldozing the brush out of the way. Some bulldozing has been done to make it possible to cross small gullies, but in many cases where there is no interference from brush or gullies the trucks are driven over long stretches where no previous work has been done. Very little or no effort has been made toward drainage of these roads so that some trouble is experienced with washing of the steeper grades during rainstorms. However the trouble is not serious and the roads dry quickly after the storms have passed.

Because of the difficulty of working the thin deposits and because of the lack of a planned operation, thorough prospecting or development, the road building operations are in a state of continual flux. The desire to find a deposit that is more suitable is partially the cause. At present plans have been considered to build a road up to the deposit represented by sample number 5. The consumation of this proposal would entail a much more extensive program than anything done in the past,

in that it would require approximately five miles of road traversing some of the deep canyons and the gaining of 1200 feet altitude the upper part of which would be steep. This proposal should not be recommended unless there are other pumice deposits nearby or that the one under consideration is found to be much larger than it is thought to be at present.

GENERAL

Freight, express, mail, in fact anything that is moved on or off the island must come by boat or plane on floats and since there is no regular service to the island the trips must be chartered. Many of the trips are chartered out of Seldovia but they have also been chartered from Anchorage.

All labor must be had from the nearby towns or elsewhere as the island is uninhabited.

Living can be made as comfortable as desired, however at the present time conditions are not improved to any extent because of the short period spent on the island, and because the operation is just starting or in the experimental stage. Living on the island would be fascinating for some, at least for a time but for others it would soon become monotonous.

The weather is said to be somewhat rainy and disagreeable. It is further said that all seasons except the summers and even those to an extent are stormy

so that boating is badly handicapped.

A good water supply for camp use can be easily developed, but it is doubtful if there is any on the island that could be made to supply power or even to supply the amount that would be necessary for a washing plant unless provisions were made for its reuse.

Power besides that used in movable equipment will probably have to be produced with internal combustion engines.

Some supplies may be had in Anchorage and Seldovia and others may be ordered from the States.

MINING AND TREATMENT SUGGESTIONS

An overhead type loader for use with a track type tractor may show greater efficiency than the high lift bucket machine that has been used.

If the operation is enlarged it is thought that the use of the "Carryall" type scraper should be investigated.

A gravity type separator or washing plant could be set up to produce a superior grade of pumice. A machine, similar to a jig or possibly one similar to the Humphrey Spiral which would require little power might be ideal. Possibly a flume type plant could be devised that would use the same principle as the Humphrey Spiral on a rougher basis in conjunction with hydraulic mining. Of course, hydraulic mining or even just a washing plant would require the development of a water supply. How-

ever, if the salt did not deposit on the pumice in deleterious quantities it might be possible to use sea water, but of course considerable experimentation would be necessary before this source of supply could be depended upon.

Certainly, before any amount of work is done on mining and treatment, work should be done toward prospecting and developing of pumice reserves so that future investments could be planned with confidence.

RECOMMENDATIONS

The recommendations for treatment and mining are contained under the heading "Mining and Treatment Suggestions."

The road necessary to reach the high grade pumice deposit that has been proposed is not to be recommended unless the deposit is much larger than thought to be at present or that other deposits are found in the vicinity that would contribute to the amount that could be hauled over the proposed road.

It is not deemed advisable to recommend that the U.S. Geological Survey do work on Augustine Island if there is any way in which their work and also mining operations can be allowed to take place on the deposits in the areas visited by J. C. Roehm (see Footnote 1). In support of the above it should be added that each of the six deposits covered by that report the thicknesses were as great or greater than those available on Augustine Island and that they were all accessible through harbors that would provide shelter from the

storms, which is a very desirable condition in this section of the coastal waters of America. Further it should be noted in the same report that some deposits were not considered because of overburden and brush conditions while other deposits were not visited because they were two miles from the beach. These two conditions that excepted deposits in that area are both applicable to the most accessible deposits on Augustine Island.

It should be considered that since pumice is a new ingredient in the building industry in Alaska it will, distinctly, be on trial. Therefore, inasmuch as it could be one of the few Alaskan commodities that could really contribute to better housing and building it behooves all concerned to get the best material available.

CONCLUSIONS

It is believed:

That while there is pumice available on Augustine Island, possibly in economically appreciable amounts those deposits that have been discovered to date and are presently accessible are very thin and require much development before they can be mined intelligently, and that there is no doubt that in order to get the best product from these deposits beneficiation would be necessary.

That the clean, high grade pumice deposit located at an elevation of 1200 feet is too small in itself to economically justify the construction of a road.

That whatever is produced on the island, it and

the necessary supplies for that production are subject to handling through a bad harbor and consequently adverse shipping conditions.

That the harbors in the vicinity of the Katmai National Monument are comparatively very good.

That the deposits of pumice are comparatively limitless, and that the grade of the pumice is also superior to that of Augustine Island.

Therefore it is concluded that it would be much better to get the pumice from the vicinity of the Katmai National Monument if it can be made available.

APPENDIX

- A -

Sample description and location.

- B -

Report of Assay showing results of tests on the samples.

MAP

Map of Augustine Island showing approximate locations.

It is not accurate but it is the best available. The dotted contours show the approximate surface of the island. What appears to be a strait between Augustine Island and a smaller land mass to the west is locally called a lake. It is said that it fills with the tides but that its entrances are not navigable with any type of boat.

SAMPLE DESCRIPTION AND LOCATION

All samples were considered surface dry when tested after being exposed to room temperatures for more than a month. During this time they were left in loose flour sacks and turned many times to promote drying.

All samples except No. 5 had an earthy smell which could be due to the overburden that had covered them or possibly to decay in the samples themselves due to weathering.

1. Sample No. 4560 Augustine Island - Stripped area of 1947 diggings - Elev. 760 - A little over a mile from the loading site on the Lagoon which is near the present camp site.

Maximum size of particle noted $2\frac{1}{2}$ inches diameter.

" " " " in sample $1\frac{1}{2}$ " "

" " " rock " " 1 " "

Thickness of the bed from which the sample was out was 2 Feet. Possible area of the bed 150 yds. wide and $1\frac{1}{2}$ miles long (estimation from appearances; the area has not been prospected.)

2/ Sample No. 4561 - Augustine Island - Prospect pit near 1947 diggings - Elev. 760 - A little over a mile from the loading site on the lagoon.

Maximum diameter of particle noted $2\frac{1}{2}$ inches.

" " " " in samp. $1\frac{1}{2}$ " "

Pits near 1947 diggings to peak N65E

Pits to loading site on lagoon S85W

Thickness of bed 3 feet.

3. Sample No. 4562 - Augustine Island - Above the 1946 diggings and approximately two miles from the loading site on the lagoon. Elev. 1010

Pit to Peak N65E

Pit to Lagoon S85W

A prospect hole. No mining anticipated. No definite thickness/

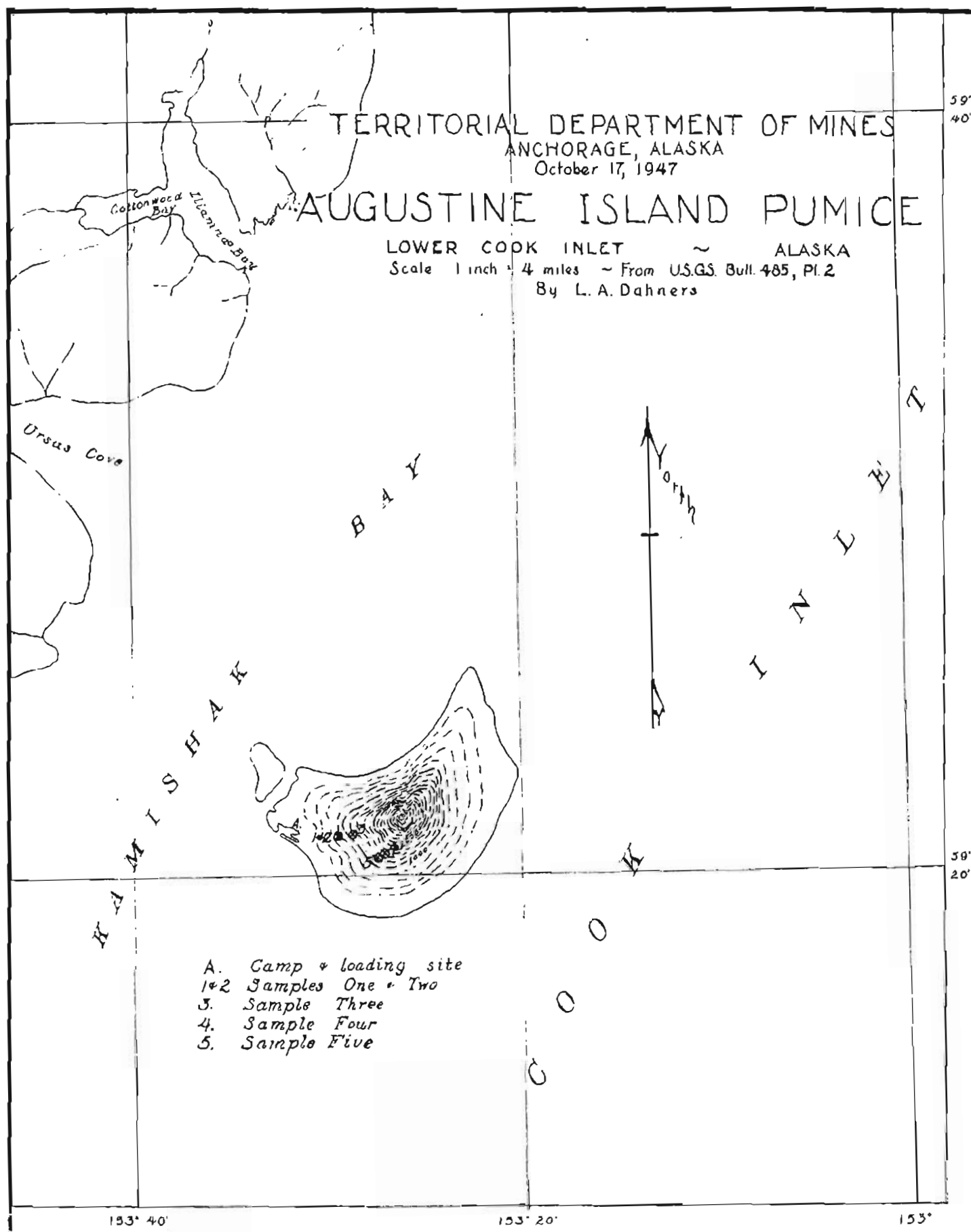
4. Sample No. 4563 - Augustine Island - 1500 Elev. No assured thickness. N29E to the Peak - Contains some pieces of rock 1 inch in diameter. Porphyritic Crystals of hornblende were noted in all the samples. These crystals occur in the pumice.

5. Sample No. 4564 - Augustine Island - Elev. 1240 - N30E to peak - Probably a freshet deposit. Probably less than 300 by 50 feet but more than 10 feet thick. The deposit is roughly crossbedded. Most of the individual pieces are rounded pebbles, some of which show flow structure. Some hornblende crystals present but little of the sample was made up of non-vesicular volcanic glass. The holes in the pumice are smaller than those in the pumice in the other deposits visited on the Island, and the pumice seems fresher.

Maximum diameter of the particle 6 inches.

" " " " in sample $1\frac{1}{2}$ " "

103-2441



TERRITORY OF ALASKA
DEPARTMENT OF MINES
ASSAY OFFICE

Anchorage, Alaska, December 11, 1917

REPORT OF ASSAY
On samples received from Augustine Island -- Pumice -- L. A. Dahnners
Address Territorial Department of Mines

ASSAY NO.	MARK ON SAMPLE OWNER'S DESCRIPTION	OUNCES PER TON		VALUE PER TON	PERCENTAGE OF			
		GOLD	SILVER					
	MESH Plus 4	Plus 10	Plus 28	Plus 60	Plus 100	Plus 150	Minus 150	
4560	1	Wt. Gms 935.5	368.5	283.5	85.1	9.52	2.4	8.3
		1/2 Wt. 55	22	17	5	-1	-1	-1
		Sp. Gr. 1.2	1.9	1.9	2.4	2.4	2.4	2.1 Ave. 1.3
		Light 91	70	32	20	20	20	25
		Glassy 9	30	68	80	80	80	75 } Estm.
4561	2	Wt. Gms 1077.3	623.7	793.8	170.1	14.9	2.4	2.8
		1/2 Wt. 40	23	30	6	1	-	-
		Sp. Gr. 1.2	1.5	1.8	2.7	2.7	2.7	2.8 Ave. 1.5
		Light 90	50	30	5	5	-	-
		Glassy 10	50	70	35	35	100	100 } Est.
4562	3	Wt. Gms 737.1	297.7	212.6	50.6	14.6	7.3	8.0
		1/2 Wt. 55	22	16	7	1	-1	-1
		Sp. Gr. 1.1	1.5	2.1	2.1	2.2	2.2	3.2 Vol. incor. Ave. 1.3
		Light 90	75	22	10	10	-	-
		Glassy 10	35	80	90	90	100	100 } Est.
4563	4	Wt. Gms 283.5	241.0	269.3	270.1	44.7	35	29.1
		1/2 Wt. 27	23	26	16	4	-1	3
		Sp. Gr. 2.0	1.9	2.1	2.5	2.7	2.9	2.5 Ave. 2.1
		High partially because it was wetter.						
		Light 50	60	40	20	25	-	-
		Glassy 50	40	60	30	75	100	100 } Est.
4564	5	Wt. Gms 481.9	311.9	453.6	396.9	113.3	23.8	31.8
		1/2 Wt. 27	17	25	22	6	1	2
		Sp. Gr. 0.9	1.0	1.5	2.1	2.5	2.5	2.6 Ave. 1.3
		Sam 10 & 5 seems to be nearly all pumice that is less granular-- more like a vesicular fluid, than the pumice of the other samples.						

All samples were tested after they had become surface dry.

L. A. Dahnners
ASSAYER.

