YAKATAGA FIELD

Groups of strong seepages, showing also considerable gas escape, distributed along the axis of a well defined anticline for a distance of nearly 20 miles, has a significance that warrants the interest of capital. The structure of the Yakataga field, however, is not such as would constitute ground for a confident prediction of big wells, for, from the surface outcroppings, all along the line of seepage, it is a tightly compressed anticlinal fold.

Shallow wells, under 1200 feet, of small production 15 to 25 barrels, should be obtained in the vicinity of all seepage area and the possibility of big wells with deep drilling, 2000 feet and over exists.

The petroleum of the field as at Katalla, is a very fine quality of high gravity (40 to 46 Baume) paraffin base oil.

Development of production between seepage areas is a logical inferencebecause of the well defined and unbroken line of the anticline axis and the sustained elevation, strike and dip of all the outcropping structure.

The cost of test drilling will probably be three times that of similar work in California, because of the remoteness of the field, the physical difficulties of getting drilling material on the ground, camp and road construction, and the importing of skilled men.

The shelter of Icy Bay is the logical avenue of approach.

Initial drilling should be done along the line of the anticlinal axis before testing out the apparently less tightly compressed portions of the fold - the ends.

Poule, Johnston, Hamilton and Crooked Creeks are recommended as favorable locations for initial drilling tests.

SUMMARY

The Chilcat, Nichawak and Yakataga oil fields of Alaska warrant the expenditure of capital to the extent of perfecting titles and testing out the productive possibilities of the ground.

Development should be carried on first in the Chilcat field becauseof the immediate and easier accessibility, smaller initial

investment and a ready market,most inexpensively reached.

Development should follow on the Yakataga field as soon as the titles are perfected,because of its greater promises,both in area and larger possible volume of production.

The rapid exhaustion of the world's store of petroleum and the steadily increasing demand for a diminishing product,give an important aspect to these undeveloped oil fields. They are given special significance also by the fact that they lie on the shore of the North Pacific, 2000 miles removed from the nearest producing fields, and at the heart of a market which they not only show possibilities of meeting,but are in a position to command.

The remoteness of the Alaska oil fields and the distinctiveness of the area to be supplied,suggests the economic advisabilities of controlling,developing and operating the fields as a unit; thus enabling every advantage to be taken of buying material in quantity transferring operations over greater distances,as may be planned with the least loss of time to labor,of developing different areas when,and as they may fit into a general scheme of development,and of preventing waste of capital in the duplicating of plants and stations for the refining and distributing of the products.

YAKATAGA DISTRICT

The Yakataga oil field is a narrow strip of territory less than two miles wide,north and south,and extending in an east and west direction from Yakataga Reef to Icy Bay-a distance of approximately 35 miles. The area is well down the southern slope of the southern and lowest of the three parallel ridges which comprise the Robinson Mountains and at no place is more than two and one half miles in a direct line from the ocean shore.

The district is reached by boat from Katalla with a landing through the surf at Yakataga Reef,eighty five miles,or in Icy Bay where landing may be made in sheltered water,one hundred and ten miles.

GEOLOGY

The geological horizons of the area are very probably as previously outlined including Oligocene, Miocene and Pliocene periods the oil horizon being along the exposure of the lower of these rocks

As complete a collection as possible of the fauna was made during the examination of the district. This is now being determined at the university of California and will no doubt definitely fix the horizons involved. The structure is made up of the following rocks:

SHALES, Gray to black in color without evidence of being organic more than to a very slight degree,

SANDSTONES, From fine to coarse grained, generally gray or buff in color, for the most part hard and closely cemented.

LIMESTONES, Occuring either as strata up to 20 feet or more in thicknessor as concretions in the shale.

CONGLOMERATES, Sometimes lensing in character but generally of considerable lateral extent and thickness. The lower conglomerates are of well worn and sorted pebbles; evidently of beach or stream accumulations. The conglomerates of the upper more recent rocks, are more or less angular and without sorting, varying in size from the smallest pebbles to boulders five or six feet in diameter, with matrix instead of being sandy as in the lower beds, containing considerable silt; apparently of glacial origin.

The above rocks are closely interbedded, the shales predominating and the sandstones being mostly massive and are without distinctive characteristics, enabling any one of them to be followed with certainty as a horizon marker for a considerable distance.

STRATIGRAPHY

The structure of the field is along a closely compressed anticlinal fold. The strike is about North 70 degrees West. Both ends of the fold curve gently southward and both plunge gently seaward the west end more steeply than the east. The eastern end of the structure apparently opens into a gentle fold. Only the upper structure however is exposed, the lower rocks are deeply hidden and consequently their attitude may not be definitely known, only inferred.

The inference for an open fold is based on the gentle arching of the upper structure. The western end of the anticline curves seaward much more sharply than the eastern end. It is possible that here also the structure opens, but no exposure covering the crown of the arch or of the southern limb of the anticline is found.

The main body of the anticline is not only tightly compressed but was probably broken in folding. The south limb of the anticline is standing vertical and in places along the axis is slightly overturned. That the whole south limb is very steep seems probable from Umbrella Reef, where even the Upper Pliocene conglomerates and shales and sandstones are standing vertical. The north limb of the anticline along the axis is vertical (in places slightly reversed) but with distance from the axis, it assumes a more and more gentle dip to the north.

While the anticlinal fold may have been broken along the main part of the axis during folding, from the evidence still remaining (of the folding movement dying out at the ends, folding becoming more gentle, and the unbroken arch still remaining at the eastern extremity, general absence of slickensiding, with the folding and crushing of the shales) it would seem probable that there was little if any faulting or displacement during the process of folding. There has also been no intrusion of igneous matter, either before or after folding.

OIL SEEPAGES

The oil seepages along the axis of the anticline are divided into at least eleven groups. These are either on creeks that cross at right angles to the strike of the structure, or on tributary streamlets that flow into these streams from along the axis of the anticline. It was interesting to note from an elevation that there was a topographic depression along the axis of the anticline in the form of short valleys, entering normal to the valleys of the main streams. There were few exceptions to this rule so that with this information, the axis of the anticline and the

line of seepages should not be difficult to follow. These eleven groups of seepages are intermittently scattered along a very narrow zone, probably not more than 800 feet wide and nearly twenty miles long. As near as could be determined from rough surveys, the groups of seepages are located on the following claims from west to east:

Group	Locality
1	Rex Claims No.s 5 and 6
2	Acme Claim No.5
3	Oil Creek No.s 3 and 4
4	Oil Creek Claim No.1 and Hamilton Claim No.7
5	Hamilton Creek Claim No.7 and White River Claim No.8
6	Fulton Claim No.1
7	Crooked Creek Claim No.5
8	Lawrence Claim No.4
9	Poule Creek Claims No.s 4 and 5
10	Munday Claims No.s4 and 5
11	Johnston Creek Claims No.s 1 and 4

While the zone of seepage is given at 800 feet wide and in some instances might be as wide as a thousand feet (north and south) it is doubtful if development would prove a width of more than 500 feet, the zone of seepage at the surface probably being somewhat wider than the actual zone of occurrence under cover.

The oil is of very fine quality of high gravity, 40 to 46 Baume, paraffin base oil.

That the line of seepage is not continuous along the axis of this anticline may be due (a) structure in places too tight to allow seepage, (b) that it has sealed itself in with occurrences now deeply covered with vegetation, (c) absence of a deeper oil bearing horizon.

The original of the source of the oil is not known. If the source is similar to that of the Katalla field, as probably is the case, and as may be naturally inferred, from the nearness of the fields to each other, similarity of age of formation and of character of the oil, the organic shales of the former nowhere occur at the surface in the latter.

They were either not involved in folding or are not high enough in the folding to occur at the surface.

The majority of the seepages occur where there is no immediate exposure of rock in place; either on sloping ground in the timber where the moss and vegetation is dense,or in smaller depressions that have become boggy with sedge impounded water. In both of the above the flow of oil may be sufficient to send a constant small supply into the lower drainage system, but no rock in place is seen. Many of these seepages in soft ground would no doubt long ago have sealed themselves in, and be lost, were it not for the bear that frequent these places and wallow in the oil and water and so keep the hole open; either to free themselves from insects in their fur or in protection against flies and mosquitos. Near these seepages there is generally a scarred tree,stained with oil where, after wallowing the bear rubs himself and reaching up full length scratches the tree.

In a number of instances however,as on Hamilton, Poule and Johnston Creeks, the oil seepages occur on well defined structure either in sandstone, jointed shale or both.

In importance the seepages on Johnston Creek no doubt stand first,though the importance of the seepage is enhanced by the fact that the oil has a chance to show itself to a good advantage on the surface of the impounded water,before escaping into the creek, there being a small natural dam below.

The seepages on Lawrence Creek are a close second. The stones on both sides of the stream were yellow with paraffin all the way up the beach,a distance of over a mile.

The seepages on Crooked and Hamilton Creeks were particularly interesting in that here the seepage occurs,in part at least,from a coarse,soft and open pored sandstone. There was an excellent exposufe of this sandstone on Hamilton Creek. On crumbling and dropping it into the water, it was immediately covered with a film of oil. The stone had a strong oder of hasoline (sample). This sandstone was jointed as all the other formation,but the joint planes were waxy with a residue paraffin of escaping oil. With depth,this

formation should give production as the pore space would act as a storage structure. The yield would be from an open sandstone and not, as in other instances, dependent for storage and migration on the joint planes of the tight textured shales. This structure could probably be developed between the two creeks.

For initial drilling work on Boule Creek should also be considered. The structure appears a little more open at this point, the two sides of the anticline dipping away from each other,with the seepage through the shale. If the surface indications of the attitude of the structure should hold with depth,oil in storage might be proved with development.

The Yakataga field is more promising for production than the Katalla district, is evident from the strength,persistence and unbroken character of the structure, size and frequency of the seepages, and greater gas pressure. The odor of gas in several places is very pronounced. In one place the noise of the escaping gas was heard and after searching near us,a small blow-hole was found under the skunk cabbage. On igniting, it gave a flame fully two feet high and burned continuously. This was on Hamilton Creek. On Johnston Creek,five miles to the east,another source of escaping gas was searched for but could not be located. Numerous small seepages of gas were noted.

DEVELOPMENT AND PRODUCTION

The lines of development in the Yakataga field is along a vertical structure,probably not more than 500 feet in width. There is no doming here to act as a cover for the accumulation of oil and the base of the oil is not such as to effectively seal the structure against escape. The very tightness of the folding however,in itself may have, in a large measure sealed the structure. With depth from the axis of the anticline, the north limb at least must ease away. It is possible that here in the less compressed area, oil in storage will be encountered. It is also possible that at the east and west end of the anticline where the folding appears more gentle,there is oil in storage,having migrated up the arch of a plunging structure. As there is no positive evidence that the heart of the anticline may not here be so tightly compressed, initial drilling at this point

would be hazardous, for if the lower strata of the anticline should prove to be steep,a few hundred feet off on one side or the other would mean drilling to a great depth without encountering oil. Some of the ground near the east end of the structure,near Icy Bay,should be tied up. This has all been staked and can probably be obtained for very little. I understand Ed Herman staked some of this ground and Leeper told me he has an option on it. The company already control good ground near the west end of the structure.

It would appear advisable that initial drilling should seek to prove the possible product of the narrow but long and actually known occurence of the oil bearing zone. This drilling should be very near if not actually on the northern edge of the zone, thus enabling the hole with depth to approach the axial plane of the anticline.

A statement of production, would of course, be only conjectured, but there are several good reasons for expecting a larger production than at Katalla,(a) source of oil does not show at the surface with smaller possibilities of escape having drained the oil content; (b) a well defined though tightly compressed anticlinal fold; (c) formation not faulted or intruded; (d) larger and more numerous oil seepages; (e) greater gas pressure.

Drilling down a certical or nearly vertical structure and which structure is also the structure of migration and seepagg, wells with at least small production should be obtained at very shallow depth. It will no doubt be advisable however early in the progress,if not at the very beginning, to test this area with deep drilling for storage structure and large production wells.

The production of this area would doubtless have been tested out 10 or 15 years ago,had it not been for the great difficulty in getting drilling material on the ground. Until recently,the area has been without a harbor. Landing had to be made through the surf which was always uncertain and generally dangerous.

During the last 20 years however, the Guyot Glacier has amde a pronounced retreat leaving a large and open sheltered body of water known as Icy Bay. The retreat of the glacier has been about 15 miles since the earthquake of 1899. At that time it stood,a solid

ice front from Icy Point across to Point Riou. Several miles of ice went out at that time, since which the retreat has been slower but apparently uniform.

I believe that the position of the ice as indicated on the pen sketch made at the time of visit, June 6th. represents general conditions. At the present time entrance to Mud Bay is feasible for small craft and is entirely free from ice. At extreme low tide the channel into Mud Bay is at least 200 feet wide and probably not less than 3 feet in depth. It may be considerably deeper. Mr. Manson nearly half a mile from the entrance attempted to wade the channel with his hip boots, but only got nicely started before he reached their limit.

In the outer bay there is an abundance but no protection from icebergs which float out, of great size from the glacier. These icebergs would militate against any dock construction very far up Icy Bay.

Soundings and some careful observation might locate a place however, in the protection of the outer zone hook where a short dock or T-end of a dock might be built, to which heavy draft vessels could make fast. From this point, material for development could be taken on a scow up Mud Bay to a point several miles nearer the field The material for the initial work might be loaded on a scow from a steamer at anchor in the outer bay.

The working out of this phase (landing and delivery of development material) requires special examination, although very reliable data on most phases of the problem may be obtained from either Mr. Manson or Mr. Leeper. From the preliminary study that we were able to give the area, Mud Bay seems the feasible channel of approach; the material brought in on scow (40 tons, more or less) with gas boat, from steamer anchored in outer bay brought up Mud Bay, as far as the water will permit, to temporary dockage and warehouse, from which it could be taken by team to point of drilling.

Should the delivery of material from warehouse to drill location be made in the winter time, ground is then frozen hard. A few temporary bridges would have to be put in, but aside from that

very little road making would be required. Docking and delivery of goods by way of Mud Bay not only obviates some expensive road making,but also shortens the distance to the drilling area, by at least five miles. Once the Company's claims are reached, roads made in representation work will save the present company considerable expense as the routes were well chosen and much of the work is still in fairly good condition,grown up with small tangle and with occasional fallen trees,but which could be quickly and inexpensively put in shape for use.

The protection from ice of Mud Bay and the shores of Icy Bay out some distance north of the sand spit is apparently due to the curving outer hook of land which throws the inner current,coming out of Mud Bay,in such a direction as to divert the ice from this shore.

If the glacier should continue to retreat at its present rate for 10 or 15 years more,from a third to a half of the glacier front will be grounded,which will mean much less ice in the bay and much greater safety to shipping. The Bay will afford a very excellent harbor for shipping along this part of the Alaska coast.

A pipe line from producing areas to Icy Bay offers no difficulty in the way of construction,and a refinery here will be well located for a distributing center.

MUNDAY CREEK The structure on this stream appears to be slightly overturned. There were no exposures of rock in place along this stream nor any open oil seepage. Oil has been only known as coming through the creek gravels.

July 3,1920,Johnston Creek Oil flows down this stream to sea. Seepage area covers an acre or more. Shows considerable gas but does not give off strong petroleum odor as some of the other seepages. Lawrence Creek shows more paraffin, but this stream has a larger amount of crude petroleum in evidence. This area is very accessible for development work and the position of the seepages should make location of initial drilling easy of determination. The large flow of oil reported is from a natural retaining pond which gathers the oil from many seepages.

A gas blow under an old stump was hunted for but could not be definitely located.

Sandstone, in several instances has been found in association with seepages, does not outcrop here, but though not showing may be in position, as the outcropping structure does not cover the entire width of the seepage zone.

January 29, 1925.

Mr. W. A. Hesse,
City.

Dear Mr. Hesse:

In answer to your inquiry about an oil proposition in Alaska. In my judgment the surest and best oil proposition in that country would be to take over the property of the present Chilkat Oil Company, and using it as a nucleus expand the business as desired. I hand you herewith a copy of my fifth annual report as President of the Chilkat Oil Company. Subsequent to the making of that report I endeavored to secure control of the Company, and being unable to gain control I sold my stock and retired from the Company.

The Chilkat Oil Company owns 480 acres of patented and proved oil lands at Katalla, Alaska. It has application pending for another 160 acres, for which it will no doubt secure patents. It has ten or twelve producing wells on one of these patented claims which I understand are now producing about 700 barrels per month. These wells are all shallow, none of them exceeding 2,000 feet in depth. The oil is a high grade (44 Be.) parafine base oil. At least 75% of the crude is made into gasoline, kerosene and engine distillate in the ordinary fire still. Under the modern cracking process practically the whole of this oil could be made into napthas.

On the patented lands, which are held in fee simple, it is probable that three or four hundred wells, such as are now producing, could be drilled. The wells are very persistent. The No. 1 Well on the property has been producing for more than twenty years and is still doing three or four barrels per day. The oil comes from shale, and no sand has ever been reached in any well. There are sandstone outcroppings in the vicinity, but no deep wells have ever been drilled. There is an excellent chance that if a well were put down to four or five thousand feet much larger production could be obtained.

The The Company has an excellent small plant, including a dock and warehouses all practically new. It has a good small refining plant, a good saw mill, and a large quantity of drilling and fishing tools. With a few additions it has drilling equipment sufficient for at least three complete drilling rigs.

In addition to the patented lands it has a preference right for permit and lease on two or three thousand acres of additional oil lands in the vicinity of its patented claims. There is no reason why this property cannot be expanded to very large and profitable production simply by multiplying the number of wells such as they now have, and an excellent chance to get larger wells with deeper drilling.

Sixty miles east of the Katalla Field there is a district known as the Yakataga Beach. Here there is a distinct anticline extending parallel to the shore for at least twenty miles. There are copious seepages at many places along this anticline of oil similar in character to that at Katalla. The Yakataga District is practically uninhabited, but is easily accessible from good harbor waters at Icy Bay, with which you are familiar.

The oil-bearing structures at Katalla are badly broken and distorted, but at Yakataga the structure is much more regular and there is every indication that wells of much larger production can be obtained at shallow depth at Yakataga than at Katalla.

The Yakatage Field can be best approached and developed from Katalla, and particularly the Chilkat Oil Company's plant and equipment there would make an admirable base from which to develop the Yakatage Field. For example, one in control of the Chilkat Oil Company's property could make up the lumber, drilling outfit, camp equipment, etc. at Katalla, load it on a barge which could be towed to Yakataga in eight or ten hours, the outfit landed on the beach, camp erected and drilling could begin within thirty days after starting.

I believe a well can be drilled at Yakataga to a depth of 1,500 feet, certainly within six months from the beginning, and possibly within three months. Upon the discovery of oil a road could be extended to Icy Bay, a dock and warehouse built there, and developments carried on as extensively as might be thought fit.

In this way much less than $100,000.00 would be required to make a test of the Yakataga Field to a depth of say two thousand feet. Of course it might be found necessary to drill a deeper well than this to tap the pool at Yakataga, in which case the cost would probably be more.

At one time the parties who controlled the Chilkat Oil Company were prepared to put its property into a larger company at a valuation of $500,000.00 on condition that $500,000.00 additional in cash was provided for further development and extensions. As you may know, there has been a bad slump in the oil business in 1923 and 1924, and I think it entirely likely that the property of the Chilkat Oil Company could be acquired now on the same basis and possibly on even better terms. The Chilkat Oil Company has drilled no new wells since 1923, but did install last season a casing-head gas plant at a cost of about $10,000.00 which I understand is working very satisfactorily.

It will be entirely feasible under the general Oil Leasing Law to get two or more permits of 2,560 acres each for drilling at Yakataga Beach. These permits, I feel sure, can be acquired from the present holders at a nominal cost, or failing this, that the Department of the Interior would cancel existing permits and grant new ones to a company with resources and ready to drill.

Of course it would be entirely feasible, and I think a good oil venture, to acquire say two or more oil permits at Yakataga Beach and send in equipment and test the territory without regard to the Chilkat property, but with the Chilkat property for a nucleus the tests could be made practically without risk, for the Chilkat property could be expanded without the least doubt into an excellent paying property.

I would suggest that a company be created with a million dollars of authorized capital, one-half of its shares to be allotted for the purchase of the Chilkat property and the other half sold to provide $500,000.00 of working capital to be supplied as required. One drill rig should be set to work drilling shallow wells in the vicinity of Katalla to keep up and increase production, another rig should be set to work at Katalla on a deep well, and a third sent to the Yakataga District as above outlined. Under this plan there would be almost no risk, with the greatest possibilities of a splendid success.

Very truly yours,

(Signed) FALCON JOSLYN

FJ MEO

CABLE CODE: BEDFORD-M'NEILL

FAIRBANKS, ALASKA

WM. A. HESSE
MINING ENGINEER
U. S. MINERAL SURVEYOR U. S. DEPUTY SURVEYOR

Seattle, Wash.

January 29,1925.

Mr. Eugene Mackay,

14 Wall Street,

New York,N. Y.

Dear Mr. Mackey:

I am sending you under separate cover two reports written by oil geologists on the Yakataga oil field in Alaska, a letter from Mr. Falcon Joslyn formerly president of the Chilcat Oil Company of Katalla Alaska, and an Alaska map showing the location of the Yakataga, Katalla and the Cold Bay oil fields. The Cold Bay field being the locality where the Standard and the Associated Oil Companies are now drilling.

Later on I will send you a letter from Mr. George C. Hazelet manager of the Chilcat Oil Company at Katalla and a sample of crude petroleum from a Katalla well which seems to be identical with the Yakataga crude; I will also have sent to you a government bulletin on the Alaska oil fields,

I have resided in Alaska twenty two years during which time I have perhaps traversed as much of the Territory as any other person. I have an intimate acquaintance with the Yakataga, Nichawak and Katalla oil fields,having made surveys in all of them.

Two geologists visited the Katalla and Yakataga fields in 1920, Messrs. Taliaferro and Stevens and while they worked together each reported independently, and what are believed to be copies of those reports are enclosed.

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WM. A. HESSE
MINING ENGINEER
U. S. MINERAL SURVEYOR U. S. DEPUTY SURVEYOR

I read the original reports and recognize considerable of the text, though of course the original reports were accompanied with drawings.

Some rather overdrawn statements are contained in these reports, relative to transportation and harbor facilities, as a matter of fact Icy Bay has since been surveyed and charted by the U.S.Coast and Geodetic Survey and its practicability as a harbor is no longer debatable.

I feel confident that there is an oil field of great importance at Yakataga, if whoever goes there knows beforehand just what he is going to do with the oil, that being a phase of the question with which I am unfamiliar.

The leasing law is feasible and in so far as it applies to Alaska, its provisions have been made quite generous; the Standard and the Associated Companies are now working under it.

It must have been an oversight on the part of Mr.Joslin not to have mentioned that under the law, one company may work five permits or leases comprising 13,800 acres of oil land.

Granting a ready market for high grade petroleum, a proposition is open here that cannot fail so far as getting the oil is concerned. Of course it is not to be expected that the field can be opened on a shoestring, nor can any other oil field. The day of grasshopper operations of which you spoke, I think are gone.

More important data will be forthcoming, it takes a little

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FAIRBANKS, ALASKA

WM. A. HESSE
MINING ENGINEER
U. S. MINERAL SURVEYOR U. S. DEPUTY SURVEYOR

time to get it all together, but by the time that you have digested this I shall have more for you.

Should you after you have studied all the data, decide that the proposition interests you, it would be best to take the matter up with Mr. Joslin. He is better qualified than I to go into the details of the proposition, and while no longer connected with the Chilcat Oil Company, is the one man capable of making an amalgamation with that company, with the view to expanding its present productive business at Katalla and opening the Yakutaga field.

To me the plan seems the most practicable of anything, drilling equipment and everything that is necessary now being available at the Chilcat Company's camp at Katalla, furnishing an ideal base for operations.

Yours very truly,

P.S. I will send you tomorrow by express a sample of gasoline made from casing-head gas at Katalla by the compression absorbtion process. I understand that the gas yields 2 gallons per 1,000 cubic feet of gas.

W.A.H.

MK-074-01

(COPY LETTER FROM GEORGE C.HAZELET MANAGER CHILCAT OIL CO.)

Cordova Alaska, Feb.6, 1925.

Wm. A. Hesse,
New Richmond Hotel,
Seattle, Wash.

Dear sir:

Complying with your request for information on the Katalla and Yakataga oil fields in Alaska,will say that for the past seven years I have been manager of the Chilcat Oil Company operating in the Katalla field.

The company owns and has United States patent to three claims of one hundred and sixty acres each and under the law applicable to Alaska expects patent to at least one more claim.

During the time that I have been manager we have drilled thirteen wells all of which have been producers ranging in production from three to twenty nine barrels per day. The oil is a parrafin base oil of from 40 to 46.5 gravity, similar in all respects to the oil of Bradford,Pennsylvania. It is high in gasoline content.

We operate a small topping plant at Katalla taking from 67 to 75 per cent of gasoline and kerosene from the oil. The balance is used for fuel or stored. The gasoline and kerosene is all sold locally and at the highest market price. Five times our present production could be disposed of in this market.

The oil is found in a broken or crushed shale along fault planes and apparently has a source much deeper than any well so far drilled, as we have never encountered any sand in our drilling.

It is my opinion that at least one hundred additional producing wells can be drilled on the ground that we now have patent to. I base this on my past experience in drilling and the fact that the wells so far drilled do not drain an area to exceed two and one half acres each. There is no apparent effect on adjoining wells when a new well is brought in. This proves to my mind that the oil does not lie in small pools in the shale but comes from some deeper pool through the

cracks and crevices. For this reason I am anxious to see one or more test wells put down.

It is my opinion that if a well was drilled to a depth of 4,000 to 5,000 feet, oil sand would be tapped and a much larger production secured. Our company has never been financially able to accomplish such deep drilling.

The Chilcat Oil Company has a large assortment of drilling and fishing tools on hand. It could put three rigs to work at any time. It manufactures its own lumber for derricks and has an abundance of first class timber on its own ground for this purpose.

In addition to the refining or topping plant we have just completed an absorption gasoline extraction plant. This plant will handle daily the two hundred thousand cubic feet of casing-head gas produced by our wells, and with the erection of another absorption towerthe capacity would be doubled.

The plant produces each twenty four hours from two hundred and fifty to three hundred gallons of gasoline having a gravity from 76 to 83 Be. which we blend with our lower grades of gasoline from the topping plant.

Referring to the Yakataga field will say of course you know no drilling has ever been done there. I have visited the fields two or three times during the past two years, and have seen the oil from the seepages which occur in the field. The oil is very similar in character to our own oil, and while I am not an oil geologist the field looks good to me, because of the fact that the country is not so badly broken up as in the Katalla field and the oil sands outcrop in many places.

I have seen the reports of Taliaferro and Stevens on the Yakataga field and I agree with them that "the district is well worthy of being prospected and justifies the expenditure of the necessary capital to make a thorough test." I say this without qualification based on my experience in the Katalla field.

If such a test is made the requisite acreage should first be secured. I believe this can be done by taking options from the

present claim holders and prospecting permits from the Government, In this way five permits of 2560 acres each could be secured covering the better portion of the field. It is my understanding that the law applicable to Alaska permits one company to hold this much ground for prospecting purposes.

As to the accessibility of the field I will say that this presents no features which anyone familiar with the north Pacific fears in the least. The field is no more inaccessible than the Katalla field has always been and presents no different problems. I am today drilling wells in the Katalla fields as cheaply as they do in California. The average cost per foot to our company for a well in the Katalla fields,cased from top to bottom and fitted with a pump is less than $10.00 per foot for a well not exceeding 1500 feet in depth.

Timber in both fields suitable for rigsand buildings is abundant, all that is necessary is a small sawmill for its manufacture.

If oil is found in the Yakataga fields it can be conveyed by pipe line to Icy Bay and there loaded onto ocean going vessels of any draught.

In conclusion I will say I know of no other locality which presents as favorable an opertunity for prospecting for oil with as many chances of success as does the Yakataga field. So far as obstacles are concerned they amount to nothing. The only requisite is sufficient money to make a thorough test.

If I can give you any further information I will be glad to do so.

Very truly,

Signed Geo. C. Hazelet

Manager Chilcat Oil Company.

Seattle, Washington.
December 20th, 1921.

Mr. A. P. Clark,
New Richmond Hotel,
Seattle, Washington.

Dear Sir:

Regarding your request that I furnish you a description of the Petroleum field of Yakataga, Alaska, I beg to submit the following:

Petroleum was discovered near the Yakataga Beach by prospectors in about 1897, at which time Petroleum lands were acquired under the Mining Laws and staked as placer mining claims. About that time claims were staked aggregating 30,000 acres, to which English capital was attracted and operations of a preparatory kind were begun by what was known as the Old English Company. Substantial wagon roads were built, surveys made for pipe lines, timbers gotten out for derrick purposes, etc.

In 1910 the Federal Government withdrew all the oil lands from entry and operations were discontinued. The English Company, however, believing such a policy would soon be abandoned continued to keep its locations alive by doing the annual assessment work on its claims until 1916 when it finally gave up hope and abandoned its holdings.

In February 1920 and Act of Congress was approved whereby Alaska oil lands were again thrown open for development by leasing. Under this leasing bill citizens of the United States were permitted to make application for permit to prospect, not exceeding 2560 acres of oil lands, subject to the following requirements:

Application to set forth the name of the applicant, description of the land sought together with a surety bond for $1,000.

After the permit is granted the permitee is required within one year from the date of such permit to establish the boundaries of his claim. Within two years to place adequate drilling machinery on the ground and within three years to drill to a depth of 500 feet unless oil shall be discovered at a lesser depth and within four years to drill to a depth of 2,000 feet.

After permitee has proven the value of the land he may then obtain a lease upon 640 acres for a period of twenty years (20), with the privilege of renewal, with no royalties contemplated during the first five years. It is believed that the lessee will be given a preference right over others for the remaining 1920 acres should he elect to lease that.

The Yakataga field lies adjacent to the Gulf of Alaska and comprises an area from 1/2 to 9 miles wide and about 50 miles inlength. Though the territory in which the first operations were contemplated and in which all preliminary work was carried on was from 1/2 to 2-1/2 miles in width and 20 miles in length, lying immediately adjacent to tide water.

In this district seepages occur along a well defined anticline for a distance of 20 miles. At Johnston Creek the flow of fresh petroleum has been variously estimated at from one to ten barrels daily. The writer believes that owing to an ideal condition for the petroleum to impound itself and the accummulation of large pools on the surface that the tendency has rather been to exaggerate the actual flow of oil. Nevertheless it is a very prominent seepage. Other seepages in the district accompanied by gas indicate a strong gas pressure in the field.

The rocks of this district are definitely known to be Tertiary and are probably of Miocene period and consist of principally sandstone shales, conglomerates with a lesser amount of limestone. There are

no intrusions or igneous rocks in the field.

The is evidence of three parallel anticlinal folds, being parallel with the coast line and thus making the approach to the field easy. The anticlines where exposure enables determination appear to have steep limbs which indicates a probably narrow zone of production, and for this reason the 640 acres allowed to be leased should embrace the entire productive area of any single 2560 acre claims

The climate in the Yakataga field is very mild being tempered by the Japanese Current. Drilling operations can be carried on 365 days a year if need be, but ingress to and egress from the field by water (the only means of reaching it) should be confined to the summer months. There is considerable rain fall in this part of Alaska.

Wild strawberries are in great abundance and any kind of vegetables may be grown. Timber of this district is the finest in southwestern Alaska and consists principally of hemlock and spruce, trees 3 or 4 feet in diameter and 60 feet to the first limb, I should say, are common.

Two Steamship Companies, operate substantial ocean going passenger and freight steamers continuously throughout the year. One line having a regulat port of call about 75 miles from this field. Transportation of supplies and equipment by steamer from Seattle to Yakutat, 75 miles southeast, thence by barge and tow boat to field would be the logical procedure for preliminary operations. Icy Bay on the eastern margin of the field and about 14 miles from the property under consideration will be the ultimate harbor for this district. This Bay caused by the recession of Malispina Glacier is as yet an unchartered harbor. Surveys are to be made next Summer

so that mariners may soon safely venture here directly with cargoes

Rather than confuse you with details about steamer freight rates, towing charges, costs of labor and various other items that enter into drilling operations, I will state that Mr. George C. Hazelet, Manager of the Chilcat Oil Company, at Katalla, estimates that with good luck one hole and possibly two could be drilled in the Yakataga field at a cost of $30,000. This estimate is based upon an inexpensive light drilling rig and a depth not exceeding 1500 feet.

I do not believe this advisable. Two horizons of oil are believed to exist and drilling operations should determine whether or not this condition obtains. I am of the opinion that the district should be tested with deep holes and drilling equipment ~~suitable~~ provided suitable for drilling them.

The only yield of petroleum in Alaska is from a single patented 160 acre claim, title to which passed to private interests before the withdrawal of the oil lands. The production here is small, The yield from any single well not having exceeded 25 barrels daily. The average depth of the holes being about 1,000 feet. This producing claim is in the Katalla field, about 100 miles from the Yakataga district.

A small refinery produces gasolene, distillate and kerosene, with no facilities for recovering other products, which constitute everything known in a paraffine base petroleum. The recovery of distillate products is about 80%. The gravity of the oil in the last well brought in last October was 46.5 Be.

I am handing you herewith a sample of crude petroleum from a seepage on Mirrow Slough in the Katalla field. This sample is unstrained crude oil that I procured from a seepage myself. All of the crudes from the Kattala and Yakataga fields, excepting this sample are of a greenish or yellowish green color.

Yours truly,

Thos A Vowell

YAKATAGA DISTRICT

Introduction: A total of 22 days was spent in field work in this district and a reconnaissance survey was made of the area lying between Yakataga Reef on the west and Icy Bay on the east a distance of about 40 miles. On account of the size of the district the difficulties of travel and transportation, the dense vegetation the lack of suitable maps and the weather conditions, it was impossible to prepare a detailed geological map showing the exact distribution of the formations. However, the structure of the area was worked out in considerable detail, and the general distribution of the formation has been mapped.

There are no settlements in the region at which supplies may be obtained. Everything must be brought in from the outside and landed during favorable weather.

Placer gold was discovered near Yakataga Reef in 1897 and attention was thus called to the district. Oil seepages have long been known also in 1898 and 1899 many claims were staked. Active placer mining began in 1899 when a few men began working the beach sa sands for their gold content. By 1904 there were about 250 prospectors in the district. However, the placer ground, never very rich soon became worked out and the miners gradually drifted away to new fields until, at present, only four are left.

Location: Yakataga Reef at the western end of the district lies 75 miles east of Katalla and 100 miles west of Yakutat Bay. Icy Bay at the eastern limit of the district is over 40 miles by water east of Yakataga Reef and 60 miles west of Yakutat Bay. Yakataga Reef lies just north of the 60th parallel of north Latitude. In length the district covers about one degree of Longitude, being between 141-21 and 142-21 west Longitude.

ACCESSIBILITY From Yakataga Reef to Icy Bay, the land presents an almost straight, unbroken front of the sea. This entire stretch of coast is an unbroken roadstead offering no shelter to vessels. Consequently a landing must be made thru the surf and this can be accomplished only in very calm weather.

Two small, rocky reefs break the regularity of the shore, but these offer no protection from storms. The larger of these is Yakataga Reef, a wave cut rocky platform, made up of shales, sandstones and conglomerates, which is about 2000 feet wide and which extends about ½ mile from the shore. The smaller of the two is Umbrella Reef which lies at the mouth of Lawrence Creek, about midway between Yakataga Reef and Icy Bay. This is also a low wave cut rocky platform, which is being rapidly cut down to tide level by the force of the waves. This reef is almost covered by high tide. Icy Bay is a well marked indentation of the coast, which has been left by the retreat of Guyot Glacier. This bay offers the only harbor along the coast between Controller and Yakutat Bays.

Icy Bay is fairly well protected and would afford a safe landing place in rough weather. Small launches may enter Mud Bay at high tide and land material on the west side of the Bay. However, from here to Umbrella and Yakataga Reefs is a very difficult trip, and hauling could only be done in the winter when the marshed and mud flats are frozen over. There are no roads at present and the expense of building one would be great.

The district is more readily accessible by water than by land The overland trip from Katalla is very difficult and even dangerous owing to the large and rapid glacial rivers and the many marshes and quicksands that must be crossed. Winter is the most favorable season for this trip, as the rivers and marshes are then frozen over and the trip may be made with dog teams.

On the whole the district is not readily accessible and the landing of materials and supplies would be a difficult and costly task.

Climate: The climate is similar to that of the Katalla district, except that it may be slightly wetter. This may be accounted for by the fact that the Japan Current is nearer shore along this straight unprotected stretch, while it is deflected out to sea by the islands which lie off the coast to the east of the Katalla district. The prevailing winds are from the east and southeast and these are often accompanied by storms.
The vegetation is similar to that of the Katalla district, but is somewhat denser and more luxuriant.

Topography: The chief topographic features of the district are as follows:
First, A narrow sandy beach which follows the coast line,
Second, A narrow marshy coastal plain, which lies between the beach and the mountains. Many of the streams on reaching the coastal strip, spread out into stagnant pools and marshy areas.
Third, The front range, a continuous ridge which parallels the coast from Yakataga Reef to Guyot Glacier; this is low on the west, rarely exceeding 2200 feet. To the east it increases rapidly in elevation- heights of 5,000 to 7,000 feet being common. This may be considered as the front range of the Robinson Mountains which lie to the north and range in elevation from 7,000 to 11,000 feet. North of the Robinson Mountains and some 35 to 50 miles from the coast, is the main St.Elias Range, which culminates to the northwest in Mt.St.Elias,18,025 feet in elevation. The main St.Elias range has not been explored or mapped and little is known concerning it.

The area under consideration lies wholly within the front range and along a low coastal strip which fronts it. The slopes are steep and precipitous, both above and below the timber line, and the streams are steep walled and precipitous. In the western part of the area, the streams rise at the base of sheer,almost unsurmountable cliffs, made up of gently dipping sedimentary rocks.

Streams: All of the streams east of Yakataga Reef are short and precipitous. They rise in the front range and cut transversely across it at right angles to the trend of the range and the coast. All of the streams west of White River are small and unimportant but beyond this to the east the streams increase in size and importance. From Munday Creek eastward glaciers occupy the upper valleys of all the larger streams. These streams offer the only means of acces into the front range.

Maps: A topographic map, on a scale of 1 to 180,000 (2.86 miles to the inch) which covers the territory between Yakataga Reef and Icy Bay, has been prepared by the United States Geological Survey. This map is of a reconnaissance nature only, and is wholly unsuitable for geological mapping. While it was of great service in the field, its many inaccuracies render it useless in many localities. A serious error has been made between Yakataga Reef and White River. This stretch is shown to be 5½ miles in length while in reality it is more than 7½ miles. As a consequence of this contraction many of the streams are left out and the topography is incorrectly shown. Furthermore , the glaciers at the heads of Munday and Johnston Creeks and Little River are incorrectly located. Another serious errorIs in the position and extent of the Yakataga Glacier, which has been placed at least one mile too far north, and which is at least four or five times as wide as indicated. There is a claim map of the district which is accurate in longitude but badly out of scale north and south.

Roads and Trails: The only roads in the district are short stretches up some of the creeks. These were made many years ago for assessment purposes and are now largely overgrown with vegetation. There are no through roads from one part of the to another. There are a few short trails up the creeks,but these, like the roads are so overgrown with vegetation as to be practically impassable.

The best method of travel is along the beach. Small quantities of supplies can be transported by dog part from one plateau another.

Geology: The entire area is underlain by Tertiary sediments, which range in age from Oligocene to Pliocene. Eocene rocks are said to outcrop about 12 to 16 miles north of the coast, where they have been thrust out over the younger sedimentary rocks. However they do not outcrop in the region under consideration and have no bearing on a discussion of the oil possibilities of the region.

There is only publication dealing directly with this district. This is "Mineral deposits of the Yakataga District, Alaska" by A.G. Maddren, U.S. Geological Survey Bulletin No. 592 issued in 1904. This bulletin deals on placer gold deposits and the oil possibilities of the region. The present writer disagrees with the bulletin on many points, but chiefly with Mr. Maddren's interpretation of the structure. He has compared the structure of the fold, along which the oil seepages occur, with the structure of some of the California fields. On page 145, the following statements appear "The essential structural factors presented in the Yakataga seepage belt do not seem to be any more complex than those met with in some of the productive fields of California. If anything the structure governing the occurence of petroleum in the Yakataga District is probably more simple than that of some of the well known California fields."

The present writer considers that the above statement is most unfortunate and misleading. It is true that the structure of some of the California fields is apparently complex, but the comparison implied between the California structures and the structures of the Yakataga district is most unhappy. The present writer is thoroughly familiar with the structure of all of the most important California fields and he emphatically states that there is little similarity between the two districts, either from the point of view of structure or lithography. A description of the structure will be given later.

The rocks exposed in the Yakataga district consist of a very great thickness of shales, sandstones and other conglomerates, similar in many ways to the sedimentary rocks in the Katalla district. As is but natural, the rocks in the two districts are not identical since they are widely separated and were deposited under somewhat different physical conditions. For these reasons rocks of exactly the same age in the two districts could not be expected to sh show identical characters.

The beds have been divided into two formations roughly equivalent to the two formations recognized in the Katalla district.

The lower division of upper Oligocene and probably lower Miocene Age has been called the Poule Creek formation, since it is well exposed in the creek of that name. The upper division of the Miocene and Pliocene Age is called the Yakataga formation on account of the excellent exposures of a part of the formation at Yakataga Reef and also because it is the most widespread formation in the Yakataga District.

More detailed work in this district would undoubtedly result in the division of the great thickness of the Tertiary strata into a greater number of formations, but for practical purposes two divisions are all that are necessary. No igneous intrusions were seen in this district.

POULE CREEK FORMATION -97-34

Character: This formation is made up of fully 4000 feet of dark, hard platy shales, in part calcareous and in part sandy, thin bedded sandstones, conglomerates, occasional thin limestone layers and one or two glauconitic sandstone beds. The shales greatly predominate and constitute at least 75% of the formation. The sandstones occur as thin layers on the lower part becoming thicker and more important toward the top. These sandstones are blue-gray when fresh and weather to a brown or buff color. They are micaceous and often somewhat feldspathic and contain numerous fragments of

plants and carbonized wood. Sandstones are more numerous in the upper part of the formation, the upper 500 feet being largely sandstone.

Distribution and thickness: This formation is the oldest exposed in the area of the anticlines. It lies in a zone more than a mile wide along the crest of the Yakataga anticline. It is exposed from Two Mile Creek on the west to Big River on the east.

The total thickness is not known as the lower part has not been exposed to erosion, but it is fully 4000 feet thick and possibly more. The formation is very fossiliferous and its age is undoubtedly Upper Oligocene. The upper part may be lower Miocene but there is little definite evidence on this point.

The fossils found in this horizon are as follows: Acilla ge Eysburgenisis; Olenya of ventracosta; Thyasira bisecta; Glycymeris sp. Nativa 2 species; Cardium sp; Turritella, diversalineta; Tercicula new species Naraopsis, cf. oregonensis; Miopleonia sp; Turritella new species; Scaphander, sp; Dentalium sp; Aturia sp.

These forms indicate an Upper Oligocene Age for the for the beds in which they are found. From the fact that this formation is somewhat similar to the Katalla formation, both lithologically and stratigraphically and that it contains numerous seepages of oil, the two are believed to be of practically the same age.

Character: Overlying the Poule Creek formation with apparent conformity is a great thickness of sandstones, shales and conglomerates. The shales are usually dark in color and are in part organic. They are usually softer than the lower shales. The conglomerates are often very thick and heavy and, like those in the Redwood formation in the Katalla district, are evidently of glacial origin. The pebbles and boulders are usually small, but occasionally there are large ungrounded blocks up to 10 to 15 feet in diameter. These boulders are of igneous and metamorphic rock that have been carried down from far to the north by glaciers. There are also some true stream conglomerates. Sandstones constitute a much larger part of this formation than they do in the Poule Creek beds. The Yakataga formation largely consists of monotonous alterations of shale and sandstone, with occasional beds of conglomerate.

Distribution and thickness: This formation lies on the flanks of the Yakataga anticline. The crest of the fold is not far from the coast and only the lower part is exposed on the southern limb. The entire thickness is exposed on the northern limb in the succeeding anticline to the north. The thickness is great and is in excess of 5,000 feet. No accurate measurements could be obtained owing to the inaccessible character of the countryto the north of the front range. A partial section of this formation was measured along the Yakataga Reef where it is well exposed. This section is as follows;

Base not exposed	41 ft.
Calcareous sandstone	27
Glauconitic sandstone	21
Thin dark beddedsandy shales with hard calcareous layers which stand out as ribs	1
Calcareous sandstone, slightly glauconitic	440
Dark, sandy shale with occasional layers of calcareous sandstone and sandy limestone	12
Green, glauconitic sandstone	70
Soft dark sandy shale	118
Glauconitic sandstone and shale with occasional hard calcareous layers	16

Dark shale with occasional layers of gray calcareous sandstone and sandy limestone	70	ft.
Sandstone and sandy limestone	26	
Crumbly brown sandstone conglomerate on top	52	
Dark fissileshale	8	
Conglomerate	60	
Dark hard fissile shale	14	
Buff shaly sandstone	25	
Dark sandy shale	4	
Shaly sandstone	28	
Dark sandy calcareous shale	50	
Conglomerate, probably glacial	1	
Sandy limestone	10	
Conglomerate	11	
Hard dark limy shale	5	
Conglomerate	73	
Hard dark shale	12	
Hard resistant gray sandstone	5	
Bluish sandy shale	24	
Gray conglomerate sandstone	31	
Bluish sandy shale	3	
Pebbly sandstone	55	
Sandy shale	1	
Light gray sandy limestone	15	
Massive gray sandstone	44	
Gray sandy shale	1	
Gray sandstone	28	
Fine grained shaly sandstone	150	
Total	1336	ft.

With the exception of the glauconitic sandstones in the lower part this monotonous repitition of sandstones and shales is characteristic of the formation as a whole.

Age: From the fossils in these beds the age is considered to be Miocene, the upper part probably extending into Pliocene.

The following fossils have been recognized: Achilla, new species Miopleonia, new species; Turritella new species; Pecten, 2 new species Chrysodomus, sp. Nearly all of these are new species but they are very similar to species known to be of Miocene age.
This formation is probably roughly equivalent to the Redwood formation in the Katalla district.

Structure: A long anticline extends from Yakataga Reef on the west to Little River on the east and forms the most pronounced structural feature of the district. This fold extends about N70 degrees West and parallels the coast, except at its western end where it swings rather sharply to the southwest and plunges rather rapidly. This fold is far from being a simple one the southern limb is either vertical or overturned, the beds dipping to the north at high angles. Overturning has taken place over much of its length, but there are areas, notably in the vicinity of Poule Creek where the beds though very steep have not been overturned. The north limb is also far from gentle. The beds rise very gradually and gently from the syncline to the north and as they approach the crestthe dip is suddenly increased and the beds rise sharply near the axis. To the east of Three Mile Creek (3 miles east of Yakataga Reef) the dips on the north limb near the crest are very steep, ranging from 65 to 85 degrees to the north. West of Three Mile Creek toward Yakataga Reef the fold turns toward the southwest and the dips are less steep, being in the neighborhood of 30 to 50 degrees to the northwest.

The fold plunges at a comparatively gentle angle toward the west from the vicinity of Poule Creek. As Yakataga Reef is approached the fold plunges more and more rapidly as it turns toward the south west. There is also a slight plunge toward the east or southeast beyond Johnston Creek, but the degree of plunge could not be deter-

mined on account of the inaccessible nature of the country. The eastern end of the fold swings somewhat to the southeast while the western end swings rather sharply toward the southwest. Thus the crest is slightly eccentric, the concave side being toward the ocean.

There is a small minor anticline on the north flank of this fold in the vicinity of Johnston Creek, but it cannot be traced for any distance. To the north of this main anticline is a broad major syncline which passes through the White River Glacier, and westward toward the Yakataga Valley. This syncline is succeeded on the north by an anticline similar to the anticline on the coast. This interior fold was visited only in the vicinity of Yakataga Glacier. Here the south limb is vertical while the north limb lies to the north at 35 to 40 degrees.

These folds have undoubtedly been produced by great compressive stresses acting from the north. These forces produced great folds with steep or even overturned limbs. In places, the folds have been broken and thrusting and faulting has taken place. The axial region of the coastal fold has been crushed and probably faulted in places.

Evidences of Petroleum

There are a large number of oil seepages in the district, nearly all of which occur along the crest of the coastal anticline. The rocks have been crushed along a part of the axis of this fold, and the zone of crushed rock has been less resistant to erosion, and the formation of a long series of depressions along the south side of the front ridge have been formed. These are most noticeable in the stretch from Fulton to Johnston Creek. Seepages are fairly numerous along this notch.

Seepages were seen in the following creeks and rivers:

One Mile Creek (1 mile east of Yakataga Reef) on Red Oil Claim No.8 and on Oil Creek Claim No.4
Hamilton Creek on Oil Creek No.1 and Hamilton Claim No.7
Salmon Creek on White River Claim No.8
Crooked Creek, on Crooked Creek Claim No.5
Lawrence Creek, on Lawrence Creek Claim No.4
Poule Creek, on Poule Creek Claims No.s 4 and 5
Munday Creek, on Munday Creek Claim No.5
Johnston Creek, on Johnston Creek Claims No.s 1 and 4

Two distinct types of seepages may be recognized. From Crooked Creek west the oil in the seepages is very thin and fluid and has a very marked odor which resembles that of distillate. The oil frequently has a slightly reddish or reddish yellow tinge. The one exception to this rule is the most westerly seepage, that on Rex Claim No.6. This is dark green rather thick oil which does not occur on the crest of the Yakataga anticline, but on the north limb. This evidently comes from a higher horizon than the other seepages. All of the others occur on the crest of the fold the oil having migrated upward from below.

To the east of Crooked Creek, the oil in the seepages is green in color, lacks the marked distillate odor and is identical with that found in the Katalla district. One explanation of this change in the character of the oil westward is that the fold plunges to the west and that the source becomes more deeply buried in that direction. The oil must travel farther to reach the surface on the western end of the fold and its longer migration through the rock masses causes it to be filtered and changed in character.

The only noticeable gas seepage is in Oil Creek. Seepages of reddish oil with a strong distillate odor occur and in the midst of these, gas comes up through the swamp water, with a hissing sound. This gas seepage on ignition burns with a steady flame about two feet high. The supply of gas is constant and the flame does not show any tendency to die down. These gas and oil seepages occur in the line of depression previously mentioned along the crest of the fold. This escape of gas indicates that the oil may be under considerable pressure.

There are several seepages on Hamilton Creek, most of which come up through and accumulate in marshy areas. At one place however, oil occurs in a soft sandstone, about 70 feet thick. Very little oil actually seeps out of the sandstone but the rock is thoroughly impregnated with a very light oil thru at least 30 feet of the total thickness of 70 feet. Gas also escapes slowly from this sandstone. The sandstone is rather soft and porous and offers an excellent reservoir rock. In places this sandstone shows a thin coating of paraffin along fracture cracks, just below the surface. This is soft and a pale dirty yellow in color and is about the consistency of butter. It has evidently separated out of the oil by chilling.

There are several small seepages on Crooked Creek, but these present few features of interest. There is a fairly good seepage at Lawrence Creek, the oil coming up thru stream detritus. Considerable paraffin coats the rocks down stream from this seepage.

There are a number of small seepages of green oil on Poule Creek Here the oil issues directly from the shales along the more or less crushed axis of the fold. Seepages occur for several hundred feet both north and south of the crest. The oil occurs along joint and fracture surfaces of the shale.

The largest seepages occur on Johnston Creek about ¾ to 1 mile from its mouth. Several seepages on the west side of the creek along a line which trends North 75 degrees West parallel to the axis of the fold at this point. There are a number of seepages in a flat marshy area about 50 feet above the level of the creek. The oil accumulates on pools of the water to a thickness of an inch or more. Gas bubbles up very slowly at this place.

The amount of oil coming from these seepages and escaping into the creekhas been variously estimated at ½ to 2 barrels per day. No such estimate is very satisfactory, as there are no means by which the amount may be checked. The writer doubts whether more than a few gallons of oil find their way into the creek each day.

Considerable paraffin has collected in the swamp showing that much oil has escaped in the course of time. These seepages on Johnston Creek have been regarded by some as marking the outcrop of the source of the oil. However, no organic shales are exposed here and there is nothing to indicate that this is the case. The writer is inclined to consider that the size of the seepages depends more on the fact that the rocks have been more severely crushed in this area and thus allowed a freer escape of oil.

No seepages to the east of Johnston Creek. A seepage was reported near the Guyot Glacier but this was visited and found to consist of iron jelly and decaying vegetation. Seepagesare reported near the western end of Yakataga Glacier, and an unsuccessful attempt was made to reach them. There is a well defined anticline in this vicinity and oil very possibly escapes along its crest.

Oil possibilities: Although the structure of the Yakataga anticline has many objectional features, such as steep dips, crushing and faulting along its axis and the frequently overturned character og the south limb, it is certainly worthy of being tested. The favorable features are the presence of seepages of high grade oil along the crest of the fold and the presence of sandstones in the western part of the ffeld, capable of acting as reservoirs for oil.

The inaccessibility of the district is the chief drawback to development. The natural difficulties may be overcome but only at great expense.

No one well will test the district, three wells at least should be drilled and these should be so located as to make a fair test of the possibilities of the district as a whole.

The most favorable area for the occurence of oil is a narrow strip of territory extending along the axis of the foldfrom a short distance east of Johnston Creek to Acma Creek near Yakataga Reef. It is difficult to say what part of this strip is most favorable but the presence of an oil sand in Hamilton Creek and the gas seepage in Oil Creek indicate that this portion offers as good, if not better chance than any other.

There can be but little doubt

There can be little doubt that oil may be encountered at almost any place along the crest of the Yakataga anticline, but whether in commercial quantities or not only the drill can tell. Wells drilled into the hard fractured shales would undoubtedly be small producers but should a sandstone such as that on Hamilton Creek be encountered a good yield of oil should be obtained.

The possible territory is necessarily narrow, owing to the very steep dips along the crest of the fold and wells must be carefully located along the crest. Care must be taken not to drill on the steep south limb, as a well so located has little chance of success. The interior anticline seen near the front of the Yakataga Glacier also offers possibilities as possible oil territory, and this also should be tested.

Method of Development: The landing of supplies and the transportation of materials from one part of the district to another will be a difficult and costly undertaking. The landing of material from large vessels at any place along the coast is not feasible, since material can only be landed in calm weather, and it might be necessary to wait for weeks for a favorable oppertunity.

The only comparatively safe shelter is Icy Bay, and this is some distance from the possible oil territory. The best method of procedure would be for a large vessel to discharge freight on scows in Icy Bay and then to tow these scows by launch into Mud Bay at high tide and to store the freight in a warehouse. The entrance to Mud Bay is only 3 or 4 feet deep at low tide but there are 2½ or 3 fathoms of water at high tide which would be sufficient for a small launch. From here material could be sledded overland when the marshes were frozen over in the winter or a favorable oppertunity awaited and the scows towed from their harbor in Mud Bay to Umbrella or Yakataga Reef and the material landed.

For the purpose a 100 H.P. gasoline launch and two 50 ton scows would be needed. A small 10 H.P. launch would also be necessary to tow the scows into shallow water at the desired landing place. The scows could be beached at high tide and unloaded and floated off empty at the next high tide. A warehouse at the head of Mud Bay, in which equipment and supplies could be stored, while waiting for favorable weather, would be necessary.

A large supply of tools and other drilling equipment should be kept on hand in order to avoid long and costly delays. A wireless plant with a radius of 250 miles would be advisable. Should in commercial quantities be developed, it would be necessary to construct a pipe line to Icy Bay.

Conclusion: Although there are many unfavorable features, the district is well worthy of being prospected. One test well would not be a satisfactory test since the district is a long one and it is impossible to state the most favorable part. One well should be put down in Poule Creek, another on Crooked Creek and a third in the vicinity of Oil or Acme Creeks. These wells would test out the oil possibilities of the district. After consideration of all the evidence it is believed that such wells have a fair chance of success, and the expenditure of the necessary capital in drilling them is justified provided the operating company should own or control a large part of the district. Should oil be encountered in commercial quantities in these wells, it would be advisable to drill a well on the fold exposed near the northwestern end of the Yakataga Glacier.

FIFTH ANNUAL REPORT

CHILKAT OIL COMPANY

2203 L. C. SMITH BUILDING

SEATTLE, WASH.

CHILKAT OIL COMPANY

2203 L. C. SMITH BUILDING

SEATTLE

FIFTH ANNUAL REPORT

TO THE STOCKHOLDERS, CHILKAT OIL COMPANY:

Herewith is submitted a statement of the accounts of the Company for the year ended December 31, 1922.

DRILLING

Three wells were completed during the year as follows: No. 19, depth 1400 feet, production four barrels; No. 20, 1220 feet, five barrels; No. 21, 1750 feet, ten barrels. The cost of these wells, including derricks, casing, pumps and other equipment, was $37,437.49. It is believed this compares favorably with the cost of wells of similar depth in other fields.

REFINERY

A first class new still of 120 barrel capacity, equipped with steam and two condenser coils, one for light oils and the other for lubricating oils and wax, was installed in a new building erected for it. Also a new tail house and shop for the refinery were erected. These improvements cost $15,068.38, and became absolutely necessary on account of the deterioration of the old stills and equipment. The new still and equipment is designed also to treat the residue, of which more than 7,000 barrels have accumulated from former years. Tests with the new still show a recovery of gasoline, distillate and kerosene as high as 83% of the crude. This is a much higher percentage than was ever obtainable with the old equipment and leaves only about 10% of wax distillates and about the same quantity of cylinder stock for further treatment. With the addition of de-waxing machines, which may be done at some future time, the entire crude and residue can be made into marketable products.

EQUIPMENT

Two new tanks were erected, one a 250 barrel gas-tight receiving tank for the crude oil, and the other a 1750 barrel tank for storing wax distillate.

Four thousand feet of 2-inch lead lines for oil and gas from the wells to the refinery were laid, some to replace worn out lines and the rest for connecting the new wells.

Two hundred and fifty thousand feet of lumber was cut and used for buildings, roads and derricks. Two old derricks, destroyed by a storm in September, were rebuilt and a new derrick for the next well, No. 22, was completed and is ready for the machinery.

A small wireless telegraph plant, suitable for communication with Cordova, was installed at a cost of $626.96 to take the place of the old telephone line which was often broken and unsatisfactory and finally went out of business entirely. This plant is operated by the bookkeeper without extra expense.

EARNINGS

Gross earnings were $89,509.96. Net earnings, before charging off cost of new wells, depletion and depreciation, were $49,974.84.

After deduction of depletion charges amounting to $20,094.00, cost of drilling new wells amounting to $37,424.49, and depreciation charge on equipment of $15,550.00, the year's operations show a net loss of $23,096.65.

FUTURE DEVELOPMENT

The drilling this year confirms the experience of former years and indicates that only a small production can be expected from shallow wells. A great number of such wells, however, can be drilled on the Company's property.

A well sunk to a depth of 4,000 feet or more might show a large production, but the Company's resources at this time are not sufficient to permit this. Such a well would cost not less than $50,000.00.

NATURAL GAS

The wells are making over 200,000 cubic feet of gas daily, estimated to contain at least two gallons of gasoline to the thousand feet. A small plant for the saving of this gasoline is greatly needed and should pay for itself in a single season. It is hoped to install such a plant this year if resources permit.

Respectfully submitted,

FALCON JOSLIN, *President.*

CHILKAT OIL COMPANY

Statement of Assets and Liabilities, December 31, 1922

ASSETS

Property Account	$1,093,876.62
Material and Equipment	69,316.36
Accounts Collectible	9,814.75
Suspense Items	689.53
Cash	18,601.51
	$1,192,298.77

LIABILITIES

Capital Stock	$224,150.00
Accounts Payable	848.92
Depreciation	47,143.49
Depletion	40,654.00
Property Surplus	909,422.00
Profit and Loss	29,919.64
	$1,192,298.77

Statement of Earnings and Expenses, 1922

REVENUE FROM OIL SALES:	
Gasoline	$16,742.01
Distillate	64,184 15
Diesel	1,949.26
Kerosene	6,402.00
	$89,277.42
Plus Oil on Hand End of Year:	
Crude	$193.43
Gasoline	77.61
Distillate	294.46
Diesel	17.14
Kerosene	81.82
	$644.46
	$89,941.88
Less Oil on Hand Beginning of Year:	
Crude	$ 80.93
Gasoline	205 60
Distillate	1,143.79
Diesel	16.23
Kerosene	122.99
	$1,569.54
Operating Earnings	$88,372.34
Rentals	600.00
Interest	537.62
TOTAL GROSS EARNINGS	$89.509.96
EXPENSES:	
Production Expense	$ 7,802.52
Refining Expense	9,228.10
Transportation Expense	15,843 84
Development Expense	37,427.49
Other Expenses	1,793.75
General Expenses	4.653.91
Taxes	213 00
Depreciation Reserve	15.550 00
Depletion Reserve	20 094.00
TOTAL EXPENSES	$112,606.61
NET LOSS FOR YEAR	$23,096.65