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Signed: John L. Noble,  
A Notary Public in and  
for the Province of  
British Columbia.

Dated at Vancouver, B. C.  
this 23rd day of March, 1939.

(SEAL)

REPORT  
ON  
TULAMEEN PROPERTIES  
IN  
PRINCETON MINING DISTRICT  
BRITISH COLUMBIA  
BY  
NORMAN C STINES

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**SUMMARY OF PRINCIPAL ASPECTS:**

**1- Reserves of Gravel:-**

	Cubic yards	Per Cu. Yd.	Content Total
Proven:	385,000	\$1.75	\$498,750
	<u>350,000</u>	0.92	<u>322,000</u>
	635,000		\$820,750
Partially Proven:-			
	<u>100,000</u>	1.75	<u>175,000</u>
TOTAL	<u>735,000</u>		<u>\$995,750</u>

**Total Proven and Indicated:**

About 4,000,000 cubic yards  
containing: \$4,000,000

**2- Total costs of working the Proven and partially proven:**

Operation	\$185,000
Royalties	<u>92,000</u>
Total	<u>\$277,000</u>

**3- Profit only on Proven and Partially Proven ground:-**

which can be won (in round figures)

in 1929-	\$46,000
in 1930-	394,350
in 1931	278,400

## 4- Time schedule of Capital requirements:-

At once	\$30,000
April 1st	30,000
May 1st	45,000
June 1st	40,000
July 1st	30,000
August 1st	15,000
September 1st	<u>10,000</u>
	<u>\$200,000</u>

5- From indicated reserves it is confidentially believed that sufficient additional ground will, during 1930 and 1931, be proven to continue the operation for five years with an annual dividend of about \$174,000; for the sixth year \$128,000, and for the next two years \$88,000 each.



**CONCLUSIONS:**

1:

There exist in the Tulameen water shed large areas of ground that are platinum and gold bearing and the gravel deposits derived therefrom contain sufficient amounts of those metals per cubic yard to make them of great commercial interest.

2: There are two kinds of deposits; those made by former streams (old channels) and those made by present streams. The conditions are such that the former can be worked cheaply by hydraulicking and the latter by dredging. The first type exists for a stretch of about nineteen miles and the second for about ten. In the first there would seem to be an aggregate of at least fifteen million cubic yards, not all of which, however, can be worked profitably. In the other class there would seem to be available, provided the unit metal content were sufficient, about one hundred million cubic yards. Up to the present the writer has investigated only two smaller areas of the first type and the conclusions following bear only on the results of his investigations. These two areas are referred to as the "Ruby" and "Nelson" and the "Sootheran" properties, and occur at the opposite ends of the nineteen mile stretch.

3: There are proven on the "Ruby" and "Nelson" claim 350,000 cubic yards of gravel containing a metal content worth 93 cents per cubic yard or a total of \$322,000.

4: There are proven on the Sootheran property 285,000 <sup>218,000 m<sup>3</sup></sup> cubic yards which will average \$1.75 per cubic yard or contain a total of \$498,750.

5: There are partially proven on the Sootheran property in the same channel an additional 100,000 cubic yards with the same average tenor and indicated in a higher channel a much larger total volume.

6: There are indicated on the Ruby and Nelson ground in other channels a large additional amount which should contain approximately the same values. The volume of such ground might possibly reach several million cubic yards.

7: The valuable unit content shown above with platinum at \$45.00 and gold at \$18.00 per ounce is about evenly distributed between those two metals,-- The platinum contains a high percentage of osmium iridium and is more valuable than ordinary platinum.

8: In addition to the metal values given above there were recovered during the investigations about 15 pounds of concentrate per cubic yard washed. The exact value of this concentrate is not yet known but from earlier investigations it would not surprise the writer if it proved to be only slightly less valuable than the free metallic content.

9: Each property is well adapted to exploitation by hydraulicking and gravity water can be brought onto each.

10: The Ruby and Nelson property can be equipped in one season for an estimated cost of \$122,500, and the Sootheran in five months for \$36,500.

11: With such equipment provided there can be moved each month on the Ruby and Nelson, 45,000 cubic yards at a cost of twenty cents per cubic yard and on the Sootheran, 30,000 cubic yards at a cost of twenty seven and one half cents per cubic yard.

12: If work in the field is started by April 1st, 1929, the equipment of the Ruby and Nelson can be completed by the end of the season and the Sootheran by September 15th, during 1929 on the latter property there should be moved 40,000 cubic yards for a recovery of \$70,000, at an operating profit of \$58,000.

13: During 1930 there should be moved from the Ruby and Nelson, 270,000 cubic yards for a recovery of about \$250,000 and from the Sootheran 180,000 cubic yards for a recovery of about \$315,000, from both of which there should be won a combined operating profit of about \$455,000. After paying royalties on purchase price and to the Government on production there should remain a divisible profit of about \$395,000.

14: If no additional ground is proven then these areas will be worked out by the end of 1931 with a net profit for that year of about \$278,000.

15: Thus, based only on a total of 735,000 cubic yards in both properties there will have been won by the end of 1931, after purchasing the Sootheran property and paying \$50,000 on the Ruby and Nelson (out of a total of \$80,000) a divisible profit of \$719,000.

16: To carry out this project and provide for all contingencies a sum of \$200,000 should be provided at the following rate.

At once	\$30,000
April 1st	30,000
May 1st	45,000
June 1st	40,000
July 1st	30,000
August 1st	15,000
September 1st	10,000

17: The above considerations deal only with proven and partially proven volumes. From a study of the conditions it is practically certain that the water

developed by this expenditure will be used for several years longer on the ground indicated in the other channels to prove which, only prospecting is necessary. Further these two developed water systems at opposite ends of this proven platinum and gold bearing series of channels control other claims which can be secured and worked on a leasing basis. The writer is firmly convinced that this operation started in this modest way will work at least five million cubic yards before being abandoned and probably a maximum of 10,000,000.

18: The water developed for one of these properties, after it has worked out the gravel, can be used to generate about 2,200 H.P. There is a market for this power, and it can be sold at such a rate as to give an annual net income of about \$75,000 on an additional expenditure of about \$85,000 for the pipe line and generating machine. The same water conduit can be used.

**INTRODUCTION:**

For years, the world has known that the Tulameen District was one containing platinum and gold. The lode and placer deposits have been studied by many authorities and a very comprehensive literature on the subject has been built up. That literature is full of comments by the authors suggesting that in this district was undeveloped source of platinum and that it could be won at a profit.

Very few, if any, engineers, versed in the operation of placer mines, have visited and studied this District. The writer was skeptical in his first visit but saw enough to warrant succeeding ones and was finally convinced that there was an excellent opportunity to develop here a very profitable small enterprise and almost equally good chances of it growing into a large profitable one.

This proposal is really only concerned at the present with the equipping of two particular areas in the Tulameen District but it is believed ultimately that this operation, if initiated, will expand very materially. To understand the conclusions reached herein, a

study of the whole district is required. That explains why this report is so comprehensive.

LOCATION AND EXTENT:

The Tulameen area lies in the southwestern portion of British Columbia. It is placed in the Princeton Mining District of the Similkameen Mining Division. The southern border of the area is about 31 miles north of the boundary with the United States.

The Tulameen River, from which the District takes its name, is a short, rapid stream rising in the Hope Range, and, flowing north-easterly, joins the Similkameen, a tributary of the Columbia, at Princeton,

Physiographically, the district is on the eastern flank of the Cascade Mountains, which is here called the Hope Range. The Interior Plateau region of the Southern and central British Columbia lies to the north and east. As a matter of fact, the area under discussion really lies within the Interior Plateau region.

The area included in this discussion would probably cover approximately 200 square miles. It contains other mineral deposits than those treated of herein, but those do not concern this report.

**ACCESSIBILITY:**

The region is very accessible. The Kettle Valley Branch of the Canadian Pacific Railway follows the Tulameen River from the village of Tulameen to Princeton, - a distance of about 16 miles. The village of Tulameen is 167 miles from Vancouver, with which city there is a train each way every day. Freight from this area can be unloaded at Tulameen, Coalmont and Ruby Stations.

The district has no direct road communications with Vancouver. It has, however, excellent road connections with Spene's Bridge, Ashcroft and Kamloops main points on the Trunk Highway running east from Vancouver, and through Princeton, by a southerly road, with the main arteries of Washington.

The district itself is well supplied with excellent roads. One parallels the railroad from Tulameen to Princeton. A well maintained branch road runs up the Tulameen River to Eagle Creek (and beyond) about twelve miles from Tulameen. Delivery to any proposed operation can be made during the working season by motor truck.

**MINING CONDITIONS:**

The mining conditions are excellent, except for cold weather in the winter months, placer operations could



be conducted all the year.

LABOR

There is a plentiful supply of local labour for all expected needs. For unusual needs, labor can be brought from Vancouver. Common labour gets five dollars per day. If boarded by the operation the deduction is from one to one and a quarter dollars per day.

TIMBER:

There is an abundance of timber on the surrounding hillsides. Rough sawn lumber costs twenty dollars per M. at a mill just opposite Granite Creek. Its delivery costs to any part of the road system would be a maximum of ten dollars.

For ordinary construction of flumes and low structures the round timbers found close to the sites can be used.

CLIMATE:

The climatic conditions are excellent. Neither summer or winter temperatures are extreme. It may be characterized as moderate with an average temperature of about 45 degrees F. The writer continued sampling and then washing outside until the latter part of December, 1928.

It is certain that hydraulicking can be carried on here for six months each year and in 1928 the season

could have been lengthened to nine months.

FUEL AND POWER:

There is a large coal mine at Coalmont and a fair coal can be purchased there very cheaply. For domestic purposes, for the first period at least, sufficient wood is available near the camps.

The proposal contemplates the development of one hundred horse power on the Ruby and Nelson property for present needs. If necessary, some 850 H.P. could be developed during the working season. There are other chances for developments. Fortunately, a hydraulic operation requires very little power.

WATER:

There is a good supply of water in the district. The Tulameen and its tributaries head in mountains that rise to a maximum of 7,500 feet above sea level. This results in those streams carrying large quantities of water over long periods in the summer and their being fed from areas where the precipitation averages about 40 inches annually, while the lower stretches through which they flow might have only about 25 inches as an annual average.

This proposal is based primarily on the water in Branite and Eagle Creeks. In the former, the flow is at its

minimum in March and September, according to the records it drops to 15 second feet for a short period in the latter month and comes up again almost immediately. The maximum flow is from May to July and reaches 400 second feet.

Eagle Creek heads in the high mountains and is fed by melting snows until early Fall. Its maximum of several hundred second feet is from May to July and its minimum in September drops to about twenty five second feet.

Thus, for the purposes of this proposal, the water required can be counted on for eight full months on Granite Creek and for nine months on Eagle Creek. During the sixth month, Granite Creek will be down to 85% of the requirements but above those again in the seventh, eighth and ninth.

The Tulameen river will be used for dumping purposes. During the period from April to July that river is in flood and will carry away, not only the current dumpings, but any accumulation from the previous periods of low water.

Once this water is no longer required for mining purposes, the same conduits can be used and equipment installed to generate power. There would be about 3,000 H. P. available from the Granite Creek development. This would be available all the year, and there is a ready market locally

for such an amount. This phase alone would add to be profitable life of the proposal an indefinite period.

TRANSPORTATION:

The transportation facilities are excellent. A railroad parallels half the area; a truck road the other half. Freight in less than carloads rates averages about \$20.00 per ton from Vancouver. The maximum local haulage rate will not exceed \$3.00 per ton.

MISCELLANEOUS:

All other conditions are excellent, in fact, the writer has never seen a hydraulic property where all conditions are so good. There is an abundance of dump, plenty of water, the gravels are free running and bed rock favorable.

TITLES:

The ground it is proposed to work is held under the usual British Columbia leases. The local recording office is at Princeton and the leases are all in good standing. Canada in respect to titles, is vastly different from the United States. One can readily ascertain the condition of title from the Gold Commissioner as no transfer

can be made without his consent (always give) and the placing of it on record.

LITERATURE ON THE DISTRICT:

The Tulameen district has attracted much attention. At first it was because it was about the only real platinum producing area on the North American Continent. Then it was on account of the other metals and minerals found in the district. Latterly, when platinum was required during the late war, renewed attention again was given it. Most of these studies were of a scientific nature, but in each case the author points out the economic probabilities and remarks on the absence of any properly directed and amply financed organization in the various attempts.

All through the various publications of both the Provincial and Dominion Governments are found references to the District, its past, present and future and remarks on its great probabilities for the development of mining enterprises therein. The writer had read numerous of these but believes that the situation can be readily grasped from the following:

Memoir No. 26 of the Geological Survey of Canada;  
Geology and Mineral Deposits of the Tulameen District, B.C.  
by Charles Gamsell, (1913).

Summary Report, 1933, Part A of the Geological Survey of Canada; Platiniferous Rocks from Tulameen May-Area, Yale District, British Columbia and Ural Mountains Russia, by Eugene Poitvein.

Bulletin No. 193 of the United States Geological Survey by Prof. J. F. Kemp. This study was made in 1900.

Since the writer's study of the district convinces him that Camsell's memoir is an excellent presentation, he particularly recommends that and quotes verbatim very freely from it.

#### HISTORICAL:

Gold was first found in this district in the 60's but no real development and production came until after 1885, when the Granite Creek discovery was made by a cowboy, John Chance. This man in searching for some lost horse went up Granite Creek. Where he entered the stream runs on bedrock. As he stooped to drink he saw coarse gold glistening on the bedrocks. From this discovery the rush began. During the following three years much mining was done, but from 1890 production has dwindled. In cleaning up the miners were bothered with "white gold"- afterwards proved to be nuggets of platinoid metals. In the early days the

price of platinum was so low that it hardly paid to save it. Only since about 1910 has its price been such as to bring these nuggets into economic importance.

The production records are far from complete. Much of the gold was never reported, and very little of the platinum. In table 1 is given the production as calculated by Cassell. He and others have estimated that the platinum production was double that given. As the gold approximated 40,000 ounces the ratio of platinum to gold by weight was 1 to 2.

Table 1

<u>Year</u>	<u>Gold</u>		<u>Platinum</u>
	Value		Ounces
1885	\$114,000		
1886	193,000		
1887	118,000	\$5,600	2,000
1888	89,000	6,000	1,500
1889	31,800	3,500	1,000
1890	17,700	4,500	1,100
1891	17,800	10,000	2,000
1892	16,750	3,500	500
1893	9,550	1,800	257
1894	5,630	950	160
1895	41,650	3,800	633
1896	9,000	750	125
1897	28,500	1,600	266
1898	7,580	1,500	100
1899	6,600	825	137
1900	4,800	-	-
1901	4,680	457	22
1902	2,700	190	10
1903	2,000	-	-
1904	2,500	420	20
1905	1,140	5,000	30
1906	2,500		
1907	1,000		
1908	1,000		
1909	1,000		
	\$724,860	45,892	9,860

The writer has not been able to find any table setting forth an estimate of the production after 1909. Each year, there has been some production by the miners and this would probably average annually for the entire period about 100 ounces each of gold and platinum.

There have been many attempts to initiate operations on a large scale. These have all failed; partly because the method adopted was unsuited to the conditions; partly because the organization making the attempt knew nothing of placer mining; but principally owing to wholly inadequate financing.

#### PAST OPERATIONS:

Under Historical the writer made some general remarks on past operations. Those referred particularly to hand scale mining and only commented on other attempts.

During the last few years, attempts to work on larger scales have been made, and a few references and comments only will be given.

First, it must be understood that the conditions are favorable for hydraulicking only. Large boulders and uneven surface make any form of mechanical excavation and removal impossible from a cost standpoint.



One attempt was made to excavate the material by steam shovel. No provisions was made for disposal of tailings and the washing devices were inadequate. No objection can be made to steam shovel as a means of excavation but it is wholly unfitted for an operation where the ground removed is to be washed for its precious metal content. In a placer operation, the least important part is the excavation. The most important is the washing,--separation of the valuable portion from the barren,-- and the disposal of the tailing. This last is always forgotten by "steam shovel devotees".

Another attempt was made to work a drag line excavator. The conditions were wholly unsuited.

Just now, there is a proposal to "dredge" the deposit at the mouth of Granite Creek in the Tuolumne. The ground is rich as the writer panned out both gold and platinum to the extent of over two dollars per cubic yard. But the "dredge" is an affair to be built from an old clam shell river dredge that was purchased in Oregon. It can be safely predicted that this enterprise will only result in loss of all their capital involved.

In each case, the operations were stated by a Company depending on its finances from the sale of the stock. As soon as the money was available they would commence operations and in each case when the required additional funds were not

forthcoming, the operation was closed down. The net result was loss of all capital. This could have been safely fortold in each case.

While these abortive attempts at larger scale working were being made, a few of the old time miners, continued to work their claims and lived on the outputs of their labors. The two most conspicuous of these were "Ruby", or "Ruby" and "Nelson", and "Scotheran."

RUBY AND NELSON GROUND:

The ground now held by Ruby and Nelson has been worked intermittently for years, as shown by the various reference in the Annual Reports of the Department of Mines of British Columbia. Most of this work has been done on the ground where the writer's work proved a large volume of rich gravel.

There are no records of the production. The writer has learned that the owner ahead of Ruby and Nelson produced from the upper portion of the lower channel in three years about \$6,000 of gold and platinum.

Then came Ruby and Nelson. Ruby has been working this alone. At first he did his work near where Rice did his, but latterly he has been working on the bedrock stratum (samples 11 and 13). For three years now, Ruby has made a

good living "sniping"

To appreciate what this means, one must know of what his work consisted. On Map No. 1 of proposal No. 1, a stream is shown near the cabin. This stream is the water coming out on bedrock. It flows only a small amount. Ruby dams it until he has enough stored to wash what he has wheeled to the dump. In this way he may be able to handle in eight hours, the equivalent of one-half a cubic yard-one-quarter is more nearly the amount.

Repeating this operation about six days in each week for probably forty weeks each year, he has produced about one thousand dollars annually. He claims his ground has averaged about six dollars per yard. The writer believes that about states the case.

At one time, he tried to work on a larger scale, and brought water from a small creek. The water was not enough. He finally concluded nothing could be done unless Granite Creek was brought in, and he refused to option his property to anyone not having the necessary finances to bring in that water.

On Map No. 2 in Proposal No. 1, are shown two old pits marked "A" and "B" in red. These pits are on two channels. The bedrock in "A" is at an elevation of 344 feet above the

railroad and in "B" at 318 feet. Ruby worked in "A" pit and produced coarse gold and platinum, but stopped owing to lack of water. The work in "B" was done much earlier. Ruby cleaned out the out one year and on bedrock secured enough coarse gold and platinum to pay him very well.

By referring again to Map 1 of Proposal No. 1, at point marked "A" in red, the bedrock is at an elevation of 277 feet. The writer is finally convinced that the "A" channel here and the "A" channel on Map 2 are the same channel. If so, then there are in this channel at least 3500 feet of gravels containing a minimum of 2,250,000 cubic yards. For reference later this will be called Ruby A channel.

In the higher channel the topography shows its probable course. On Map 2 it has been shown as Ruby B channel. Its extent is unknown, but its surface manifestations are greater than those for Ruby A. However, it would not be easy to hydraulic.

The government report for 1936 says:

"Most of the season was spent in building a damand pipe line to furnish water for hydraulic mining. Owing to a dry season, very little could be done after July. This lease covers what is known as the old Roney high channel-lease, which produced a lot of gold in past years. The elevation of this channel is about 100 feet above the present bed of the Tulameen River. There appears to be a considerable yardage of likely-looking gravel on the east end of the claim which the owner intends working. A total of 25 ounces in gold and nine ounces in platinum was recovered."

In the 1927 Report the following remark is made:

"Lease. "This lease, mentioned in the 1936 Annual Report, was worked by K. Ruby and partner, of Cosimont. The ground covers one of the proven high channels that produced much gold in the past. Insufficient capital to install proper working machinery and water storage above has been the reason of low production."

Sotheran Ground:

Garnet Sotheran first came into the district in 1935. That year, he cleaned out the old pit. This took him all summer as he worked alone with a wheelbarrow. He would wheel the material to the bank and drop it down a chute into a sluice box. The gravel would be washed and the gold and platinum caught in the riffles. This first year, he moved only tailings, but cleaned up about \$500.00 worth of gold and platinum.

The next year he has one man working with him. They worked in the same way and recovered 75 ounces of platinum and 5 ounces of gold. They worked about three months.

In 1927 they worked again with rocker and sluice and recovered about 30 oz of platinum and 7 oz. gold.

In 1938 they only worked about 8 weeks and recovered about 21 oz. of platinum and 5 oz. of gold.

During the four years he has worked he has sold hid gold and platinum for about \$10,000. It is doubtful

if he has moved a total of five hundred yards of dirt for an average recovery of about \$30.00 per cubic yard.

The interesting thing about this operation is that gold forms a small part. Also the platinum is coarse and rough, - there is practically no fine stuff at all. Much of the platinum has the rock matrix still adhering to it.

The Royal Bank branch at Coalmont writes that they have marketed \$4,468.71 worth of platinum and "a small proportion" of gold for Sootheran.

The department of Mines Report for 1926 makes the following statements:

Sootheran Leases. "Garnet Sootheran owns one river and two bench leases on the Tulameen River, approximately half a mile below Eagle Creek. His partner, J. Hamilton, owns the adjoining lease up-stream. The Sootheran lease (No. 153) includes what is known as the "deadhorse" claim, worked many years ago. During May and June, the two partners whilst working together a short distance below Champion Creek Bridge, discovered a pay-streak along the side of and under the boulder-dumps of some old placer-diggings. Practically no work was done to demonstrate the thickness of this pay-streak or its area, chiefly on account of the piles of small boulders on top of it. Between May 17th and June 22nd, 35 crude troy ounces of platinum was taken out from short narrow drains and open-outs spotted over an area of about 200 feet. According to the owner, this amount of platinum was recovered from 736 partially filled small wheelbarrows, and he estimated that fifteen full barrows represented 1 cubic yard of gravel; so that the 35 crude troy ounces of platinum represents the production from anywhere between 24 and 49 cubic yards. The pay-streak appears to be an iron-stained partially cemented gravel of unknown thickness. Bedrock had not been tested under this gravel at the time of examination (July 3rd, 1926) except around the rim, where it showed a decided dip down under the old workings.

"Two theories are offered as an explanation of this find, since it occurred in an old placer diggings; one is that the former miners cleaned up all the values, which were thought to be mostly gold, down to the cemented gravel or false bed-rock mentioned above and left everything below because the values were mostly in platinum valued, then, at only a few dollars an ounce; the second theory is that the platinum found is the discard from the former miners' sluice-boxes, which seems unlikely, because, as a general rule, only the coarse platinum was thrown out of the boxes and the final separation took place at the cabins.

The cost of placer mining in the early days on the Tulameen was very high on account of lack of transportation of any kind. The width of the bench on which the old channel is located is between 300 and 350 feet at the widest part and approximately 2,500 feet long. Owing to the mountain-slides, it is very difficult to estimate the width of the old channel, and there may be other higher channels filled with debris under the present wagon road. Cleaning away the piles of loose boulders offers no serious hindrance to the exploration of the bed-rock gravels, and with such high values in platinum obtainable, it is difficult to understand why the lease is lying idle. Water for mining can either be obtained from Eagle Creek, half a mile distance, or from the Tulameen River."

The value of these statements in British Columbia Government Reports is very considerable because the district engineer always visits the workings to verify his statements.

Again from the 1927 report:

"Another spectacular find of platinum was made on the Tulameen River during the summer by Garnet Sootheran and his partner, a short distance down stream from a spot where a discovery was made in 1926. Practically no work was done to prove the extent of this find owing chiefly to continued freshets which flooded the workings. Additional labour during the low-water season would go a long way towards proving whether these values are isolated segregations or an extensive bedded deposit underlying the old workings, which was left unworked owing to the low price of platinum in the early days."

Sootheran

Leases

Work in 1928 showed that this was just a "spill over" from the channel proper, the bedrock of which is about 50 feet above the present stream.

These statements bear out Sootheran's estimates of a production of about \$10,000 consisting of approximately 131 ounces of platinum and 20 ounces of gold.

NATURE OF GRAVEL DEPOSITS:

Charles Gamsell in his Memoir 26, has put this very well indeed and as the writer subscribes to his statements verbatim quotations four pages, 131 to 135 are made:-

"The placers of the Tulameen district are valuable for their gold as well as their platinum content, and these deposits have up to date proved to be the most important of its ore deposits. There is some evidence that the placer deposits were worked to a limited extent many years before 1885, but at that date they came into considerable prominence through the discovery of course gold on Granite Creek. For the few years following, the district produced remarkably well for such a small area, and about 1891 it came to be recognized as the most productive platinum region on the North American Continent. Since then the production has steadily declined year by year until, in 1910, it was so small that placer mining might almost have been said to be extinct. The streams in the district which carry an appreciable amount of gold or platinum, or both, are: Tulameen River, Granite Creek and its tributary Newton Creek, Collins Gluch, Cedar Creek, Bear Creek, Mine Creek, Eagle Creek, Champion Creek and Boulder Creek. Tulameen River: The Tulameen River has not been proved to be everywhere productive in gold or platinum. The reason for this is not apparent, but it is probably because bedrock is not easily reached on some parts of it. Mining has been carried on in three separate sections of the river, namely, near the mouth of the river, about two miles below the mouth of Granite Creek; and between Slate Creek and the mouth of Champion Creek. The last mentioned portion of



the stream is the only one that comes within the limit of the area under discussion."

"From Granite Creek up to Slate Creek the Tulameen valley is wide and its gravel deposits deep, and no attempts have been made to prospect it, so that it is impossible to say what it may contain. Above Slate Creek, however, the valley contracts, the stream flows in a narrow rock-walled canyon, about 300 feet deep. This canyon is of comparatively recent formation and has been cut down since glacial time, into the bottom of the old, glacial valley.

In this part of its course the stream has cut out its valley in peridotite, pyroxenite, and in the stratified rocks of the Tulameen group.

The productive placers of this part of Tulameen River are of two kinds, namely, those lying in the stream bed, and the bench deposits that rest on the sides of the valley either in, or above the level of the canyon. Owing to the narrowness of this part of the valley these gravel deposits are not of great extent, but they constitute some of the best paying ground of the whole district. They rest directly in bed-rock, which is never more than a few feet below the surface.

The placers of this part of the Tulameen carry both gold and platinum, and contain also small quantities of native copper and rich gold bearing pellets of silver glance. The proportion of platinum to gold is greater here than in any of the other localities, and in mining it was found to increase up-stream as far as the mouth of Eagle Creek where the greatest quantity was obtained. At hydraulic workings a short distance below the mouth of Eagle Creek the proportion of platinum recovered was greater than of gold, and nuggets of platinum were often obtained which weighed from one-fourth to one-half an ounce each.

Different portions of this part of the river has been worked over many times, and at present it is, with the exception of Granite Creek, the only part of the whole district in which placer mining is carried on year by year.

Granite Creek:—Granite Creek, one of the principal tributaries as the Tulameen River, enters it from the south and drains a part of the Interior Plateau region. From Tulameen River up to the mouth of Newton Creek, or virtually for the whole of that part of its course which lies within the limit of the map, it flows into a narrow rock-walled canyon, cut about three hundred (300) feet into the bottom of a broader and more open valley. In this part the stream flows in many places directly

on the bedrock, and the gravels are nowhere deep or very wide spread. In the more open part of the valley, above Newton Creek where the grade is easier, the gravel deposits are deeper and of greater volume.

The rocks cut through by Granite Creek are the stratified rocks of the Tulameen group, which in places contain gold bearing quartz veins.

Granite Creek has been mined from the Tulameen River up to Newton Creek, above which the gravels were so deep that bed-rock could not be easily reached. In this part there was little bench gravel, the workable deposits being found in the bed of the present streams, and occasionally in old, abandoned channels, which cut across points in the present valley. The shallowness of these gravels made them easily mined and they were soon worked out. The pay gravels were found resting directly on bed-rock and proved to be compact and cemented together with stiff clay.

Both gold and platinum occur in the creek, the ratio varying from 4 parts of gold to 1 of platinum, to equal parts of each metal. The proportion of platinum increased higher up in the stream and was greatest in the Newton Creek branch.

The gold is coarse and rough, denoting a local origin and nuggets have been obtained worth from \$100.00 to \$150.00. Some of the nuggets examined appeared to be aggregates of smaller nuggets grown or welded together.

The platinum is in smaller nuggets, generally rounded and pitted with holes. No nuggets have been obtained, to the writer's knowledge, weighing more than half an ounce.

Champion Creek. Champion Creek joins the Tulameen from the south, nearly 12 miles above Eagle Creek. Its valley is similar to those of many other tributaries of the Tulameen, having a narrow rock-walled canyon near its mouth and a broader flaring valley above.

Good prospects have been obtained on gold and platinum from the gravels above the canyon, but the ground is deep and has not been bottomed. There are virtually no gravels in the canyon portion, at the mouth of the stream."

The bench gravels are undoubtedly the richer and more easily exploited. The gravels in the wide stretch of the Tulameen between Slate and Granite creeks are poor and less is known of them but they should contain enough platinum and gold to make them of commercial interest.

The bench gravels vary from very coarse to fine, contain some large boulders that require special handling, contain no apparent beds of clay or sand, vary from a few to probably 100 feet in thickness, vary from narrow remnants or parts of channels to 350 feet in width, and are ideally adapted to removal by hydraulicicking.

The valley gravels within the limits mentioned are medium to fine, contain no boulders that would interfere with their exploitation, vary from shallow depths to over 80 feet, vary from four hundred to three thousand feet in width and are apparently excellently adapted for working by dredging.

#### WATER SUPPLY:

Under mining conditions the question of water supply was covered. The government has recording stations on the Tulameen but not for Granite and Eagle Creeks. The writer had an opportunity to observe the flow of those creeks in September and October of 1938. The lowest observation

on Granite Creek gave 22 second feet, and on Eagle Creek 47. Last year was supposed to be a dry year.

When the operations herein proposed have proven the results foretold, additional supplies could be provided. A dam could be constructed on Granite Creek. This would hold up enough water to allow of a probable seasonal supply of 50 second feet. The natural flow would give this for three to four months and storage would be necessary for only for four to three months to get a six months season.

From Eagle Creek 50 second feet could be secured for five months and probably storage for the sixth could be provided in one of the lakes at its head.

The development of these two streams to their fullest would probably allow the moving of one million yards of bench gravel annually.

#### RESERVES OF GRAVEL.

This report treats only of that section of the Tulameen River from Eagle to Roany creeks. It is known that gravels carrying precious metals exist above and below those points and on tributaries but these have not been studied by the writer.

In this section, the gravels are bench and stream. The bench gravels are remnants of former channels of the

present streams. At Roany Creek at least, three old channels at different elevations can be easily recognized. It is believed there are four. At Eagle Creek two can be easily recognized.

It is difficult to give the detailed figures on which the total yardage as given below is based. It is really more of a guess. It is subject to wide variation either way. The writer places the total volume of bench gravels at 15,000,000 cubic yards. Of this total quantity probably only part can be profitably worked.

Of the stream gravels there is a very large quantity between Slate and Granite Creeks, a distance of 6-5 miles, the width of these gravels will average 2,000 feet. The only definite results show depths from 19.5 to 72 feet, at the upper end, and an 80 foot hole at the lower end did not reach bedrock. For the whole area 60 feet thickness of gravels is a conservative average. These figures indicate over 140,000,000 cubic yards. But a large part of these gravels along the left rim are undoubtedly not of commercial interest. It would seem, however, as though 100,000,000 cubic yards might reasonably be expected to be of commercial interest.

After the writer's first study he felt that the best chance of developing a business with the least amount of

capital was in the bench gravels. Therefore, in planning his investigations he selected the most promising of the bench areas. Here "most promising" does not refer to metal content but to where the most data were available and the least amount of further prospecting would be required. He believes that any similar given areas in the intervening distance would give corresponding results.

Under the next heading, the writer describes the method of obtaining the data upon which unit content is based, and here will only state the results.

Ruby and Nelson:

Map No. 1. shows the area where detail prospecting was done. Within the dotted line there are in excess of 350,000 cubic yards of "proven material."

Lying above this channel is a second one. It is exposed by the cut (a). The eastern end of this channel is shown at "A" on Map 2 and the channel's course indicated by the broken red line. In this channel there are indicated 2,250,000 cubic yards. However, this is not even classed as "partially proven" as the writer's sampling was confined wholly unsystematic pan sampling.

There is still a third channel lying above this one. It is known by "B" on Map 2. This channel will contain an even

greater amount.

Sootheran:

Reference should be made to Map 3 of Proposal 3 to follow these estimates.

At the lower end of the Sootheran ground is an old pit. This is what remains of early day work when platinum was much less valuable. Here the proportion of platinum to gold is about six to one and then the small gold yield did not give the necessary returns. Levels taken in this pit show bedrock on the outside to have an elevation of 141 and 153 (river as datum at 100) and next the bank to be 146 and 147. These points appear to be in the center of the channel. Therefore, the channel would have a width of about 350 feet.

The depth of bank on the inside of the pit is about forty feet and increases to about 60 just about the road. The average depth may be taken at 30 feet.

In the area marked "A" in the red on Map No. 3, there are a minimum of 285,000 cubic yards. This is considered as proven.

In the area marked "B" are a minimum of 100,000 cubic yards more and are considered as partially proven.

The channel extends upstream as indicated in "C". In that section there are indicated a further 1,000,000 cubic yards which can be hydraulicked.

There is still another channel higher up the hill

but no estimates of probable gravel therein are now attempted.

SUMMARY:

Summarizing the above figures, the following is obtained:

	<u>Ruby and Nelson</u>	<u>Sotheran</u>	<u>Total</u>
Proven:	350,000	285,000	635,000
Partially proven:		<u>100,000</u>	<u>100,000</u>
TOTAL	<u>350,000</u>	385,000	735,000
Indicated:	2,250,000	1,100,000	3,350,000
Grand Total	2,600,000	1,385,000	3,985,000

In round figures the writer has used 4,000,000 cu. yd. as minimum amount that would be available on these two properties. All of this could be worked by the proposed installations.

Other adjoining properties:

The proven ground on the Ruby and Nelson adjoins, on the upstream side, the workings of Howard. He commenced operating in 1928 on the same channel. This extends on his property for at least 5,000 feet. His workings show a lot of fine material overlying the coarser bedrock wash and at the upper end a much thicker deposit. His piping has not yet reached bedrock. In this stretch there should be from 600,000 to 1,000,000 cu. yds.



Then comes a stretch where the present river seems to have removed a section of this channel and the "Guest" group of claims is reached. On this group there should be from 3,000 to 4,000 feet of this channel in which there should be a minimum of 1,000,000 cu. yd and more likely 1,500,000.

Above this channel stretching across this entire length is the Ruby A Channel. The topography shows it to be practically intact. It has a minimum length of 7,000 feet and contains a minimum of 4,500,000 cu. yds.

The Ruby B channel does not pass over this ground but turns to the south and goes into Granite Creek probably following quite closely the proposed Flume line.

This, in addition to the 2,600,000 cu. yd. indicated on the Ruby and Nelson ground, there are excellent chances of making available to that system a further yardage, on the lowest channel, of from 1,800,000 to 2,500,000; and on Ruby A Channel, a minimum of 4,500,000. If these quantities prove out they would warrant development of more water as these reserves would mean about 20 years additional life.

The above considerations add nothing to the present proposal but they do indicate that the proposition might develop from a very good small short lived operation into a medium size long lived one.

The Tulameen from Champion Creek (about 2 miles above

Eagle) to Bear or Lowess creek (about two miles below Eagle) is paralleled, first on one side and then on the other, by remnants. All these remnants could be worked by or through the Eagle Creek development. In this stretch, in the two old channels, are a minimum of 5,000,000 cu. yd. of similar gravel.

This may reach 8,000,000.

Here too, therefore, instead of a relatively short life, there might be a relatively long one to this operation. But this consideration carries no particular weight in consideration this proposal, only adding to the attractiveness of the original proposal.

#### METHOD OF PROSPECTING:

In the succeeding section, the writer has given figures for what he calls the "unit precious metal content". Those figures are based partly on results from his own prospecting and partly on results from the small scale operations. The history of his own work should assist in determining the correctness of his conclusions.

The first work was purely preliminary in character. This consisted mainly of panning, but some rocking and sluicing was also done. The method depended on conditions at any one sampled face.

For quantitative work 100 pans were taken to represent

a cubic yard. The samples were panned or rocked, the gold and platinum saved and weighed separately, and the contents of the gravel in place calculated therefrom.

The samples taken in this work extended from Eagle to Roany Creeks. Upon the basis of this work it was estimated that the Ruby and Nelson ground would go 60 cents per cubic yard and the Sootheran ground \$1.75.

Then followed the detailed sampling. On the Ruby and Nelson ground a pump and pipe line were so placed that water from the Tulameen River could be raised sixty feet and large samples worked.

The samples were secured by making channel cuts from the banks exposed. These cuts varied from 35 to 18 feet long and averaged 16" wide by 6" deep. In all on this ground there were washed about 23.5 cu. yd. from fifteen samples.

During this period of sampling the writer and his assistants were taking pan samples from many other places and estimating the contents. These were only checks against the more careful work to be certain that no tampering with samples was being done.

The exposure on the Ruby and Nelson were such that it was not deemed necessary to use shafts from surface to bed-rock. It is believed that the problem did not warrant such a

expenditure. This is not a new country and the work done over the years shows very clearly what to expect. The results exceed those expectations by about 50 per cent.

On the Sootheran property the same detailed work was not done. Comparison of the final with the preliminary results on the Ruby and Nelson convinced the writer that such detail work on the Sootheran was not necessary and the unit content shown in the next heading is based on the preliminary sampling and Sootheran's production records.

Sampling of gravel deposits is not an exact procedure. For any given deposit it varies with the character of the deposit, its size, the amount of capital required, the spread between cost and yield, the purchase price involved, and the amount and authenticity of the data available.

In the Ruby and Nelson the capital involved is roughly \$125,000; in the Sootheran \$36,000. The amount spent on the Ruby and Nelson is about \$10,000. To secure the data that would be necessary for large placer examinations, when the spread between cost and yield is small, requires a proportionately large expenditure for equipment. In the case of a small placer property with a very great spread between cost and yield that expenditure is not warranted. That was the situation here. Any one familiar with hydraulic mining after doing some preliminary prospecting and studying the production records

of other properties could arrive at conclusions which would not vary appreciably from conclusions based on detail sampling obtained by making large expenditures. Surveys to determine quantities and working data were really all that was required.

PRECIOUS METAL CONTENT:

Before outlining the details of how the estimated unit content was obtained, the basis of the metal price should be set forth.

The question of price for gold needs no particular discussion. It is \$20.67 per ounce of fine gold. For Tulameen this amounts to just over \$18,000 per ounce of gold as recovered from the gravels.

PRICE OF PLATINUM:

For the years immediately preceding the war, platinum sold at about \$35.00 per ounce. During and immediately following the war, the price went to a maximum of \$115.00 per ounce. The last quotation was \$70.00 per ounce.

Whatever the price, it is really a controlled one. The great source of platinum is Russia. The reserves of gravel from which the Russians obtain their platinum are such that they could flood the market and put the price so low as to stop production elsewhere (except where platinum is a by-product as from Sudbury ores. But there is a price

below which Russia can not produce.

Before the war the writer was very closely connected for several years with the Russian Platinum industry. As a result of that association and the knowledge gained, taking into account the present conditions in Russia, he is convinced that about \$45.00 per ounce is the lowest limit at which Russia can produce at a profit. That price would almost immediately stop production in South America and South Africa. The Canadian production is not enough to have any direct bearing on the price, Therefore \$45.00 is taken as the basic price.

But the Tolameen platinum is not an ordinary product. The following analysis shows its chemical composition.

Osmiridium	14.63%	6.00%	
Platinum	68.19	78.00	60.04%
Iridium	1.21	4.02	16.00
Ruthenium	3.10		7.25
Palladium	0.36	.50	
Copper	5.09	.65	
Iron	7.87	9.80	
Gold		.45	5.50
Silver		.28	
Nickel		.10	
Osmium			6.80
Rhodium			6.06

The first analysis comes from page 85 A Summary Report, part A, 1923, Geological Survey of Canada.

The second is an analysis made by Sheffield Smelting Company, Sheffield, England.

The third is an analysis of platinum from Ruby and Nelson made by Johnson and Sons, of London, England. They paid for a shipment, made by Ruby, on this basis. It is the first time that any concern has done this.

The important part of these analysis is, that Osmiridium is much more valuable than platinum. Its last price was \$358.00 per oz. while platinum sold at \$70.00. In the Ruby shipment referred to above, settlement was as follows:

		L. s. d.	L.	s.	d.
Au.	0.152 oz.	4.4.9	0	17	11
Pt.	3.590 oz.	24.0.0	63	3	3
Ir.	0.686 oz.	75.0.0	51	9	0
Os.	0.292 oz.	22.0.0	6	8	6
Ni.	0.310 oz.	11.0.0	3	8	2
Rh.	0.350 oz.	17.0.0	4	8	5
	4,290		<u>L138.</u>	<u>15.</u>	<u>2.</u>

They charged L3.15.0 for refining, paying Ruby L135.0.3. If the platinoids had been paid for as platinum only, Ruby would have received but L 96.9.3 or L 39.11.0 less.

On that same basis of difference at present prices, taking the Platinoids at \$45.00, there is a safety factor of \$13.50 per ounce. If the present prices are used, then this safety factor becomes about \$21.00 per ounce.

In view of the above, the writer believes that, using \$45.00 per ounce as the selling price of the platinum, in calculating the returns, any lowering of the present price of

platinum has been sufficiently discounted.

All of the platinum recovered by the writer's sampling on both the Ruby and Nelson and Sootheran properties, has shown the "Iridescent" feature characteristics of platinum high in Osmiridium.

Ruby and Nelson:

As outlined earlier, the preliminary sampling led the writer to estimate sixty cents per cubic yard as the metallic content in the Ruby and Nelson ground. This is based on panning and sluicing about one half a yard from various places. The samples ran from about twelve cents to \$2.40 per cubic yard of bank.

The details of the final sampling are given below. For the location of these samples, reference is made to Map 1 of the Proposal 1. (these details are on pages 46, 47 and 48).

A study of the figures show that the metals are distributed throughout the mass of gravels.-- From the top to bed-rock. This condition is explained by the following:

The bravels in the channel sampled were derived not only from the cutting down of the stream through primary and secondary platiniiferous and suriferous materials at the time the channel was being out but they have been augmented by small streams and gulches cutting across the channels Ruby A

(For continuance of text to page 48)



DETAIL FIGURES OF SAMPLING RESULTS ON WHICH ESTIMATED VALUE  
OF RUBY AND NELSON GROUND IS BASED:

Sample No.	Length	Size	Content in per cubic yard		
			Platinum	Gold	Total
4	5.0 ft.	.50 cu. yd.	32.5	15.0	47.5
5	5.7	.35	58.2	2.9	61.1
6	4.6	.35	7.5	256.8	264.3
A- Average for 5.1 ft. is -					
1					
1	9.0	.50	10.9	17.6	28.5
2	4.0	.25	8.0	6.0	14.0
3	3.5	.25	59.9	96.0	155.9
7	4.7	.25	17.3	12.5	29.8
8	8.7	.25	6.9	6.5	13.4
B- Average for 6 ft. is -					
9	6.7	.25	97.9	5.6	103.7
C- Average for 6.7 ft. is -					
11	13.	7.25	38.7	37.8	76.5
12	16.5	10.00	48.0	26.8	74.8
D- Average for 16.5 ft. is -					
13	5.5	.50	199.3	78.4	277.7
E- Average for 3.5 ft is -					
					277.7
H- Average for composites A to E is					
					98.6
14	18.0	.50	80.0	23.7	103.7
15	12.5	.75	44.0	29.5	73.5
F- Average for 18 ft. is -					
18	7.0	.75	25.0	33.6	58.6
G- Average for 7 ft. is -					
					58.6
I- Average for composites F and G is					
					82.7
Composite H represents			37.8	averaging	98.60
" I "			25.0	" "	82.70
The average is therefore					92.24

## Averages:

Each cubic yard contains	340 Mg.	Platinum
" " " "	721 "	Gold
" " " "	48.9¢	In Platinum
" " " "	43.3¢	In gold

Platinum is taken at \$45. per ounce.

Gold is taken at \$18.50 per ounce.

Ratio of Platinum to Gold @ by weight 47. to 100  
by value 113 to 100

Composite A sample represents the upper 5.1 feet of the deposits at the lower end;

Composite B sample represents the next lower 6 feet of the deposit at the lower end;

Composite C sample represents the next lower 6.7 feet of the deposit at the lower end;

Composite D sample represents the next lower 16.5 feet of the deposit at the lower end and includes that gravel next to bedrock;

Composite E sample represents the upper 3.5 feet of bedrock at the lower end;

Composite H sample is a section of 37.8 feet represented by Composite samples A to E inclusive and is what the full thickness of the deposits at the lower end averages.

Composite F sample represents the bottom 18 feet extending from bedrock upward at the upper end of the deposit.

Composite G sample represents the uppermost 7 feet of the deposit at the upper end.

Composite I sample represented by the composite samples F and G is what the full thickness of the deposit at the upper end averages.

Samples 14, 15 and 16 are small in size because, when taken, the ground was frozen and had to be thawed which prevented larger samples except at undue cost.

All samples were taken and washed during freezing or sub-freezing weather - from 32° above to 8° below and the frozen ground was not always thoroughly thawed so large tailing losses tended to cut down recovery.

The present price of platinum is about \$70.00 per ounce and of osmium iridium about \$253.00. This platinum contains about 7% of the latter metals, and at to-day's market the product should sell for about \$77.00 per ounce instead of the \$45.00 per ounce used in all above estimates. If the selling price had been used, the average recovery would have been shown at \$83.64 per cubic yard for the platinum instead of \$43.8 taken, or a total of \$1.27 instead of \$0.82 taken.

(Text continued from page 45)

A. B. The material brought in by these latter bring down continually new supplies of the metals. Since the whole mass is quiet, the heavy metals remain approximately where they drop and do not work down to bedrock.

A study of the production records of Ruby, and his predecessor Rice, show that for the ground they moved, the yield was about \$6.00 cubic yard. Of course they selected only the richer spots. If the balance were barred and the relative proportions held, then their results would indicate about dollar ground.

Ruby's work showed richer gravels where sample 14 and 15 were cut, than where 11, 12 and 13 were cut. The re-

verse is true of these samples. Undoubtedly the gold had something to do with this, but the interesting feature of these samples is, that the average at the lower end, of twelve samples, was 28.6 cents, and of three at the upper end, 32.7 cents per cubic yard. This shows the uniformity of the distribution.

Howard's work commences right next to the upper boundary of Ruby and Nelson's ground. He has not yet reached bedrock or cleaned up his ground sluice. Notwithstanding this, he estimates his recovery at 50 cents per cubic yard for the gold alone. He has not cleaned up the platinoids as they were still in black sands.

In the above estimate of metal content, no value has been placed on the concentrate recovered during sampling. This amounted to about fifteen pounds per cubic yard washed. The laboratory work on these has not yet been done.

#### Sootheran:

In the preliminary work, there was taken nine samples. The results of these are given in table 11, page 50.

The first six samples represent the bedrock gravels. The last three samples represent the upper gravels. Sample 8 was taken above sample 4 and the sample 9 above sample 2. Sample 7 was in the bank up hill from sample 6. For locations of these see Map 3 in Proposal No. 3.

TABLE 11

<u>Sample No.</u>	<u>Cut Length</u>	<u>Cy. Yd.</u>	<u>Mgs. Au.</u>	<u>Pt.</u>	<u>per cu. Au. Pt.</u>	<u>yd. Both</u>
1	3 ft.	.05	55.	302.	.660 8.76	2.42
2	5.	.10	73.	273.	.438 3.958	4.39
3	6.	.10	30.	252.	.180 3.654	3.83
4	9.	.15	112.	637.	.447 6.146	6.59
5	2.	.05	92.	431.	1.104 12.499	13.60
6	3.	.05	20.	109.	.240 3.261	3.40
7	3.	.05	12.	53.	.144 1.537	1.68
8	4.	.10	8.	40.	.054 .580	0.83
9	4.	.10	2.	54.	.072 .783	0.85
Arithmetic Averages -					.371 4.564	
Geometric Averages					.337 4.304	
"	"	bedrock samples (1-6)		.435 5.645		
"	"	upper	"	(7-9)	.085 .915	1.00

The bedrock samples represent an average thickness of 4.3 feet. The other three samples represent an average thickness of 26 feet. Thus, the average for the deposit depth of 30.3 feet is \$1.75 as follows:

4.3'	X \$6.07	26,101.
<u>26.0'</u>	<u>X 1.00</u>	<u>26,000</u>
30.3	1.75	52,101.

The ground sampled is very high grade. The metalics are practically all platinum, the ratio of platinum to gold by weight being 5.18 to 1; and by value 12.8 to 1. The gold alone would not carry this operation and explains the failure of early operators whom attempted to work here when platinum was worth only from 50 cents to \$2. per ounce.

The writer has never before sampled such uniformly high grade ground in any district.

Comparing these figures with Sootheran's Production results one can easily see why he has produced \$10,000, for such a small volume of ground.

It has occurred to the writer that someone might question the advisability of allowing the samples 7 to 9 to represent 26 feet of the bank above the bottom four feet and the following calculation is inserted:

4.30	X \$6.07	26.101
3.75	X 1.00	3.750
21.95	X -	0
<hr/>		<hr/>
30.	-	29.851

Allowing no value at all to the balance of 21.95 feet the average becomes just under \$1 per cubic yard.

This is manifestly unfair, but it gives the lowest figure that the most pessimistic view could place on this ground.

On the other hand, if the proper allowance is made for the osmium iridium content and the payment for it taken at its proper price, then the \$5.63 taken for the platinum becomes \$7.38 and the average value of the bedrock gravels becomes \$7.75. Likewise that for the upper 3.75 feet becomes \$1.27. The average then is \$1.27 for the section.

4.30 x 7.75	33.325
3.75 x 1.27	4.762
<u>21.95</u> -	<u>0</u>
30.00 1.27	38.087

After taking all factors into consideration, the writer is confident that the figure of \$1.75 cubic yard is correct. He expects the hydraulicking of this ground to overrun this by a considerable amount.

The platinum here is very much coarser than that from Ruby and Nelson. It is also rougher, and from appearances contains more osmium iridium. Some of the larger pieces have the matrix adhering to them. This matrix appears

to be Dunite and Chromite.

BLACK SANDS:

Black sands are abundant in all gravels. Many assays of samples of the sands and even of nodules up to several pounds in weight have been made. The writer has had twenty-seven samples assayed. Of these, two carried no platinoïds; four carried only traces; and the balance from 0.04 to 7.60 ounces of platinoïds per ton with an average of 1.75. Eight samples of nodules averaged 1.82 and twelve samples of the fines averaged 1.70 ounces of platinum per ton. With platinum at \$45.00 per ounce, these products are worth respectively \$81.90 and \$76.50 per ton for their platinum content.

The Ruby and Nelson samples produced 15 pounds of black sand per cubic yard. If these black sands assay only the average of \$76.50, then they represent 57 cents per cubic yard of gravel in the bank.

These black sand can be easily saved. The question is- can the values be extracted?

The writer has made only a few tests and those are most encouraging. The extraction was 81% at a cost of about \$6. per ton. The product obtained contained about 63% platinoïds. There is a ready market for such material.

The writer at the moment is not placing any particular



value on these sands, but they warrant further study.

Others have also found this condition to be true.

Ruby sent samples of both nodules and sands to Johnson and Son of London. They gave the following returns:

From the nodules:

3.5 oz. Au.	worth	13 - 19 - 4
3.0 oz. Pt.	"	<u>35 - 9 - 9</u>

47 - 0 - 1

Less cost treatment

18 - 0 - 0

NET WORTH:

29 - 9 - 1

or about

\$147. per ton.

From the sands:

9. oz. Pt. per ton

21. 5 oz. Au. per ton

In Cwt. lots these were worth-

for platinum

8 - 11 - 0

for gold

4 - 8 - 2

12 - 19 - 2

Less treatment cost

19 - 2

Net worth:

12 - 0 - 2

or about \$58.45 - about 58 cents per pound.

At the same time, Ruby sent a duplicate of the nodule sample to Baker & Co., and they returned 3.5 oz platinum and 3 oz of gold per ton.

Sotheran claims to have ground down a black sample (sand) and panned out all the visible platinum. He then sent the ground material away for assay and received a return of about fifty cents per pound for the platinum contained.

The Department of Mines at Ottawa received a 4 oz. sample of black sand. This was supposed to have come from two yards of gravel. They wrote:

"On assay, this material was found to contain: platinum at the rate of 521.57 oz. per ton; arsenic at the rate of 58.62 oz.; gold at the rate of 75.62 oz.; silver, very small quantity."

This was calculated to represent \$1.15 per cubic yard of gravel.

The literature is full of instances where the assaying of these sands and nodules has given extraordinarily high platinum contents. But all the writer wishes to point out now is, that these warrant for the considerable attention.

#### METHOD OF OPERATION:

These gravels are excellently adapted to removal by straight hydraulicking. All channels, except Ruby B, parallel the present streams and there is, therefore, no trouble with grade and no long bedrock sluices will be required. Side dump can be obtained very readily.

There are some large boulders but they can either be shot or derricked out. The power plant at Ruby and Nelson will allow for economic handling by hydraulicking. Shooting can be resorted to at Sootheran's.

The water for hydraulicking can be brought in at such elevations that it will have heads of from 200 to 400 feet. The duty should be excellent.

CAPITAL REQUIRED:

Installation of equipment:

Surveys have been made to determine the flume and pipe line locations. The details are included in the proposal submitted herewith:

Ruby and Nelson:

Proposal No. 1 has been worked out for this property. In the summary on the first page, this is shown as \$122,500;

This expenditure will provide the property with 1000 miners inches of water, and all the equipment necessary for its use. Allowing for a duty of 1.5 cubic yards per day for each miners inch, gives a total output of 45,000 cubic yards per month, or for a six month season, 270,000 cubic yards.

Sootheran:

In Proposal Number 3 are given the details of the plant and equipment required to put 1000 miners inches of water on the property. The cost is \$36,500. There should be moved monthly 30,000 cubic yards, and seasonally, 180,000.

General Overhead:

During construction, there will have to be maintained a general office in Vancouver, and a local office in Tulameen.

The monthly expenditures in connection with this office, will be about as follows:

Rent	\$50.00
Office help	150.00
Telephone & Telegraph	50.00
Supplies	35.00
Legal	50.00
Audit	50.00
Management	1000.00
Unforeseen	<u>215.00</u>
	\$1800.00

This will run for 9 months in 1939 for a total of \$14,400.

Tulameen Office:

Rent, fuel, etc.	100.00
Time & store keeper	200.00
Assistant	150.00
Truck Driver	150.00
Truck and Car	200.00
Supplies	50.00
Telephone & Telegraph	50.00
Unforeseen	<u>100.00</u>
	\$1000.00

This will run for 8 months for a total of	\$8,000.00
For the ninth month	<u>400.00</u>
	\$8,400.00

Prospecting Expenses:

There have been already spent about \$13,000. This will have to be repaid.

Organization Expenses:

There will be organization expenses and expenses in connection with the securing of options and water rights. These will be about as follows:

Options	\$4,000.00
Water Rights	1,000.00
Organization	<u>1,000.00</u>
Total	\$6,000.00

Summary:Construction-

Ruby and Nelson	\$111,300
Sootheran	<u>33,235.</u> \$144,535

Contingencies:

Ruby and Nelson	\$11,200
Sootheran	<u>3,265</u> \$14,465

General Overhead;

Vancouver	\$14,400
Tulameen	8,400 \$22,800

Prospecting expense:	\$13,000
Organization Expense	6,000
	<u>\$199,800</u>

Operating Cost:

In hydraulicking operations such as these, the costs are generally very low. However, here there are special conditions which might tend to low capacity and for the purpose of this estimate, the worst possible results are assumed.

The controlling factor in unit cost is the output. The average duty of a miner's inch per day for all installations is about 2.25 cubic yards. Under the conditions here it will be lower. For the Sootheran it is assured at one cubic yard and for the Ruby and Nelson, at one and a half.

Operating Proper:Ruby and Nelson:

The crew at the Ruby and Nelson will consist of 22 men. In addition, there will be charges one-half the Superintendent's time. Thus these are detailed monthly as follows:

Superintendent	\$300.
Foreman	300.
3 pipers @ \$7.50 per d.	775.
1 powder man @ \$6 per d	180.
7 laborers @ \$5.50 per d	1125.
3 cleanup men @ \$5.50 per d	525.

1 blacksmith	\$225	
1 carpenter	200	
4 flume tenders @ 5.50	700	
Unforeseen	<u>670</u>	\$5,000
Supplies:		<u>1,700</u>
TOTAL		\$6,700

This is at the rate of 15¢ per cubic yard

Proportion of overhead 5¢

Total 15¢

#### Sootheran

The crew of the Sootheran will consist of 20 men in addition to one-half of the Superintendent's time charged to the operation. This, these are detailed monthly as follows:

Superintendent:	\$300.00	
Foreman:	300.00	
3 pipers @ \$7.50 per day	775.00	
1 powderman @ \$6.00 per day	180.00	
7 laborers @ \$5.30 per day	1125.00	
3 cleanup men @ \$5.50 per day	525.00	
1 blacksmith	225.00	
1 carpenter	200.00	
2 flume tenders	350.00	
Unforeseen	<u>520.00</u>	\$4,500.00
Supplies:		<u>1,500.00</u>
Total:		6,000.00

This is at the rate of 20¢ per cubic yard.

Proportion of overhead 7.5¢ per cubic yard.

Total 27.5¢

The cookhouse expenses are included under labor.

Overhead expenses:

There are overhead expenses both in Vancouver and Tulameen. For the purposes of this estimate, these are taken at the highest that can be expected, being firmly convinced that they will be considerably lower. This over head total would conduct an operation several times larger than this.

Tulameen:

The office will be at Tulameen and will have a personal of three men: Time and Store keeper, assistant, and truck driver and mechanic. The monthly costs will be about as follows:

Rent, fuel, etc.	\$100
Timekeeper	300
Assistant	150
Truck Driver	175
Maintenance cars	175
Office Supplies	50
Tele. and Telegr.	50
Unforeseen	<u>100</u>

Total \$1,000

This expense will continue for about 8 months of the year. \$8,000

For the other four this will be 1,000

Total \$9,000

Vancouver:

The Vancouver office will be in a general office occupied by others, and the help will also be used by others



The monthly expenses during the season will be about as follows:

Rent	\$50	
Office force	150	
Tele. & Teleg.	50	
Supplies	35	
Legal	50	
Auditor	50	
Management	1000	
Unforeseen	<u>215</u>	
Total		\$1,600
This expense will continue for 8 months		12,800
The other four it will amount to		<u>5,200</u>
Total annually		\$18,000

**Summary:**

Thus the combined overhead annually amounts to \$27,000 for the two or \$13,500 for each property. This means 5 cents per cubic yard against the Ruby and Nelson and 7.5 against the Sootheran.

**PROFITS FROM OPERATING:**

**Ruby and Nelson**

The yield from the ruby and Nelson will be 93 cents per cubic yard and the cost 20. Therefore, the operating profit will be -

Per cubic yard		72 cents
Per month	<u>\$32,400</u>	
Per season	<u>\$194,400</u>	

From these, however, must be deducted the government royalty and the owners royalty until a total of \$60,000 has been paid. Thus, there are left each season a net profit of \$152,300.

Sotheran:

The yield from the Sotheran will be \$1.75 per cubic yard at a cost of 27.5 cents. Therefore, the profits will be -

per cubic yard	say	\$1.47
" month	\$44,100	
" season	\$264,600	

From these, however, must be deducted the government and purchase royalties. The purchase royalty will amount only to \$25,000. and will be paid off after about 60 days of operation. Thereafter, the net profit will be \$34,050 monthly or \$258,300. annually.

FINANCIAL CONSIDERATIONS:

To carry out this program a total of \$300,000 must be provided. It is difficult to set the rates at which this should come, but the following schedule would be about right:

At once	\$30,000
April 1st	30,000
May 1st	45,000
June 1st	40,000
July 1st	30,000
August 1st	15,000
September 1st	<u>10,000</u>

TOTAL	\$200,000
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If this money is provided at the above rate and work is started by April 1st., the Sootheran property should be equipped and running by Sept. 15th and the ruby and Nelson equipped by November 15th. It is doubtful if any run can be had this year.

With the yields and costs as estimated herein, there should result from the proven and unproven ground, after allowing for government and purchase royalties:-

in 1929	a profit of	\$48,000
1930	" " "	394,350
1931	" " "	<u>278,400</u>
or a total of		718,750
Deducting the capital		<u>200,000</u>

There remains a net profit of \$518,750

As shown under Reserves of Gravel, there remain in the Sootheran ground about 1,000,000 more cubic yards and in the Ruby and Nelson, 2,250,000 cubic yards of indicated ground. Assuming only one-half the proven unit content and the same rates of working and costs there would remain the following:

For 5 years a profit annually of	\$174,000
For 1 year more " " "	126,000
" 2 years more " " "	68,000

In the meantime, there remain some 11,000,000 more cubic yards of gravel, parts of which at least should prove worth exploiting,

**PROGRAM OF PROCEEDURE:**

The following program is necessary:

- A- Secure options from Ruby and Nelson and Sootheran.
- B- Take the necessary steps to secure the water rights.
- C- Organize the B.C. Corporation; and
- D- Commence and carry out the construction program.

**MAPS AND ENCLOSURES:**

Sent herewith a map showing the Tulameen and the claims thereon for that stretch covered in this report.

There are also sent proposals 1 and 3.

Proposal 1 contains the details of the estimates for the Ruby and Nelson construction.

Proposal 3 contains the details of the estimates for the Sootheran construction.

Respectfully submitted,

"Norman C. Stines"

Vancouver, B. C.

March 13th, 1929.

# SURVEY OF FLUME GRADE FROM EAGLE CREEK TO PLACER WORKINGS.

SCALE  
200 FEET TO ONE INCH.

