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SETTEA CREEK
PLACER EVALUATION REPORT
DEASE LAKE, BRITISH COLUMBIA

FOR

SETTEA CREEK JOINT VENTURE

BY

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WHITEHORSE, YUKON

NOVEMBER, 1986

PROJECT D86-152

BACKGROUND

In May of 1986, the Settea Creek Joint Venture was formed to investigate the gold-bearing potential of placer claims on Settea Creek, British Columbia, held by John and Evelyn Rattray of Dawson Creek, British Columbia, on behalf of the Edzerza Brothers, Allen, Bob and John, of Whitehorse, Yukon. An option to purchase a 60% interest in the property was signed on June 16, 1986, between the parties. The Joint Venturers were unable to raise the necessary funds to exercise the option and it was dropped in early December, 1986.

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INTRODUCTION

The following report summarizes the information obtained and/or available to date concerning the placer gold deposits described herein and makes recommendations for the development and putting into production of the placer claims.

Fred R. Dorward, P.Eng., of Dorward Enterprises Ltd., was commissioned by the Settea Creek Joint Venture to carry out the testing and investigations and to prepare this final report.

PROPERTY DESCRIPTION

The placer mining property comprises the following claims:

Placer Lease Numbers 11996, 11997, 11998, 11999, 9229, 9230 and 9231.

At the time of writing this report, the claims are in good standing until April 27, 1987. Additional assessment work as a result of the testing program will extend that date.

Each claim is 500 metres x 1,000 metres, and the seven claims therefore total approximately 350 hectare.

There is a mining camp on the property, sitting roughly on the northeast corner of claim PL11996. It consists of the following:

Structures:	1 Cook Shack, fully equipped
	6 Tent Frames, 9x12, covered
	1 Tool Shed

The owners have the following equipment on the site.

Mining Equipment:	1	10" Electric Pump
	1	200 KW Cat Generator
	1	6" Volume Pump and 100 foot rubber hose
		700 feet 10" Aluminum Pipe and fittings
	1	2" Pressure Pump and 300 foot rubber hose
	1	4.5 KW Generator
	1	Combination welder-generator
	1	XBX 11 Radio
	6	Oil Stoves
	1	45" Standard run sluice box, complete
	1	Gold Hound
		Miscellaneous tools, steel, etc.
Exploration Equipment:	1	JCB 805B ½ yard Hoe
	1	Super Sluice
	2	3" Pumps and 550 foot hose
	1	Advanced design long tom

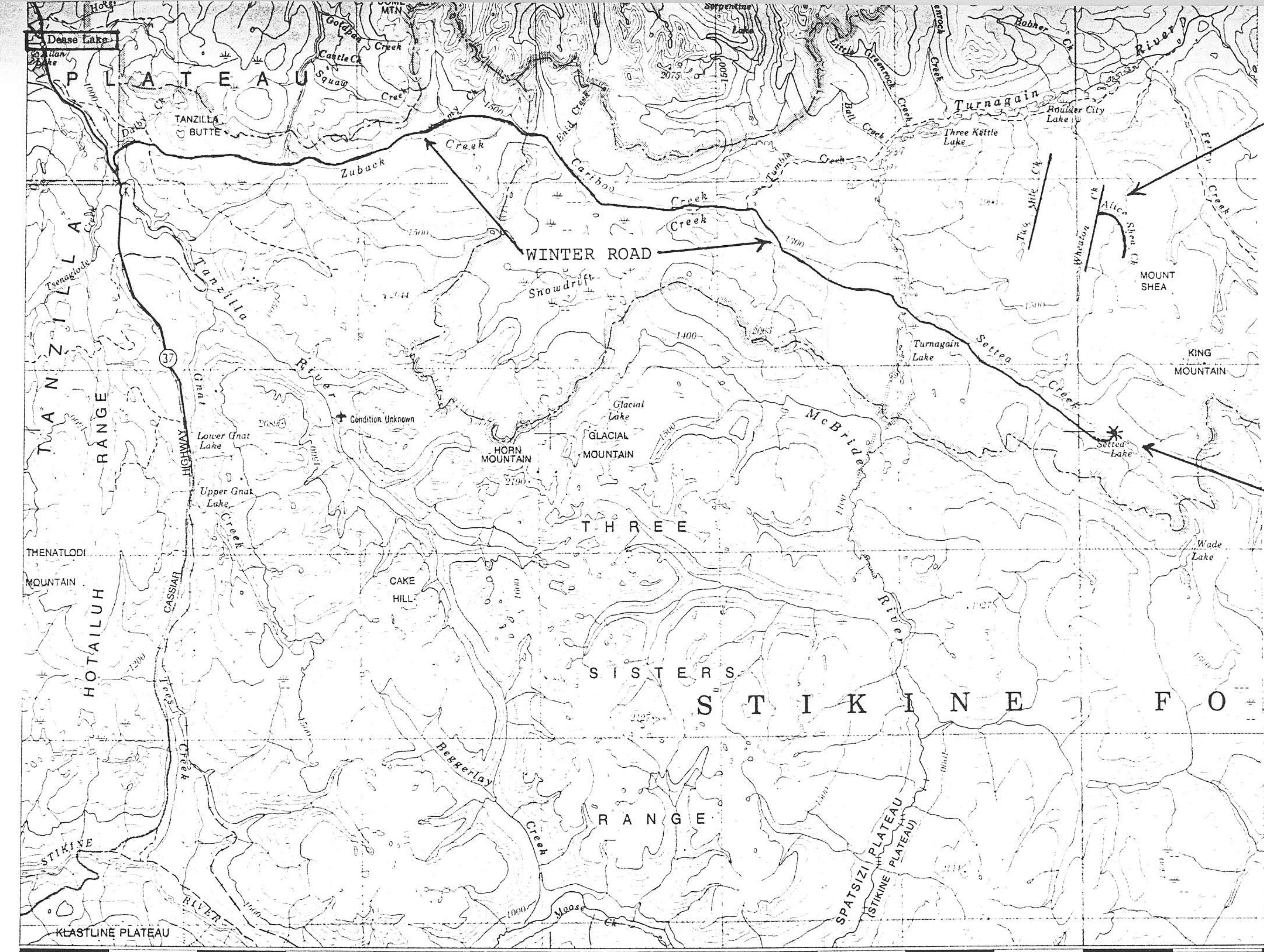
LOCATION AND ACCESS

The claims are located on Settea Creek, an easterly-trending tributary of the Turnagain River. The camp is 44 air miles east of Dease Lake, B.C. The latter is served by the Cassiar Highway and, thus, has good access south to Prince George and Vancouver. There is a regular weekly trucking service and also a weekly air connection to the south.

Chartered aircraft are available in Dease Lake and include both land and float planes, as well as helicopter services. Float planes can land on Settea Lake, which is about ½ mile from the camp and connected with a good road. A start has been made on an air strip, but it is not at present usable. 1986 rates for air services to the camp on a return basis were as follows:

Helicopter	$597.00
Otter Float	$321.20
Beaver Float	$249.04
Cessna Wheel	$148.72

Land access to the camp is by means of a winter cat trail. The distance is approximately 60 miles from Dease Lake.



Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES. Derived from 1:50 000 maps, information current as shown in diagram. Published in 1985.

Copies may be obtained from the Canada Map Office, Department of Energy, Mines and Resources, Ottawa, or your nearest map dealer.

Information concerning bench marks and horizontal survey monuments can be obtained from Geodetic Survey, Surveys and Mapping Branch, Ottawa.

CRY LAKE

CASSIAR LAND DISTRICT

BRITISH COLUMBIA COLOMBIE-BRITAN

Roads:	Routes:		
hard surface	revêtement dur	dual highway / double chaussée	more than 2 lanes / plus de 2 voies
hard surface	revêtement dur	2 lanes / 2 voies	less than 2 lanes / moins de 2 voies
loose or stabilized surface, all weather	gravier, aggloméré, toute saison	2 lanes or more / 2 voies ou plus	less than 2 lanes / moins de 2 voies
loose surface, dry weather	de gravier, temps sec		
cart track	de terre		
trail, cut line or portage	sentier, percée ou portage		

FOR COMPLETE REFERENCE SEE REVERSE SIDE   POUR UNE LISTE COMPLÈTE DES SIGNES, VOIR AU VERSO

Scale 1:250 000 Échelle

Miles 5 0 5 10

Kilometres 5 0 5 10 15 20

Magnetic declination 1985 varies from 28°25′ easterly at centre of west edge to 28°26′ easterly at centre of east edge. Mean annual change decreasing 8.4′.

En 1985, la déclinaison magnétique varie de 28°25′ au centre du bord ouest à 28°26′ au centre du ... annuelle moyenne décroît de 8,4′.

DORWARD ENTERPRISES LTD.
26 Sunset Dr. N.
Whitehorse, Yukon
Y1A 4M8

SETTEA CREEK PLACER EVALUATION

LOCATION MAP

NORTHERN BRITISH COLUMBIA

NOVEMBER -- 1986

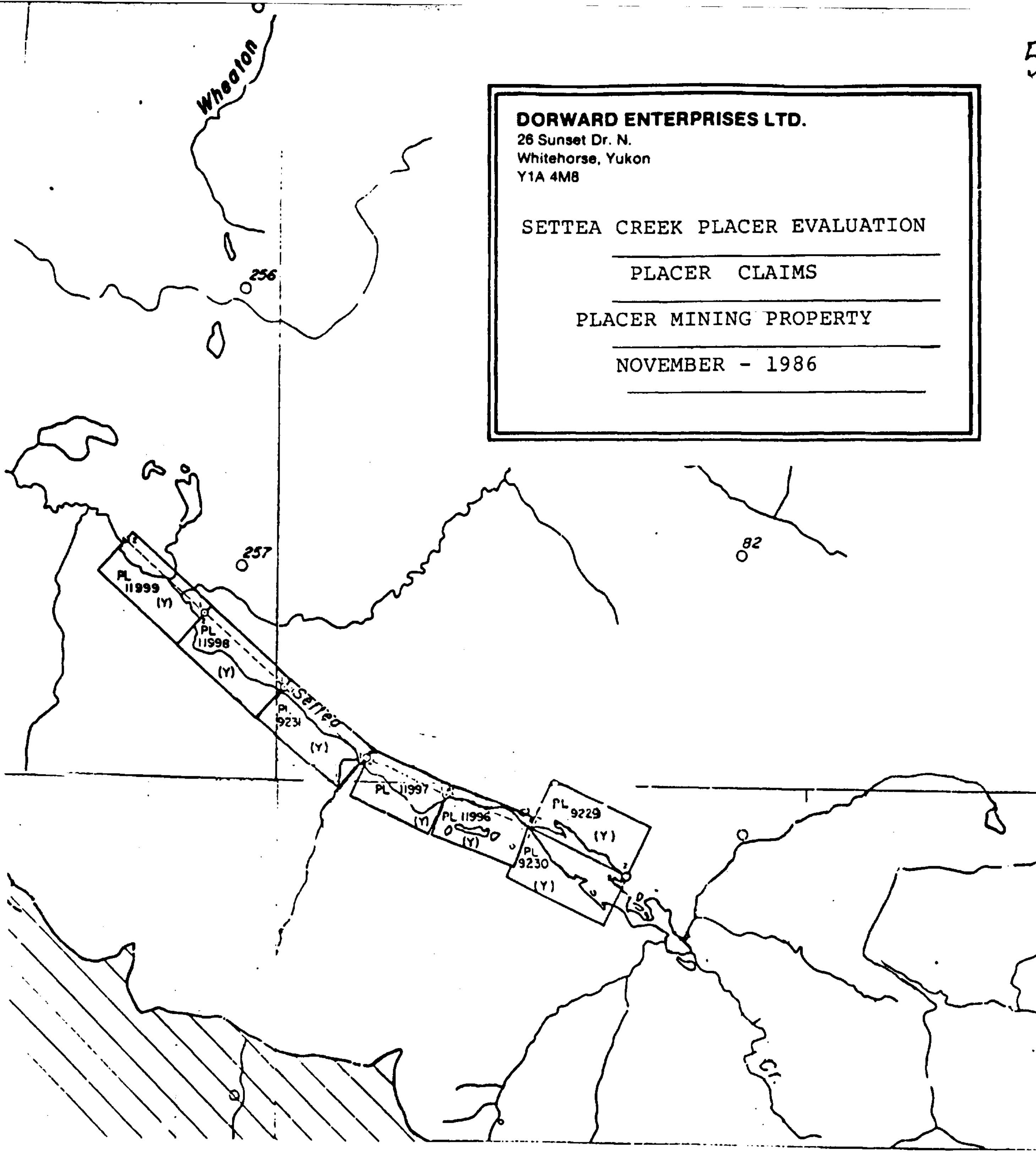
DORWARD ENTERPRISES LTD.
26 Sunset Dr. N.
Whitehorse, Yukon
Y1A 4M8

SETTEA CREEK PLACER EVALUATION

PLACER CLAIMS

PLACER MINING PROPERTY

NOVEMBER - 1986



CLIMATE AND TOPOGRAPHY

The climate is that typical of interior northern B.C. Rainfall in Settea Valley would probably be between 25 and 30 inches per year on the average, with snowfall in the 2-foot range. Since precipitation is heavier at higher elevations, Caribou Pass receives considerably more snow.

The ice leaves Dease Lake usually during the first week of June, and Settea Lake would be 2-3 weeks later. The lakes ice up in the November-December period.

Summer temperatures in the valley can range to 80-85°F, but are commonly less with the nights being quite cool. Frost can occur at anytime during the short summer. Despite occasional low winter temperatures, there is no permanently frozen ground in the valley.

Settea Creek lies in the Cassiar Mountains, and the area can generally be described as mostly mountains with broad areas of alpine plateau country. The upper part of Settea Creek lies in a broad, flat valley partly occupied by Settea Lake, the latter being about one mile long and only fifty yards wide. The upper valley terminates in a 100-foot waterfall, and the creek occupies a sharply incised valley and partial canyon down to its entry into Turnagain River.

Dease Lake lies at an elevation of 2,700 feet. Settea Lake lies easterly at an elevation of 4,625 feet. The winter trail rises sharply from Dease Lake to Caribou Pass at 4,700 feet, and then down along Caribou and Snowdrift Creeks. It crosses the latter at 4,000 feet and the Turnagain River at 3,500 feet.

The mountains in the surrounding area are fairly rugged and range from 5,600 to 6,600 feet. For the most part, the trail traverses open alpine meadows with numerous small lakes. Timberline is at about 4,600 feet. The country past Caribou Pass is, however, not heavily forested.

HISTORICAL SETTING

The first recorded discovery of gold in the area occurred in 1873, when the Thibert party recorded a discovery claim in what became known as Thibert Creek. Henry Thibert, a French Canadian, had come into the region the year before with a Scottish traveller named McCulloch. They wintered on the Stikine, where gold had been found in small quantities in 1861 by Choquette and Carpenter. McCulloch died of exposure from falling into the river, but Thibert mined in the area for many years.

During the 1870's, there was much placer prospecting and mining activity in the area north of Dease Lake Village, notably on Dease, Thibert and McDame Creeks. During this time, some prospecting was carried out on the Turnagain River to the east, but no major finds were recorded. In 1874, prospectors found gold in streams about 70 miles southeast of Dease Lake. These were probably tributaries of the Turnagain River, and it is possible that Settea Creek was one of them. Yields of $27.00 per day (1986 price) in coarse gold were reported. The showings were not followed up due to the distances involved and the low returns. By the early twenties, there was little activity in the area.

In 1924, William Grady and J.H. Ford discovered gold on Goldpan Creek, 10 air miles east of the village of Dease Lake. This sparked a small rush and, again, the area to the east was prospected. There were no worthwhile deposits found as a result of this activity.

In 1927, Pat Colter and Hughy Ford prospected Settea Creek above the falls and reported finding gold. In 1934, William Grady sparked a rush on Settea that saw it staked throughout its length. In the meantime, gold had been found on Wheaton Creek in 1932. In 1934, Alice and Vern Shea prospected on what became known as Alice Shea Creek, a tributary of the Wheaton. In 1935, they found a 52-ounce nugget on this creek. Frank and George Bobner found gold on Two Mile Creek in 1936.

In 1925, an Englishmen, Percy Peacock, moved in the area and set up as a trapper with his cabin on Boulder Creek about 35 air miles east of Dease Lake Village. In 1937, he found gold in gravel beside his cabin and set up mining operations. The period 1934-38 saw the opening up of placer mining on Boulder, Alice Shea and Two Mile Creeks and, by 1983, over 25,000 ounces of gold is reported to have been taken from these creeks.

With all the action in the Wheaton area, Settea Creek was abandoned, except for an operation by James Le Corse and Archie LeMay just above Settea Falls. They evidently did quite well during the period 1937-40, when the operation stopped with the suicide of one of the partners. There is no record of their production. They had not bothered to record claims. They were the ones who built the diversion channel that runs from the lake down the west side to the falls. This diversion is still quite usable. They are reported to have had problems with too much water in their diggings and the heavy bedrock.

There was no further activity until the 1960's, when Erik Larson prospected Settea Creek and the area to the east. He claimed that Settea held considerable promise. He reported to George Edzerza, a well-known packer in the area, that there was over 10,000,000 cubic yards of gravel above the falls that would someday yield over $3,000,000.

In 1980, the Settea Gold Co. was set up by Allen, Bob and John Edzerza, sons of George. Money was raised, and a small mining operation was set up above the falls using a long conventional sluice box and cats. They had problems with the sluice box, and it wasn't until the end of the season that they were able to get the sluicing operation functioning properly. At that point, they reported taking 60 ounces from about 300 yards. The gold was very coarse.

In 1981, they operated for a few days but had to give up on their operations due to lack of financing. They were able to get 28 ounces from 300 yards.

In 1983, Bob Hilker, P.Eng., Calgary Mining Engineer, made a visit to the property on behalf of a prospective investor. From a small test, Hilker reported getting $45.00/yard. In his report, he proposed a grade of $15.00/yard and estimated that there was at least 1,000,000 cubic yards at this grade. Unfortunately, the investor was not able to follow up on the prospect.

In 1985, a test program was carried out by another potential investor. The results of this program were not make public. The investor tried to do a takeover of the property but was unsuccessful.

GEOLOGICAL SETTING

The oldest rocks in the Settea Valley are a thick section of volcanic and sedimentary rocks of Triassic age, which form a belt along the south ridge that forms the valley. The sedimentary rocks consist of well-bedded locally fetid limestone. The volcanic assembly includes andesite, basalt, tuff, breccia, volcanic sandstone and conglomerate, minor greywacke, argillite and shale.

Included in this assembly is an outcrop of serpentinized peridotite that lies on the northeast side of the pass separating Settea Creek Valley from Wade Lake, which drains south into the Stikine River system. This may be of Devonian age and, thus, older than the rocks above.

The ridge to the north, which is cut on the west by the upper reaches of the Wheaton River and further east by the north branch of Settea Creek, is of Lower Jurassic age. It consists of well-bedded greywacke, phyllitic slate and conglomerate. Included are a few small exposures of the limestone referenced above.

The valley is filled with Pleistocene and Recent fluviatile gravel, sand and silt, glacial outwash, till and alpine moraine.

Underlying the Pleistocene deposits above Settea Falls is a thick, flat lying flow of late Tertiary basalt. This also outcrops at intervals down to the Settea Valley below the falls. At this time, the extent of this flow is not known. There may be no direct connection between the many outcrops below. The flows are of local nature and, since they have not weathered to any extent, are of recent origin.

GLACIAL HISTORY

Glacial drift is abundant in the region and, in places, fills the valley bottoms to considerable depths. Evidence of the main ice sheet in the most recent advance shows to elevations of 5,500 feet and, to a lesser extent, to 6,000-6,500 feet levels. The general direction of ice movement in the northern part was south to a few degrees west of south. In the Stikine valley, the ice moved down the valley.

There is considerable evidence to indicate that the area west and northwest of Settea Lake was a main gathering ground for the main ice sheet, and erosion by it is not well marked. Evidence of erosion by valley glaciers is, on the other hand, well marked.

Settea Creek Valley does not appear to have been heavily glaciated by either the main ice sheet or by valley glaciers. In point of fact, it would appear that there was a long period, or series of periods, when the main sheet held at a level of about 4,500 feet and erosion of the mountains around upper Settea Valley was able to continue unabated.

During this period, it is conjectured that upper Settea Creek drained north into the Wheaton River Valley. It is also likely that the Stikine Ice Sheet forced its way at times through Wade Pass and the Kehlechoa Pass and intruded into Settea to be met there by the Cassiar Ice Sheet from the north. This would occur at elevations above about 5,000 feet. In short, Settea Valley appears to have been protected from heavy glacial scouring by its ring of high mountains.

GEOLOGICAL HISTORY OF SETTEA CREEK

It is likely that Settea Creek existed during the age prior to the volcanism that gave rise to the Tertiary Olivine Basalt flows. It was probably a fairly fast-flowing stream from its headwaters down to its junction with the Turnagain River. Settea and Turnagain Lakes would not have existed at that time.

During the extensive volcanic activity that took place in the Western Cordillera in the Tertiary Age, a fissure or fissures appeared somewhere in the upper northerly part of the upper valley. A lava flow issued from these fissures and moved down the valley, filling in the lower portions of the valley. This flow would have covered the old valley gravels, and it is possible that a buried placer exists under the flows. The flows may have come from several fissures along the valley.

Following the Tertiary Age, a new Settea Creek was formed on top of the basalt, and an erosional process started that resulted in a new valley, which was likely quite similar to the one we see today. Since the basalt, except for areas of ash flow, was quite hard and did not erode easily, the new valley probably formed to one side or the other of the flows. These areas cut down quickly, and a waterfall developed where the basalt gave way to the softer sediments. Originally, this waterfall was further downstream than it is today, and one can see at least one other location about a mile downstream from the camp where it existed.

During the glacial period, ice blocked the normal route of Settea Creek, and a terminal moraine existed at a point about 2 miles below the present falls. This caused the accumulation of gravels in the upper valley to a level of about 4,650 feet. At the terminal of the ice some, if not all, of Settea Creek was diverted into the Wheaton River. During this period, the lake above the falls may have been in existence.

After the retreat of the ice, the waters had to recut the channel through the gravels and, in so doing, concentrated the gold from the auriferous gravels in the main channel.

More than one ice age is known, and it is also known that the ice surged and retreated. As a result, average ice levels in the Turnagain Valley were often exceeded. These surges would not necessarily be at the same time as a surge from the Stikine Glacier to the south. At high ice levels, upper Settea Valley would have been covered with shallow ice pushing up the valley from the west and, at the same or different times, pushing up the two passes on the south and east. Wade Pass was no doubt formed by the Stikine Glacier pushing through the soft serpentine rocks in this area and depositing them in upper Settea Valley.

Since there are extensive serpentines to the north in the valley of Wheaton Creek, it follows that the Turnagain Glacier could have also brought material into the valley. However, the travel distance for it to have done so is much greater.

Following glaciation and to the present day, the creek has continued its task of concentrating the gold from the auriferous gravels in its main channels.

SURFICIAL GEOLOGY

From notes and observations made during the excavation of the test pits during the summer of 1986, the gravels were found to be stratified, water sorted and lain. Generally, the top soil and muck is shallow and averaged no more than 12 to 18 inches in the areas tested. The gravels ranged from fine sand or silt through various sizes of gravel to small and large boulders. In deeper holes, there could be more than one layer of each. Boulders were quite common and are often found in boulder trains. Depth of gravel to bedrock in the area above the falls ranged from 3 to 12 feet. The depth of gravel below the falls was not determined due to being beyond the reach of the hoe and level of water.

The gravels, sand and silt all appear to be of local derivation, being predominantly serpentine, shale, conglomerate, basalt, greywacke, some quartz, argillite and limestone. The limestone was noticeably more predominant on the south side of the valley.

The bedrock in all test holes was found to be Tertiary basalt.

Settea Creek has formed an extensive delta at its mouth and, in fact, this delta has blocked the river and caused the formation of Turnagain Lake. It is estimated that over 50,000,000 cubic yards of gravels make up the delta, and all of this material has been provided by Settea Creek.

B.C. PLACER MINING REGULATIONS

Before commencing any operations or, indeed, proceeding with planning, reference should be made to the following publications:

Mining (Placer) Act
Guide to Legislation and Approvals in Placer Mining
Guidelines for Mineral Explorations
Guide to Placer Staking

Specific information on the subject can be obtained by contacting the Mine Inspector at the Ministry of Energy, Mines and Petroleum Resources office in Smithers, B.C., Bag 5000, 3793 Alfred Avenue, Phone (604) 847-7383. There are also Gold Commissioners offices in Atlin and Cassiar where forms and documents may be obtained and claims recorded.

1986 EXPLORATION PROGRAM

The 1986 exploration program was set up on the basis of a two-month test pit operation. The intent was to dig pits in various locations to and into bedrock and sluice the gravels thus obtained. A total of 23 test pits and trenches were completed. The nature of the bedrock and the capability of the equipment precluded any testing of the bedrock.

The following equipment was used:

½ yard JCB 805B Backhoe
Super sluice vibrating sluice box
Two 3" pumps and hose
Advanced design long tom concentrator
Gold Hound, pans, screens and miscellaneous equipment.

The backhoe was used to excavate and feed the gravels into the sluice box. The heavy concentrate was then run through the long tom. The light concentrate was screened, panned and processed through the Gold Hound.

The objectives of the program were as follows:

1. To determine depths and characteristics of gravels at various locations on the claim above the falls and the claim below the falls.
2. To determine characteristics of the bedrock.
3. To determine gold-bearing characteristics of the gravels.
4. To determine nature of any water problems.
5. To determine any special problems associated with the gravels that might cause sluicing problems.

With the exception of the inability to penetrate the bedrock, all of the above objectives were achieved on the claim above the falls. Due to the depth of gravels below the falls, the objectives were only partly achieved on the lower claim.

CHARACTERISTICS OF GRAVELS

As reported under the heading Surficial Geology, the gravels were found in all test holes to be well sorted and stratified. They were obviously laid down by water action. Nowhere was glacial till found, even on higher knolls, although it is very likely that the valley margins downstream are glacial till.

The gravels have a higher-than-normal percentage of silts and fine sands on the one hand, and a higher percentage of large cobbles and boulders on the other hand. Medium-sized material is in the minority. The fines are derived largely from shale, serpentine, argillite and limestone and the larger material from conglomerate, basalt, limestone and quartz.

In some cases, the silts were found in layers that approximated clays in texture, and these were found to be difficult to break up. The material found between basalt blocks also tended to be hard-packed and gummy.

BEDROCK CHARACTERISTICS

In all test pits, the bedrock was found to be Olivine Basalt. This basalt results from lava flows during Tertiary times and before the major glaciation. The basalt is layered approximately horizontally. In some cases, it slopes slightly upstream and, in others, it does the same downstream. The depth of the basalt is not known but, at the falls, it appears to be about 50 feet plus.

From the test pits and the existence of outcrops, it can be reasonably assumed that the whole valley above the falls is underlain by the flows. It can be assumed that the flows originated along the north side of the valley, since the highest exposure forms a bench along the north side. The flow would have run down the valley towards the Turnagain and probably filled a major portion of the valley that existed at that time.

The basalt breaks apart vertically into blocks with ½" to 6" or more spaces between. These spaces are filled with gravel that has trapped the majority of the gold. The blocks vary in size from 6" or less to 4 feet or more. The layers vary from 3" or less to 2 feet or more and are often in the form of a wedge with the narrow side on the downstream side and the wide on the upstream side.

Some flows were more ashlike and have eroded into pea-size gravel. It is likely that the river has cut its canyon in these more easily eroded flows. There were probably a number of flows, and the fissures that gave rise to the flows developed along the contact between the Upper Triassic and Lower Jurassic.

WATER CHARACTERISTICS

Settea Creek is fed from Settea Lake which, in turn has a number of small feeder streams. The most notable are the two that come from the passes at the east end and the one off the south ridge at the east end. The high mountains surrounding the valley above the falls receive high snowfall and summer rains at the higher elevations, which ensure flows on a year-round basis. The lake acts as a reservoir.

Adequate water for placer operations is available except, perhaps, in the driest years. Previous operators have had problems with too much water rather than not enough.

Because the basalt flows are broken into blocks and columns on a vertical basis, groundwater flows through them readily. Seeps are common wherever the basalt is exposed. Where the basalt slopes down going upstream, this seepage water tends to collect and eventually overflows downstream.

At the lake, the creek is about 30 feet wide and 6 inches deep. At the falls, it is about 8 feet wide and 2½ feet deep.

SOURCE OF GOLD

As has been previously indicated, the gravels on Settea Creek all appear to be of local derivation. This would indicate that the gold is also of local origin. This is supported by the following:

1. One 9 gram nugget was found that was entirely crystalline gold with no worn surfaces.
2. Many of the small nuggets found are round and have original surfaces with little signs of wear.
3. Fine pieces of gold, when viewed under a microscope, have a high percentage of shiny surfaces.
4. Some of the nuggets have quartz retained with them.
5. Quartz veins on the property assay gold values.
6. All of the stratified gravels in the valley show low values of gold.
7. The valley has not been scoured by glaciation from outside sources.

GOLD CHARACTERISTICS

The gold on Settea Creek is reported to have a fineness of 820. The main impurity is silver. The gold is generally bright with few flattened surfaces. Round rather than flat pieces are in the majority.

It is estimated from test results that +8 and larger nuggets could run about 25 to 30 percent of the total recovery. On the other hand, fine gold below 30 mesh will run in the range of 15 to 20 percent.

NATURE OF SETTEA CREEK GOLD PLACER DEPOSIT

Test results indicate that there are low gold values throughout the gravels that cover the basalt bedrock above the falls and in the gravels in the valley below the falls. These values are not of economic significance. Where the gravels have been sorted and washed downstream to the Turnagain, they have left behind and concentrated the gold into and on bedrock. Thus, economic values of gold lie in present and ancient stream channels.

The creek is approximately 11 miles in length from its junction with the Turnagain River to the lake outlet. The first basalt outcrop going upstream is at about the 3 mile marker. Below this point, the preglacial, prelava flow channel is most likely the same as the present-day channel. William Grady's 1934/35 hand workings are on this portion of the creek.

Above the basalt outcrop, the present valley may or may not follow its prelava flow channel. Since the basalt, for the most part, is resistant to erosion, it is more than likely that the present valley is to one side of the old channel, and the lay of the ground indicates that this is to the south of the old one. Whether the old channel exists under the lava flows is a matter for conjecture and exploration.

Generally, gold does not travel too far when the stream slope is less than 100 feet per mile. The slope on Settea Creek varies considerably over its length, varying from 30 feet to as high as 160 feet. The area above the falls has a slope of about 30 feet per mile, and there is little doubt that only the very fine gold moved downstream from the area. This is confirmed by the crystalline nature of the gold found above the falls.

Not including the falls, the next four miles proceeding downstream has a drop of about 65 feet per mile. This brings us to the canyon, where the drop changes to 160 feet per mile. This section would have seen considerable movement of gold downstream, and the sections below the canyon should prove richer than the canyon itself. The section below the canyon varies from 90 feet per mile to as high as 130.

There is little doubt that gold will be found throughout the length of Settea Creek. This is supported by the findings of William Grady, who set up a hand mining operation on a low bench about a mile upstream from the Turnagain River. He recovered coarse gold and would have continued his operation except for problems with high water. In addition, the opening of Wheaton River, where working conditions were better, proved more rewarding. There is no record of other works on the Creek, except for the two French Canadians who hand mined above the falls for several years. They seem to have done quite well, as they consistently paid their bills and were able to finance the construction of a diversion ditch from the lake to the south side of the falls. It is reported that they got most of their gold out of cracks between the basalt blocks, which they had to pry apart by hand.

The placer deposit below the falls is contained within a deeply incised valley approximating a canyon in the centre part. For the most part, the mineable area would be between 50 and 250 feet in width. The depth of gravels has not been determined but is certainly in excess of 16 feet, the maximum depth tested in 1986. All gravels are water-saturated, as there is only a foot or so of gravel and ground cover above creek level. This portion of the creek has a length of about 10 miles.

The portion of the valley covered by the property is a bit over 2 miles in length. Assuming that about 5 feet of gravels on bedrock and 4 feet of bedrock would be processed on the average, the gravel reserves for the lower claims would be about 800,000 cubic yards.

Note: In this discussion, the above depth for material to be processed under present economic conditions will be used for all reserve calculations.

The placer deposit above the falls consists of a number of visible channels starting at the lake and terminating at the falls or at the river valley. Generally, this area has the appearance of a wide, flat plain with a few knolls and ridges. There is not much cover on the gravels and even the knolls and ridges exhibit the stratification of the sediments within.

These channels are described as follows, starting on the north side of the valley.

CHANNEL "A" This is probably the oldest channel and runs from the lake along a high bench on the north side, dropping down a long chute (waterfall and rapid) into the valley about one mile below the falls. The gravel reserves for this channel are estimated to be about 200,000 cubic yards.

CHANNEL "B" This channel is a remnant of Channel "A", which forms a lower bench and which probably ended in the present falls. The gravel reserves for this are estimated to be about 25,000 cubic yards.

CHANNEL "C" Settea Creek presently occupies this channel, which is the lowest of all channels. Gravel reserves would be about 200,000 cubic yards.

CHANNEL "D" This is the last major channel and consists of a broad channel at the lake somewhat upstream of the present lake outlet and breaking into three subchannels at the lower end before it discharges into the falls. This is not the present falls but a more ancient one to the south of the present falls. Reserves for this channel are estimated to be of the order of 600,000 cubic yards.

Not included in the channels are extensive areas in between which more than likely cover very old channels--probably preglacial. Some 800,000 cubic feet of reserves can be assumed for this ground.

In addition to the above, the property includes two claims at the lake. There has been no testing on this ground, and the exact nature of this ground is not known. No reserve estimate has, therefore, been made at this time.

Total estimated gold-bearing recoverable gravel and bedrock reserves for the property is estimated to be 2,625,000 cubic yards.

It is interesting to compare this figure with that for the delta, which has been previously indicated, namely 50,000,000 cubic yards.

COMPOSITION OF HEAVY MINERALS

Gold in placers is almost always accompanied by other heavy minerals, such as hematite, magnetite, garnet, ilmenite, chromite, platinum, zircon, scheelite (tungsten), wolframite, cassiterite and cinnabar. These are generally referred to as "black sands". The following information is known at this time.

Hematite is not a major constituent of the black sands but is found. Magnetite is found in heavy concentrations and may represent as much as 8 ounces per cubic yard.

The concentrate was assayed for platinum, and a trace was found. It was also tested for scheelite and none found. There is no visible garnet or cinnabar. The others may be present in small quantities.

POTENTIAL FOR JADE ON THE PROPERTY

Jade boulders have been found on the property, and one small 250 pound block was drilled during the 1986 season. It was found to be of excellent colour but with too many inclusions.

The jade would most likely have been brought onto the property from the Wade Pass Sepentinic Peridotites by glacial action and less likely from the north. There are several jade mining operations in the area east and west of Boulder Creek north of Settea Creek.

The serpentine outcrops in Wade Pass and further east should be prospected. When mining, jade boulders should be set aside and the location of the find recorded on a master map so that any pattern that might establish the source might be revealed.

MINING PROBLEMS

1. Gold in gravel or sand will migrate downward as long as the material is loose and is agitated by flowing water. As a general rule, the gold settles until it reaches bedrock. The gravels at Settea seep water readily, and it is apparent that the gold has largely settled down to the bedrock. Not only has it done this, but it has settled into the cracks and crevices that we have indicated is a characteristic of the deposit. In most other placer deposits in Yukon and B.C., the bedrock is decomposed for a few feet or more, and the gold in the cracks and crevices can easily be recovered by stripping off the bedrock with the gravels down to a level where decomposition has not taken place.

   In some placers, the bedrock is not decomposed, nor has it any cracks and crevices, but it has a relatively smooth surface worn so by the action of the water in the stream. In this case, it can be scraped off satisfactorily or washed down.

   On Settea Creek, the bedrock has not decomposed but, due to shrinkage when the lava cooled and later by frost and water action, a system of cracks and crevices formed. In addition, basalt separates fairly easily on a plane roughly parallel to that of the original flow. This results in blocks that lift from water and ice action, and gravel gets deposited below these blocks.

   In this case, the basalt bedrock will have to be ripped by heavy equipment before being processed.

2. Lava flows are often thinner at the leading edge of the flow, and this gives rise to a wedge effect in that a layer may be only an inch thick at one point and 2 or 3 feet at a point 10 feet away. The thickness also varies across the flow. On Settea, the thin portion of the wedge is downstream. This gives rise to an endless variety of

basaltic pebbles, rocks, cobbles and boulders. If the top slopes down going upstream, a pocket results that tends to collect water.

This wedging effect actually contributes to the retention of gold, since it simulates large riffles in the surface of the basalt.

3. As reported, the gravels have a very high percentage of rocks, cobbles and boulders ranging in size up to 4 feet or more. These are commonly basalt, but serpentine, jade, quartzite and conglomerate are also present. The basalt ones are often found in "nests" or "trains" and may be found at any level in the gravels.

When the bedrock is ripped, a large number of basalt blocks, ranging in size from a few inches to 3 or 4 feet, will result.

Equipment capable of processing a high percentage of cobbles and boulders over one foot in size will be necessary.

4. We have pointed out that the serpentine present in the gravels are relatively softer than many of the other materials. The basalts and conglomerates, on the other hand, are wear-resistant. The result is that the softer materials have been ground down into fine sands, silts and clays. In some cases, layers of clay have been formed, and the cracks and crevices have a high percentage of these fines and are very firm and compacted.

Since the gold tends to stick to the clays until it is in suspension in the water, it is important that a thorough washing cycle precede any attempt to sluice the gravels.

5. We recovered a very high percentage of magnetite from the concentrate. It is very likely that the efficiency of the sluicing and cleanup processes will be seriously reduced by the large quantities of this mineral present in the gravels.

This problem can be countered by having an efficient sluicing process and by more frequent cleanups. Consideration should be given to the inclusion of an automatic magnetic belt pickup at the head end of the sluice box.

6. Wherever a test hole was excavated, groundwater seeped into the hole at or before the bedrock level. This is, of course, not unusual in placer operations and is the main reason for bedrock drains. In this case, it also takes place at levels above the current creek and indicates that the gravels above the falls are a part of a huge aquifer. Drainage of works will, no doubt, be a continuing problem.

   The diversion ditch will have to be put into use right away, and it may be that diversions will be required on both sides of any works.

7. The district is noted for large nuggets, and Settea Creek follows this trend. It is recommended that the sluice box be equipped with a nugget trap to ensure recovery of larger pieces of gold.

GOLD RESERVES

Research and study of previous gold testing and production, supported by the findings of the 1986 test program, result in the following:

1. In 1939, a reported return of more than $100.00/cubic yard
2. In 1980, a reported return of $78.60.
3. In 1981, a reported return of $35.40.
4. In 1983, a reported return of $85.00.
5. In 1986, an estimated return of $24.00 per cubic yard in the main channel (C).

The first four items above are from "hot spots", or "pay streaks", and indicate that there is considerable potential for high recoveries. The last was in the main channel and just upstream and to the side of the 1983 production.

Analysis of the 1986 test program, with adjustments made for sluicing losses and bedrock gold, indicates possible returns for the nine-foot pay zone used to estimate gravel reserves from a low of $7.50 to a high of $20.00 per cubic yard. Provided only economic grades of gravels are processed (in a plant designed to overcome the mining problems reported), an average return of $12.00 per cubic yard should be possible, based on gold at $390.00 U.S. per ounce.

The estimated value of gold reserves on the property, based on the above, are as follows:

Visible channel (1,025,000 cubic foot gravels)	$13,500,000.00 CDN
Ancient channels (800,000 cubic foot gravels)	$ 9,600,000.00 CDN
Downstream of falls (800,000 cubic foot gravels)	$ 9,600,000.00 CDN

RECOMMENDED MINING AND EXPLORATION PROGRAM

It is recommended that a combined mining and exploration program be commenced on the property. The mining operation should be set up on the main channel on the south side and above any previous workings. The stream should be diverted into the diversion channel and a bedrock drain constructed from the lip of the falls to the cut. This will require removal of bedrock in the drain to the level of the bedrock to be removed in the cuts.

Only paying gravels should be sluiced. The bedrock should be broken up and processed to a level that will ensure that all contained gravels are processed. While we have estimated reserves on the basis of 9 feet, this figure should be revised as the work proceeds in keeping with returns. Equipment should be carefully selected to ensure that an efficient mining operation is maintained and costs kept to a minimum.

Non-economic gravels should be carefully stockpiled and recorded, as they may be of economic value at some future date. Records should include maps and potential returns per cubic yard. Because of the nature of the deposit, it is highly recommended that an accurate system of ground recording be established so that the pay zones can be established and followed. This must include an assessment of bedrock contours and characteristics.

An exploration program should also proceed in conjunction with the mining program. This would be in two stages. The first would be a continuation of the 1986 testing program and should start immediately.

The objectives of Stage One of the exploration program would be as follows:

1. Determine characteristics of Channels "A", "B" and "D".
2. Verify extent of basalt bedrock.

3. Determine concentration of gold in gravels in a traverse across the valley to find out if gold values are higher on the south side or the north side.

It is recommended that trenches be dug, rather than test pits, with reduced quantities from each test compared to 1986. The establishment of a central test sluice location should be considered. Gravels to be tested would be moved by truck or other vehicle.

The Second Stage of the exploration program should be set up in the second year and would consist of a drilling program with the following objectives:

1. Determine characteristics of the valley gravels below the falls.
2. Determine bedrock in valley.
3. Drill at least one hole through basalt above falls to determine thickness and presence of gravels under basalt.
4. Possibly drill benches above and on both sides of the valley above the falls.

It may be possible to get some idea as to the thickness of the basalt and the existence of gravel under same by bulldozing out the talus slope below the falls just to the south of the present waterfall.

RECOMMENDED MINING METHOD

The mining method recommended for this property would be the conventional bulldozer-sluice box combination. In order to process the large boulders, provide effective washing action and keep water requirements to a minimum, a Derocker is highly recommended. Alternatively, a large Trammel capable of handling up to 4-foot boulders could be used. The following is based on the assumption that the Derocker would be used. The Derocker would feed a modified Ross-type sluice box.

Two D8 cats or larger would be used to rip the bedrock and excavate the gravels and push them into the Derocker. They would also be used to remove tailings.

A recycle pond or ponds would have to be constructed just above the falls, and a settling pond may be required at the foot of the falls as well. A small recycle pond exists at the falls now and may prove usable. A centrifugal pump would recirculate water for the Derocker and sluice box.

The main flow of the creek would be diverted by means of the existing diversion ditch, but makeup water for the recirculation system would be obtained before this takes place. While there may be enough seepage water to make up losses in the recirculation system, it is likely that water will have to be pumped from the ditch from time to time.

There is little overburden in the main channel, but what little there is would be conveniently stockpiled well to the side of the active works. This would be used for reclamation purposes after completion of mining.

In the primary extraction process, the product will be screened down to 1½ to ¼ inch size with a second break for the ¼ inch minus fines. The latter will be directed into the side runs, and the ¼ inch plus will go down the centre run. In view of the larger nuggets found on Settea, a nugget trap would be built into the top end of the sluice box, probably at the head of the centre run.

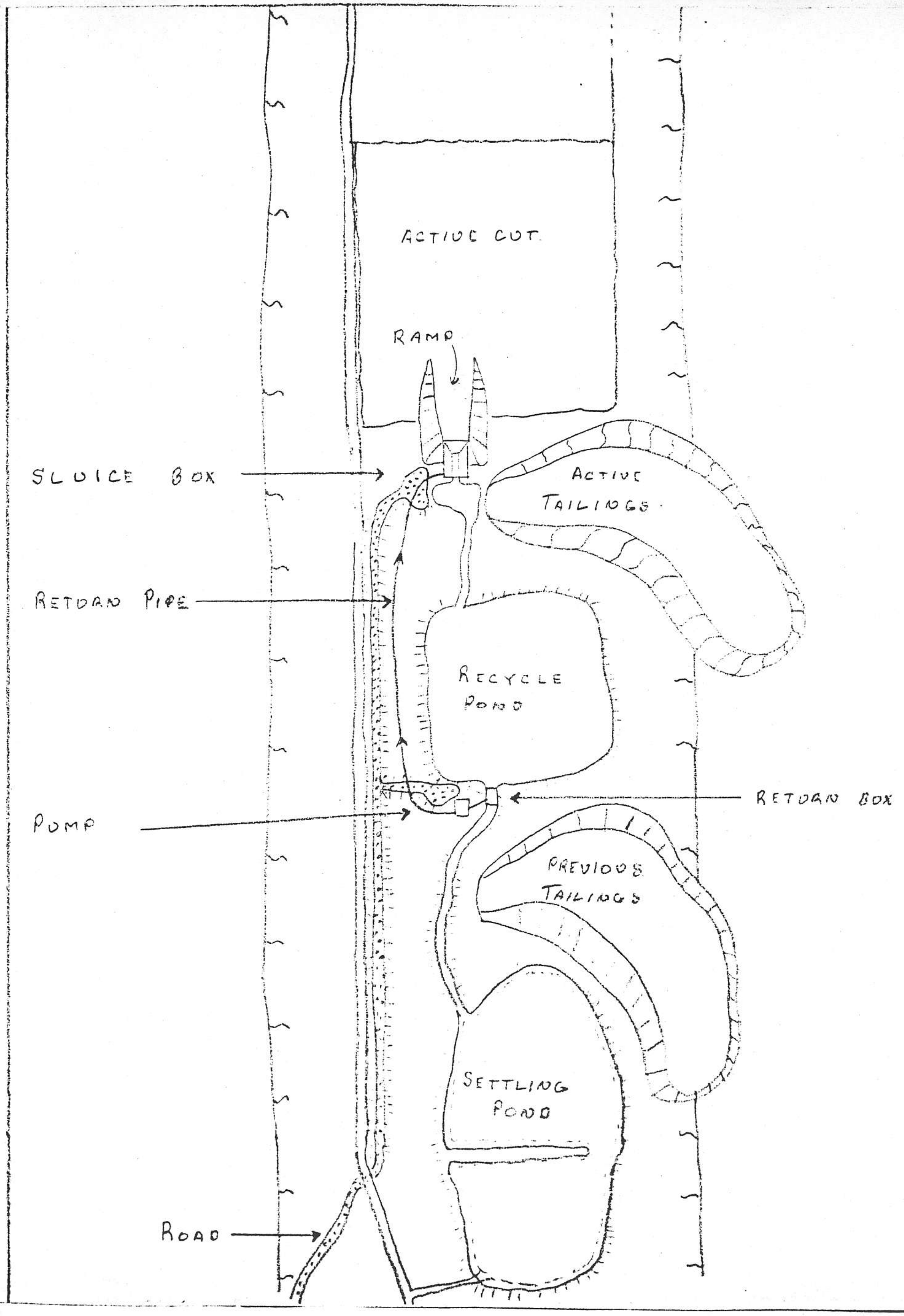
Consideration would be given to the addition of a travelling magnetic belt at the head of the sluice box for removal of magnetite. This magnetite would likely be sold as a by-product of the operation and would likely have contained gold. This material could be processed in camp for gold recovery, if the values are high enough to warrant this action.

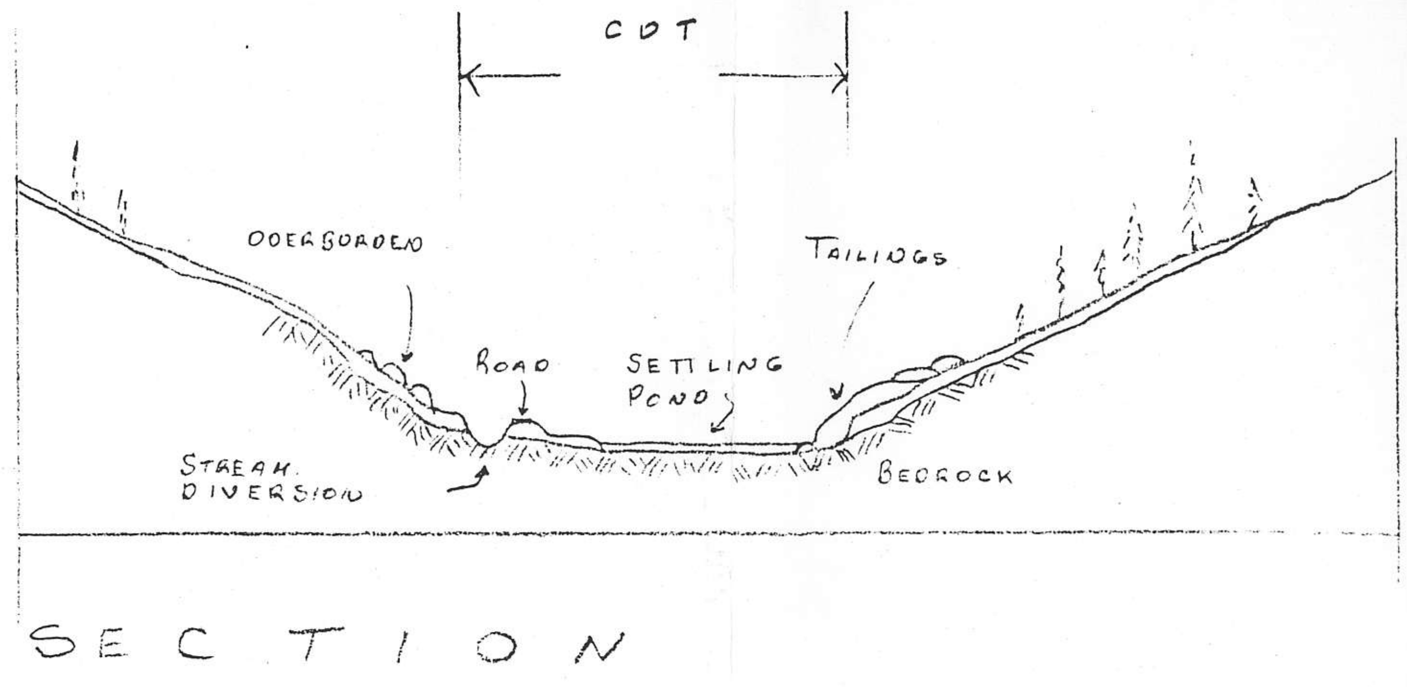
Cleanups of the side runs would be carried out on a daily or 10-hour basis or to suit recovery values. The centre run cleanup would be regulated by recovery but would generally be every three or four days.

A secondary extraction process would be set up in camp at a secure location. Primary concentrate would be run through a "state of the art" long tom. In the case of the centre run, concentrate material would be screened to ¼ inch minus. The ¼ inch plus material would be checked for nuggets.

Following the long tomming, the tertiary concentrate would be screened and the fine gold run over a copper amalgam plate to remove any black sand remaining. A magnet would be used to remove any magnetite.

The bulldozers would be needed to excavate a bedrock drain, build tailings and settling ponds, construct access roads for the testing program and prepare ground in advance of the active working cuts. Ground control of the pay gravel would be by panning and, more preferably, by processing on a consistent basis one or two yards of the gravels in the next cut.





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26 Sunset Dr. N.
Whitehorse, Yukon
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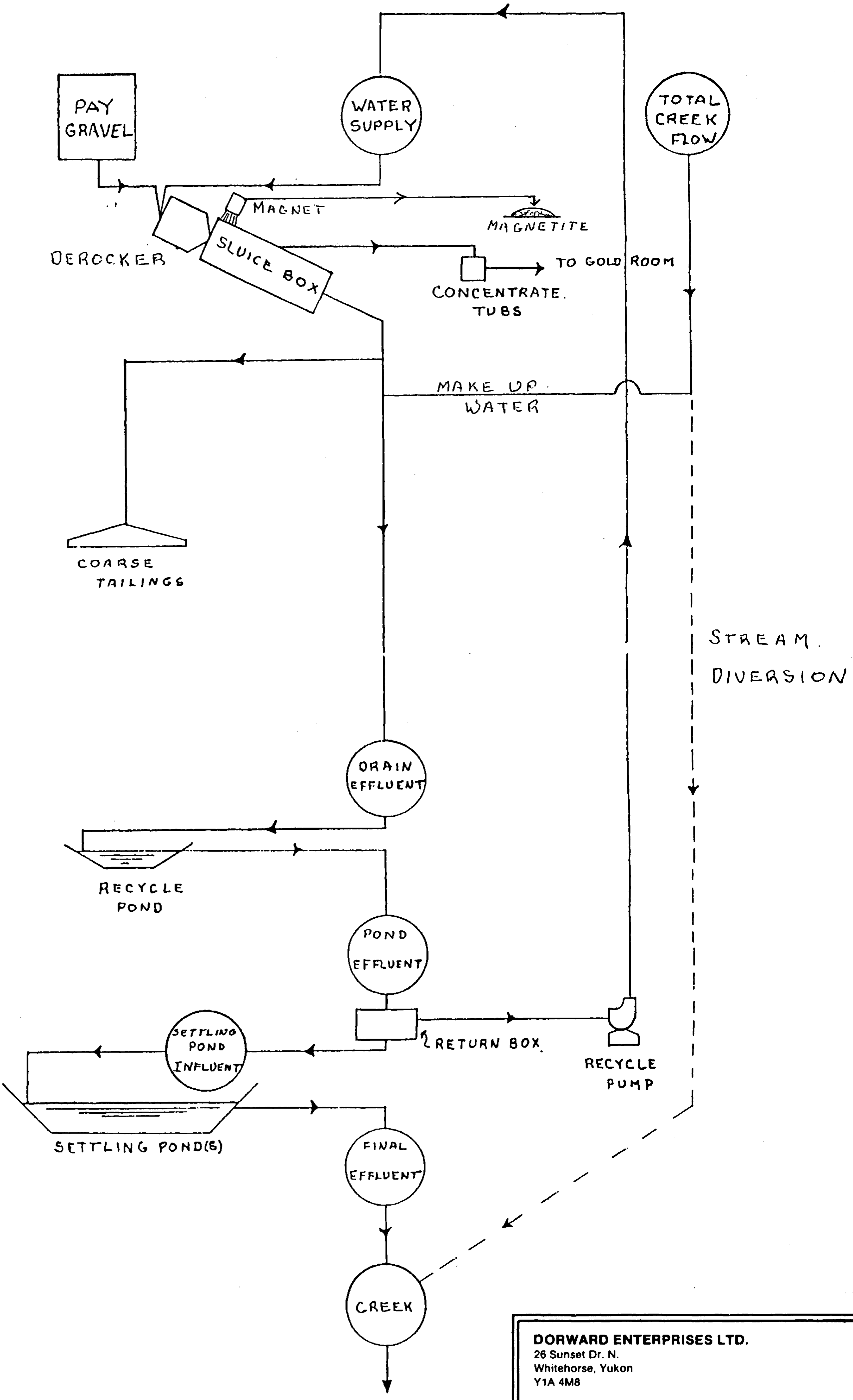
SETTEA CREEK PLACER EVALUATION

TYPICAL MINING PLAN

NOVEMBER -- 1986



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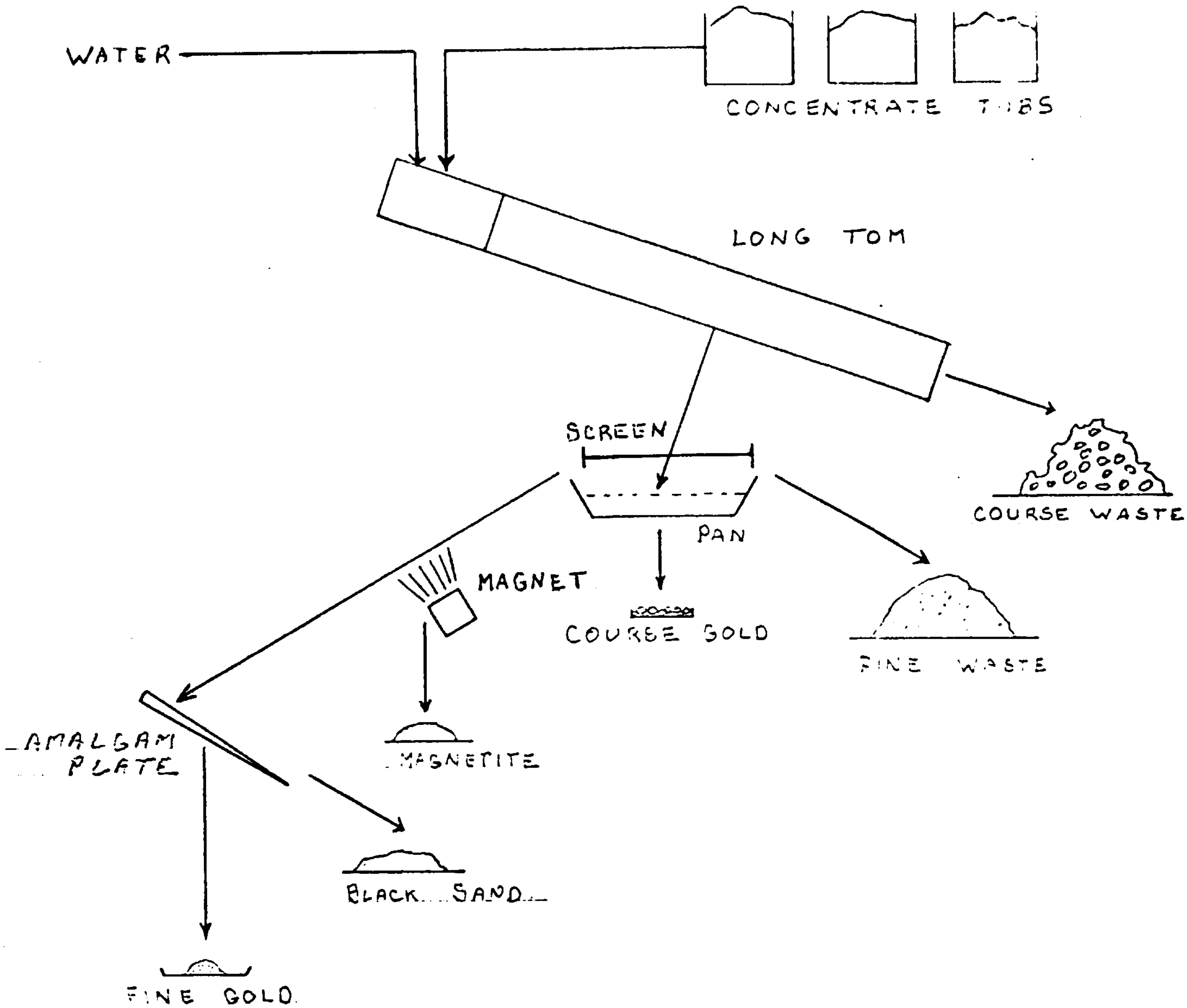
SETTEA CREEK PLACER EVALUATION

TYPICAL FLOW

PRIMARY CIRCUIT

NOVEMBER -- 1986



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SETTEA CREEK PLACER EVALUATION

TYPICAL FLOW

SECONDARY AND TERTIARY CIRCUITS

NOVEMBER -- 1986

MANAGEMENT AND STAFFING

The camp crew would consist of a mine foreman, two equipment operators, a mechanic-welder, a general roustabout and a cook.

PRODUCTION OBJECTIVE

The equipment recommended for mining this property is capable of processing 100 cubic yards of pay gravels per hour. On the basis of a 10-hour work day and 120 sluicing days per season, this works out to 120,000 cubic yards per season. At $12.00 per yard, this represents $1,440,000.00 in gold sales. At $390.00 U.S. for gold, 820 fineness and exchange at .72, this is 3,242 ounces of raw gold.

A production objective of 3,000 raw ounces of gold is therefore recommended for each season. Due to setup and ground preparation time, it is unreasonable to expect this in the first season, and 2,000 ounces would be more reasonable for the first year.

CAPITAL COSTS

The following is based upon an immediate start in mining, as recommended, with an exploration program to commence at midseason. There is no allowance made for property acquisition. Cost estimates are based upon purchase of good, used units. In the case of the Ross Box and Derocker, the cost will cover modifications required to match up units, put in a nugget trap and refurbish.

It is recommended that tractors be purchased with mainframes that have had only 1,000 to 2,000 hours and that all hydraulics, roller parts, final drives, head lines, injectors, etc., be new. It should also be realized that equipment requires 1,200 to 2,000 hours of operation to work in and identify any problems.

Mining Equipment

2 D8K Cat Tractors	$250,000.00
1 Ross Box with mods	50,000.00
1 Derocker with mods	50,000.00
1 Pump	25,000.00
2 Freight Trailers	25,000.00
Subtotal	$400,000.00

The mining equipment at the site should be examined to determine its usefulness to the mining program, its condition and cost, if any, to put into operation. Any items not specifically required should be taken out on a return haul and sold.

Exploration Equipment

The equipment used in the 1986 test program is still on the property and is in good condition. It is available and is adequate for any proposed trench testing, provided one of the tractors can be used for support on occasion when needed.

Pre-Production Expenses

Included under this heading are repairs to the camp and existing mining equipment, as well as the cost of a winter haul of new equipment, staples and fuel.

Camp and Equipment repairs	$ 10,000.00
Winter Haul	25,000.00
Staging and support	5,000.00
Subtotal	$ 40,000.00
TOTAL CAPITAL REQUIREMENT	$440,000.00

COST OF OPERATIONS

Costs of the mining and exploration activities have been considered in two separate sections, defined as follows:

A. Operating Costs are those costs that relate directly to mining activities and result in gold production and revenue.

These costs include equipment operation and labour distribution, tailings disposal, stripping, reservoir operation and settling pond repairs. They are based on a six-month operational season.

B. Non-Operational Costs are those costs that relate to administrative, head office and accounting expenditures and that do not contribute to the production of gold and revenue.

Pre-Production and Exploration Costs are those costs required to put the mine into operation prior to gold production and the costs of the exploration program and generally referred to as CDE and CEE.

The following is based upon the recommended program:

A. OPERATING COSTS

1. Equipment

2 D8K Cat Tractors (3,000 hours)	
Maintenance, lube, filter, tracks @ $25.00/hour	$ 75,000.00
Fuel (45 litres/hour) 135,000 litres	
1 Generator (4,000 hours)	
Maintenance, lube, oil, filter @ $2.00/hour	$ 8,000.00
Fuel (7 litres/hour) 28,000 litres	
1 Pump (1,200 hours)	
Maintenance, lube oil, filter @ $5.00/hour	$ 6,000.00
Fuel (22 litres/hour) 26,000 litres	
1 Derocker (1,200 hours)	
Maintenance, lube oil, filter @ $5.00/hour	$ 6,000.00
Fuel (22 litres/hour) 26,000 litres	

Miscellaneous: Gas pumps, welders, heaters, repairs, etc.			
600 hours @ $2.00/hour			$ 1,200.00
Fuel (gas)	2,800 litres		
Equipment Total			$ 96,200.00

2. Fuel

Diesel	215,000 litres	@ 50¢/litre	$107,500.00
Gas	2,800 litres	@ 60¢/litre	$ 1,700.00
#2 Fuel Oil	1,000 litres	@ 60¢/litre	$ 600.00
Fuel Total			$109,800.00

3. Staff

Foreman	$5,000.00 x 6 months	$ 30,000.00
Operators	2 @ $4,500.00 x 6 months	$ 54,000.00
Welder/Mechanic	$4,500.00 x 6 months	$ 22,500.00
Cook	$3,000.00	$ 15,000.00
Roustabout	$2,500.00	$ 12,500.00
Staff Total		$134,000.00

4. Food, Supplies and Maintenance

6 persons @ $2,400.00	$ 14,400.00

5. Freight, Misc. Steel, Welding Supplies	$ 15,000.00

6. Equipment Repairs

Cutting edges, corner bits, ripper teeth	$ 28,000.00
Cost of Operations	$397,400.00

B. NON-OPERATIONAL COSTS

Exploration Program	$ 50,000.00
Administration and Engineering	$100,000.00
Total	$547,400.00

Based on estimated 120,000 cubic yards per season, this works out to a cost of some $4.56 per cubic yard.

CONCLUSIONS AND RECOMMENDATIONS

It should be possible to achieve a production of some 3,000 ounces of raw gold with a fineness of 820 and value of $1,332,500.00 at $542.00 Canadian with minimum capital expenditure.

The cost of this production is some $4.56 per cubic yard, or $182.47 per ounce.

There is sufficient reserves for the proposed operation to last eight years and the prospect of another 12 years or more. An effective exploration program must be maintained to ensure future reserves.

It is important to properly test ground ahead of the processing program, and it is desirable to strip non-economic gravels from the following year's proposed production at the end of the previous season.

It is recommended that every effort be made to increase the gravels sluiced, balanced against cost and the percentage of contained gold recovered.

Unit operations should be continuously reviewed and detailed records kept for each machine and man on a per cut basis.

Volume and production must be tied to the unit operation costs. This would include grade profiles, yards processed, bank yards, overburden depth and wasted gravels.

The cut should be tested by panning, particularly at bedrock levels, to determine cutoff grades.

The treatment of the concentrate and the pay gravels should be reviewed to ensure that as much of the fine gold as practical is being recovered.

Finally, an area program of careful examination and acquisition should be maintained to acquire additional properties.