South Big Salmon River Drilling Project

1987

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For
Canada Tungsten Mining Corporation Limited
South Big Salmon River Project
Two Mile Placer Lease 7524
Whitehorse Mining District
Yukon Territory
N.T.S. 105 E-8

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This report has been examined by the Geological Evaluation Unit under Section 41 Yukon Placer Mining Act and is recommended as allowable representation work in the amount of $ 2000.00.

ABLeBarge

for Chief Geologist, Exploration and Geological Services Division, Northern Affairs Program for Commissioner of Yukon Territory.

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SUMMARY

The 1987 Churn Drill program in the South Big Salmon River Valley between Martin Creek and Livingstone Creek was not successful in locating pre-glacial gold bearing channel. Modest amounts of extremely fine grained gold was found in the top 26 feet of hole SAL 87-1 and the top 41 feet of hole SAL 87-2. Only minor amounts of extremely fine grained gold was found at depths below 41 feet.

Two keystone Churn Drill holes were drilled for a total of 104 feet. Drilling took place over a 13 day period commencing October 22, 1987 and finishing November 3, 1987. Drill hole SAL 87-1 was drilled to 29 feet then abandoned due to the bit becoming stuck down the hole. The hole had deflected causing a curvature in the casing. Hole SAL 87-2 was located 20 feet to the south of SAL 87-1. It was drilled to a depth of 75 feet. This hole was stopped due to difficulty in driving the casing deeper and excessive inflow of ground water. Bedrock in this area is at a depth greater than 75 feet.

The South Big Salmon River Valley appears to have been at least partially scoured during the Ried glacial period as the ice sheet moved northward. Fluvioglacial gravels were then deposited in the valley as the ice sheet retreated.

Gravels containing extremely fine grained gold were deposited over the barren fluvioglacial gravels in broad alluvial fans as a result of the erosion of gold bearing bench gravels.

Pre-glacial gravels (gold bearing) may exist on the east side of a bedrock ridge that parallels the South Big Salmon River near its confluence with Martin Creek. This ridge extends onto the subject property in the vicinity of the #2 Placer Lease 7524 claim post. No testing of this area has been carried out to date.

The gold found in the surface gravels of the northern portion of Placer Lease 7524 is generally extremely fine grained (+/- 100 mesh) and extremely flat. The Cory Shape factor analysis indicates that although the edges of the gold grains are angular, it is angular only in one dimension. The grains are very flat and extremely thin in cross section. This shape analysis explains why some of the gold floated on the water in the pan. This extremely flat shaped gold along with it extremely fine grained particle size would certainly present recovery problems.

The gravels contain many thin layers of clay mixed with sand to fine gravel sized particles. Some of the clay material breaks up fairly easily while some is very sticky and difficult to break up. This may cause processing problems.

The drill program and the limited amount of reconnaissance work around the property indicate a geomorphologically complex depositional history.

1.0 INTRODUCTION

The South Big Salmon River Drilling Program was designed to discover if gold bearing pre-glacial gravels exist in the wide valley area located east of the South Big Salmon River between two tributaries, Martin Creek and Livingstone Creek. The information gathered from the program would determine whether further work should be undertaken to explore for potential mineable placer reserves.

A program of overburden drilling was carried out using a modified Keystone Churn Drill. This drill is mounted on tracks that have been secured to steel skids. The entire unit is towed from drill site to drill site using a cat.

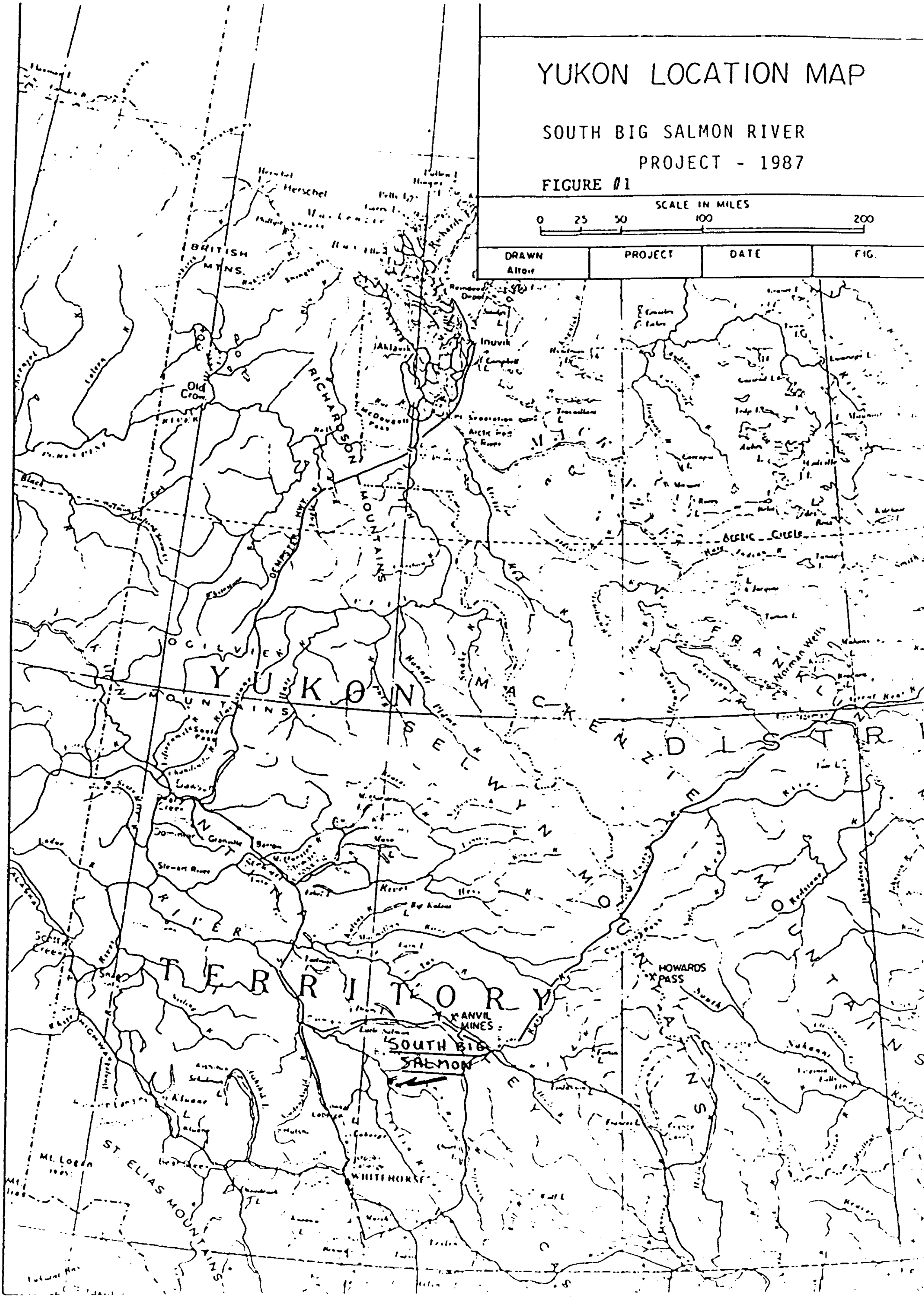
The target area is a relatvely unexplored portion of the South Big Salmon River Valley. The South Big Salmon River flowed across this old valley bottom and was mostly likely a braided stream that carried fluvioglacial gravels from the toe of a retreating glacial ice sheet. This drill target was selected to test for the possible existence of a buried pre-glacial gold bearing gravel channel. The drill site was spotted next to an old shaft that was excavated by the "old timers". The shaft was filled with water and thus could not be examined. It is believed that the "old timers" dug this shaft to try and locate pre-glacial gravels. As there were no records available on this old work, it was decided to drill test this same area of ground.

The South Big Salmon River area is a historical gold mining camp and its mining history goes back to the Klondike gold rush period around 1899 when gold was discovered in Martin Creek and Livingstone Creek. Numerous old pits and shafts are located on this placer lease as well as on Martin Creek, Livingstone Creek, bench areas and old dry stream beds.

2.0 LOCATION AND ACCESS

Placer lease 7524 is located along the east side of the South Big Salmon River some 50 miles by air northeast of Whitehourse, Yukon at 61 degrees 18' 30" north latitude and 1340 20' west longitude (Fig. 1).

The property starts at a point on the South Big Salmon River approximately 2.5 miles downstream from its confluence with Martin Creek and extends upstream for 2 miles to within 0.5 miles of its confluence with Martin Creek.


YUKON LOCATION MAP
SOUTH BIG SALMON RIVER
PROJECT - 1987
FIGURE #1
SCALE IN MILES
0 25 50 100 200
DRAWN
Altoir
PROJECT
DATE
FIG.
BRITISH MTNS.
Herschel
Inuvik
Aklavik
Old Crow
RICHARDSON MOUNTAINS
DEMPSTER HWY
OGILVIE
YUKON
MOUNTAINS
SELWYN MOUNTAINS
MACKENZIE DISTRICT
MACKENZIE MOUNTAINS
FRANKLIN
Norman Wells
Arctic Circle
Dawson
Stewart River
TERRITORY
HOWARDS PASS
ANVIL MINES
SOUTH BIG SALMON
WHITEHORSE
Kluane L
ST ELIAS MOUNTAINS
Mt. Logan

An airstrip located on the north side of Martin Creek near its mouth provides year round access to the property by fixed wing aircraft. A second air field, called Emminger Field, is located 7.9 kilometers (4.74 miles) north of the Martin Creek air strip. This airfield has been brushed out to a length of five thousand (5,000) feet and can be upgraded with little work to handle large freight planes such as Hercules aircraft.

The principle land route into the area consists of one hundred and two (102) miles of pioneer road which links the property with the Yukon Highway at Whitehorse, Yukon. This road traverses southwest from Livingstone, Yukon, and crosses the South Big Salmon and Teslin Rivers to connect the property to Whitehorse, Yukon. The road is used by local miners to move heavy freight to the area during winter months when ice provides natural bridges over the rivers.

Whitehorse, Yukon, located at Mile Post No. 918 on the Alaska Highway, is the capital of the Yukon Territory, and is the supply center closest to Livingstone, Yukon, and Martin Creek. Whitehorse, Yukon, is serviced by schedules airlines and various trucking operators.

3.0 UNITS OF MEASUREMENT AND GRID CONTROL

Imperial System units have been used in this report for the following reasons:

1) Reports and work conducted by others on the Martin Creek and Livingstone Creek areas was reported on using the Imperial System.

2) Drill tools and sample intervals etc, are measured in Imperial units.

3) The Imperial System appears to be the standard i;n the Yukon placer industry (the Placer Mining Act is still in Imperial units).

4) The drill hole location grid was compassed in and distances between stations were measured using a metric unit chaining machine. All drill holes have metric coordinates and the grid lines are identified by a metric unit line number. These units were converted to imperial units to facilitate the plotting of the drill holes etc. on a 1 inch = 400 feet scale field map. In the event that all data is required to be recorded in metric, the grid and drill hole coordinates are already established in this system. The 1 inch = 400 feet field map has been converted and drafted by computer at a scale of 1:4,000 (Fig. 2).

Gold weights are reported in their standard units, namely milligrams, grams and troy ounce (1 troy ounce = 31.1035 g).

A grid was established in the property to facilitate the mapping of geomorphic features and spotting of drill holes. The grid was put in using a compass and metric unit distance chaining machine. The lines and stations plotted on Drill Hole Location Plan Map (Fig. 2) are as compassed and have not been direction or distance corrected by transit surveying at this time.

The southwest corner of the "old timer's" shaft located approximately 6,600 feet along and 340 degrees from the #2 lease claim post was used as the starting point for the grid. This point was designated Line 15 00N station 1500E. The 1500E baseline was run along azimuth 340 degrees and extended north westerly to L 2500N station 1500 E. To the south east long azimuth 160 degrees the baseline extended to line 500S station 1500 E. Starting at line 1500N station 1500 E grid lines were compassed and chained in at 300 meter intervals off the 1500 E baseline. These crosslines were compassed in along azimuth 250 degrees and 70 degrees. Stations were established on these lines at 100 meter intervals. Line 1500N is the most northerly line put in and line 500S is the most southerly line put in.

A magnetic declination of 026 degrees east was used for the compass work on the grid.

4.0 CLAIM STATUS

The South Big Salmon River property consists of one (1) Two Mile River Prospecting Lease designated number 7524 staked by and held by Robert Van Wyk. The beneficial ownership of the property is held 50% by Robert Van Wyk and 50% by Douglas Gonder, Sr.

5.0 DRILLING EQUIPMENT/METHOD

A completely rebuilt Keystone Churn Drill was used to carry out the drilling program on the South Big Salmon River property. This drill was mounted on crawler tractor tracks which were underlain and secured to steel skids. The drill was moved from site to site using a D-7 cat. This drill was selected for this test work because it was present on the property and for its historical reputation for providing good representative samples. The Yukon Consolidated Gold Corporation (now owned by Teck Corporation) utilized the churn drill extensively in the Klondike gold fields to evaluate large tracks of land prior to dredging. The primary disadvantage of this drill is that it is very slow and depending on gravel types etc. it can have a limited depth of penetration.

During the drilling program on the South Big Salmon River property it was found that clay layers, particularily those in excess of one foot thick, were difficult to penetrate with the casing. This was also the case if boulder rich layers were encounted. A two to three inch gravel plug was left in the casing drive shoe after each sample was baled. This reduced sample contamination by sealing off the shoe so water and gravels could not come into the casing from the sides of the hole below the casing. Only when the driving of casing became so difficult did it become necessary to drill slightly ahead of the driving shoe. The distance drilled ahead of the shoe rarely exceeded six inches.

Ground water infiltration did present some problems particularily in hole SAL 87-2 where at 75 feet in depth the water seepage was quite rapid and often filled the casing stem to within 18 feet of the top of the hole. Although time consuming, this water was baled out prior to pumping or baling of each sample. This maintained the integrity of the sample by minimizing the chances that gold might be washed out of the sample as the baler rose to the ground surface through a column of water in the casing stem.

Two foot samples were taken at the start of the program, however, it was found that there was an excess of slurried material and the five gallon sample buckets could not properly contain all this material. The sampling was quickly adjusted so that sampling was done one foot intervals. All the coarse material and material held in suspension in water could be collected in the five gallon buckets. The slurried material was allowed to settle out in the buckets prior to processing.

The casing used was Schedule 40 coated pipe with a six inch inside diameter. The casing drive shoe was 6.9 inches I.D. The casing was driven 5 feet at a time. At the end of a 5 foot drive, the core was drilled and removed in one foot intervals. A 5 foot section of casing was added to the top of the stem and then driven for another five feet.

A detailed paper on churn drilling and drilling techniques is included below. The diagram shown in Figure 1 in the paper is of the Hillman type. The Keystone drill used on the project has different power and operating mechanism but the principles are the same. The drill stem, casing, bits, drive shoe and baler equipment and mechanisms are virtually the same on the Keystone drill as on the Hillman drill shown in the diagram.

Drill hole SAL 87-1 was drilled to a depth of 29 feet. The hole was abondoned at this point because of problems with the drill bit becoming stuck down the hole. It was discovered that the hole had deflected causing a significant curvature of the casing. The long drill stem could not easily negotiate its way up and down the hole. Because the samples from this hole contained significant quantities of gold it was decided that a second hole should be drilled close by so that a test to bedrock could be done. This would determine if the gravels were gold bearing from surface to bedrock. It was still the objective of this hole to discover if higher grade pre-glacial gravels existed in this area near bedrock.

Drill hole SAL 87-2 was collared approximately 20 feet south of hole SAL 87-1. It was drilled to 75 feet. Bedrock was not reached, however, it is believed to be within 10 to 15 feet of the bottom of the hole. The drilling was stopped when the casing could not be driven down any further. Ground water was also flowing in at a considerable rate. It was not determined conclusively what was preventing the casing from being driven down but it is possible that the hole was very close to bedrock i.e. within two feet and coarse gravel and boulders were lodged between the shoe and hard bedrock surface. The casing shoe may also have caught a large boulder which could not be broken up and dislodged with the drill bit. The sample processing showed that the amount of gold had decreased dramatically in samples taken from 41 feet to the bottom of the hole at 75 feet.

TABLE 1

Drill Hole Data and Drill Performance Summary

Hole	Easting	Northing	Depth	Start	Finish	Hrs. Driving Casing	Rate/Ft/Hr	Hrs Drilling and Sampling	Rate (Ft/hr)
SAL 87-1	STN. 1506.4E	L1483N	29 ft	Oct 22/87	Oct 25/87	6 hrs	4.8 ft/hr	15 hrs.	1.9 ft/hr

Approximately 8 hrs divided between cutting pipe, welding pipe, maintenance, meals and travel.

Hole abandoned due to sticking drill bit in deflected hole.

Hole	Easting	Northing	Depth	Start	Finish	Hrs. Driving Casing	Rate/Ft/Hr	Hrs Drilling and Sampling	Rate (Ft/hr)
SAL 87-2	STN 1508.8E	L1477.5N	75 ft	Oct 26/87	Nov 3/87	21 hrs	3.62 ft/hr	32 hrs	2.3 ft/hr

Approximately 17 hrs divided between cutting and welding pipe, bit buildup and sharpening, maintenance, meals and travel.

Hole stopped (possibly very near bedrock) as casing could not be driven further and excessive water inflow.

0707A
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DRILLING TECHNIQUES AND EVALUATION OF PLACER GOLD DEPOSITS

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Even though standard churn drilling techniques may be recommended in placer gold sampling programs, other methods may prove to be more satisfactory. It is necessary that other methods also be considered in an attempt to lower costs. The time required to drill a hole must be considered too, especially in the evaluation of potentially large economic auriferous gravel deposits.

Each placer deposit may have certain characteristics and ultimate requirements which will prevent any one technique from being considered "best". Consequently, several types of evaluation methods are described.

Churn Drills, Tools and Accessories

Up until the last few years, practically all placer drilling has been accomplished with churn drills of the type developed for drilling water wells. In general, the placer churn drill consists of either a rigid (one piece), or a telescoping type derrick which supports a crown sheave through which the drilling rope or cable passes. One end of the rope or cable is wound around a hoisting drum and the other end is fastened to the digging tools. Between the drum and the crown sheave is a mechanism (either a walking beam or a pulley on a crank) for alternately pulling up and dropping the line with its attached tools. This imparts a churning or spudding action. The drum which holds the drill line is fitted with a brake strong enough to not slip even when the entire weight of the tools is bouncing on the end of the line. The drill is also equipped with a smaller friction driven drum on which a cable, usually 3/8" in diameter lowers and raises the pump or bailer for cleaning the cuttings from the hole.

The tools ordinarily consist of a rope or cable socket, a stem, and the bit. If extra weight is required, a sinker bar or short length of stem is added. These tools are cylindrical, usually 3" to 4" or 4-1/2" in diameter, and weigh between 800 and 3,000 lbs. The weight depends on the diameter and length of the tools, and on the length of the derrick and the drilling job it must accomplish. The tools are fastened together by pin and box (tapered male and female threaded parts) which are much stronger than ordinary threads. The bit is a cylindrical piece flattened and sharpened at the lower end. The exact shape of the cutting edge and of the bit depends on the type of ground that is to be drilled. Rock bits are heavy and thick and their cutting edges form a relatively blunt angle. Placer bits for chopping fine gravel are thinner and have sharper cutting edges. The sand pump, or bailer, is a cylindrical tube usually 4" in diameter and 6 to 8 feet long, with a hinged valve in the bottom. A plunger with a rubber or leather piston is attached through a rod to the cable (sand line). As the piston moves up, sludge or cuttings are sucked into the pump or bailer to be hoisted to the surface. Other tools that are usually necessary include a set of jars. Jars consist of a short stem constructed in two parts having 12" to 18" of end motion. They are used when there is danger of the bit sticking, as they provide either an upward or a downward jar which is very effective in extracting a stuck or sticking bit. A "bell" or "horn" socket may be necessary to pull a string of tools out of the hole. A rope spear may be necessary to catch the end of a broken rope or cable.

All of the drilling tools are round in cross-section, except for the lower part of the bit. In order for the joints to be tightened with heavy tools referred to as stem wrenches, a square section called simply a square, has been molded into each end of the tool parts. In order to tighten the drill stem to the rope socket for instance, the stem wrenches are placed on the squares in the correct position. The pressure necessary to tighten and/or loosen the joints is obtained with the use of a chain wrench bar or come-along.

In thawed ground it is necessary to use casing in order to keep the hole from caving during drilling. The casing must be made of the highest quality steel obtainable, as it must be driven and pulled many times during a season. It can be made up in five or six foot sections and in any diameter specified, usually 4", 5", 6" or 8". Heavy couplings were previously used to join the pipe sections. The threads were straight, so that the pipe butted up in the center of the coupling. Now, many drillers are using the "flush" joints type of casing sections. Male threads are machined on one end of the casing section and female threads on the other end. The threads are square or box-like in shape.

The drive shoe screws onto the first section of drive pipe going into the ground. This shoe is like a thick coupling with a shoulder against which the drill pipe butts, thus eliminating the stress on the threads. The bottom of the shoe tapers to the inside so that the cutting edge diameter is larger than the casing diameter. The drive shoe's cutting edge diameter for a 4" casing measures 5-1/4", for 6" casing the shoe measures 7-1/2", and for 8" casing a 9-3/4" drive shoe is used.

Another heavy piece called the driving head is screwed onto the upper end of the casing. It also has a shoulder which seals or butts against the top of the casing, thus preventing the threads from absorbing the blow. The drive clamps are two heavy pieces of iron, which when held together with two drive clamp bolts, grip the lower square on the stem above the bit. As the tools work up and down, instead of going to the bottom of the hole as in drilling, the drive clamps strike the driving head on the casing and drive the casing downward. Two special open end wrenches and a 3 lbs. single jack hammer are necessary to put on and take off the drive clamps.

The casing is usually pulled with a top puller. The bit is removed from the stem and a top puller substituted. This consists of a section of stem with a bumper block or hammer on the bottom and a cap or head that screws onto the casing through which the pulling mechanism can slide. The bumper block or hammer strikes the bottom of the pulling head on its upward stroke. Pulling in this manner is the most severe service the drill pipe must undergo,

Yukon Placer Mining, 1978-82, p. 35-42

because all the stress is taken by the threads. Ordinary pipe wrenches of the chain type (pipe tongs) are used to tighten pipe.

Casing can also be pulled with a mechanism that fits inside of the casing near the bottom of the hole. This is called a bottom hole puller. The bit must be removed from the drill stem and a set of jars added to the stem. The bottom hole puller is attached to the lower end of the jars and lowered into the hole. When it reaches the bottom, a quick upward blow with the jars sets the puller jar dogs onto the inside of the casing. Subsequent upward blows create the force necessary to drive the pipe out of the ground. A downward blow releases the pulling dogs so that the puller can be removed. This is a much better way to pull casing but the puller is very expensive and the upkeep is quite costly. It will, however, pull casing when the top puller cannot and it does not put the terrific strain on the casing threads that the top puller does. Some prospectors prefer to use ordinary water well casing cut in lengths 4-5 feet long for shallow ground. This type of casing requires a lot of cutting and welding as no threaded couplings are required.

Several makes and models of churn drills are available. When comparing the drills, one should remember that he usually gets what he pays for. As an example, a drill capable of driving a 4-inch casing produces a sample of less than half the area of a 6-inch casing. Likewise, the drilling capacity of light drills is far less than that of heavy ones, and more time is required to keep cheaply built drills repaired.

The C. Kirk Hillman Airplane Drill is perhaps the lightest drill in operation today. Its weight, less tools and casing, is between 1,600 and 1,800 lbs. It drives a 4 or 5-inch casing. Power is supplied with a 3 HP or a 5 HP Fairbanks Morse Engine. Its practical drilling capacity is about 40 feet, although deeper holes have been drilled.

C. Kirk Hillman also builds a large, heavier drill called the "Prospector". This drill weighs about 4,600 lbs. exclusive of tools. It is designed to handle 6-inch casing and is capable of drilling most placer deposits.

The Keystone Model 70 was one of the first churn drills developed in America. The earlier models were powered with steam engines but now probably all have been converted to either gasoline or diesel. Without tools this drill weighs about 6,600 lbs. It is capable of handling between 1,500 and 2,200 lbs. of tools. The derrick is 34 feet high. The drill is usually mounted on skids or a truck.

Several models of Bucyrus churn drills are made. Two models used in Alaska are the 20 W and the 22 W. The 20 W is the lighter, weighing between 3,000 and 4,000 lbs. without tools. It is capable of drilling to at least 100 feet with 6" casing, and is either truck or skid mounted. The derrick can be ordered as a rigid fixed length or a telescopic mast. The telescopic mast high position is 36 feet and the low is 24 feet. The tool cable is 5/8" and it has a 3/8" sand line cable. The tools weigh between 1,200 and 1,800 lbs. It can be purchased with a 4 cylinder 30 HP gasoline motor or a comparable diesel engine.

The 22 W is a heavier drill, weighing around 9,000 lbs. without tools. The tools weigh between 1,800 and 2,500 lbs. The drill is capable of drilling 6", 8", 12" and 16" holes. The tool cable is 5/8" or 3/4", depending on tool weight and drilling depth. It is powered with either a 6 cylinder gasoline or diesel unit in the 50 HP range. These drills are usually skid mounted but they can also be mounted on trucks or tracks. Skid mounting usually adds another 8,000 lbs. or so to the total weight.

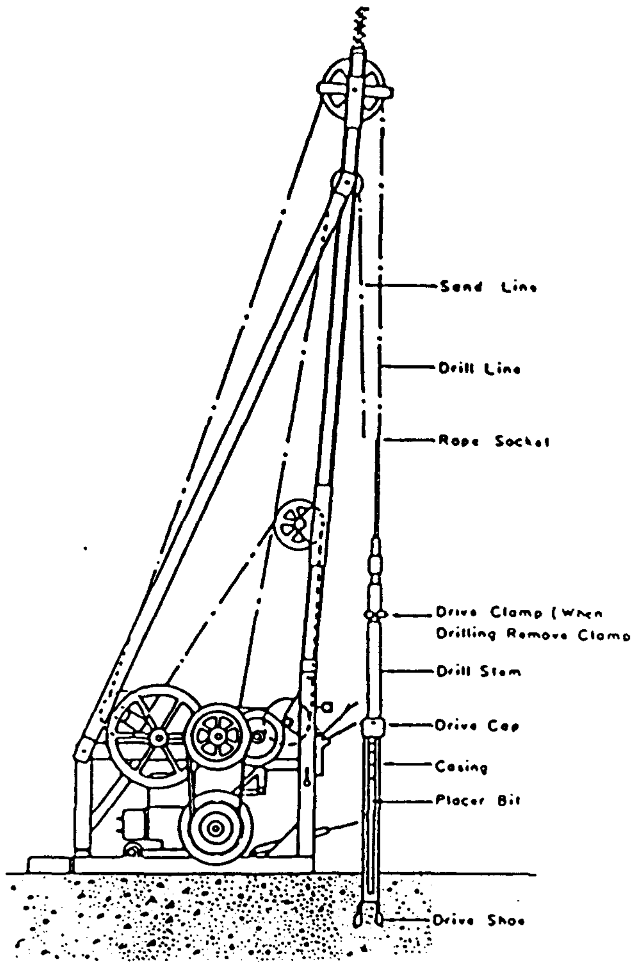


Figure 1: Basic equipment used in churn drilling (after Wells, J.H., 1973).

Churn Drilling Techniques

The overall operation of sampling placer ground with churn drills can be divided into 5 steps. They are driving, drilling, pumping, panning, and pulling. Driving provides a measurement of the core of gravel. The effective diameter of the drive shoe determines the area of gravel cut as the casing is driven into the ground. Drilling breaks or chops up the core with the drill bit and prepares it for removal from the casing. Water must be added during the drilling operation (unless the hole is making water) to make a sludge that can be pumped out of the hole with the bailer or sandpump. When the loaded bailer is hoisted out of the hole it is lowered into a mud box. There the contents of the bailer are washed out and the outside of the pump is cleaned with water. Pumping is repeated until the hole is clean. The mud box discharges the sludge and water into a volume bucket where it is slimed and measured. The cuttings are then usually washed in a rocker and the rocker concentrates are further reduced by panning. The panner estimates the weight of gold recovered from each drive, and enters this information on the drill log for the hole. The driving, drilling and pumping sequence are repeated for each drive (usually a foot at a time) until the hole is completed. The engineer in charge weighs the total gold and calculates the value of the hole, usually in dollars and cents per cubic yard. The drive pipe or casing is then pulled out of the hole and the drill is moved to the next location.

In drilling, all the information required to completely describe a drill hole must be recorded on drill logs. The drill data are recorded in one of several columns, such as time of pumping, depth of pumping or casing before and after pumping, measured loose volume, theoretical volume, no. of colors, estimated weight of gold, character of material information, and remarks. In addition the drill log is dated, with the hole and line number, location, equipment used, driller and panner's name, etc.

Churn drillers should never drill and pump below the casing. A 2-3 inch plug at the end of the casing is sufficient in most cases. This assures the driller of true and representative samples. If he drills and pumps from below the drive shoe, he is pumping from an area larger than his drive shoe, and is contaminating his sample with foreign material. If extra gold gets into the sample because he pumped from below the casing, he is salting his sample. This is a condition every driller must attempt to avoid. Of course, if the drive pipe hits a boulder, then the driller must go below the shoe in order to try and break the rock, so that further drilling can continue.

Erratic drill cores can be a problem. A rock partially blocking the drive shoe may move downward with the pipe and force the material beneath it to one side, resulting in deficient core. Ground with occassional "tight" horizons also gives less core than it should when material packs in the pipe, and causes other material to be pushed aside. The core rise may be normal but subsequent pounding by the drill bit can push the core out of the casing so the pump picks up little or no core. Overpumping in loose ground brings excess material from below the casing. Hydrostatic water tends to push excess material into the casing.

Theoretically, a 1-foot drive with 6-inch casing using a 7-1/2-inch shoe should produce a 20.3-inch rise. In practice, the theoretical amount of core is rarely obtained. Instead, too much or too little for a given drive is obtained. The most important thing is that for a placer drill sample to be meaningful, it must take into account the amount of material "actually" obtained from any particular sample interval. In other words, if a drillhole increment contains too much core its value must be downgraded. If it does not contain enough core its indicated value can be upgraded. Many engineers base their adjusting method on either the ratio between the theoretical and the actual core rise, or the theoretical and the measured volume. The basic formula for the two methods are:

Corrected gold weight

$$= \frac{\text{Theoretical core rise}}{\text{Actual core rise}} \times \text{Estimated Weight}$$

Corrected gold weight

$$= \frac{\text{Theoretical core volume}}{\text{Actual core volume}} \times \text{Estimated Weight}$$

6.0 COST REPORT

Total costs incurred as a result of the drill program are (Canadian) $31,346.81. Table 2 illustrates these expenditures.

7.0 GEOLOGY OF THE PROGRAM TARGET AREA

The drilling program carried out in the fall of 1987 was directed towards the location of a buried pre-glacial gold bearing channel in the South Big Salmon River Valley between Martin Creek and Livingstone Creek. This area had significant merit as an exploration target for the following reasons:

1) Gold bearing pre-glacial gravels have been mined since the Kondike Gold Rush days in Martin Creek, Livingstone Creek and other creeks which are tributaries of the South Big Salmon River.

2) Although the area has been mined since 1899 very little in the way of detailed geological studies and prospecting has been done in the area. The complex glacial history of the area is poorly understood and there is significant potential for discovering placer deposits that are masked by overprinting of glacial features.

3) Favourable host rock geology for hard rock gold deposition.

4) Gold bearing glacial gravels overlie gold bearing pre-glacial gravels in the Martin Creek drainage.

5) A rock reef running parallel to South Big Salmon River in the vicinity of the mouth of Martin Creek trends onto the southern portion of the subject lease. This rock reef may have protected pre-glacial gravels from glacial ice scouring.

6) The area appears to have a similar depositional and glacial history as the Dublin Gulch - Haggart Creek drainages.

The drill program did not locate gold bearing pre-glacial gravels. Surface gravels were, however, found to contain some extremely fine grained flat gold particles in the northern portion of the lease. The southern portion of the lease in the vicinity of the rock reef was not tested. The onslaught of inclement weather precluded an extended drill program.

TABLE 2

SOUTH BIG SALMON RIVER

Salaries	$ 1,600.00
Overhead and Fringes	160.00
Fuel, Lubricants, & Consumables	2,016.79
Camp Materials/Food	1,648.11
Mechanical Repairs/Maintenance	113.26
Aircraft Charters	4,332.80
Contractor (Mgr)	3,162.50
Contractor (Drilling)	13,225.00
Travel	1,108.85
*Legal/Administration	1,349.50
Drill Pipe	700.00
Pipe Preparation	930.00
TOTAL:	* $31,346.81

* Legal Incomplete

The logs of the gravels intersected in drill holes SAL 87-1 and SAL 87-2 indicate that the gravels in the vicinity of the drill are in excess of 75 feet thick. Gold bearing gravels extend from the surface to a depth of 41 feet in the vicinity of hole SAL 87-2. From 41 feet to the bottom of the hole at 75 feet the gravels are washed river gravels with much less sand, silt and clay matrix material than found in the top 41 feet of gravels. There is also a dramatic decrease in the amount of gold in this lower section of gravels.

The area appears to have been affected by two glacial events. The first glacial event called the Ried Glacial period affected the South Big Salmon River to the greatest extent while the most recent glacial period that occurred some 10,000 years ago probably did not invade this area to any great extent.

Before glaciation affected the subject area, normal erosional processes caused the deposition of gold in the main east-west trending drainages such as Martin and Livingstone Creeks. The steep gradient of these creeks allowed the stream waters to gradually winnow finer gold from the gravels and leave the coarser gold behind. The finer gold migrated downstream to the mouth of the creek where the South Big Salmon River picked it up and redistributed along its course. This gold was probably concentrated along the river gravel bars etc. A resistant rock reef that parallels the South Big Salmon River's eastern limit probably acted as a natural gold trap and may formed the original channel way for the South Big Salmon River and Martin Creek. The South Big Salmon river moved to its present position as a result of gradual erosion of a portion of this resistant rock. This may have occurred as a result of ordinary river erosion or the later glacial ice may have removed a portion of this resistant rock allowing the River to "break through" and reposition itself. This action left the area east of the rock reef preserved as a bench like feature.

During the Ried glacial advance, a thick sheet of ice moved northward along the South Big Salmon River Valley causing extensive scouring of the valley bottom and walls. The east-west trending drainages such as Martin Creek and Livingstone Creek were largely protected from the scouring action of the ice but considerable drift and fluvioglacial material was deposited in the valleys and buried the pre-glacial creek gravels. It appears that the main South Big Salmon River Valley was scoured by ice action and that the gold-bearing pre-glacial gravels were removed and distributed throughout the region to the north of the property. It is not known if the gold-bearing pre-glacial gravels located east of the rock reef discussed previously were also scoured out. Some work by placer miners in this area suggest that the gravels are preserved but this is only "heresay" as no <u>properly controlled</u> evaluation of this area has been done.

Along the margins of the advancing ice sheet thick lateral morraines developed. Only small sections of this material is left today, preserved as benches. These morraines dammed off the east-west drainages to a great extent. As fluvioglacial material gradually deposited in these valleys, the valley floors rose and the creek drained into areas offering the least resistance. Although the writer is not certain, it appears that Sylvia Creek (located south of Martin Creek) and Martin Creek were diverted to the north along an incised fault scarp which is part of the Teslin Suture. Livingstone Creek appears to have flowed southwards into this fault scarp at one time. Gold from pre-glacial gravels located in the higher elevation upstream portions of these creeks was deposited in this fault zone area. Gold in the fluvioglacial gravals was derived from sources outside the immediate area. Some of this gold was probably reconcentrated and mixed with near source pre-glacial gold in this fault area. The waters from Martin, Sylvia and Livingstone Creek probably converged at a point nearly midway along the fault zone between Martin and Livingstone Creek. At this point the waters discharged westerly into the South Big Salmon River.

The greater water volume from the combined drainages of Sylvia and Martin Creek possibly filled in this area of creek convergence and caused extensive sediment deposition. This raised the fault zone floor and caused Livingstone Creek to be diverted to its present northerly trending course.

As the glacier retreated, washed gravels were deposited onto the scoured South Big Salmon River Valley floor. At this time the South Big Salmon River was probably a braided stream depositing gravels of considerable volume. As the ice continued to retreat, the volume of water in the South Big Salmon River decreased and the river essentially consisted of one primary channel that meandered across the valley. The gold bearing bench gravels deposited along the above noted fault zone eroded into the South Big Salmon River Valley. The South Big Salmon River redistributed and in some cases reconcentrated this gold bearing material. This material formed a gold bearing "top" gravel over barren glacial outwash gravels. This appears to be the case in the vicinity of drill holes SAL 87-1 and SAL 87-2.

As one traverses long azimuth 250 degrees towards the South Big Salmon River from the two drill sites, several depressions and broad ridges are encountered. The writer believes these features actually outline the old river courses. The depressed areas are the old river bottoms. As the ground rises on each side of the depressions, this indicates the old river banks or gravel bars paralleling the rivers edge.

With the continued retreat of the glacier, Martin Creek and Sylvia Creek broke through the morraine dam and again flowed westerly into the South Big Salmon River. These creeks were essentially left occupying "hanging valleys" after the retreat of the ice. The streams began a period of active down cutting. As the streams cut through gold bearing fluvioglacial gravel deposits, the gold was carried down to the fan area that was slowly rebuiding near the confluence area of the creeks with the South Big Salmon River. As down cutting continued, some of the pre-glacial gold bearing gravels were re-exposed and are subject to mining today.

The composition of the gravels found in the 1987 drill holes have a remarkably consistent background tenor of stone compositions. Most of the stones are dark coloured and are made up of dark greenish lithic tuff, greenstone and grey meta sediments. Outcrops of this material are located some four to five miles and more east of the immediate area and indicate that most of this material was eroded and transported to the area by glacial action. The rock types located adjacent to the drill area and in the Martin Creek area consists of sequences of grey aphanitic quartzite, micaceous quartzite and chloritic schist. It would be expected that pre-glacial gravels would be composed of these rock types. Only very minor amounts of these rock types were found in the gravels encountered in the drill holes.

As discussed previously, the washed river gravels located at the bottom of the 1987 drill holes are overlain by weakly gold bearing clay rich gravels. The compositions of the stones found in both gravels are virtually identical indicating a common glacial source. As is common with fluvioglacial material, clay content in the gravels is relatively high. This material was eroded off bench areas and redeposited on the outwash gravels in the South Big Salmon River Valley. In the outwash gravels, the gravels were derived from the same source as the fluvioglacial gravels except clay material was removed due to a greater meltwater volume and turbidity which kept the clays in suspension.

The pre-glacial erosion and gold deposition and glacial erosion and deposition cycles appear to be very similar to the events that formed and eroded gold deposits in the Dublin Gulch area. In the Dublin Gulch and Haggart Creek drainage, glacial ice moved southerly down the Haggart Creek Valley. This caused scouring of extensive pre-glacial gold bearing gravels from the Haggart Creek Valley. Dublin Gulch, and east-west trending drainage, was dammed off and pre-glacial gold bearing gravel were covered with fluvioglacial clay rich gravels. As the ice retreated, Dublin Gulch commenced active downcutting through the fluvioglacial gravels and pre-glacial gravels. Gold was redeposited in the Haggart Creek Valley in a mixture of the fluvioglacial and pre-glacial gravels derived from Dublin Gulch (see Dublin Gulch Drilling Project - 1987 by Lennan for details).

8.0 DRILL SAMPLE PROCESSING

The drilling program on the South Big Salmon River Placer Lease was carried out using a rebuilt and modified Keystone Churn drill. The drilling methods and drill have been described previously.

Initially the samples were collected from two foot drill intervals, however, the collection buckets could not contain all the coarse material and soupy silt and sands held in suspension in the water so samples were collected from one foot intervals.

The drill sample baler collected the sample from the bottom of the drill hole by employing a suction pump that was activated once the baler struck the gravels. The material was sucked into the baler and then the baler was lifted out of the drill hole. The baler was then set in a tiltable rest attached to the end of a 10 inch wide by 10 feet long steel trough. The trough emptied into a plastic sample bag set inside a five gallon plastic collection bucket. This bucket itself was set inside a 45 gallon steel drum that had been cut in half. This ensured that any overflow from the five gallon collection bucket would be collected in the half drum.

The baler was tipped so that it layed down in the trough. The sample was washed out of the baler and into the trough which then carried the sample to the plastic bag lined five gallon bucket. The baler and trough were washed clean leaving them both uncontaminated for the next sample.

The samples were removed from the dill site and taken to the processing area. The samples were allowed to sit for several hours to allow suspened material settle out of the water. The water was then decanted off into a 6 mesh screen that was set above a plastic collection tub. The screen was checked for gold and other materials of interest. The remaining coarse sands and gravels were emptied into a second collection tub and then screened (using a 6 mesh screen) into the tub containing the previously decanted water. The screen was checked for gold nuggets, colour, gravel type, clay colour and content and any foreign material. This information was entered on a log sheet. Once the material left in the screen was carefully checked over, it was discarded.

The screened sample was then hand fed (using a small scoop) onto a heavy mineral concentrating wheel. This wheel is approximately five feet in diameter and has a reversed spiral of raised and slightly angled ridges resting on the flat base of the wheel. A three inch diameter opening is located at the center of the wheel. A water manifold is set across one half of the wheel and feeds water in controlled flow amounts over the wheel as it turns. The wheel rotates by means of a geared, RPM adjustable electric motor. The wheel can be tilted from a near horizontal position to a near vertical position.

The wheel is tilted to an angle of approximately 45 degrees and the water flow turned on. The motor is started and set to turn the wheel at approximately 30 to 40 RPM. The sample is placed at the bottom of the wheel (the wheel has a 2 1/2 inch wide rim of flanged steel). As the wheel rotates, heavy minerals including gold settle to the bottom of the wheel rim. The heavy minerals are picked up by the reverse spiral ridges and they gradually migrate along the edges of the ridge towards the hub or center of the wheel. A light flow of water from the overhead manifold removes lighter minerals that may migrate to the center of the wheel. This lighter material is washed back down to the bottom edge of the wheel.

The heavy minerals are washed into the opening at the center or hub of the wheel. The heavy minerals are collected in a container placed under the opening. A collection tank surrounds the lower half of the wheel so that water containing sample materials that is carried over the lip of the wheel rim on its lowside is saved. An opening at the bottom of the collection tank directs this overflow into a small long tom sluice box. The wheel is left to rotate for 15 to 20 minutes. The container located under the opening in the center of the wheel is removed so the concentrate collected therein can be panned down. The wheel is tilted to a near horizontal position and the remaining sample material migrates to the opening at the center of the wheel and rops into the long tom sluice box located under the previously described collection tank. The wheel is now clean and ready for the next sample.

The concentrate collected in the container that was placed below the wheel center opening was panned down to remove non-heavy minerals. Drill steel was removed with a magnet. The types and amounts of heavy minerals were noted and recorded in the drill logs. All the gold colours were counted and sizes and shapes were also noted and recorded in the drill logs (Appendix B). This material was placed in tagged and labelled ziploc bags. These samples were then ready for analysis.

The long tom consisted of a four foot long by six inch wide steel trough lined with a three foot long by six inch wide strip of Monsanto CH-4 astro turf. An expanded metal mesh was placed over the astro turf and this acted as small sluice box riffles to trap any gold that was not captured by the concentrating wheel. The long tom was cleaned up periodically and the concentrate panned down so that the quantities and types of heavy minerals could be observed. The numbers of and sizes and shapes of gold colours were also recorded in the logs with the total interval for all the particular samples that were processed. The timing of the clean up was selected by the noting of abrupt changes in gold content as samples were processed on the concentrating wheel. This prevented dilution of gold values in a particular gravel section if several barren samples had been processed on the wheel prior to clean up. This also applied conversely if a barren interval were enriched by a few samples of gold bearing gravels.

Because of the very fine grained nature of the gold found in the South Big Salmon River gravels and the fact that some of the extremely fine grained gold floated on the water in the gold pan, it was uncertain whether amalgamation techniques used for gold extraction in the Dublin Gulch drill samples would be applicable to this area. It was decided to subject two sample concentrates from hole SAL 87-2 to a series of four tests. These tests would determine various physical characteristics of the gold particles (size, shape, etc.) and would ascertain the best technique for extraction of the gold from sample gangue to yield a measureable quantity that could be utilized for grade calculations. These tests were conducted by Bacon and Donaldson and Associates.

The test program consists of:

a) Screen Analysis - Fractions:
   + 100 mesh
   - 100 mesh

b) Cory shape factor analysis on size fraction.
c) Amalgamation of samples on size fraction.
d) Fire Assay on size fraction.

The samples selected for this test are listed below:

Hole Number	Footage
SAL 87-2	13 to 25.5 feet
SAL 87-2	36 to 37 feet

These samples all contained 9 or greater amounts of gold colour of various sizes (as counted during th panning of sample concentrates).

Several other samples were tested once the above tests defined the best method for sample analysis. Results of the tests and correspondence with Bacon and Donaldson are located in Appendix A.

9.0 CONCLUSIONS

In the vicinity of the 1987 drill holes a substantial thickness (up to 40 ft. thick to date) of gold-bearing clay rich gravels of probable fluvioglacial origin overlie relatively barren washed clay deficient glacial outwash gravels. The gold bearing gravels appear to have been deposited in the South Big Salmon River Valley as a result of erosion of gold bearing fluvioglacial bench gravels located east of the valley between Martin Creek and Livingstone Creek. Traverses across the South Big Salmon River Valley from the river edge to the base of the bench deposits indicate that a substantial area of the valley may be underlain by this material eroded off the benches.

For the most part, the South Big Salmon River Valley was scoured during the Ried glacial period. Most of the gold deposited in the fluvioglacial gravels came from sources outside the local drainage area. Only since the retreat of the ice and recent downcutting of tributary streams in the hanging valley has gold derived from local sources been re-eroded and deposited in fans near the mouth of the major tributaries.

There remains a possibility that some gold-bearing pre-glaciaal gravels are preserved in the valley east of the rock reef that parallels the South Big Salmon River near the confluence with Martin Creek.

The extensive glacial fill and morraine cover in the vicinity of the bench deposits may be masking pre-glacial stream channels which contain placer gold.

The potential for developing readily accessible placer gold reserves in surface gravels only is marginal at best. The extremely fine grained, flat and light weight floating gold particles yielded very low grade values that would be uneconomic to recover. The gold is essentially derived from sources outside the immediate surrounding area. Gold values may be upgraded in some of the valleys by recent remobilization of pre-glacial gold in the tributary hanging valleys.

The gold ranges in size from #10 sized nuggets (1 only found in drill hole) to extremely fine grained sizes (-150 mesh). The gold size chart at the beginning of the drill logs contained in Appendix B will give one an idea of gold grain sizes. Some of the extremely fine gold floats on water as observed in the panning of the concentrates. The major heavy mineral is magnetite. It appears to be found in moderate concentration.

Grey clay and brown clay layers in the gold bearing surface gravels may cause some processing problems if conventional sluicing methods were to be employed for gold recovery. The clay layers appear to be relatively thin (6 inches or less) and usually contain sandy and fine gravels throughout. Some of the clay material breaks up. Although the clay layers appear to be thin, they are numerous thus giving an overall clay rich sequence.

Ground water was encountered at the 75 ft. depth level in hole Sal 87-2. The flow rate was substantial and could present problems for sample recovery in future drilling programs. It could also present mining problems.

10.0 STATEMENT OF QUALIFICATIONS

I, William Brian Lennan, of the City of Port Coquitlam, in the Province of British Columbia, do hereby certify:

1) I graduated in Geology (B. Sc. 1973) from the University of British Columbia.

2) I have practised my profession as an Exploration Geologist continuously since graduation and have been employed by such mining companies as Texas Gulf Inc., Cities Service Minerals Corporation, Canada Tungsten Mining Corporation, Queenstake Resources Ltd. and New Global Resources.

3) I am a Fellow of the Geological Association of Canada. I am also a member of the Canadian Institute of Mining and Metallurgy and the Prospectors and Developers Association of Canada.

4) I do not have any interest in the Canada Tungsten controlled and/or optioned claims in the South Big Salmon River area or in the securities of Canada Tungsten Mining Corporation nor do I expect to receive any such interest in the future.

5) I have personally conducted placer sampling programs on the South Big Salmon River placer property and logged and sampled all churn drill samples collected on this property. I have gained knowledge of the placer geology in various areas by working on the placer mining project located on Dublin Gulch from 1983 to 1987 for Canada Tungsten and by conducting various property examinations in the Yukon. This report is an interpretation of the data obtained.

Brian Lennan

W.B. Lennan, B.Sc., FGAC

WBL:v1:0699A
November 13, 1987

APPENDIX A

Bacon and Donaldson

Test Results and Correspondence

November 17, 1987 CT 10.16

Bacon & Donaldson
2036 Columbia Street
Vancouver, B.C.
V5Y 3E1

Attention: Mr. Morris Beattie

Dear Sirs:

John Clarke and I found it useful in meeting with you yesterday to discuss physical and chemical test programs for our drilling program from our Yukon placer properties. The initial indications from the drilling program lead us to believe that these deposits contains fine placer Au and that particle shape and size information is as important as a quantitative analysis.

Based on our discussions the following test program is proposed for the panned reverse circulation drill hole samples:

(A) Screen Analysis - Fractions + 150 mesh
- 150 + 200 mesh
- 200 mesh

(B) Cory shape factor analysis on size fraction.

(C) Amalgamation of samples on size fraction

(D) Fire assay on size fraction

In order to keep the cost of the test program to a minimum a few selected samples will be subjected to the complete set of tests. Once these initial results have been received and reviewed then decisions can be made as to what additional tests are required on the remaining samples.

The samples that have been selected for the initial test program are as follows:

Hole #	Footage	
SAL 87-2	13' - 25.5')	Salmon River Samples
SAL 87-2	36' - 37')	

A list of the additional samples is attached for future reference.

Yours very truly,

CANADA TUNGSTEN MINING CORPORATION LIMITED

J.B. Reid

JBR:vl:0213J
Encl.
cc: J.D. Clarke
W.B. Lennan

Salmon River

Samples	Footage
SAL 87-1	0 - 6 ft
"	6 - 8 ft
"	8 - 10 ft
"	10 - 12 ft
"	12 - 15 ft
"	15 - 17 ft
"	17 - 19 ft
"	19 - 20 ft
"	20 - 22 ft
"	22 - 23 ft
"	23 - 24 ft
"	24 - 25 ft
"	25 - 26 ft

Processed sluice box concentrate collected from panning wheel overflow. Material sluiced is from 10 - 29 ft interval of hole SAL 87-1.

Samples	Footage
SAL 87-2	0 - 2 ft
"	2 - 13 ft
"	13 - 25.5 ft
"	25.5 - 27 ft

Long tom clean up under concentrator wheel for samples from 2 - 27 ft.

Samples	Footage
SAL 87-2	27 - 28 ft
"	28 - 29 ft
"	29 - 30 ft
"	30 - 32 ft
"	32 - 33 ft
"	33 - 34 ft
"	34 - 35 ft
"	35 - 36 ft
"	37 - 38 ft

Long tom clean up over 27 - 39 ft interval

Samples	Footage
SAL 87-2	39 - 40 ft
"	40 - 41 ft

BACON,
DONALDSON
& ASSOCIATES LTD.

2036 COLUMBIA STREET
VANCOUVER, B.C. CANADA V5Y 3C1
TELEPHONE (604) 879-8461
TELEX 04-53437

December 18, 1987

CANADA TUNGSTEN MINING CORP. LTD.
Box 12525 Oceanic Plaza
Suite 1600 - 1066 W. Hastings Street
Vancouver, B.C.
V6E 3X1

Attention: Mr. J. B. Reid

Dear Britt,

Following are results for the analysis of the placer samples which were delivered to our laboratory on your behalf. The following notes should be taken into consideration in evaluating the results:

1. It was initially intended to separate the samples into three fractions finer than 150 mesh. Screening of the samples revealed that there was negligible minus 150 mesh material. The samples were screened into plus and minus 100 mesh fractions therefore.

2. Visible flakes of gold were removed from the samples in order to determine their shape factor. The weight of this gold should be added to the weight of the gold recovered by amalgamation to get the total free gold recovered.

3. The gold content of the amalgamation residue was determined by fire assay.

4. Due to the small size and thin nature of the gold flakes it was not practical to measure their thickness. This dimension was therefore calculated by weighing the flakes using their calculated volume based on a particle s.g. of 14 together with the cross-sectional area.

Table 1

	Sample I.D.	Fraction	Total wt. g	Au used for shape factor mg	Amalg. Raw Au mg	Residue Au oz/ton
1.	SAL 87-2	+100	52	.146	1.581	.138
	13-25	-100	6.68	.131	3.051	.406
2.	SAL 87-2	+100	24.5		0.604	.062
	36-37	-100	1.2		0.302	.181

Table 2

Flake		Wt (mg)	a (mm)	b (mm)	c (mm)	Shape Factor
1	1	0.049	0.468	0.298	0.032	0.086
	2	0.023	0.381	0.290	0.019	0.057
	3	0.027	0.310	0.222	0.036	0.136
	4	0.019	0.238	0.222	0.033	0.142
	5	0.028	0.413	0.179	0.035	0.127
1B	1	0.047	0.409	0.194	0.054	0.191
	2	0.018	0.500	0.254	0.013	0.036
	3	0.016	0.329	0.230	0.019	0.070
	4	0.029	0.437	0.222	0.027	0.087
	5	0.021	0.409	0.159	0.029	0.116

(a) Samples 1 through 8 are the +100 mesh fractions while 1B through 8B are the -100 mesh fractions

(b) shape factor - c/ ab

Two additional samples from the Salmon River, consisting of composites of a series of individual samples, were amalgamated. The results are presented in Table 3.

Table 3

Sample	Total Weight g	Raw Gold mg
SAL 87-2 0'-2'		
2'-13'		
25.5'-27'	135.9	6.055
SAL 87-2 27-28		
28-29		
30-32'		
32-33		
33-34		
35-36		
37-38		
long tom C.U.	207.3	14.038

Yours truly,

BACON DONALDSON & ASSOCIATES LTD.

F. Beattie

Dr. M. J. V. Beattie, P.Eng.
MJVB:jrh

Salmon River Project 1987

Sample Grade Estimation

Drill Hole	Interval (ft)	Au Weight (mg)	Au Weight (Toz.)	* Theoretical Sample Volume (yd^3)	Grade (Toz./yd^3)
SAL 87-2	0 - 2				
	2 - 13				
(Long Tom)	2 - 27	6.055			
	13 - 25	4.909			
	27 ft	10.964 mg	0.00035 Toz.	0.196 yd^3	0.0018 Toz./yd^3
	27 - 29				
	28 - 29				
	30 - 32				
	32 - 33				
	34 - 35				
	35 - 36				
	37 - 38				
(Long Tom)	27 - 39	14.038			
	36 - 37	0.906			
	12 ft	14.944 mg	0.00048 Toz.	0.087 yd^3	0.0055 Toz./yd^3

Weighted Average Grade **39 ft @ 0.003 Toz./yd^3**

* 6 in. crowd in casing shoe

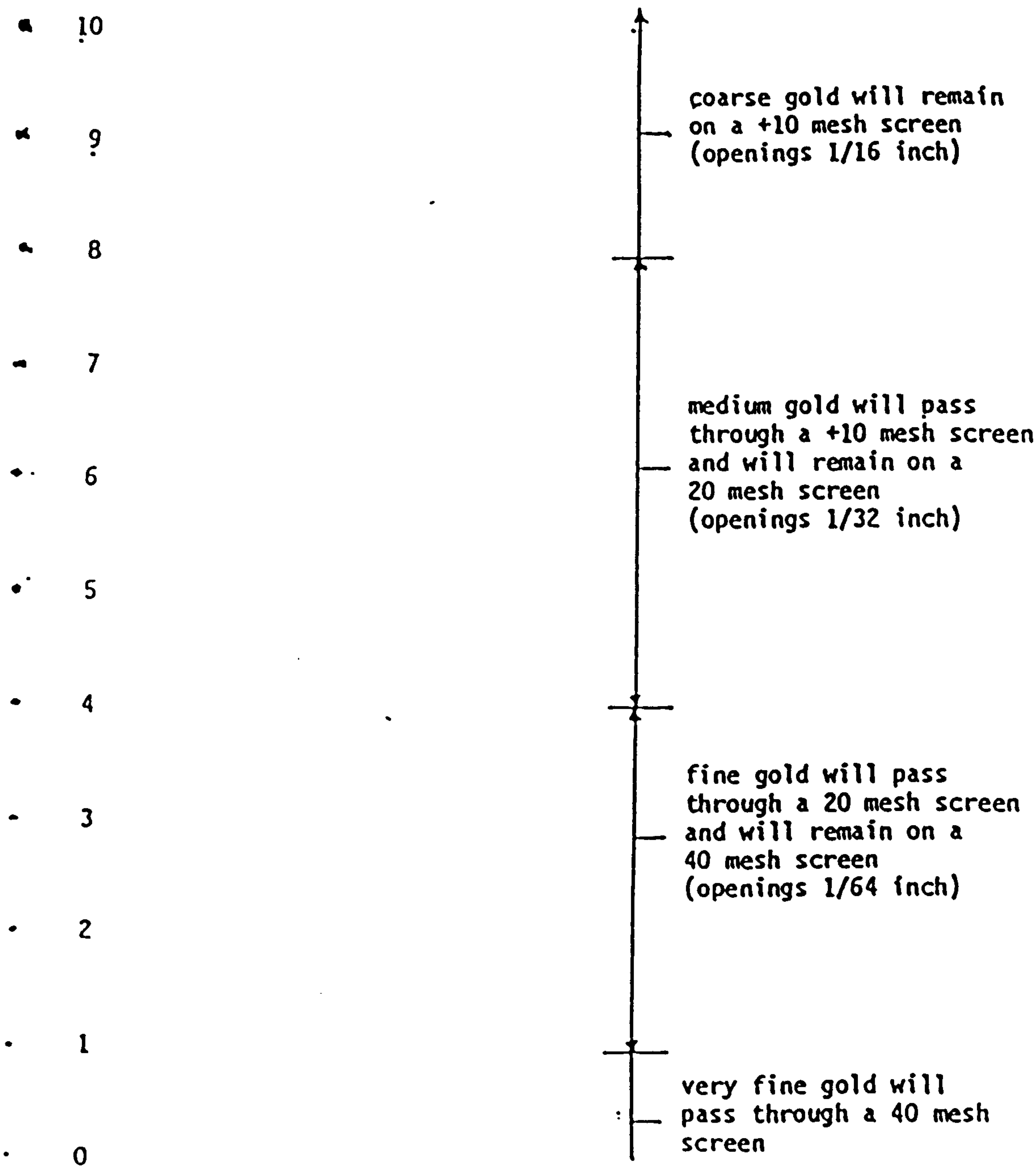
0744A

APPENDIX B

Gold Size Chart and South Big Salmon River Project

1987 Drill Logs

GOLD ESTIMATION CHART



SALMON RIVER CHURN DRILLING PROJECT

October - November 1987

Drill Logs

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-1 0 - 6 ft.	60 lbs.		+ 20 extremely fine colours. Moderate black sand.	Very soupy sample, Brown cobble gravels. 90% of stones are dark green to black coloured. Stones are metavolcanics and ultramafics. Abundant epidote. Great variety of rock types.
SAL 87-1 6 - 8 ft.	70 lbs		Approx. 20 very fine colours and approx. 30 extremely fine colours. Abundant black sand.	"
SAL 87-1 8 - 10 ft.	65 lbs		6 very fine colours 6 extremely fine colours. Abundant black sand	"
SAL 87-1 10 - 12 ft.	82 lbs		15 very fine colours. Abundant black sand.	Same type of rock chips as above. 80% dark to light green chips. Sandy and silty matrix. Colour of soupy mud silt brown.
SAL 87-1 12 - 15 ft.	75 lbs		10 very fine colors 15 + extremely fine colours. Abundant black sand.	Same rock chips as above. Much more brown clay. Not much gravel in sample. Clay is sticky and forms balls in cuttings.
SAL 87-1 15 - 17 ft.	77 lbs		1 - #1 colours. 5 very fine colours. Approx. 25 extremely fine colours.	Same great variety of rock types in gravels. Approx. 80% of rock chips are dark green to medium green meta volcanics and some ultra mafics. 25% of sample is gravel material and 75% is a muddy slurry of silt and sand. Abundant brown sticky clay balls.

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-1 17 - 19 ft.	79 lbs		14 very fine colours. Abundant black sand.	Same as 15-17 ft.
SAL 87-1 19 - 20 ft.	67 lbs		25 extremely fine colours. Abundant black sand.	Same as 15-17 ft. very silty and clay rich section.
SAL 87-1 20 - 22 ft.	72 lbs		8 extremely fine colours. Mod. black sand	* Clay rich section is still present. Gravel chips still of a great variety but dark gray to black fine grained volcanics account for 50% of chips. Colour of muddy material changes to a grey brown colour.
SAL 87-1 22 - 23 ft.	77 lbs		8 extremely fine colours. Minor black sand. Abundant fine pyrite.	Same as 20-22 ft. Harder section in hole. Boulder? Hole starts to deflect.
SAL 87-1 23 - 24 ft.	62 lbs		7-10? extremely fine colours. Minor black sand Abundant fine pyrite.	"
SAL 87-1 24 - 25 ft.	49 lbs		6 extremely fine colours. Minor black sand and abundant pyrite.	"
SAL 87-1 25 - 26 ft.	62 lbs		8 extremely fine colours. Minor black sand and abundant pyrite.	"

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-1 26 - 28 ft.	74 lbs		No visible gold. Minor black sand and abundant pyrite.	Clay balls much smaller averaging 3 mm across. Gravel still highly variable in composition. Dark gray to black rock chips decrease (40%). Greenish chips 40%. Pink to red quartz chips 20%.
SAL 87-1 28 - 29 ft.	62 lbs		1 extremely fine colour.	* Colour changes to brown from grey brown.

Hole abandoned - bit stuck in hole due to bend in casing.

Processed sluice box concentrate collected from panning wheel overflow. Material sluiced is from 10 to 29 feet interval of hole SAL 87-1. Approximately 175 colours in pan. Weak black sand and moderate pyrite.

E.O.H.

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-2 0 - 2 ft.	15 lbs		60 extremely fine colours. Minor heavy minerals.	Reddish brown surface cobble gravels. Gravels 50%, sand 25% silt 25%. Gravel contains stones of highly variable composition.
SAL 87-2 2 - 13 ft.	230 lbs		1 - #1 colour 15 very fine colours. 88 extremely fine colours. Minor black sand and moderate pyrite.	Brown soupy wet sample. Gravel stones are of a great variety of composition. Primarily dark green to medium green grey meta-volcanics and/or basic to ultrabasic stones. Light brown pink qtz and qtzite chips. Approx. 20% of sample. Abundant brown clay lumps. Sand and gravel grains stuck in clay. Gravel 50%, clay 25%, silt and sand 25%.
SAL 87-2 13 - 25.5 ft	281 lbs		11 - #1 colours 40 - very fine colours 257 - extremely fine colours. Minor black sand and mod. pyrite.	" Washed gravels still grey to greenish coloured. Most boulders are meta-volocanics grey cherts and ultrabasics. Intersected a harder penetrating section from 16 ft. to 13 ft. Gravel 50%, silt and sand 30%, clay 20%. Drill cuttings coarser with rock chips to 1.5 cm. dia. Abundant clay balls (brown). Approx. 25% of sample collected was gravel, rest was silt and sand in suspension.
SAL 87-2 25.5-27 ft (1 ft. extra due to swell)	140 lbs		110 extremely fine colours. Abundant pyrite, moderate black sand.	As above but clay content starts to decrease. Green meta-volcanics with angular clasts of purple aphanitic rocks. (Tuff? or agglomerate?) Good gravel & recovery. Gravels 60%, sand & silt 30%, clay 10%. Increase in pinkish coloured rock chips.

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description

Hole SAL 87-2 cont'd

Long tom clean up under concentrator wheel for samples from 2 to 27 ft.

1 - #3 colour
4 - #1 colours
20 - very fine colours
93 - extremely fine colours
Moderate black sand & pyrite

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-2 27 - 28 ft	79 lbs		4 extremely fine colours. Moderate black sand and pyrite.	Same gravels as from 25.5 ft. 27 ft. Slight increase in brown clay.
SAL 87-2 28 - 29 ft	75 lbs		45 extremely fine colours. Moderate black sand and pyrite.	Gravel stone composition and and colours remains the same as previously described. Brown clay gravels increase significantly. Sandy particals contained in clay. Gravel 45%, silt & sand 25%, clay 30%.
SAL 87-2 29 - 30 ft	57 lbs		63 extremely fine colours. Moderate black sand and pyrite.	"
SAL 87-2 30 - 32 ft	55 lbs		8 very fine colours 21 extremely fine colours	Appears to change to a sandier section (possibly just more pulverized). Sand grains appear to have some greenish meta-volcanics composition as coarser gravel material. Some white quartz chips and pinkish coloured grains.
SAL 87-2 32 - 33 ft	35 lbs		3 - #1 colours 10 very fine colours 25 extremely fine colours. Moderate black sand and pyrite.	"
SAL 87-2 33 - 34 ft	56 lbs		2 very fine colours 14 extremely fine colours	* Same gravels as above. Clay balls change to a dark grey brown clay with sand incorporated in matrix.

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-2 34 - 35 ft	52 lbs		6 extremely fine colours. Minor black sand & pyrite.	Same as 33 to 34 feet.
SAL 87-2 35 - 36 ft	50 lbs 1'3"(swell)		73 extremely fine colours. Moderate heavy minerals.	*Gravel composition changes colour of muddy water to grey brown. Some grey brown gravel clay. Gravels contain more grey to black aphanitic meta volcanic? rocks. Less greenish coloured rock chips. Quartz and feldspar chips 10%. Gravel 50%, sand & silt 40%, clay 10%.
SAL 87-2 36 - 37 ft	67 lbs 1'3"(swell)		1 - #1 colour 10 extremely fine colours. Moderate black sand and pyrite.	" quartz chips decrease to 5%. Grey clay still present 10%
SAL 87-2 37 - 38 ft	75 lbs 1'3"(swell)		18 extremely fine colours. Moderate black sand and pyrite.	" Grey clay content increase to 15-20%. Abundant clay balls.
SAL 87-2 38 - 39 ft	65 lbs		4 extremely fine colours. Moderate heavy minerals	Same as 37 to 38 feet. Appears to be layers of clay in sands and gravels.

Long tom clean up over 27 to 39 feet interval

1 - #10 colour (nugget)
3 - #3 colours
5 - #1 colours
20 - very fine colours
110 - extremely fine colours

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-2 39 - 40 ft	52 lbs		8 extremely fine colours. Moderate black sand and pyrite.	*Gravels as above. Clay (grey brown) increases to approx.25% Still high percentage of sand and gravel material mixed in clay. Breaks up fairly well. More greenish meta-volcanic and less grey to black aphanitic stones.

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-2 40-41 ft	60 lbs		10 extremely fine colours. Minor heavy minerals	Same as from 39 to 40 feet. Clay still strong. 15% white to pinkish quartz stone fragments.
SAL 87-2 41-42 ft	32 lbs		2 very fine colours Minor heavy minerals.	Same grey brown clay gravels continue. Clay increase to 35%. Gravels 40% silt and sand 25%.
SAL 87-2 42-43	43 lbs		3 extremely fine colours. Moderate black sand and pyrite.	" Clay diminishes dramatically to approx. 10%. The clay is grey coloured and contains sand and gravel sized grains.
SAL 87-2 43-44 ft	36 lbs		No visible gold Minor heavy minerals.	* Sample is mostly water Grey brown very sandy layer. Clay content remains low (below 10%). Gravel are grey to greenish meta-volcanics.
SAL 87-2 44-45 ft	63 lbs		No visible gold Moderate black sand and pyrite.	As above - sample mostly water. Sandy layer continues and grey clay still approx. 10%. Gravels are grey to greenish meta-volcanics. 2% white quartz chips.
SAL 87-2 45-46 ft	54 lbs		2 extremely fine colours. Moderate black sand and pyrite.	* Slightly brown colour. Clay increases to 20-25%. Small clay seam. Dark green meta-volcanics gravels continue.
SAL 87-2 46-47 ft	46 lbs		1 - #1 colour 5 extremely fine colours	Brown soupy sample. very sandy gravels. Gravel 35%, sand 40%, silt 15%, brown clay 10%. More greenish and yellow rock chips.
SAL 87-2 47-48 ft	42 lbs		3 extemely fine colours. Moderate heavy minerals.	Same as 46-47 ft. Very little material in sample. Sand 70% silt 30%.

Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-2 48-49 ft	38 lbs		No visible gold. Minor black sand and pyrite.	Still very little material in sample. Mainly sand and silt sized particles.
SAL 87-2 49-50 ft	58 lbs		"	"
SAL 87-2 50-51 ft	62 lbs		"	" Brown clay increases to 15-20% 1 to 2 cm lumps.
SAL 87-2 51-52 ft	53 lbs		"	" Clay drops off again to 5%.
SAL 87-2 52-53 ft	67 lbs		3 extremely fine colours. Moderate black sand and pyrite.	Brown clay gravels as above. Clay increases again to 20%. Abundant brown clay balls. Gravels are grey to greenish meta-volcanics. Quartz and qtzite chips increase to 10%.
SAL 87-2 53-54 ft	59 lbs		1 extremely fine colour.	* Lighter brown to slightly reddish brown gravels. Gravels drop off to 35%. Very sandy layer. Brownish stones and brown quartz chips - 40% of gravels. Clay is less than 5%.
SAL 87-2 54-55 ft	69 lbs		2 extremely fine colours	Coarse washed gravels in sample. Abundant rock chips to 2 cm diameter. Still brownish to slight red brown colour. More quartz fragments and brownish multi composition stones.
SAL 87-2 55-56 ft	63 lbs		3 extremely fine colours.	Same as 54-55 ft. Very sandy layer. Coarse gravel material disappears. No clay.
SAL 87-2 56-57 ft	45 lbs		2 extremely fine colours. Moderate heavy minerals.	Sandy washed brown gravels. Highly variable stone compositions in gravels. Qtz and qtzite chips 20%. Gravels 30%, sand and silt 70%. Rounded stones.

Sample No. & Interval	Weight	Theoretical Volume	# of Colours	Description
Hole SAL 87-2 57-58 ft	72 lbs		No visible gold Moderate heavy minerals.	Same as 56-57 ft. plus some clay (brown) 10%. Gravel 60%, sand and silt 30%.
SAL 87-2 58-59 ft	62 lbs		2 - # 1 colours. Minor black sand and pyrite.	" Coarse brown gravels as above. Great variety of stones. The greenish meta-volcanics rock chips are most common.
SAL 87-2 59-60 ft	52 lbs		No visible gold. Minor black sand pyrite.	* Changes to grey brown gravels. Rock chips are almost all the same composition. Drilled a boulder? Black quartzitic? schist chips. No clay. Other gravels are greenish meta-volcanics.
SAL 87-2 60-61 ft	72 lbs		1 - #1 colour Moderate black sand and minor pyrite.	* Changes back to a dark brown sandy gravels. Great variety of stones. Minor clay.
SAL 87-2 61-62 ft	78 lbs		No visible gold Minor heavy minerals.	" Gravels are a little coarse here. Stones up to 2.5cm dia. of green and purple meta-volcanics and lighter green qtzitic chips are the main gravel components.
SAL 87-2 62-63 ft	62 lbs		"	" Increase in quartz chips to 25% of gravels.
SAL 87-2 63-64 ft	60 lbs		"	"
SAL 87-2 64-65 ft	78 lbs		"	" Decrease in quartz chips. Colour of water is reddish brown. Less coarse rock chips.
SAL 87-2 65-66 ft	62 lbs		"	"

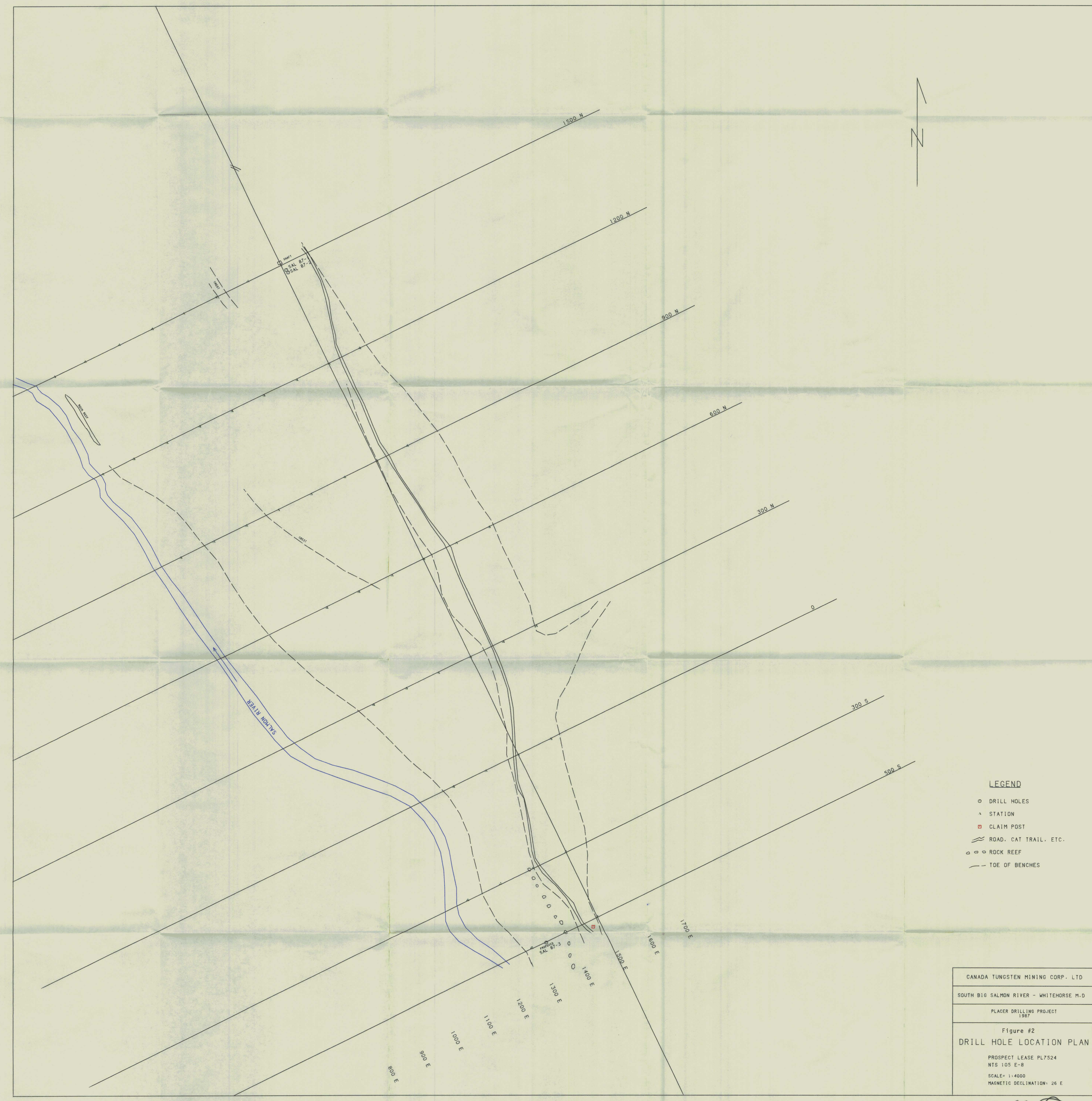
Sample No. & Interval Hole	Weight	Theoretical Volume	# of Colours	Description
SAL 87-2 66-67 ft	62 lbs		1 extremely fine colour. Moderate black sand.	* Brown cobble gravels. Grey to light greenish coloured gravels due to abundant qtzite chips. Greenish meta-volcanic rock chips. Gravel 60%, silt and sand 40%.
SAL 87-2 67-68 ft	66 lbs		3 extremely fine colours. Moderate heavy minerals.	" Abundant brownish rock chips and light green grey qtzite chips.
SAL 87-2 68-69 ft	72 lbs		No visible gold. Minor heavy minerals.	Same as 67-68 ft. interval.
SAL 87-2 69-70 ft	52 lbs		"	"
SAL 87-2 70-71 ft	76 lbs		"	" With increase in sand content and decrease in gravel content by 15%.
SAL 87-2 71-72 ft	68 lbs		"	* Clay increase to 35%. Gravel 35%, silt and sand 30%. Gravel shows limonite staining.
SAL 87-2 72-73 ft	65 lbs		1 extremely fine colour. Abundant black sand.	Reddish brown very silty and sandy gravels. Gravels contain a wide variety of stones ranging from granitic rocks to green meta-volcanic rocks.
SAL 87-2 73-74 ft	50 lbs		No visible gold. Moderate black sand. Minor pyrite.	* Less reddish brown, very silty. Silt 25%, gravel 25% and sand 50%. Gravel is made up of 85% granitic rock chips and quartz.
SAL 87-2 74-75 ft	50 lbs		"	No gravels in sample. Brown soupy sand and silt. Hole making water and casing cannot be driven further. Sand flooding in.

E.O.H.

BL:v1:0665A
November 10, 1987

** PLOT OF SALMON RIVER PLACER PROJECT - DRILL HOLES AT 1:4000 **

120097



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