

REGULATION OF PLACER (GOLD) MINING

Paper presented
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GENERAL GEOLOGY OF BRITISH COLUMBIA PLACER FIELDS

The important placer fields of the province lie along a broad zone stretching north-westerly from the international boundary line up to Atlin and extending into the Yukon Territory.

Physiographically, the placer fields are situated in the central belt of the Cordilleras of Canada. This central belt is comprised of the Columbia, Interior, Cassiar and Yukon systems. Generally speaking, the placer fields of British Columbia occur in plateau areas where alpine mountains are absent. As a rule the topographic relief is not great, although in places the deep valleys of the Fraser Plateau give an appearance of true mountain topography.

Placers in British Columbia may be broadly divided into the following classes:

Original Tertiary Gravels: Only remnants and fragments of these are left and in following a Tertiary channel it may be cut off abruptly; this sudden termination is due to erosion by glaciation. They occur on bedrock and are usually buried beneath glacial gravels. This is the "lead" gold of the old-times.

Inter-Glacial Gravel Deposits: In many instances these gravels are found on a previously deposited glacial clay, but may occur on bed-rock. These are derived by interglacial stream-action concentrating glacial gravels robbed from original Tertiary channels.

Post-Glacial Gravel Deposits: The Pleistocene or Glacial Epoch scattered enormous masses of gravels across the country and particularly in the main stream-channels. In the zones of original Tertiary Placer deposits these glacial gravels contained more or less gold, but almost always, the original Placer-gravels were so diluted with extraneous material that the final depositions of glacial gravels were of no economic value as Placer deposits. In this connection it should be remembered that ice erosion did not concentrate. In places these glacial gravels have been concentrated by post-Pleistocene stream-action, but as a rule these deposits are low grade, with the exception of bar deposits, which sometimes have rich shallow ground.

Variations of these three types occur, but in a broad general way this classification includes all Placer deposits in the Province. In some cases ancient channels have been left stranded through diversion of the waters by glaciation, covered by Glacial gravels, and later these ancient channels were robbed by recent stream-action giving rise to rich Placers in the present streams. This occurred by Keithley Creek and in part on Lightning Creek.

Masses of Tertiary gravels with a rich gold content have apparently, in place, been plucked out by Glaciation and deposited almost intact away from the original source and entirely surrounded by glacial gravels. This was suggested as the explanation of the rich patch at Cedar Creek.

PLACER DEPOSITS

Placers are deposits of sand, gravel or other alluvial material which contain particles of valuable minerals in workable quantities. In addition to the occurrence of gold in Placers, other valuable minerals such as platinum, cassiterite (tin ore), silver, copper, rubies and diamonds may also be found.

Deposits may be either residual placers or transported alluvial placers. In both types the source of the gold was originally in lode or vein deposits in the solid rock, the gold being eventually freed from its enclosing rock by the action of the elements (changes in temperature, frost, rain, wind, and chemical actions) gradually decomposing and partially removing some of the rock by mechanical means or in solution.

In the case of residual Placer deposits, the gold and much of the decomposed vein-rock is left in approximately its original location. If the formation of a Placer stopped at this point, as it sometimes does, there would be little concentration of the gold. The richest portion of the deposit would already be at the surface, and the values would get progressively leaner as you go deeper.

Alluvial placer, also derived by the weathering of lode and vein deposits of gold, result from the removal of the decomposed gold-bearing rock by natural agencies, principally running water, and the further crushing and breaking of the rock during the period of travel, by the action of solution and abrasion. This is in turn followed by the sorting action of the moving water which carries away the lighter and finer material and permits the deposition of the heavier materials, including the gold and black sands, at places in

the stream where the velocity of the moving water is reduced. The largest and heaviest pieces will obviously be deposited first, or nearest their origin in the lode or vein, while the lighter and finer material will frequently be carried long distances. Due to the different amounts of water which will flow in any stream during the course of many seasons, the gold, black sands, and rock material deposited in the stream-bed will be re-sorted and worked over many times until finally the gold, black sand, and other heavy particles of metal work down through the gravel and become concentrated at or near bed-rock of the creek bottom. After the gold reaches bed-rock, or on a clay or hard-pan false bed-rock, it may move slowly down-stream until it lodges in crevices, cracks, or other irregular openings.

There is no fixed rule as to where gold is apt to occur in the stream-bed, as the velocity of the stream is not the same at all points and the gold is naturally dropped by the water to the stream bottom when the velocity of the water is not sufficient to carry it along. At the time of formation of transported Placer deposits, water was necessarily present, but later disturbances and geological changes in the climate may have caused the stream to flow in a different location or to dry up, thus leaving the Placer deposit high up on the bank of a stream or in a dry location.

Streams are often found to have a bed of clay or hard-pan on or above the true bed-rock. This layer of clay is known as a false bed-rock and it may have a marked effect on gold distribution.

The following are some of the terms used to describe the commonly encountered types of transported placer:

Creek Placers: These are gravel deposits found in the beds and intermediate flood-plains of small streams. They are generally shallow and have been the most productive of high-grade Placer gold; the gold generally being concentrated on or just above bed-rock. If the bed-rock is badly broken or decomposed, the gold will be found in the cracks and crevices, and it will be found necessary to dig down into the bed-rock to make a good recovery of the gold values.

Gulch Placers: This type of placer is similar to the Creek Placer, except that the stream is usually intermittent in its flow or has been dried up altogether.

River-Bar Placer: When bars of gold-bearing sand or gravel have been formed along sides and in the centre of the larger streams and rivers, they are known as river-bar Placers. The gold is often distributed throughout the bar and is generally fine compared to the coarser gold found in the creek Placers. Bar Placers are generally low grade, but occasionally very rich bars are found.

Bench Placers: Gravel deposits of gold bearing material in old (ancient) stream channels and flood plains which stand 50 to several hundred feet above the present stream or river level are called bench Placers and represent the remnants of stream beds which existed in the earlier stages of the stream development.

Lake Bed Placers: Placers formed of present or ancient lakes formed as landslides or glacial dams across the gold-concentrating stream.

Sea Beach Placers: Placers reconcentrated from the sea-coast gravels by the action of the waves along the sea shore.

REGULATIONS ON PLACER (GOLD) MINING

The Mining (Placer) Act and Regulations govern the acquisition of placer minerals in British Columbia. Except for hand panning, one must, in order to acquire placer minerals, become a free miner by obtaining a free miners certificate, stake a location, and apply for and be issued a Placer Lease.

The staking for placer minerals can only be done in areas of the province that have been designated as placer land by the Lieutenant-Governor in Council.

The Mining (Placer) Act permits a free miner to be issued only two placer leases in a calendar year. The free miner may, however, stake any number of locations as agent for other free-miners. A Placer Lease's maximum size is 1000 metres long by 500 metres wide (twice as long as a mineral claim).

PERMITTING

Once the placer miner has obtained his Placer Lease, either as the legal owner or as the operator through a written agreement with the owner, he must now obtain approval to work the lease. The approvals the operator will require are:

Ministry of Energy, Mines and Petroleum Resources

- approval of the work system and reclamation program.

Ministry of the Environment

A. Water Management

- Water approval - for operations larger than hand work - building any structures within high water mark (i.e. diversions, bridges, dams and culverts).

B. Waste Management Branch

- Pollution Permit for any discharge from a Placer operation may be required. -Pollution Permit for refuse disposal from camp waste may be required.

Ministry of Forests - Forestry Cutting Permits

- Free-Use Permit (up to 1 hectare disturbance)
- Licence-To-Cut (over 1 hectare disturbance).

Federal Fisheries & Oceans

- Federal Fisheries approval of intake water structures.

No work can be started on a Placer Lease prior to the securing of all approvals, or an operator may be subject to charges.

Ministry of Energy, Mines and Petroleum Resources

A Notice of Work on a Placer Lease must be submitted to the District Mines Office prior to commencement. The Notice requires a brief mining plan to be completed.

Listed below are some of the details required:

1. For Hand Operation: This is an operation which utilizes only hand equipment and a small pump (max. 1 1/2"). The operator must:
 - complete the first page of Notice, including the accurate and detailed mining plan and location map.

2. For Operations with Mechanical Equipment: These operations which plan to use mechanical equipment to either test and/or operate on the lease, the operator must:
- (a) Submit a Notice giving full details of the proposed system of work including:
 - (i) Type of equipment,
 - (ii) Duration of work,
 - (iii) Method of treatment of wash water and number and size of settling ponds.
 - (iv) Estimate of area of land surface to be disturbed,
 - (v) Proposed method of reclamation work,
 - (vi) The mining plan and location map should show:
 - Mine water source
 - Pumps
 - Diversion canals
 - Pipelines
 - Settling ponds (size, location, type)
 - Areas proposed to be stripped for mining.
 - Process plant (i.e. sluice box, screening plant, etc.)
 - Drains
 - Tailings disposal areas
 - Overburden disposal areas
 - Exact location of working area of lease, and on a location map the location of nearest community
 - Scale: Operations up to 200 m³/day =1:5000
 - Operations over 200 m³/day =1:1250
 - (b) All operations with mechanical equipment must post a reclamation bond prior to commencement of work.
 - (c) The Notice should be sent to the District Office.
 - (i) Hand operation - 7 days prior to commencement of work,
 - (ii) Mechanical operation-45 days prior to commencement of work.

Although it is to the operator's advantage to submit applications as soon as possible to the following agencies for approval, permits will not be issued by them until the mine plan has been approved and the reclamation bond has been paid.

Water Approval - Water Management Branch

1. Water approval is mandatory for any operation larger than a hand operation. The approval allows for the use of water for a maximum of six months.
2. Cost for water use is \$100.00 for each cubic foot per second or fraction thereof.
3. Permanent structures (i.e. dams, bridges, culverts) on a water course and creek diversions require separate authorization from the Water Management Branch.
4. The Water Approval Application should be fully completed clearly stating the amount of water required. The sketch should show the location of works on the lease including location and size of settling ponds.
5. The Water Approval Application is referred to Fish and Wildlife, Waste Management and Federal Fisheries for comments.

Forestry Approvals - Ministry of Forests

1. Free-Use Permit
 - (a) First time application for a Free-Use Permit can expect to take up to 30 days for processing.
 - (b) A Free-Use Permit allows for clearing of:
 - 0.4 hectares (1 acre) =mineralized area.
 - 0.4 hectares (1 acre) =campsite.
 - 0.2 hectares (0.5 acre) =drill site.
 - 0.4 hectares (1 acre) =portal site (underground)
 - 1.6 km for access road and 4.8 km for trails.
2. Licence-To-Cut
 - (a) If disturbance to the Placer Lease exceeds the limits of a Free-Use Permit, an application for a Licence-To-Cut must be applied for.
 - (b) The Licence-To-Cut Application may take up to 6 months to process.
 - (c) A detailed mining plan (1:1250) must be submitted with the Licence-To-Cut Application.

- (d) To facilitate the above process, where possible, a joint inspection between owner/operator, Ministry of Energy, Mines and Petroleum Resources, Ministry of Forests and other concerned agencies is made to review the requested area and help eliminate any problems prior to commencement of work.

NOTE: If an operator plans apply for a Licence-To-Cut, the application should be submitted in the fall of the previous year to eliminate delays for the following season.

Fish and Wildlife Branch

Identification of colour coding is required. Guidelines for placer operations are keyed to these colour codes. The guidelines are available from the Ministry of Energy, Mines and Petroleum Resources or the Regional Fish and Wildlife offices. These guidelines are related to the importance of the stream to fish. The streams and lakes are coded as follows:

1. Red (R) -Streams and Lakes containing spawning areas, highly utilized and sensitive areas.
2. Yellow (Y) -Streams or lakes containing rearing areas, resident population, migration routes or discharge into waters containing these values.
3. Green (G) -Streams or lakes with low fish values.

Federal Fisheries and Oceans

The Department of Fisheries and Oceans is responsible for the management and protection of all species of salmon and their "habitat". The "Fisheries Act" defines habitat as, "spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life process". The Schedule B clauses (i.e. Red, Yellow, and Green codes) of the Placer Lease are designed to provide adequate protection of the Fisheries Resource.

Stream side vegetation stabilizes banks and provides shade, food and a filter-strip. As a rule of thumb, a ten (10) metre undisturbed green strip is required along the stream bank if water quality is to be maintained.

High water back-channels provide extremely valuable rearing, migration and protection areas for small fish. They must not be disturbed, or blocked off, or used as Settling Ponds.

Section 28 of the Fisheries Act states that all water intakes must have proper screening to prevent the passage of fish from any Fisheries waters into such water intake. The fish guard or screen must be built and maintained by the owner to the approval of the Ministry or of such officer as the Minister may appoint to examine.

1. The specification for intake structures are;

- (a) Screen Material - shall be either aluminum, stainless steel, brass or bronze.
- (b) Screen Mesh Size - clear openings of the screen shall not exceed 3 mm (0.10 inch). The open screen area shall not be less than 50% of total screen area.
- (c) Screen Area - a minimum unobstructed screen area of ten (10) square feet shall be provided for each cubic foot per second (375 imperial gallons per minute).
- (d) Screen Protection - the intake structure shall, where necessary, be equipped with a trash rack or similar device to prevent damage to the screen from floating debris.
- (e) Screen Accessibility - the screen shall be readily accessible for cleaning and inspection.
- (f) Design and Location - the design and location of the intake structure shall be such that a uniform flow distribution is maintained through the total screen area.
- (g) All diversions and/or pump capacity greater than 1 cubic foot per second - (exceeding 3/5 imperial gallons per minute) shall submit to the Manager, Habitat Management Division, Department of Fisheries and Oceans, 1090 West Pender Street, Vancouver, B.C. V6E 2P1, detailed plans of the proposed installation for review and approval. The plans shall contain the following information:
 - (i) Intake structure, location and dimensions.
 - (ii) Maximum capacity of diversions.
 - (iii) Screen dimensions and material.
 - (iv) Mesh size.
 - (v) Fabrication details.
 - (vi) Minimum water level at the intake site.

In most cases, early consultation between the miner and the Government officials responsible for Fish Habitat Management will make it possible to devise a plan that meets the needs of all concerned.

Waste Management Branch

The requirements of the Waste Management Branch concerning the discharge of effluents are as follows:

1. Red Colour-Coded Streams and Lakes - all wash water shall be re-circulated in a closed system so that there will be no discharge of sediment-contaminated water into any water course.
2. Yellow and Green Colour-Coded Streams and Lakes - sediment-contaminated water caused by any operation shall be contained and/or treated prior to discharge into any water course as per Fish and Wildlife Guidelines.