YUKON-GUYANESE
PLACER MINE TOUR

July 31st to August 7, 1999

By

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EXECUTIVE SUMMARY

A one-week field trip by Guyanese miners and officials from GGMC and Guyana EPA was sponsored and hosted by the Canada/Guyana GENCAPD project. The group left Guyana on Friday, July 30 and returned Monday, August 9.

Participants included:
From GGMC, James Mingo and Ronald Glasgow, Aleisha Narain from the EPA, Charles DeFreitas and Patrick Harding representing Guyana Gold and Diamond Miners Association and Jean-Marc Barbera the GENCAPD field manager. Randy Clarkson, a consultant from the Yukon was the host for the week.

During the week, the group toured eight different placer mines. The objectives of the trip were to learn about gold recovery circuits in Canadian placer mines, observe environmental protection at Canadian placer mines and determine if there were any Canadian mining or environmental protection technologies that were readily adaptable to Guyanese mines.

The group also held discussions with various government agencies in the Yukon. Participants were welcomed to the Yukon by acting government leader of the Yukon Territory, Dave Sloan. Discussions with various government officials centred on regulations, regulatory development, territory development and Indigenous rights. A large amount of information was exchanged between the two groups.

Radio journalists met the group and conducted interviews with Aleisha Narain and Charles DeFreitas.

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JULY 31ST

- The Guyanese group arrived in Whitehorse Airport, rented an AWD (all-wheel drive) van, and was met by Glen Mills who assisted with the purchase of rubber boots and warm fleece sweaters.

- The group drove to Dawson City, arrived late that evening and met Randy Clarkson at the Triple J Hotel.

• AUGUST 1ST - SIXTY MILE PLACER DISTRICT

- Located about 100 km northwest of Dawson City, on the Top-of-the World Highway, near the Alaska/Yukon border.

- **K-I MINING,** on Glacier Creek, a tributary of the Sixty Mile River (tributary to the Yukon River)

- Owned by Mike and Kim McDougall, Mr. McDougall is the President of the Klondike Placer Miners Association.

- Description: A small family run placer mine using a basic triple-run sluicebox and a D8H Caterpillar Bulldozer, a Hitachi excavator, and a 6 by 8 inch recirculating water supply pump. Mike has about 2 to 3 employees.

- Mike was mining on Glacier Creek in an area that had been sporadically mined several times previously over the last century.

- We first observed his sluicebox concentrate clean-up system that used hydraulic jigs and a small sluicebox to clean the gold without the use of mercury.

- Then we moved up to his pit and examined the geology and discussed the merits of his auger drilling in advance of mining to assist him in mine planning and reclamation planning. Mike was doing poorly until he started explorations in advance of his mining and described mining without drilling as "mining blind".

- Then we examined his tailings disposal and recycled process water system. Mike's sluicebox water was totally recycled with minor amounts of water added from the creek to make up for losses due to evaporation and percolation through the soils.

- We examined the layout and design of his series of settling ponds leading to his recycling pond and the pump and pipeline which returned water to his sluicebox

- We discussed his use of aluminum irrigation pipe for water pipe instead of the PVC pipe that is used in Guyana.

- Mike discussed his process discharge limit (2.0 ml/l of settleable solids) and how he measured it using an Imhoff Cone. Mike was responsible for measuring his effluent once a week and recording the results.

- We discussed his reclamation plan and how he intended to refill pits and round stockpiles to aid in natural revegetation.

- When he was asked what he thought about the environmental regulation implementation Mike indicated that it should be done over a long period of time (in cooperation with the different stakeholder groups involved) and one mine at a time.

- He was also reluctant to incur high restoration costs (such as artificial seeding and fertilization) and preferred natural revegetation as well as site-specific, intelligent, and practical solutions.

JAYCEE MERTAGH - Miller Creek near outlet to the Sixty Mile River

- A small family based placer mine with a custom-built but sophisticated hydraulic powered oscillating feeder, vibrating screen deck, stacking conveyor and New Zealand style hydraulic riffles.

- His heavy equipment included a front-end loader, D9H bulldozer and a Hitachi excavator.

- He was stripping black muck (frozen organic/ice layer) and surface overburden gravels from his pit.

- He did not have good drill information and indicated that he should have located that pit further towards the left limit of the valley.

- We did not see his settling ponds because they were located further down the valley.

AUGUST 2 - DAWSON MINING DISTRICT - DOMINION CREEK AREA

Located about 100 km south-east of Dawson City

GIMLEX GOLD MINES, Jim and Dagmar Christie - located on Lower Dominion Creek, a tributary to the Indian River (tributary to the Yukon River)

- This was a family owned large placer mine with large-scale heavy equipment and four to six employees.

- This placer mine required 50 feet of stripping of black muck and gravels resulting in an open pit with great depth and large size (as placer mines go).

- We examined how he filled his previous pits with waste from his existing pits and back filled topsoil to cap pits.

- He was sluicing with total recycle, closed circuit water use - we examined the layout of his pump and settling ponds with particular attention to the construction of a dike in the center of the tailings pond to increase settling efficiency.

- He had a "Z" design sluice box with state-of-the-art Canadian feeding, screening and sluicing technology.

- We examined the conveyors, screen deck and sluices in detail.

- His mining methods employed two small bulldozers, one very large Komatsu 475 dozer, two front loaders, two excavators and miscellaneous equipment, heavy equipment required for deep stripping depth and for large plant throughput.

- We examined a large auger drill mounted on a Nodwell all terrain low-ground pressure vehicle for access to drilling site without roads or damage to the environment and discussed its application, specifically mobility, in Guyana.

- We discussed the application of auger drilling to Guyana in regards to soil types and the occurrence of water.

- He stated that trees are planted in drilled pits that are abandoned.

- We examined the sluicebox concentrate (gold cleaning) system, which utilized a screen and small sluices in combination with a large homemade rotary gold wheel for gold cleaning without the use of mercury.

GYPPO MINING - George Abermeth - located on Rob Roy Creek, a tributary of Dominion Creek

- George was one of the three Yukon miners who accompanied Randy Clarkson on the tour of the Guyanese placer mines two years ago and so was familiar with Guyana's mining conditions.

- This was a very small placer mine (by Yukon standards) with small heavy equipment and about three employees.

- George was stripping black muck/ice permafrost with a hydraulic monitor and small (D8H) bulldozer.

- The other heavy equipment included a small hydraulic excavator used to feed the sluicing plant.

- He had constructed a series of settling ponds to settle the black muck and allow total recirculation of his water for hydraulic monitoring.

- We examined the design and layout of settling and recycle ponds with emphasis on central dike to improve settling efficiency and filter out organics prior to pumping.

- We discussed how all water for hydraulic monitoring in Canada must be settled and the application of recycling water for hydraulic monitoring in Guyana.

- We examined a simple but efficient screening and sluicing plant constructed of an old used screen and sluices which were not fancy but worked well.

- Dinner with Abbermath

ROSS MINING Limited, Norman Ross, located on lower Dominion Creek (tributary to the Indian River) next to Gimlex Mining.

- This is a very large placer mine with similar stripping requirements to Gimlex (50 feet of black muck and overburden.

- However, this operation used bulldozers to strip, and excavators to feed a fleet of off-highway trucks.

- Some of the trucks were hauling gold bearing gravels to a stockpile near the sluice plant while others were hauling waste to refill and contour old pits.

- We examined reclaimed mining areas that had been covered with fine soils and scarified (scratched with equipment) to aid in natural revegetation.

- One area was over one year old and thickly covered in natural grasses and willows (brush trees).

- The other area was reclaimed only this spring and we were able to see how scarifying enhanced the revegetation. These indents were already sprouting and growing natural grasses.

- The refilling and scarifying of areas mined out was not required by law (at this time) but was being done by the miner anyway.

- We examined the series of settling ponds and total recycling system for process water including the large water pump and pipeline system.

- We examined the state-of-the-art feeding, screening, and sluicing system that was all mounted on wheeled carrier.

- The sluiceboxes were hung from cables and oscillated to help prevent packing.

- The screen deck used reinforced rubber screens on top and polyurethane screens on the second deck.

- We examined the camp and the mobile homes provided for the workers and their families. In the Yukon, families generally accompany the miners, unlike in Guyana and most mines are family operated.

- August 3rd - Dawson Mining District

VICEROY MINERALS LTD - located about 50-km north-east of Dawson City

- This is a large heap leach gold operation owned by Viceroy Minerals, a publicly traded company.

- The mining was conducted from several hillside pits excavated by drilling, blasting and hauling the ore to a crusher and then stacking on the heap.

- There were several pieces of heavy equipment including blast-hole drills, excavators, bulldozers and off-highway trucks.

- We examined the mining operations and pits.

- We examined the dumping of overburden soils in abandoned pits to aid in reclamation and the spreading of commercial seed and fertilizer to artificially induce re-vegetation.

- The commercial seed used was not endemic to northern climates, unfortunately the mine is relatively new and it was not certain if the plants will regenerate.

- The heap leaching pad was in the process of enlargement and we were able to examine the ground preparation, the welding of impervious plastic liners, and the initial placement of sand, crushed ore and drip tubes on the heaps.

- Some discussion was held regarding measures to allow winter operations such as heating the dilute cyanide (CN-) solution with excess (waste) heat from the generators and from the waste oil burning facility.

- We examined the piping and ditches sealed with plastic and clay where the pipes from the beach pad were laid in.

- We examined the netting above the pregnant solution ponds (to keep birds out) and the construction of the ponds containing cyanide.

- We toured the mill where the pregnant solution was treated with carbon for absorption, stripping of the carbon and electrowinning.

- We examined the measures in place to prevent and treat accidental ingestion of cyanide (antidotes, personal showers, eye showers).

- We examined the analytical laboratories and their equipment for measuring cyanide as well as the fire assaying facilities for gold analysis.

- There was much discussion regarding the placement of wells and the sampling of the well water to check for cyanide migration and/or leaks under the leach pad.

- We questioned and examined the project's environmental screening and its decommissioning plan including the reclaiming of the mine pits, rinsing of the heap and final abandonment procedures.

Bear Creek/Dawson City Museum

- We examined the old Yukon Consolidated Gold Company head operations including its gold cleaning and refining operations where mercury was used and retorted from 1910 to 1965.

- We examined historic mining equipment and the extensive civil works (ditches, siphons, pipelines, hydroelectric facilities) etc. to conduct bucket-line dredging operations from 1910 to 1965.

- We examined the extent of mining disturbance due to older methods of hydraulicking and bucket line dredging.

AUGUST 4TH

- On August 4th, the group split up with Charles, Patrick and Ronald accompanying Stuart Schmidt in his aircraft to Stuart's mines on Eureka Creek (tributary to the Indian River), (a tributary of the Yukon River) and on Thistle Creek (a tributary of the Stewart River). The remainder of the group including Aliesha, Jean- Marc, James and Randy drove back up over the Top-of -the-World highway to the Fortymile mining district.

FORTYMILE PLACERS - Bill Claxton and Leslie Chapman - located about 150 km northwest of Dawson City on the Fortymile River.

- The Fortymile River is a historic mining area, which was discovered and mined years before gold was discovered near Dawson. It was the Fortymile miners who had staked all of the creek claims prior to the arrival of outsiders during the gold rush of 1898.

- This is a small family run operation with no employees, husband/wife/and son team using the New Zealand floater method to mine river bar deposits and low bench deposits near (and in) the Fortymile River.

- The heavy equipment included a small Hitachi hydraulic excavator which dug the initial hole required for the mining method and was used to feed the sluicing plant and a small (D6) bulldozer used to do a small amount of stripping.

- The processing plant was floating on steel pontoons and consisted of a small feed hopper, trommel screen and twin sluice runs fitted with New Zealand style hydraulic and Canadian expanded metal riffles, small conveyor carried screen oversize rocks and piled them behind the plant.

- The gold on the Fortymile River was extremely fine and flattened and was similar to much of the gold mined in Guyana.

- The mining method involved digging a hole in a sand bar, pushing berms up around the perimeter of the sand bar to prevent flooding and/or process water escaping to the river - floating the pontoons - sliding the skid mounted plant onto the pontoons.

- Once the plant was floating in the initial hole, the excavator dug in front of the plant and fed gravels to its feed hopper.

- The process water was obtained with a submersible electric pump located in the same hole as the floating plant.

- The mining progressed up the river bar and the old mining area was infilled in the process of mining.

- A small bulldozer was used to smooth the tailings piles behind the plant and to recontour to the original ground profile (the miners had to survey the ground profile and ensure it was returned to the original profile after mining).

- This method allowed the river bars to be mined with very little impact on the aquatic or terrestrial environment, no release of process water.

- The river bars were mined when the river was low (late July to September or October).

- In early summer low benches on the river were mined by the same process, except that more overburden had to be stripped, and the water had to be pumped from the river to keep the mining hole full of water.

- We examined river bars and benches that had been mined and restored to a near natural condition.

- There was a great deal of discussion regarding the applicability of this mining method to Guyana's rivers and near shore areas.

SCHMIDT MINING - EUREKA CREEK OPERATION - Stuart and Nancy Schmidt - Located about 150 km southeast of Dawson City (2 hours by rough road).

- This was a medium scale (by Yukon standards) bulldozer and triple-run sluicebox operation with about 6 to 8 employees and a hired manager.

- Large bulldozers (D10N) were used to strip the permafrost black muck to a depth of 7 feet from above the pay gravels and mine the 7 feet thick pay gravels.

- The same bulldozers ripped and pushed pay gravels up an earth ramp to an elevated triple run sluicebox.

- The same bulldozers pushed tailings away from the end of the sluicebox.

- A large volume of process water was pumped to the sluicebox and a large monitor was used to wash pay gravels from the top of the sluicebox and through the box.

- The tailings effluent water was ditched to a series of settling ponds prior to discharge into Eureka Creek.

- The sluicebox concentrates were upgraded by screening and the use of a Diester Shaking Table, no mercury was used but the gold was relatively coarse.

- Mining methods, mine costs, current Yukon water and land regulations as well as the applicability of Missile gravel pumping systems to Dawson City mines were discussed in detail.

SCHMIDT MINING - THISTLE CREEK OPERATION - Located about 200 km southeast of Dawson City (air and river access only, no road access).

- This was a medium scale (by Yukon standards) bulldozer and triple-run sluicebox operation with about 4 to 6 employees and a hired manager.

- Large bulldozers (D10N) were used to strip the permafrost black muck to a depth of 5 to 15 feet from above the pay gravels.

- The same bulldozers ripped and pushed pay gravels up an earth ramp to a triple run sluicebox and was also used to push tailings away from the end of the sluicebox.

- A large volume of process water was pumped to the sluicebox and a person used a large monitor to wash pay gravels from the top of the sluicebox and through the box.

- The tailings effluent water was ditched to a series of settling ponds prior to discharge into Thistle Creek.

- Problems with evaluation of placer gravels with very coarse gold were discussed. Drilling was not effective here due to coarse gold.

AUGUST 5TH

- The group returned to Whitehorse from Dawson with stops enroute at the five finger rapids and Braeburn (Cinnamon Strip) lodge for supper.

AUGUST 6TH - SERIES OF MEETINGS IN WHITEHORSE

- **9:00-9:30** - Official welcome by Dave Sloan, acting government leader of the Yukon Territory.

Discussions focused on:

- (1) First Nation (Amerindian) rights, land claim settlements (grandfathering of existing mining claims and private land).

- (2) Involvement by First Nations in mining developments.

- (3) The development of the Development Assessment Process (for screening new projects), section 14 of the Umbrella Final Agreement obliges government that socio-economic agreements be struck to maximize benefits to First Nations.

- The Yukon government pays a local band person to assist in developing an agreement with a developer to include training and maximum use of local resources.

- Miners were concerned with the Land Claims process but were pleased when they were concluded due to the greater certainty which prevails.

- **9:30- 11:30** - Department of Indian and Northern Affairs Canada (DIAND) - meeting with Terry Sewell (regional director DIAND) and Dave Latoski (Chief Mining Inspector)

- Dave is head of a group of inspectors who are in charge of inspecting placer and hard-rock mines under the Yukon Placer Act, Yukon Quartz Act (Mining Tenure and Land Use and Reclamation), Yukon Waters Act (Water rights, stream diversions, and effluent discharges), the Fisheries Act (Alteration of habitat, release of effluents).

- Dave likened his department to the "old colonial government" (of Ottawa) and that devolution would put control of mining inspection in the hands of the Yukon government soon?

- Dave discussed staking and mineral tenure in the Yukon in detail.

- Dave discussed that his inspectors practice the three "E's" – Education, Encouragement and lastly Enforcement - his inspectors are both technicians and police. Training of inspectors and inspection schedules were also discussed.

- The Yukon has 312 water licenses issued to placer miners and 161 operating placer mines.

- His inspectors enforce the Yukon Placer Mining Act, the Yukon Quartz Mining Act, Yukon Waters Act, Federal Fisheries Act, Territorial dredging regulations and the Territorial Coal regulations.

- **11:30 to 12:30** YUKON TERRITORY WATER BOARD - Judy Doering and others

- The Waterboard is an independent board nominated by government which sit as private citizens and are appointed by the Minister.

- The board is mandated by the Yukon Water Act.

- The board is a quasi-judicial board whose decisions are final – can only be overturned if the proponent can prove that the board acted improperly, beyond their scope or did not observe natural justice.

- The Board meets once a month, members are paid an honorarium only, have a staff and can hire technical advisors. The board operates with rules of procedural fairness - and all information is public, there are no private meetings.

- The Board awards two types of licenses, type A and type B: Type B are routine licenses without significant environmental impact; if there is any intervention (i.e. significant environmental impact) the application is considered a type A.

- Almost all applications result in licenses but conditions of licenses cover environmental and other concerns of stakeholders.

- Any non-issuance of a license is generally due to unmitigable impact on previous water license.

- Bonding and/or security is not generally required for placer mines but is always required for hard rock mines.

- Applications for licenses are passed out to First Nations, municipalities, government agencies and any interested persons for comments.

- Stakeholders can request more information and/or intervene for, or against the application.

- The board encourages discussion between the applicants and intervenors.

- The typical time for placer mining water license approval is three months (provided there are no interventions), typical period of issue for placer mining is 3 years.

- **12:30- 2:00 -** Lunch with David Latoski

- Further discussions regarding his inspectors and the training they require.

- Dave noted his interest in coming to Guyana to assist in the GENCAPD project.

- The idea of bringing Guyanese inspectors to Canada for training was discussed.

- **2:00 to 3:30** - Jesse Duke Mine Facilitator, Don Toews (Chief of Fisheries), Government of Yukon

- Jesse Duke promotes mining to encourage investment in the Yukon, has a portfolio of grants/incentives and geology programs to encourage mining exploration and investment.

- Jesse provides technical and non-technical information due to public concerns, hosts workshops and provides information for the media.

- The Guyanese were impressed with the concept of a mining facilitator and the initiatives the Yukon undertakes to promote mining exploration and investment.

- Don Toews talked briefly about regulation of the placer industry.

- He noted that it took 10-15 years to develop regulations for placer mining (fishing regulations).

- However, interim standards were adopted and implemented during period of research.
- The mining industry contributed to research.
- Don emphasized that research needs to be done which is independent and objective to justify regulatory standards.
- Stakeholders need to decide what answers need to be addressed and agree on studies to address their concerns.
- Don indicated that government cannot establish arbitrary standards or they will loose credibility.
- Don indicated that the placer industry needs to be involved, educated and given time to adapt to regulations.
- With regard to interim standards, Don indicated they must be justifiable and based on science.
- Don indicated the need to get opposing groups (stakeholders) to meet and talk and come up with compromise solutions to mining regulation.
- There is a need to develop a working relationship with other stakeholders even if you do not agree with them.
- In the Yukon's case there was a joint requirement by environmental groups and the mining industry for enforcement.
- He emphasized the need to build in a requirement for review of regulatory standards, to make sure that you are reviewing a common objective (such as water quality).
- The discharge standard is the tool to achieve the objective.
- Comparisons between the Yukon's water quality objectives (protection of Salmonids) versus those in Guyana (mainly drinking water and protection of bio-diversity) were made.
- Guyanese indicated that the regulations should be flexible with people as the first priority.

- **3:30 to 4:30** - George MacKenzie-Grieves (Environmental Protection Agency) and Al Kapty (Chair of Yukon Placer Committee)
- George reviewed the mandate of the EPA and its relationship with the Fisheries Act and the Canadian Environmental Protection Act.

- The Department of Environment Act has powers and functions over which Parliament has jurisdiction by law but is not assigned to other departments such as the monitoring of trans-boundary streams, renewable resources, water, meteorology and coordination and enhancement of quality of the natural environment.

- Al Kapty introduced the multi-stakeholder Yukon Placer Committee and described its membership - Klondike Placer Miners Association, Yukon Conservation Society, Yukon Council of First Nations, Government of Yukon, DIAND, and the federal Department of Fisheries and Oceans (DFO).

- Al emphasized the need for developing a working relationship, the need for compromise and consensus building among stakeholders.

- The Yukon Placer Authorization and its guiding principles were introduced.

- Emphasis that both mining and fisheries were important to the Yukon and that both needed to be protected and enhanced since they could both operate without the destruction of the other.

- **7:00 to 11:00** - Steve Morison's home in rural Whitehorse.

- Steve Morison is a consultant environmental geologist and a close friend of Randy Clarkson.

- There was lots of general discussion of placer mining and regulation in the Yukon and Guyana.

AUGUST 7TH

- Unfortunately the trip to Atlin was canceled due to the shut down of most of the mines for the annual summer miner's barbecue.

- Crepe Breakfast at the Clarkson's in rural Whitehorse

- Journey south-east 130 km to Fraser British Columbia (near the border with Alaska) to review revegetation of an eight year old hydro right-of-way with northern grown indigenous commercial seeds and fertilization.

- Pre-vegetation in coastal and in alpine environments were compared.

- The impacts of scarification and artificial seeding at hydro right-of -way versus natural revegetation at placer mines near Dawson and artificial seeding with non-indigenous species at Viceroy Resources near Dawson were noted.

- Inspection of 250 kW hydro power generation facilities at Fraser and discussion on potential for transfer of small scale hydro technology to rural Guyana with emphasis on remote mining areas and on Amerindian communities.

GENERAL CONCLUSIONS OF THE GROUP

Yukon Environment and Soils

- Yukon placer mines are seasonal with as little as 100 days available for sluicing whereas Guyanese can mine year-round.

- Most placer gravels in the Yukon have a much higher percentage of coarse gravels and cobbles, and have much less sand and clay than in Guyana. This will have an impact on the application of settling ponds, process water recirculation systems and on gravel pumping.

- The Yukon has more mountainous terrain with different soils with permafrost. The presence of permafrost requires that miners plan further in advance to allow time for permafrost to thaw. Yukon miners need to plan 2 to 3 years in advance of mining.

- The permafrost lowers and/or removes the water table in the Yukon, while in Guyana the water table is much higher. This would create challenges in the application of Yukon style auger drilling and may increase pit dewatering costs in Guyana. However, Guyana's clay soils are much less permeable than the gravel soils of the Yukon.

- The common mica schist bedrock in Yukon is much less abrasive than bedrock types found in Guyana, this would create less wear on machinery.

- Yukon forests are more homogeneous (less bio-diversity), much smaller, and easier to remove. Mining ground is generally easier to strip than in Guyana.

- Wildlife diversity in Yukon is limited, eg. There are no reptiles.

- The Yukon does not have tropical diseases such as malaria.

- Infrastructure and roads are present and in good condition, mines are easily accessible.

Gold

- In general, Yukon placer mines mine higher gold grades than in Guyana.

- Most gold in the Yukon (except the Fortymile Area and White Channel deposits) is coarser and rounder than gold recovered in Guyana, therefore Yukon recovery methods and concentrate upgrading methods would need to be adapted for conditions in Guyana.

- Unlike Guyana, Yukon mines do not use mercury, but instead use small screens, sluices, jigs and shaking tables for up-grading concentrates.

- Many Yukon miners still use ounces per square bedrock feet for assessing the value of placer ground (a practice which came from the dredging era) instead of grams per cubic metre or ounces per cubic yard.

- Yukon miners use metal instead of wood sluices.

Placer Mining Regulations

- The Yukon placer mining industry has strict environmental regulations, as it relates to maintenance of aquatic quality. Yukon miners can divert some types of streams (no or limited fish streams) for mining but must create an alternative stream with conditions similar to original.

- A water license is the key regulatory license for placer miners in the Yukon and is granted by an independent non-governmental board. Yukon uses a one window approach.

- Financial bonding is not generally used for Yukon placer mines. It is required only if miner has demonstrated non-compliance with regulations.

- The Yukon Placer Committee is a multi-stakeholder group that meets regularly to discuss regulations for various streams and effluent discharge standards.

- The Yukon placer staking and mineral tenure is well organized.

- Yukon mines inspectors are well paid and well respected because of their training and enforcement practices. Yukon inspectors are not considered by miners to be corrupt.

- Yukon mine inspectors must inspect each placer mine at least once a year but normally inspect more often than once a year, once during operation, and then to observe restoration.

- There is a greater emphasis on worker safety in the Yukon.

- Guyana needs to gradually phase in mine regulations over a period of time.

- Guyana needs to foster cooperation between the miners, inspectors, government agencies and stakeholder groups to develop regulations and guidelines.

- It may be beneficial to send GGMC inspectors to the Yukon to observe Yukon inspectors and for additional training.

- Guyanese miners need advice for practical solutions, assistance, guidance and inspection.

Mine Planning and Exploration

- Due to the requirement for thawing permafrost in advance of mining, Yukon miners are forced to plan (up to 2 to 3 years) in advance of mining.

- Most Yukon miners use auger drilling and bulk sampling to outline their future mining areas and to plan their stripping and mining areas.

- A lack of drilling and/or planning can result in the isolation of otherwise economic pay gravels.

- In Guyana there is a need for more mine planning and exploration (drilling) in advance of mining. However, different soil and groundwater conditions and limited access to machinery may dictate different solutions.

- Guyanese miners may need advice on mine planning prior to mining.

- Placer exploration should be done by miners (and GGMC?) prior to mining.

Settling and Recycling of Process Water

- All Yukon placer mines must use settling ponds to remove sediment from their sluicebox effluent prior to discharge.

- Many Yukon placer mines are able to completely recycle their process water for sluicing and for hydraulic stripping (K-1, Ross, Gilmex, Gyppo), this is sometimes due to a scarcity of water.

- Most Yukon placer mines use their old mining pits for settling ponds and waste soil disposal.

- Yukon miners have heavy equipment available to build settling and recycle ponds and ditches, Guyanese often do not have access to this machinery.

- Yukon placer miners tend to use aluminum pipe instead of PVC for process water pipe.

- Guyana mines may need larger settling ponds due to fine soils and clays common to Guyana.

- It would be difficult to construct settling ponds in Guyana without machinery.

- Guyana may have to rely on site specific solutions to settling ponds including filling of old pits and utilizing natural depressions.

- Guyana miners should be required to use mined out areas as settling ponds.

- A study should be undertaken in using demonstration projects with a miner who can afford a settling pond and the necessary heavy equipment.

- Guyanese may need more time and more preparation to construct ponds.

Revegetation

- Yukon placer mining land use regulations require that the mined/stripped areas are left in a state which encourages natural revegetation.

- This includes filling pits, contouring piles, reducing slopes to stable angles, spreading of fines over mined areas and scarifying areas to promote natural reclamation.

- Some mines (such as Ross Mining) were doing land reclamation years in advance of legal requirements.

- Artificial seeding and fertilization at Viceroy Minerals is more expensive and may not be as good in the long term although planting with indigenous seeds (at Fraser) promotes more rapid regrowth.

- Guyana must find the best practical achievable solution to guarantee restoration of mined lands.

- Research should be done to determine an acceptable state of topography that promotes natural re-vegetation in Guyana.

River and River Bank Mining

- Dredging of rivers and major streams is not permitted in the Yukon, however minor streams with no or limited fish habitat can be diverted provided that alternative streams are created.

- The banks and exposed bars of Yukon rivers can be mined with "New Zealand" style floating sluices and excavators (similar to Fortymile Placers), there is no discharge of sediment or effluent into the river with this method.

- Missile large-scale suction dredges mine Guyanese Rivers.

- Guyanese miners are however not allowed to mine the river banks within 66 feet of the river edge.

- The Fortymile "New Zealand" mining method may be adaptable to allow mining of Guyanese River bars and banks with little or no discharge of effluent, depending on soils and mining conditions.

Mining and Costs

- Yukon mines are larger, more capital intensive, use heavy equipment and generally produce more gold per mine per year than in Guyana.

- A large capital investment is required for Yukon placer mines whereas Guyana placer mines are smaller and less capital intensive.

- Canadian taxes are high, the taxation system is complex, however there are incentives for placer exploration which sometimes include stripping as an exploration expense.

- Labour costs are higher in the Yukon, but miners use their family members and more heavy equipment to reduce labour costs.

- The Yukon has a well-organized mining infrastructure set up including to get machinery parts and repairs.

- In general, fuel costs are lower in the Yukon, delivery by road and/or barge is also often cheaper, fuel price at mine site can be 50% of typical Guyana placer mine.

- Yukon mines use much larger quantities of diesel fuel; (e.g. Schmidt is burning 11 gal/hr in his D10 N bulldozer).

- Guyanese Missile pumps have much lower fuel and operating cost requirements than any heavy equipment.

- Most Yukon placer mines have better road access than Guyanese mines (however there are also air and river access mines with no road access).

- Government maintain roads in Yukon.

Social Differences

- There are almost no hand scale miners in Yukon versus thousands of pork-knockers in Guyana.

- A small mine in the Yukon is large by Guyanese standards.

- Most Yukon miners have their families living and working with them through the summer whereas most Guyanese miners are men working far away from their families.

- Yukon miners are very versatile and well trained.

- Most Yukon placer mines are far away from residential areas, and therefore have much less impact on humans (such as effluent problems for downstream miners no for drinking water).

- Yukoners have friendly and efficient service sector for the mining industry.

- There are few problems with illegal entry of miners unlike Guyana.

Other

GYPPO MINING
- Good illustration of hydraulic mining with settling ponds and total recirculation of water.

FORTY MILE PLACERS RIVER DREDGING
- Good demonstration of mining along a river with good reclamation, illustrated how to set up the mining method and move the heavy equipment, no discharge of water or solids into the river - may have applications for mining river bars and banks in Guyana depending on soil conditions and/or the ability to remove clay overburden prior to mining.

SCHMIDT MINING - EUREKA CREEK
- Miners were impressed with simplicity and high throughput of Schmidt's bulldozer mining system, however triple-run sluicebox would probably not recover the finer Guyanese gold.

- Discussed the potential application of Missile pumps to process shallow pay gravels, some problems with permafrost.

RECOMMENDATIONS FOR ANY OTHER TOURS

- Background geographical and historical data should be provided to participants before they leave Guyana.

- Most participants felt that the tour should be longer and more diverse.

- More time should be allocated for mine visits to discuss mine costs and procedures in detail. (However most miners are rushed in summer due to short mining season and some are not willing to offer detailed cost and procedural information).

- More time for meeting regulators/inspectors and government officials in Whitehorse is needed.

- The Guyanese requested copies of the Umbrella Final Agreement (Land Claims Settlement), Annual Placer Industry Compliance Report, Placer Mining Act, Quartz Mining Act, Yukon Water Act, DFO Act and Mining Land Use Regulations.

APPENDIX A

PHOTOS

Sixty Mile Placer, K-1 Mining: View of the Mining Pit

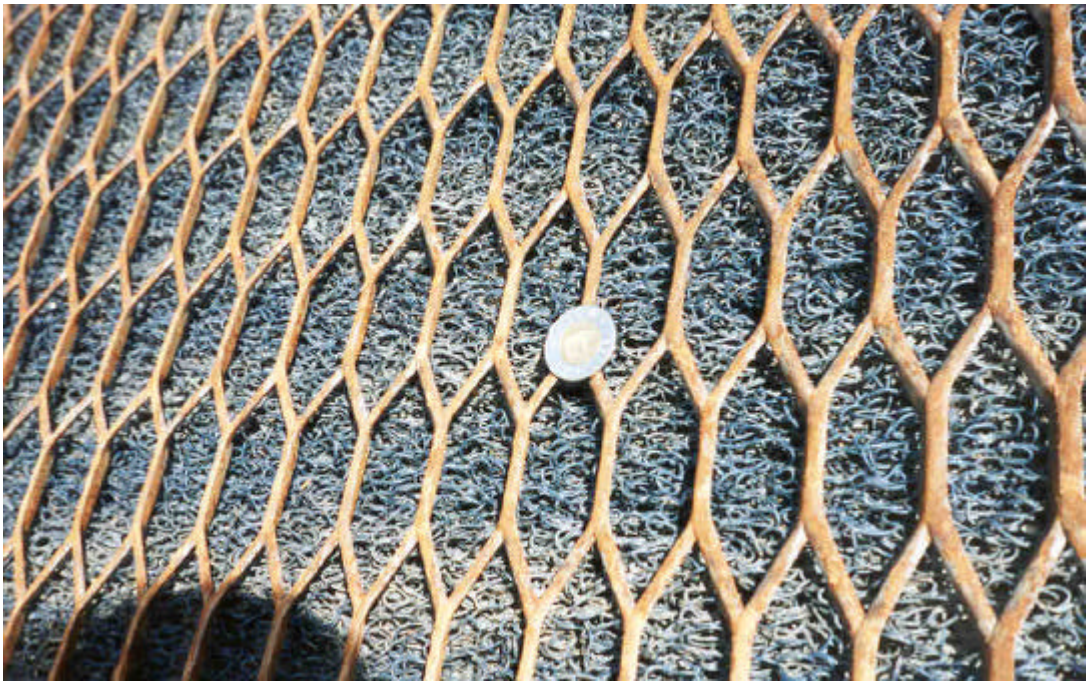
Sixty Mile Placer, K-1 Mining: Mike McDougall and the Guyanese Delegation

Sixty Mile Placer, K-1 Mining, Preparation of the Polishing Pond

GIMLEX Gold Mines, Large Custom-Built Rotary Gold Wheel for Final Cleaning

Sixty Mile Placer, Jaycee Mertagh Miller Creek: General View of Sluicing System

GIMLEX Gold Mines: Nodwell All Terrain Low Ground Pressure Vehicle with Large Auger Drill



GYPPO Mining: Close-up of Mat and Screen

GYPPO Mining: General View of Sluice Box

GYPPO Mining: Scraping Site

GYPPO Mining: Tailings Pond and Pumping Station

ROSS Mining: View of Operating Sluice Rows

ROSS Mining: Cleaning Water Jets in First Screening Process

VICEROY Minerals Ltd: Reclaimed Pit

VICEROY Minerals Ltd: Drainage System of New Pad Under Construction

VICEROY Minerals Ltd: Group Looking at Pad Construction

VICEROY Minerals Ltd, Environmental Technician Office: Well Organized and Equipped

Polyurethane Screen used for Vibrating Screen Deck (10-20 times longer wear resistance than woven wire mesh usually used)

FORTYMILE Placer, Claxton/Chapman Site: General View of River Bank Mining

FORTYMILE Placer, Claxton/Chapman Site: Front View of New-Zealand Floating Sluicing System

FORTYMILE Placer, Claxton/Chapman Site: View of Complete New-Zealand Floater Sluicing System

Acting Government Leader of the Yukon Territory, Dave Sloan with Guyanese Delegation

Guyanese Delegation with Yukon Training Territory Water Board

Reclaimed Mining Area: Indian River Basin

Aerial View of Hunker River Basin Area

View of Dawson City at the Junction of the Yukon and Klondike rivers