PROSPERITY
A Gold-Copper Project of Taseko Mines Limited

Taseko Prosperity Gold-Copper Project

Appendix 3-8-C

Taseko Mines Limited

APPENDIX 3-8-C

AN ASSESSMENT OF THE HANCEVILLE HATCHERY AS A RAINBOW TROUT FRY PRODUCTION FACILITY

FRESHWATER FISHERIES SOCIETY OF BC

AN ASSESSMENT OF THE HANCEVILLE HATCHERY AS A RAINBOW TROUT FRY PRODUCTION FACILITY

Prepared for: Taseko Mines Limited

by

FRESHWATER FISHERIES SOCIETY OF BC

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Freshwater Fisheries Society of BC

EXECUTIVE SUMMARY

Taseko Mines Limited is working with the Ministry of Environment to develop a Fisheries Compensation Plan related to the proposed development of the Prosperity copper-gold deposit (Prosperity Project) at Fish Lake located on the Chilcotin Plateau in central BC.

One aspect of the compensation plan will be a fish culture program utilizing the Fish Lake rainbow trout stock. The program will include the capturing and spawning of wild Fish Lake stock, the incubating and rearing of the progeny and the liberation of fry into area lakes in the fall of each year for the duration of the mine project – about 20 years.

The Freshwater Fisheries Society of BC was asked by the parties to conduct an initial assessment of the old Hanceville Hatchery as a potential site to conduct the fish culture program. This report contains the results of this initial assessment including our recommendations and cost estimates for the renovation and operation of the Hanceville facility should it be chosen as the preferred option for fish culture program delivery.

To renovate or replace the Hanceville Hatchery will require a capital investment between $285,000 and $400,000 depending upon the option chosen. These estimates are not inclusive of all costs and must be considered preliminary. The annual operational costs will be in the $65,000 to $75,000 range exclusive of administration/project management cost. A major challenge will be to attract and keep qualified staff due to the seasonal nature of the work and the remote location.

Serious consideration should be given to having the fish culture services provided from an existing fish culture facility in another location. By incorporating the Fish Lake fish culture program into existing operation such at the Clearwater Trout Hatchery for example, the probability of program success will be higher and at a substantially lower cost.

ACKNOWLEDGEMENTS

I wish to thank Tom Wilkinson (Ministry of Environment) and Norm Ringstad (Norm Ringstad and Associates) for their assistance with completing this project. I also want to acknowledge the assistance and advice provided by Don Peterson and Marla Zarelli of FFSBC in the preparation of this report.

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by

Ray Billings[1]

1.0 INTRODUCTION

The Hanceville Hatchery located approximately 70 km west of Williams Lake, BC (Figs. 1 and 2) is owned by the provincial Ministry of Environment (MOE). The hatchery has been periodically operated by the Williams Lake MOE staff since the early 1980s to culture a variety of fish stocks including Chilcotin River steelhead, Puntzi Lake rainbow trout and Horsefly River rainbow trout. The hatchery has not been operated nor had any maintenance done since about 1995.

Fish culture services will be required as part of the fisheries compensation program should Taseko Mines Limited's Prosperity copper-gold deposit be developed at Fish Lake in central British Columbia.

The Freshwater Fisheries Society of BC (FFSBC), is an independent non-profit society that provides fish culture services to the province. FFSBC was asked by Taseko Mines Limited to provide an assessment of the current condition of the Hanceville Hatchery and to provide approximate cost estimates to upgrade the facility to appropriate fish culture standards and to operate the facility as a rainbow trout fry production facility.

Assumptions:

1. The facility will operate for a period equal to the life of the proposed mine – about 20 years.
2. The annual operating period will be from late April to end of September – no winter operation.
3. Trout eggs will be collected remotely and shipped to the hatchery – no requirement to hold brood fish on the site. The costs and logistics associated with remote brood trapping and egg collection activities are not considered in this report.
4. The annual production target will not exceed 80,000 fry with a target size of 3 grams.
5. Fry will be distributed to several lakes in the vicinity of the proposed mine site and other locations to be determined. Unusual costs associated with fish stocking (use of aircraft etc.) are not considered in this report.

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Figure 1. Key Map

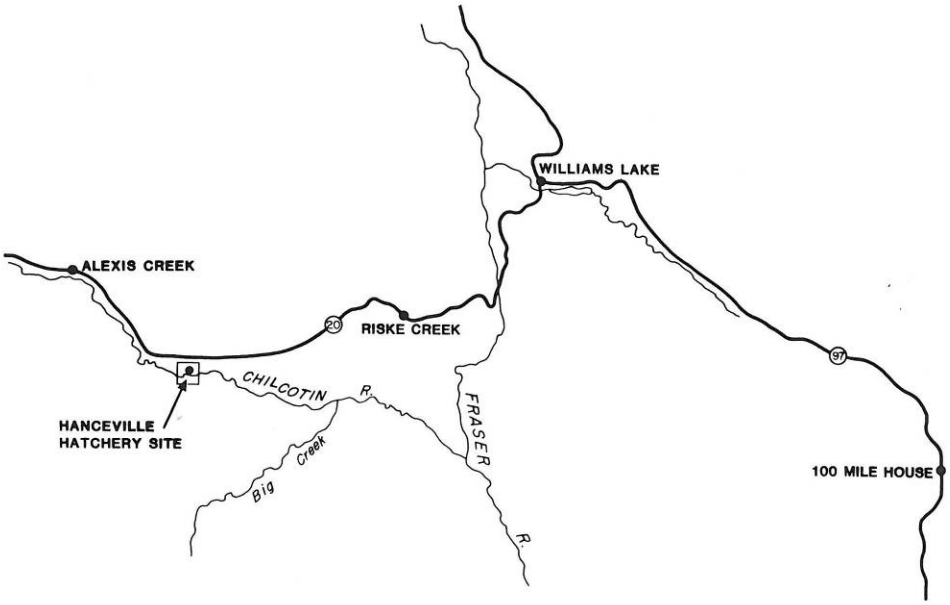

Figure 2. Location Map

2.0 DESCRIPTION OF HATCHERY

The Hanceville Hatchery is located about 70 kilometres west of Williams Lake on 108 hectares of ranch land owned by the province. The hatchery is easily accessible from a gravel road system connected to Highway 20 along the Chilcotin Plateau in central BC.

The hatchery facilities were constructed about 25 years ago and consist of a simple, post and beam wooden building enclosing seven large fish rearing troughs, three vertical tray incubators and other ancillary fish culture equipment.

The water supply for the hatchery originates at a spring located about 300 metres upstream of the hatchery. Water is diverted from the spring pond into a collection box and then flows by gravity through a plastic waterline to the hatchery facility. The waterline generally follows a ditch filled with overflow water from the spring. The spring water supply flows year round at approximately 2,800 litres/minute and at a fairly consistent 11 – 11.5^{o}C. All previously tested water quality characteristics have shown this water supply to be suitable for fish culture needs. The MOE is licensed to use up to 1 cubic foot per second (~1,700 litres/minute) of this water supply for fish culture purposes.

After passing through the hatchery, water is discharged into an adjacent settling pond and then continues downstream via a ditch and creek towards the Chilcotin River. Three nearby ranch operations may utilize this discharged water for irrigation purposes by agreement with the ministry.

3.0 CONDITION OF HATCHERY

The Hanceville Hatchery is of a very basic design and has been exposed to the weather for about 25 years. Fortunately, the climate in this area is very dry and the wooden structure appears to be relatively sound and generally intact.

All major components of the hatchery were inspected on June 11, 2008 with the following results:

3.1 Site Access

- Rough dirt driveway overgrown with local grasses. Satisfactory condition.

3.2 Spring Water Supply

- Considerable vertical drop from spring to hatchery providing excellent potential for a reliable gravity water flow system.

- Only partial fencing around the water spring allows easy access by livestock.

- Livestock can also access the ditch and waterline potentially resulting in bank erosion and/or damage to the waterline.

- Spring water collection box damaged and unsuitable for future use.

- Hatchery waterline is broken in at least one location and may be subject to further breakages.

- Exposed access to spring pond and water in ditch and hatchery settling pond poses significant risk of contamination and disease from all forms of wildlife.

- Several mature rainbow trout were observed in ditch and settling pond adjacent to and upstream of hatchery. Potential vector for fish disease.

- At least 2 other waterlines are connected to the spring water supply and ditch so presumably neighbours are accessing some of this water for their needs.

3.3 The Hatchery Water Distribution System

- The hatchery water distribution head tank is made of aged wood and is unsuitable as a safe water supply.

- The hatchery discharge pipe is made from a half-round 14” galvanized steel culvert.

- The discharge pond is functional although shallow with numerous live fish inhabiting it.

3.4 Building and Utilities

- Rats and mice have infested all areas of the hatchery.

- Hatchery floor is gravel and unsuitable for biosecurity needs of cultured fish.

- Tin roof on wood trusses appears in satisfactory condition although it may leak during certain weather conditions.

- The electrical service does not appear to be consistent with present day electrical standards. The electrical supply has been disconnected at the hatchery power pole. The inside electrical service appears to be a 60 amp 120 volt 1-phase service. This is inadequate for most modern small electrical needs. No 3-phase electrical power was observed in the immediate area although it is not required for this small hatchery facility.

- Environmental controls and alarms systems are aged and inadequate for safe culturing of fish.

- No glass or security screens are attached to the building's windows.

- No appropriate toilet facilities. An old composting toilet is located in the hatchery building.

3.5 Fish Culture Equipment

- Three vertical tray (Heath brand) incubation systems are located in the hatchery. Trays appear to be in satisfactory condition and suitable for future use.

- Six – 16' X 2.5' X 2' aluminum jumbo flat-bottomed rearing troughs are located at the hatchery. They are all in satisfactory condition and suitable for future use.

- One 16' X 2' X 2' plastic trough is located at the hatchery. It too is in satisfactory condition and suitable for future use.

- An aged EWOS fish feeding system is installed at the hatchery. It is unsuitable for present fish culture needs.

4.0 PERMITS

The Federal/Provincial Introductions and Transfers Committee (http://www.al.gov.bc.ca/fisheries/ITC.htm) must approve the culture and movement of fish within BC. In addition, the MOE regulates the use of surface waters and the discharge of hatchery waste water to the environment.

Permit approvals will be required from each of these regulatory agencies before any future fish culture activities can legally operate at this facility.

In addition, as noted above, the hatchery building and its associated systems will likely require inspection, upgrading and approval by the local regional district and provincial health and electrical authorities.

5.0 BUDGET ESTIMATES

5.1 Capital Cost Estimates

Table 1 outlines cost estimates to upgrade the existing hatchery facility according to the recommendations in Section 6.0. Also, for comparison we have included cost estimates to replace this building with a new structure. These order of magnitude estimates are considered to be +/-25% accuracy. Any agency planning to fund and operate this hatchery should first develop a more tightly specified plan for this facility and spend additional time preparing more refined and accurate cost estimates.

Table 1. Capital cost estimate to upgrade the existing Hanceville Hatchery.

Item	Option 1. Upgrade Existing Facility	Option 2. New Replacement Facility
Hatchery Building, Access & Utilities		
Driveway access	3,000	3,000
General site and building cleanup, painting	5,000	-
Building demolition and disposal	-	5,000
Concrete floor slab with process discharge drain, floor drain & exterior perimeter drain	15,000	25,000
Windows, reframing, window security screens, security door	10,000	-
Repairs and modifications to incubation, bench, etc.	5,000	-
Replacement insulated hatchery building (1400 sq ft) with electricals to house work bench, freezer space, incubation, troughs, storage	-	100,000
Upgrade to 200 amp electrical service	3,000	-
Upgrade to 400 amp electrical service		5,000
Site landscaping	500	1,500
Sewage holding tank (staff)	-	3,000
Site fencing	8,000	8,000
Water Supply and Discharge		
Cover spring water source	10,000	10,000
Water intake box fabrication and installation	10,000	10,000
Replacement waterline	15,000	15,000
Fish barrier to upstream ditch	5,000	5,000
Head pipe, valves and bypass	10,000	10,000
Aeration	3,000	3,000
Fencing and gate	1,500	1,500
Discharge screening and pond dredging	3,000	3,000
Fish Culture Equipment		
Jar incubators	2,500	2,500
Belt feeders	6,000	6,000
Screened trough covers	6,000	6,000
Trough outlet screens	2,500	2,500
Disinfection tub	400	400
Freezers (mortality & food)	800	800
Transport tank	5,000	5,000
Small tools	2,000	2,000
Brushes, buckets, sieves, nets	2,000	2,000
Weigh scales (2)	3,500	3,500
emergency oxygen system	4,000	4,000
Level and flow alarms	4,000	4,000
portable water pumps	2,000	2,000
portable generator	2,000	2,000
Planning, Materials Ordering and Construction Labour	8,800	8,800
Optional - Staff Residence & office	*125,000*	*125,000*
Total Estimated Capital Cost	**$ 283,500**	**$ 384,500**

These cost estimates do not include project management, design, inflation, contingency, geotechnical or other professional services or costs.

5.2 Fish Culture Program Parameters

Operating cost estimates for a future rainbow trout fry program have been developed based on the following fish culture parameters:

- 150,000 Fish Lake stock rainbow trout green eggs to be collected from Fish Lake over an approximate 2 week period in early to mid May.

- 80,000 Fish Lake rainbow trout fry to be produced at Hanceville Hatchery.

- 10,000 of the above fry to be released into 2 lakes located adjacent to the proposed mine project for genetic preservation purposes.

- 70,000 of the above fry will be surplus and will be released into several yet to be determined local lakes for food fishery and/or recreational and commercial purposes.

- Stocking dates for all above fish will be during the first two weeks of September.

- Staffing Assumptions:
  - The hatchery will operate 7 days a week and there must be at least one trained person available 24 hours per day in case of emergency.
  - One full time project fish culturist will be required for 5 months each year. This individual will be responsible for all planning, logistics and fish culture activities including egg collection, incubation, rearing and liberation and associated administration, maintenance and reporting.
  - One part-time hatchery assistant position will be required for 5 months each year to assist the project fish culturist and to provide holiday relief.
  - In addition, a third person should be available as needed to assist with work overloads or to provide security/alarm response when other staff are away from the general area.
  - *<u>Note</u>: It is likely that the actual fish culture demands will not exceed 3-4 hours per day/7days per week once egg collections are completed. The project fish culturist will have time available to conduct other tasks in the immediate area. Other fisheries or unrelated tasks may be necessary to make this an engaging full time position. Otherwise enthusiasm may wane and staff turnover quite possible.*

- Trained fish culture staff will be paid $20/hour - $25/hour (8hrs/day) with an additional 20% assumed for salary overhead and benefit purposes.

- A pickup truck will be leased seasonally for the project.

5.3 Operating Cost Estimates

Table 2 outlines cost estimates based upon the earlier noted fish culture program parameters. These estimates are considered to be +/-25% accuracy. Any agency planning to fund and operate this hatchery should develop a more tightly specified plan for this facility and spend additional time preparing more refined and accurate cost estimates.

These cost estimates do not include any overtime, emergency response or standby time.

Table 2. Operating cost estimate for Hanceville Hatchery fish culture program.

ITEM	COST ESTIMATE
Senior Fish Culturist (8 hrs/day X 108 days X $25/hr)	21,600
Junior Fish Culturist (8 hrs/day X 64 days X $20/hr)	10,240
Employee overhead (+20%)	6,368
Truck lease	5,000
Truck maintenance & repairs	1,500
Motor fuel	3,500
Fish food	2,000
Anesthetics, drugs, chemicals	2,000
Electrical charges	1,500
Building & grounds maintenance	3,000
Equipment maintenance	1,000
Septic service	1,000
Miscellaneous materials & services	3,000
Egg collection station costs	3,000
Total Estimated Operating Costs	**$ 64,708**

Note: While the work demands during the rearing season should generally not exceed 3-4 hours per day, fish culturist positions have been budgeted at eight hours per day as this will be needed to attract a qualified individual. See additional information in this regard in Section 5.2 Staffing and Section 6.0 Recommendations.

6.0 RECOMMENDATIONS

6.1 Access

- Construct a simple gravel-based driveway to the hatchery building with parking spaces for two vehicles.

6.2 Spring Water Supply

- Install full fencing of spring to exclude all livestock and other wildlife.

- Replace existing intake box with an aluminum and screened water intake box.

- Replace and bury waterline and associated valves and fittings to avoid future damage from livestock, vandals and weather.

- Incorporate a screening and aeration system in any future buried waterline to ensure no debris fouls hatchery plumbing and hatchery water supply is fully saturated with oxygen.

- Cover the spring and pond to exclude leaves, debris and all wildlife.

- Remove all fish, dry and fill existing ditch leading from the spring to the hatchery to exclude any future fish and other disease vectors.

- Any legal water users must connect to new water intake box at spring pond.

6.3 The Hatchery Water Distribution System

- Fabricate a new aluminum or plastic header pipe and new water valves and piping to all hatchery containers.

- Replace the culvert discharge pipe with a more easily cleaned concrete discharge channel with grating, screening and pipe system leading to the settling pond. This channel along with a connecting incubation discharge channel would be integrally formed into a new concrete floor slab.

- Add three levels of discharge screening (legal requirement) to prevent any fish from escaping downstream from hatchery facilities.

- Replace the aged thermograph and level control system.

- Dredge the effluent pond to obtain further depth and settling ability. In addition, any fish that might accidentally escape from hatchery containers and into the settling pond must be prevented from migrating either upstream or downstream through effective screening and/or other barrier systems.

- Install a new level and flow alarm system connected to landline communications system.

6.4 Building and Utilities

The following recommendations apply to the renovation of the existing facility:

- All access points for rodents, birds and other wildlife must be blocked. This is critical for fish biosecurity purposes and also for human health (e.g., Hantavirus) reasons.

- A full concrete floor be constructed with discharge drain and floor drain system incorporated into floor slab.

- A roofing company assess the condition of the existing roof and replace as needed.

- An electrical contractor to develop a lighting and electrical distribution system to bring the building in line with the electrical code.

- Hinged glass and metal mesh screens be added to three sides of the existing building to allow for outside light and breezes to enter building but exclude wildlife, vandals and inclement weather as necessary.

- A portable toilet to be provided or a small washroom facility connected to a seasonally pumped septic holding tank or septic discharge system be constructed depending on health and building code requirements.

6.5 Fish Culture Equipment

- Purchase of 10 – 6” upwelling incubators for initial egg incubating needs and to help minimize fungus problems.

- Fabricate new outlet and intermediate mesh screens for all existing troughs.

- Fabricate mesh shade/predator covers for all existing troughs.

- Purchase a series of belt or other suitable trough feeders.

6.6 Consider Replacement of the Existing Facility

While our sense is that the existing facility can potentially be made functional again, it presents a number of security, fish health and human health risks in its current condition. Before launching a major upgrading/renovation of the old facilities, consideration should be given to building new. It may be more practical to demolish the existing hatchery building and replace it with a prefabricated, insulated steel building installed on a full concrete slab.

6.7 Consider other Options for Fish Culture Service Delivery

To renovate or replace the existing Hanceville Hatchery will cost in the order of $285,000 to $400,000 plus fees, permits etc. In addition, operating and maintenance costs will total between $65,000 and $75,000 annually. Along with these costs, there will be administrative and management overhead to administer the staffing, operations and facility projects each year. It is unclear who will provide this management/administration function but it will also generate costs.

A new hatchery facility could be developed in a location closer to the proposed mine site at Fish Lake. This site would be able to share staff, maintenance and other resources with mine operations and would also benefit the community most impacted by any future mine development.

A source of groundwater would have to be located and developed resulting in higher initial capital development costs. In addition, groundwater would likely be cooler than the exceptionally warm and reliable spring water supply found at the Hanceville Hatchery site. Cooler fish rearing water would require additional heating in order to allow fish to reach their target size by early September. There would be increased pumping, heating and maintenance costs associated with the use of pumped groundwater. Risk also increases when fish are fully reliant on the delivery of a pumped water supply as mechanical and/or electrical failure could be catastrophic.

FFSBC operates a number of large and small fish culture facilities around the province. We estimate that the cost of conducting an egg collection at Fish Lake (or alternate), shipping eggs to our Clearwater Trout Hatchery for incubation and fry rearing then delivery to lakes in the vicinity of the proposed mine project will cost something in the order of $35,000 per year. A program delivered through a major facility like Clearwater would offer two key advantages to operating at the Hanceville location:

1. Less risk
   Fish produced under the supervision of qualified and experienced fish culture staff with the support of fish culture and fish health biologists and dedicated maintenance technicians are less likely to suffer fish health problems or losses from human error or system failures.

2. Lower cost
   We estimate the cost of producing the 80,000 fry per year for 20 years at Hanceville will total $1.5M. - $1.8M. This service can be provided for the same period through Clearwater Trout Hatchery at about $.7M or less – a saving of up to $1M the life of the project.

These financial savings could be used to complete other fisheries compensation work. For example, savings of $50,000 annually could be directed to improving fishing and angler access in the southern Cariboo; a very exciting prospect and a great opportunity for Taseko Mines Limited to demonstrate the benefits of the compensation program in a broader, more effective and productive way.

7.0 PHOTOS OF HANCEVILLE HATCHERY

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Photo 2. Spring Pond

Photo 3. Spring waterflow measurement weir

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Photo 5. Broken water supply pipe

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Photo 7. Upstream water supply ditch

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Photo 23. Aluminum jumbo troughs

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