

**Background Information on the Spillover**  
**from the Pumphouse Reservoir for**  
**Curragh Resources Limited**

**July 30, 1986**

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A Need for Additional Water During the Winter Operating Season

Curragh Resources Ltd. has reopened the former Cyprus Anvil Mine site, 17 km northwest of Faro, Yukon and wishes to increase production above the former maximum level by September, 1986. To maintain this production level during the winter months (November 1 - April 30), mine operations require more water for the milling process.

Cyprus Anvil's water licence (#Y2L3 - 0005) issued on February 4, 1975, indicates that when the North Fork of Rose Creek is being diverted into the pumping reservoir an overflow of 1000 gpm must be maintained over the pumping reservoir spillway. To prevent a fish barrier to the North Fork of Rose Creek this diversion may only be operated from November 1 to April 30 (DIAND, 1973, p. 4). It is this amount of water that Curragh is attempting to obtain in order to meet increased production levels during the winter months.

In a review of all information made available to Leverton and Associates, there appears to be no specific justification to the 1000 gpm value. In a report by Acres Consulting Services (1985, p. 8) a reference is made that a summer riparian flow of  $0.076 \text{ m}^3/\text{s}$  (1000 l/gpm) must be released to satisfy fisheries requirements between Rose Creek dam and the confluence with the North Fork; however, this site is upstream of the location dictated in the actual water licence.

No reference is made in either the transcripts of the public hearings of the Yukon Territory Water Board (May 17, 1973) or in communications between Dr. A. B. Hollingshead - Controller of Water Rights (Yukon Water Board) and Mr. R. L. Haffner - Vice President and General Manager (Anvil Mining Corporation Ltd.) to the origins of this 1000 gpm level of spillover.

Fisheries and Oceans (1981) stipulates that any fishway (or diversion channel) must be supplied with a sufficient quantity of water as the Minister considers necessary to enable the fish . . . . to pass through the same during such times as are specified by any fisheries officer - Section 20(1). The quantity of water must be sufficient for the safety of fish and for the flooding of spawning grounds to such a depth . . . . for the safety of the ova deposited thereon - Section 20(10).

The Fisheries Act stipulates that no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat - Section 31(1). Fish habitat is not clearly defined in terms of natural or artificial criteria, only as areas on which fish depend directly or indirectly in order to carry out their life process - Section 31(5).

The mine was responsible for constructing a fish passage around their tailings pond to allow fish access to the upper reaches of Rose Creek. The mine is allowed to shut off this access from November 1 to April 30 since it is believed that arctic grayling, *Thymallus arcticus*, do not migrate upstream during this time period and the water is needed for the milling process.

In 1981 (Weagle, 1986, pers comm.) an addition was made to the diversion channel in the vicinity of the second tailings ponds which created a major depression in the channel allowing some arctic grayling to perhaps overwinter. This appears to be a major factor which fisheries are arguing requires the 1000 gpm in winter. A flow rate must be maintained for fish passage; however, the passage was constructed solely for fish movement, not overwintering. If the mine had not created depressions in the passage, no flow would be required. Any fish now wintering there would move downstream to natural wintering habitat. There is no justification that flow is required down the channel in winter since no fish will use the channel for migration at that time of the year. The holes therefore can be sounded and filled in to construct a perfect ladder structure.

If fisheries do not accept this position, questions can be raised as to the 1000 gpm flow rate. Dane (1978) states that flow through any fish passage is calculated based on the width and length of the passage. The volume of water can be found using a depth value which is in all cases, ... sufficient to submerge the largest fish using the structure. As an example, Dane (1978) states that for Pacific salmon, *Oncorhynchus sp.*, a minimum depth must be between 0.2 - 0.25 m. As a much smaller bodied fish, the arctic grayling would require much less of a minimum depth to submerge the largest fish, rough estimates would be from 0.10 - 0.15 m. Hence if we knew the width and length of the passage and using this depth, we can calculate the volume of water necessary in each section of the passage at any one time. This may be substantially less than the 1000 gpm figure and therefore free up extra water for Curragh's use. In summary, Curragh has three options available:

### Option One

Under the terms of the Fisheries Act, passage must be guaranteed for fish to reach the upper reaches of Rose Creek. Since during the winter period, fisheries gives Curragh the right to block passage beyond the head of the diversion channel (pumphouse pond - see licence) then the passage is not being used for movement, only overwintering. Overwintering locations are not natural habitat in this case, but areas created by Curragh due to their compliance with the construction of additional lengths of passage, passage as required by the Fisheries Act. By removing these holes, Curragh would be forcing fish to overwinter in natural habitat downstream of the tailings outlet, and therefore use the passage for movement during the May 1 - October 31 period as dictated by Fisheries.

### Option Two

The 1000 gpm appears to be an arbitrary figure. According to fisheries sources there are distinct guidelines on the quantity of water in a passage for the safe movement of fish. Since arctic grayling are the largest fish who will use the passage (Weagle, 1981), the volume of water necessary for safe fish passage would be based on the largest size of arctic grayling. If these corrected volumes are calculated it may result in significantly lower amounts of water needed to be spilled than those specified by fisheries.

### Option Three

Total compliance with fisheries guidelines, hence finding additional water from other sites.

## References

**Acres Consulting Services. 1985. Cyprus Anvil Mine Rose Creek Reservoir hydrology study. Calgary, Alberta.**

**Dane, B. G. 1978. A review and resolution of fish passage problems at culvert sites in British Columbia. Fisheries and Marine Technical Report #810, Vancouver, B. C.**

**DIAND. 1975. Water licence for Cyprus Anvil Mining Corporation Ltd., # Y2L3 - 0005. Yukon Territory Water Board. Whitehorse, Yukon.**

**Fisheries and Oceans. 1981. Fisheries Act. Government of Canada, Fisheries and Oceans, Ottawa, Ontario.**

**Weagle, K. 1981. The impact of the scheme 2 abandonment plan on the grayling population of Rose Creek - draft report. Ken Weagle Environmental Consultant Ltd., Whitehorse, Yukon.**

**Yukon Territory Water Board. 1973. Transcript of the public hearings for the water licence of Anvil Mining Corporation Ltd., Whitehorse, Yukon.**