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CURRAGH RESOURCES INC.

INTER OFFICE MEMORANDUM

cc
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To: O. Turtola
From: W. Scheding
Date: 29/09/88
Subject: Winter Water Conservation Plan 1988/89

Warm winters and wet summers have in the last two years kept the water reservoir almost full even in February. This situation cannot be relied upon, so that a plan is needed to monitor consumption and compare with available supply and storage to ensure production until next spring run-off (end of May, usually).

External Measures

(A) Action

(1) Build up the reservoir stop logs to their maximum height by the middle of October at the latest (40" above spillway).

(2) Divert the N. Fork of Rose Creek into the pumphouse pond as soon as no overflow is observed from the dam (the Water Board has allowed us to do this in 86/87 and 88/89, but there is no advantage in doing this too early). This diversion should be ceased prior to the spring run off to minimize silting of the pumphouse pond (pond capacity is far below original).

(3) Start pumping from the 4 well pumps in mid-November, once the flow starts diminishing from the N. Fork of Rose Creek. Adjust the valve on the reservoir to minimize overflow from the pumphouse pond (should be less than 500 gpm).

(B) Monitoring

(1) Check reservoir and pumphouse pond daily for overflow volume and well field for correct operation (R. Carreck or delegate).

(2) Check volumes of all well pump discharges on a weekly basis, using the simple orifice/diff. pressure method. Also check dissolved metals in water from wells nearest tails dam (K. Waybrant).

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(3) Survey water level in reservoir at monthly intervals, more often if rapid depression of the ice surface occurs. (Surveying). Results to be plotted on Mine Engineering's Level vs. capacity profile, allowing for silting (R. McLenehan). Conatruct external water balance once a month (reservoir, well field, pond, mill supply.

Internal Measures

If external water balances show even a remote possibility of a water shortfall before freshet (latest in early June), internal measures should be implemented. In the long term, reductions in water use are an objective of the Water Board, especially since we sometimes approach the 6500 igpm stated in our water licence. This also saves us power, in that less water has to be pumped to the mill.

Recycle

The following water supplies are available for recycle to independent water systems.

Category	Source	Suitable for recycle to	Volume (igpm)
A. Clear water no chemical additives	1. Vacuum pump seal water 2. Compressor cooling water 3. Air conditioning water	a. Flotation Sprays b. Regrind & cleaner sump hosing (summer only) Winter availability	150 50 150 200
B. Suspended solids, no chemical additives	1. Crusher scrubber water (primary and secondary) (8 scrubbers in all)	a. Grinding circuit pump-box make-up (manual addition)	200 200
C. Suspended solids, chemical additives	1. Lead clarifier overflow 2. Zinc clarifier overflow	a. thickener sprays b. dewatering area hosing c. Final concentrate launder sprays	200 300 500

A total of 900 igpm is available for recycle, but separate re-use systems are required, because of the limited applications for Category B and C water.

Category (A) water is currently directed to the grinding and final tails trenches. With some fairly extensive piping, all three sources could be redirected to the unused reclaim water tank currently situated in the regrind sump area. A small water booster pump or two small staged centrifugal SRLs could be used to provide water for regrind sump hosing and cleaner sump hosing as required. When not required for hosing, the flow could be directed to the lead 2nd cleaners for launder water sprays.

Category (B) water cannot be used for sprays, due to particullate loadings, which can be quite coarse. The solids loadings in the scrubber water, currently directed to the grinding circuit trench, probably add up to about 1000 Kg/day of rod mill feed. Redirection of this water to 3401/02 and 3403/04 splitter boxes is the obvious choice. This option is already in place, with two 2x2 SRL pumps able to return scrubber water independently to these pump boxes. Currently almost all scrubber water is collected in a single pumpbox to which these two pumps are connected. When not operating, the pumpbox overflows and the water goes to the trench. At present this water addition can only be controlled manually with valves. If automatic control of cyclone feed density is achieved by means of water addition to the pumbox, use of recycle in this application will not affect control, as long as the manual addition is less than the total addition at the box. At 80 mtph (minimum tonnage), 80% solids in rod mill discharge and 55% solids in secondary cyclone overflow, water addition at the sumps is 165 igpm per sump, so that complete reuse of this water should be possible without causing a control problem.

Category (C) water is the most plentiful and the most problematic in reuse. This water contains frother, collector, flocculant and, most problematic, filter aid residuals which cannot be recycled to flotation. Furthermore, solids loadings in lead and zinc can be high (up to 2000-3000 ppm) on occasion, when the thickeners are down or during flocculant outages. This essentially restricts reuse of lead clarifier overflow to thickener sprays (coarse nozzles), lead dryer sump hosing and final concentrate launder sprays (coarse jets), and zinc clarifier overflow to corresponding zinc circuit locations. Without this, serious cross-contamination of concentrate is possible.

In the winter of 1986/87, lead clarifier and zinc clarifier overflows were directed to the two 10x8 SRLs currently used for zinc stock tank cycloning. By appropriate closing and opening of valves in the water system, this allowed recycle of this water to the zinc cleaner circuit and to the thickener sprays, lead clarifier overflow was soon directed out, to prevent cross-contamination, while high suspended solids eventually prevented use of zinc clarifier overflow also. The total amount of water recycle possible is therefore 900 igpm, although only 200 igpm is solids-free and uncontaminated with chemicals.

onservation

Final tailings solids loadings are quite low, considering the tonnages and unit processes used in this operation. Twenty-five percent solids is about the average of X9 (at the drop-box) when properly sampled for solids loading. Regression analysis of water consumption (measured by a DP cell with orifice on the holding tank feed line) against tonnage indicates that a large proportion of the flow is not tonnage-related and the poor correlation coefficient suggests that it is not well-controlled.

A simple water balance for the mill is shown in Figure 1. Twenty-five percent solids at X9 at 550 mtph rod mill feed and normal heads relates to an overall consumption of about 5350 igpm, versus an 'accounted' consumption takes into account known W/S ratios in flotation feed, recommended water additions for scrubbers, vacuum pumps etc., and best estimates for launder sprays based on % solids in 1st cleaner tailings. Flows not taken into account are irregular flows from hoses for grinding area, regrind area, cleaner area and dryer sump clean-up. At from 50-100 igpm per hose, not many wash up points are needed to generate 700 igpm, especially if they are left running continuously to clear continuous spillage or through carelessness.

Areas of possible water conservation and potential savings are given below:

		Flow (igpm)
Hoses for clean-up		300
Finer, high velocity sprays on launders	Pb	200
	Zn	300
		800

This represents a much larger fresh water saving potential than recycle, since 700 igpm of the 900 igpm recycle above is likely to be intermittent due to plug up or control problems.

Monitoring and control of overall water consumption through judicious use of water is possible because of the mill totalizer, the reading of which is recorded every shift. The reading is multiplied by 10 to give consumption in cubic meters. At present the meter appears to read about 20% low, so that a reading of 30,000 cu.m in a day, actually corresponds to about 36,000 cu.m (or 25% solids in 12,000 mtpd of tailings). If the instrumentation is left in the present state, each shift should be limited to a reading of 1500, (15,000 cu.m) if there are any doubts concerning water supply later in the winter.

Monitoring

(1) Weekly samples at X9 should be stepped up to twice weekly as of mid-November, for analysis both of cyanide (to be kept below 0.5 ppm) and for accurate % solids monitoring by the Environmental group.

(2) Using % solids data and the mill tailings tonnage at the time, an estimate should be made of the consumption rate. Over a month, these readings should be compared with the mill totalizer readings.

Action

(1) If a shortfall of water appears possible from external monitoring internal recycle measures should be implemented immediately. Category (B) water could be re-used almost immediately, while piping for Category (A) water would take a few weeks, even on a rush. Category (C) reuse should only be used in desperation, after all other conservation measures have been implemented.

(2) In parallel with recycle measures (B) and (A) above, installation of low-volume sprays in the cleaner banks (presently on only 2 out of 5 banks) should be implemented. In addition, stringent water usage limits should be set, based on the mill totalizer readings.

W. Scheding
WS/nn