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5th November, 1987.

Curragh Resources Inc.
117 Industrial Road,
Whitehorse, Yukon Y1A 2T8

Att. Joan Eamer

Dear Sirs

RE: SEEP SURVEY AND DEVELOPMENT OF FARO MINE ABANDONMENT PLAN

Introduction

This letter is written in response to your written request of October 23rd. to review the initial results of the Faro Zone Two waste dumps seep survey. The material provided is attached here to for ease of reference and is labeled as follows:

Figure 1	Seep flow measurements - Sept 24 to 26
Figure 2	Seep zinc levels - June 18 & Sept 24 to 26
Figure 3	Seep zinc loadings - Sept 24 to 26
Table 1	Field notes
Table 2	Seep survey data
Table 3	Calculated zinc, copper and sulphate loadings
Table 4	Acid generation test results

As requested, I have also discussed the seep results and methodology with Keith Ferguson at EPS.

Review of Flow Data

The seep identification and flow data provides a good understanding of the observable surface flows which enter the Zone Two pit as at 24th to 26th September 1987. The following comments apply:

Other flow directions. The estimated seepage loss from the Faro Creek diversion ditch is approximately 25 l/sec. Surface flow into the Zone Two pit is only 9.5 l/sec. A large portion of the Faro Creek seepage loss flows in other directions or enters the ground water. It would be beneficial to superimpose the dump and pit plan on the original surface contours which will give some indication of the direction of shallow groundwater flows at the base of the dumps and in the overburden soils. It is important to determine where these other flows reach the surface.

Contribution of precipitation to flows. If the net infiltration into the waste dumps is 50% of precipitation then the average annual infiltration flow through the dumps to the north east of Zone Two pit is estimated at about 2 l/sec. This flow rate will change with the seasons and is expected to be greatest in the early spring during the freshet. Seasonal seep surveys and measurements of the flow rates are necessary.

Control of seepage losses from Faro Creek diversion. The greatest proportion of the the current surface flows to the Faro Two pit may be due to the seepage losses from the Faro Creek diversion.

The lining of this diversion channel, now complete, may drastically effect the seepage and leaching of the waste dumps. If seepage and leaching flows to the Faro Two pit is to be controlled then the seepage losses must be understood and controlled. Continued monitoring of the weirs in the diversion channel and seep surveys next summer will do much to increase this understanding. Monthly monitoring of the flow into the Zone Two pit (seep 2) is recommended. Consideration must be given to installing an effective wear and weather resistant liner to this diversion if it is to operate in the long term, after abandonment.

Effect of pit dewatering on the groundwater flow. The cone of groundwater depression caused by the Faro pit dewatering may be responsible for the draining of all or most groundwater below the south east dumps towards the pit. Since there is only a low rate of recharge through infiltration into the dumps, this may be the reason why no significant seeps are observed in September along the south and eastern toe of the dumps. This observation should be checked during the spring freshet. The available information on the permeability of the pit wall rocks and piesometric levels surrounding the pit should also be checked.

Additional flow into Zone Two pit. Most of the Zone Two pit has been backfilled and it is therefore not possible to identify all the sources of seepage into the pit. Once pit dewatering has been completed it will be possible to measure the total rate of inflow.

Review of seep water quality data

The seep water quality data provides a good indication of the sources of contaminants in surface flows. The following comments apply:

Sources of acid generation. It is apparent that acid generation is occurring at two locations; seeps 11 and 31. With the low pH of these seeps they are very high in both total copper and zinc concentrations. Both of these seeps issue directly from pit walls indicating the presence of acid generating wall rock. All other seeps have a high pH.

Sources of zinc leaching. Except for seeps 11 and 31 the copper concentrations are low from all seeps. The remaining seeps from the pit walls (seep 12 upwards) are generally moderately low in zinc. Seeps from the waste dumps (below seep 9) are generally significantly higher in zinc (5 to 6 ppm). These concentrations exceed discharge quality criteria and it is necessary to reduce such leaching as part of the abandonment plan. The possible mechanism of zinc leaching requires some research and investigation before control measures can be applied with any confidence.

Possible causes of zinc leaching. Zinc leaching could possibly be occurring as a result of acid generation in part of the dump followed by neutralization of the seepage along the flow path through basic waste and by mixing with basic water. This potential should be checked by reviewing the acid generating potential of the waste in these rock dumps and by some kinematic acid generating tests (humidity cell tests) as discussed in the next section. Once zinc is in solution it is not readily precipitated except at very high pH's.

Seasonal variations in contaminant concentrations. It has been experienced at other waste dumps that there is a seasonal variation in both flow and concentrations and that the two are not proportional. A very large increase in contaminant loadings may be experienced during the early part of the freshet. A monthly measurement of the flow and quality in the discharge to Zone Two pit (Seep 2) increased to weekly during the freshet is recommended. A minimum of 6 seep surveys (3 covering the period of the freshet) is recommended in the first year to determine the seasonal variation in the seep water quantity and quality.

Other contaminants. The water from the Zone Two pit is high in zinc (20 ppm). It is recommended that it be tested for for a full suite of 26 elements to determine if there are any other contaminants at significant concentrations.

Review of acid generating potential of Faro pit rock waste

The results of static, acid/base tests conducted in 1987 are presented in Table 4. Of these 25 test results, four show acid generating potential, one of which is from massive sulphides. Another four display neutralization capacity to acid generating potential ratios of about 3.2, at which uncertainty exists. At these low ratios the potential for acid generation depends on the kinematics of acid generation compared to neutralization availability. Acid generation potential can only be determined by long term kinematic tests (such as humidity cell tests) or long term field observations. The extent to which these samples are representative of the waste in the south east waste dumps should be investigated. Based on these results alone it is appears that there is some potential for zones of acid generation in the dumps. Consideration should be given to testing high zinc seepage water for Thiobacillus ferrooxidans. The EPS in Vancouver have offered to conduct such tests if Curragh provided the samples. The presence of viable bacteria would indicate that bacterial acid generation is occurring in the dump. Unfortunately the absence of such bacteria would not be conclusive evidence that it is not occurring.

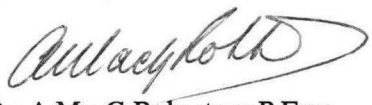
Seep survey for entire dump and pit area

In order to demonstrate an understanding of seep water qualities from the dumps and pit area in the long term it will be necessary to complete seep surveys of the entire mine effected area. This data would be used to estimate contaminant loadings to adjacent surface waters for both pre and post abandonment measures conditions. Dilution rates would then be determined to estimate the resultant receiving water quality. In the absence of good seep data it will not be possible to demonstrate the effectiveness of any proposed abandonment measures.

We welcome the opportunity of answering any questions you may have regarding the contents of this review.

Yours Truly,

STEFFEN, ROBERTSON & KIRSTEN (BC) INC.



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