

007784

MEMORANDUM

DATE: January 13, 1992

TO: Brian Campion

FROM: Dave Harpley

RE: Review of Kevin Morin's Comments on Seepage from the Main Pit at Faro

With reference to Morin's comments for Environmental Protection dated January 1, 1992, you should also read SRK's letter to Curragh dated as above which includes comments on his comments, and provides more background on the subject.

The main theme of Morin's comments is that there is a gradient and pathways for seepage flow from the Main Pit to the North Fork. Gradient refers to the slope of the water-table from one point to another. As the pit will be flooded to an elevation above the North Fork, it is true to say that there is **potential** for a groundwater gradient towards the North Fork. For such a gradient to **exist**, groundwater must occur in rock pores or fractures and be hydraulically connected in order for flow to originate from the pit and flow towards and discharge into the North Fork. It is possible to have a water-filled fracture immediately adjacent to an open but dry fracture if the two are not connected. Then the gradient in the water-filled fracture may be high, but zero in the dry fracture. We should be willing to concede that there is a gradient given the simple elevation difference. However, the presence of groundwater pathways from the pit to the creek is a far more complex and judgemental question. In the SRK letter referred to above, I have gone to some length to provide an evaluation of the potential for inter-connected pathways, and the amount of flow that might move through such pathways. This flow appears to be very small.

In terms of the borehole and geological data available and Morin's comments:

- the borehole data was available to Morin, but no reference was made to it in the text, or indication that it was reviewed in any detail. It is an important piece of data, and I get the impression that Morin did not really look at it. It may be to Curragh's advantage to expose this during questioning;
- the geological data was only partly available to Morin, although EP were invited to request assistance. A lot more information was made available to me by Lee Pigage, Curragh's senior geologist. Lee has "lived" with the Faro rocks since 1986, and hence he and now I have a better assessment of their physical nature and behaviour.

We should beg to differ with Morin's statement that "Curragh has not even determined the nature and locations of the flowpaths". The nature of the flowpaths was indicated in the Piteau report i.e. low permeability (ability to transmit water) wallrocks in the form of schists and phyllites, some permeability in limited fractures, but truncation of these fractures by clay filled faults and dike intrusions. As for locations, apart from the main and mappable faults, all rocks have individual joint patterns, all of which have potential to transmit water. The key is whether the joints are **open** to flow. Our assessment is that, apart from isolated cases, they are not. The major faults also appear to be filled with clay and other minerals so that they are not significant pathways. If they were, we would expect most flow to occur close to surface, and as the faults are oriented towards the Zone II Pit, it is reasonable to assume that any flow in the faults would arrive in the water ponded in Zone II.

Morin states "no discussion of measured hydraulic conductivities (permeability) between the Zone II Pit and the North Fork could be found". The rocks there are the same as those tested in the Main Pit, reported on in the Piteau study. It is reasonable to assume that the same data is relevant to the same rocks, although local weathering and blasting effects may vary.

Morin often refers to undertaking studies "consistent with the procedures and recommendations accepted by the B.C. Acid Mine Drainage Task Force". There are several questions/comments one could ask/make:

1. Exactly what procedures is he referring to, and what is their relevance
2. Who are the main authors of the reports he refers to (I believe he is the main author and therefore cannot be considered impartial in making his recommendations)
3. He is implying that the B.C. AMD Task Force now sanctions the procedures, and that any other approach is inadequate. I am sure the Task Force would have a different interpretation.

In Morin's discussion of contaminant source, he refers to stored acid products in wallrocks, and an open pit mine in B.C. where 70% of the annual acid generated remains on fractures. He is referring to Equity Silver, the most notorious example of very severe acid generation rates in western Canada, and perhaps the whole of North America. It appears that Faro's acid generation rates are much, much less than Equity's, and it would be unfair to compare the two equally. Curragh has recognized the acidity generated by the Main Pit wallrocks. Please refer to the SRK letter which describes the high alkalinity of the tailings stream which is expected to neutralize acidity. We may accept that there is some potential for residual acidity on wallrocks. However, our contention is that the flow paths do not exist to any great extent, and so the acidity, if present, should remain in the pit. We therefore believe the contaminant source will be taken care of, and pit water monitoring data would be provided to show this.

It is our opinion that the investigation recommended by Morin is not appropriate for two reasons:

1. seepage potential has been studied and is considered to be low, and in any case, the water quality of any seepage is expected to be good

2. to investigate Main Pit seepage in isolation of other potential sources of contamination would not be appropriate. The SRK letter indicates that the focus of North Fork protection should be on Zone II Pit seepage and drainage from the waste rock dumps

We consider a more appropriate investigation program is described in the SRK letter which considers all of the potential contaminant sources.

Curragh can undertake to demonstrate the acceptable capacity of the pumping well in the Zone II Pit in terms of controlling the pit water-level. Monitoring will be made to ensure this control and indicate a second well if necessary before the level reaches a critical elevation.

It has been stated by SRK that the origin of the contamination recorded in the boreholes adjacent to the North Fork is unclear. Here we agree with Morin. SRK has devised an investigation program, described in the SRK letter.

In summary, Morin's assessment has some merit, but appears to be superficial in many cases. It may be that EP's terms of reference were very strict i.e. a small budget. It would be advantageous to highlight the considerable amount of data available to and assessed by Curragh and their consultants, and the range of previous studies conducted. These studies and the program described in the SRK letter demonstrate Curragh's commitment to seepage control and water quality protection. We should point out Morin's disadvantage in not having the data and knowledge available to him, and also that it would seem that he has not made best use of what data he had.

F A C S I M I L E

ADDRESSEE'S NAME G. Accet

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PAGES EXCLUDING HEADER 2

DATE 14 Jan. 1992

ADDITIONAL MESSAGE OR INFORMATION:

ENVIRONMENTAL PROTECTION
Box 6010
Whitehorse, Yukon

13 January 1992 4484-37/A293

Judi Doering,
Manager, Water Board Secretariat
YTWB
302, 4114 4th Ave.
Whitehorse, Yukon
Y1A 4N7

Dear Judi:

We have enclosed a brief list of errata pertaining to the EP/DFO intervention submitted to the Board on January 3, 1992. We would request that the Board consider appending this to our brief at the hearing.

These changes deal with significant typographical errors. Others stem from slight variations in wording resulting from last minute changes in the Curragh/Gov't of Canada agreement (Exhibit IV). Although the intent is the same, the wording varied slightly between these two documents.

On a separate matter we would like to request of the Board that the EP/DFO presentation at the hearing come after the DIAND presentation. This has been the practice at past hearings and is necessary because the EARP screening presentation sets the framework for significant elements of our intervention.

Thank you for your attention to these requests.

Respectfully,



Vic Enns
Manager, Pollution Abatement

cc. Curragh Resources
DIAND - Water Resources
DFO



ERRATA

Environmental Protection and Fisheries and Oceans Canada Brief to the Yukon Territory Water Board, IN89-001, Public Hearing January 15, 1992

- A. The wording for proposed licence clauses listed in the Government of Canada/Curragh agreement (Exhibit IV) vary slightly in some instances with those in the EP/DFO brief (Exhibit V(d)). The following recommendations in the EP/DFO brief are superseded by recommendations as presented in the Government of Canada/Curragh Resources agreement submitted by Curragh (Exhibit IV):

Recommendation: 3
 4 (sub-sections 3(b) and 3(c) only)
 7
 9

The rationale for each recommendation remains as presented in the EP/DFO brief.

- B. The following are corrections to the EP/DFO brief:

Recommendation 4 in the Executive Summary (page ii) should end following the first paragraph. Delete from "Proposal for 3(i):" to end of page.

10.5 years -> PC
203 years -> full
please
 Delete Recommendation 5 in the Executive Summary (page iii) and replace with the version of Recommendation 5 provided at the top of page 9 of the intervention.

Recommendation 14, pages vii and 18, point 1.2, fourth line should read - "specific" conductance; second last line - "maximum" elevation *Spelling only*

Page 4 sixth line from bottom should read - "(see point b) below)"

Page 14 third line from bottom should read - "(see Section 4.0)" - delete remainder of phrase in brackets

Page 21

first line should read - "see recommendation 2"

Section 7, point 1, starting second line should read -

"The plan proposes to treat the old tailings and tailings deposited behind the Intermediate Dam until reprocessing begins. We are encouraged that the company will be undertaking these investigations and support their mitigation efforts in this area."

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To - À	From - De Lois Craig	Program Code - Code de pro	
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	Division Environment & Land Claims		

Page 1 of *5

Curragh Resources Inc. - Amendments to the January 3, 1992
Environmental Screening Report regarding the Down Valley Tailings
Impoundment Decommissioning Plan (SRK) and Abandonment Aspects
of the Water Recycle and Tailings Deposition Plan (Kilborn)

Distribution List

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▶ If further space is required please use a second page - Si cet espace est insuffisant veuillez utiliser une deuxième feuille

Message Prepared by - Message rédigé par Val Bowie	Telephone No. - No de télé 667-3251
Signature of Person Authorizing Message - Signature de la personne autorisant l'envoi du message	Date Jan. 13, 1992



Government of Canada / Gouvernement du Canada

MEMORANDUM

NOTE DE SERVICE

To / À

See Distribution List

From / De

Lois Craig
Director, Environment & Land Claims
Yukon Region

Subject / Objet

**Curragh Resources Inc. - Amendments to the January 3, 1992
Environmental Screening Report regarding the Down Valley Tailings
Impoundment Decommissioning Plan (SRK) and Abandonment Aspects of
the Water Recycle and Tailings Deposition Plan (Kilborn)**

Security Classification - Classification de sécurité	
Our File - Notre référence	5510-4-4C
Your File - Votre référence	
Date	January 13, 1992

Attached you will find an amendment to the Screening Report submitted to DIAND on January 3, 1992. We found a number of typographical errors in our original submission as well as some errors and inconsistencies in the text that might lead to confusion and felt it necessary to issue this amendment.

Lois Craig
Director
Environment & Land Claims
Yukon Region

January 13, 1992

**Curragh Resources Inc. - Amendments to the
January 9, 1992 Screening Report regarding
the Down Valley Tailings Impoundment
Decommissioning Plan (SRK) and Abandonment
Aspects of the Water Recycle and Tailings
Deposition Plan (Kilborn)**

Table of contents:

Conclusion page should be on page 15 rather than page 14.

Page 6 - Issue ii:

The Rose Creek Spillway is also referred to as the Intermediate Dam Spillway.

Andy
Clarification. The plans do examine structural and hydrology issues and risks but they do not examine these same issues and risks as they pertain to the possible failure of upstream structures such as the haul road or fresh water reservoir.

Page 7, Paragraph 1, second last line:

Add ... all abandonment structures.

Page 8 - Issue iv:

Mitigation section should be deleted and the following should be inserted in its place.

It is recommended that Curragh be requested to submit a financial assurance proposal to the Government of Canada for their preferred option, which specifies when and how funding of tailings and pit decommissioning is to occur. A contingency financing plan should also be required of Curragh for tailings and pit decommissioning by a date acceptable to Government to cover the eventuality that they find option five is not economically viable.

It is recognized that such financial assurance proposals cannot be separated from financial assurance associated with overall site abandonment and therefore it is recommended that such proposals be submitted no later than submission of a comprehensive abandonment plan as required by Government.

**Page 11 - H. Socio-economic Concerns:
Paragraph 2, last line**

Economy should be economy.

Page 13 - J. Recommendations:**Recommendation 3:**

delete existing text and substitute

Andy!
A downstream risk analysis should be undertaken as a component of the integrated, comprehensive abandonment plan showing the risk and consequences of a catastrophic failure of the tailings structure. If this analysis is not carried out, or if the analysis shows the consequences of failure to be significant, extreme event standards should be used for the design of abandonment structures; an assessment of the consequences of failure of the haul road and fresh water reservoir to the tailings structure should be carried out as part of the integrated, comprehensive abandonment plan; the existing tailings structures remain at risk during operation and it is recommended that the adequacy of the current design standards be reviewed.

Recommendation 4:

Add ... and into the North Fork of Rose Creek prior to the water level of the main pit reaching the elevation of the North Fork, and a groundwater contingency plan should be developed ...

Page 14 (Continuation of J. Recommendations)**New Recommendation 10:**

The existing water licence requirement for post-decommissioning water quality downstream of the tailings facility to be within CCRM guidelines for the protection of aquatic life should remain as the objective for all abandonment plans attached to the licence. Abandonment objectives for the receiving environment should be discussed further through the development and screening of an integrated, comprehensive abandonment plan and consideration could be given to amending the water quality objective when a comprehensive plan is incorporated into the water licence.

**Curragh Resources Inc. - Amendments to the
January 3, 1992 Environmental Screening
Report regarding the Down Valley Tailings
Impoundment Decommissioning Plan (SRX) and
Abandonment Aspects of the Water Recycle and
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