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**WINDY CRAGGY COPPER/COBALT/GOLD/SILVER PROJECT  
KEY MDRP AGENCY MEETING WITH GEDDES RESOURCES LIMITED**

**STAGE I SUBMISSION REVIEW**

**Date:** Thursday, July 5, 1990, 9:00 a.m.

**Place:** Office of Steffen, Robertson and Kirsten  
800 - 580 Hornby Street, Vancouver

**PROPOSED AGENDA**

**1. Introduction/Purpose of Meeting**

**2. Project Planning Update**

- o Results of recent proponent sponsored public meetings.
- o Planning for project components in Alaska.
- o Communication with Alaska State/U.S. Federal Review Agencies.

**3. Summary of Stage I Review Comments**

- o Stage "II".
- o Outstanding Stage I issues.
- o Revised Stage I plan.
- o Further ARD meetings/information exchanges.

**4. Integration of Further Submissions**

**5. Timing of Further Submissions**

**6. Other Business**



Province of  
British Columbia

ENGINEERING AND  
INSPECTION BRANCH

Ministry of  
Energy, Mines and  
Petroleum Resources

# MEMORANDUM

To: Ralph McGinn  
Anne Currie  
John Errington  
Tom Schroeter  
Lisa Cox  
David Parsons  
Garry Alexander  
Frank Rhebergen  
Bruce Letvak

Date: July 4, 1990

File: 15140/Windy Craggy

Re: Windy Craggy Project - Stage I Review Meeting

This memo confirms the key MDRP agency meeting with Geddes Resources Limited to discuss the Stage I review comments and the requirement for a revised Stage I submission. The meeting is scheduled for July 5, 1990, 9:00 a.m., at the offices of Steffen, Robertson and Kirsten, 800 - 580 Hornby Street. A proposed agenda is attached.

I appreciate your efforts to attend this important meeting.

for Norman Ringstad  
Chairman  
Mine Development Steering Committee  
c/o Engineering and Inspection Branch  
Mineral Resources Division

NR:sf

Attachment: Proposed agenda

cc: Keith Somerville  
Geddes Resources Limited

# MEMORANDUM

Ministry of  
Energy, Mines and  
Petroleum Resources

Province of  
British Columbia

ENGINEERING AND  
INSPECTION BRANCH



Date: July 4, 1990  
File: 15140/Windy Craggy

To: Ralph McGinn  
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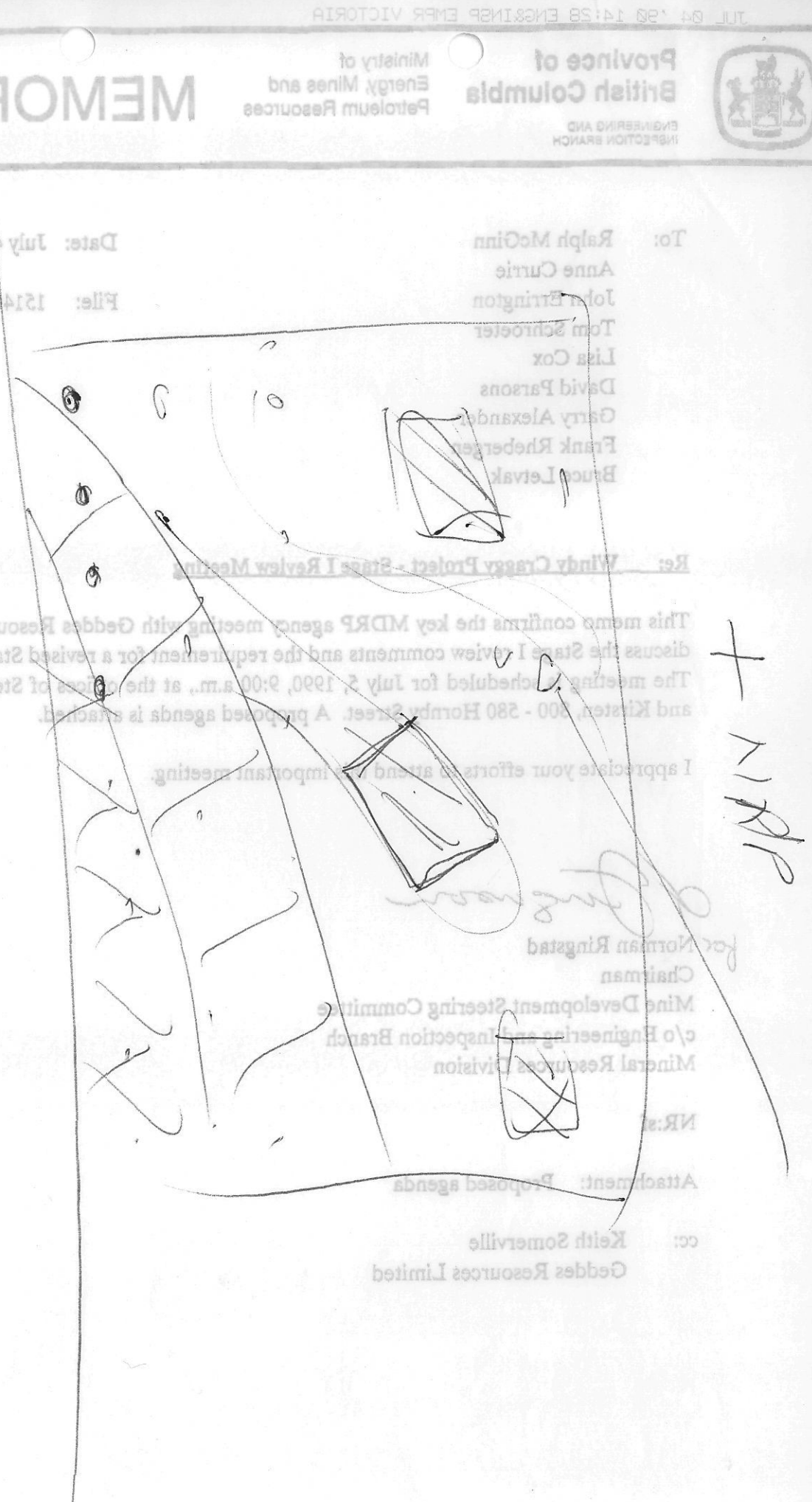
Mine Development Steering Committee  
c/o Engineering and Inspection Branch  
Mineral Resources Division

NR:

Attachment: Proposed agenda

cc: Keith Somerville  
Geddes Resources Limited

+ MRP



# WINDY CRAGGY - Stage 1 Review

July 5/90  
SRK offices - Van.

9:15am - 1:45pm

## Summary of Stage 1 Review Comments

- outstanding issues (Stage 1) = AMD (ARD)
- Lisa Cox (Env. Can.) - blending of waste rk. on glaciers
- Gary Alexander (MOE) - mine access road - could be handled at Stage II but could use more data 'now'
- Frank Rhebergen (MOE) - AMD - disposal of waste rk. on glaciers (MOE developing policy now)
- Bruce Letvak (MOE) - Tailings pond - technical, earthquake, Road - wildlife studies, water management
- Gary Alexander (MOE) - MOE not separated Stage 1 vs Stage 2 requirements (as Envir. Can has done)
- Ralph McGinn (Env'R) - AMD - developing policy - esp. waste rk. under water
  - blending of waste rk. - on a glacier - not acceptable.
  - company to determine mining method (i.e. u/g vs open pit)
  - safety - working on dumps
  - tailings impoundment → groundwater contamination - wet option for abandonment preferred.
  - road concerns → Stage II
  - stability of tailings impoundment → Stage III
  - Ministry - 'proposal' (if economically feasible)

- Ringsstad : a) 2 Policies - 1) AMD (soon) 2) Glaciers - waste disposal (- early stages)
- b) company requires plus technical data
  - c) Compendium of review comments - to be made public (then MDRP)

- Senerville: stage 1 Revised Plan - overall direction =
- a) Process concepts - open pit, u/g (technical/economics) trucking
  - material handling (e.g. high sulfide waste rk.) = pipelines
  - capacity - 'new' ore reserves - rpt. from Flour-Daniels by August

b) Waste Management - i) under water (tailings + and waste rock)  
ii) "heap" disposal for + net neutralizing material → attempt to document

- need to delineate wasterock (geological) - types, location, quantity, stage of mining
- characterization of waste rock → neutralizing, acid generating, etc. (ICP work from ddh; leach pad tests; column tests, etc.)
- field programs (in progress) - wasterock/ore relationship
- surficial work - hydrology, glaciology

Robinson: Options - a) haul over glacier b) tunnel to south Tats valley

- sufficient storage, space - net acid gen. material → under water
- currently drilling from surface to get more info to characterize rock 'above' the orebody (lacking info to date)
- test older drill holes + ICP corel. (ABA tests)
- start drilling in pond area (13) - geotechnical stability, groundwater quality
- glaciation study - uoc - plus 2 ddh to base of Tats glacier
- plan to put waste material on Frobisher + Tats glacier assuming not acid generating

Ferguson ~~Robinson~~: question <sup>why</sup> - 2 'separate' tailings (i.e. rock/tailings)

Robinson: - potential advantages to future recovery.

Samerville: - mechanical benefits of handling separately

Robinson: - possible stockpile of 'low grade' - under water

Cox: Acid generating material back into pit?

Robinson: Yes - staged into pits

Brodie: + NNP into pits, - NNP under water

Ferguson: high S and high NNP - ones to watch!

Ringsdale: Any value for NNP to send underwater vs surface

Ferguson: Still examining! - need kinetic tests (eg. 3:1 test)

Bratlie: - look closely at <sup>dist'n of</sup> rock characters (block models) - as economics dictates.

- address uncertainties re - underwater vs surface impoundment

Zorkin: dump of waste rk. on glacier

Somerville: Pit - ore/waste 'controls' eg. 12 1/2 m<sup>3</sup> influence 'blocks'

Rhebergen: Method of ABA analyses? eg. BC Research method

- need to differentiate between different methods used,

Zorkin: Test Programs i) quantities/volumes <sup>(character)</sup> of waste rocks -> acid-base accounting + kinetic (humidity cells -> reactivity)

- use-existing cores - new drilling (~ 125 add. ABA samples)

- ICP data w/ calcium particularly

- mineralogical est. of sulfur using 'past' drill logs

ii) waste management plans - waste rock dumping on glacier (non-acid generating) - to demonstrate! (determine cut-off point) - data avail. for Stage II rpt.

Cox, Ferguson: need to address putting waste rock on the glacier w/rt ~~the~~ the long term effects!

Ferguson: morphologies of sulphides/carbonates are specifically treated in column tests eg. fibroidal py, massive po, etc.

- use range of kinetic tests to obtain ABA data from 'all' rock types

Rhebergen: Particle sizes, rock 'breakdown'

Ferguson: Working on developing a general waste rock <sup>disposal</sup> model (with SRK Eng.)

Letvak: Option of not dumping on the glacier.

Robinson: - economically not feasible to take down (~ 12km) to Tats valley.

Alexander: results of u/G study be part of Stage 1?

Somerville: Yes - but u/G (at this time) will only be 'supplemental'

Ringsstad: Important to identify options of other place to dump waste rk. (not on glacier) - for sake of the public!

Robinson: Will do - but other option must probably not economic.

Alexander: Ministry/Gov't Policy - eg. 'mining' of ice to get at South Zone.

McGinn: Questions policy - should be treated as site specific (i.e. political)

Ringstad: Glaciology study could be very important!  
- MOE should identify (i.e. issue) waste rock dumping onto glaciers.

Alexander: Recognizes need for MOE to expedite 'glaciology' issue

Robinson: Wants to ensure industry/public input. May have to be site-specific to address expediency.

Cox: Technical comments (cf. policy comments)

Zorkin: (cont'd) ii) underwater disposal option - 'flooded' test columns.  
- transport/placement of rts. prior to being put under water.  
iii) pit walls - theoretical modelling

Letvak: water balance in pits important - uncertainty

Rhebergen: MOE doesn't consider collection/treatment of AMP over a long period is viable.

Robinson: AMP coming into glacier now & for previous yrs.

Rhebergen: - relative rates of weathering (eg. 50 yrs. from now)

Robinson: 'sub-summary'

Ringstad: Do key agencies understand company's current plans?

Cox: Yes - collection/treatment for Stage 1 (waste dumps and pit)

Rhebergen: Yes - need more discussion re-tailings improvement (maintenance into perpetuity). → Stage II

Ringstad: Do key agencies need a Geddes written submission for 'focussed' Stage 1 study (in progress)

Rhebergen: Want subsequent meetings to provide consultative input.

Alexander: Problem (uneasy) with putting waste rock on glacier  
- public interest - options must be stated clearly.  
- also road corridor

Ringsstad: Public comments, 'considered' but no direct decision making  
Ferguson: waste mt. on glacier - contingency? - short/medium/long term. eg. monitoring

Rhebergen: MCE will be very conservative Eg. Zn levels

Robinson: Natural weather mitigations

Ringsstad: - need for a 'revised' Stage 1 mine plan ('focussed')  
- Further meetings? - as req'd: Mon. ~~July 15th~~ July 15th  
- asked Schroeter for any GSB comments? - none

12:30 - Break - lunch

12:45 - Reconvene

Agenda Item #2

Somerville: Results of public info. meetings + 'Alaskan' issue  
- i) Consultant, Craig Aspinall, preparing a rpt. on public meetings - incl. questions by topics. → avail. next week → MDR  
- ii) Newsletter planned - identify a short list of 'most common' topics (layman's language) → August  
- iii) Technical seminars - by Geddes, SAK, Norecol → to communities  
- plan not yet completed for 'Alaskan' issue - esp. Haines people  
Alaska - engineering study of transport of concentrate to sea port  
engaged - avail. by Sept. 1. Feasibility by Jan '91  
(~~not~~ initially based on truck haul) - Eng. gp. from Anchorage  
- socio-economic study in Haines (based on trucking option)  
- environmental aspects - not yet initiated (recognizes its importance)  
- no communication link <sup>with Gov't bodies</sup> established yet - would like to! (help?)

Ringsstad: Have you studied pipeline scenario? concentrate/fuel

Somerville: Yes (Wright Eng.) - concentrate. fuel - no → by Aug.

~~Ringsstad~~  
Ringsstad: Use of road, town - Alaskan permits - MDRP does not have any jurisdiction; however, will help to establish a link with appropriate Gov't agencies.



Ringstad (cont'd) - meeting in Seattle last wk. with Ringstad/Cox + key US officials - technical info exchange (ad hoc group)  
- "Governmental Coordination Group (GCG)"

Cox! - Need (plan) for Geddes to contact US Groups!  
(Previous pleas apparently not acted upon) [Contact: Carrie Howard]  
- request (suggest) that Geddes submit a 'tandem' rpt. (along with the 'focussed' Stage 1 rpt.) to Alaskan agencies  
- also suggest to do above verbally.  
- file rpts. at same time (MDRC / Alaska)

Ringstad! Comments/suggestions re- Alaskan meetings esp. terms of reference  
- important to interact with Alaskan officials

Timing of Submissions?

Somerville - more engineering data by Aug.  
- 'focussed' Stage 1 rpt. by Sept. '90

Ringstad! Summary:

(Chairman) - options - economics/environment  
- reclamation bonding - how much, how long?

Somerville! Request for data on reclamation scenarios

Errington! Suggests company should provide plan with guesstimates

McBinn! EMR needs more info - like to amortize over mine life

Robinson! SRK to provide input to Geddes

Tom Schroeter  
July 5/90



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Province of  
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ENGINEERING AND  
INSPECTION BRANCH

Ministry of  
Energy, Mines and  
Petroleum Resources

AUG 02 1990  
MEMORANDUM

To: Ralph McGinn  
John Errington  
✓ Tom Schroeter  
Garry Alexander  
Bruce Letvak  
Frank Rhebergen  
Keith Ferguson  
Lisa Cox

Date: July 31, 1990

File: 15140/Windy Craggy

**Re: Windy Craggy Project - Minutes of 1990-07-05 Meeting**

Attached please find Anne Currie's minutes of the 1990-07-05 meeting, which was held at the office of Steffen, Robertson and Kirsten, 800 - 580 Hornby Street. If you find any errors, omissions or misinterpretations, please contact Anne Currie at 356-2195 or myself at 356-2229.

Norman Ringstad  
Chairman  
Mine Development Steering Committee  
c/o Engineering and Inspection Branch  
Mineral Resources Division

NR:AC:sf

Attachment: Minutes of 1990-07-05 Meeting

# MINE DEVELOPMENT REVIEW PROCESS

## WINDY CRAGGY COPPER/COBALT/GOLD/SILVER PROJECT

### KEY MDRP AGENCIES' MEETING WITH GEDDES RESOURCES LIMITED

#### STAGE I SUBMISSION REVIEW

Steffen, Robertson and Kirsten  
800 - 580 Hornby Street  
Vancouver, British Columbia

1990-07-05

Attendees:	Norman Ringstad	MDSC/MEMPR
	Anne Currie	MDSC/MEMPR
	Ralph McGinn	MEMPR
	John Errington	MEMPR
	Tom Schroeter	MEMPR
	Garry Alexander	MOE
	Bruce Letvak	MOE
	Frank Rhebergen	MOE
	Keith Ferguson	DOE
	Lisa Cox	DOE
	Keith Somerville	Geddes
	Phil Claridge	Geddes
	Keith Robinson	SRK
	John Brodie	SRK
	Jim Malick	Norecol
	Niko Zorkin	Norecol

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#### INTRODUCTION

- o Based on the review of the Stage I report, the mine plan was found to be unacceptable by key Mine Development Review Process (MDRP) agencies due to the potentially adverse environmental effects of acid rock drainage (ARD).
- o The purpose of the meeting was to discuss the concerns of key MDRP agencies regarding ARD, and provide direction on a revised Stage I mine plan.

**SUMMARY OF AGENCIES' CONCERNS**

- o Environment Canada (DOE) noted that the company's plans to blend alkaline materials with significant quantities of potentially acid producing rock to prevent ARD formation have not been proven on a full or pilot scale in metal mining operations in Canada. It is also concerned about Geddes plans to dispose of potentially acid producing waste rock on glaciers.
- o The objective of DOE's technical review of the Stage I report was twofold:
  - 1) to provide direction on a revised Stage I report; and
  - 2) to provide initial terms of reference for Stage II studies for project components and baseline studies other than the mine plan.

Detailed recommendations for Stage II mine planning studies will be provided following the review of the revised Stage I report.

- o The Ministry of Environment (MOE) agreed that the disposal of waste rock on glaciers is a major concern, and it is currently developing a policy on glaciers which will include waste rock disposal. At this time, MOE cannot give the company any assurances that even the dumping of non acid-generating waste rock on glaciers would be supported.
- o Although the proposed access road is not a Stage I concern, MOE noted that not enough information has been provided by the company for the Ministry to assess the proposed route alignment. Additional information is required on the impacts of the proposed road on wildlife resources.
- o The Ministry of Energy, Mines and Petroleum Resources (MEMPR) is currently consolidating its review comments, and ARD is identified as a major concern. The only acceptable strategy for preventing ARD is the underwater disposal of tailings either in a lake or permanently flooded pond.
- o MEMPR's policy on ARD has been drafted and circulated to members of the Reclamation Advisory Committee for comment. The Ministry plans to circulate the policy more widely. The policy puts into writing what has been working policy.
- o MEMPR's responsibility is to provide guidance on the safe disposal of waste rock and to ensure the safety of workers at the mine site. The Ministry is concerned about the placement of waste rock on glaciers as it relates to the safety of mine workers.
- o No agreement was reached at the meeting on an acceptable ratio for blending acid generating and acid consuming rock. There was also no agreement on what net neutralization potential value should be used to confirm the non-acid generating potential of rock.

- o N. Ringstad noted that MEMPR's policy on ARD and MOE's policy on glaciers are important components of the Windy Craggy project review. The policy on glaciers will be developed jointly by the Water and Waste Management Branches and coordinated by the Policy and Planning Branch.
- o MOE's policy on glaciers is in its infancy as it has arisen largely due to the Windy Craggy project. Glaciers are considered a watercourse under the **Water Act**. The development of the policy will be delayed until the results of the company's technical studies are known. In the past, the Ministry has rejected proposals to mine glaciers to produce ice cubes, but it has approved the construction of mine roads over glaciers. During the development of this policy, the Ministry will examine other jurisdictions' policies. MOE appreciates the urgency of developing this policy.
- o The compendium of review comments on the company's January, 1990 submission will summarize outstanding Stage I and Stage II information requirements. It will be made available to the public at the same locations as the Stage I report.
- o A second newsletter will be drafted and sent to everyone on the Mine Development Steering Committee (MDSC) mailing list. It will summarize the key issues raised by the review agencies, local governments, Native and public groups, and the next steps in the review process. Key MDRP agencies will be given an opportunity to review the newsletter before it is circulated.
- o N. Ringstad noted that approval-in-principle (AIP) is granted when all policy issues are resolved and all technical issues are identified and are known to be resolvable. AIP does not automatically result in the granting of permits as further data and information is required in support of permit and approval adjudication.

#### Project Planning Update

- o Wright Engineers is currently conducting engineering studies which are examining both open pit and underground mining options. The mechanical handling of waste rock, ore and concentrate is also being examined. The company is also reviewing options for transporting the concentrate such as trucking and pipelines. Wright's report will be completed in August.
- o The company is exploring two options for the management of waste rock: underwater disposal and heat disposal. The objective of these studies is to demonstrate that heat disposal will produce a negative net neutralization potential. Geddes noted that it plans to blend waste rock, as proposed in the Stage I report, are not being evaluated.

- o The framework for the waste rock management studies consists of three components:
  - 1) Delineation of waste rock - Geological methods will be used to identify the different types and configurations of waste rock.
  - 2) Characterization of waste rock - These studies include acid base accounting, humidity cells and column leach testing. It will help Geddes understand the quality of waste rock.
  - 3) Field programs - Drilling will be conducted to provide additional information on the characterization of the waste rock.
  
- o SRK is reviewing options to determine the most economical method for moving acid generating waste rock and ore to a mill site located near the tailings pond area. Two options are being considered. The first option is to construct an underground tunnel to move ore to the south Tats Valley. The second option is to haul ore to the pond on a road which crosses over the glacier.
  
- o The upper Tats Valley is the best location of the tailings pond but the location for the mill is undecided. SRK will be conducting geotechnical studies to examine the foundation conditions of the pond. The core samples will be thick enough to address concerns relating to seismic activity.
  
- o A glaciation study is being conducted by the University of British Columbia. Samples will be collected from the base of glaciers.
  
- o DOE wondered what the advantages were of maintaining two separate cells in the tailings impoundment. The company noted that it will store low grade acid generating ore in one cell of the pond, and it may want to gain access to the ore at some future date for processing. Geddes realizes that there are advantages to mixing waste rock with tailings.
  
- o The company plans to dispose of waste rock with a positive net neutralization potential on glaciers and waste rock with a negative net neutralization potential underwater. DOE wondered that given the nature of the orebody, how feasible is it to determine which rock has positive net neutralization potential. Geddes noted that there will be a laboratory on site for testing and that mining will occur in blocks. Further drilling will also improve the characterization of the rock type.
  
- o Norecol summarized the proposed ARD studies. An acid base accounting (ABA) program will be conducted to develop a database to help understand the characteristics of the waste rock. One hundred and fifty additional ABA samples will be collected. Information from these samples will be available prior to the submission of the revised Stage I report. Humidity cells and kinetic tests will be undertaken to determine the reactivity of the waste rock. Tests will also be conducted on specific waste management plans to demonstrate that

they are feasible. This information will not be included in the revised Stage I report; however, it will be outlined in the Stage II submission.

- o DOE is concerned about the company obtaining a representative characterization of the waste rock prior to beginning the kinetic tests. Geddes noted that it has two drill core samples from the south pit and two drill core samples from the north pit will be taken. It does not plan to begin the column tests until one month from now. Given the high costs of conducting kinetic tests, DOE recommended that the company delay beginning these tests until the testing program is agreed to by key MDRP agencies.
- o DOE noted that the use of remedial measures is not possible if the waste rock that is dumped on glaciers does not behave as predicted. Government agencies cannot afford to take any risk and thus, agencies must be 100 per cent confident about the fate of the waste rock.
- o DOE noted that it will also be important to have an understanding of the relationship of calcium/sulphur. The company may want to consider "fast" kinetic testing. Given the size of the Windy Craggy deposit, MOE recommends that the company use a range of kinetic tests.
- o Geddes commented that it will be examining the competency and natural segregation potential of the waste rock.
- o MOE wondered whether the company had considered any alternatives to dumping waste rock on glaciers. The company noted that there is no other disposal site unless the rock is hauled twelve kilometres. Given the public's concerns about the dumping of waste rock on glaciers, the company should examine alternative disposal options.
- o The company is also developing a database to examine ARD in the pit walls. This assessment will be based on data which is being collected for some of the other test programs.
- o MOE commented that it does not consider the long-term treatment and collection of ARD as being a viable option. The conditions of the pit at the end of mining is also important. Thus an assessment of long-term pit drainage is necessary.
- o DOE noted that although it is difficult to conceive of contingency plans, the company must try to develop contingency plans over the short, medium and long-term to reduce the level of risk.
- o Further meetings between the company and the key MDRP agencies are required to discuss testwork for ARD and water management. The agencies want to have a good understanding of what studies the company is planning to conduct.



- o A meeting to discuss ARD testwork is proposed for 1990-07-16. MDSC representatives will not attend this meeting; however, the Committee would appreciate being kept informed. The MDSC will coordinate any future meetings when broader issues are being discussed.
- o A meeting between key MDRP agencies and the proponent to discuss and review the table of contents of the revised Stage I report is recommended.

#### **GEDDES PUBLIC CONSULTATION PROGRAM**

- o The company recently conducted a series of public meetings. C. Aspinall is preparing a report which will contain a description of the meeting process and a summary of the questions and responses that were raised at the meetings. The questions and responses will be organized by topic. The report will be submitted to the MDSC, and it will not be widely circulated by the company.
- o The company plans to publish a second newsletter which will discuss the public meetings, and identify a short list of some of the concerns that were raised at the meetings.
- o Geddes is planning to hold a series of technical meetings in some of the communities which will be most affected by the project. Presentations will likely be made by consultants from SRK and Norecol and by Geddes. The purpose of the meetings is to discuss some of the technical issues such as ARD and glaciology, in more detail.
- o The company may also hold a meeting in Haines to discuss Alaskan-related aspects of the project. This meeting would be held at the same time as the technical meetings.
- o A company in Anchorage has been hired to examine the transportation of the concentrate in Alaska, and the handling and storage of the concentrate at the port in Haines. Socio-economic studies are also being undertaken to examine the potential socio-economic impacts of the project on the community of Haines. The environmental studies in Alaska have not yet been initiated, although the company realizes that they should soon be started.
- o DOE encouraged the company to contact Ms. Kerry Howard, Office of the Governor of the State of Alaska, to arrange meetings with U.S. federal and state agencies.

#### **INTER-GOVERNMENTAL WORKING GROUP**

- o An inter-governmental working group (the Governmental Coordination Committee) has been established to help coordinate the review by British Columbian, Canadian federal, Alaska State and U.S. federal agencies. Representatives from Alaskan State and federal agencies, the Federal Government, the MDSC and the Premier's Office are members of the Committee. The Committee's first meeting was held in Seattle on 1990-06-28. Future meetings will be held as they are needed.

- o The objective of the Committee is to: consult on review processes and schedules on both sides of the B.C./Alaska border; and facilitate the exchange of technical information on project issues of common transboundary concern.
- o Although the MDRP's jurisdiction ends at the border, it is appropriate for the MDRP and U.S. review to be coordinated to ensure that B.C. is not put in the position where it is ready to recommend approval-in-principle, but the U.S. agencies are not ready.

#### INTEGRATION OF FURTHER SUBMISSIONS

- o When the company files the revised Stage I report it should also file a tandem document, which addresses U.S. concerns, with the U.S. federal and state agencies in order to bring project planning and assessment on the Alaska side up to a Stage I level of detail. The MDSC would appreciate receiving a copy of this report.
- o Geddes should review the Alaskan comments and incorporate these comments into the terms of reference for the Alaskan studies. These terms of reference should be reviewed by the U.S. agencies, as soon as possible.

#### TIMING OF FURTHER SUBMISSIONS

- o The company hopes to submit its revised Stage I report in September, 1990. The timing of the submission of the report to U.S. agencies will be determined by what additional information must be provided by the company.

#### SUMMARY

- o It is important for the company to evaluate and incorporate options in future submissions. The company should also begin to begin evaluating the project's reclamation costs. MEMPR's current bonding policy for any mine in B.C. is to set the bond annually at a level which reflects all outstanding decommissioning and closure costs existing at that time. Geddes commented that it is interested in receiving information on how bonds should be calculated. Once the company obtains more information on its mine plan, MEMPR could provide some assistance.

Compiled by: Anne Currie  
A/Secretary  
Mine Development Steering Committee  
c/o Engineering and Inspection Branch  
Mineral Resources Division



AUG 28 1990

YCS → Windy Craggy

To: Ralph McGinn  
John Errington  
✓ Tom Schroeter  
Garry Alexander  
Bruce Letvak  
Frank Rhebergen  
Keith Ferguson  
Lisa Cox

Date: August 24, 1990

File: 15140/Windy Craggy

**Re: Windy Craggy Project - Minutes of 1990-07-05 Meeting**

The purpose of this memo is to clarify several points in the minutes of the 1990-07-05 meeting, which was held to discuss the concerns of key MDRP agencies regarding acid rock drainage and provide direction on a revised Stage I mine plan. Changes are highlighted in boldface type.

Page 2, bullet 5

- o The Ministry of Energy, Mines and Petroleum Resources is currently consolidating its review comments, and ARD is identified as a major concern. The only acceptable strategy for preventing ARD is the underwater disposal of tailings and waste rock either in a lake or permanently flooded pond.

Page 3, bullet 7

- o The company is exploring two options for the management of waste rock: underwater disposal and **heap** disposal. The objective of these studies is to demonstrate that **heap** disposal will produce a negative net neutralization potential. Geddes noted that its plans to blend waste rock, as proposed in the Stage I report, are not being evaluated.

Page 4, bullet 2

- o SRK is reviewing options to determine the most economical method for moving acid generating waste rock and ore to a mill site located near the tailings pond area. Two options are being considered. The first option is to construct an underground tunnel to move **acid generating waste rock and ore** to the south Tats Valley. The second option is to haul **acid generating waste rock and ore** to the pond on a road which crosses over the glacier.

Page 4, bullet 3

- o The upper Tats Valley is the best location of the tailings pond but the location for the mill is undecided. SRK will be conducting geotechnical studies to examine the foundation conditions **for the proposed** pond. The core samples will be thick enough to address concerns relating to seismic activity.

*Anne Currie*

Anne Currie  
A/Secretary  
Mine Development Steering Committee  
c/o Engineering and Inspection Branch  
Mineral Resources Division

AC:sf

cc: Norm Ringstad



Province of  
British Columbia

Ministry of  
Energy, Mines and  
Petroleum Resources

# MEMORANDUM

Smithers telephone: (604) 847-7383

To: Tom Schroeter

DATE: March 14, 1991

From: Dave Lefebure

RE: WINDY CRAGGY REVISED STAGE 1 REPORT

\*\*\*\*\*


I have read the Windy Craggy Revised Stage 1 report submitted by Geddes Resources Limited. I am impressed with the increased data base dealing with acid mine drainage. It is also encouraging to see the substantial reduction in waste rock generated by the combined open pit and underground mine proposal favoured in the revised report. The stripping ratio for the open pit has dropped from 3.1:1 to 1.9:1 with a decrease in the total waste rock from 481 million tonnes to 251 million tonnes. Unfortunately for Geddes Resources Ltd., their new plan will reduce the overall copper recovery from the mining operation by 35% from the Stage I mining plan.

In my comments on the Stage I report I mentioned that

*"The Stage I discusses only an open pit mining operation. This does beg the question why not consider an underground mining operation. The latter mining method would offer some distinct advantages, such as reducing the amount of waste rock which would have to be stockpiled. This could be one of the simplest ways to reduce a potential acid mine drainage problem on the site. The stage II document should weigh the relative benefits, costs and risks associated with both an underground and open pit operation."*

The revised Stage I report does address this concern with a proposed mixed method of open pit and underground mining. They have included costs for the open pit and three styles of underground mining. Their conclusion is that a completely underground mine would be more costly and is not an economic proposition. There should be a more complete analysis of the relative costs of dealing with the acid-generating rock wastes (handling and reclamation) in the Stage II report. An assessment of the relative long term risks of the different mining methods should also be prepared.

This may be an area which will have to be addressed by the government to have an independent risk assessment of the mining plans.

LOG NO: MAR 20 1991	VAN 1
ACTION:	
	
FILE NO:	Windy Craggy

On page 5-10 it is remarked that "the risks associated with open pit operations are much less than with underground operations". This statement is followed by several other remarks which suggest a strong bias for open pit mining by Geddes Resources Ltd. Recent experience at the Nickel Plate and Premier Gold open pit mines have underlined the risky nature of mines in general. There are many examples of highly profitable underground mines handling massive sulphide ore similar to the Windy Craggy deposit.

On page 4-20 it states that "much of the waste rock within the proposed open pits contains erratic amounts of sulphide and carbonate". This will require considerable control be used during the mining operation to identify potentially acid-generating waste rock. Geddes Resources Ltd. has outlined an ambitious plan for categorizing and handling waste rock. The mitigation of the acid rock drainage problem will depend on Geddes Resources Ltd. ability to separate the acid-generating waste from the other waste. I anticipate that the Engineering and Inspection Branch will review this area in detail.

More information is needed on the limestone quarry proposed for the Tats valley - size, exact location, quality.

The results of studies of the impact of glaciers covering on reducing acid generated by sulphide-bearing rock will be interesting. It should be noted that there is an existing surface gossan which is currently covered in part by the ice sheet.

I have included a copy of the memorandum I completed for the Stage I report for your reference.

## Conclusions

The Geological Survey Branch should consider requesting the following information be included in the Stage II report by Geddes Resources Ltd.:

- 1) An analysis of the relative costs of handling acid-generating rock waste in both open pit with underground and underground mining operations.
- 2) An assessment of the relative long term environmental risks of both open pit with underground and underground operations.

Our Ministry should consider the need for an independent risk assessment of the Windy Craggy mine plan.

In response to Norm Ringstad's questions in his memorandum of January 7, 1991:

- 1) No concerns with Stage 1.
- 2) See above for Stage II.
- 3) More information about proposed limestone quarry.

A handwritten signature in cursive script that reads "David Lefebvre". The signature is written in black ink and is positioned in the lower-left quadrant of the page.

*Tom* *F.Y.I.*  
*Dave*

*April 30, 1990*

To: Vic Preto

DATE: ~~March 14, 1991~~

From: Dave Lefebure

RE: WINDY CRAGGY STAGE 1 REPORT COMMENTS

\*\*\*\*\*

I have read the Windy Craggy Stage 1 report submitted by Geddes Resouces Limited with particular attention given to sections 2, 3.6, 5,7, 9 and 14.

Section 2

The ore reserves are substantial and the estimates are reasonable based on my knowledge. A more detailed review of their data might be warranted.

Section 3.6

The Stage I discusses only an open pit mining operation. This does beg the question why not consider an underground mining operation. The latter mining method would offer some distinct advantages, such as reducing the amount of waste rock which would have to be stockpiled. This could be one of the simplest ways to reduce a potential acid mine drainage problem on the site. The stage II document should weigh the relative benefits, costs and risks associated with both an underground and open pit operation.

It would appear that relatively small amounts of low grade ore shown in Table 3-2 might be better handled by processing immediately rather than being stored at the head of Red Creek, at least for the first three years. This would reduce the necessity of temporary stockpiles.

In the Stage II report it will be important to provide a complete picture of the distribution of the sulphide-bearing waste. The deposit has a very sulphide-rich stringer zone which includes a lot of probable waste rock. Any plans to deal with potential acid mine drainage need to be based on accurate assessments of the type and volume of waste material. These assessments should include scenarios such as the following which is mentioned in the report:

"It should be noted that less sulphide waste will be mined during the operations than is predicted in Table 3-3 because pit-planning completed to date has been based on conservative cutoff grade. Consequently, some of the stringer stockwork and sulphide lenses and most of the massive sulphides below cutoff grade will, in fact, be processed in the mill as ore."



## Section 7

The access road is a critical aspect of this project. I have already recommended the Geological Survey Branch support the company's decision to utilize the Scottie Pass corridor (July 24, 1989).

## SECTION 14

The Stage I report may have overestimated the number of employees which will come from towns such as Prince George, Fort St. John and Smithers. Other fly-in mining operations in the northwest province have frequently drawn a lower percentage of people from the north and many more from southern B.C..