

EQUITY SILVER MINES LIMITED

20 June 1989

MEMORANDUM

TO: ENGINEERING SUPERVISOR
FROM: Mine Geologist
RE: LIMESTONE STANDARDS: CRITERIA FOR SELECTION

INTRODUCTION

Various mineralogical and metallurgical criteria are needed to evaluate a limestone deposit for acid neutralizing potential and calcining ability. Following are a number of parameters and standards which should be used. This information was obtained from Equity's Assay Lab personnel, Star Equipment Ltd. (Dahl Lake quarry), Continental Lime (formerly Steele Bros.) and Texada Lime.

RECOMMENDATION

It is recommended that Equity use the following criteria to evaluate limestone for calcining purposes only:

Minimum: 95% CaCO₃
Maximum: 4000 ppm Mg
Maximum: 1.25% residual oxides (iron and aluminum)
Maximum: 2.25% insolubles (SiO₂)
Maximum: 0.01% phosphorous

It is difficult to set standards for limestone which will be used for treatment of acid mine drainage (A.M.D.). Obviously the purer the limestone, the more efficient the treatment will be and therefore the less tonnes will be required to neutralize a given amount of A.M.D. For a more detailed account of limestone costs and tonnages, refer to Table II in memo of 27 Feb., 1989 to Engineering Supervisor from Environmental Co-Ordinator which documents yearly tonnages and costs of limestone from various known sites. The acid neutralizing potential of a limestone should of course be a major consideration but site location, transportation costs and costs for site preparation and extraction should also be considered.

LIMESTONE PARAMETERS

Following is a breakdown of limestone and lime components:

- 1) Limestone can raise the pH of A.M.D. to 4.5 or 5 but only within practical time limits of 6 to 10 minutes.
- 2) CaO (lime) can neutralize 31.5 meq HCl/g. This means it

takes 31.5 millilitres of 1N HCl to neutralize 1g of lime.

- 3) 100% CaCO₃ contains 40.04% Ca.
- 4) 100% CaO contains 71.5% Ca.
- 5) 100% CaCO₃ contains 56.03% CaO.
- 6) Definition of acid neutralizing determinations:
 - a) CaCO₃ (A.A.) means that %Ca is read directly from the atomic absorption unit and CaCO₃ is calculated from the Ca value.
 - b) CaCO₃ (acid neut.) means that CaCO₃ is dissolved and titrated with hydrochloric acid. It is assumed that all basic material is CaCO₃. Of the two determinations, this is the more accurate for %CaCO₃.
- 7) 100% MgO contains 60.3% Mg.

SPECIFICATIONS

The following limestone specifications were obtained for calcining purposes only:

- a) Star Equipment Ltd (Dahl Lake Quarry)

Pulp mills in Prince George require limestone of the following specifications:

Minimum: 97% CaCO₃
 Maximum: 0.75% MgO (4086ppm Mg)
 Maximum: 1.0% SiO₂
 Maximum: 0.75% Fe

- b) Texada Lime buys limestone with the following specifications:

Minimum: 97% CaCO₃
 Maximum: 0.60% MgO (3600ppm Mg)
 Maximum: 1.0% SiO₂
 Maximum: 0.5% iron and aluminum oxides
 Maximum: 0.01% phosphorous

- c) Continental Lime says that for selling on the open market, limestone must have the following specifications:

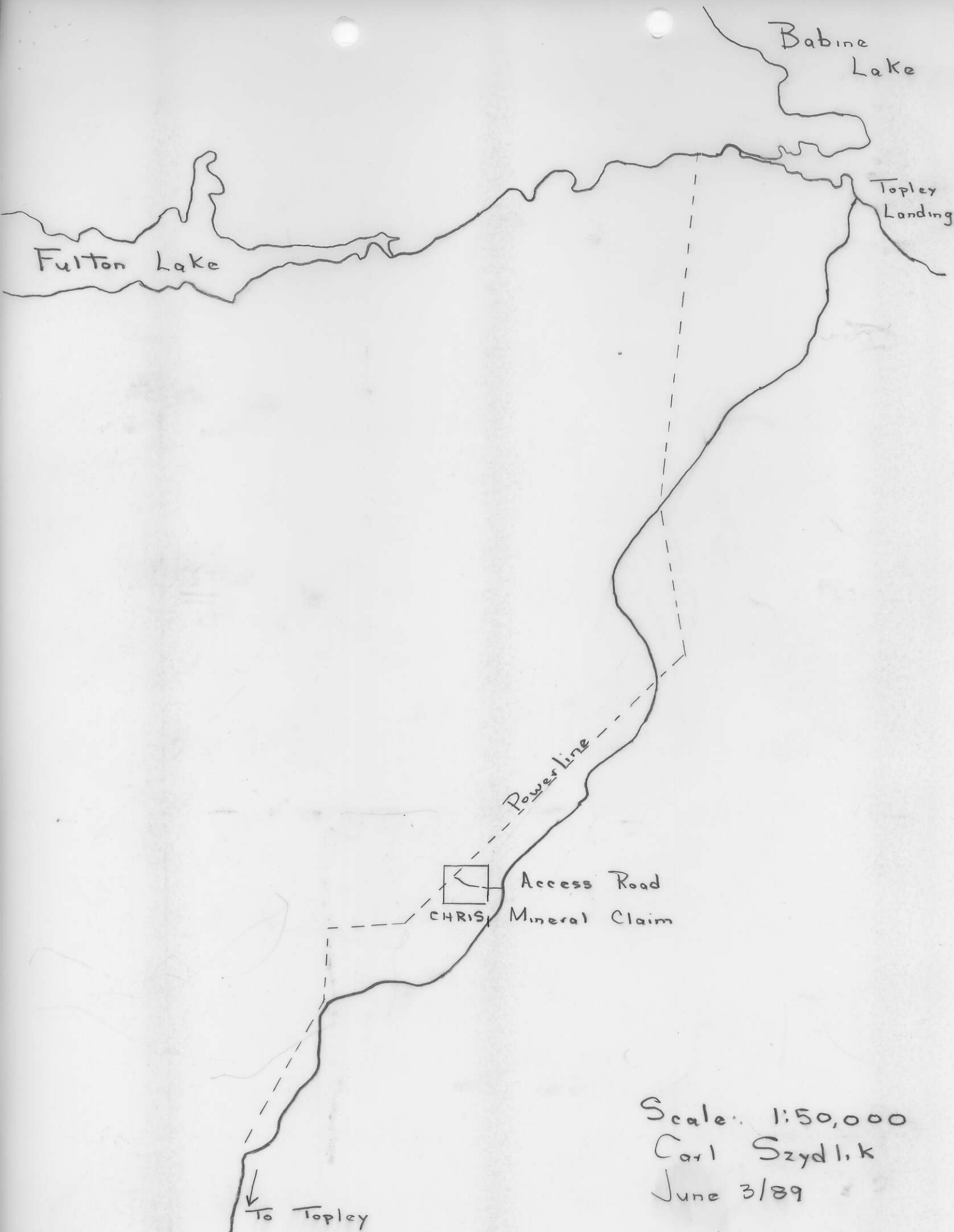
Minimum: 95% CaCO₃
 Maximum: 2.0% Mg (20,000 ppm Mg)

Maximum: 2.0% - 2.5% SiO₂
Maximum: 1.0% - 1.5% residual oxides (iron and
aluminum oxides)

J. Cyr

cc. Mine Manager
Mine Superintendent
Environmental Co-Ordinator

Mine Geologist



Babine Lake

Fulton Lake

Topley Landing

Powerline

Access Road

CHRIS Mineral Claim

To Topley

Scale: 1:50,000
Carl Szydlik
June 3/89

West
Claim
Boundary

3m Deep Trench
gave no Ls

30m

B.C. Hydro

Right-of-Way

60m

Sp 4

20m

Sp #3

15m

Sp #2

Sp #1

25m

Sub oic of Limestone

Access
Road

Scale: Schematic
Carl Szydlik
June 3/89

