SRK Consulting
Engineers and Scientists

Steffen, Robertson and Kirsten (Canada) Inc.
Suite 800 – 1066 West Hastings Street
Vancouver, B.C. V6E 3X2
Canada

vancouver@srk.com
www.srk.com

Tel: 604.681.4196
Fax: 604.687.5532

Memorandum

To:	File	**Date:**	July 22, 2005
cc:	Daryl Hockley Cam Scott	**From:**	John Chapman
Subject:	Rose Creek Tailings Deposit Supplemental Lime Demand Testing Revised	**Project #:**	Task 22(a)

REVISED

1 Introduction

During the 2004 investigation, estimates of the lime demand for the tailings were derived to investigate the cost implications for tailings relocation. These estimates were derived from six bulk tailings samples, two from each of the Original, Secondary and Intermediate impoundments, which were subjected to lime neutralization tests. The lime demand results from these tests were then extrapolated to the underlying tailings based on paste pH and conductivity measurements at depth. The estimated lime neutralization costs were significant, in the order of $80,00,000 for all of the tailings.

Verification of these estimates is required as part of further design of the tailings relocation option. Therefore, an additional series of lime neutralization tests is recommended as described in the following.

2 Proposed Scope of Work

Additional tailings 'fresh' samples will be required to complete the evaluation. Since a drilling program is planned in a concurrent investigation (Task 22(h) Attenuation Testing), tailings samples will be recovered from that program.

2.1 Sample Selection

Three deep bores will be completed to obtain samples from the entire depth of the tailings profile. The proposed bore locations are shown in Figure 1.

Additional tailings samples for the lime demand testing will be obtained from the Attenuation Testing bore holes that will be located within each tailings deposit.

Samples will be prepared to represent each one meter interval of the tailings from surface to the base of the tailings deposit. Care will be taken to ensure that no porewater losses occur during sample preparation.

2.2 Testing

2.2.1 Lime Demand Testing

The paste pH and conductivity of each composite sample will be determined prior to testing. Moisture determinations will also be completed for each composite sample.

Lime demand tests will be completed on representative subsamples of about 200 g from each composite sample. The tailings sub-samples will be suspended in about 400 mL of water and well mixed for about 30 minutes. Lime, as a 10 g/L or a 100 g/L (depending on sample pH) milk of lime slurry, will then be added to the tailings to attain an endpoint pH of 9.5. The slurry will be stirred continuously for 24 hours, after which the pH will be checked and adjusted as necessary until a stable endpoint pH is reached. Once a stable endpoint pH has been achieved, the total lime demand will be recorded.

2.2.2 Settling Tests

Settling tests will be completed on selected samples to establish settled densities of the neutralized tailings. The settling tests will be completed in 1 liter measuring cylinders.

2.2.3 Aging Tests

At completion the lime demand and settling tests, neutralized tailings with various lime additions will be placed in three columns. A water cover of at least 1 m will be established over the top of the tailings solids. Porewater will be extracted from the tailings at 1 week, 3 weeks, 6 weeks and at 12 weeks and submitted for detailed analysis.

2.2.4 Mineralogy

Selected samples of the neutralized tailings will be submitted for mineralogical examination to assess secondary mineral formation.

2.3 Reporting

The results from the testing will be used to estimate the overall lime demand for the tailings contained in each of the impoundments. In additions, contaminant concentrations that may develop in the neutralized tailings in the long term will be estimated from the porewater monitoring results.

3 Cost Estimate

The estimated costs are summarized in Table 1. GST has not been included in the estimate.

The cost estimate assumes that i) all of the samples will be obtained from the planned drilling program and from hand excavated test pits as required, ii) the sample selection and preparation will be undertaken concurrently with Task 22h and that travel and accommodation will be covered by that task; and, approximately 30 samples will be selected for lime neutralization testing.

Table 1. Estimated Costs

Task	Professional Time (hrs) DEH	JTC	DBM	Task Fees	Disbursements Laboratory	Drilling*	Accom. & meals	Comm. Charge	Task Disb.	Task Total
Program Design and Planning	8	8	16	$ 4,440				$ 222	$ 222	$ 4,662
Field Investigation		4	40	$ 4,700	$ 300	$ 26,275	$ 400	$ 235	$ 27,210	$ 31,910
Laboratory Investigations		8	8	$ 2,200	$ 22,500			$ 110	$ 22,610	$ 24,810
Mineralogy			4	$ 400	$ 5,100			$ 20	$ 5,120	$ 5,520
Reporting	16	32	24	$ 10,880				$ 544	$ 544	$ 11,424
Subtotal	24	52	92		$ 27,900	$ 26,275	$ 400	$ 1,131		
Unit Rates (per hour)	$ 180	$ 175	$ 100							
ITEM Total	$ 4,320	$ 9,100	$ 9,200	$ 22,620	$ 27,900	$ 26,275	$ 400	$ 1,131	$ 55,706	$ 78,326
Contingency (10 %)										$ 7,833
Cost Estimate										$ 86,159

Notes:

* Drilling estimate includes $8000
No travel allowance has been included as it was assumed that DBM will already be at site

DEH - Daryl Hockley
JTC - John Chapman
DBM - Dyl MacGregor

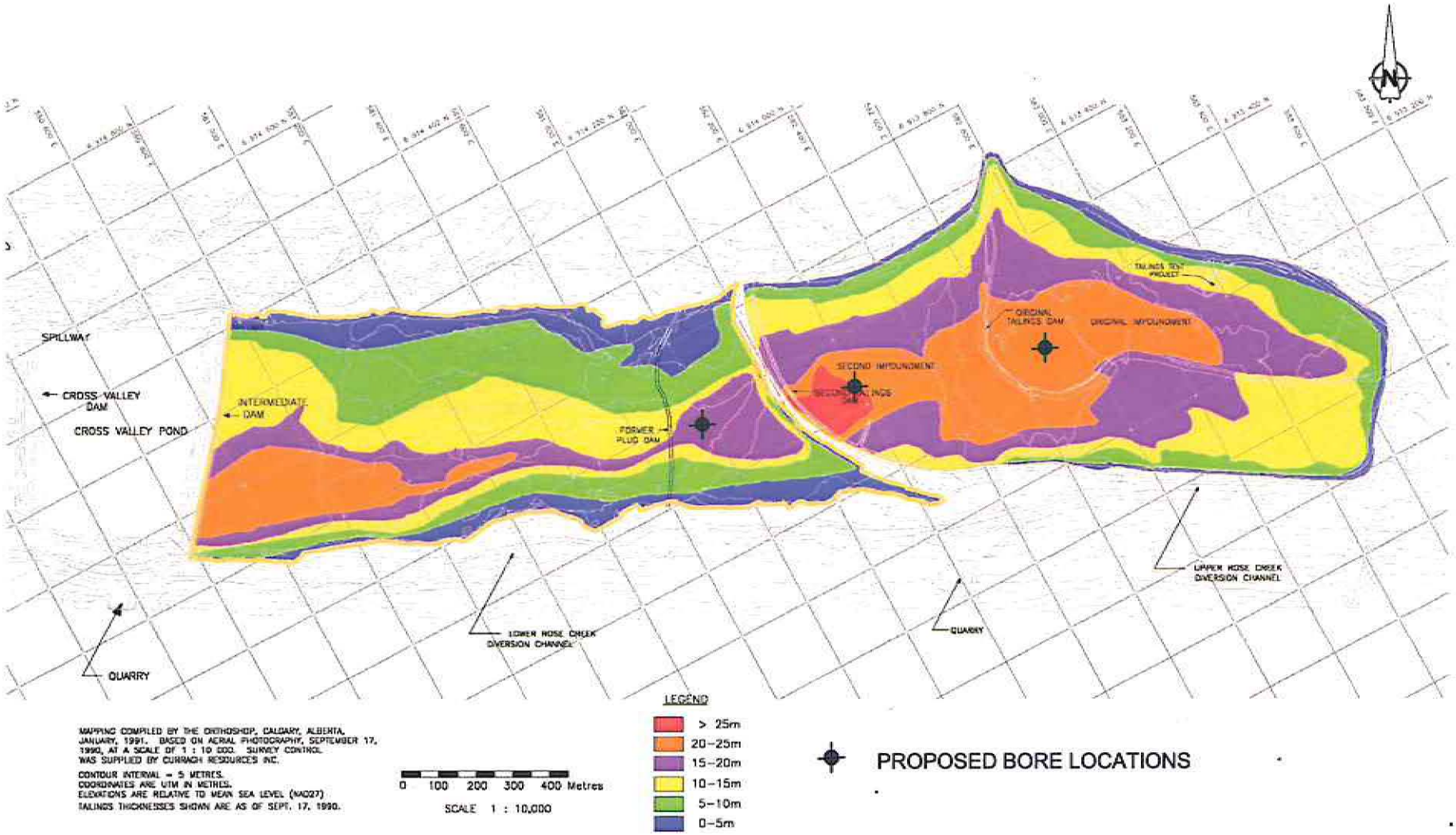

Figure 1. Proposed Bore Locations