

Appendix F8

Capital Costs for Avalanche Management

PROJECT MEMORANDUM

Date: April 13, 2012
To: Seabridge Gold Inc.
From: Brian Gould, P. Eng;
Re: CAPEX costs for Avalanche Management

1.0 Introduction

Alpine Solutions Avalanche Services (Alpine Solutions) submitted a memorandum to BGC Engineering Inc. (BGC) outlining the key elements of an active avalanche management plan for the KSM Project (Alpine Solutions, 2011a). Specific infrastructure required to implement the avalanche management program is expected to include:

- Fixed Remote Avalanche Control Systems (eg. Gazex);
- Avalanche Supporting Structures (fencing);
- Explosive Magazines;
- Ground based pneumatic explosive launchers;
- Other infrastructure including remote telemetry weather stations, ridge top shelters, tracked snow vehicles (snow-cats), Infrasonic Sensors; and
- Personal Protective Equipment (PPE) and Rescue Equipment.

Alpine Solutions also submitted an email to Wardrop Engineering Inc. (Alpine Solutions, 2011b) which outlined pre-feasibility level estimated capital expenditures (CAPEX) for the avalanche management plan for the KSM Project. These costs were estimated to be accurate to plus or minus 30%.

This memorandum provides an update to the pre-feasibility level estimated CAPEX required for the active avalanche management plan. Costs for permanent avalanche mitigation (diversion berms, catchment berms, avalanche stopping walls, or any other permanent mitigation measure), snow clearing machinery, and operations and maintenance costs are not included in this memorandum.

2.0 Capital Expenditures

A total of approximately \$24.9M is estimated as the required CAPEX for avalanche management for the KSM Project. Figures have been adjusted due to an updated General Arrangement at the mine site, and as a result a slightly reduced requirement for Remote Avalanche Control Systems (RACS) in the area. In addition, we have received revised pricing for infrasonic sensors. Costs are based on experience with other avalanche management programs as well as discussions with avalanche infrastructure suppliers and installers. Table 2-1 presents costs for each category of avalanche management identified.

Table 2-1 Summary of CAPEX for KSM Project

ITEM	CAPEX (\$K)
FIXED AVALANCHE MANAGEMENT	
Materials	
RACS (eg. Gazex)	\$6,000
Supporting Structures (fencing)	\$3,900
Installation	
RACS (eg. Gazex)	\$6,000
Supporting Structures (fencing)	\$7,000
AVALANCHE EXPLOSIVE CONTROL	
Launchers	\$200
Explosive Magazines	\$40
INFRASTRUCTURE	
Trucks, Snow-cats	\$800
Ridge top Shelters	\$200
Weather Stations	\$100
Infrasonic Sensors	\$340
OTHER	
PPE and rescue	\$200
Office, supplies	\$100
TOTAL	\$24,880

3.0 Limitations

The cost estimates provided in this memorandum are based on a preliminary layout of facilities as specified in the two forthcoming BGC geohazards and risk assessment reports (Revision C), and project access requirements as understood by Alpine Solutions. Costs are estimated to plus or minus 30%. There are several factors which may change these initial estimates. These include, but are not limited to:

- Price adjustments from manufacturers of avalanche control equipment;
- Change in exchange rates which would impact imported products;

- Variation in geotechnical conditions where fixed structures are installed;
- Changes in the General Arrangement of facilities and access routes; and
- Adjustments in the Consumer Price Index, which may impact labor rates.

4.0 Closure

This document was prepared by Alpine Solutions Avalanche Services for the account of BGC Engineering Inc. and Seabridge Gold. The material in it reflects Alpine Solutions best judgment in light of the information available to Alpine Solutions at the time of preparation. Any use which a third party makes of this document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Alpine Solutions accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions, based on this document.

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Yours Sincerely,
Alpine Solutions Avalanche Services
Per:

Brian Gould, P. Eng.
Senior Avalanche Specialist

References

Alpine Solutions, 2011a. Active Avalanche Management Plan for the KSM Project. Report prepared for BGC Engineering and Seabridge Gold. Dated May 4, 2011.

Alpine Solutions, 2011b. Avalanche Management at KSM. Email submitted to Wardrop Engineering Inc. and BGC Engineering Inc. Dated April 1, 2011.