

# Technical Report on the Lucky Queen Deposit, Lucky Queen Property, Keno Hill District, Yukon

Report Prepared for

**Alexco Resource Corp.**



Report Prepared by



SRK Consulting (Canada) Inc.  
2CA017.001  
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# **Technical Report on the Lucky Queen Deposit, Lucky Queen Property, Keno Hill District, Yukon**

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Photo from Lucky Queen property looking towards Bellekeno

## Executive Summary

The Lucky Queen prospect is one of several polymetallic silver-lead-zinc deposits occurring in the historic Keno Hill silver-lead district located near Mayo, Yukon Territory. A mineral resource model was constructed by SRK Consulting (Canada) Inc. ("SRK") during the first quarter of 2011 using a geostatistical block modeling approach, constrained by wireframes, provided by Alexco Resource Corp. ("Alexco"). Mineral resources are classified as Indicated and Inferred Mineral Resources following the CIM Definition Standards for Mineral Resources and Mineral Reserves (December 2005) guidelines.

This technical report documents the mineral resource estimate for the Lucky Queen prospect. It was prepared following the guidelines of the Canadian Securities Administrators National Instrument 43-101 and Form 43-101F1, and in conformity with generally accepted CIM "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines".

## Property Description, Location, Access and Physiography

The Lucky Queen property is located in the Mayo Mining District approximately 350 kilometres ("km") north of Whitehorse, Yukon Territory, within the Keno Hill mining district. Mayo is accessible from Whitehorse via a 460 km all weather road and by air via the Mayo airport. A gravel road connects Mayo to the Project area. Alexco currently maintains a land position at the Lucky Queen property comprising 51 surveyed quartz mining leases and six unsurveyed quartz mining claims. Mineral exploration at Keno Hill is permitted under the terms and conditions set out by the Yukon Government in the Class IV Quartz Mining Land Use Permit – LQ00240, issued on June 17, 2008 and is valid until June 16, 2018. The mineral resources for the Lucky Queen prospect reported herein are located on the Uncle Sam, Mayo, Lucky Queen and Mathole quartz mining leases.

Central Yukon is characterized by a sub-arctic continental climate with cold winters and warm summers. Average temperatures in the winter are between minus fifteen and minus twenty degrees Celsius while summer temperatures average around fifteen degrees Celsius. Exploration and mining work can be carried out year-round. The landscape around the Lucky Queen Project area is characterized by rolling hills and mountains with a relief of up to 1,600 metres ("m").

## History

The Keno Hill mining camp area has a rich history of exploration and mining. Silver was first found in 1901 but small-scale mining only began during 1913. High silver prices at the end of the First World War renewed interest in the district and ultimately success at the Keno Mine led to a staking rush, resulting in the discovery of a number of rich silver deposits. During the early 1920's the Treadwell Yukon Company Limited ("TYC") began its growing influence on the fate of the new mining district. The Lucky Queen deposit was mined from 1927 to 1932 when reserves were exhausted, producing 123,000 tons of ore at 97.8 ounces per tonne ("opt") Ag from two ore shoots.

The Second World War resulted in a sharp decline in activity in the Keno Hill camp until a new company, Keno Hill Mining Company Ltd., later United Keno Hill Mines Ltd. ("UKHM") purchased the TYC properties and started production. Very good results led to another staking rush and the formation of a large number of junior exploration companies, many of which were purchased by UKHM. The 1950's proved to be the most successful time of the mining camp. Starting in the early 1960's, new discoveries and additions to ore reserves lagged production. The Lucky Queen vein

and strike extensions were explored intermittently by surface overburden drilling, trenching and soil sampling throughout the 1950's, 1960's, 1970's and early 1980's. An exploration drift, collared near the Black Cap prospect and totalling approximately 1,800 m, was developed by UKHM in 1985-1987. It was designed to come in underneath the historical Lucky Queen workings and attempt to raise into the No 2 Inclined shaft. Poor ground conditions around the shaft, combined with difficulty in locating the vein and an urgent need for miners elsewhere in the district caused the adit to be abandoned. UKHM closed permanently in early 1989. In June 2005, Alexco was selected as the preferred purchaser of the assets of UKHM by PricewaterhouseCoopers Inc., the court-appointed interim receiver and receiver-manager of Keno Hill. In February 2006, Alexco's purchase of UKHM's assets through Alexco's wholly-owned subsidiary, Elsa Reclamation & Development Company Ltd. ("ERDC"), was approved. Under the Keno Hill Subsidiary Agreement, ERDC is indemnified against all historical liability, has property access for exploration and future development and is not required to post security against pre-existing liabilities. ERDC received a water license from the Yukon territorial government in November 2007 giving Alexco free and clear title to surface and subsurface claims, leases, free-hold land, buildings and equipment at Keno Hill. Alexco embarked on an aggressive surface exploration program in 2006 with continued yearly exploration programs through 2010.

## Regional and Local Geological Setting

The Keno Hill mining camp is located in the northwestern part of the Selwyn Basin in an area where the northwest-trending Robert Service Thrust Sheet and the Tombstone Thrust Sheet overlap. The area is underlain by Upper Proterozoic to Mississippian rocks that were deposited in a shelf environment during the formation of the northern Cordilleran continental margin. The area underwent regional compressive tectonic stresses during the Jurassic and the Cretaceous, producing thrusts, folds and penetrative fabrics of various scales.

The Robert Service Thrust Sheet in the south is composed of Late Proterozoic to Devonian clastic sandstone, minor limestone, siltstone, argillite, chert, and conglomerate. The Tombstone Thrust Sheet to the north consists of Devonian phyllite, felsic meta-tuffs and metaclastic rocks, overlain by Carboniferous quartzite which is the main host for the silver mineralization in the Keno Hill camp. Four intrusive suites intrude the layered rocks:

- Early Paleozoic diabase dikes and sills;
- Mid-Triassic gabbro to diorite pods;
- Early Cretaceous Tombstone granite to granodiorite suite; and
- Upper Cretaceous peraluminous porphyritic granite.

The local geology is characterized by three sedimentary rock units metamorphosed to greenschist facies assemblages during the Middle Cretaceous. The Lower Schist comprises Devonian to Mississippian graphitic, calcareous, and sericitic schists, quartzite and minor greenstone of Middle Triassic age. The lower contact of this unit has been cut off by the Tombstone Thrust Fault. The 700-metre thick Mississippian Central Quartzite (the Keno Hill Quartzite) consists of quartzite with minor schist, phyllite and greenstone horizons. It is the most important host to the silver mineralization at Keno Hill. The Upper Schists comprise Cambrian quartz-mica schist, quartzite, graphitic schist and minor limestone. The Robert Service Thrust Fault separates the Upper Schist from the younger Central Quartzite.

The rock units are intruded by quartz-feldspar porphyritic sills, commonly in the Lower and Upper Schists. They are correlated with the ninety three million year old Roop Lake granite (Mayo Lake pluton).

Four sets of faults are important. The oldest fault set consists of south dipping foliation-parallel structures related with the Tombstone Thrust Fault. The second fault set ("longitudinal veins") comprises northeast to east-northeast trending, steeply dipping sinistral faults with offset locally reaching more than 150 m. These faults essentially carry all the silver mineralization that was mined in the Keno Hill district. The third fault set ("transverse faults") includes north-west striking and steep north dipping structures, generally barren but filled with quartz containing trace to minor arsenopyrite, pyrite and jamesonite. They may represent dilatational zones between "en echelon" longitudinal faults. Late north to northeast trending cross faults displace (dextral and sinistral) veins or longitudinal faults by up to 2,000 m.

## Deposit Types and Mineralization

The Keno Hill District is a polymetallic silver-lead-zinc vein district with characteristics analogous to Kokanee Range (Slocan), British Columbia; Coeur d'Alene, Idaho; Freiberg and the Harz Mountains, Germany; and Příbram, Czech Republic. Common characteristics include the proximity to crustal-scale faults, affecting thick clastic metasedimentary rocks intruded by felsic rocks that may have acted as a heat source driving the hydrothermal system. At Keno Hill, the largest accumulation of silver, lead and zinc minerals occurred in structurally prepared competent rocks, such as the Central Quartzite.

In general, gangue minerals include manganiferous siderite, minor calcite, and quartz. Silver occurs in argentiferous galena and argentiferous tetrahedrite. In supergene assemblages, silver can be native or in polybasite, stephanite, and pyrargyrite. Lead occurs in galena and zinc in iron-rich sphalerite. Other sulphides include minor pyrite, arsenopyrite, and chalcopyrite.

At the district scale, the hydrothermal system exhibits sharp lateral mineralogical changes equivocally associated with temperature gradients around magmatic rocks. The hydrothermal veins also exhibit sharp vertical mineralogical zoning; historically interpreted to be lead-rich at the top to more zinc-rich at depth. The Lucky Queen vein structure has a strike length, defined by drilling, of approximately 650 m and is open along strike to both the northeast and southwest with reported thicknesses of a few centimetres to several metres.

## Exploration

Most past exploration work in the Keno Hill district was conducted as support to the mining activities until the mines closed in 1989. This historic work involved surface and underground drilling designed to explore areas surrounding the main underground working areas.

The current exploration conducted by Alexco is the first comprehensive exploration effort in the district since 1997. Alexco conducted surface diamond drilling programs in the Lucky Queen prospect area between 2006 and 2010. Drilling included four drill holes totalling 875 m in 2006, three drill holes totalling 557 m in 2007, twelve drill holes totalling 2,999 m in 2008, fourteen drill holes totalling 3,048 m in 2009, and fourteen drill holes totalling 3,625 m in 2010.

## **Sampling Method, Approach and Analyses**

Historical samples collected by previous project operators include underground chips, split core, reverse circulation and percussion drill cuttings. Sampling procedures are incompletely documented from project archives. Historical drill core samples were taken using procedures meeting industry best practices, reverse circulation and percussion drilling assay samples were taken from split recovered drill cuttings.

Information regarding historical assay procedures is limited. All assays were performed by the mine laboratory located in Elsa. SRK understands that gold and silver were determined by fire assay, while lead and zinc analyses were performed by atomic absorption or titration methods.

Alexco implemented industry best practice procedures for all aspects of the drilling, collar and downhole surveying, core description and sampling, sample preparation and assaying, and database management. Assay samples were collected on half core sawed lengthwise with sampling intervals honouring geological boundaries. Sample intervals vary from 0.1 to 1 m in visibly mineralized core with up to 2 m lengths used away from obviously mineralized material.

Alexco used industry best practices assaying protocols including the use of commercial certified control samples, sample blanks and duplicates at an adequate frequency to monitor the accuracy of laboratories ALS-Chemex, Eco Tech and AGAT, all of which are accredited under ISO-170025 Standards Council of Canada. Assay samples were dispatched for preparation and assaying using adequate security protocols. All samples were prepared using standard preparation protocols. Each sample was assayed for gold by fire assay and atomic absorption spectrometry on 30-gram sub-samples and for a suite of between twenty-seven and forty-eight elements (including silver, lead and zinc) by four acid digestions and either inductively coupled plasma atomic emission spectroscopy or mass spectroscopy on 0.5 gram sub-samples. Elements exceeding concentration limits were re-assayed using methods suitable for high concentrations.

## **Data Verifications**

Alexco scanned and, where applicable, digitally captured historical data creating an extensive digital database. Data relating to the Lucky Queen resource area were verified by Alexco personnel.

Alexco verified the historical Lucky Queen chip sample data collected by Treadwell Yukon/UKHM for those levels occurring within the resource zones. Sampling was done mainly in the 1930's and - 1980's at Lucky Queen. Documented sampling procedures are available for the 1980's programs but do not exist for the earlier campaigns. As the underground workings are currently inaccessible, no confirmation check sampling could be performed by Alexco. As a result all historical chip sampling occurring within the Lucky Queen resource area is not deemed reliable for inclusion in a reportable resource calculation. The data were used for select geostatistical analyses, mainly variography.

SRK reviewed the analytical quality control data produced by Alexco for the 2006 to 2010 core drilling at Lucky Queen and concluded that Alexco personnel used diligence in monitoring quality control data, investigating potential failures and taking appropriate corrective measures when required for the collected data. The quality control data collected by Alexco in between 2006 and 2010 are comprehensive and the assaying results delivered by ALS Chemex, Eco Tech and AGAT Labs are generally reliable for the purpose of resource estimation.

## Mineral Processing and Metallurgical Testing

No specific testing has been carried out on the mineralization found at the Lucky Queen deposit. SRK assumed that the mineralization found within the deposit will have similar metallurgical characteristics to the Bellekeno deposit now being developed by Alexco.

## Mineral Resource Estimate

The Lucky Queen resources were estimated using 3-D Gemcom block modeling software in multiple passes in 10 by 10 by 10 m blocks by inverse distance squared. Grade estimates were based on capped one meter composited assay data. Capping levels were set to 6,300 grams per tonne for silver, 2 grams per tonne for gold, 14.8% for lead and 7% for zinc. Blocks were classified as indicated mineral resources if at least two drill holes and four composites were found within a 50 by 50 m search ellipse. All other interpolated blocks were classified as inferred mineral resources

Table i below summaries the mineral resources estimated by SRK for the Lucky Queen deposit as of July 27, 2011.

**Table i: Mineral Resource Statement\* for the Lucky Queen Deposit, July 27, 2011.**

Deposit	Class	Tonnes	Ag g/t	Au g/t	Pb %	Zn %
Lucky Queen	Indicated	124,000	1,227	0.17	2.57	1.72
	Inferred	150,000	571	0.16	1.37	0.92
<p>* Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates.</p> <p>** Reported at an NSR cut-off of \$185 (1 US\$ = 1 CA\$)/tonne using long term metal prices (US\$) and recoveries developed for the nearby Bellekeno deposit (Ag US\$18.50/oz, recovery 96%; Pb US\$ 0.90/lb, recovery 97%; Zn US\$ 0.95/lb, recovery 88%; Au US\$ 1,100/oz, recovery 72%). Ag grades capped at 6,300 g/t; Pb capped at 14.8%, Zn capped at 7%, Au grades capped at 2 g/t.</p>						

## Conclusions and Recommendations

Between 2006 and 2010, Alexco completed five drilling programs on its Lucky Queen property in the Keno Hill district located in Central Yukon Territory. These drilling programs confirmed the existence of moderate polymetallic silver mineralization in this area.

SRK recommends that Alexco continues to explore the Lucky Queen deposit to further evaluate the potential of the deposit in a two phased approach with the second phase contingent on positive results from the first phase. The first phase would include rehabilitation of the adit, establishment of drilling platforms and 1,500 m of drilling at a total cost of \$5.1M. The second phase would include bulk sampling of a drift on 100 m of the vein and detailed metallurgical testing of mineralization at a total cost of \$1.2M. The total cost for the two phases would be \$6.3M.

# Table of Contents

Photo from Lucky Queen property looking towards Bellekeno .....	i
Executive Summary .....	ii
Disclaimer.....	x
List of Abbreviations .....	xi
<b>1 Introduction .....</b>	<b>1</b>
<b>2 Reliance on other Experts.....</b>	<b>2</b>
<b>3 Property Description and Location .....</b>	<b>3</b>
<b>4 Accessibility, Climate, Local Resources, Infrastructure and Physiography .....</b>	<b>7</b>
<b>5 History.....</b>	<b>9</b>
<b>6 Geological Setting and Mineralization .....</b>	<b>11</b>
6.1 Regional Geology.....	11
6.2 District Geology.....	13
6.3 Mineralization .....	15
6.4 Lucky Queen Mineralization.....	16
<b>7 Deposit Types .....</b>	<b>17</b>
<b>8 Exploration .....</b>	<b>18</b>
<b>9 Drilling.....</b>	<b>19</b>
9.1 Historical Drilling .....	19
9.2 2006 - 2010 Alexco Drilling .....	19
<b>10 Sampling Method and Approach .....</b>	<b>22</b>
10.1 Historical .....	22
10.2 Alexco 2006-2010 .....	22
<b>11 Sample Preparation, Analyses and Security .....</b>	<b>23</b>
11.1 Historical Samples .....	23
11.2 Alexco 2006 – 2010 Exploration Programs .....	23
<b>12 Data Verification.....</b>	<b>25</b>
12.1 Historical Data Verification.....	25
12.2 Alexco Data Verification .....	25
12.3 Analytical Quality Assurance and Quality Control Programs.....	26
12.3.1 Historical Exploration	26
12.3.2 Alexco 2006 - 2010 Exploration Programs.....	26
12.4 SRK Data Verification .....	27
<b>13 Adjacent Properties .....</b>	<b>30</b>
<b>14 Mineral Processing and Metallurgical Testing .....</b>	<b>31</b>

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<b>15 Mineral Resource Estimates .....</b>	<b>32</b>
15.1 Introduction .....	32
15.2 Wireframe Construction .....	32
15.3 Database .....	33
15.4 Specific Gravity .....	34
15.5 Compositing .....	35
15.6 Data Statistics .....	35
15.7 Capping .....	37
15.8 Variography .....	38
15.9 Block Model .....	38
15.10 Grade Interpolation .....	39
15.11 Block Model Validation .....	39
15.12 Block Model Sensitivity Analysis .....	41
15.13 Mineral Resource Classification .....	42
15.14 Mineral Resource Statement .....	43
<b>16 Other Relevant Data and Information .....</b>	<b>45</b>
<b>17 Interpretation and Conclusions .....</b>	<b>46</b>
<b>18 Recommendations .....</b>	<b>47</b>
<b>19 References .....</b>	<b>49</b>

## List of Tables

Table i: Mineral Resource Statement* for the Lucky Queen Deposit, July 27, 2011.....	vi
Table 3.1: Lucky Queen Property Claims and Leases .....	5
Table 5.1: Past production records for Lucky Queen property.....	9
Table 12.1: Commercial Standard Reference Material Used by Alexco for the 2006 to 2010 Drilling Programs	26
Table 12.2: Quality Control Data Produced by Alexco in 2006 to 2010 for Lucky Queen .....	27
Table 14.1: Summary of projected metallurgical recoveries .....	31
Table 15.1: Lucky Queen deposit sample database .....	34
Table 15.2: Lucky Queen Specific gravity measurements .....	34
Table 15.3: Composite data summary statistics for Lucky Queen .....	37
Table 15.4: Composite capping levels for Lucky Queen .....	38
Table 15.5: Modelled semi-variogram for Ag.....	38
Table 15.6: Block model location and setup for Lucky Queen .....	39
Table 15.7: Search ellipse parameters for Lucky Queen .....	39
Table 15.8: Nearest neighbour block model validation .....	41
Table 15.9: Lucky Queen Indicated block model quantity and grade estimates* at various cut-off grades.....	41
Table 15.10: Dollar equivalent (NSR) calculation parameters .....	43
Table 15.11: Mineral resource statement*, Lucky Queen deposit, Lucky Queen project, SRK Consulting (Canada) Inc., July 27, 2011 .....	44
Table 18.1: Budget for recommended exploration program.....	47

## List of Figures

Figure 6.1: General Geology of the Selwyn Basin Area. Image from Dusel-Bacon et al. (2002). .....	12
Figure 6.2: Local Geology of the Keno Hill Camp. (Image Modified from a GSC map). .....	14
Figure 9.1: Location of Surface Drill holes drilled in 2006 to 2010 at the Lucky Queen. Section is looking northwest.....	20
Figure 12.1: Blank analytical results plotted against time. ....	28
Figure 12.2: SRM performance for silver.....	28
Figure 12.3: Duplicate analyses comparison.....	29
Figure 15.1: Section of Lucky Queen wireframes looking northwest .....	33

## **Disclaimer**

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (Canada) Inc. ("SRK") by Alexco Resources Corp. ("Alexco"). These opinions are provided in response to a specific request from Alexco to do so, and are subject to the contractual terms between SRK and Alexco. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report.

## List of Abbreviations

<b>Name</b>	<b>Abbreviation</b>
Canadian Institute of Mining & Metallurgy	<b>CIM</b>
day	<b>d</b>
Dollars (Canadian)	<b>\$ or CN\$</b>
Dollars (US)	<b>US\$</b>
Footwall	<b>FW</b>
grams	<b>g</b>
Hanging wall	<b>HW</b>
hour	<b>h</b>
hectare (10,000 m <sup>2</sup> )	<b>ha</b>
kilometres	<b>km</b>
kilowatt	<b>kW</b>
metres	<b>m</b>
metres above sea level	<b>masl</b>
Million / mega (10 <sup>6</sup> )	<b>M</b>
National Instrument 43-101	<b>NI 43-101</b>
National Topographic Service	<b>NTS</b>
Net Smelter Return	<b>NSR</b>
Non-acid Generating	<b>NAG</b>
North American datum	<b>NAD</b>
potentially acid generating	<b>PAG</b>
Rock Quality Designation	<b>RQD</b>
short take-off and landing	<b>STOL</b>
specific gravity	<b>SG</b>
ton (2000 lbs)	<b>ton</b>
tonne (1000 kg)	<b>t</b>
Universal Transverse Mercator coordinate system	<b>UTM</b>
volcanogenic massive sulphide	<b>VMS</b>
micron	<b>µm</b>

# 1 Introduction

This technical report summarizes a mineral resource estimate produced for Alexco Resource Corp. (“Alexco”) for the Lucky Queen deposits, one of several polymetallic silver-lead-zinc deposits occurring in the historic Keno Hill silver-lead district, near Mayo, Yukon Territory.

The mineral resource models were constructed by SRK Consulting (Canada) Inc. (“SRK”), during the first quarter of 2011 from drilling information acquired by Alexco during the years 2006 to 2010. Mineral resources were classified as Indicated and Inferred Mineral Resources following the CIM Definition Standards for Mineral Resources and Mineral Reserves (December 2005) guidelines. The report was prepared following the guidelines of the Canadian Securities Administrators National Instrument 43-101 and Form 43-101F1, and in conformity with generally accepted CIM “Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines”.

The report was compiled by Dr. Gilles Arseneau, P. Geo. and Darell Farrow, M.Sc., Pr. Sci. Nat. with assistance from Melanie Roberts and Stan Dodd of Alexco. The information contained in this report was provided by Alexco and gathered by SRK during the site visit. Dr. Arseneau and Chris Elliott of SRK carried out a visit to the Lucky Queen project to examine the Lucky Queen deposit. In total SRK spent two and half days at site between July 26 and 28, 2010 examining drill core, core logging and sampling procedures, visiting drill sites and examining the mineralization exposed in surface cuts. Mineral resources were estimated by Fred Brown CPG, Pr.Sci.Nat., under the supervision of Dr. Arseneau.

## **2 Reliance on other Experts**

In preparing this report, SRK has relied on information provided by Alexco for matters pertaining to environmental, socioeconomic, and permitting issues. SRK did not carry out a title search for the property. Instead, we have relied on an opinion of title provided by Alexco.

### 3 Property Description and Location

The Lucky Queen property is located in the Mayo Mining District approximately 350 kilometres (“km”) north of Whitehorse, Yukon Territory, within the Keno Hill mining district (Figure 3.1). Mayo is accessible from Whitehorse via a 460 km all weather road and by air via the Mayo airport. A gravel road connects Mayo to the project area. The area is covered by NTS map sheets 105M/14. Alexco currently maintains a land position at the Lucky Queen property comprising 51 surveyed quartz mining leases and six unsurveyed quartz mining claims (Figure 3.2).

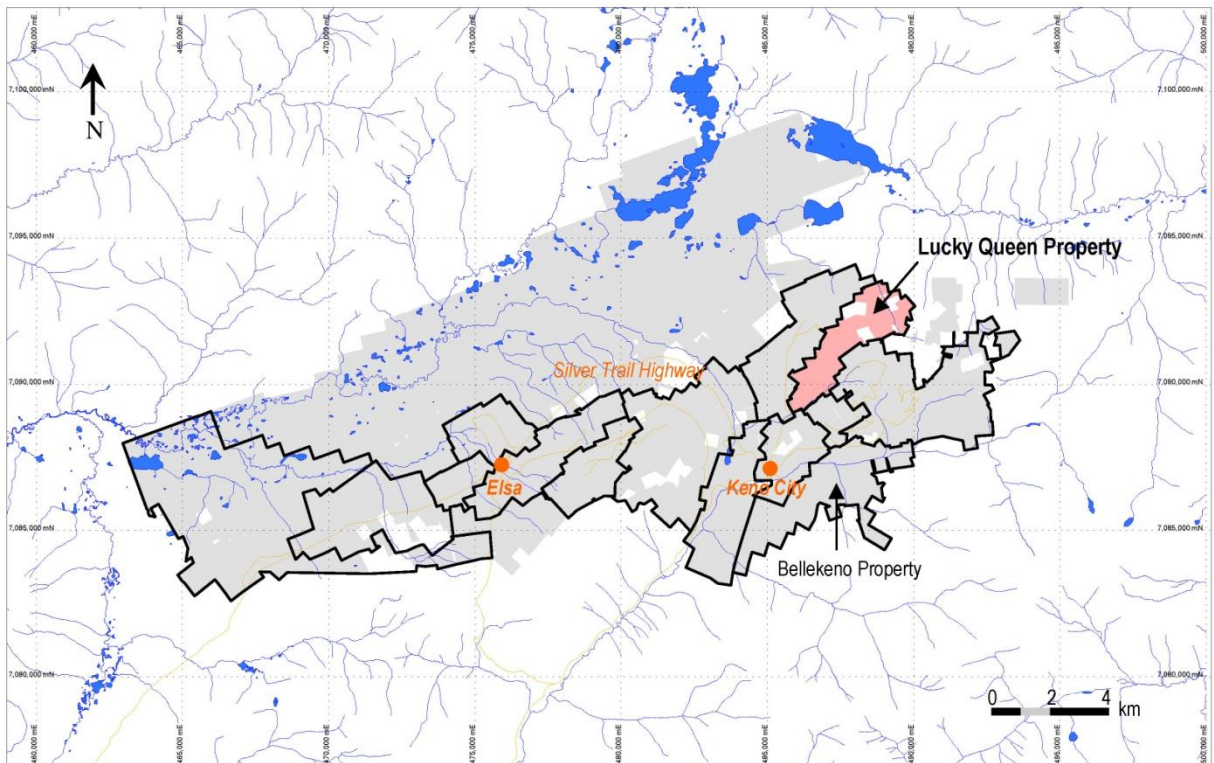
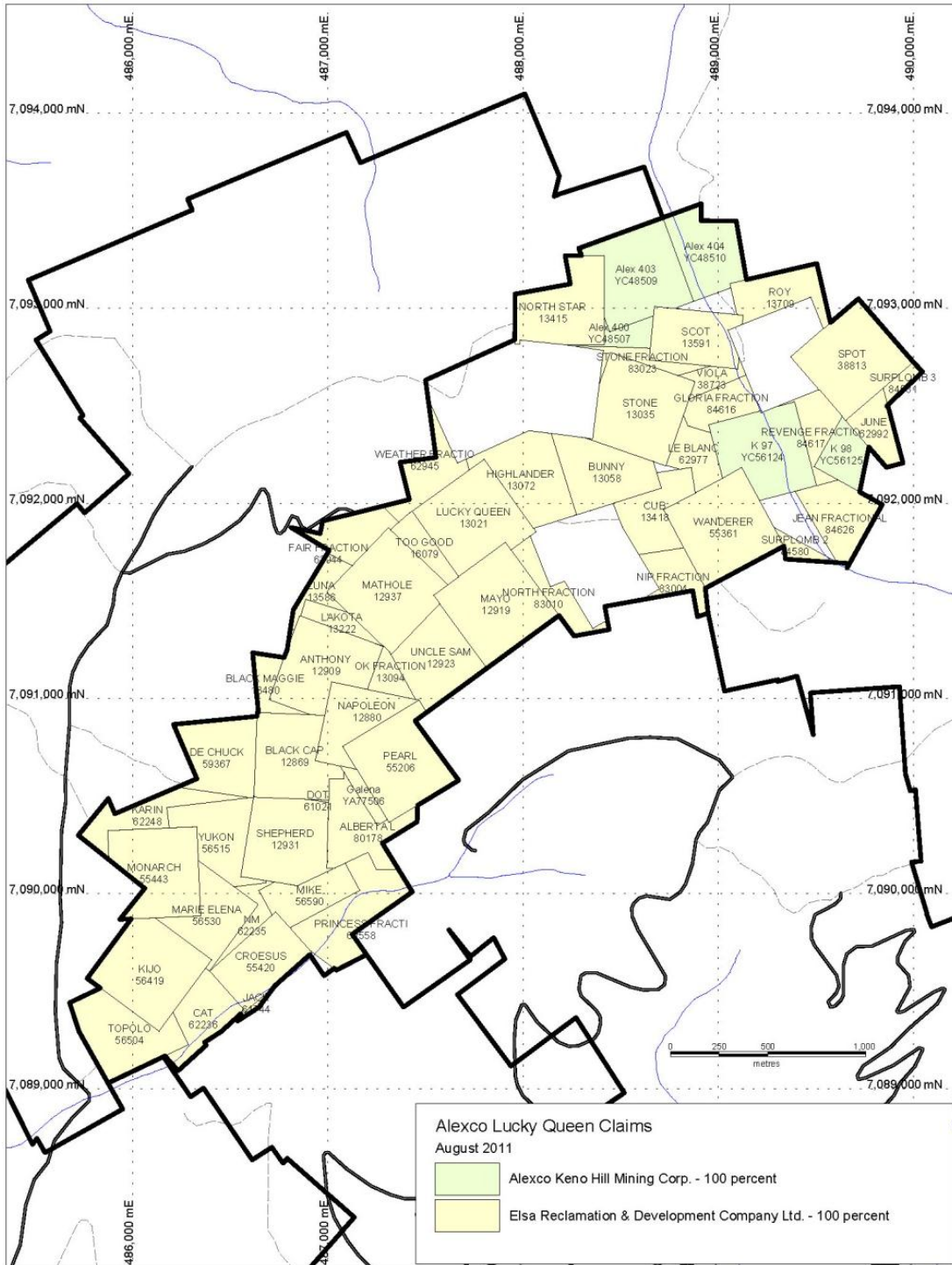


Figure 3.1: Lucky Queen Property location



**Figure 3.2: Lucky Queen Property claim map**

The Lucky Queen deposit is centred at Latitude 63 degrees, 56 minutes 55 seconds north; Longitude 135 degrees 15 minutes 12 seconds west.

Mineral exploration in the Keno Hill district was initially permitted under the terms and conditions set out by the Yukon Government in the Class III Quartz Mining Land Use Permit – LQ00186, issued on July 5, 2006 and valid until July 4, 2011. Alexco subsequently obtained a Class IV Quartz Mining

Land Use Permit – LQ00240 on June 17, 2008. The two permits were amalgamated on December 8, 2008 under #LQ00240 which is valid until June 16, 2018.

The mineral resources for the Lucky Queen deposit reported herein are located on the Lucky Queen property comprising the Quartz mining claims and leases listed in Table 3.1. All quartz mining leases have been legally surveyed whereas the quartz mining claims have not been legally surveyed.

**Table 3.1: Lucky Queen Property Claims and Leases**

Claim Label	Grant Number	Lease Number	Owner Name	Expiry Date
ALBERTA L	80178	NM00499	Elsa Reclamation & Development Company Ltd. - 100%	20251126
Alex 400	YC48507	OM00027	Alexco Keno Hill Mining Corp. - 100%	20161231
Alex 403	YC48509	XM00298	Alexco Keno Hill Mining Corp. - 100%	20161231
Alex 404	YC48510	NM00655	Alexco Keno Hill Mining Corp. - 100%	20161231
ANTHONY	12909	NM00642	Elsa Reclamation & Development Company Ltd. - 100%	20300324
BLACK CAP	12869	NM00175	Elsa Reclamation & Development Company Ltd. - 100%	20221119
BLACK MAGGIE	13480	4161	Elsa Reclamation & Development Company Ltd. - 100%	20160903
BUNNY	13058	NM00035	Elsa Reclamation & Development Company Ltd. - 100%	20200425
CAT	62236	NM00403	Elsa Reclamation & Development Company Ltd. - 100%	20250612
CROESUS	55420	NM00564	Elsa Reclamation & Development Company Ltd. - 100%	20271102
CUB	13418	NM00372	Elsa Reclamation & Development Company Ltd. - 100%	20250510
DE CHUCK	59367	NM00176	Elsa Reclamation & Development Company Ltd. - 100%	20221119
DOT	61021	NM00574	Elsa Reclamation & Development Company Ltd. - 100%	20271102
FAIR FRACTION	62944	NM00474	Elsa Reclamation & Development Company Ltd. - 100%	20251126
Galena	YA77506	XM00462	Elsa Reclamation & Development Company Ltd. - 100%	20131231
GLORIA FRACTION	84616	OM00003	Elsa Reclamation & Development Company Ltd. - 100%	20171008
HIGHLANDER	13072	NM00034	Elsa Reclamation & Development Company Ltd. - 100%	20200425
JACK	61744	NM00398	Elsa Reclamation & Development Company Ltd. - 100%	20250612
JEAN FRACTIONAL	84626	OM00005	Elsa Reclamation & Development Company Ltd. - 100%	20171008
JUNE	62992	NM00614	Elsa Reclamation & Development Company Ltd. - 100%	20290821
K 97	YC56124	3456	Alexco Keno Hill Mining Corp. - 100%	20131215
K 98	YC56125	XM00028	Alexco Keno Hill Mining Corp. - 100%	20131215
KARIN	62248	NM00526	Elsa Reclamation & Development Company Ltd. - 100%	20261101
KIJO	56419	NM00088	Elsa Reclamation & Development Company Ltd. - 100%	20210820
LAKOTA	13222	NM00635	Elsa Reclamation & Development Company Ltd. - 100%	20291231
LE BLANC	62977	NM00650	Elsa Reclamation & Development Company Ltd. - 100%	20310312
LUCKY QUEEN	13021	4067	Elsa Reclamation & Development Company Ltd. - 100%	20140217
LUNA	13586	NM00637	Elsa Reclamation & Development Company Ltd. - 100%	20291231
MARIE ELENA	56530	NM00508	Elsa Reclamation & Development Company Ltd. - 100%	20261101
MATHOLE	12937	4163	Elsa Reclamation & Development Company Ltd. - 100%	20160907
MAYO	12919	4113	Elsa Reclamation & Development Company Ltd. - 100%	20151221
MIKE	56590	NM00568	Elsa Reclamation & Development Company Ltd. - 100%	20271102
MONARCH	55443	NM00432	Elsa Reclamation & Development Company Ltd. - 100%	20251126
NAPOLEON	12880	NM00033	Elsa Reclamation & Development Company Ltd. - 100%	20200313
NIP FRACTION	83004	NM00591	Elsa Reclamation & Development Company Ltd. - 100%	20271102
NM	62235	NM00576	Elsa Reclamation & Development Company Ltd. - 100%	20271102
NORTH FRACTION	83010	NM00592	Elsa Reclamation & Development Company Ltd. - 100%	20271102
NORTH STAR	13415	NM00173	Elsa Reclamation & Development Company Ltd. - 100%	20221113
OK FRACTION	13094	NM00556	Elsa Reclamation & Development Company Ltd. - 100%	20271102

PEARL	55206	NM00562	Elsa Reclamation & Development Company Ltd. - 100%	20271102
PRINCESS FRACTI	62558	NM00473	Elsa Reclamation & Development Company Ltd. - 100%	20251126
REVENGE FRACTION	84617	2231	Elsa Reclamation & Development Company Ltd. - 100%	20171008
ROY	13709	NM00558	Elsa Reclamation & Development Company Ltd. - 100%	20271102
SCOT	13591	NM00557	Elsa Reclamation & Development Company Ltd. - 100%	20271102
SHEPHERD	12931	NM00177	Elsa Reclamation & Development Company Ltd. - 100%	20221119
SPOT	38813	NM00160	Elsa Reclamation & Development Company Ltd. - 100%	20220602
STONE	13035	NM00503	Elsa Reclamation & Development Company Ltd. - 100%	20261101
STONE FRACTION	83023	NM00595	Elsa Reclamation & Development Company Ltd. - 100%	20271102
SURPLOMB 2	84580	2228	Elsa Reclamation & Development Company Ltd. - 100%	20171008
SURPLOMB 3	84581	2229	Elsa Reclamation & Development Company Ltd. - 100%	20171008
TOO GOOD	16079	4076	Elsa Reclamation & Development Company Ltd. - 100%	20140611
TOPOLO	56504	NM00093	Elsa Reclamation & Development Company Ltd. - 100%	20210822
UNCLE SAM	12923	4068	Elsa Reclamation & Development Company Ltd. - 100%	20140312
VIOLA	38723	NM00560	Elsa Reclamation & Development Company Ltd. - 100%	20271102
WANDERER	55361	NM00161	Elsa Reclamation & Development Company Ltd. - 100%	20220602
WEATHER FRACTION	62945	NM00475	Elsa Reclamation & Development Company Ltd. - 100%	20251126
YUKON	56515	NM00096	Elsa Reclamation & Development Company Ltd. - 100%	20210822

## **4 Accessibility, Climate, Local Resources, Infrastructure and Physiography**

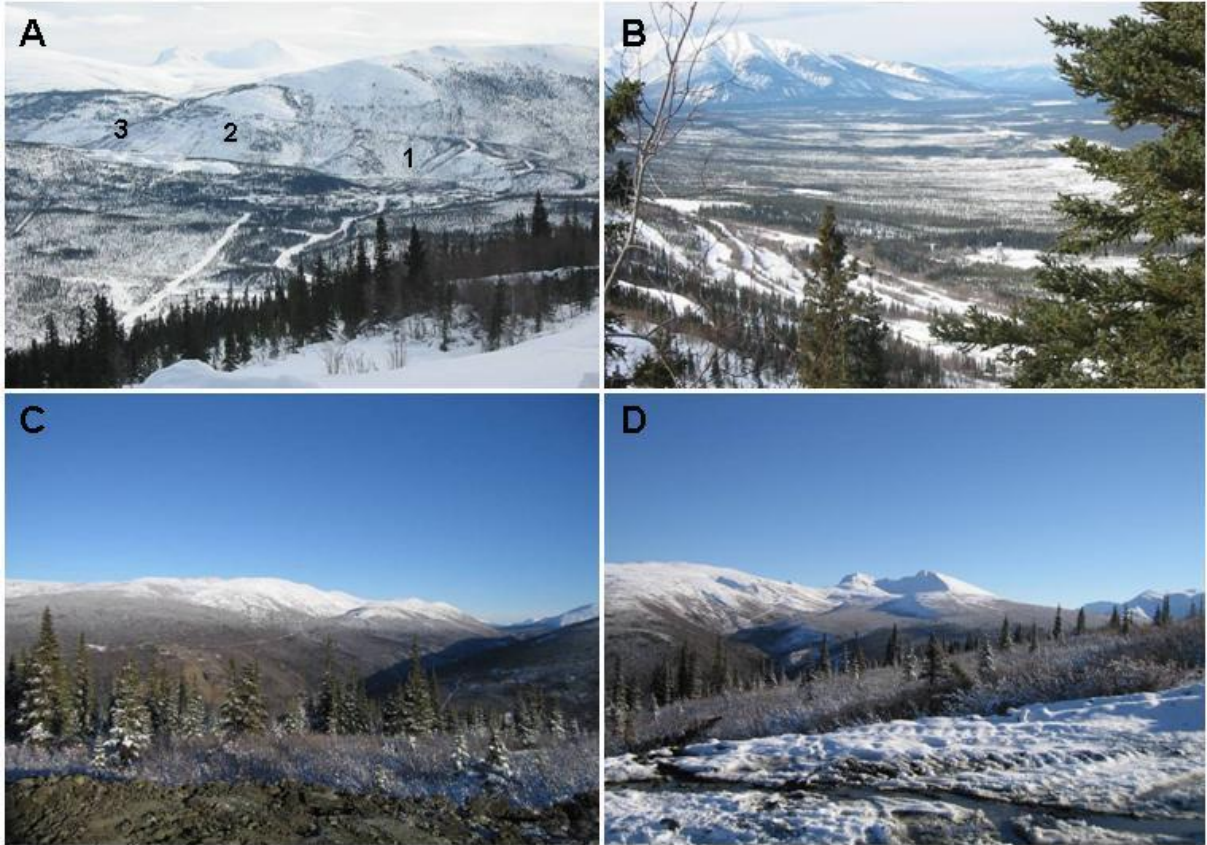
The Lucky Queen deposit is included within the historic Keno Hill mining camp, located in central Yukon Territory (Figure 3.1). The closest town is Mayo, located on the Steward River, approximately 55 km to the south. Mayo is accessible from Whitehorse via a 460 km all weather road; the town is also serviced by Mayo airport, which is located just to the north. A gravel road leads from Mayo to the project areas. Historically, the mining camp was linked by river route to the outside world; since 1950 the all-weather highway, which was also used for transporting the ore, has been the main link.

The central Yukon Territory is characterized by a sub-arctic continental climate with cold winters and warm summers. Average temperatures in the winter are between minus fifteen and minus twenty degrees Celsius but can reach minus sixty degrees Celsius. The summers are moderately warm with average temperatures in July around fifteen degrees Celsius. Exploration and mining work can be carried out year-round.

Because of its northern latitude, winter days are short; north-facing slopes experience ten weeks without direct sunlight around the winter solstice. Conversely, summer days are very long, especially in early summer around the summer solstice. Annual precipitation averages twenty eight centimetres ("cm"); half of this amount falls as snow, which starts to accumulate in October and remains into May or June.

Three phase power is available in many parts of the district as well as limited telephone service. A large number of roads constructed for past mining operations are still serviceable. The old company town of Elsa, located toward the western end of the district, comprises several buildings that are currently being used for storage, maintenance work, housing and offices. The main camp and kitchen are located at Flat Creek, just west of Elsa.

The landscape around the Lucky Queen deposit is characterized by rolling hills and mountains with a relief of up to 1,600 m (Plate 1). The highest elevation is Keno Hill at 1,975 m. Slopes are gentle except the north slopes of Keno Hill and Sourdough Hill.



**Plate 1: Typical landscape in the Keno Hill District**

Photo A: Taken from Galkeno 300, looking southeast at (1) Keno City, (2) Lightning Creek Valley, (3) Bellekeno 600 adit is just out of sight from this view angle; Photo B: View from road above Elsa, looking northwest; Photo C and Photo D: Views looking north from the drilling sites at Bellekeno.

## 5 History

The history of the Keno Hill mining camp is well described in Cathro (2006); the information presented in this section draws heavily from that source.

The Keno Hill mining camp area has a rich history of exploration and mining dating back to the beginning of the 1900's. Earliest prospectors had been working the area around Mayo for gold, especially after the Klondike gold rush of 1898. The first silver was found in 1901; however, interest was low due to the prospector's interest in gold alone despite an assay from 1905 yielding more than ten kilograms per ton ("kg/t") silver. Small-scale mining finally commenced in 1913 with a first shipment of fifty-five tons of ore to a smelter in San Francisco. Due to the shallow depth of the deposit and the First World War, interest in the area had dwindled by 1917.

The end of the First World War and high silver prices led to renewed and ultimately successful exploration activity in the area with the Yukon Gold Company and later Keno Hill Limited as the first truly commercial operators. Success at the Keno Mine led to a staking rush, resulting in the discovery of a number of rich deposits.

In the early 1920's the Treadwell Yukon Company Limited ("TYC"), became interested in the Keno Hill area and, under the leadership of Livingston Wernecke, acquired a number of claims and started mining. The Lucky Queen deposit was mined from 1927 to 1932 when reserves were exhausted, producing 123,000 tons of ore at 89.2 ounces per tonne ("opt") Ag from two ore shoots. Four levels of underground workings (50, 100, 200 and 300) totalling approximately 1,085 m, were developed, with level development roughly coincident with extensive stoping, resulting in the Lucky Queen production totals listed in Table 5.1. There were no historical resources or reserves remaining at the Lucky Queen mine.

**Table 5.1: Past production records for Lucky Queen property.**

Mine	Imperial tons	Ag Oz/t	Pb (%)	Zn (%)	Ag ounces	Pb pounds	Zn pounds
Lucky Queen	123,590	89.2	7.0	2.7	11,019,368	17,223,250	6,653,462

Wernecke's death and the Second World War resulted in a sharp decline in activity in the Keno Hill camp until a new company, Keno Hill Mining Company Ltd., later United Keno Hill Mines Ltd. ("UKHM"), spearheaded by Thayer Lindsley, purchased all TYC properties and started production. Very good results led to another staking rush and the formation of a large number of junior exploration companies, many of which were purchased by UKHM. The 1950's proved to be the most successful time of the mining camp. Starting in the early 1960's, new discoveries and additions to ore reserves lagged production.

The Lucky Queen vein and strike extensions were explored intermittently by surface overburden drilling, trenching and soil sampling throughout the 1950's, 1960's, 1970's and early 1980's. A 500 level exploration drift, collared near the Black Cap prospect and totalling approximately 1,800 m, was developed by UKHM in 1985-1987. It was designed to come in underneath the historical Lucky Queen workings and attempt to raise into the No 2 Inclined shaft. Poor ground conditions around the

shaft, combined with difficulty in locating the vein and an urgent need for miners elsewhere in the district caused the adit to be abandoned. UKHM closed permanently in early 1989.

Between 1990 and 1998, The Dominion Mineral Resources and Sterling Frontier Properties Company of Canada Limited ("Dominion"), after acquiring a thirty-two per cent interest in UKHM, carried out extensive reclamation, remediation, and exploration work at the Bellekeno, Husky Southwest, and Silver King mines in order to reopen the camp. Lack of financing forced Dominion to abandon its rights, in effect reverting back the rights to UKHM. Environmental liabilities and site maintenance costs drove UKHM into bankruptcy; the Federal Government inherited the assets.

In June 2005, Alexco was selected as the preferred purchaser of the assets of UKHM by PricewaterhouseCoopers Inc., the court-appointed interim receiver and receiver-manager of Keno Hill. In February 2006, following lengthy negotiations with Federal and Territory Governments, the Supreme Court of the Yukon Territory approved Alexco's purchase of UKHM's assets through Alexco's wholly-owned subsidiary, Elsa Reclamation & Development Company Ltd. ("ERDC").

Interim closing of the Keno Hill transaction was completed on April 18, 2006, and an agreement governing management and future reclamation of the Keno Hill district was signed. Under the Keno Hill Subsidiary Agreement, ERDC is indemnified against all historical liability, has property access for exploration and future development and is not required to post security against pre-existing liabilities. ERDC will also be reimbursed for its future environmental reclamation activities - estimated at more than CDN\$50M - while itself contributing CDN\$10M to the clean-up of the Keno Hill district. ERDC has also assumed responsibility for ongoing environmental care and maintenance of the site under contract to the Yukon Territory Government, and is actively conducting a baseline environmental assessment and site characterization program.

To finalize the Keno Hill acquisition, ERDC applied for and received a water license in November 2007. Upon receipt of the license, ERDC received clear title to surface and subsurface claims, leases, free-hold land, buildings and equipment at Keno Hill.

During 2006, Alexco embarked on an aggressive exploration program in the Keno Hill district, targeting the historical resources at Bellekeno and Husky SW and subordinately other former mines in the district. Drilling by Alexco in the Lucky Queen prospect area totalled four surface core drill holes (875 m) in 2006, three surface core drill holes (557 m) in 2007, twelve surface core drill holes (2,999 m) in 2008, fourteen surface core drill holes (3,048 m) in 2009 and fourteen surface core holes (3,625 m) in 2010.

## 6 Geological Setting and Mineralization

### 6.1 Regional Geology

The Keno Hill mining camp is located in the northwestern part of the Selwyn Basin in an area characterized by the Robert Service Thrust Sheet and the Tombstone Thrust Sheet; these thrust sheets are overlapping and trend north-westerly. The area is underlain by Upper Proterozoic to Mississippian rocks that were deposited in a shelf environment during the formation of the northern Cordilleran continental margin (Figure 6.1). A compressional regime that possibly existed during the Jurassic, but certainly during the Cretaceous produced thrusts, folds and penetrative fabrics of various scales. Early large scale deformation (D1) produced recumbent folds, resulting in local structural thickening of strata. A second (and possibly third, D3, Roots, 1997), deformational event (D2) produced gentle southwesterly plunging syn- and antiform pairs; layering in these structures are axial planar to the D1 recumbent folds.

The Robert Service Thrust Sheet in the south is composed of Late Proterozoic to Cambrian sandstone, locally with interbedded limestone and argillite, a Cambrian to Middle Devonian succession of siltstone, limestone and chert, and Upper Devonian argillite, chert, and chert pebble conglomerate. The latter unit unconformably overlies the lower units.

The Tombstone Thrust Sheet to the north consists of Devonian phyllite, felsic meta-tuffs and metaclastic rocks, overlain by Carboniferous quartzite. This latter rock unit is locally thickened due to folding and or thrusting and hosts the mineralization of the Keno Hill camp.

Intrusive rocks formed during four episodes of plutonism. Early Paleozoic fine-grained diabase occurs as metre-scale dikes and sills in the Upper Proterozoic to Lower Cambrian rocks. During the Mid-Triassic, gabbros to diorites formed pods of various sizes, primarily in the Devonian and Mississippian rocks of the Tombstone thrust sheet. A third phase of plutonism took place around ninety two million years ago in the early Cretaceous and resulted in widespread and voluminous Tombstone intrusions of commonly granitic to granodioritic composition. The youngest magmatic activity occurred around sixty-five million years ago in the Upper Cretaceous and resulted in the formation of peraluminous megacrystic potassium feldspar granite.

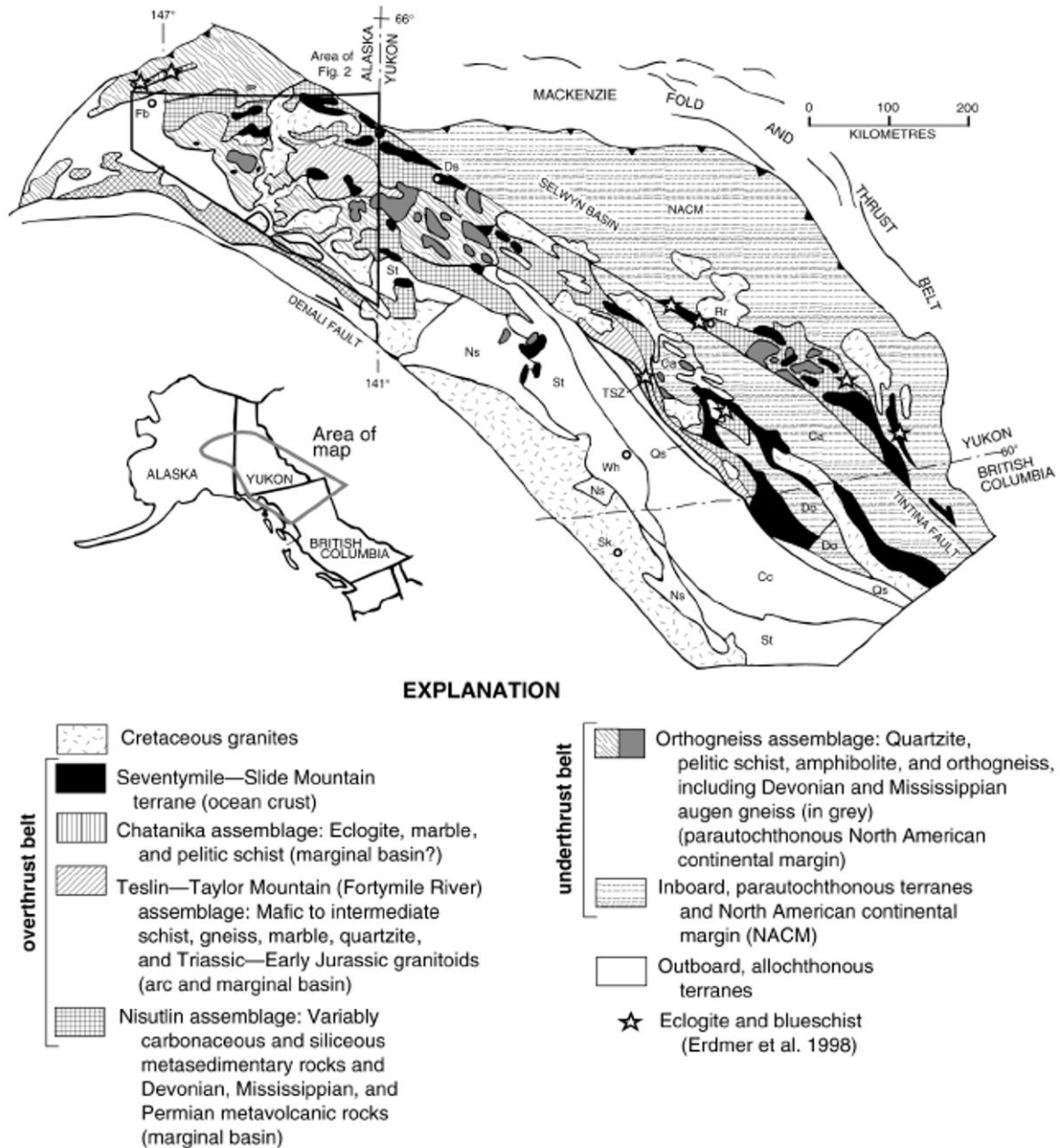


Figure 6.1: General Geology of the Selwyn Basin Area. Image from Dusel-Bacon et al. (2002).

In addition to the Keno Hill silver mining camp, where polymetallic veins were exploited, the area hosts a number of occurrences and showings of tungsten, copper, gold, lead, zinc, antimony and barite.

Tin, tungsten, and molybdenite occurrences are possibly related to the suite of Cretaceous intrusion, whereas lead, zinc, and barite occur in stratiform calcareous sedimentary rocks of early to mid-Paleozoic age typical of sediment-hosted deposits.

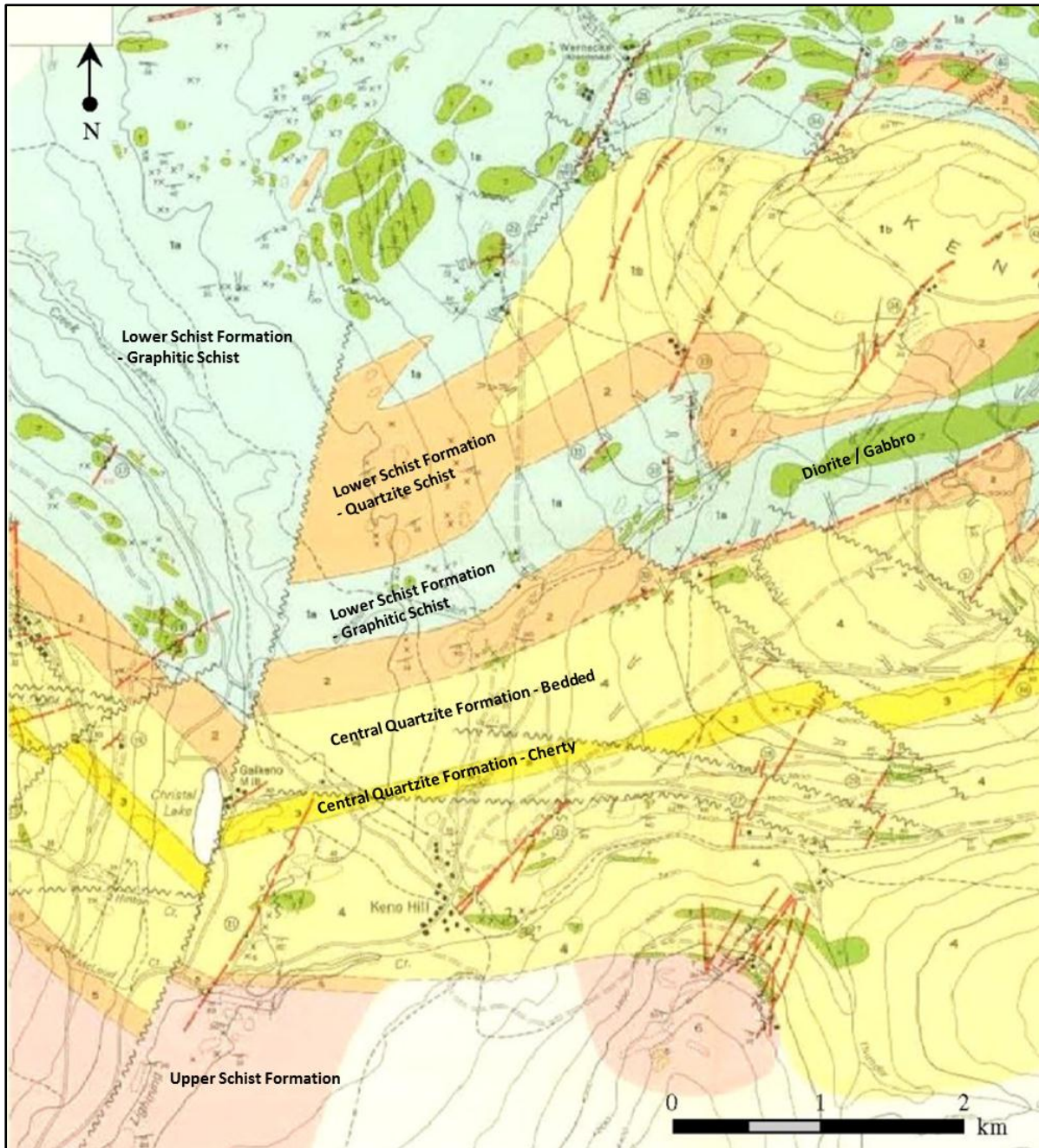
## 6.2 District Geology

The local geology is characterized by three sedimentary rock units: Lower Schist, Central Quartzite, and Upper Schist (Figure 6.2). Individual layers are thought to be conformal and are metamorphosed to greenschist facies assemblages. Regional metamorphism is believed to have occurred in the Middle Cretaceous, about 105 million years ago.

The Lower Schist is of Devonian to Mississippian age and is composed of graphitic, calcareous, and sericitic schist, thin and locally thick-bedded quartzite and minor greenstone of Middle Triassic age. The greenstone forms sills and/or boudins and consists of metadiorite and metagabbro. The sills and boudins form bodies up to 1.0 km long and 30 m thick. They occur primarily on Keno Hill. Weathering of the Lower Schist is pronounced and results in small silica fragments supported by a clay matrix. The fast weathering prevents outcrops from forming. The lower contact of this unit has been cut off by the Tombstone Thrust Fault.

The Mississippian Central Quartzite, also known as the Keno Hill Quartzite, has a structural thickness of approximately 700 m and consists of bedded and massive quartzite with minor schist and phyllite layers, as well as greenstone horizons, which occur most commonly in the lower half of the Central Quartzite. The thickness of this unit is especially great in the Keno Hill area; which is likely due to the presence of a D1 fold nose and accompanied structural thickening in the Keno Hill area. Underground exposure has revealed tight isoclinal folding. Internal fracturing leaves the unit prone to weathering, resulting in the formation of felsenmeer downslope, where large slabs of quartzite accumulate. This unit is the most important host to mineralization of the Keno Hill camp.

A package of Cambrian quartz-mica schist, quartzite, graphitic schist and minor limestone comprise the Upper Schist. The Robert Service Thrust Fault separates the Upper Schist from the younger Central Quartzite.



**Figure 6.2: Local Geology of the Keno Hill Camp. (Image Modified from a GSC map).**

A number of quartz-feldspar porphyritic sills have intruded the stratigraphy parallel to schistosity. The sills are most common in the Lower and Upper Schists and can reach thicknesses of up to 50 m; reports of occurrences in the Central Quartzite are inconclusive and vague. The quartz-porphyry sills are believed to be related to the ninety three million year old Roop Lake granite (also known as Mayo Lake pluton), which is located southeast of the camp.

Structurally, the property is characterized by four sets of faults; many of which have been filled by hydrothermal minerals, forming veins. The oldest fault set consists of south dipping structures that are generally parallel to foliation and are apparently associated with the Tombstone Thrust Fault

since movement was contemporaneous or slightly later. Locally, brittle deformation has been observed along these structures. A second fault set, known as “longitudinal veins”, strikes northeast to east northeast and dips steeply southeast. The latest movement along these faults is sinistral with offsets locally reaching more than 150 m; however, more than one episode of movement is commonly indicated. Depending on the competency of the host rock, longitudinal veins can be up to thirty metres wide in an anastomosing system of sub-veins. Essentially all mineralized rock was mined from these longitudinal veins. A third set of faults, known as “transverse faults”, is north-west striking and dips steeply to the north. Transverse faults commonly do not contain silver and lead mineralization but are commonly filled by quartz with trace to minor arsenopyrite, pyrite and jamesonite. Vein thicknesses can reach five metres. Transverse faults are believed to be dilational zones between an echelon longitudinal faults.

A younger set of faults, known as cross faults, strike north to northeast with a dip of sixty degrees west to southwest and offset vein or longitudinal faults by up to 2,000 m. In the western part of the camp, dextral movement is the most recent event along these structures, whereas in the eastern part of the camp sinistral movement with less magnitude prevails.

### 6.3 Mineralization

Good summaries of the mineralogy of the Keno Hill District silver-lead-zinc mineralization can be found in Cathro (2006), Murphy (1997), and Roots, (1997). Mineralization in the Keno Hill camp is of the polymetallic silver-lead-zinc vein type. Mineralization of this type ideally exhibits a succession of hydrothermally precipitated minerals from the vein wall towards the vein center. However; at Keno Hill, multiple pulses of hydrothermal fluids traveling through the same structure are very likely to modify the original succession of precipitated minerals by recrystallization and/or repetition of the original succession. Supergene alteration can further change the mineralogy in a vein. In the Keno Hill area, supergene alteration reached a maximum depth of about 200 m shortly after vein emplacement. Due to glacial erosion, much of the supergene zone has been removed.

In general, common gangue minerals include manganiferous siderite and to a lesser extent quartz and quartz breccia as well as calcite. Silver occurs in argentiferous galena and argentiferous tetrahedrite (freibergite). In supergene assemblages, silver is further found as native silver, in polybasite, stephanite, and pyrargyrite. Lead occurs in galena and zinc in sphalerite, which is iron-rich. This type of sphalerite is also known as marmatite and contains approximately seven per cent less zinc than “normal” sphalerite. Furthermore, sphalerite can contain approximately 7,000 to 10,000 grams (“g”) of cadmium per tonne and up to 800 g of tin per tonne (non-recoverable). Other sulphides include pyrite, arsenopyrite, and chalcopyrite. Pyrite and arsenopyrite are locally gold-bearing.

In addition to a lateral zoning mentioned above, veins exhibit a vertical change in mineralogy. A typical oreshoot displays a predictable vertical zoning from lead-rich at the top to zinc-rich at the bottom. Mineralogically, the ore changes with increasing depth from galena to galena-freibergite, to galena-freibergite-sphalerite-siderite, to sphalerite-freibergite-galena-siderite, to sphalerite-siderite, to siderite-pyrite-sphalerite (Cathro, 2006). Due to this zonation, individual veins have historically been interpreted to have a silver-poor sphalerite-rich lower zone. Historically, it was also believed that economic mineralization in the Keno Hill camp was restricted to a shallow zone of about 120 metres thickness; the discovery of the Number 3 Vein below the 400 level in the Hector-Calumet

mine in 1948 showed that silver-rich veins exist deeper than historically believed and that known veins exhibit depth potential.

In addition to the local changes in mineralogy, a camp-scale zonation from high gold to copper and iron to zinc ratios of tetrahedrite in the west of the camp to lower ratios in the east has been recognized. It is believed that the Roop Lakes Granite, located ten to fifteen km west of the camp, acted as a heat source for the hydrothermal system that resulted in the precipitation of the vein minerals. With increasing distance from the granite, hydrothermal fluids would have experienced a general decrease in temperature, leading to the observed change in metal ratios. Murphy (1997) points out, however; that the geometry between intrusion and mineralized veins might not reflect the geometry during the time of hydrothermal activity. Since the timing of mineralizing events and deformation is poorly constrained, the apparent zoning could be the result of other, as of yet unknown, factors.

Despite the above mentioned uncertainties, a generally lower fluid temperature along the western edge of the camp could be responsible for the epithermal character of the ore from the Husky, Husky Southwest, and possibly the higher levels of the Bellekeno deposits. These deposits contained higher gold grades than other deposits of the camp. Gold occurs as electrum, in pyrite, and in arsenopyrite. Sulphide mineralogy at Husky and Husky Southwest is also different from the bulk of the mines; the main sulphide is pyrite, which amounts for one to five per cent. Galena is rare and not argentiferous; instead silver occurs as microscopic crystals of native silver and argentite.

## 6.4 Lucky Queen Mineralization

The Lucky Queen vein structure has an average strike of approximately 43 degrees azimuth, with local variations ranging from 25 to 60 degrees, and an average dip of around 45 degrees to the south, within a range of 30 to 55 degrees. The main structure has a strike length, as defined by drilling, of approximately 650 m and is open along strike to both the northeast and southwest. Stratigraphic units correlative across the structure show a dip-normal separation of approximately 30-35 m. Reported thickness ranges from just a few centimetres to several metres. Mineralized zones are largely composed of brecciated wallrock, siderite ( $\pm$  limonite), vein quartz and ore minerals including, silver sulphosalts, galena, sphalerite and native silver. Minor primary minerals present include arsenopyrite and pyrite.

## 7 Deposit Types

The Keno Hill Mining camp has long been recognized as a polymetallic silver-lead-zinc vein district with characteristics possibly similar to other well-known mining districts in the world. Examples of this type of mineralization include the Kokanee Range (Slocan), British Columbia; Coeur d'Alene, Idaho; Freiberg and the Harz Mountains, Germany; and Příbram, Czech Republic.

The common characteristics of these locales are their proximity to crustal-scale faults, and the occurrence in a package of monotonous clastic metasedimentary rocks, which have been intruded by plutons. Even though the mineralization is not likely related to the intrusions, they may have acted as a heat source for hydrothermal circulation. Mineral precipitation occurred where metal-laden hydrothermal fluids with a temperature of 250 to 300 degrees Celsius traveled through open fractures caused by a local tensional stress regime in an otherwise compressional environment and precipitated metals as pressure and temperature changed.

The metals were likely leached from crustal rocks by hot circulating fluids. Mineral precipitation likely occurred at an average depth of about six km. Fluid mixing of hydrothermal fluid with meteoric fluid is common as is boiling. Multiple fluid pulses resulted in a repetition of the mineral sequence precipitated as well as recrystallization and modification of the existing mineral assemblage.

At Keno Hill, the largest accumulation of ore minerals occurred in structurally prepared competent rocks, such as the Central Quartzite, resulting in areas of increased fluid flow. Incompetent rocks like phyllites tend to produce fewer and smaller (if any) open spaces, limiting fluid flow and resulting mineral precipitation.

## 8 Exploration

Most past exploration work in the Keno Hill district was conducted as support to the mining activities until the mines closed in 1989. A good summary of the early exploration work is provided by Cathro (2006). This historic work involved surface and underground drilling designed to explore areas surrounding the main underground working areas. It is beyond the scope of this report to describe all historical exploration work completed in the Keno Hill district. Only the relevant historical work completed at the Lucky Queen property is included below.

The current exploration conducted by Alexco is the first comprehensive exploration effort in the district since 1997. During the initial phase of Alexco's involvement at Keno Hill, a program of geologic data compilation, aero geophysical surveying (conducted by McPhar Geophysics) and surface diamond drilling was completed.

Past operator UKHM accumulated a huge number of paper maps and documents relating to nearly seventy years of district mining, but the documentation and data were never assembled into a coherent database that could be used to decipher the geology on a district scale. Beginning in late 2005 and continuing through 2008, Alexco has converted over 100 gigabytes of this historic data to digital form by scanning and data entry.

Two diamond drilling rigs were mobilized to the district during the summer of 2006. Drilling by Alexco in the Lucky Queen prospect area totalled four surface core drill holes (875 m) in 2006, targeting the vein structure below the south-western end of the historical workings and around the lowermost reaches of the internal winze. As a routine procedure, all diamond drill core sampled was analyzed for thirty-three elements with analyses of these geochemical data being used to gain a better understanding of the distribution of mineralizing fluids on both a district and local scale.

Diamond drilling at Lucky Queen late in the season in 2007 consisted of three surface core drill holes (557 m), of which only one reached target depth before inclement weather forced an end to the drilling season. In 2008, twelve surface core drill holes (2,999 m) were drilled as stepouts along the vein strike to the southwest. Closer spaced and infill drilling around the 2007 drill hole intercept was the focus of the 2009 (fourteen surface core drill holes for 3,048 m) and 2010 (fourteen surface core holes for 3,625 m) drill campaigns that formed the basis for this resource estimate.

A district wide surface geological mapping and structural study, started in 2008, was continued through the 2010 field season with findings incorporated into the Lucky Queen geologic models where applicable.

Two geophysical techniques have been used over the Lucky Queen property i.e. aeromagnetic and aereoelectromagnetic. The high quality results generated by these surveys were successful in helping to identify possible hidden structures and covered stratigraphy. There is, however, no obvious signature unique to known mineralization.

## **9 Drilling**

### **9.1 Historical Drilling**

For the Lucky Queen area, historical drilling information is available from the 1950's through the 1980's.

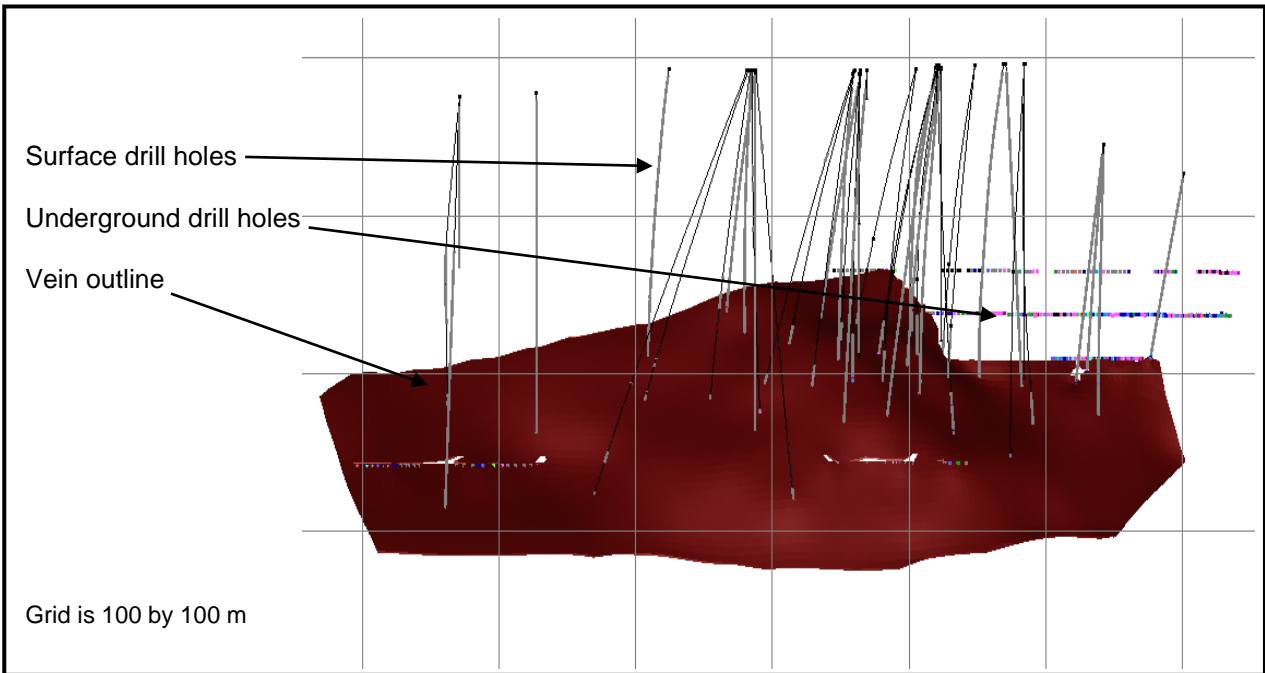
In 1957 UKHM drilled two surface diamond drill holes (LQ2 and LQ4) that intercepted the main Lucky Queen structure below the existing 300 level workings. Core recovery was very poor. For example, across a 50.90 m interval (from a depth of 156.06 m to 206.96 m in hole LQ4), in the approximate vicinity of the vein, recorded recovery averaged only 22%. The fractured, friable nature of ore material makes its retrieval very unlikely given the already poor recovery conditions. No assays exist for holes LQ2 or LQ4 because ore material was either not intercepted or was not recovered and, thus, assaying was likely deemed unnecessary. In addition, survey control for these holes is sparse. For the above reasons the historical surface core drilling data was not used in the Lucky Queen resource estimate.

In 1985-1987 UKHM drilled underground test holes from the Lucky Queen 500 level adit. These percussion holes were sampled and assayed at four foot intervals. Percussion drilling does not reliably present the accurate location of a sample. No recovery data was obtained by UKHM. On this basis, historic assays were not used in this resource estimate. The test holes did provide some useful geological information and were used to help constrain the geometry of the main Lucky Queen structure and associated splay structures during wireframe construction.

Shallow, rotary percussion surface holes were also drilled in the Lucky Queen area in the 1970's through 1980 totalling approximately 20,400 m in 507 holes. As with the underground rotary percussion holes these data was not deemed reliable for use in the resource calculation. The data were used in select geostatistics (variography) and in construction of mineralization/geologic models, where applicable.

### **9.2 2006 - 2010 Alexco Drilling**

Alexco conducted surface diamond drilling programs at Lucky Queen from 2006 – 2010 with forty-seven core holes totalling 11,104 m drilled (Figure 9.1). The drilling was designed to test along strike and down-plunge of the historical workings.



**Figure 9.1: Location of Surface Drill holes drilled in 2006 to 2010 at the Lucky Queen. Section is looking northwest.**

In 2006, diamond, drilling was performed by Peak Diamond Drilling based out of Courtney, British Columbia utilizing two skid mounted drill rigs, a LF-70 drill and an EF-90 drill. Drilling was done by the wireline method using N- size equipment (NQ2).

In 2007 and 2008 diamond drilling was performed by Quest Diamond Drilling based out of Abbotsford, British Columbia utilizing four skid mounted drill rigs, two LF-70 drills and two LF-90 drills in 2007 and two skid mounted drill rigs, one LF-90 and one QD-4 drills in 2008. Drilling was done by the wireline method using H-size equipment (HQ). In 2009, underground diamond drilling was performed by Boart Longyear of Haileybury, Ontario, utilizing two LM90 drills.

The 2009 surface drilling was performed by Kluane Drilling of Whitehorse, YT utilizing two skid mounted KD-1000 drills. Drilling was done by the wireline method using N- and H-size equipment.

Surface drilling in 2010 was split amongst three contractors; Cabo Drilling based in Surrey, BC, Kluane Drilling out of Whitehorse, Yukon and Ensign Encore Drilling from Calgary, Alberta. For all campaigns the drilling was well supervised, the drill sites were clean and safe, and the work was efficiently done. Diamond drill operational safety inspections were conducted on each drill rig at various times throughout the drilling programs.

Surface drill hole collars were located respective to Universal Transverse Mercator (“UTM”) coordinates. Proposed drill hole collars were located using a Garmin GPS. Final and completed collars were surveyed with either an Ashtech GPS utilizing post-processing software or a Sokkia GRX1 RTK GPS. Final coordinates were also recorded in the UTM coordinate system.

Surface drill holes ranged in length from 18 m to 324 m, averaging 235 m. Most holes were drilled on a north-westerly azimuth with a declination of between forty-five and eighty degrees. In most cases the drill holes were designed to intercept the mineralized zones perpendicular to the strike direction to give as close as possible a true thickness to the mineralized interval. Down hole surveys were taken approximately every sixty metres in 2006, thirty metres in 2007 and 2008 or fifteen metres in 2009 and 2010 using a Reflex survey tool.

Standard logging and sampling conventions were used to capture information from the drill core. The core was logged in detail using paper forms with the resulting data entered into a commercial computerized logging program either by the logging geologist or a technician. Four sets of data were captured in separate tables:

- Lithology and Structure;
- Mineralization;
- Alteration; and
- Geotechnical.

Any remarks were also captured. Lithology was documented by a one to four- letter alphanumeric code with additional modifiers. Structural data consisting of type of structure and measurements relative to core axis were recorded within the Lithology table. The Mineral table captured visual percentage veining (by type), sulphide (galena, sphalerite, pyrite, arsenopyrite, stibnite, chalcopyrite, freibergite and native silver), and oxide (limonite, sulphosalts and wad). Specific alteration features including silica, carbonate and iron oxide ("FeOx") alteration were also captured using a qualitative weak to strong scale. The geotechnical table records percentage recovery and rock quality determination for the entire hole and fracture intensity where warranted.

Alexco systematically measures core specific gravity ("CSG") of mineralized material as well as basic rock types. Specific gravity is measured using a balance and measuring the weight of core pieces in air and in water. Core weighted in water is not covered by wax or plastic film. Alexco collected approximately 305 core specific gravity measurements during the 2006 - 2010 drilling programs at Lucky Queen. Pulp specific gravity ("PSG") measurements were obtained by pycnometry on select assay intervals of mineralized zones for Alexco drilling by ALS Chemex Laboratories and AGAT Labs.

## 10 Sampling Method and Approach

### 10.1 Historical

Information regarding historical (pre-Alexco) sampling approach and methodology is limited. The available documentation is outlined below.

A 1965 UKHM document outlines the sampling procedures for a newly purchased percussion drill. It was found that in most cases the frozen ground gave sufficient support for the drill hole without additional casing. In a few cases where the ground was not frozen, casing was advanced with the drill bit.

Drill cuttings were collected using a locally designed cone-shaped deflector with a catch pan shaped to fit around the casing. During drilling operations, cuttings were blown upwards between the drill rod and the casing, hit the deflector and were caught by the catch pan. Runs were five feet (1.5 m) in length, and provided ten to fifteen pounds of sample material. At the end of each shift several hundred grams were split from each sample in the geochemical laboratory; the remainder of the sample material was screened to minus fourteen mesh. Constituents of the fine and coarse fraction were identified separately.

A document dated 1994 by Watts Griffis and McQuat ("WGM") outlines sampling procedures for the reverse circulation drilling. Two samples were to be collected for each five foot interval. One sample was sent to the laboratory while the other sample stayed at the drill for reference. The samples were collected in porous plastic bags and were dried prior to analysis. The document stresses cleanliness during the sampling procedure in order to avoid contamination.

An undated UKHM document outlines underground chip sample procedures as well. In addition to the above information, emphasis is put on clean faces in order to prevent sample contamination from previous blasting activities. Samples were to be taken within a 1.5 feet (0.5 m) wide area across the rock face. In addition to separate samples per rock type, this undated document requires separate samples for a change in structure. The sample location was to be measured from the nearest survey station; the resulting distance measurement was used to plot the samples (and assay results) on level plans. More detailed information was listed regarding the direction in which samples were to be taken for various kinds of underground openings.

### 10.2 Alexco 2006-2010

The sampling protocol for the 2006 - 2010 Alexco surface drill programs has been the same. The logging geologist marks the sample intervals on the core. Samples are typically two metres in length within major rock types. Sample intervals are broken at lithological contacts and at significant mineralization changes. Sample intervals within mineralized zones range from 0.10 metre to 1.0 metre, based on consistency of mineralization. In 2006, drill holes were sampled top to bottom, while from 2007 – 2010 some intervals of barren material were not sampled for holes in close proximity to drill holes that were sampled continuously.

After logging, the core was digitally photographed and sawn in half lengthwise using a diamond saw with attention paid to core orientation. One half was returned to the core box for storage at site and the other bagged for sample shipment. No further on-site processing was performed.

# 11 Sample Preparation, Analyses and Security

## 11.1 Historical Samples

Historical sample results were not used in the production of the resource estimate summarized in this report.

## 11.2 Alexco 2006 – 2010 Exploration Programs

Some minor modification in the sample shipment procedure has occurred over time, primarily in response to changing laboratory locations and the logistics surrounding available commercial transport. In all cases approximately four to five individual samples were placed in rice bags (grain sacks) for shipment. In 2006, samples were sent to Whitehorse, Yukon via Kluane Transport then to the ALS Chemex facility in North Vancouver, British Columbia for preparation and analysis via Manitoulin Transport. Beginning in 2007, each rice bag was sealed with a numbered security tag. Bags are then placed on pallets and wrapped for shipping. In 2007/2008, samples were transported to the Canadian Freightways facility in Whitehorse, Yukon by Alexco personnel. Canadian Freightways then trucked the samples to the ALS Chemex facility in Terrace, British Columbia for preparation. Pulverized sub-sample splits were then sent to the ALS Chemex facility in North Vancouver, British Columbia for analysis. In 2009, samples were transported to the Eco Tech Labs prep facility in Whitehorse, Yukon by Alexco personnel. Pulverized sub-sample splits were then sent to the Eco Tech facility in Kamloops, British Columbia for analysis. In 2010, samples were shipped via Manitoulin Transport to Whitehorse, Yukon where they were couriered to the prep facilities of either AGAT Labs or ALS Chemex in Whitehorse. ALS Chemex, Eco Tech and AGAT Laboratories are all accredited to ISO 17025 by the Standards Council of Canada for a number of specific test procedures, including: fire assay for gold and silver with atomic absorption and gravimetric finish; multi-element inductively coupled plasma optical emission spectroscopy; and atomic absorption assays for silver, copper, lead and zinc. ALS Chemex laboratories also participate in a number of international proficiency tests, such as those managed by CANMET and Geostats.

Sample preparation and analyses is consistent for the 2006 - 2010 Alexco programs for all labs. Sample preparation consists of initial fine crushing of the sample to better than seventy percent passing two millimetres. A nominal 250 g split of this material is then pulverized to greater than eighty-five percent passing seventy-five micron for analyses. Duplicate samples are prepared at the preparation facility by collecting a second 250 g split from the crushed material taken from the preceding sample when noted.

Samples are analyzed for gold by fire assay and atomic absorption spectrometry on thirty gram sub-samples and for a suite of twenty-seven to forty-eight elements by four acid digestion and either inductively coupled plasma atomic emission spectroscopy or induced coupled plasma mass spectroscopy (on 0.5 g sub-samples). Elements exceeding concentration limits of ICP-AES or ICP-MS were re-assayed by single element four acid digestion and atomic emission spectroscopy. Silver results exceeding ICP-AES limits are re-assayed by fire assay and gravimetric finish on 30 g sub-samples. Lead and zinc results exceeding concentration limits were analyzed by volumetric titration.

Alexco implements standard assay quality control procedures for all Keno Hill drill campaigns. Each twenty-sample batch sent for assaying includes three control samples: a commercial Standard Reference Material ("SRM"), a blank and a duplicate. The location of control samples in the sample

stream is defined by the logging geologist (standard reference material or “SRM”, blank, and duplicate). Control samples were inserted when the core was sawn or when the whole core was sampled. The SRM is already processed to a pulp and is inserted as ~50-100 g sample. The blank is commercially purchased “landscape rock”, either dolomite or basalt. Approximately 0.35 kg to 1.5 kg of this material is inserted. An empty sample bag is inserted at the location of the duplicate which is prepared during sample preparation at the laboratory prep facility. The duplicate consists of a coarse reject split of the preceding sample.

The quality control program developed by Alexco is considered mature and overseen by appropriately qualified geologists. The data collected by Alexco on the Keno Hill project was acquired using adequate quality control procedures that generally meet or exceed industry best practices for a resource delineation stage exploration property.

## 12 Data Verification

### 12.1 Historical Data Verification

During almost 100 years of exploration and mining in the Keno Hill area, large amounts of data and documents were produced; much of this material is accessible to Alexco.

Large amounts of data were scanned by Alexco with documents initially labelled with the location (e.g. file cabinet number and drawer) before being moved from the storage sites to the scanning facility. The scans of large maps and sections are stored as image files (jpeg format) where the file name contains original title block information. Individual files are stored in directories that mimic the physical storage location. Smaller maps and reports were scanned and saved as Adobe® pdf files. Naming convention and file hierarchy are the same as for the large maps. Each file is also given a five digit number that is added in front of the file name. These numbers are listed in an Excel spreadsheet that also contains the file name, the file extension, the file size, the scanning date and the directory location, as well as a key word index for each file. The scans were also organized into descriptive folders for each mine/prospect.

#### 12.1.1 Diamond Drill Data

All accessible diamond drill hole logs were transcribed onto standardized spreadsheets as close to verbatim as possible; the original logs were scanned and file names and numbers were recorded in the new spreadsheets as well. These first spreadsheets were then inspected by geologists for consistency. The next step was to “normalize” the original transcribed data in order to match current nomenclature; data verification was ongoing. Collar information, as well as survey, assay and recovery data were then verified by a person other than the original data entry person; the final step was to amalgamate separate spreadsheets into one global database.

#### 12.1.2 Chip Sample Data

Data verification by Alexco personnel was done on the TYC and UKHM underground chip sample data from the assay plans associated with the historical Lucky Queen mine. The verification procedure consisted of cross-checking the assay values in the database to the values on the original scanned historic assay plan maps. The sample interval points and respective silver assays were imported from the database and overlain on the original maps. All points were visually inspected to ensure that chip sample lines fall within the boundaries of the drift outlines. Then all assay intervals in the database were checked to ensure they matched with what was originally written on the maps.

### 12.2 Alexco Data Verification

Alexco maintains an SQL database of all Keno District drill and sample data. Each property is assigned an identifier to extract property specific subsets from the master database. All data is entered or imported into the database via Datashed database management software. The Lucky Queen data is exported from the SQL database by scripted routine to comma separated values (“csv”) files, which are imported into Minesight. The following drill hole files are generated: collar, survey, drill hole assay, chip sample assay, geology, and geotechnical. During the 2006 to 2010 drilling programs, Alexco personnel conducted routine visual verifications to ensure the reliability of the drilling data, including a 100% check of the collar and survey tables and a minimum 10% verification of the remaining exported tables. The process uncovered a low level of data entry errors which were corrected.

## 12.3 Analytical Quality Assurance and Quality Control Programs

Quality control measures are typically set in place to ensure the reliability and trustworthiness of exploration data. This includes written field procedures and independent verifications of aspects such as drilling, surveying, sampling and assaying, data management and database integrity. Appropriate documentation of quality control measures and regular analysis of quality control data are important as a safeguard for project data and form the basis for the quality assurance program implement during exploration.

Analytical control measures typically involve internal and external laboratory control measures implemented to monitor the precision and accuracy of the sampling, preparation and assaying. They are also important to prevent sample mix-up and monitor the voluntary or inadvertent contamination of samples. Assaying protocols typically involve regular duplicate and replicate assays and insertion of quality control samples to monitor the reliability of assaying results throughout the sampling and assaying process.

### 12.3.1 Historical Exploration

Historical assays were not used in the calculation of mineral resources summarized in this report.

### 12.3.2 Alexco 2006 - 2010 Exploration Programs

The Alexco assay quality control procedures are outlined in Section 12.2. Three control samples (standard, blank, duplicate) were included in each twenty-sample batch sent for assaying. During the 2006 – 2010 drill campaigns, Alexco used one of ten Standard Reference Material (“SRM”) purchased from WCM Sales Limited of Burnaby, British Columbia: six polymetallic copper, lead, zinc and silver reference materials (PB 111, PB 112, PB 113, PB 116, PB 129 and PB 131) and six silver reference materials (PM 1107, PM 1108, PM 1116, PM 1117, PM 1128 and PM 1133) for inclusion in each twenty sample batch (Table 12.1).

**Table 12.1: Commercial Standard Reference Material Used by Alexco for the 2006 to 2010 Drilling Programs**

SRM	Cu (%)	S.D.	Pb (%)	S.D.	Zn (%)	S.D.	Ag (g/t)	S.D.	Ag (oz/t)	S.D.
PB111	0.69	0.01	2.12	0.04	0.45	0.02	195	6		
PB112	0.85	0.01	0.92	0.02	1.27	0.03	222	2		
PB113	0.47	0.01	1.11	0.02	1.40	0.05	22	1		
PB116	0.43	0.01	1.40	0.06	0.85	0.02	22	1		
PB129	0.28	0.01	1.24	0.02	2.00	0.06	23	1.7		
PB131	0.47	0.01	1.04	0.04	1.89	0.06	262	11		
PM1107							1194	34	34.8	1.0
PM1108							658	10	19.2	0.3
PM1116							769	23	22.4	0.7
PM1117							386	16	11.3	0.5
PM1128							502	12	17.3	0.4
PM1133							757	19	22.1	0.5

Assay results for quality control samples were monitored on an ongoing basis during all drill programs (2006 to 2010). Each potential quality control failure was investigated and appropriate remedy action was taken, including the re-assaying of batches containing abnormal quality control samples. In some instances, the potential failures occurred in batches of samples outside potentially mineralized areas. In such cases no remedy actions were taken.

The 2006 to 2010 external analytical quality control data produced by Alexco is summarized in Table 12.2.

**Table 12.2: Quality Control Data Produced by Alexco in 2006 to 2010 for Lucky Queen**

Quality Control Type	Count	Ratio
Core Samples	3,144	
Blanks	185	1:17 (5.9%)
Standard Reference Material	183	1:17 (5.8%)
Coarse Reject Duplicate	186	1:17 (5.9%)

All standards consistently returned values within  $\pm 2$  standard deviations of the mean, with only occasional values falling outside this limit, but within  $\pm 3$  standard deviations of the mean.

Analysis of assays from coarse reject duplicate samples suggests that silver, lead and zinc grades can be reasonably reproduced with no apparent bias.

## 12.4 SRK Data Verification

SRK reviewed and verified the Lucky Queen drill hole data and quality control assay data from 2006 to 2010 and found the data to be reliable for resource estimation purposes.

The 2006 to 2010 quality control data collected by Alexco is considered comprehensive and the assaying results delivered by ALS Chemex and AGAT Labs are considered reliable for the purpose of resource estimation.

SRK aggregated the assay results for the external quality control samples and duplicate assay pairs. Time series bias charts and assay pair precision plots were constructed for applicable elements. The charts are presented below in Figures 12.1 to 12.3 below.

A total of 185 samples of unknown composition designated as blanks were submitted by Alexco during drilling operations. Performance of the blank samples was reasonably good, with no systematic failures noted for Ag, Pb or Zn. For Au assays, 6% of the submitted blanks returned a grade higher than 0.01 g/t (Figure 12.1).

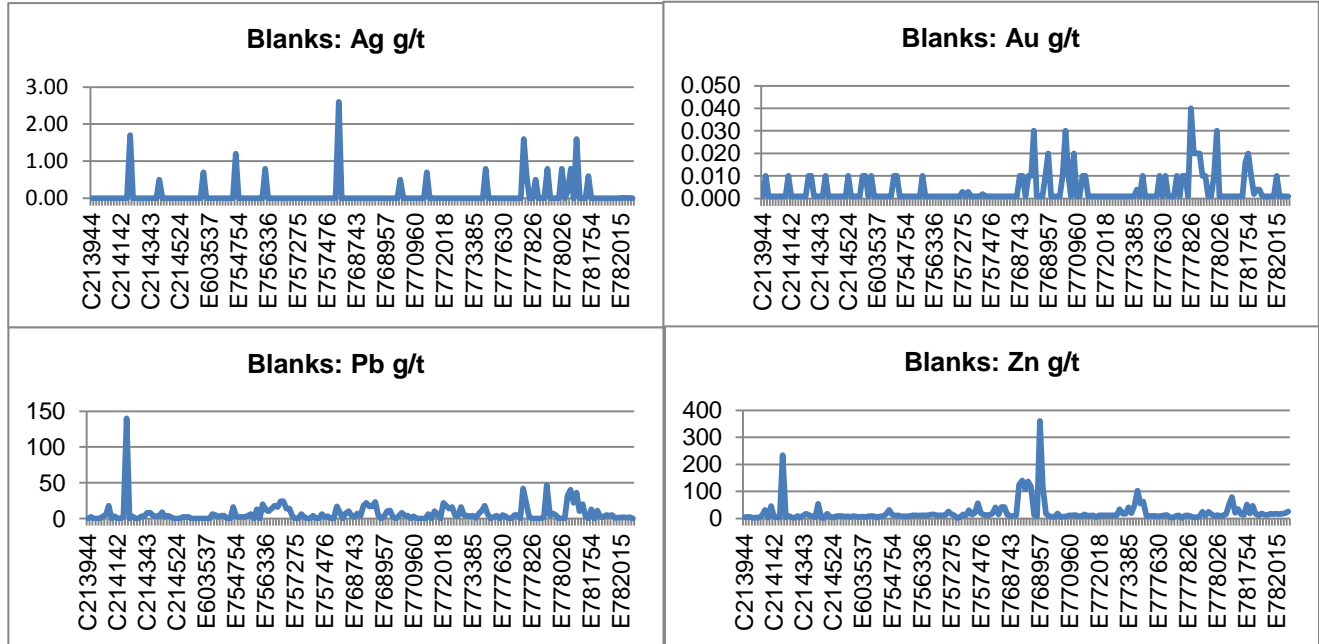


Figure 12.1: Blank analytical results plotted against time.

A total of 183 commercial standard reference samples were submitted by Alexco during drilling operations. All reference standards used by Alexco were purchased from WCM Minerals, Burnaby, BC Canada. Performance of the commercial standard reference samples was reasonably good, with only the analytical results for one standard (PM-1107) being consistently less than the average grade of the standard (Figure 12.2).

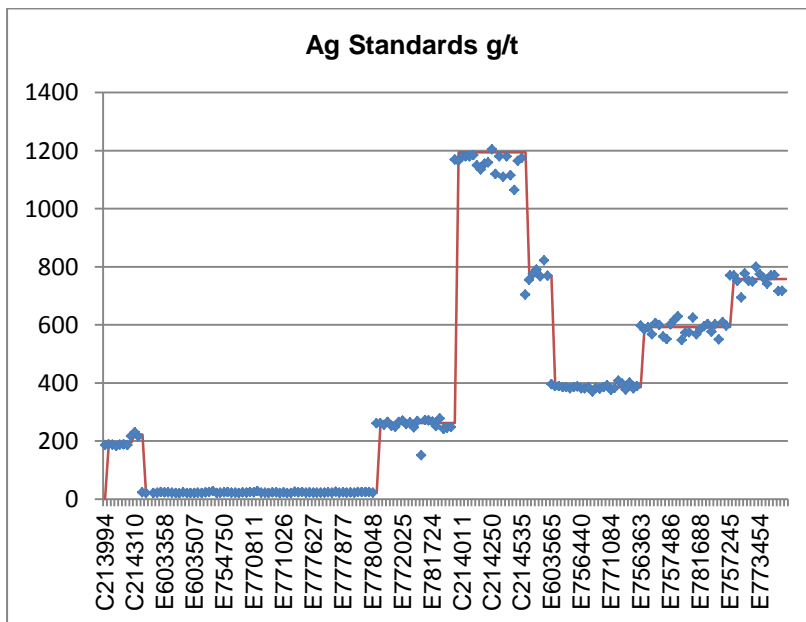
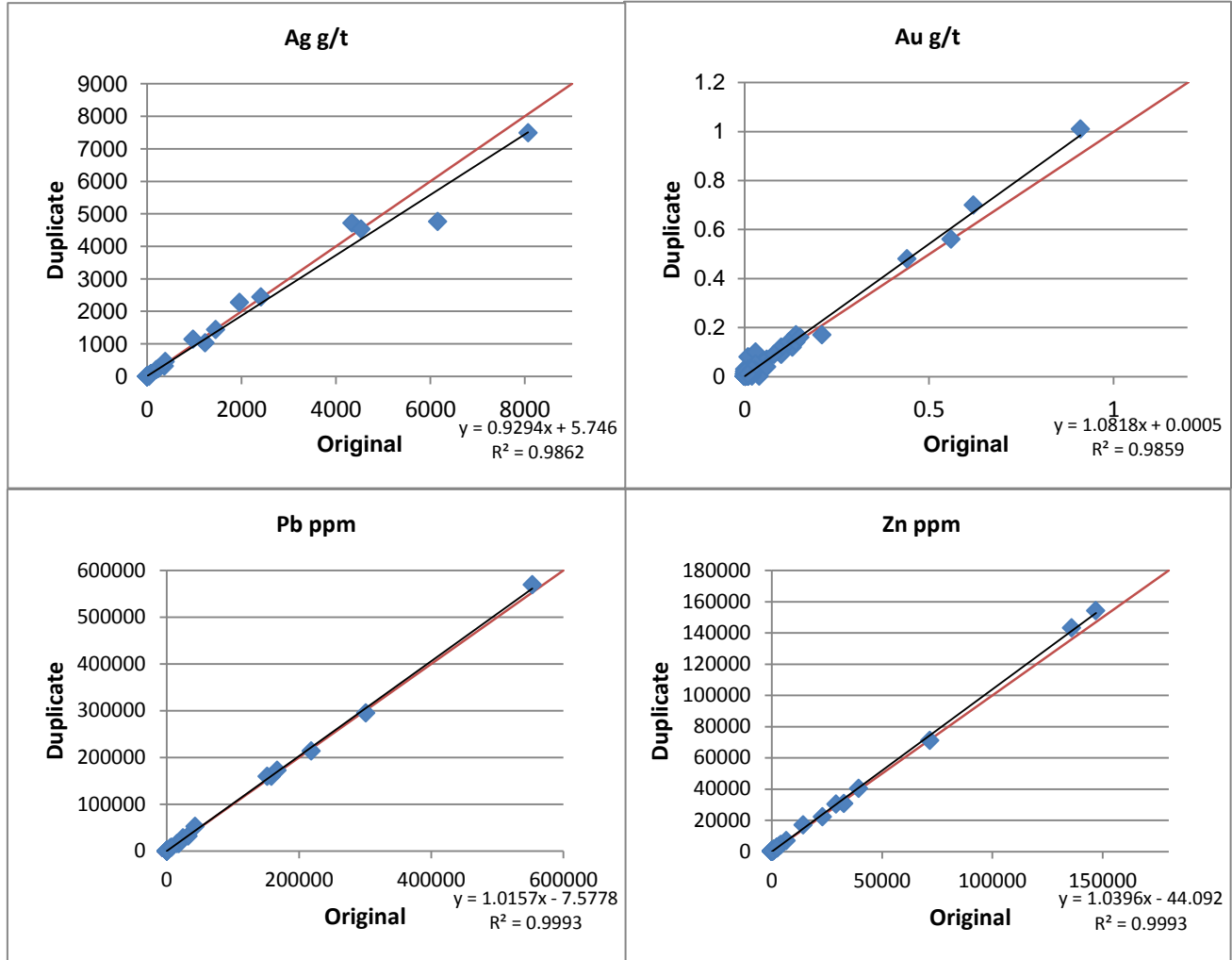


Figure 12.2: SRM performance for silver

A total of 186 samples were analyzed as duplicates by Alexco. No significant discrepancies were noted between the original and duplicate analyses, and the correlation between samples is good (Figure 12.3).



**Figure 12.3: Duplicate analyses comparison**

SRK has verified the QAQC program established by Alexco, reviewed the results and deemed the data to be suitable for mineral resource estimation.

## 13 Adjacent Properties

There are no adjacent properties considered relevant to this technical report.

## 14 Mineral Processing and Metallurgical Testing

No metallurgical samples have been collected from the Lucky Queen deposit. For the purpose of this study, SRK has assumed that the deposit would have similar metallurgical properties to those of the Bellekeno deposit. Three separate metallurgical tests have been carried out on the mineralization at Bellekeno.

Test results from three testing programs indicate that the mineralization of the Bellekeno deposit responds well to a lead and zinc differential flotation process using a cyanide-free zinc mineral suppression regime. Silver minerals are intimately associated with lead minerals and are recovered as a silver-lead concentrate. A separate zinc concentrate is also produced from the Bellekeno operation.

Metallurgical performance estimated from test work and assumed for this report is based on test work completed by SGS Lakefield Research Ltd. in 2007 and by Process Research Associates Ltd. in 1996 and 2008/09. Table 14.1 shows the average projected metallurgical performance.

**Table 14.1: Summary of projected metallurgical recoveries**

Product	Mass %	Grade				Recovery			
		Au (g/t)	Ag (g/t)	Pb (%)	Zn (%)	Au (g/t)	Ag (g/t)	Pb (%)	Zn (%)
Head	100	0.42	871	9.47	5.6	100	100	100	100
Pb-Ag Con	13.1	1.5	6,185	70.3	2.3	47.7	92.7	96.9	5.4
Zn Conc	9.1	1.1	300	0.52	54.4	23.9	3.1	0.5	88.4

## 15 Mineral Resource Estimates

### 15.1 Introduction

SRK was engaged in June of 2010 by the Alexco to provide a mineral resource estimate for the Lucky Queen deposit.

The mineral resources presented in this report represent the first time disclosure of mineral resource for the Lucky Queen deposit. Historical production attributed to the Lucky Queen deposit between 1913 and 1990 is eleven million ounces of silver from 124,000 tons, at a recovered grade of 89.2 oz/st Ag (~3058 g/t), 7.0% Pb and 2.7% Zn (Cathro 2006).

### 15.2 Wireframe Construction

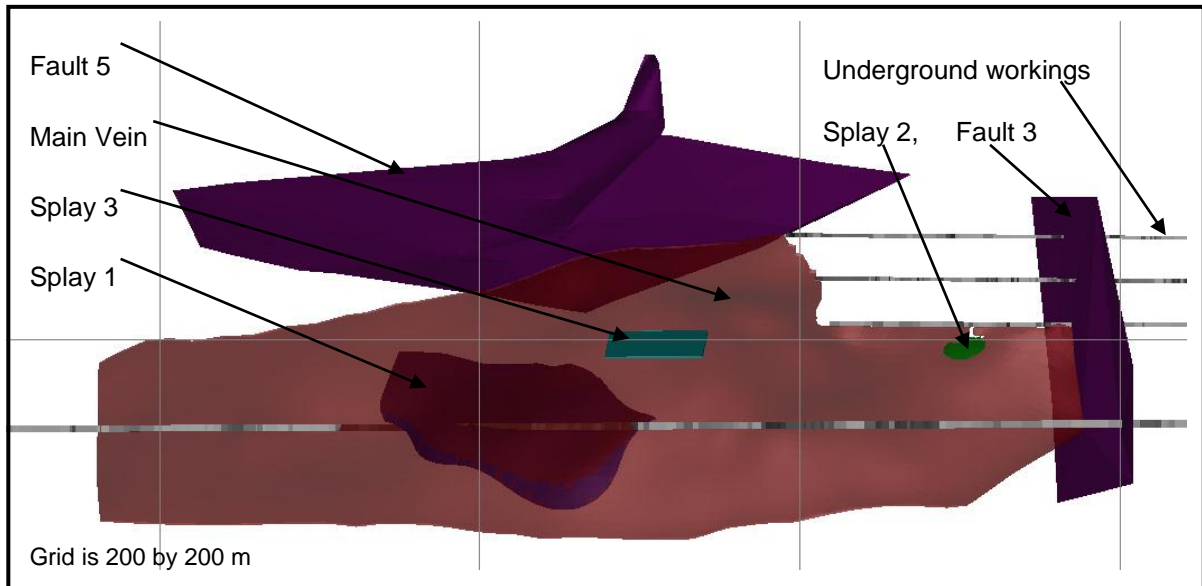
Three dimensional wireframe solids were constructed by Alexco to accurately represent the geometry of the Lucky Queen vein structures. SRK reviewed and validated the wireframes before resource estimation. SRK concluded that the wireframes of the Lucky Queen deposit were fair representations of the mineralized veins and acceptable for resource estimation.

At Lucky Queen the majority of high-grade silver-bearing ore material is confined between relatively intact rocks of the hangingwall and footwall and is manifested as hydrothermal vein minerals and highly deformed fault rocks (in varying proportions). High silver values are only rarely located outside the main structure as stringer zones or splays. Coincidence of high grade ore within identifiable structural limits made it sensible to base the wireframe on structural-geologic grounds, and contacts were chosen accordingly. In addition to Alexco drill hole data, historical drill hole data and geologic mapping conducted by UKHM were used to constrain the geometry of the main Lucky Queen structure and associated splay structures where applicable.

Historical drift and stope mapping is considered by Alexco to be accurate and representative. Field verification of the mapping could not be performed by Alexco geologists because of the current inaccessibility of the underground workings. However, historical maps of other mines in the Keno Hill district have been verified and found to be generally accurate in their representation of the geology. Historical maps were scanned, geo-referenced and imported into Minesight. The images were then draped onto drift solids at the appropriate elevation. This mapping was used to tag hangingwall and footwall contacts on the wireframe.

The wireframe solid of the main vein and splay structures were built using MineSight 3D software. Initially, a flat surface that approximated the orientation and extent of the resource area (a best-fit plane) was constructed using both drill hole and underground historical mapping information. This was then contoured at elevation intervals of four metres and the contours used to generate a new surface. The new surface contained over 10,000 faces instead of its predecessor which contained less than 10. However, the size, shape and orientation of the new surface remained as before; a best-fit plane. The "surface deform" tool was used to gradually distort this surface so that it honoured the chosen vein contacts in the hangingwall. This was an iterative process, initially setting the deformation to cover a wide area and then gradually reducing this area until the surface honoured all chosen vein contacts. A footwall surface was constructed in the same manner as above. A third surface to connect the hangingwall and footwall surfaces was created and all three surfaces were merged together to form a solid. The preceding method was also used in the construction of wireframe solids for all splay structures.

The main Lucky Queen mineralized body occupies a central part of the primary wireframe and the most important constraints delineating it are the lower grade drill intercepts that occupy locations above, below and to the northeast. Beyond these drill holes the wireframe is cut off (approximately) along the deepest extents of the 200 and 300 level historic workings. Fault 3 and 5 cut off the wireframe to the northeast and at shallow elevations respectively. The earlier Lucky Queen workings include extensive stoping. As a result, it was decided to exclude the entire area containing the 50, 100, 200 and 300 level workings from the wireframe solid. Those areas of the 500 level workings that intersect the wireframes were also removed from the wireframe solid (Figure 15.1).



**Figure 15.1: Section of Lucky Queen wireframes looking northwest**

### 15.3 Database

The Lucky Queen data are exported from the SQL database by scripted routine to csv files, which are imported into Minesight. The following drill hole files are generated: collar, survey, drill hole assay, chip sample assay, geology, and geotechnical.

The Lucky Queen database comprises descriptive information and assay grades both from historical underground sampling and from exploration drilling carried out by Alexco from 2006 through 2010. The database was provided to SRK as an Excel format spreadsheet and contains a total of 558 records encompassing 47 diamond drill holes (DDH) and 511 historical underground channel samples (Table 15.1). From the drilling results, Alexco has identified a total of 106 diamond drill hole intervals as primary vein intercepts and 26 intervals as secondary splay intercepts, based on a combination of geological logging and assay grades.

**Table 15.1: Lucky Queen deposit sample database**

Type	Count	Ag (g/t)	Au (g/t)	Pb (ppm)	Zn (ppm)	Vein Width (m)
Historical Chip	511	2,175	NA	50,661	39,216	1.20
Alexco DDH Vein	106	1,426	0.19	36,523	21,222	0.67
Alexco DDH Splays	26	1,128	0.06	18,340	6,905	0.78
Alexco DDH other	3,012	3.6	0.02	322	378	1.84

The supplied mineral resource database was imported into a GEMS format Access database, and validated by checking for:

- 1) Inconsistencies in naming conventions or analytical units;
- 2) Duplicate entries;
- 3) Overlapping intervals;
- 4) Length or distance values less than or equal to zero;
- 5) Blank or zero-value assay results;
- 6) Out-of-sequence intervals;
- 7) Intervals or distances greater than the reported drill hole length;
- 8) Inappropriate collar locations; and
- 9) Missing interval and coordinate fields.

Two trivial terminal interval survey distances were noted and corrected; no other significant validation errors were noted in the supplied database. Assay intervals marked as below detection limit were assigned a nominal grade of 0.001 prior to importing into GEMS.

## 15.4 Specific Gravity

The data supplied by Alexco for the Lucky Queen included a total of 191 specific gravity measurements (Table 15.2). Specific gravity was measured by Alexco using a laboratory scale and recording the mass of drill hole core pieces in air and in water. Drill hole core was not covered by wax or plastic film prior to immersion. Regression analysis of the supplied specific gravity measurements shows a moderately strong correlation between the lead assay results and the reported specific gravity, with a correlation coefficient of 0.62 (Figure 15.2). A linear correlation was therefore used to populate the database with calculated specific gravity values based on the observed correlation, where:

$$\text{Specific Gravity} = \text{Pb (ppm)} \times 0.00006 + 2.617$$

**Table 15.2: Lucky Queen Specific gravity measurements**

Total Samples	Minimum Specific gravity (t/m3)	Maximum Specific gravity (t/m3)	Average Specific gravity (t/m3)	Median Specific gravity (t/m3)
191	1.24	6.81	2.74	2.60

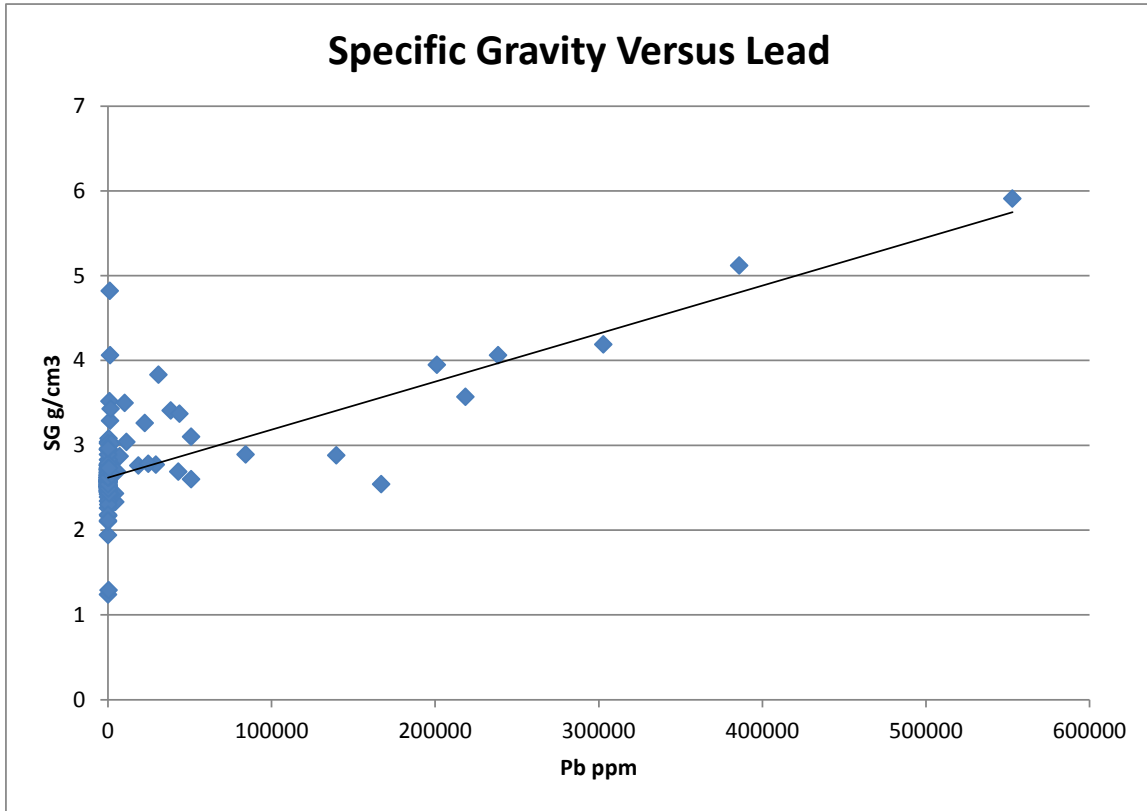


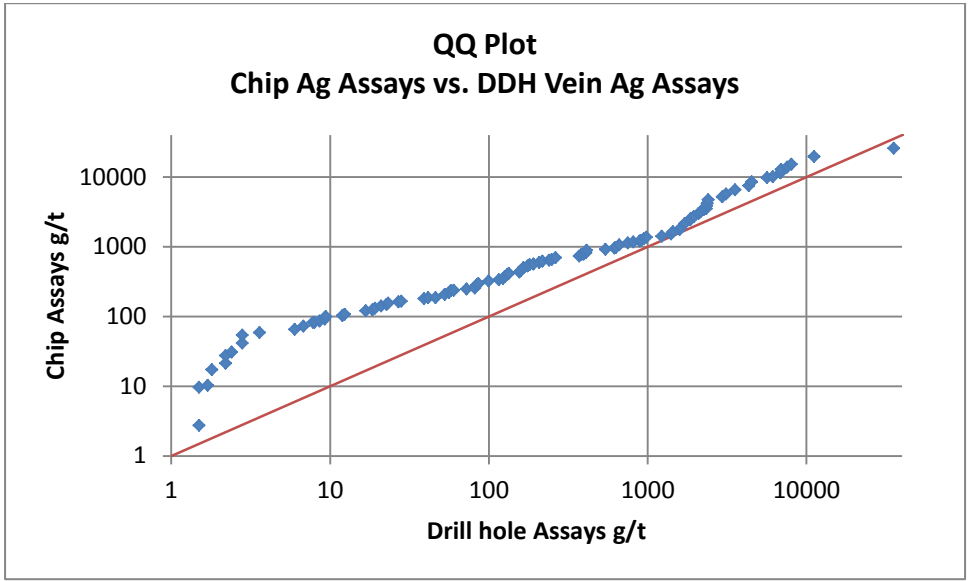
Figure 15.2: Scatter plot of lead assay results and specific gravity measurements.

## 15.5 Compositing

Alexco identified a total of 106 diamond drill hole assay intervals as primary vein intercepts and 26 intervals as secondary splay intercepts. These assay intervals were imported into GEMS, and assays were then composited to one metre length-weighted intervals within the defined vein wireframes. Terminal composites with a length of less than 50 cm were merged with the preceding composite in order to avoid a short sample bias during estimation. Missing sample intervals were assigned a nominal value of 0.001 during compositing.

## 15.6 Data Statistics

Examination of the distribution of the drill hole and chip assay sample populations suggests that the drill hole assay data differ significantly from the chip assay data (Figure 15.3). The chip sample data were therefore used for continuity analysis, but were not used for mineral resource estimation.



**Figure 15.3: Q-Q plot of chip and drill hole Ag assay sample data**

Summary statistics were compiled for the composite data, both for the defined Luck Queen vein and for a secondary splay identified by Alexco (Table 15.3). A total of 66 composites were derived for the Lucky Queen vein, and fifteen composites for the secondary splay. An additional five composites averaging 1,591 g/t of Ag have been identified by Alexco, but were not assigned to the primary Lucky Queen vein or the secondary splay. Correlation analysis between commodities indicates a strong correlation between Ag and Pb, with a correlation coefficient of 0.62.

**Table 15.3: Composite data summary statistics for Lucky Queen**

Type	Statistic	Ag g/t	Au g/t	Pb ppm	Zn ppm
Total Composites	Number of Samples	81	81	81	81
	Average	814	0.14	17,909	12,080
	Minimum	0.2	0.001	2,327	44
	Maximum	13,998	3.00	303,963	210,100
	St Dev.	1,929	0.375	42,651	31,353
	CV	2.4	2.8	2.4	2.6
Vein Composites	Number of Samples	66	66	66	66
	Average	960	0.161	20,831	13,944
	Minimum	0.6	0.001	32	44
	Maximum	13,998	3.00	303,963	210,010
	St Dev.	2,098	0.412	46,265	34,315
	CV	2.2	2.6	2.2	2.5
Splay Composites	Number of Samples	15	15	15	15
	Average	174	0.022	5,054	3,877
	Minimum	0.2	0.001	23	116
	Maximum	2,125	0.155	60,714	27,195
	St Dev.	547	0.040	15,496	7,862
	CV	3.2	1.8	3.1	2.0

## 15.7 Capping

Grade capping analysis was conducted on the domain-coded and composited grade data in order to determine the influence of extreme values during linear estimation. The combined composite sample population for the main Lucky Queen vein and splay was examined using histograms, probability graphs and capping plots. Capping threshold values were selected that minimize changes in the composite sample distribution, and composites were capped to these values prior to estimation. For Pb, the capping threshold was set to the percentile used for grade capping of Ag in order to maintain the observed correlation between these two elements (Table 15.4).

**Table 15.4: Composite capping levels for Lucky Queen**

Commodity	Maximum Value	Cap Value	Average	Average Capped	Number Capped	Lost Metal*
Ag (g/t)	13,998	6,300	960	834	2	13.1%
Au (g/t)	3.00	2.00	0.16	0.15	1	10.0%
Pb (ppm)	303,963	148,000	20,831	18,461	2	11.4%
Zn (ppm)	210,100	70,000	13,944	10,143	3	27.2%

\*Lost metal is  $(Average - Averaged Capped)/Average * 100$  where Average is the average grade of the assays before capping and Average Capped is the average grade of the assays after capping.

## 15.8 Variography

Three-dimensional continuity analysis was conducted on the composite assay data and underground chip sample grade data for the Lucky Queen vein. Downhole and directional un-transformed and normal-scores transformed and normalized experimental semi-variograms were examined for Ag, with the horizontal and across-strike directions aligned with the modeled vein orientation (Table 15.5). Rotation was defined by the GEMS ZYZ convention within the rotated block model coordinate space. Due to the spatial distribution of the data, only a strike experimental semi-variogram could be satisfactorily modeled, and the range of the resulting normal-scores experimental semi-variogram was used to define sample selection requirements and classification criteria.

**Table 15.5: Modelled semi-variogram for Ag**

Direction	Experimental Semi-Variogram	Range
Nugget	0.2	
Sill 1	0.2	12
Sill 2	0.6	100

## 15.9 Block Model

A rotated block model was constructed to cover the entire extent of the mineralized veins as defined by Alexco. The block model includes separate sub-models for silver, lead, zinc and gold grade estimates, as well as estimated specific gravity, classification criteria, validation estimates and a calculated block NSR value. A block percentage model was used to accurately determine volume and tonnage values based on the supplied Alexco vein wireframes. The geometrical parameters of the block model are summarized in Table 15.6.

**Table 15.6: Block model location and setup for Lucky Queen**

Description	Easting (X)	Northing (Y)	Elevation (Z)
Block Model Origin (NAD 83 Zone 8N)	486,900	7,091,300	1,200
Block Dimensions (metres)	10	10	10
Number of Blocks	70	100	50
Rotation (degree)	-50° counter-clockwise		

## 15.10 Grade Interpolation

Inverse distance squared (“ID2”) estimation procedure was applied for the estimation of block grades. A two-pass series of expanding search ellipsoids with varying minimum sample requirements was used for sample selection and estimation, with the primary and secondary axes of the search ellipsoid defined by the silver semi-variogram range. Composite data used during estimation were restricted to samples located in their respective domain. Individual block grades were then used to calculate an NSR block model. For the second pass, estimation results were also iteratively queried to ensure that all potential mineral resources within the defined domains were estimated. Estimation criteria are summarized in Table 15.7.

During the first pass, four to twelve composites from two or more drill holes within a search ellipsoid corresponding to 50% of the semi-variogram range were required for the estimation. All blocks estimated during the first pass were classified as Indicated.

During the second pass the search ellipse was expanded to ensure that all blocks within the defined vein and splay models were estimated. Between four to twelve composites from one or more drill holes were used for estimation. All blocks estimated during the second pass were classified as Inferred. All splay resources were also classified as Inferred due to the small number of total samples for this domain.

**Table 15.7: Search ellipse parameters for Lucky Queen**

Estimator	Search Pass	Search Type	Rotation		Search Ellipse Size			Number of Composites		Max. Samples per DDH
			Z	Y	X (m)	Y (m)	Z (m)	Min.	Max.	
ID2	1	Ellipse	0°	50°	50	50	10	4	12	3
ID2	2	Ellipse	0°	50°	300	300	60	4	12	0

## 15.11 Block Model Validation

The block model was validated visually by the inspection of successive section lines in order to confirm that the block model correctly reflects the distribution of high-grade and low-grade samples.

Trend analysis for the Lucky Queen mineral resource estimates demonstrates a minimal global bias and slight smoothing for the ID2 estimate as compared to an Nearest Neighbor (NN) estimate, and correctly reflects grade trends along the strike of the deposit (Figure 15.4). An additional validation

check was also completed by comparing the undiluted ID2 block model estimates to an undiluted NN block model estimate generated using the same search criteria and tabulated at a zero cut-off (Table 15.8). The observed differences between the undiluted ID2 average block estimates and the undiluted NN average block estimates are a function of the sharp grade drop immediately adjacent to the high-grade core of the vein.

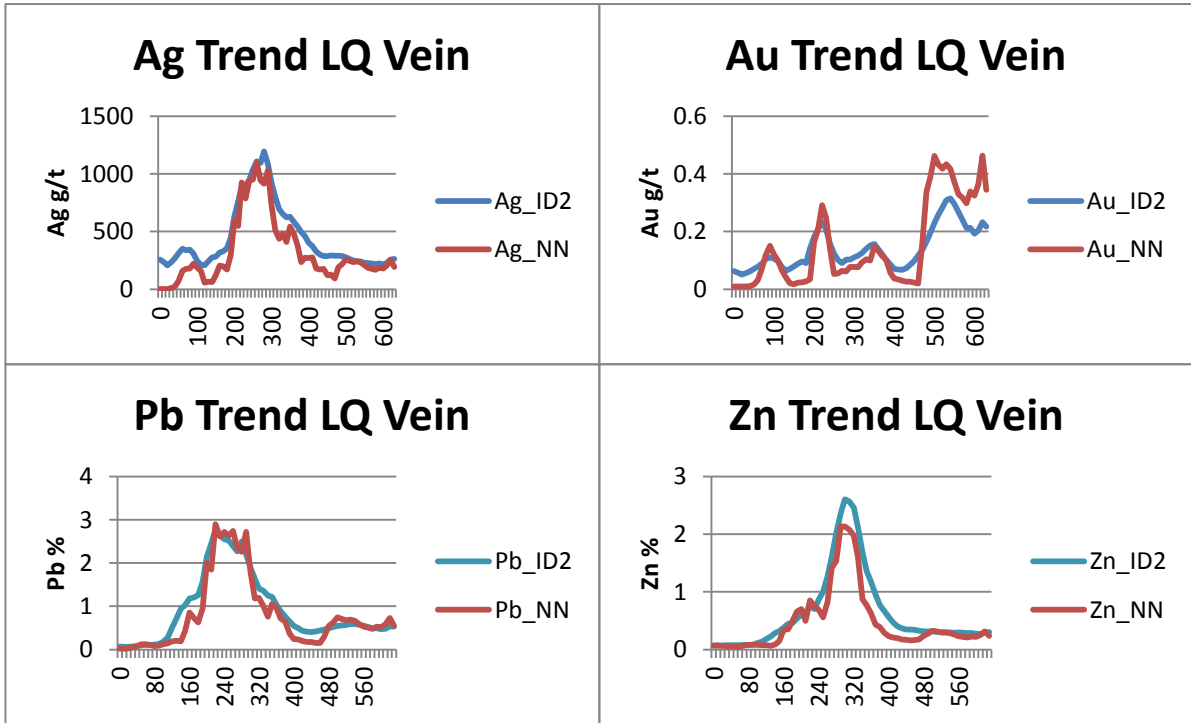


Figure 15.4: Swath plots comparison of ID2 and NN estimation

**Table 15.8: Nearest neighbour block model validation**

	ID2 Block Average	NN Block Average
Ag (g/t)	545	452
Au (g/t)	0.14	0.15
Pb (%)	1.22	1.14
Zn (%)	0.82	0.70

## 15.12 Block Model Sensitivity Analysis

The Lucky Queen mineral resources are not sensitive to the selection of cut-off grade. Table 15.9 shows the global quantities and grade estimates at different cut-off grades for the Lucky Queen vein and Figure 15.5 represents the effects of increasing cut-offs on the tonnage and grade of the Lucky Queen deposit. The reader is cautioned that these figures should not be misconstrued as a mineral resource. The reported quantities and grades are only presented as a sensitivity of the resource model to the selection of the cut-off grades.

**Table 15.9: Lucky Queen Indicated block model quantity and grade estimates\* at various cut-off grades**

NSR Cut-Off C\$	Tonnes '000	Ag g/t	Contained Metal Ag ozs '000
C\$ 230.00	115	1,297	4,782
C\$ 215.00	119	1,262	4,833
C\$ 200.00	121	1,250	4,848
<b>C\$ 185.00</b>	<b>124</b>	<b>1,227</b>	<b>4,878</b>
C\$ 170.00	126	1,207	4,902
C\$ 155.00	128	1,191	4,919
C\$ 140.00	130	1,183	4,927

*\* The reader is cautioned that the figures presented in this table should not be misconstrued as a mineral resource statement. The reported quantities and grades are only presented to show the sensitivity of the resource model to the selection of cut-off grade.*

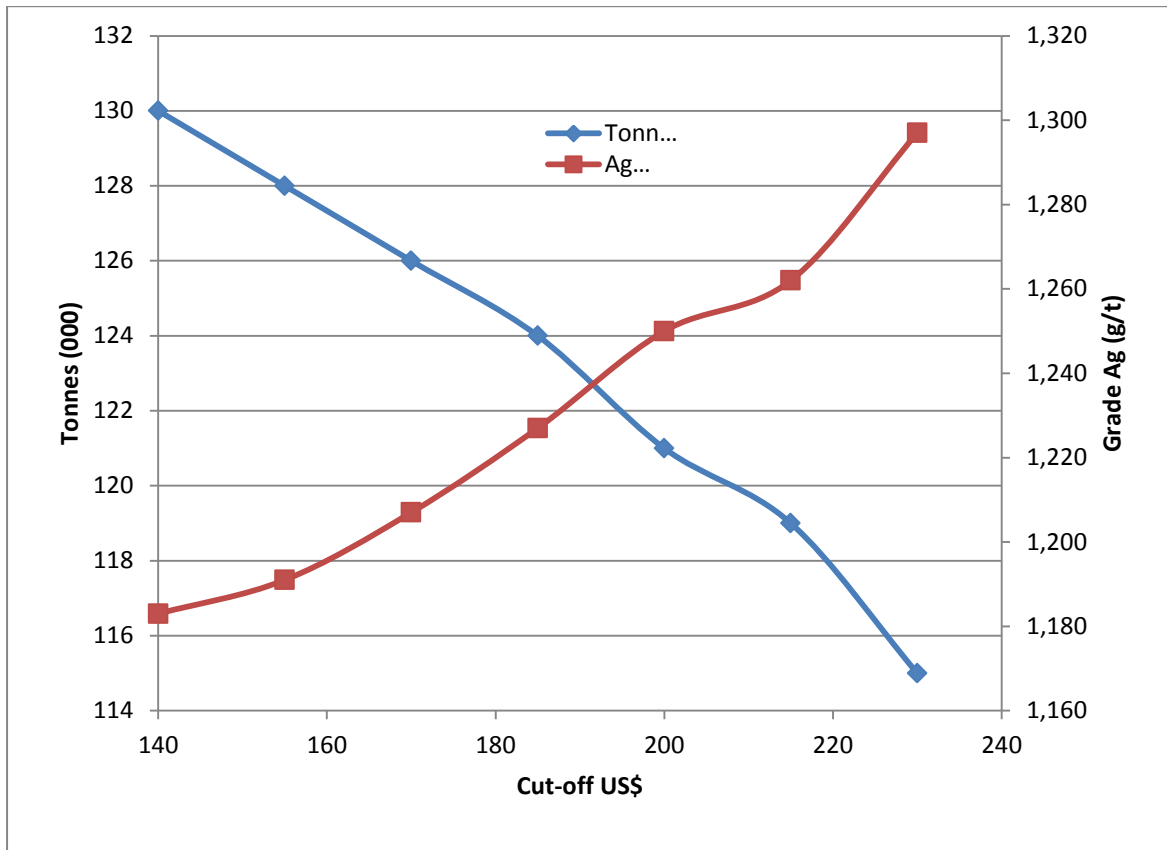


Figure 15.5: Grade tonnage curve for Lucky Queen

### 15.13 Mineral Resource Classification

Mineral resources were estimated in conformity with generally accepted CIM “Estimation of Mineral Resource and Mineral Reserve Best Practices” guidelines. Mineral resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent resource estimates. Mineral resources may also be affected by subsequent assessments of mining, environmental, processing, permitting, taxation, socio-economic and other factors.

Mineral reserves can only be estimated based on the results of an economic evaluation as part of a preliminary feasibility study or feasibility study. As such, no mineral reserves have been estimated by SRK as part of the present assignment. There is no certainty that all or any part of the Mineral Resources will be converted into a mineral reserve. Confidence in the estimate of Inferred mineral resources is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure.

Mineral resources for the Lucky Queen project have been estimated and classified according to the “CIM Standards on Mineral Resources and Reserves: Definition and Guidelines” (December, 2005) by FH Brown, CPG, Pr.Sci.Nat., under the supervision of Dr. Gilles Arseneau P.Geo., both “Independent Qualified Persons” as defined by National Instrument 43-101. The commercial Gemcom GEMS and Supervisor software programs were used for mineral resource modeling.

SRK considers that the quality of the exploration data (confidence in the location and reliability of assaying results) acquired by Alexco is good and therefore is not a factor that would impact resource classification. The confidence in the underlying datasets support classification of Indicated and

Inferred mineral resources within the meaning of the CIM Definition Standards. However, there is insufficient information to confirm both the geological and grade continuity with the current level of sampling to support a Measured mineral resource classification within the meaning of the CIM Definition Standards.

In classifying the mineral resources all blocks estimated in the first estimation run were considered indicated and all blocks estimated using the second estimation run were considered inferred.

## 15.14 Mineral Resource Statement

CIM Definition Standards for Mineral Resources and Mineral Reserves (December 2005) define a mineral resource as:

“A concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals in or on the Earth’s crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge”.

The “reasonable prospects for economic extraction” requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade taking into account extraction scenarios and processing recoveries. SRK considers that the mineralization evaluated in the Lucky Queen deposit is amenable for underground extraction. On the order of 20% of the Lucky Queen vein as modeled by Alexco has a horizontal width of less than 1.20 m. In order to determine the quantities of material offering reasonable prospects for economic extraction from an underground mining operation, grades for blocks with a horizontal width of less than 1.20 m were adjusted to a minimum thickness of 1.20 m at zero grade.

Commodity prices were provided to SRK by Alexco as representative of their long term strategic forecast. Economic parameters are summarized in Table 15.10.

**Table 15.10: Dollar equivalent (NSR) calculation parameters**

Commodity	Price	Recovery
Ag	US\$ 18.50/oz.	96%
Pb	US\$0.90/lb.	97%
Zn	US\$0.95/lb.	88%
Au	US\$1,100.00/oz.	72%

Mineral resources for the Lucky Queen deposit are tabulated in Table 15.11 **Error! Reference source not found.** and have been defined relative to a NSR cutoff of C\$185.00, using metallurgical recoveries as proposed in the recent Preliminary Economic Assessment for the Bellekeno project at Keno Hill (Wardrop, 2009).

**Table 15.11: Mineral resource statement\*, Lucky Queen deposit, Lucky Queen project, SRK Consulting (Canada) Inc., July 27, 2011**

<b>Vein</b>	<b>Class</b>	<b>Tonnes</b>	<b>Ag g/t</b>	<b>Pb %</b>	<b>Zn %</b>	<b>Au g/t</b>
Main Lucky Queen Vein	Indicated	124,000	1,227	2.57	1.72	0.17
	Inferred	133,000	564	1.33	0.89	0.18
Splay	Inferred	17,000	626	1.68	1.21	0.05
<b>TOTAL</b>	<b>Indicated</b>	<b>124,000</b>	<b>1,227</b>	<b>2.57</b>	<b>1.72</b>	<b>0.17</b>
	<b>Inferred</b>	<b>150,000</b>	<b>571</b>	<b>1.37</b>	<b>0.92</b>	<b>0.16</b>

\* Reported at a NSR cut-off grade of C\$185.00/t using metal prices (USD) and recoveries of Ag US\$18.50/oz, recovery 96%; Pb US\$ 0.90/lb, recovery 97%; Zn US\$ 0.95/lb, recovery 88%; Au US\$ 1,100/oz, recovery 72%. All numbers have been rounded to reflect the relative accuracy of the estimates. Mineral resources are not mineral reserves and do not have demonstrated economic viability. Confidence in the estimate of Inferred mineral resources is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure.

## 16 Other Relevant Data and Information

The Lucky Queen deposit is situated on the Lucky Queen property, approximately 5.6 km from the Alexco mill near Keno City. Alexco commenced commercial production at the Bellekeno mine on January 1, 2011. Commissioning of the Alexco conventional flotation plant and Bellekeno underground mine, initiated in late September 2010, was completed at the end of December with both mine and mill achieving an average throughput of 250 tonnes per day of ore for 30 days.

Mining and milling operations will be carried out year-round at a base-plan production rate of 250 tonnes per day, with mining accomplished by a mining contractor using predominantly cut-and-fill mining methods augmented with some minor shrink stoping to optimize high grade mineralization extraction and manage dilution.

In early December, 2010, Alexco announced the execution of lead and zinc off-take agreements with Glencore Ltd., Stamford ("Glencore"), a branch of a wholly owned subsidiary of the Swiss-based international natural resources group Glencore International AG. Shipments of concentrate from Bellekeno mine were initiated at the same time, and by December 31, 2010 a total of 326 tonnes of lead and zinc concentrate had been delivered to a North American smelter.

## 17 Interpretation and Conclusions

Between 2006 and 2010, Alexco completed five drilling programs on its Lucky Queen property in the Keno Hill district located in Central Yukon Territory. These drilling programs confirmed the existence of moderate polymetallic silver mineralization in this area.

Surface geologic mapping during this time throughout the district resulted in an increased understanding of the structure and stratigraphy and their controls on mineralization. This has allowed for the construction of high quality geologic models used in producing the mineral estimates for the Lucky Queen deposit.

The main Lucky Queen vein structure has a strike length, as defined by drilling, of approximately 650 m and is open along strike to both the northeast and southwest with thickness ranges from a few centimeters to several meters. SRK considers the modeled wireframes, based on structural-geological grounds, constructed by Alexco to be fair representations of the mineralized veins and splays and acceptable for resource estimation.

The Alexco drilling information was acquired using procedures that meet or exceed industry best practices. Alexco personnel used diligence in monitoring quality control assaying results, investigating potential failures and taking appropriate corrective measures when required. The quality control data collected by Alexco from 2006 to 2010 is considered comprehensive and the final, in some cases replicated, assay results delivered by ALS Chemex and AGAT Labs are generally reliable for the purpose of resource estimation.

The mineral resources presented in this report represent the first time disclosure of mineral resource for the Lucky Queen deposit by Alexco.

The mineral resource for the Lucky Queen deposit, at a NSR cut-off of \$185/tonne includes 124,000 tonnes at an average grade of 1,227 g/t silver classified as Indicated mineral resources and 150,000 tonnes at an average grade of 571 g/t silver classified as Inferred mineral resources.

## 18 Recommendations

SRK recommends that Alexco continues to explore the Lucy Queen deposit to further evaluate the potential of the deposit. SRK recommends that Alexco re-establishes access to the 500 Level to setup underground drilling platforms to further evaluate the down dip continuity of the vein and to collect a bulk sample of the mineralization. The proposed exploration program is divided in two successive contingent phases: Phase 1 would include the rehabilitation of the adit and establishment of drilling platforms and the drilling of 1,500 m at a total cost of \$5.1M including camp logistics and support; Phase 2, contingent on positive results from Phase 1, would include drifting 100 m along the vein to take a 1,620 tonne bulk sample at a cost of \$1.0M and detailed metallurgical testing of mineralization at an estimated cost of \$200,000. A detailed budget for the recommended exploration program is listed below (Table 18.1).

The total cost of Phase 1 and Phase 2: \$6.3M.

**Table 18.1: Budget for recommended exploration program**

Activity	Quantity	Unit	Cost Estimate (CDN\$)
Phase 1			
Exploration Drilling	1,500	Metres	
Rehabilitation of the Adit			
Camp Logistics and Support			
<b>Phase 1 Total</b>			<b>\$5,100,000</b>
Phase 2			
Bulk Sampling	1,620	Tonnes	\$1,000,000
Metallurgical Testing			\$200,000
<b>Phase 2 Total</b>			<b>1,200,000</b>
<b>TOTAL</b>			<b>\$6,300,000</b>

**Prepared by**



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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

## 19 References

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