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**MINE DEVELOPMENT AND OPERATIONS PLAN**

**LUCKY QUEEN AND ONEK MINES – KENO HILL SILVER DISTRICT**

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October 2012



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## **1 INTRODUCTION**

### **1.1 PROJECT BACKGROUND**

Alexco Keno Hill Mining Corp. (AKHM) continues to develop the mineral resources of the Keno Hill Silver District. Alexco proposes to bring the newly discovered extensions of the historic Lucky Queen and Onek deposits into production in order to supplement the Bellekeno mine currently in production. The new Lucky Queen and Onek ore deposits are located proximal to the historic Onek and Lucky Queen silver/lead/zinc mines and will be milled along with Bellekeno ore at the existing Keno District Mill. This document summarizes the Mine Development and Operations Plan for Alexco Keno Hill Mining Corp. (AKHM) for the Lucky Queen and Onek deposits.

### **1.2 PROPERTY LOCATION**

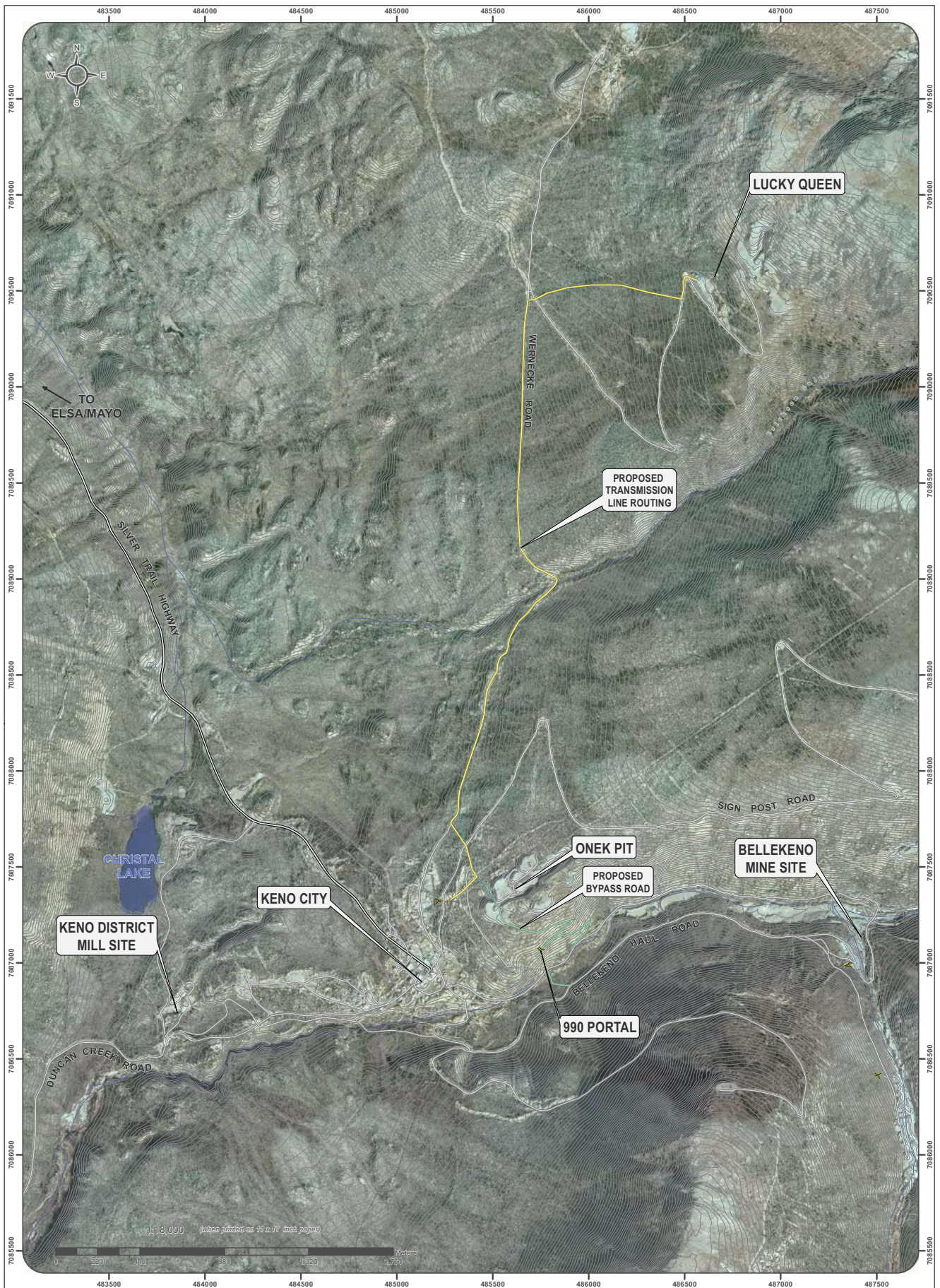
The Lucky Queen and Onek properties are located in the Mayo Mining District approximately 350 kilometres (“km”) north of Whitehorse, Yukon within the Keno Hill Silver District (Figure 1-1). The Lucky Queen and Onek deposits are located in the vicinity of Keno City (63° 55’N, 135° 29’W), 354 km (by air) due north of Whitehorse. Access to the property is via a paved, two-lane highway from Whitehorse to Mayo (407 km) and an all-weather gravel road northeast from Mayo to Elsa (45 km); a total distance of 452 km. The area is covered by NTS map sheets 105M/14. The location of the Lucky Queen and Onek deposits within the Keno Hill Silver District is shown in Figure 1.1.

#### **1.2.1 Lucky Queen Location**

The Lucky Queen 500 level adit is located at UTM 7,090,550N and 486,630E zone 8.

#### **1.2.2 Onek Location**

The Onek 990 portal is located at UTM 7,087,070N and 485,750E zone 8.



Adit	Proposed Bypass Road	Highway
Proposed Transmission Line	Proposed Road	Secondary
		Contour (5 m interval)



ALEXCO KENO HILL MINING CORP.  
 PROPOSED DEVELOPMENT PLAN  
**FIGURE 1-1**  
**ONEK AND LUCKY QUEEN**  
**AREA OVERVIEW**

DRAWN BY JP	SEPTEMBER 2012	VERIFIED BY LH
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Aerial photograph obtained from Geodesy Remote Sensing Inc., Calgary Alberta. Imagery acquired September 13<sup>th</sup> and 14<sup>th</sup> 2006. Site hydrography and contours derived from 2006 aerial imagery obtained from Aero Geometrics, Calgary Alberta.

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## 2 SITE DESCRIPTION

The Lucky Queen and Onek deposits are within the historic Keno Hill Silver District (KHSD), located in central Yukon Territory. The closest town outside of Keno City is Mayo, located on the Stewart 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 KHSD was linked by river route to the outside world; since 1950 the all-weather Silver Trail 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. Mining operations are 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 telephone and internet 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 by AKHM 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 and Onek deposits is characterized by rolling hills and mountains with a relief of up to 1,600 masl. The highest elevation is Keno Hill at 1,975 masl. Slopes are gentle except the north slopes of Keno Hill and Sourdough Hill.

### 2.1 HISTORY

The Keno Hill Silver District 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 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 United Keno Hill Mines Ltd. (UKHM) 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.

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 and no additional work was completed until Alexco began exploration activity in 2006.

In 1922, the Onek Mining Company Ltd. was organized to explore the core Onek claims via a number of open cuts and shallow underground workings in two shafts. In 1950 to 1952, UKHM reopened the shafts and drove an adit in from the northwest to drift along the vein strike at the 400 Level for about 1,300 feet, driving raises up into the historic workings along the way. The Onek Mine was revisited in the early 1960's with limited success. All mining at Onek ceased in 1965, until the late 1980's, when a 20 - 40 m deep open pit was developed by UKHM over the length of the majority of the Onek workings around the historical shafts.

Alexco acquired the Keno Hill Silver District in 2006 and title was granted in 2007 upon receipt of Type B care and maintenance water use licence. During 2006, Alexco embarked on an aggressive exploration program in the Keno Hill Silver District, targeting the historical resources at Bellekeno as well as Lucky Queen and Onek. 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. Alexco conducted surface diamond drilling programs in the Onek deposit between 2007 and 2011. Drilling included 13 surface core drill holes totalling 2,802 m in 2007, 29 surface core drill holes totalling 5,127 m in 2008, 25 surface core drill holes totalling 2,913 m in 2010 and 12 drill holes totalling 1,138 m in 2011.

## **2.2 GEOLOGICAL**

### **2.2.1 District Geology**

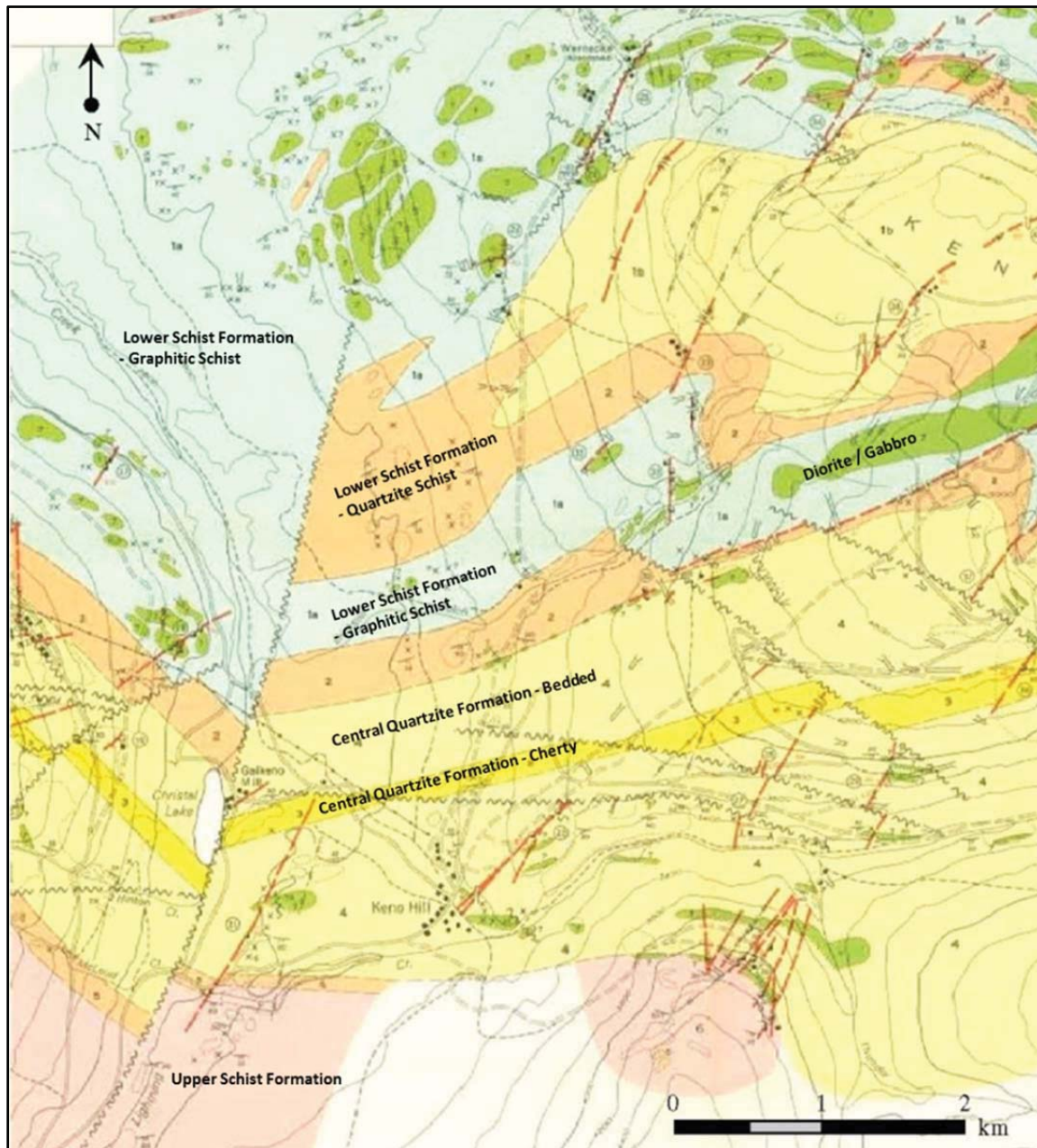
The local geology is characterized by three sedimentary rock units: Lower Schist, Central Quartzite, and Upper Schist (Figure 2-1). Individual layers are thought to be conformal and are metamorphosed to greenschist facies assemblages. Regional metamorphism is believed to have occurred in the Middle Cretaceous, 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 Silver District.

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 2-1 Local Geology of the Keno Hill Silver District (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 en 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.

### 2.2.2 Mineralization

Mineralization in the Keno Hill Silver District 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; in the KHSD, 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.

### 2.2.3 Lucky Queen Geology

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.

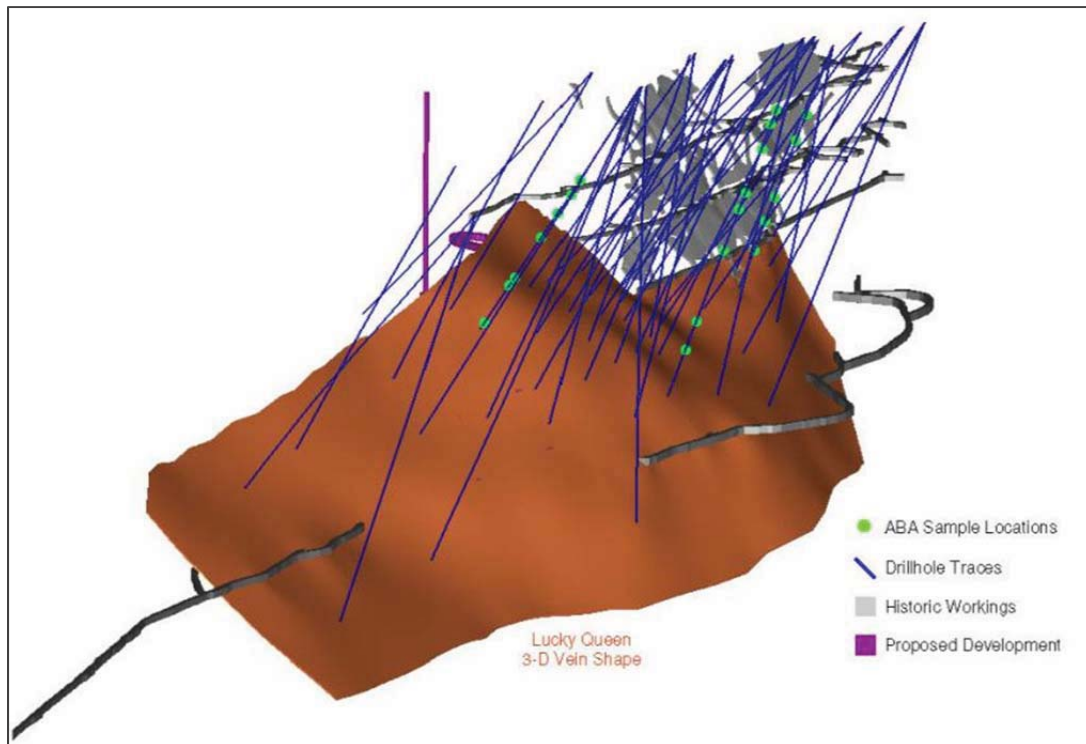
Alexco conducted surface diamond drilling programs at Lucky Queen from 2006 – 2010 with forty-seven core holes totalling 11,104 m drilled as shown in blue in Figure 2-2 - Figure 2-6. The drilling was designed to test for the vein structure along strike and down-plunge of the historical workings, and for the construction of a robust geological model.



**Figure 2-2 Lucky Queen Deposit Plan Map**

The Lucky Queen vein structure consists of one through-going structure with several secondary splay veins and 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. 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.

Mineralized zones are largely composed of brecciated wallrock, siderite ( $\pm$  limonite), vein quartz and ore minerals including silver sulphosalts, galena, sphalerite and native silver. Reported thickness ranges from just a few centimetres to several metres. Minor primary minerals present include arsenopyrite and pyrite.



**Figure 2-3 Lucky Queen Deposit Oblique View, looking north-northeast**

The Lucky Queen deposit is hosted largely in massive quartzite with minor schist beds, as shown in the cross-sections below, with several graphitic schist units in the hanging wall and a massive greenstone body in the footwall.

The graphitic schist units are dark grey to black, greasy to the touch and highly variable in thickness. They again are likely locally thickened by folding and bedding plane faults, and in the area of the proposed development form layers on the order of 10 - 30 meters thick.

The massive quartzite is composed of 2 - 10 m thick, light grey to black quartzite layers, often with thin schist layers in between.

The greenstone units intrude mainly along foliation planes at Lucky Queen and occur mainly as 5-10 m thick sills with some minor thin discontinuous lenses.

Stratigraphic units correlative across the structure show a dip-normal separation of approximately 30-35 between the hanging wall and footwall stratigraphy.

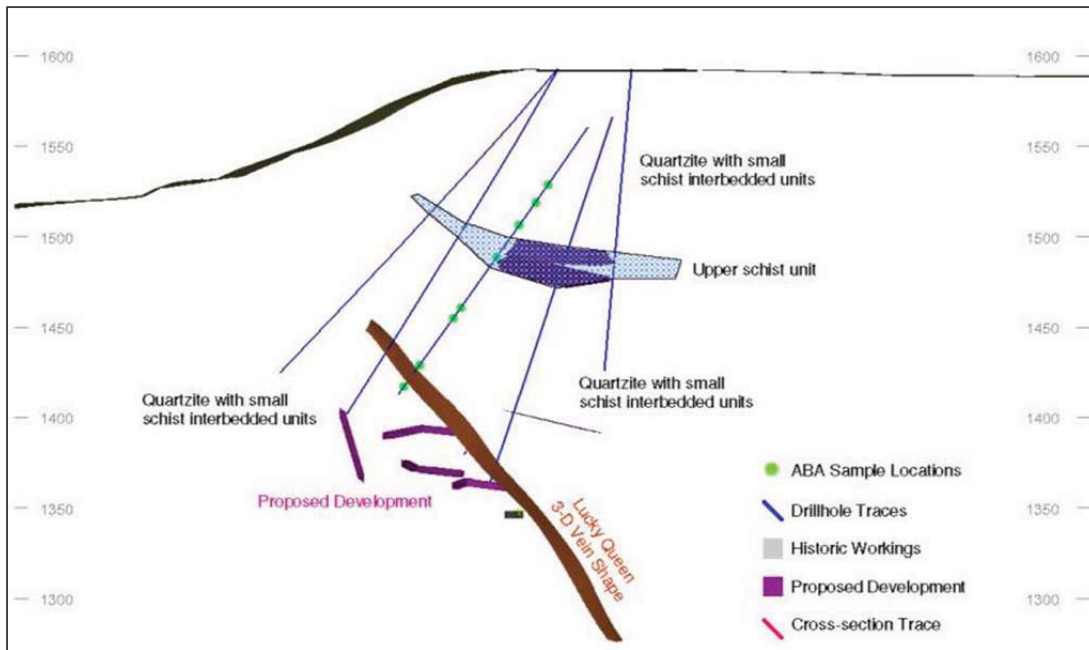


Figure 2-4 Lucky Queen Cross-Section A, looking north-east

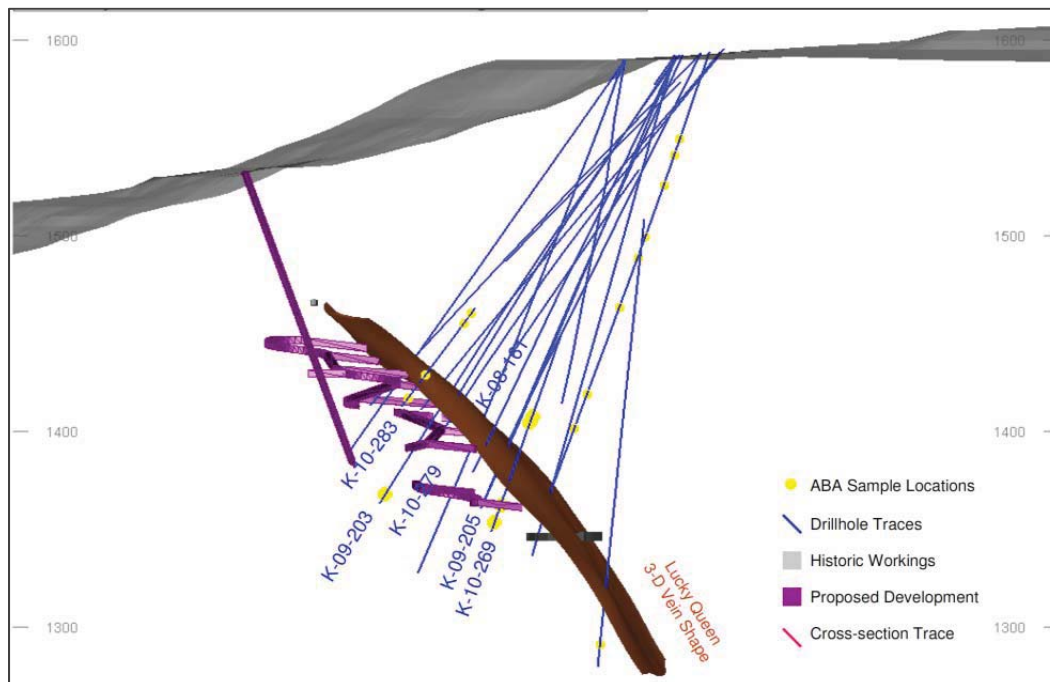
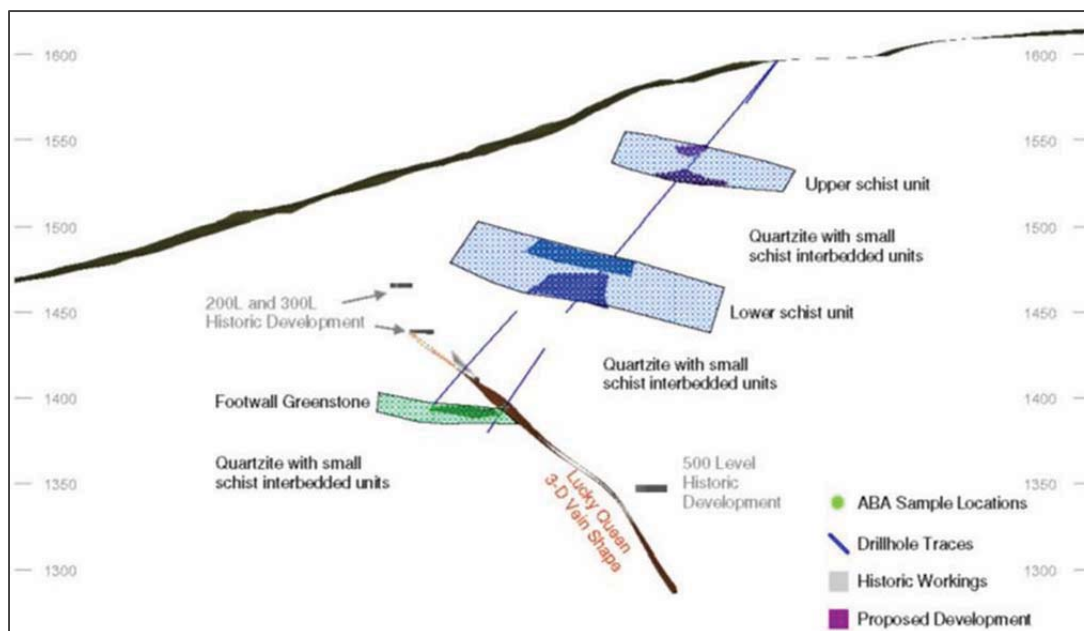


Figure 2-5 Lucky Queen Cross-Section B, looking north-east



**Figure 2-6 Lucky Queen Cross-Section C, looking north-east**

Cross-faults with minor to moderate offset on the vein structures that were mapped in the historic workings (the L2, L2A and L1 faults) were not able to be correlated through the drill holes into the current proposed development area, and may well not be very continuous or through-going structures with any significant offset. The major regional structure with significant offset identified in the Lucky Queen deposit is the Lucky Queen vein-fault itself. Historical records as well as current water monitoring on the 500 Level adit that passes through all of these structures show that these structures are not significant water-bearing conduits.

## 2.2.4 Onek Geology

Alexco conducted surface diamond drilling programs at Onek in 2007, 2008, 2010 and 2011, with seventy eight core holes totalling 11,981 m drilled. The drilling was designed to confirm and test historic reserve/resource blocks and extend known mineralization along strike and down plunge in order to produce a robust geological model and a new resource calculation. The drillholes, shown in blue in Figure 2-7 - Figure 2-13, combined with the historic underground mapping and historical drilling, showed a consistent and predictable stratigraphy that could be traced in both the hangingwall and footwall of the deposit, as shown in the cross-sections through the deposit as outlined in the plan map.

The Onek vein system comprises at least three individual vein faults occurring within a broad northeast striking, southeast dipping structural zone. The vein faults occur over a strike length of at least 600 metres and are characterized by brittle fractured or milled zones locally containing massive sulphide vein material consisting of sphalerite, galena and siderite along with minor pyrite, arsenopyrite and quartz. Mineralized breccias zones are also present consisting of wall rock fragments and siderite-sulphide cement. These zones are often surrounded by brittle fractured zones cemented by siderite and minor sphalerite stringers.

At Onek, this stratigraphy is offset in an oblique-normal sense along the vein-fault structures, which are of the longitudinal type outlined above. The faults show a history of repeated fault movements with subsequent infill of vein material, such that the open space was continually being filled and healed with the vein minerals such as sphalerite, siderite, quartz and galena. There is some post-mineral faulting along the vein structure, but the oxidation of the vein minerals is limited to the near surface drill intercepts.

Based on the detailed geological model produced for the Onek deposit, the major regional structure is the vein-fault itself, with the most fault offset occurring along Vein 1. There were no cross-faults identified in the main body of the Onek vein-fault. At the far north-eastern end of the deposit, the vein-faults turn to the right and split into multiple small splays, and it is likely that a cross-fault will be identified in that area.

A water monitoring hole installed in the footwall of the Onek deposit (ON-MW-01) shows a static water level of 960 masl. This indicates that the groundwater elevation is below the elevation of the resource targeted by the proposed workings and also below the lowest workings in the historic Onek mine.

Drilling and pit mapping at Onek has shown the rock types to be layered in a highly conformable and predictable sequence, and has produced a robust geological model. The rock sequence has been offset along the main vein-fault approximately 180 metres left-laterally along strike, and the hanging wall sequence has been correlated with the same sequence in the footwall.

The rock sequence outlined for Onek from the top down is:

- Thin-bedded quartzite with small schist intervals
- Greenstone unit
- Thin-bedded quartzite with small schist intervals
- Graphitic schist unit - highly variable in thickness
- Several greenstone units with small quartzite units in between
- Sericite schist unit - variable thickness
- More massive quartzite with small schist intervals and thin greenstone intervals
- The thin-bedded quartzite unit is characterized by 0.5 - 2 meter thick quartzite layers separated by thin layers of schist on the order of 10 centimeters to one meter.

The graphitic schist units are dark grey to black, greasy to the touch with very little quartzite and highly variable in thickness, and may be locally thickened by folding and bedding plane faults.

The sericite schist unit is a light green color with abundant sericite and quartz and minor interbedded graphitic schist. It also is highly variable in thickness and may be locally thickened by bedding plane faults and folding.

The more massive quartzite underlying the sericite schist unit is composed of 2 - 5 meter thick quartzite layers often with thin schist layers in between. This unit tends to act in a more brittle manner than the schist rich units, which makes it a good host for mineralization.

The greenstone units are thought to intrude mainly along foliation planes in the stratigraphy and so occur as thin discontinuous lenses through to 5-10 metre thick sills that may be traced over hundreds of metres in drillcore.

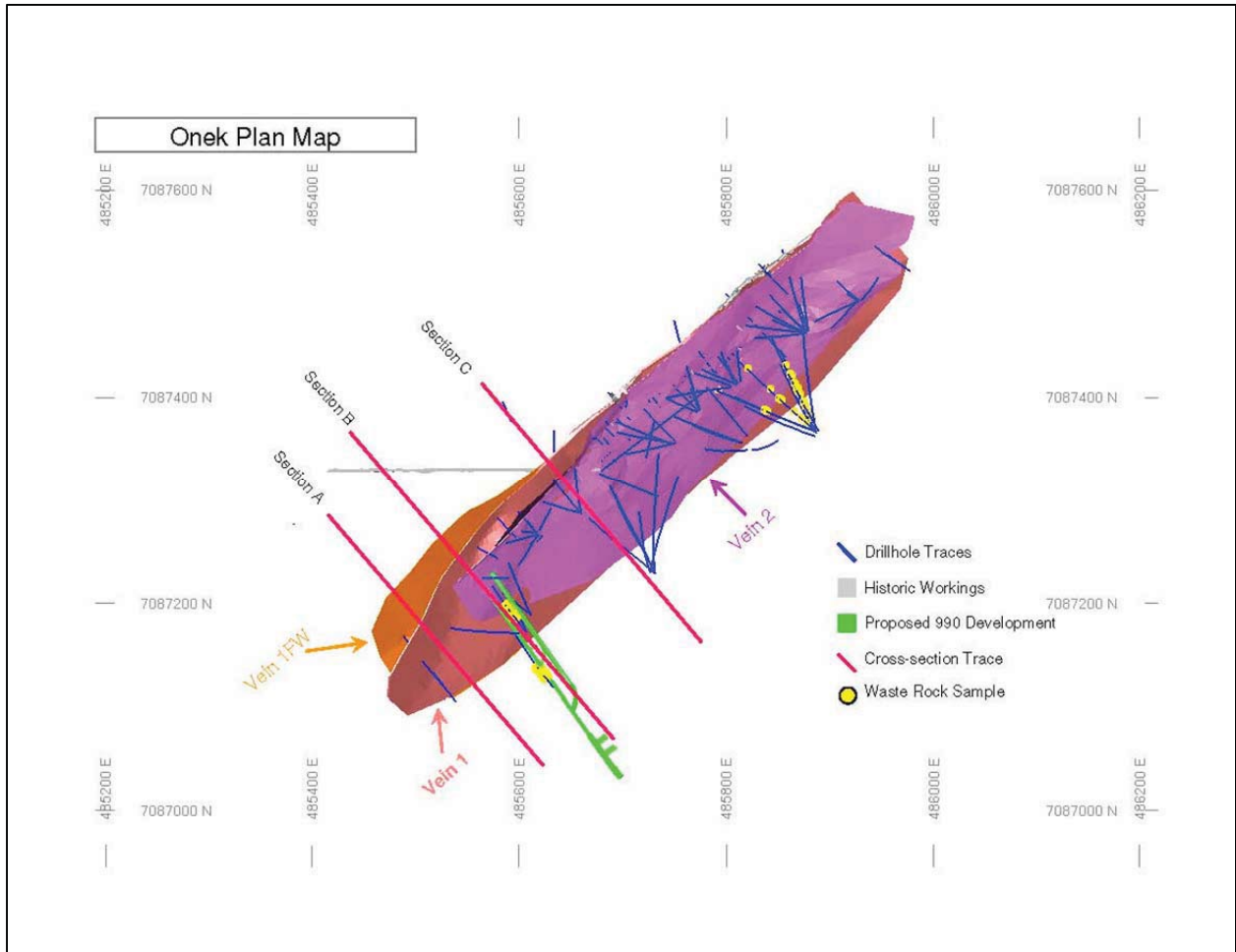
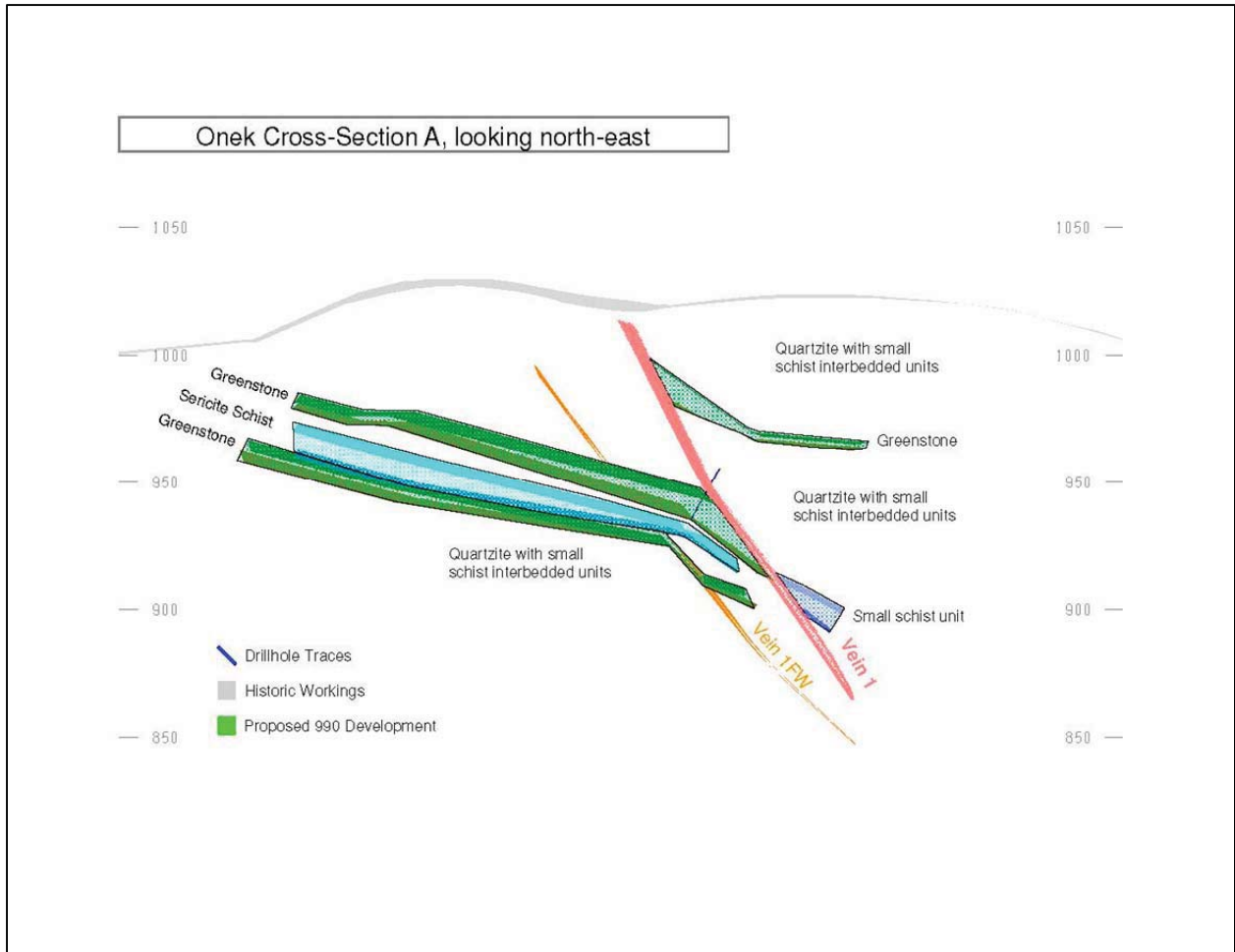


Figure 2-7 Onek Deposit Plan Map



**Figure 2-8 Onek Cross-Section A, looking north-east**

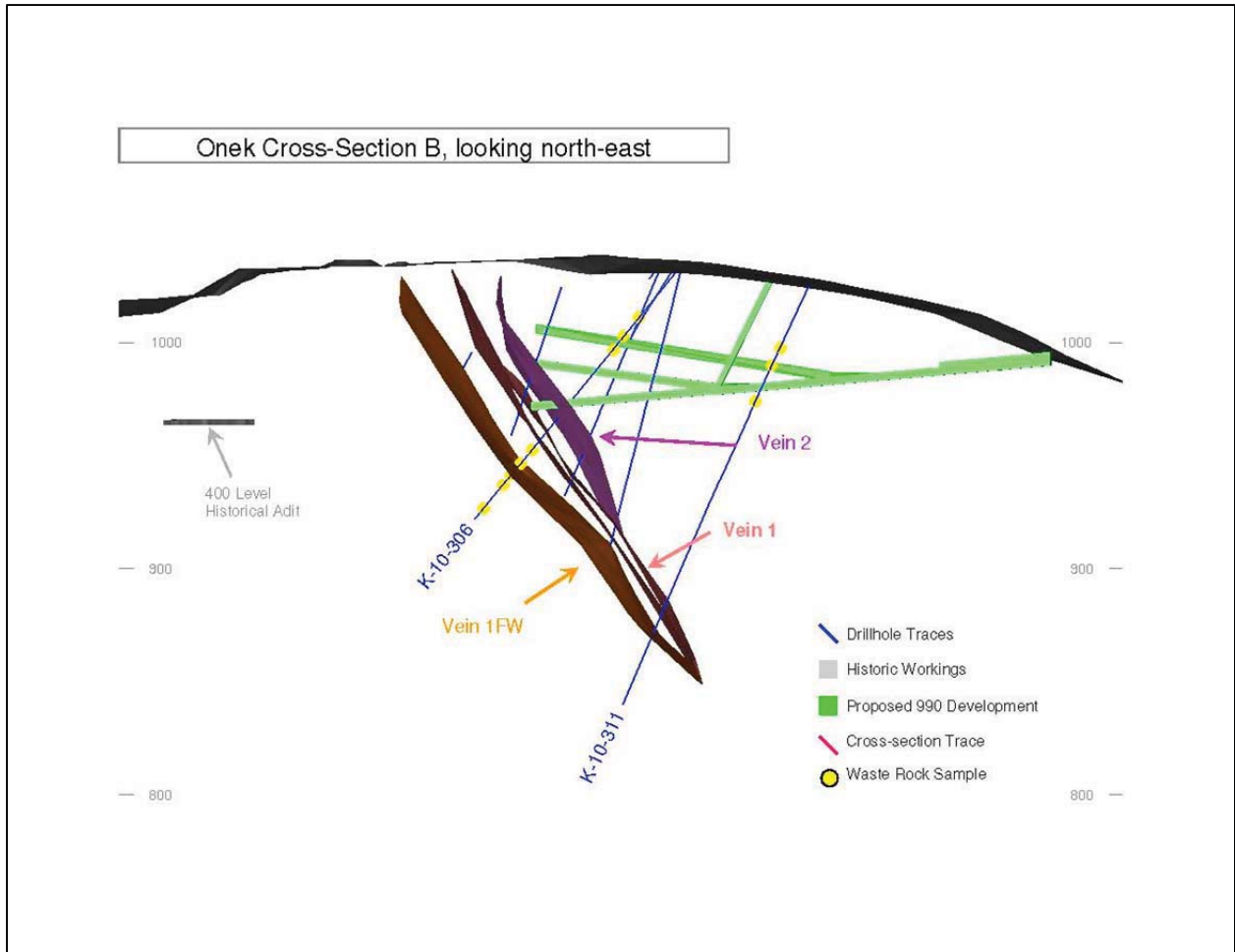
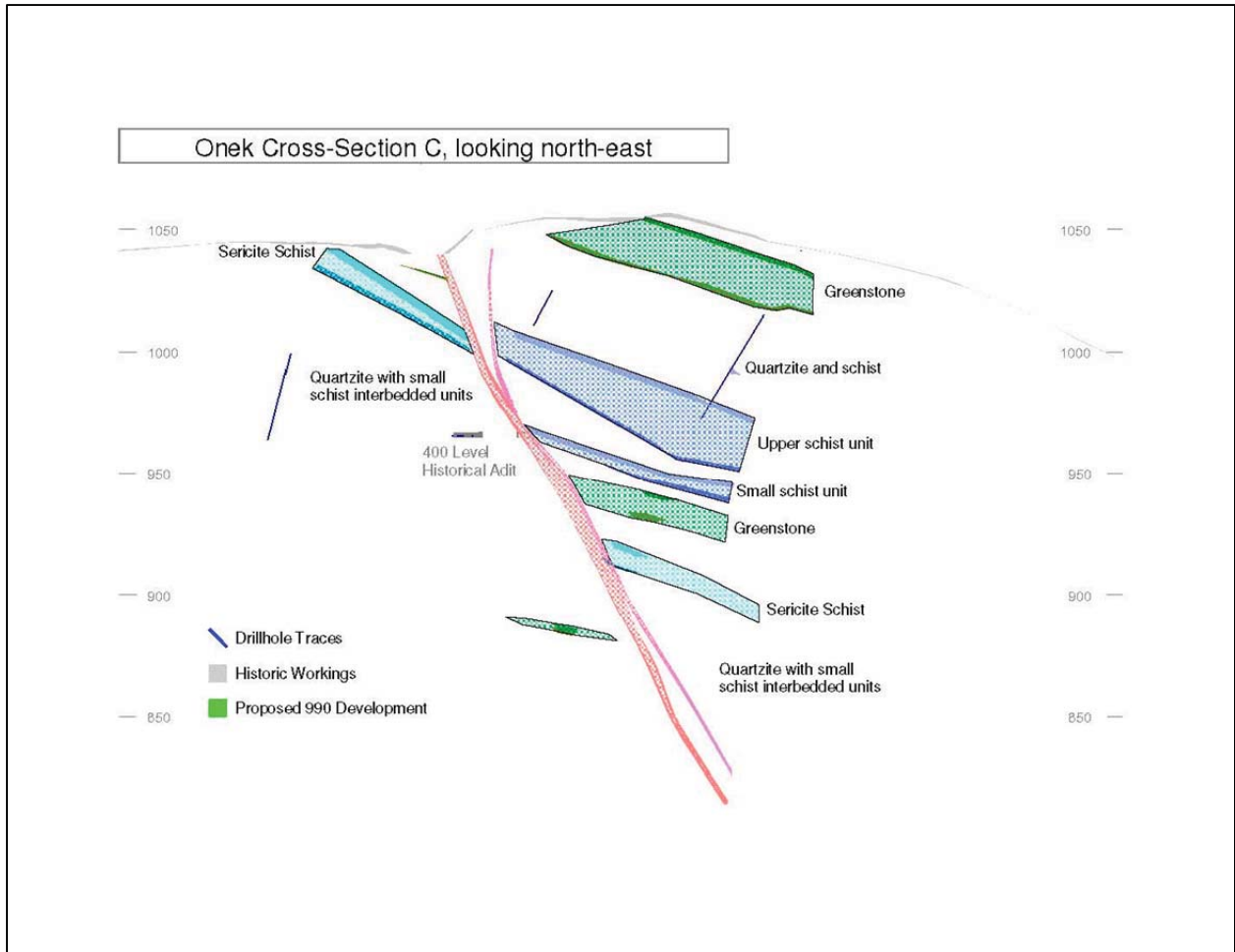
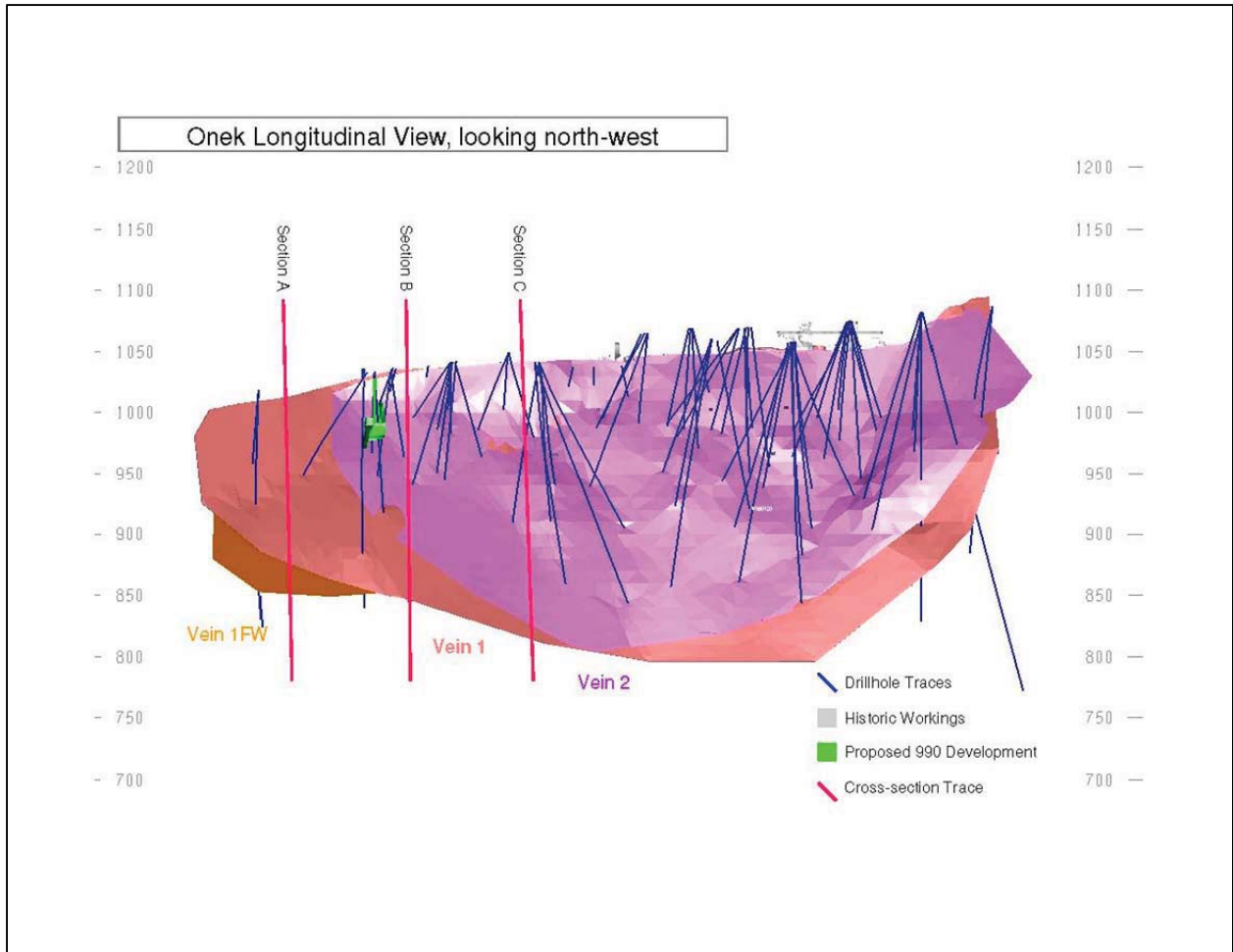


Figure 2-9 Onek Cross-Section B, looking north-east



**Figure 2-10 Onek Cross-Section C, looking north-east**



**Figure 2-11 Onek Oblique View, looking north-northeast**

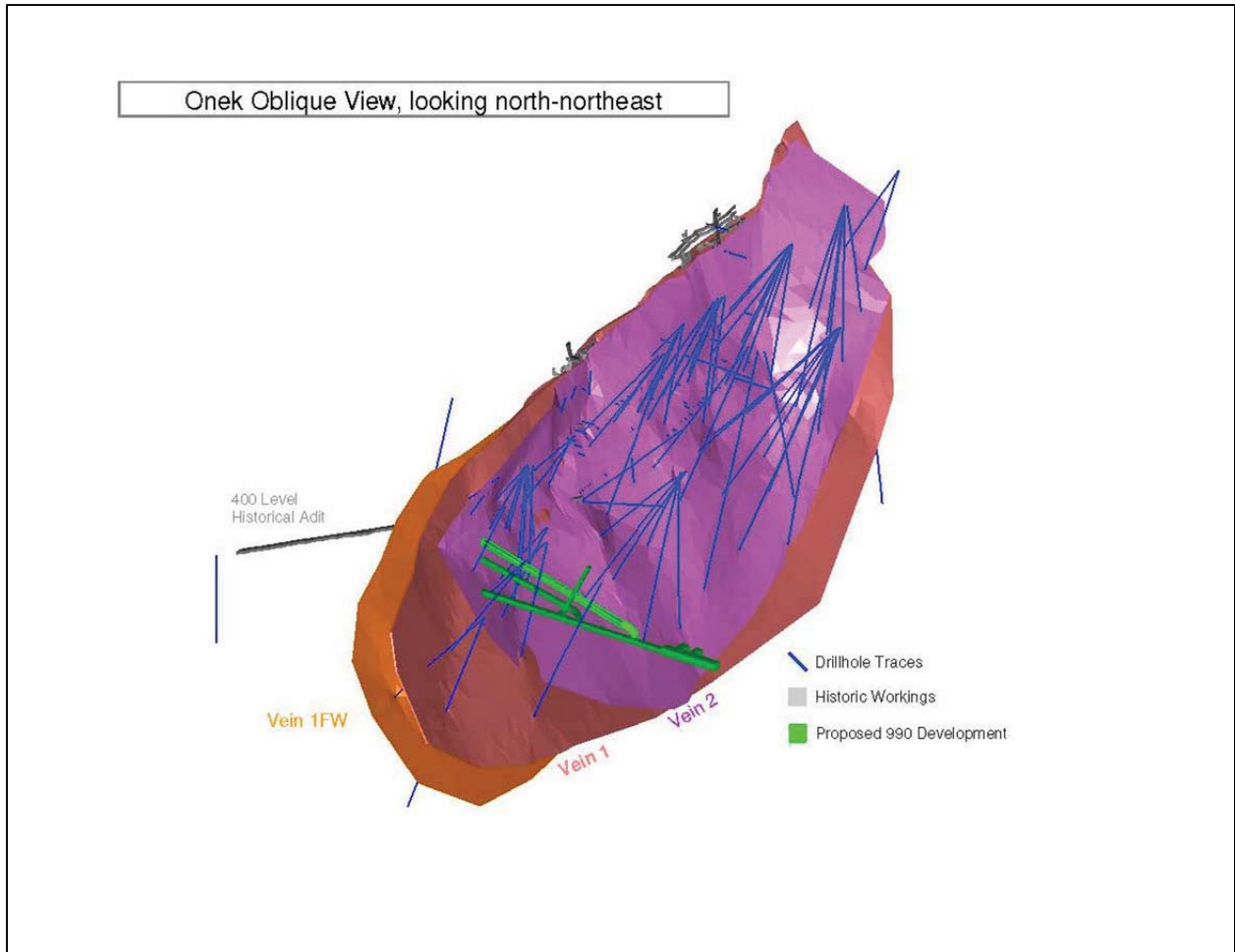


Figure 2-12 Onek Longitudinal View, looking from footwall to the south-east

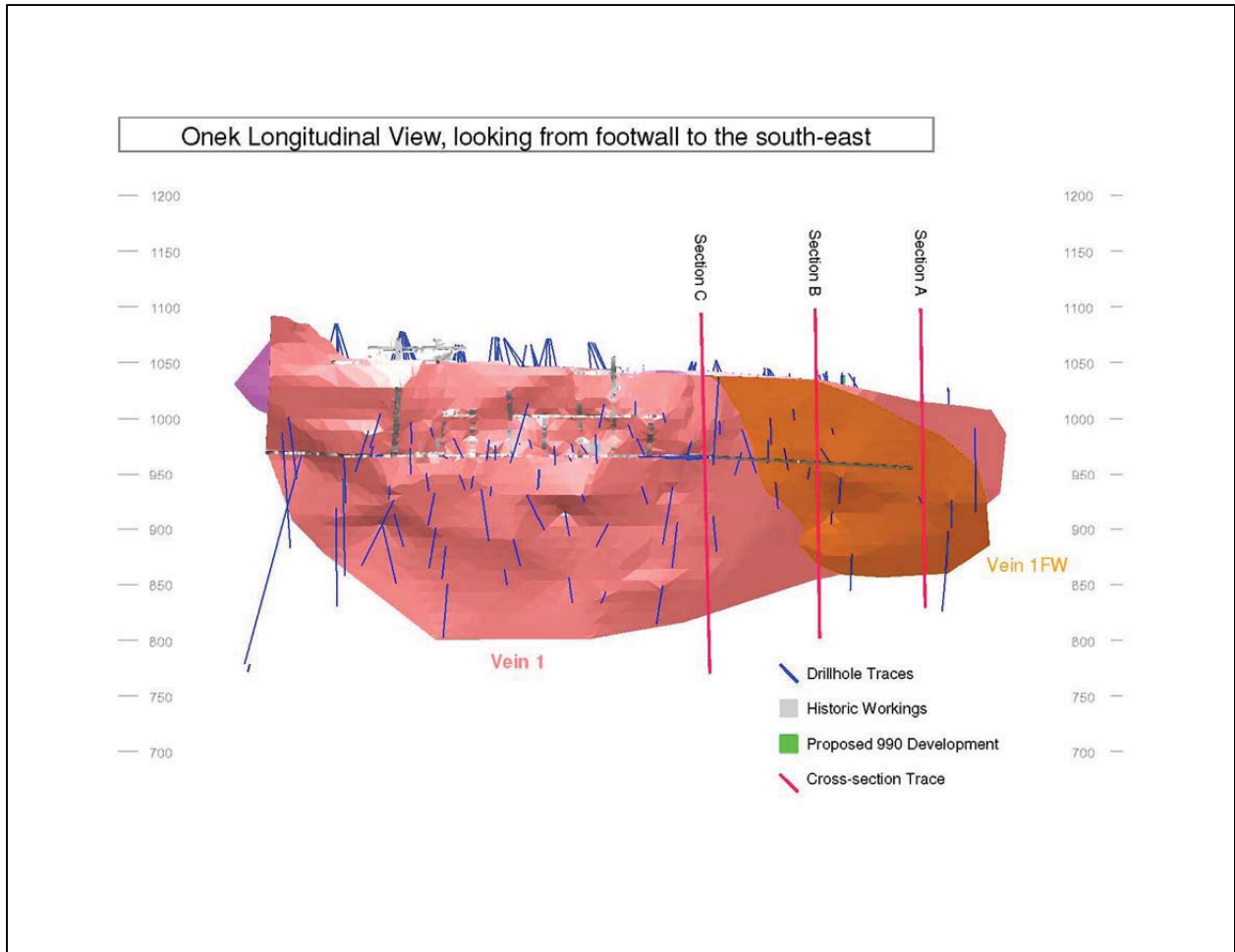


Figure 2-13 Onek Oblique View, looking south-southeast

## 2.3 HYDROLOGY

The Keno Hill Silver District contains two main watersheds: Lightning Creek water shed and the Christal Creek watershed which is a sub-watershed of the South McQuesten River.

Christal Creek flows northwest from Christal Lake for approximately 22 km before it flows into the South McQuesten River. Water chemistry and aquatic resources in the creek have been influenced by previous mine and milling operations including tailings deposition and adit discharge. Christal Creek receives input from treated water from Galkeno 900 adit, Galkeno 300 adit, and seepages (surface and groundwater) from workings on the west face of Keno Hill. Christal Lake has been a receptor for effluent from various mines including Galkeno 900 and the Mackeno Mill area and Mackeno tailings, contributing to metal loading in Christal Creek.

Lightning Creek is situated within a narrow valley with a steep gradient flowing from the north side of Sourdough Hill into Duncan Creek, which drains into the Mayo River. Hope and Thunder Gulches flow into Lightning Creek within the bounds of the KHSD. Lightning Creek has also been the site of extensive placer mining upstream of Keno City both historically and at present time. Treated mine adit discharge (QZ09-092) from Bellekeno 625 (north side of Sourdough Hill) eventually reports to the Lightning Creek drainage.

## 2.4 GENERAL ENVIRONMENTAL CONDITIONS

Table 2-1 summarizes existing environmental conditions in the Keno Hill project area. The Keno Hill Silver District lies within the Yukon Plateau – North Ecoregion, just south of the Wernecke Mountains. The terrain consists of concordant, rolling, upland areas separated by wide valleys. Alpine mountain peaks extend above the uplands locally. Many valleys include peatlands, palsas, fens and meadows of sedge tussocks. Upper slopes may be covered with scree material, with treeline occurring at 1,350 to 1,500 m. The area has been influenced by the latest glaciation but shows more subtle evidence of an earlier event as well.

**Table 2-1 Keno Hill District Environmental Setting Summary**

Drainage Region	Stewart River drainage region
Significant Watersheds	McQuesten River, Lightning Creek and Stewart River Watershed, Mayo River
Ecoregion	Yukon Plateau (North)
Study Area Elevation	900-1350 m asl (Above Sea Level)
Vegetation Communities	Northern boreal forests occupy lower slopes and valley bottom; spruce, pine and alder; grasses and sedges, mosses occupy forest floor; heavy moss and lichen growth resident as ground cover understory of shrub willow; open and forest fringe areas of willow and scrub birch, and various flowering plant species.
Wildlife Species	Moose, grizzly and black bear, caribou, beaver, wolf, lynx, marten, wolverine, western tanager, magnolia warbler, white-throated sparrow, bald eagle, furbearers and small animals. Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed species include: Common Nighthawk (Threatened); Rusty Blackbird and Olive-Sided Flycatcher (Special Concern).
Fish Species	Bering and Beaufort Sea salmonids and freshwater species, including: Arctic grayling, Arctic char, lake trout, trout perch, lake whitefish, broad whitefish, burbot, inconnu, Arctic Cisco, Northern pike, slimy sculpin

## 2.5 CLIMATE

### 2.5.1 Meteorological Monitoring

An automated meteorological station (Calumet Weather Station) was installed on Galena Hill above the Hector adit at 1,380 masl in June 2007. The station measures air temperature, relative humidity, barometric pressure, rainfall, wind speed and direction, solar radiation, and soil temperature. Average monthly temperatures range from a low of approximately -19°C in January to a high of approximately 12°C in July. Table 2-2 summarizes total rainfall and average temperatures recorded at the Galena Hill meteorological station from 2008 to date.

**Table 2-2 Calumet Weather Station Temperature and Rainfall 2008-2012**

Month	Average Temperature °C					Total Rainfall mm				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
January	-17.18	-18.84	-14.08	-16.78*	-18.67	-	-	-	-	-
February	-16.99	-16.95	-9.09	-15.88*	-9.95	-	-	-	1.8*	<sup>5</sup>
March	-11.04	-16.39	-9.21	-12.92*	-12.85	-	-	-	0.5*	<sup>5</sup>
April	-4.93	-4.75	-2.01	-3.77*	-1.91	1.0	-	1.3*	2.8*	<sup>5</sup>
May	3.31	3.66	5.35	4.41*	1.71	25.4	21.8	32.3*	15.5*	<sup>5</sup>
June	8.70	9.58	8.68	8.82*	9.16	44.6	11.8 <sup>3</sup>	56.7*	121.8*	<sup>5</sup>
July	8.17	12.45	10.35	<sup>2</sup>		108.4	22.8 <sup>4</sup>	137.7*	<sup>5</sup>	
August	5.54	7.47	9.61	<sup>2</sup>		110.2	89.4	140.0*	<sup>5</sup>	
September	2.27	3.58	2.40	<sup>2</sup>		61.4	50.4	78.0*	<sup>5</sup>	
October	-7.2	-4.73	-4.86	<sup>2</sup>		12.6	-	16.0*	<sup>5</sup>	
November	-10.17	-11.94	-11.19	-17.39		-	-	-	-	
December	-18.34	-11.16	-17.72	-11.78		-	-	-	-	

Notes:

- 1 Station Commissioned June 15, 2007: calculations for last half of June.
- 2 Temperature probe malfunction
- 3 Rainfall gauge malfunction on June 11; total rainfall provided for June 1-11
- 4 Rainfall gauge back online July 7; total rainfall provided for July 7-31
- 5 Tipping bucket malfunction
- 6 Calculated from MAYO A data

A Campbell Scientific meteorological station located above the District Mill near Keno City (at an elevation of 935masl) was commissioned and installed in June 2011. The sensors on this station include air temperature, relative humidity, rainfall and wind speed and direction. Note that the wind sensor is at a height of 10 m, which is the standard height for use of the data in air dispersion models. Table 2-3 summarizes data collected to date at the Keno District Mill.

**Table 2-3 Monthly statistic for meteorological parameters collected at Keno District Mill Station**

	Monthly Avg. Temp (°C)	Monthly Avg. Max Temp (°C)	Monthly Extreme Max Temp (°C)	Monthly Avg. Min Temp (°C)	Monthly Extreme Min Temp (°C)	Monthly Total Rain (mm)	Monthly Avg. Wind Speed (m/s)	Monthly Max Wind Speed (m/s)
Jun-11 <sup>1</sup>	11.96	18.59	24.72	6.30	-2.56	n/a	1.35	9.14
Jul-11	12.91	18.50	25.67	8.00	5.09	n/a	1.15	8.02
Aug-11	9.78	15.58	22.32	5.37	1.93	n/a	1.18	9.15
Sep-11	6.07	11.29	17.97	1.85	-2.47	n/a	1.43	11.36
Oct-11	-2.74	0.20	7.20	-5.41	-9.84	2.60 <sup>2</sup>	0.94	13.12
Nov-11	-19.54	-16.79	-4.23	-22.47	-34.99	0.00	0.58	12.05
Dec-11	-12.95	-9.37	-2.61	-16.47	-24.17	0.00	0.81	14.52
Jan-12	-23.13	-18.61	-0.76	-27.24	-37.91	0.00	0.59	9.51
Feb-12	-10.00	-6.26	3.27	-13.56	-26.86	0.10 <sup>3</sup>	1.38	15.62
Mar-12	-13.37	-7.09	6.30	-18.42	-28.02	0.00	0.97	9.24
Apr-12	0.96	7.12	10.59	-4.34	-16.64	0.60 <sup>3</sup>	1.37	10.27
May-12	6.35	11.75	18.93	1.54	-3.73	18.10	1.77	10.60
Jun-12	13.46	19.56	29.60	7.80	3.91	21.70	1.44	10.26

<sup>1</sup> 29 complete days – station was commissioned on June 2

<sup>2</sup> Partial month (16 complete days) - also some rainfall was recorded at temperatures below 0 °C and may be due to snowmelt

<sup>3</sup> Rainfall recorded at temperatures below 0 °C may be due to snowmelt

A Yukon Government monitored snow course station located at 1,310 masl also exists in the area and has been monitored regularly for about 30 years. Table 2-4 provides data collected by YG during snow surveys conducted between 2006 and 2011.

**Table 2-4 Calumet - YG Snow Course Station Data 2006-2011**

Date of Survey	Snow Depth (cm)	Water Content (mm)	Average Water Content* (mm)
28/2/2006	87	196	180
28/3/2006	90	186	202
1/5/2006	113.6	275 E	199
No survey	-	-	180
30/3/2007	93	186	201
27/4/2007	80	134	199
2/3/2008	63	104	180
1/4/2008	71	110	201
1/5/2008	60	158	196
24/2/2009	86	161	178
1/4/2009	103	242	198
28/4/2009	98	235 E	195
24/2/2010	68	110	177
29/3/2010	77	154	199
26/4/2010	57	133	196
23/2/2011	88	139	175
28/3/2011	84	146	198
27/4/2011	61	148	194

Note:

E=Estimate

\*Average for reporting period (March/April/May) with approximately 30 years on record.

Alexco also conducted snow surveys in 2011 and 2012 at ten monitoring stations in order to better represent the varying snow conditions as a function of aspect, elevation, etc. Snow water equivalent (SWE) results are presented in Table 2-5 below.

**Table 2-5 Snow Survey SWE Results 2011-2012**

Station	Jan 2011	Feb 2011	Mar 2011	Jan 2012	Feb 2012	Mar 2012	April 2012
BKS-1	7.62	7.62	5.08	6.03	16.14	18.73	8.74
BKS-2	7.62	7.62	7.62	12.17	13.60	9.31	20.84
BKS-3	7.62	10.16	7.62	9.63	12.49	4.44	7.74
BKS-4	7.62	7.62	7.62	8.47	17.59	12.28	8.84
BKS-5.0	5.08	7.62	5.08	13.65			
BKS-5.1	-	-	-		11.27	12.17	9.63
BKS-6	2.54	2.54	0	11.22	12.59	14.82	19.84
BKS-7	7.62	10.16	7.62	12.49	13.65	4.82	8.47
BKS-8	7.62	7.62	5.08	9.90	13.81	17.36	19.47
BKS-9	7.62	10.16	10.16	12.44	13.33	17.14	0.00
BKS-10	10.16	7.62	5.08	13.33	16.46	27.68	10.74
Mean	7.112	7.874	6.096	10.93	14.09	13.87	11.43

Prior to the 2007 hydrometeorological station installation, climatic data was collected from three monitoring stations operated within the boundaries of the mine site. Two of these stations were maintained by the Atmospheric Environment Service (AES; now Meteorological Service of Canada, MSC) and were located at the Elsa townsite and on the southern flank of Keno Hill. The third station was operated on a seasonal basis by AANDC at a site in the Flat Creek catchment near the historical townsite of Elsa. In addition to these mine site stations, the MSC operates a principle climatological station at the Mayo Airport, located some 40 km southwest of Elsa.

### **3 SITE PREPARATION**

#### **3.1 CLEARING**

##### **3.1.1 Clearing Required at Lucky Queen**

Minimal area is required to be cleared at Lucky Queen as it is a previously developed mine site. The two areas requiring clearing are the non acid generating or metal leaching (N-AML) waste rock disposal area (WRDA) and the potentially acid generating and/or metal leaching (P-AML) waste rock storage facility (WRSF). The total area to be cleared for Lucky Queen N-AML WRDA is 8,000 m<sup>2</sup> and 5,000 m<sup>2</sup> for the P-AML WRSF. Clearing will be kept a minimum at the Lucky Queen Mine. Clearing will be conducted under the environmental protection provisions of the QML.

##### **3.1.2 Clearing Required at Onek**

Minimal area is also required to be cleared at Onek. The single area requiring clearing is for Onek 990 portal pad. The total area required to be cleared for Onek 990 portal pad is approximately 4,175 m<sup>2</sup>. Additional area may be cleared for the Keno City Bypass Road up to 10,000 m<sup>2</sup>. Clearing will be kept a minimum at the Onek Mine. Clearing will be conducted under the environmental protection provisions of the QML.

#### **3.2 STRIPPING AND GRUBBING**

##### **3.2.1 Stripping and Grubbing required at Lucky Queen**

Stripping and grubbing is required for the area to be cleared for the Lucky Queen N-AML WRDA. The area to be stripped and grubbed will be kept a minimum at the Lucky Queen Mine. No stripping or grubbing is required for the P-AML WRSF. Any vegetation stripped or grubbed will be stockpiled for potential use for reclamation.

##### **3.2.2 Stripping and Grubbing Required at Onek**

Stripping and grubbing is required for Onek 990 portal pad and Keno City Bypass Road. The area to be stripped and grubbed will be kept a minimum at the Onek Mine. Any vegetation stripped or grubbed will be stockpiled for potential use for reclamation.

## 4 DEPOSIT INFORMATION

The geology of the Lucky Queen and Onek deposits are described in Sections 2.2.4 and 2.2.5 respectively.

### 4.1 ORE RESERVES

#### 4.1.1 Lucky Queen

Mineral reserves are currently not stated for the Lucky Queen deposit as mineral reserves are to be known to be economically feasible for extraction. A Preliminary Economic Assessment has not been completed on the Lucky Queen deposit.

Mineral resources for Lucky Queen are shown in Table 4-1.

**Table 4-1 Lucky Queen Summary of Resources**

Category	Tonnes	Ag (g/t)	Au (g/t)	Pb (%)	Zn (%)	Contained Ag (oz)
Indicated	124,000	1,227	0.2	2.6%	1.7%	4,891,000
Inferred	150,000	571	0.2	1.4%	0.9%	2,753,000

1. All mineral resources are classified following the CIM Definition Standards for Mineral Resources and Mineral Reserves (December 2005), in accordance with the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines and the guidelines of NI 43-101.
2. Mineral resources are not mineral reserves and do not have demonstrated economic viability. All numbers have been rounded to reflect the relative accuracy of the estimates.
3. The resource estimates for Lucky Queen have an effective date of July 27, 2011, and are supported by disclosure in the news release dated July 27, 2011 entitled "Alexco Announces Initial Resource Estimates for Lucky Queen and Onek" and by a technical report filed on SEDAR dated September 8, 2011 entitled "Technical Report on the Lucky Queen Deposit, Lucky Queen Property, Keno Hill District, Yukon".
4. The disclosure regarding the summary of estimated resources for Alexco's mineral properties within the Keno Hill District has been reviewed and approved by Scott Smith, P.Eng., Bellekeno Mine Manager with Alexco and a Qualified Person as defined by NI 43-101.

#### 4.1.2 Onek

Mineral reserves are currently not stated for the Onek deposit as mineral reserves are to be known to be economically feasible for extraction. A Preliminary Economic Assessment has not been completed on the Lucky Queen deposit.

Mineral resources for Onek are shown in Table 4-2.

**Table 4-2 Onek Summary of Resources**

Category	Tonnes	Ag (g/t)	Au (g/t)	Pb (%)	Zn (%)	Contained Ag (oz)
Indicated	585,000	194	0.7	1.2%	13.7%	3,648,000
Inferred	236,000	203	0.4	1.1%	11.5%	1,540,000

1. All mineral resources are classified following the CIM Definition Standards for Mineral Resources and Mineral Reserves (December 2005), in accordance with the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines and the guidelines of NI 43-101.
2. Mineral resources are not mineral reserves and do not have demonstrated economic viability. All numbers have been rounded to reflect the relative accuracy of the estimates.
3. The resource estimates for Onek have an effective date of July 27, 2011, and are supported by disclosure in the news release dated July 27, 2011 entitled "Alexco Announces Initial Resource Estimates for Lucky Queen and Onek" and by a technical report filed on SEDAR dated September 8, 2011 entitled "Technical Report on the Onek Deposit, Onek Property, Keno Hill District, Yukon".
4. The disclosure regarding the summary of estimated resources for Alexco's mineral properties within the Keno Hill District has been reviewed and approved by Scott Smith, P.Eng., Bellekeno Mine Manager with Alexco and a Qualified Person as defined by NI 43-101.

**Table 4-3 Lucky Queen and Onek Property Claims and Leases**

Claim Label	Grant Number	Lease Number	Owner Name
ANTHONY	12909	NM00642	Elsa Reclamation & Development Company Ltd. - 100%
PEARL	55206	NM00562	Elsa Reclamation & Development Company Ltd. - 100%
CAKE	62341	NM00288	Elsa Reclamation & Development Company Ltd. - 100%
OK FRACTION	13094	NM00556	Elsa Reclamation & Development Company Ltd. - 100%
SHEPHERD	12931	NM00177	Elsa Reclamation & Development Company Ltd. - 100%
KIJO	56419	NM00088	Elsa Reclamation & Development Company Ltd. - 100%
ERICA	62247	NM00465	Elsa Reclamation & Development Company Ltd. - 100%
LONE STAR	12965	NM00030	Elsa Reclamation & Development Company Ltd. - 100%
GALENA FARM	13032	NM00193	Elsa Reclamation & Development Company Ltd. - 100%
BES	56533	NM00436	Elsa Reclamation & Development Company Ltd. - 100%
MATHOLE	12937	4163	Elsa Reclamation & Development Company Ltd. - 100%
BLACK CAP	12869	NM00175	Elsa Reclamation & Development Company Ltd. - 100%
TOM BOY	56505	NM00092	Elsa Reclamation & Development Company Ltd. - 100%
PORKY	55389	NM00052	Elsa Reclamation & Development Company Ltd. - 100%
CAMARRILA	59249	NM00268	Elsa Reclamation & Development Company Ltd. - 100%
KARIN	62248	NM00526	Elsa Reclamation & Development Company Ltd. - 100%
CAPSTAN	59250	NM00269	Elsa Reclamation & Development Company Ltd. - 100%
DAWSON	62367	NM00472	Elsa Reclamation & Development Company Ltd. - 100%
ROBIN	55341	NM00048	Elsa Reclamation & Development Company Ltd. - 100%
CAMEO	59248	NM00267	Elsa Reclamation & Development Company Ltd. - 100%
MONARCH	55443	NM00432	Elsa Reclamation & Development Company Ltd. - 100%
DE CHUCK	59367	NM00176	Elsa Reclamation & Development Company Ltd. - 100%
NAPOLEON	12880	NM00033	Elsa Reclamation & Development Company Ltd. - 100%
MARIE ELENA	56530	NM00508	Elsa Reclamation & Development Company Ltd. - 100%
SEGLE	56534	NM00437	Elsa Reclamation & Development Company Ltd. - 100%
JIMMIE	55330	NM00047	Elsa Reclamation & Development Company Ltd. - 100%
MARMOT	55385	NM00049	Elsa Reclamation & Development Company Ltd. - 100%
YUKON	56515	NM00096	Elsa Reclamation & Development Company Ltd. - 100%
LITE FRACTION	82289	NM00589	Elsa Reclamation & Development Company Ltd. - 100%



Claim Label	Grant Number	Lease Number	Owner Name
UNCLE SAM	12923	4068	Elsa Reclamation & Development Company Ltd. - 100%
UPTON	14002	NM00029	Elsa Reclamation & Development Company Ltd. - 100%
FISHER	12876	NM00022	Elsa Reclamation & Development Company Ltd. - 100%
CROESUS	55420	NM00564	Elsa Reclamation & Development Company Ltd. - 100%
Galaxy	Y 69403		Elsa Reclamation & Development Company Ltd. - 100%
NM	62235	NM00576	Elsa Reclamation & Development Company Ltd. - 100%
ELI	55319	NM00563	Elsa Reclamation & Development Company Ltd. - 100%
ALBERTA L	80178	NM00499	Elsa Reclamation & Development Company Ltd. - 100%
Galena	YA77506		Elsa Reclamation & Development Company Ltd. - 100%

## 5 GEOTECHNICAL ASSESSMENT

### 5.1 ROCK MASS QUALITY

The current mine development rehabilitation program on the 500 Level at Lucky Queen has been useful in assessing ground conditions at that location. Section 6.6 Ground Support Methods describes the ground support classes and ground support requirements.

Quality control / quality assurance of the ground support methods for both Lucky Queen and Onek will be monitored by the following programs;

- On-going field observations of ground support installations
- Pull-tests to determine anchor strengths of various ground support anchors / rockbolts. These tests will be performed on ground support installations that have been installed specifically for the purpose of doing the test. These installations will not be part of the active ground support.
- Pull-tests will be performed on each type of anchor / rockbolts and in each type of ground condition.
- Test panels for shotcrete to determine compressive strengths

As development and production advances, routine ground control and stability inspections will be done. This will be performed by Alexco personnel in conjunction with external rock mechanics / ground control experts. An annual audit and report will also be done in order to continuously review ground conditions and support methods.

In addition, any suspected ground concerns will be monitored by the appropriate instrumentation including field observations, ground movement monitors (GMMs), extensometers and/or other methods deemed appropriate. A dedicated ground control log book will be located at each mine and ground control concerns tracked and documented on an on-going basis. In addition, safety discussions are held with all personnel on a daily basis and this forum will be used to raise awareness of any ground control concerns and to discuss solutions.

Ongoing collaboration with the external rock mechanics / ground control experts will provide added support to the overall ground control and ground monitoring program.

## 6 UNDERGROUND MINE DESIGN AND METHODS;

### 6.1 MINE DESIGN:

#### 6.1.1 Lucky Queen

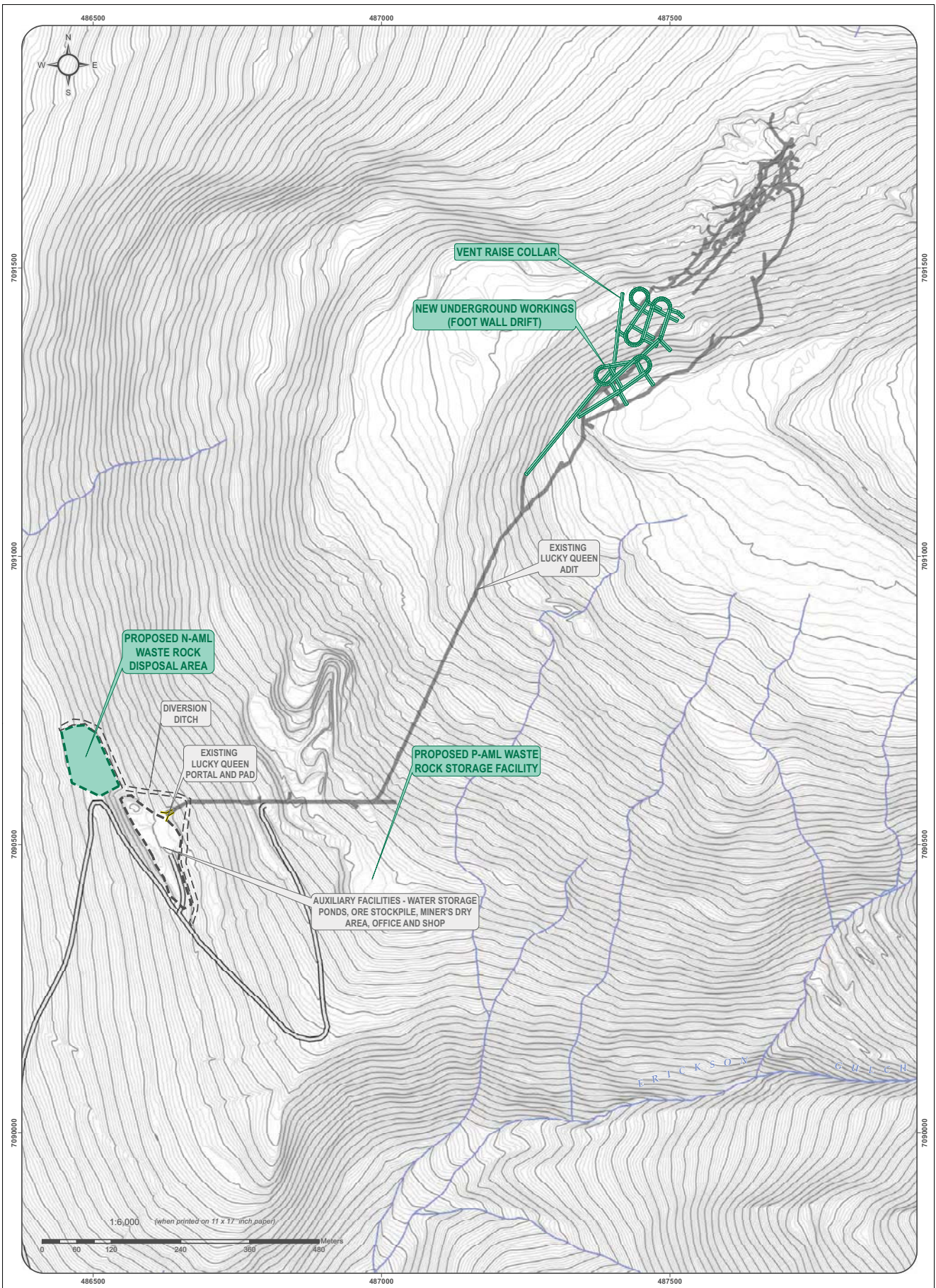
The Lucky Queen Mine will be accessed via a single portal on the 500 Level which presently includes approximately 1800 meters of underground workings. The former owners, United Keno Hill Mines completed portal and drift development during the period of 1984 and 1987. The current and proposed Lucky Queen underground workings are shown on Figure 6-2, 6-3 and 6-4. The site layout for Lucky Queen is shown in Figure 6-1.

The surface mine design includes the following facilities;

- Shop, office and dry;
- Ore and waste handling systems;
- Electrical power generation;
- Compressed air generation;
- Supplies storage;
- Ventilation fans and heaters; and
- Water handling.

The underground mine design includes;

- Rehabilitation of the portal and existing underground workings (presently underway) including;
  - Rehabilitation of square site timbers and installation of ground support as per the current ground support standards (see Section 6.6);
  - Removal of current track;
- Footwall access to the mineralised vein via a 3.0m high x 3.0m wide ramp driven at +12%;
- Vein access drifts;
- Ore and waste pass access drifts and ore/waste transfer raises and chutes;
- Underground shop and refuge station; and
- Ventilation raise.



<ul style="list-style-type: none"> <li><span style="color: green;">—</span> Proposed Underground Workings</li> <li>— Existing Underground Workings</li> <li>— Contour (5 m intervals)</li> <li>— Contour (1 m interval)</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid black; padding: 2px;">EXISTING</span> Existing Features</li> <li><span style="background-color: #90EE90; padding: 2px;">PROPOSED</span> Proposed Features</li> </ul>
<p><small>Site hydrography and contours derived from 2006 aerial imagery obtained from Aero Geometrics, Calgary Alberta. This drawing has been prepared for the use of Access Mining Consultants Ltd's client and may not be used, reproduced or relied upon by third parties, except as agreed by Access Mining Consultants Ltd. and its client, as required by law or for use of governmental reviewing agencies. Access Mining Consultants Ltd. accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without Access Mining Consultants Ltd.'s express written consent.</small></p>	



 	<p>ALEXCO KENO HILL MINING CORP. PROPOSED DEVELOPMENT PLAN</p> <p><b>FIGURE 6-1</b></p> <p><b>LUCKY QUEEN PROPERTY OVERVIEW</b></p>
	<p>SEPTEMBER 2012</p> <p><small>I:\keno_Area_Mines\LOM\Map\1_Overview_Maps\Project_Overview_20120202.mxd (Last edited by: janc.9/20/2012/11:46 AM)</small></p>



Figure 6-2 Lucky Queen Mine Plan View

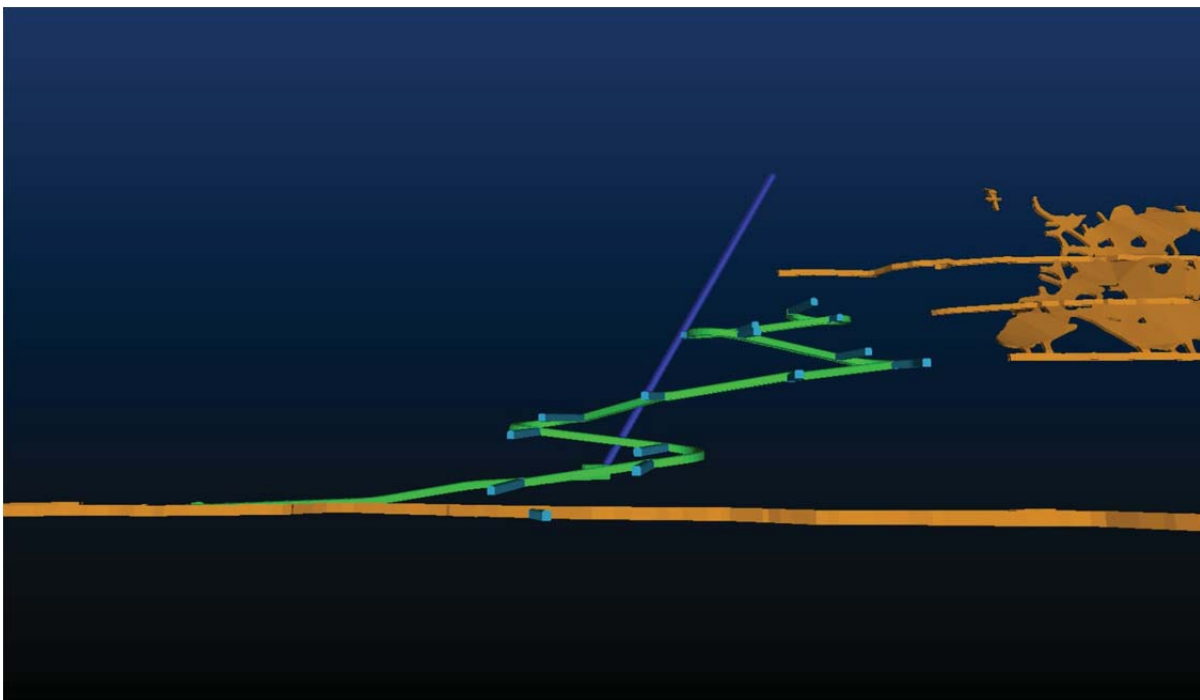
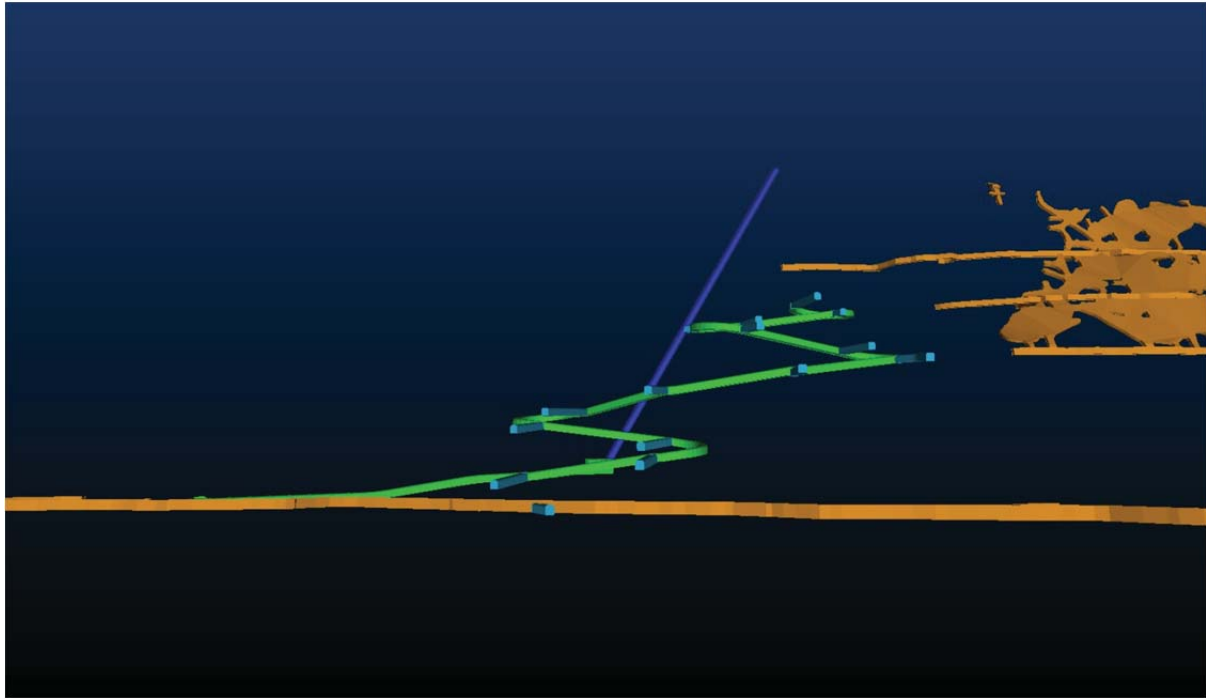


Figure 6-3 Lucky Queen Development Plan Conceptual Cross Section



**Figure 6-4 Lucky Queen Development Plan Conceptual Oblique Section**

### 6.1.2 Onek

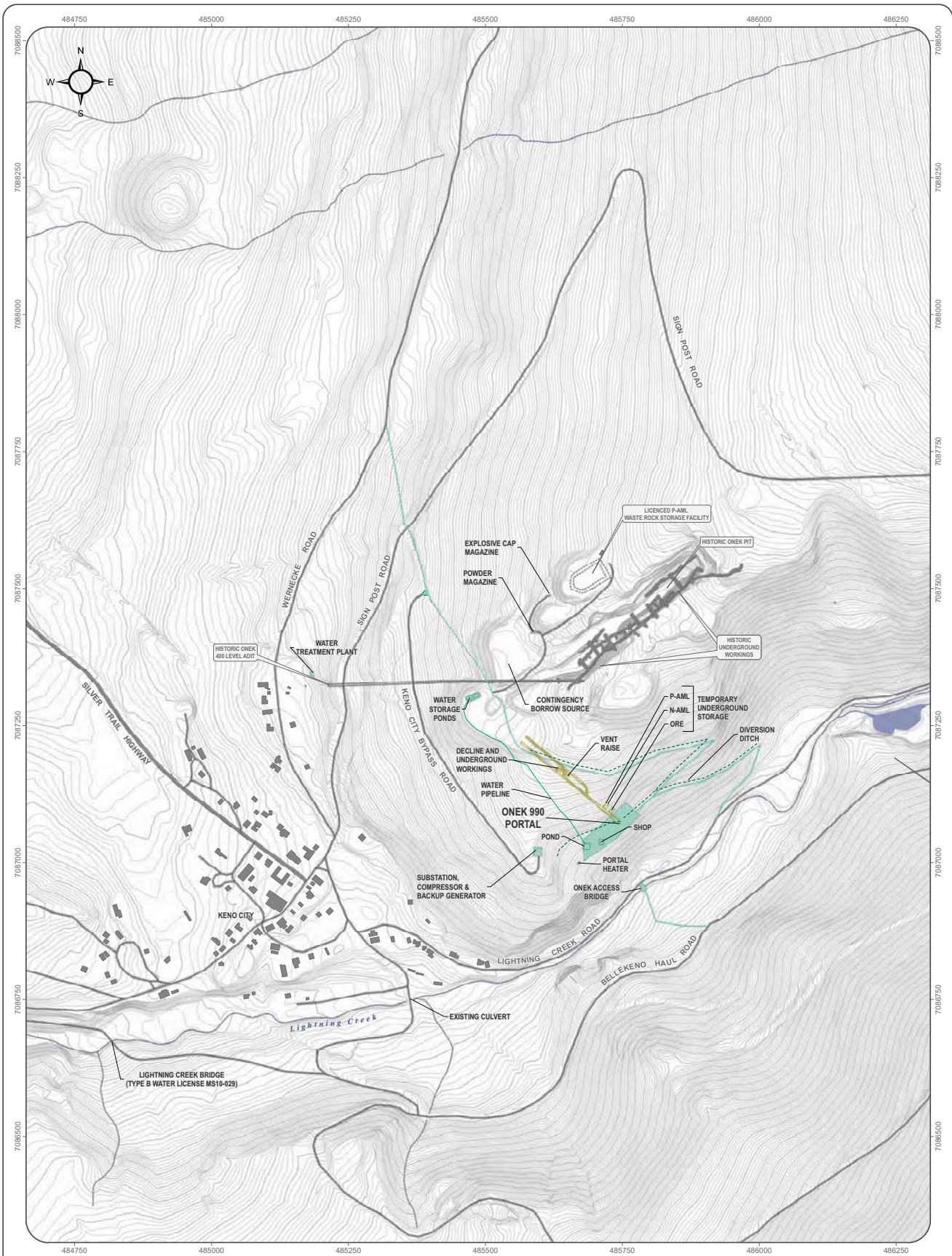
The historic Onek Mine was mined by open pit methods by UKHM in 1985. In addition, an underground development campaign was conducted beneath the open pit via the Onek 400 level in the 1920's. AKHM is proposing to access the Onek deposit via the Onek 990 portal. The current mine design and mining campaign will not intersect the historical open pit and underground development and will not access or breach those openings. The current design will be a totally separate, isolated and separate mine. The design and layout of the Onek 990 underground workings are shown on Figure 6-6, 6-7 and 6-8. The Onek project site layout is shown in Figure 6-5.

The surface mine design for the new mining campaign will include the following facilities;

- Shop, office and dry;
- Road construction;
- Portal pad construction;
- Ore and waste handling systems;
- Electrical power generation;
- Compressed air generation;
- Supplies storage;
- Ventilation fans and heaters; and
- Water handling.

The underground mine design includes;

- Development of the portal and underground workings including;
- Hanging wall access to the mineralised vein via a 5.0m high x 5.0m wide ramp driven at -5% for the first 50 meters followed by 4.0m high x 4.0m wide at -12% for the remainder of the decline;
- Vein access drifts;
- Ore and waste pass access drifts and ore/waste transfer raises and chutes;
- Underground shop and refuge station; and
- Ventilation raise.



Datum: NAD 83; Projection: UTM Zone 8N  
 1:6,500 When printed on 11 by 17 Inch paper

0 100 200 Meters

- Existing Features
- Proposed Feature
- Proposed Underground Footprint
- Building/Structure
- Diversion Ditch
- Proposed Bypass Road
- Proposed Road
- Highway
- Secondary
- Contour (5 m interval)
- Contour (1 m interval)

**ALEXCO KENO HILL MINING CORP.**  
**PROPOSED DEVELOPMENT PLAN**

**FIGURE 6-5**  
**ONEK DEPOSIT - 990 OPTION**  
**PROJECT LAYOUT**

Site hydrography and contours derived from 2006 aerial imagery obtained from Aero Geometrics, Calgary Alberta.

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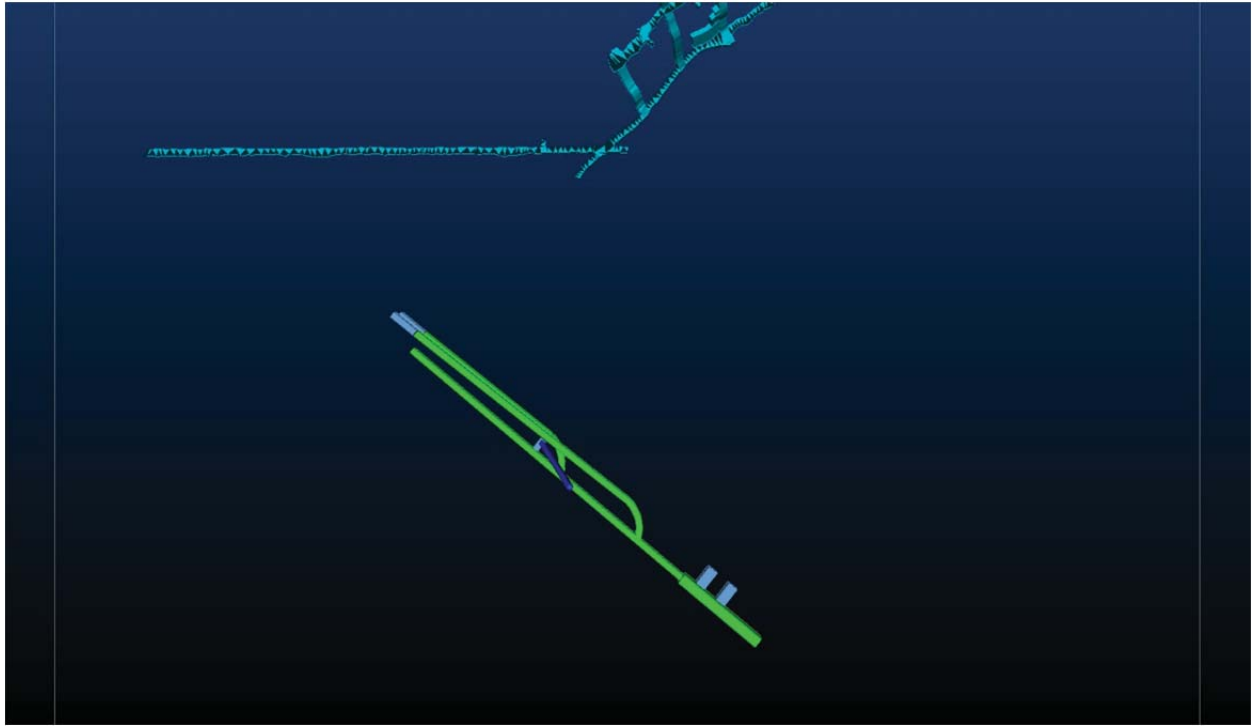


Figure 6-6 Onek Deposit – 990 Option Project Layout

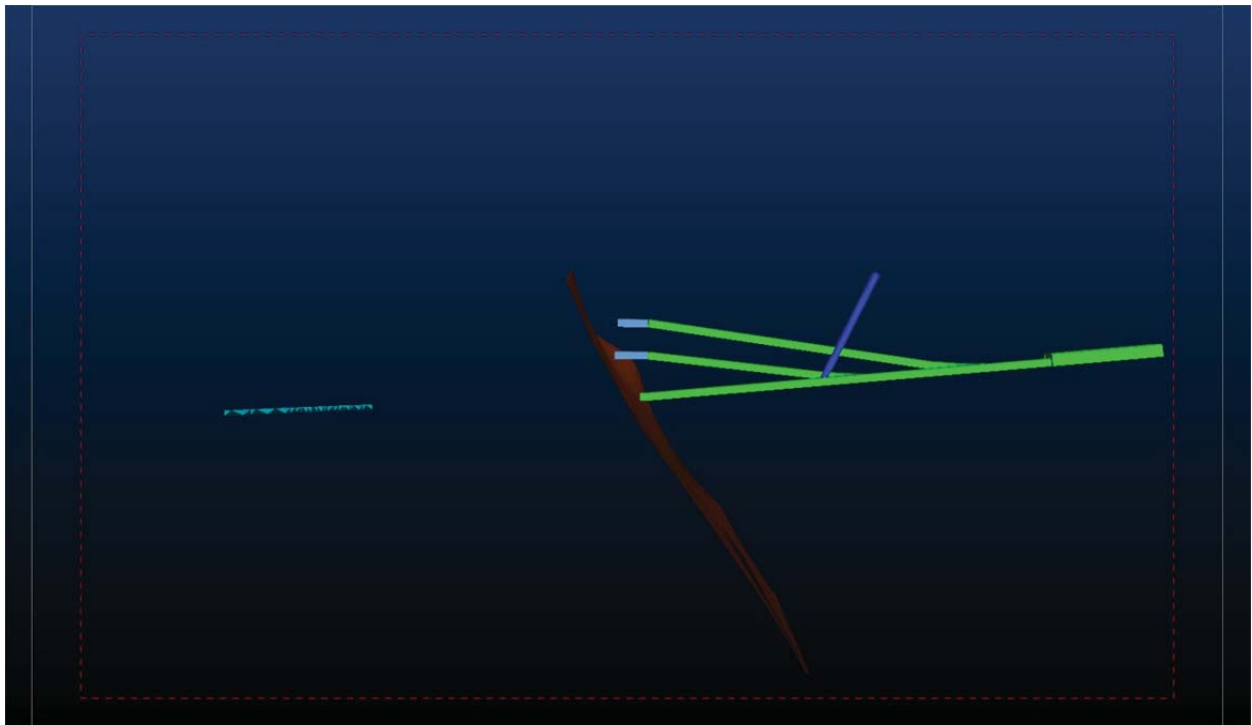
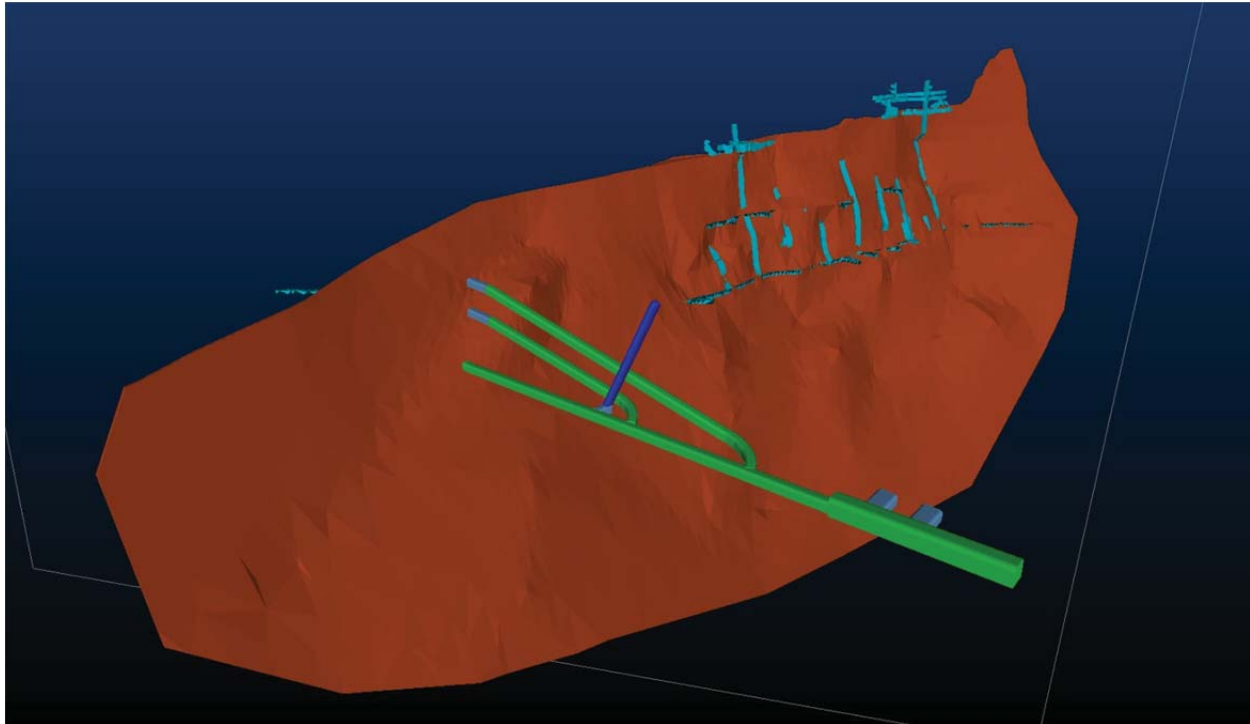


Figure 6-7 Onek Development Plan – 990 Portal Conceptual Cross Section



**Figure 6-8 Onek Development Plan 990 Portal Option 3D Perspective**

## **6.2 DESIGN PARAMETERS:**

### **6.2.1 Portal and Decline:**

#### *6.2.1.1 Lucky Queen*

The Lucky Queen 500 level adit is located at UTM 7,090,550N and 486,630E zone 8. The 500 level underground workings are relatively flat, +.1% and was collared in 1984 by United Keno Hill Mines. The portal has been rehabilitated; track and timber removed and the workings have been setup to accommodate trackless mining.

There are several laydown areas outside the portal, as shown in Figure 6-1. The areas contain ground support materials, piping and miscellaneous supplies used in the development of the mine.

#### *6.2.1.2 Onek*

The Onek 990 portal collar will be located at UTM 7,087,070N and 485,750E zone. The portal will be collared at 5.0m x 5.0 m at a grade of -5.0% for an overall distance of 50 meters.

There will be several laydowns on the portal bench for ground support materials. The majority of the mining gear will be stored at the shop and office location as shown in Figure 6-5.

## 6.2.2 Mining Method:

### 6.2.2.1 Lucky Queen

The Lucky Queen mine is to be considered a conventional mechanized operation. LHD's and Trucks will be used for the movement of waste and ore to designated areas. Jumbo drills, longtom's, stoper's and jacklegs will be used in the extraction of the waste drifts and the ore. In the initial stages of mine development the footwall extraction drift complete with secondary drifts (shop, sumps, remucks and safety bays) will be driven to establish an orepass above the 500 level drift. The extraction drift will then continue to the first intersection of the vein. All ground support in the extraction drift and secondary headings will be installed as per the ground support standards in Section 6.6. During the extraction of ore, the ground conditions will be accessed and a mining method chosen. It is expected that the following three methods of mining will be considered.

- Conventional Cut and Fill – Jackleg, stopers and slushers;
- Mechanized Cut and Fill – Jumbo and LHD; and
- Longhole Stoping.

### 6.2.2.2 Onek

The Onek mine is to be considered a mechanized operation. Jumbo drills, Maclean bolter and jacklegs will be used in the extraction of the waste drifts and the ore. In the initial stages of mine development the hangingwall extraction drift will be driven to intersect the vein at the 970 elevation. All secondary drifts will be driven at this time. (ore and waste remucks, sumps, ramp collars to sublevels 2 and 3). All ground support in the extraction drift and secondary headings will be installed as per the ground support standards in Section 6.6.

LHD's and Trucks will be used for the movement of waste and ore to designated remucks. The material will then be hauled with haul trucks to designated areas on surface or to the mill. During the extraction of the vein bulk sample, the ground conditions will be accessed and a mining method chosen. It is expected that the following two methods of mining will be considered.

- Mechanized Cut and Fill – Jumbo and LHD;
- Longhole Stoping.

## **6.2.3 Emergency Measures**

### *6.2.3.1 Lucky Queen*

The Lucky Queen Mine will be equipped with stench gas on the fresh air intake and the compressed air line. A procedure will be in place for the release of the stench gas during an emergency situation. The mine will have a secondary exit via a raise to surface, refuge station and communications using a leaky feeder system. A secondary communications system will be in place, this system will use Femco phones.

### *6.2.3.2 Onek*

The Onek Mine will be equipped with stench gas on the fresh air intake and the compressed air line. A procedure will be in place for the release of the stench gas during an emergency situation. The mine will have a secondary exit via a raise to surface, refuge station and communications using a leaky feeder system. A secondary communications system will be in place, this system will use Femco phones.

## **6.3 DEVELOPMENT AND PRODUCTION OPERATIONS**

### **6.3.1 Development of a Mining Area**

#### *6.3.1.1 Lucky Queen*

AKHM is currently completing the rehabilitation of the 500 level. Upon completion of the rehab (1000 meters from the portal) a 3.0 x 3.0 footwall extraction drift at +12% grade will be driven to intersect the vein. Secondary drifts including but not limited to a maintenance shop, remucks where required, safety bays, orepass access drift and sumps will be completed as the extraction drift advances to the vein. A conventional raise will be driven from the 500 level to intersect the orepass access drift. A chute will be installed to load trucks with waste and ore.

Ore access drifts will be driven at 50 meters intervals from the footwall extraction drift. The vein will be intersected perpendicular to the ore access drift. Access drifts will first be driven 3.1 x 3.1 meters at -10%, this will allow for 3 cuts of the vein from each access drift.

A central blasting system, using conventional cable wire, junction boxes and blasting boxes will be used throughout the development and production stages of the mine. The main central blast station will be placed outside the portal entrance.

### 6.3.1.2 *Onek*

Upon completion of the portal bench and establishment of the portal collar at the 990 meter elevation, a 5.0m x 5.0m hangingwall extraction drift at -5% will be driven for a distance of 50 meters. This drift will include sumps and remucks for ore and waste storage. The remainder of the extraction drift will be driven (4.0 x 4.0 meters) at -10%, to intersect the vein at bench elevation 970 meters. Secondary headings, sublevel 1 and 2 ramps will be collared, remucks established as required, sumps and safety bays, will be collared as the ramp advances. A conventional escape raise (2.4 x 2.4 meters) at 70 degrees will be driven to surface to establish the ventilation system and provide a secondary escape.

The vein will intersect perpendicular to the hangingwall extraction drift at the 990 meter bench elevation. Two parallel ramps (Sublevel 3 – 3.7x3.7 meters @ +10% and Sublevel 2 – 3.7x3.7 meters @ +15%) will be driven to insect the vein at elevations 990 and 1010 meters. Both ramps will be collared during the development of the primary decline.

A central blasting system, using conventional cable wire, junction boxes and blasting boxes will be used throughout the development and production stages of the mine. The main central blast station will be placed outside the portal entrance.

## 6.3.2 Production from a Mining Area

Mining method selection for both Lucky Queen and Onek is contingent on the characteristics of the deposits and must take into account deposit geometry, geology, geotechnical characteristics, ore recovery, hydrogeology, and other variables. Current mining operations at Bellekeno have confirmed the need to employ a range of mining methods to suit localized characteristics.

Upon preliminary review of the deposit characteristics, three main mining methods were determined to be suitable for different parts of the Lucky Queen and Onek deposits. These methods consist of mechanized overhand and underhand cut and fill (C&F), shrinkage stoping and longhole (LH) stoping for pillar recovery. The actual methods used, and variations of the methods applied, will depend on site specific conditions in each area of the deposit. The preferred mining methods are listed in Section 6.2.2.

## 6.3.3 Backfill Procedures

Backfill approaches for both Lucky Queen and Onek will be similar. Decisions for each operation will be based on the results of the initial mining and bulk sample taking into consideration ore geometries, ground conditions, selected mining methods, availability of materials.

### 6.3.3.1 *Cemented Tailings/Waste Rock Backfill*

Cemented tails and waste rock back fill are the preferred backfill methods. Where sill pillars are required, a cemented fill will be used to provide a stable back to mine up to from beneath. Extraction of the vein from the

final lift requires that the pillar is self-supporting and maintains integrity while the heading is active. The quality and the placement of the fill are both important factors in this application. An increased cement content of between four and five percent will be required to provide the required strength of the pillar. In areas where additional caution is required during final lift extraction, the lift will be mined using up-holes and remote mucking.

Careful preparation of the excavation where cemented fill is to be placed will be required, including blasting beyond the vein contacts to provide a clean, rough surface for the fill to hang on. The floor should be cleaned prior to placement to prevent material falling from the back following mining. An appropriate lead time should be provided to allow set-up and cure for the cemented fill. Standard quality control procedures (e.g. unconfined compressive strength and slump tests) should be completed during batching and following placement of cemented tailing fill materials.

#### *6.3.3.2 Uncemented Rock/Tailings Fill*

For the overhand cut and fill mining method, uncemented rock fill/development waste and/or tailings fill will likely be utilized. These materials should be placed into headings as tight to the back as possible.

#### *6.3.3.3 Paste Fill*

A paste backfill system will be considered a likely option if the cut and fill method was deemed to be the most suitable mining method.

### **6.4 MATERIAL RELEASE SCHEDULE**

Ore feed from Lucky Queen, Onek and Bellekeno combined is necessary to maximize the current mill capacity of 400 tpd. Based on the current production capacity of Bellekeno and the development plans for Lucky Queen and Onek, Figure 6-9 presents a nominal quarterly ore production profile from the 3 mine operations. These estimated production profiles will change depending on backfill sequences, ore grades, waste development requirements and mill throughput. Waste development will vary over the life for each property.

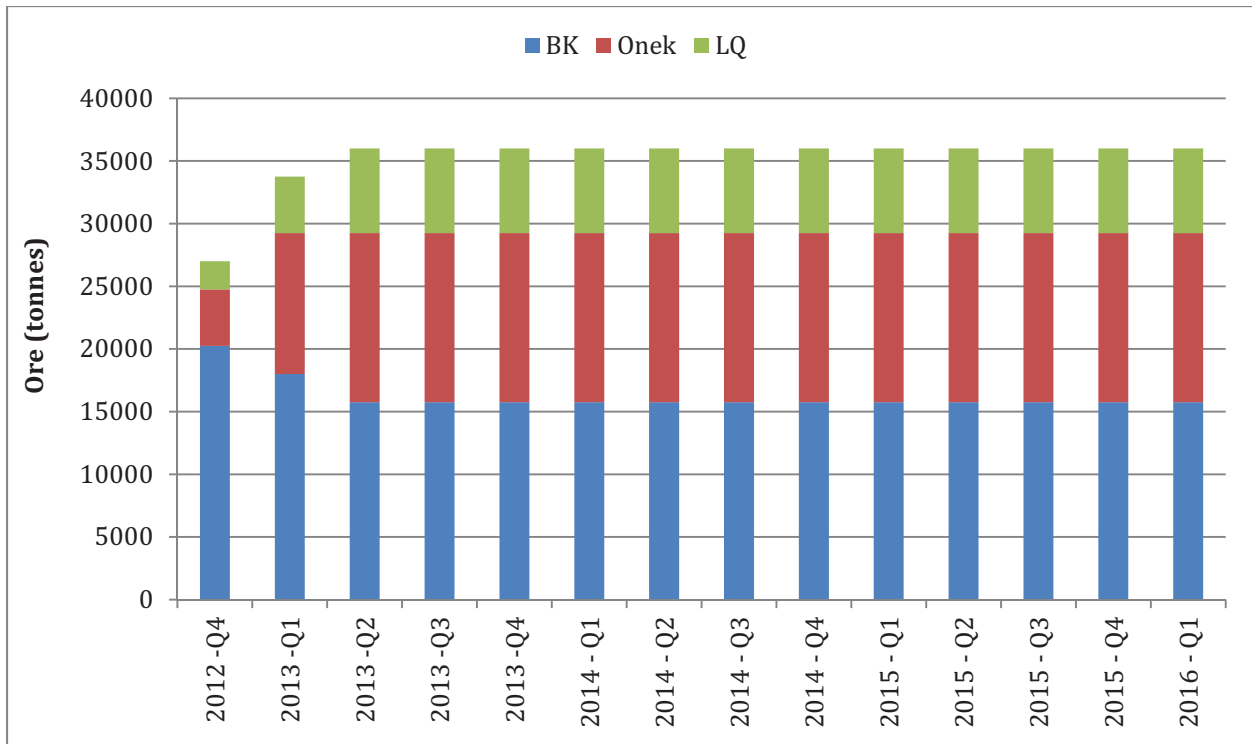


Figure 6-9 Ore Release Schedule (tonnes) by Quarter

## 6.5 VENTILATION:

### 6.5.1 Lucky Queen

The Lucky Queen mine initial ventilation system will initially consists of a booster type fan arrangement. Fresh air will be pushed into the portal via a Alphaair 20 hp. 36" fan @ 20,000 cfm c/w 30" twin duct, the fresh air will free flow along the 500 level drift until it is pickup by a 60 hp. 30" fan @ 20,000 cfm c/w 30" vent duct, at approximately 350 meters from the portal. The fresh air will be pushed down the vent duct and will be supplemented by booster fans as per Figure 6-1. The exhaust air will free flow from the face down the 500 level until it reaches the 60 hp fan. The vent system contains a total of 200 hp, which equates to 149 Kilowatts. Power is maintained by a 500 Kilowatt diesel powered generator.

This ventilation configuration will be maintained during the initial development and during the extraction of the bulk sample. Upon completion of this phase, a 210 meter vent raise will be driven to surface. The ventilation system will then be redesigned to a push-pull system using the 500 level for either exhaust or fresh air.

A present, the mine air is heated with 3 (ea) 500,000 btu oil fired heaters. The ambient temperature in the mine is approximately 3 degrees Celsius. The heater is located approximately 30 meters from the portal and is equipped with a 20 hp 36" fan @ 20,000 cfm. The heated air is moved down the 30" insulated twin duct to the portal. Heating of the mine air begins in October and ends in May.

### 6.5.2 Onek

The Onek mine initial ventilation setup will consist of 1 (ea) 42" – 60 hp. Alphaair fan, c/w 2 silencers and 42" twin duct, providing 30,000 cfm of fresh air. This arrangement will be in place for the waste development and the extraction of the bulk sample. During the development phase, a vent/escape raise will be driven to provide a secondary egress from the mine and means of providing fresh air.

Mine heat will be provided with a 6,000,000 btu propane heater, pushed underground with the 100 hp – 60,000 cfm fan. This fan will be mounted at the base of the raise and air will draw through the heater. The expected ambient underground temperature will be 3 to 4 degrees Celsius. Secondary ventilation required will be with secondary fans and duct. The portal will be used as the exhaust airway. The total overall power requirements are expected to be 250 hp or 187 Kilowatts. Power will be provided from the YEC grid or by a back-up diesel generator.

## 6.6 GROUND SUPPORT METHODS:

### 6.6.1 Ground Classes

Based on the interpreted geotechnical conditions at Bellekeno, the following ground classes have been defined and presented in Table 6-1. These are based on the lithology determined from the face of the

advancing heading. These ground control classes will form the basis of the ground control management for Onek and Lucky Queen and additional classes added or modified as required.

**Table 6-1 Ground Classes**

Area	Ground Class	Typical Conditions
Development Headings	DG-1	Quartzite with less than 20% interbeds of schist (graphitic, chloritic). RQD* 70 – 90%, and intact rock strength (“IRS”) 100 – 150MPa.
	DG-2	Quartzite with 20 – 80% interbeds of schist (graphitic, chloritic). RQD 60 – 80%, and IRS 40 – 90MPa.
	DG-3	Fault/shear zones comprising predominantly graphitic schist. RQD <50% and IRS 15 – 40MPa.
Production Headings	PG-1	Predominantly intact vein materials with RQD 50 – 60% and IRS 20 – 40MPa. Weaker materials comprise <10% of vein; HW and FW units are competent and intact.
	PG-2	Predominantly intact vein materials, with brecciated or sheared HW and/or FW contacts. RQD 20 – 50% and IRS 15 – 30MPa. Weaker materials comprise 10% - 40% of vein width.
	PG-3	Predominantly soil strength materials in vein. HW and FW units are broken or sheared. RQD 0 – 30%, and IRS <15MPa. Excavation potentially does not require the use of explosives

\* “RQD” Rock Quality Designation

### 6.6.2 Support Requirement Evaluation

Development and production support requirements are based on the ground classes that are determined to be representative of the likely rock mass conditions. Mining practices in and around the deposit will need to be cautious and excavation size and overbreak limited as much as possible to maintain the stability of the excavations. Mining rates within the vein are expected to be low due to the requirement of short face rounds.

### 6.6.3 Support Classes

Support classes have been determined for the ground classes. Options have been provided in some classes to allow for flexibility in the selection of mining equipment.

### 6.6.4 Development support requirements

In general, the infrastructure is considered to be open for the long term situation, and support has been designed accordingly. The infrastructure has been designed to avoid areas with potential poor ground conditions; in some situations this is unavoidable and support will be increased to provide long term stability. Table 6-2 outlines the recommended ground support for development headings.

### 6.6.5 Intersection Support

Where intersections will be formed in PG-1 and PG-2 ground conditions, a standardized bolting program will be required. In addition to the standard Support Class requirements, any span opened over and above the

standard development width (4.5 m) should be supported with additional grouted rebar bolts installed with mesh straps throughout the intersection. It is a requirement that permanent support, suitable to the final excavated dimension, be installed prior to the breakaway being taken. Table 6-3 outlines the support requirements for large intersections.

**Table 6-2 Support Classes for Development Headings**

Area	Ground Class	Support Class	Support Requirements
Development Headings	DG-1	DS-1	1.8m friction anchors on 1.2x1.2m diamond spacing across back and shoulders. #6 galvanized welded wire mesh across back and shoulders. Additional spot bolting down ribs as required
		DS-2	1.8m grouted rebar on 1.2x1.2m diamond spacing across back and shoulders. #6 galvanized welded wire mesh across back and shoulders. Additional spot bolting as required
	DG-3	DS-3	1.8m resin grouted rebar on 1.2x1.2m diamond spacing down to 1.4m above floor. #6 galvanized welded wire mesh down to 1.2m above sill. Additional spot bolting as required. Mesh straps as required
	DG-4	DS-4	25mm flash-coat shotcrete in back and ribs. 2.4m resin grouted rebar on 1.0x1.0m diamond spacing down to 1.2m above floor. #6 galvanized welded wire mesh down to 1.0m above sill. Mesh straps as required. 50-75mm additional shotcrete in back and ribs. If required: spiling at 30cm centres with 4.5m self-drilling or grouted hollow bar spiles

**Table 6-3 Support Requirements for Large Intersections**

Area	Ground Class	Support Requirements
Development Headings	DG-1	2.4m grouted rebar on 3.0m diamond spacing throughout intersection Mesh Straps
	DG-2	Final support installed before breakaway taken
	DG-3	4.5m cable bolts on 2.0m diamond spacing throughout intersection Mesh straps Final support installed before breakaway taken

### 6.6.6 Production Support Requirements

Support design for production headings has been based on observed ground conditions, historic support performance, and anticipated ground conditions. It should be assumed that an increase in ground support will delay advance rates. Table 6-4 outlines support for production headings.

**Table 6-4 Support Classes for Production Headings**

Area	Ground Class	Support Class	Support Requirements
Production Headings	PG-1	PS-1	1.8m friction anchors across back on 1.2x1.2m spacing; rib bolting as required. If required: #6 galvanized welded wire mesh across back and shoulders. If required: 25mm flash-coat shotcrete in back; rib coverage as required
		PS-2	1.8m friction anchors across back on 1.2x1.2m spacing; rib bolting as required. #6 galvanized welded wire mesh across back and shoulders. If required: 25mm flash-coat shotcrete in back; rib coverage as required
	PG-2	PS-3	1.8m resin grouted rebar* across back and either friction anchors or grouted rebar in ribs on 1.0x1.0m spacing #6 galvanized welded wire mesh across back and shoulders. Mesh straps as required
	PG-3	PS-4	25mm flash-coat shotcrete on back and ribs. 1.8m grouted rebar* on 1.0x1.0m spacing in back and ribs. #6 galvanized welded wire mesh down to 0.8m above the sill 50-75mm shotcrete in back and walls If required: spiling at 30cm centers with 4.5m self-drilling or grouted hollow bar spiles. Mesh straps as required.

### 6.6.7 Shotcrete Requirements

Where required, shotcrete will be used to provide short and long term stability to access and production headings. In production headings, the main purpose of the shotcrete will be to prevent progressive ravelling of the rock mass. Where required, a 25 millimetre (“mm”) flashcoat of shotcrete can be applied immediately after mucking to tie the rock mass together prior to the installation of conventional bolts and mesh support. Additional shotcrete can be applied if ground conditions dictate. In areas where shotcrete is required, it is important that shotcrete is applied as soon as possible following blasting and mucking to control the behaviour of the rock mass and prevent unravelling of the rock mass before final support is installed. In excavations expected to be open for the long-term, shotcrete can be used to prevent rock mass dilation and ravelling (e.g. where schist packages are intersected). In this situation, shotcrete can be applied as a flash-coat, with additional shotcrete thickness (50-75 mm) added following the installation of conventional support. Dry-mix shotcrete is the recommended product for use at Bellekeno due to the requirement for compact equipment that can be rapidly moved around the mine. It is recommended that multiple dry-mix shotcrete machines are available for back up, and to support the need for multiple headings to be operating at one time. For most applications, additives will be used to provide the fast set-up times required to prevent ravelling of vein materials prior to conventional support installation.

### 6.7 GROUND SUPPORT MONITORING INSTRUMENTATION

The current mine development rehabilitation program on the 500 Level at Lucky Queen has been useful in assessing ground conditions at that location. Section 6.6 Ground Support Methods describes the ground support classes and ground support requirements.

Quality control / quality assurance of the ground support methods for both Lucky Queen and Onek will be monitored by the following programs;

- On-going field observations of ground support installations;
- Pull-tests to determine anchor strengths of various ground support anchors / rockbolts. These tests will be performed on ground support installations that have been installed specifically for the purpose of doing the test. These installations will not be part of the active ground support;
- Pull-tests will be performed on each type of anchor / rockbolts and in each type of ground condition;
- Test panels for shotcrete to determine compressive strengths.

As development and production advances, routine ground control and stability inspections will be done. This will be performed by Alexco personnel in conjunction with external rock mechanics / ground control experts. An annual audit and report will also be done in order to continuously review ground conditions and support methods.

In addition, any suspected ground concerns will be monitored by the appropriate instrumentation including field observations, ground movement monitors (GMMs), extensometers and/or other methods deemed appropriate. A dedicated ground control log book will be located at each mine and ground control concerns tracked and documented on an on-going basis. In addition, safety discussions are held with all personnel on a daily basis and this forum will be used to raise awareness of any ground control concerns and to discuss solutions.

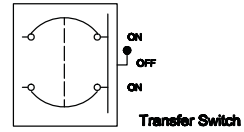
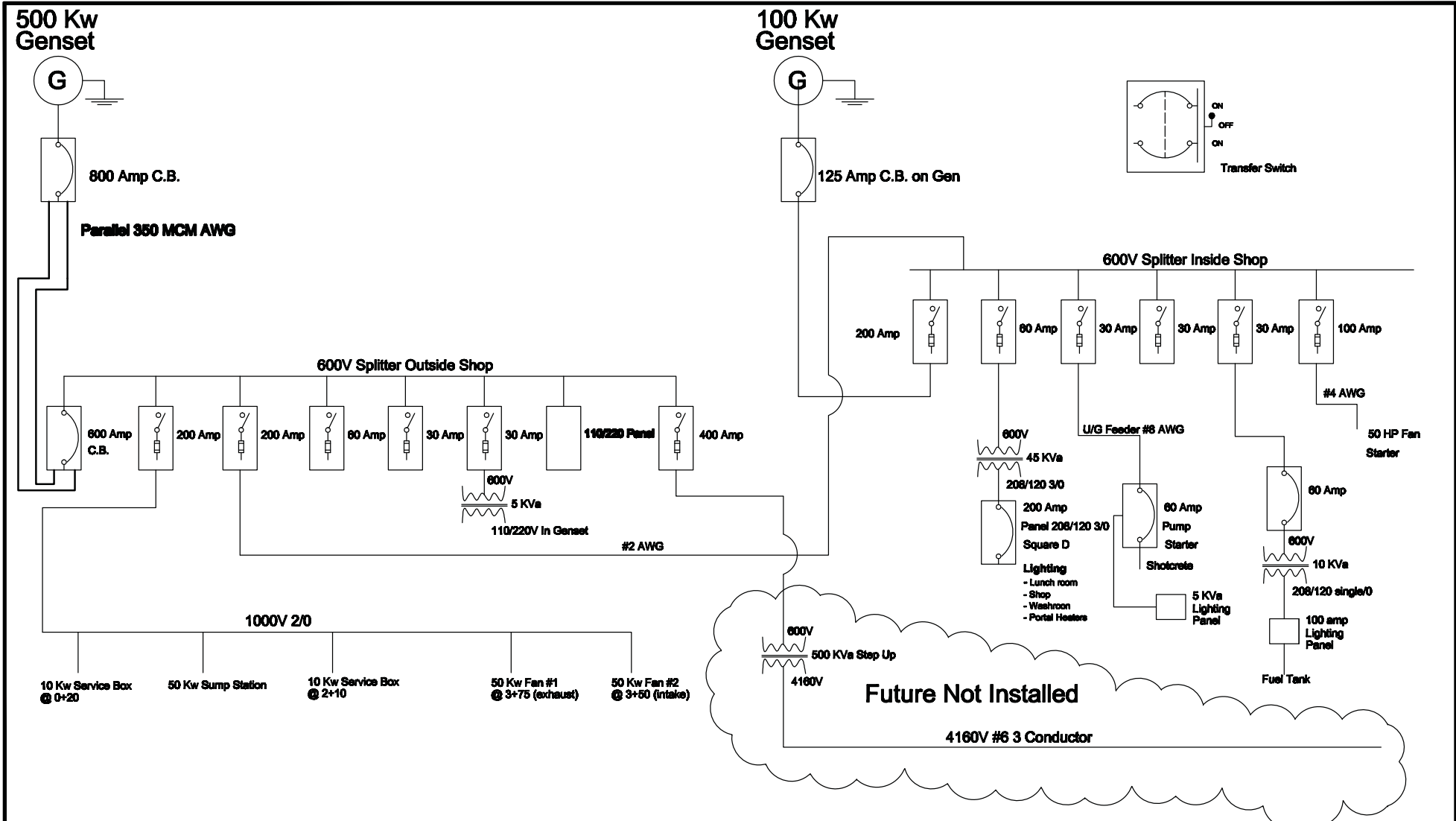
## **6.8 POWER**

### **6.8.1 Lucky Queen**

Electrical power for Lucky Queen will initially be provided via on site diesel powered generators and eventually also through grid power, depending on capital and operating cost trade-offs. Under full operating conditions, Lucky Queen is expected to require 750kW (19,710 MWh/yr). Lucky Queen requires more power than Onek because of the additional ventilation requirements due to its longer mine access. A transmission line may be established in the future along Wernecke Road to the site. A generic single line diagram of the power distribution for the Lucky Queen underground operation is presented as Figure 6-10.

### **6.8.2 Onek**

Power requirements at Onek are estimated at 300 kW (6,570 MWh/yr). Development will begin at Onek with diesel powered generators. As ore development commences, establishment of grid power will be finalized based on prevailing economic factors. A short transmission line will be established from the Onek substation to the 990 Portal Pad. The Onek mine will have back-up diesel generators placed on the Onek 990 portal pad. A generic single line diagram of the power distribution for underground mines in the KHSD is presented as Figure 6-11.

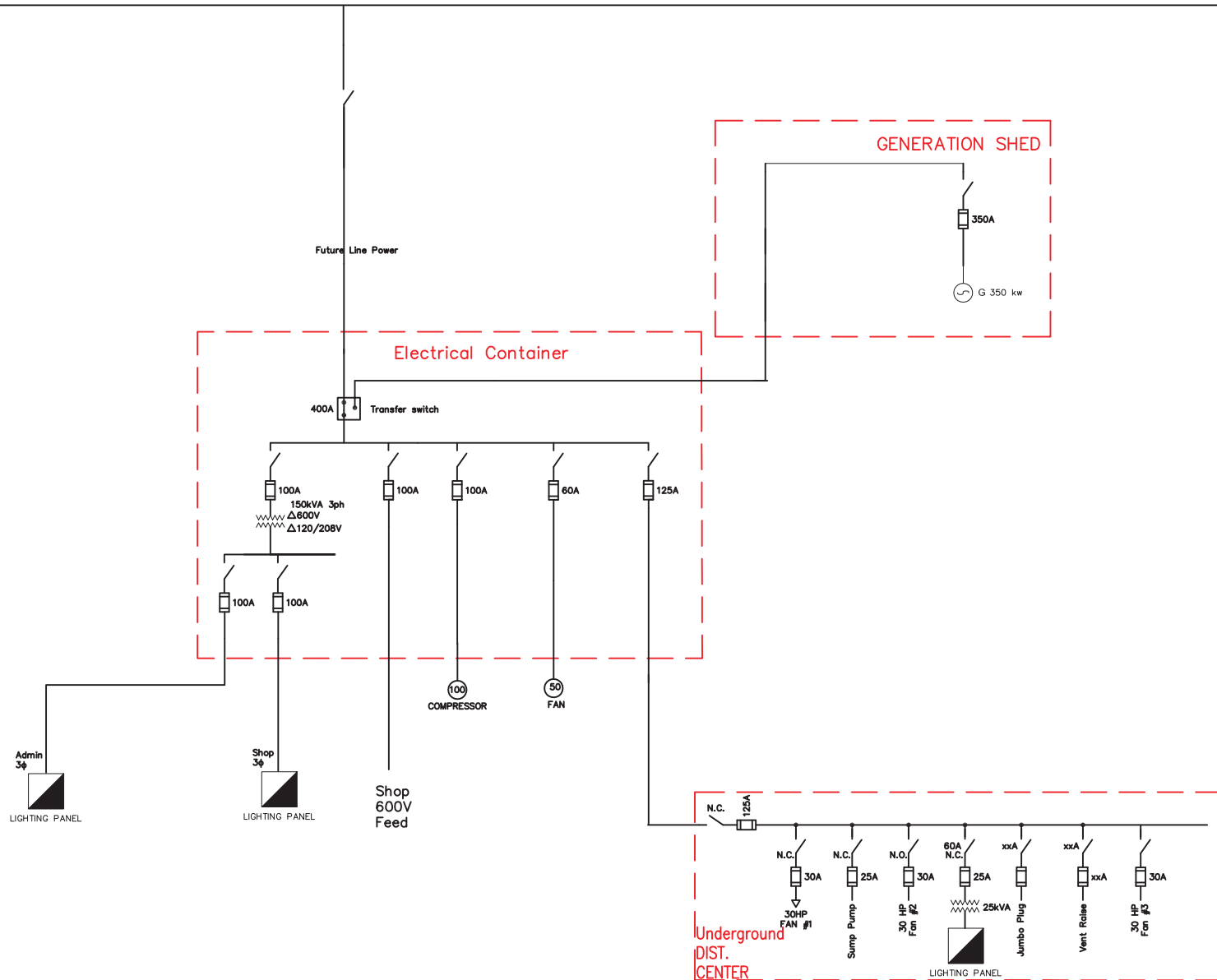


**ALEXCO RESOURCE CORP**  
**Lucky Queen Mine**

DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE: <b>Lucky Queen</b> Single Line Electrical Drawing		
Drawn by: KF	Scale: NTS	
Date: Dec 12/11	Approval:	Date:
File: Lucky Queen Single Line.dwg		

# ONEK SINGLE LINE ELECTRICAL DIAGRAM



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Figure 6-11  
Onek Single Line Electrical Diagram

SEPTEMBER 2012

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## **7 ASSOCIATED MINE SERVICES AND INFRASTRUCTURE**

### **7.1 POWER**

The power requirements for the Lucky Queen and Onek mines was presented in Sections 6.8.1 and 6.8.2 and single line electrical diagram is presented in Figure 6-11.

### **7.2 COMMUNICATIONS**

The Keno Hill Silver District is not within the Yukon grid for cell phone communication therefore a dedicated on site radio communication system has been installed for the Bellekeno mine. The system in place functions for both the Lucky Queen and Onek mines. A leaky feeder system will be installed at both Lucky Queen and Onek which allows surface radio communication to extend to underground operations.

### **7.3 COMPRESSED AIR**

Compressed air at the Lucky Queen mine is supplied by a Gardner Denver diesel compressor providing 800 cfm of compressed air to the underground workings. The compressed air is piped via a 6-inch victaulic air line from the portal to the working face.

The Onek mine will be initially supplied with compressed air via a Gardner Denver 800 cfm diesel compressor. A 6-inch Victaulic air line will provide air to the working face. Upon completion of the power upgrade from generator power to grid power, the mine will be equipped with a electric compressor. The electric compressor will supply 1000 cfm of compressed air at 125 psi.

### **7.4 DEWATERING**

The Lucky Queen and Onek Mines will be developed above the groundwater table, therefore no dewatering protocols are required. Additionally, the Lucky Queen 500 level underground workings are free draining. If greater volumes of water are encountered at Onek contingency storage ponds will be in place to properly manage the water according to the Water Management Plan.

### **7.5 WASTE ROCK AND ORE STORAGE**

Waste rock including P-AML and N-AML will be generated from the Lucky Queen and Onek mines and will be stored in the appropriate locations depending on the geochemical characterization. Based on the current ratio of N-AML and P-AML to ore material estimated at Onek and Lucky Queen, Figure 6-9 and 6-10 presents the waste rock estimated to be generated on a quarterly basis. The current Bellekeno Waste Rock Management Plan will be used to identify and classify P-AML and N-AML waste from Onek and Lucky Queen.

The existing approved Waste Rock Management Plan will be applied to characterize the waste rock types during development and mining.

### 7.5.1.1 N-AML Waste Rock Disposal Areas

#### *Lucky Queen N-AML Waste Rock Management*

Up to 80,000 t N-AML waste rock generated from development and mining and Lucky Queen will be deposited in a new N-AML WRDA, which will be built as an extension to the historic waste rock dumps at Lucky Queen (Figure 6-1). Approximately 8,000 m<sup>2</sup> of clearing will be required to accommodate the new N-AML WRDA. EBA has provided a geotechnical review of the location of the Lucky Queen N-AML WRDA.

Additionally, N-AML material will be used for general construction including repairs and surface capping of the existing site access roads. N-AML waste rock may also be placed underground as backfill.

#### *Onek N-AML Waste Rock Management*

Up to 90,500 t N-AML waste rock generated from development and mining at Onek will primarily be used as surface construction material for road building and upgrades. N-AML waste rock will otherwise be placed within the licenced Bellekeno N-AML WRDA located along the Bellekeno Haul Road. (Figure 7-1). The Bellekeno N-AML WRDA has not yet been constructed because to date all N-AML material has been used for surface construction. As required by QZ09-092, groundwater monitoring wells will be established once the N-AML WRDA is in use. N-AML waste rock may also be placed underground as backfill.

### 7.5.1.2 P-AML Waste Rock Storage Facilities

#### *Lucky Queen P-AML Waste Rock Management*

The new P-AML WRSF will be constructed at Lucky Queen based on the generic facility design by EBA and approved during Bellekeno licencing. Figure 6-1 shows the location of the new P-AML WRSF, which will be designed to accommodate up to 44,000 t of P-AML material. P-AML waste rock may also be placed underground as backfill as well as being deposited into the Onek P-AML facility.

#### *Onek P-AML Waste Rock Management*

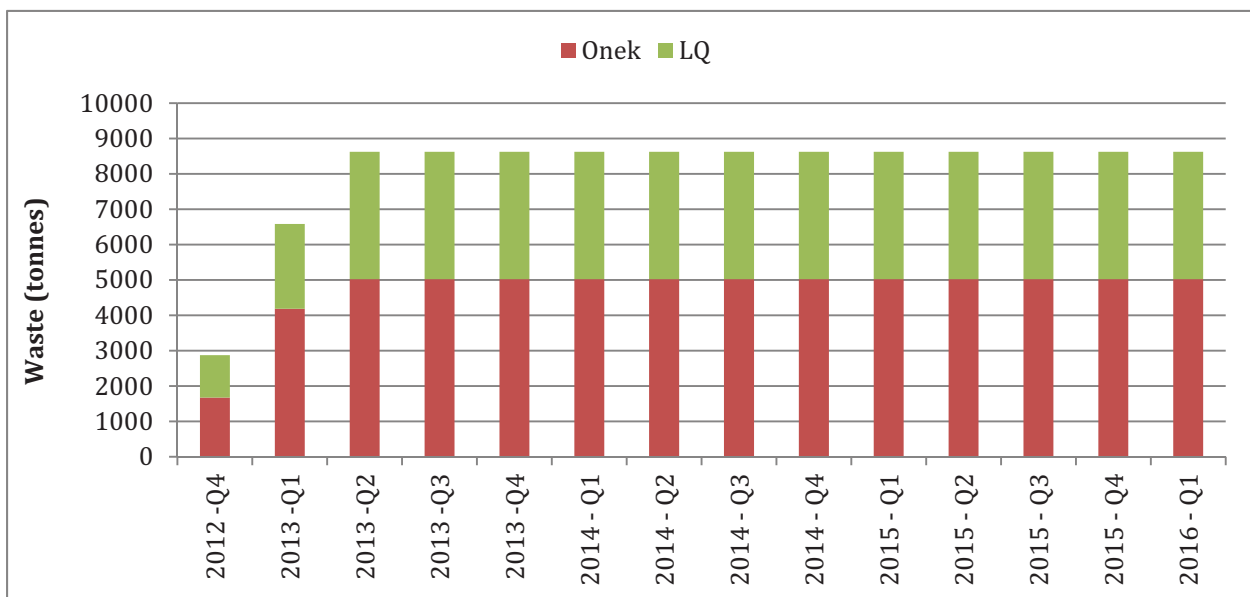
During initial development of the Onek decline and before the Keno City Bypass Road to the Bellekeno Haul Road is complete, P-AML material will be stored in the licenced Onek P-AML WRSF located on a historic dump (Figure 6-4). This facility is currently being constructed according to the approved generic facility design by EBA.

Once the Keno City Bypass Road is complete, a portion of the P-AML waste rock generated from the Onek mine operations (ramps and drifts) may be rehandled underground in Onek or can be placed in the existing licensed Bellekeno Temporary P-AML WRSF (Figure 7-3). In accordance with QZ09-092, this material will be placed under the static water level in the Bellekeno Mine upon mine closure. P-AML waste rock may also be placed underground as backfill.

### 7.5.1.3 Temporary Ore and Waste Rock Storage

*Lucky Queen Temporary Ore and Waste Rock Storage*

Ore and P-AML material from Lucky Queen Mine will require temporary storage on surface prior to transport to the mill and WRSF, respectively. The temporary storage area will be located beneath the trestle over-hang on the Portal Pad. The Lucky Queen trestle has separate ore and waste dump pockets to allow segregation of waste and mineralized material. The base of the trestle will be constructed from a cemented rock base similar to the base that is constructed at the coarse ore storage pad at the crushing plant (i.e. 0.5 m thick cemented rock base). A sloped roof will also be constructed over the ore storage pad to reduce precipitation falling over the stockpiled ore material. The cemented rock base will be sloped inwards to collect any meteoric water that may fall on top of the ore material. The ore and P-AML material will not be stored at the temporary storage area for longer than 30 days.



**Figure 7-1 N-AML Waste Rock Generation Schedule**

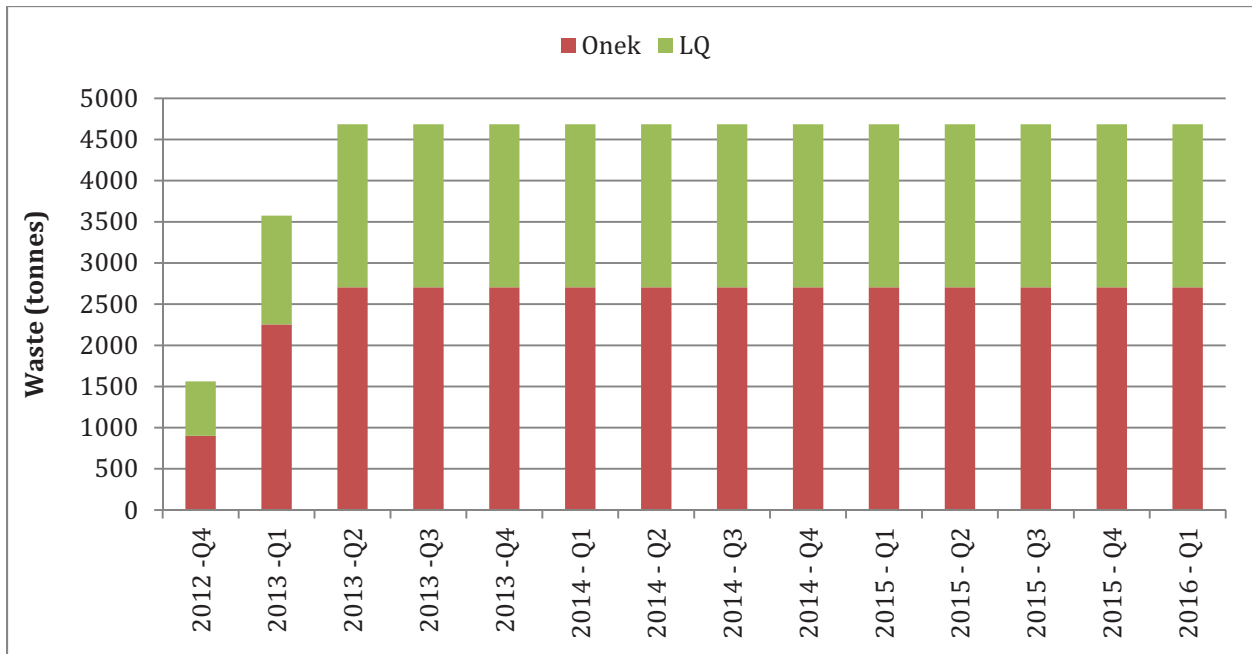
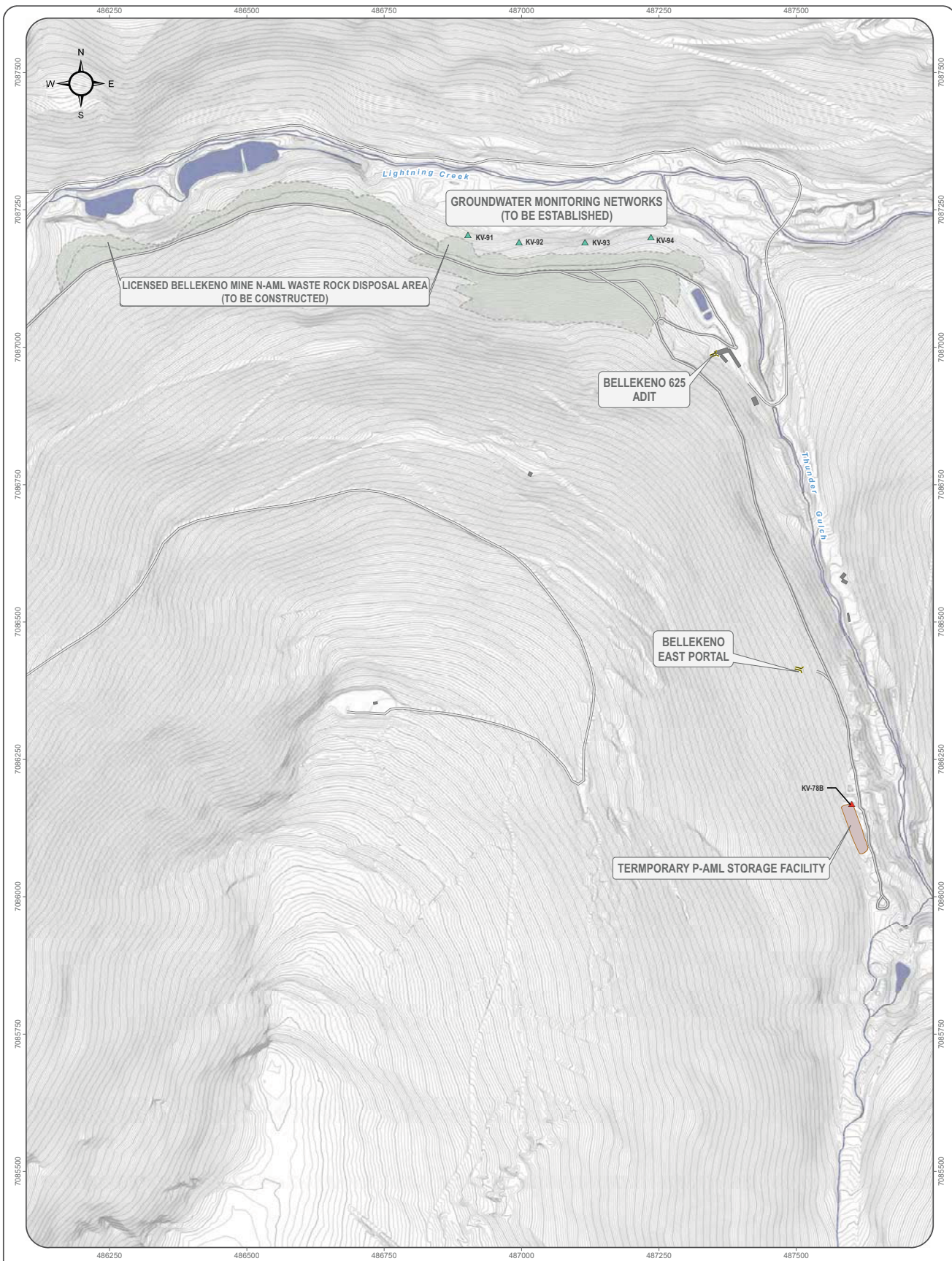


Figure 7-2 P-AML Waste Rock Generation Schedule



Datum: NAD 83; Projection: UTM Zone 8N  
 1:6,500 When printed on 11 by 17 Inch paper

0 100 200 Meters

- ▲ Water Quality Station
- ▲ Groundwater Monitoring Well
- Building/Structure
- Tempory P-AML Storage Facility
- N-AML WRDA
- Highway
- Secondary
- Contour (5 m interval)
- Contour (1 m interval)

**ALEXCO KENO HILL MINING CORP.  
 PROPOSED DEVELOPMENT PLAN**

**FIGURE 7-3**

**ONEK PROJECT SITE (EAST AREA)**

Site hydrography and contours derived from 2006 aerial imagery obtained from Aero Geometrics, Calgary Alberta.

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### *Onek Temporary Ore and Waste Rock Storage*

The Onek temporary storage area for ore and waste rock will be located underground near the portal (Figure 6-4). This measure will limit noise generation, as well as exposure of the rock to precipitation. The ore and P-AML material will not be stored at the temporary storage area for longer than 30 days.

## **7.6 TAILINGS STORAGE FACILITY**

The Dry Stack Tailings Facility is an existing licenced feature. There are no proposed engineering or design changes for the addition Bellekeno/Lucky Queen/Onek composite tailings.

## **7.7 INDUSTRIAL COMPLEX**

Both the Onek and Lucky Queen mines will have separate shops and building on the portal pads to store equipment and supplies required for mining.