NI43-101 TECHNICAL REPORT ON THE BALABAG GOLD PROJECT, ZAMBOANGA PROVINCE, PHILIPPINES

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1 SUMMARY

Georeference Online Ltd. was retained by Yulo Perez, Chief Operating Officer of TVI Resource Development Phils. Inc. (TVIRD), to prepare an independent Technical Report, according to the NI 43-101 standard, on the Balabag Project in Zamboanga, southern Philippines.

The Technical Report was requested as a contribution towards the pre-development program currently ongoing at the Balabag Project site.

The author spent four and a half days in Manila reviewing property documents and data with company staff in late March 2012. Copies of relevant documents and data files were made for later more detailed study and manipulation in Vancouver.

The author visited the Balabag property itself on March 29, 2012, where he was able to talk to project staff, review project facilities, and witness ongoing geological work, including drilling and drill-section re-interpretation.

The tenement covering the Balabag property has a total area of 4,779 hectares. The tenement comprises a Mineral Production Sharing Agreement (MPSA) originally in the name of Zamboanga Minerals Corporation.

Balabag is accessible from Manila by air. Two airlines maintain regular scheduled 1 hourr and 20 minute flights from Manila to Zamboanga City. From Zamboanga City, access to the property is by a 5-hour drive via the all-weather Zamboanga – Dipolog national highway.

A new road, not yet open to the public, has recently been constructed by TVI which reduces the driving time between Zamboanga City and Balabag significantly.

Generally, the topography in this region is moderately rolling to semi-rugged.

The property was initially under an option agreement with Rio Tinto Exploration Philippines Corporation from October 15, 1996 to January 14, 1998,

The first resource estimate for the Balabag Project, together with a NI 43-101-compliant technical report, was produced in 2007 by an independent consultant, P.J. Lafleur GeoConseil Inc.

According to Lafleur's report, the indicated resource at a cut-off grade of 0.5 g/t Au was 1.4M tonnes at 2.87 g/t Au and 84.3 g/t Ag. In addition, an inferred resource of 2.4M tonnes at 2.11 g/t Au and 45.7 g/t Ag was declared and recommended for further drilling.

In October 2010, TVIRD completed an in-house resource estimate with the assistance of GeoSystems International, Inc.

TVIRD conducted an in-house resource in August 2011, this time based on 199 holes which included all data acquired prior to the cut-off date June 30, 2011.

The August 2011 resource model yielded an estimated 1.69 million MT at 2.48 g/t Au and 75.5 g/t Ag, assuming a cut-off grade of 0.40 g/t Au. Similar to the previous model, the 2011 model was prepared without reference to NI 43-101 or JORC standards.

The Philippines regional geology is dominated by Tertiary and younger plutono-volcanic sequences that are superimposed on both continental and oceanic crust. The regional geology of the Zamboanga Peninsula is less well understood than other parts of the country, and its mineralization potential remains to be quantified as the area continues to be under-explored.

The oldest rock unit mapped in the Balabag Project area is an intrusive, mainly diorite, porphyry inferred as Pre-Oligocene. This is overlain by late Oligocene to Middle Miocene sediments. The sediments are generally steeply dipping and unconformably overlain by volcanic rocks. A younger intrusive suite of andesite to dacite porphyries intruded the volcanics, sediments and older diorite.

The gold-silver mineralization in the Balabag prospect is a low-sulphidation epithermal vein system. The area is characterized by quartz veining and silica replacement in andesitic to dacitic volcanics and fine-grained laminated tuffs.

The main mineralized zone at Balabag is situated in the Tinago area where a relatively more continuous quartz vein system along strike has been interpreted based on the available drill data of generally 25m spacing.

Gold and silver are the only elements of economic interest which have been identified to date within the Balabag project. Gold occurs mainly as high-Ag electrum with minor amounts of native gold. It occurs as fine and coarse-grained particles. Fine-grained Au is mainly locked in non-opaque minerals, and to a lesser extent, pyrite. In some cases, large grain size and euhedral forms of pyrite contain high concentrations of gold. Silver occurs mainly as acanthite and as native silver.

The following two mineralisation types have been proposed for the Balabag deposit:

- "True" veins (DOMAIN1) – these are better-mineralized veins with more predictable spatial continuity. The banded quartz veins are generally higher in Au grade in association with very fine-grained black sulphides seen as streaks and patches. Three types of "true" veins have been observed, and defined, to the extent that they occur on their own or together, as "DOMAIN1" mineralisation:
    - Banded, high Au, quartz veins with banded black sulphides
    - Massive translucent to milky quartz veins
    - Quartz vein breccia with angular andesitic clasts
- Quartz stockworks (DOMAIN2) – this type is low grade and erratic in thickness. It occurs by itself or in close spatial association with the true veins. Zones of this kind of mineralisation have been defined as "DOMAIN2" mineralisation.

"DOMAIN1" and "DOMAIN2" mineralisation margins have been identified and digitised on all geological sections, and then connected between sections to form wireframes enclosing the volumes constituting this DOMAIN1 mineralisation.

Drilling in Balabag was initiated in 2000 when Templar Gold N.L. drilled five shallow holes totalling 593 meters to test three targets within the area (see Section 5 above).

TVIRD commenced a drilling campaign in November 2005 to evaluate the mineralization potential of the Balabag Prospect. By the end of June 2011, a total of 199 exploration drill holes were completed, totalling 23,690 meters. The drill holes are generally dipping -60 degrees at 160 degrees azimuth.

Verification of data serving as critical input for this report was limited to confirmation, by the author, of the existence, in good order, of:

(a) The Balabag drill core remaining after cutting for assay;
(b) Photographs of all drill core before cutting;
(c) The associated assay results in their paper and digital form and associated drill logs in their digital form (of which there are more than one version);
(d) Somewhat limited documentation of quality control carried out on borehole sample assays;
(e) Interpreted geological sections drawn onto downhole borehole log and assay plots, which were reviewed in detail with project staff both in Manila and at Balabag,

More thorough data verification was not included in the scope of this report.

The author is satisfied that all the above currently exist in a form readily available for inspection, either in the company's office in Manila, or at its Balabag site office in Zamboanga, and that they are of a quality that supports the accurate estimation of project mineral resources using the methods described in this report.

The following recoveries have been reported as expected for Balabag ore when treated by gravity concentration followed by cyanidation (Williams, 2011):

- 95% – 97% for gold
- 67% – 85% for silver

No distinction has been made with respect to whether these recoveries are specific to oxidised or sulphide zones of the deposit, although oxidised and sulphide zones are known to exist in the deposit, and work is currently underway to delimit their exact boundaries.

A density of 2.40 was used for TVI's August 2011 DOMAIN1 resource estimation, being the average of 195 density determinations, and the same value has been judged appropriate for the estimation presented in this report.

The author reviewed the results of the most recent Balabag variographic studies (Digdigan, 2012), and found the variograms derived were unsuitable for use in kriging.

Consequently, the gold assay results for DOMAIN1 were re-analysed using the VISOR Module of the Snowden Supervisor 8 system. Although, by using log-transformed gold values, more viable variograms were identified for both the Horizontal and Dip planes, after extensive analysis it was not possible to identify viable variograms in the Across Strike plane, and hence this approach was taken no further.

Without access to viable variograms for interpolation by kriging, the interpolation method for gold and silver considered most appropriate to Balabag was the "inverse distance squared method".

The figures in the table below reflect the author's best estimate of Measured, Indicated and Inferred gold and silver resources at Balabag – unadjusted for 24 years of underground mining of this resource by illegal miners - based on information reflecting drilling competed to the end of June, 2011, which information the author believes to be of adequate quality to arrive at these estimates.

	TONs	AU (G/T)	CONT. AU (OZ)	AG (G/T)	CONT. AG (OZ)
Inferred	**0**	**-**	**-**	**-**	**-**
Indicated (prior to illegal mining)	**1,784,555**	**2.34**	**134,262**	**72.3**	**4,148,196**
Measured	**0**	**-**	**-**	**-**	**-**

It has not been possible for the author to estimate the extent to which this resource has been depleted by its illegal mining, but estimates of this depletion made to date range from 158,000 tons at 2.15g/t Au and 134g/t Ag to double that amount.

Current available information on the Balabag deposit confirms it to be a small, low-sulphidation epithermal gold-silver deposit with mineralisation occurring in veins of variable size, and grade which varies from low to very high, apparently over short distances when sampled with drillcore. As such, it is a difficult deposit to evaluate using geostatistical methods because of the difficulties it presents in allowing the derivation of meaningful variograms.

Fortunately, exploration personnel working on the project have invested significant effort in delimiting the margins of the main mineralised geological unit (DOMAIN1-type veins) based on geological criteria which are independent of gold or silver grade. This allowed the reliable calculation of the average gold and silver grades of these units using inverse distance squared calculations – although the actual location of the high and low grades will be subject to some error, this error not being so great as to prevent mining feasibility studies being carried out, so long as these take into account the potential scale of locational error in the grade model.

Georeference Online Ltd makes the following recommendations:

- TVI should complete the mapping of the extent of depletion of the Balabag resource by illegal mining and apply this depletion to realise an “un-qualified” indicated resource for the property;
- TVI should complete its current re-interpretation of drill sections, which is focused on recognising the continuity, or lack thereof, of geological elements between sections, and including a boundary between oxidised, partially oxidised, and sulphide mineralisation;
- If there are significant differences between the resulting interpretations and those used as input to the current resource evaluation, the resource evaluation exercise should be repeated;
- TVI should compare the metallurgical (recovery and grinding characteristics) of oxide and sulphide ores, and, if these prove to be materially different, build these fields into the orebody model for separate tabulation of oxide and sulphide ores.

2 INTRODUCTION

Georeference Online Ltd. was retained by Yulo Perez, Chief Operating Officer of TVI Resource Development Phils. Inc. (TVIRD), to prepare an independent Technical Report, according to the NI 43-101 standard, on the Balabag Project in Zamboanga, southern Philippines.

This Technical Report conforms to that standard.

TVIRD is a subsidiary of a public Canadian-based exploration company, TVI Pacific Inc. (TVI), which is focused on the production, development, exploration and acquisition of resource projects in the Philippines. TVIRD produces copper and zinc concentrates from its Canatuan mine, is in pre-development at the Balabag gold and silver project (THE subject of this report), and is carrying out exploration programs on its other North Zamboanga tenements.

This Technical Report was requested as a contribution towards the pre-development program currently ongoing at the Balabag Project site.

The author spent four and a half days in Manila reviewing property documents and data with company staff in late March 2012. Copies of relevant documents and data files were made for later more detailed study and manipulation in Vancouver.

The author visited the Balabag property itself on March 29, 2012, where he was able to talk to project staff, review project facilities, and witness ongoing geological work, including drilling and drill-section re-interpretation.

3 RELIANCE ON OTHER EXPERTS

This report has been prepared by Georeference Online Ltd. (GOL) for TVIRD. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to GOL at the time of preparation of this report;
- Assumptions, conditions, and qualifications as set forth in this report, and
- Data, reports, and other information supplied by TVIRD and other third party sources.

GOL has relied on ownership information provided by TVIRD. GOL has not researched property title or mineral rights for the Balabag property and expresses no opinion as to the ownership status of the property.

Except for the purposes legislated under provincial securities laws in Canada, any use of this report by any third party is at that party's sole risk.

4 PROPERTY DESCRIPTION AND LOCATION

The tenement covering the Balabag property has a total area of 4,779 hectares. The tenement comprises a Mineral Production Sharing Agreement (MPSA) originally in the name of Zamboanga Minerals Corporation (ZMC) registered as Title No. 086-97-IX. The MPSA is located within the Municipalities of Bayog, Zamboanga Del Sur and Zamboanga Sibugay Province, Island of Mindanao, Philippines (Figure 1).

The MPSA was granted on November 20, 1997 and subsequently registered with the Mines and Geology Bureau (MGB) on May 6, 1998. The MPSA has a term of twenty five years and may be renewed for another term not exceeding twenty five years. The boundaries of the contract area have not been legally surveyed. The MGB will only issue an "Order to Survey" should ZMC submit to the MGB a mining project feasibility study. The property has, and is being, affected environmentally by the activities of illegal small-scale miners in the Balabag area at Tinago, Unao-Unao, Miswi and Lalab. The miners are extracting gold from the surface and underground workings. The illegal rod and ball mills use mercury in the amalgamation process, and the CIP operators recover gold using cyanide. Neither of these two processes would appear to be being used in an environmentally responsible manner by the illegal miners.

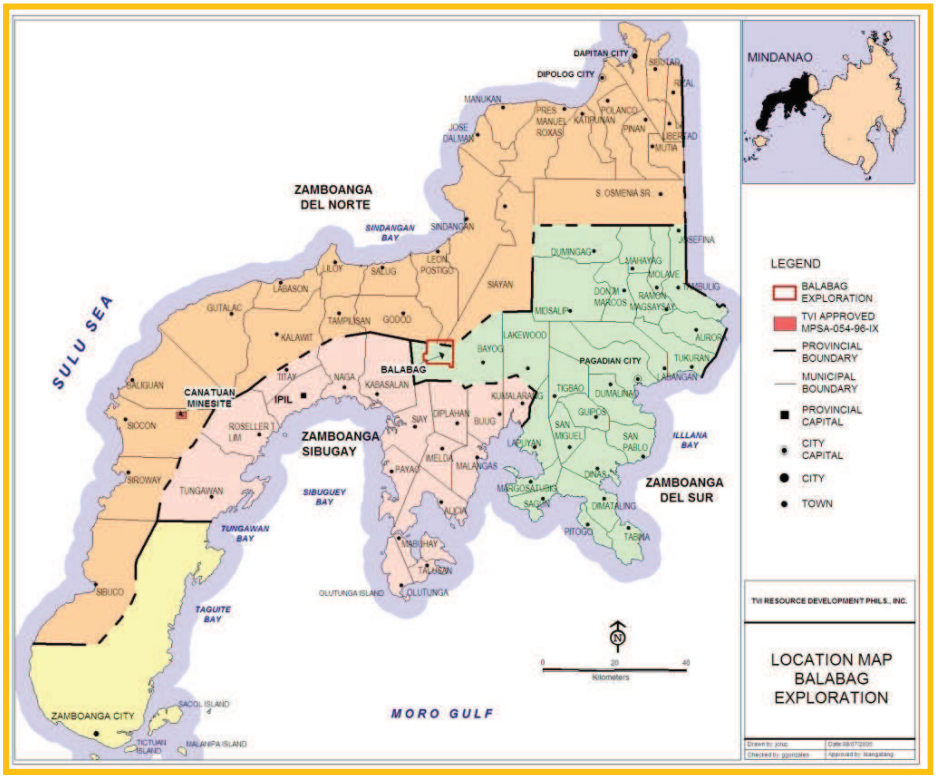

Figure 1: Balabag Project location map.

The MPSA of Zamboanga Minerals Corporation was assigned to TVIRD pursuant to a Deed of Assignment executed by and between ZMC and TVIRD on July 6, 2009 with addendum to the Deed of Assignment on

August 27, 2009. The assignment in favor of TVIRD was approved by the Department of Environment and Natural Resources on September 28, 2009.

5 ACCESS, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOLOGY

Balabag is accessible from Manila by air. Two airlines maintain regular scheduled 1 hr and 20 minute flights from Manila to Zamboanga City. From Zamboanga City, access to the property is by a 5-hour drive, first via the all-weather Zamboanga – Dipolog national highway, then on a sealed road from Imelda town to the Barangay of Guinoman in the Municipality of Diplahan. A new road, not yet open to the public, has recently been constructed by TVIRD which reduces the driving time between Zamboanga City and Balabag significantly.

The topography in this region is moderately rolling to semi-rugged.

The central section of the Zamboanga Peninsula falls within the Type IV weather classification under the Climate Map of the Philippines. It is relatively dry from January to May and wet throughout the rest of the year. Mean annual average precipitation is 2,239.5 mm.

6 HISTORY

6.1 Exploration

The property was initially under an option agreement[1] with Rio Tinto Exploration Philippines Corporation (RTEPC) from October 15, 1996 to January 14, 1998. RTEPC conducted detailed geological mapping and rock sampling, geochemical stream sediment and grid-soil sampling, and an IP-Resistivity survey. In November 1997, RTEPC reported:

- High grade epithermal gold mineralisation in the Tinago small-scale mining area measuring 20 meters by 130 meters averaging 20.32 g/t Au and 464.04 g/t Ag based on 145 rock samples collected.
- A broad geochemical gold soil anomaly of greater than 0.1 ppm Au.
- The presence of drainage geochemical anomalies of 100 to 360 ppm copper coupled with 10 ppm molybdenum in Legumbong, in the south-western part of the area, being suggestive of possible porphyry copper mineralisation.
- Rock geochemical anomalies in the San Pedro, north-central section of the area, reflecting copper skarn mineralisation believed to be related to an andesite porphyry. Rock chips and grab samples from the Upper Dipili copper skarn gave assay results ranging from 1.72% to 9.49 % Cu, 148 to 242 ppm Ag, 1,000 to 15,910 ppm Pb and 11,000 to 88,400 ppm Zn.

[1] Information summarised from Flint (2005) and Lafleur (2007).

Templar Gold N.L., a Perth, Australia based company signed an Option Agreement with ZMC for a six year option term beginning 18th February 1999. During this Option Agreement, Goldminco Corporation (listed in Canada) provided all the funding for Templar Resources Phil. Inc. operations in the Philippines. On November 25, 2004, the Option Agreement with ZMC was terminated by Templar Resources Phil. Inc. On April 25, 2005 ZMC entered into an agreement with TVI Resource Development Phils., Inc. (TVIRD).

Templar Resources is inferred to have had access to RTEPC's results, and to have therefore progressed directly to drilling once they moved onto the property. Their program was modest, and access to sites is known to have been affected by the presence of the illegal small-scale miners. Five shallow relatively narrow-diameter (NTW and BTW) holes totalling 593.6m comprised a scattered test of three of the four prospects within the Balabag project area. The first two holes missed the gold veins. Hole 3 was sited at Miswi and from 79m returned 14m @ 5.2 g/t Au, 85 g/t Ag (including 3m @ 16.6 g/t Au, 311 g/t Ag). Holes 4 and 5 were drilled at Tinago. Hole 4 intersected a small-scale miners' stope but hole 5 from 2m intersected 9m @ 5.4 g/t Au, 122 g/t Ag (including 2m @ 19.7 g/t Au, 450 g/t Ag.).

The first resource estimate[2] for the Balabag Project together with a NI 43-101 compliant technical report was produced in 2007 by an independent consultant, P.J. Lafleur GeoConseil Inc. The initial resource study was based on the 69 drillhole program undertaken by TVIRD from 2005 to early 2007.

According to Lafleur's report, the indicated resource at a cut-off grade of 0.5 g/t Au was 1.4M tonnes at 2.87 g/t Au and 84.3 g/t Ag. In addition, an inferred resource of 2.4M tonnes at 2.11 g/t Au and 45.7 g/t Ag was declared and recommended for further drilling.

As the drilling at Balabag progressed, TVIRD conducted further in-house resource re-evaluations to provide updated estimates of the project's economic potential.

In October 2010, TVIRD completed an in-house resource estimate with the assistance of GeoSystems International, Inc.

In this process, the 2007 resource model was re-evaluated with the inclusion of drilling data gathered from 2007 to 2010. 67 new drill holes were added to the initial 69 holes that were used in the first estimate, and the five holes drilled by Templar Gold N.L. were also incorporated. The orebody model was based on interpreted outlines of zones with gold grades >0.1 g/t Au.

The 2010 model, which was prepared without reference to reporting standards, served as the basis for an initial project scoping study completed in early 2011.

TVIRD conducted another in-house resource in August 2011, this time based on 199 holes which included data acquired prior to the cut-off date June 30, 2011.

This August 2011 revision involved modeling of two geological domains for the mineralized zones—the "true" veins (DOMAIN1) and the quartz stockworks (DOMAIN2). True veins are more predictable in

[2] Information summarised from Guillermo et al (2012).

terms of continuity and have higher Au and Ag grades, while quartz stockworks are generally more erratic in thickness and much lower in grade. Separate envelopes were created to constrain the grades according to geological domain, thus, preventing the invalid extrapolation of high metal grades into incorrect locations during interpolation.

The August 2011 resource model yielded a DOMAIN1 estimate of 1.69 million MT at 2.48 g/t Au and 75.5 g/t Ag, assuming a cut-off grade of 0.40 g/t Au. Similar to the previous TVIRD model, the 2011 model was prepared without reference to NI 43-101 or JORC standards.

The three resource evaluations described above were all provided to the author prior to his evaluation described in this report. Subsequent to the author's providing his preliminary resource estimation to TVI, the results of a resource evaluation undertaken by Geostat Systems International Inc., also in 2011, were provided to the author (Digdigan, 2012d). This evaluation was reportedly undertaken using multiple indicator kriging to estimate Au and Ag grades, and an undisclosed method to interpolate densities into the deposit model. The results of this evaluation are presented in Table 1 below.

ROCKGROUP	GRADEGROUP	Volume	Density	Tonnage	AU_GT	AG_GT
		M**3	T per M**3	T	Grade	Grade
DOM1	0.0 - 0.1	13,563	2.27	30,729.926	0.053	6.2
	0.1 - 0.2	14,326	2.31	33,090.937	0.162	10.3
	0.2 - 0.3	27,028	2.35	63,459.155	0.251	9.5
	0.3- 0.4	31,122	2.39	74,345.833	0.353	10.7
	0.4 - 0.5	23,195	2.32	53,863.899	0.448	12.8
	0.5 - 1.0	114,303	2.31	264,301.355	0.758	20.5
	1.0 - 2.0	208,982	2.31	482,451.159	1.430	51.1
	>2.0 gt Au	297,914	2.36	702,569.190	4.027	118.7
	Total	730,432	2.33	1,704,811.456	2.225	68.1
DOM2	0.0 - 0.1	364,369	2.39	871,684.989	0.070	4.2
	0.1 - 0.2	686,758	2.36	1,624,132.329	0.146	5.5
	0.2 - 0.3	286,171	2.36	675,418.510	0.243	7.0
	0.3- 0.4	98,264	2.36	231,795.737	0.338	8.7
	0.4 - 0.5	26,163	2.36	61,790.712	0.438	9.4
	0.5 - 1.0	6,475	2.30	14,863.598	0.563	9.9
	1.0 - 2.0	0	0.00	0.000	0.000	0.0
	>2.0 gt Au	0	0.00	0.000	0.000	0.0
	Total	1,468,200	2.37	3,479,685.874	0.166	5.8
Total		2,198,632	2.36	5,184,497.330	0.843	26.3

Table 1: 2011 Balabag resource estimate by GSI using multiple indicator kriging.

The table below provides a summary of the four resource models generated by or for TVIRD from 2007 to 2011. For ease of comparison, the resources reported in Section 14 below have also been included in this tabulation (Table 2).

	TONs	AU (G/T)	CONT. AU (OZ)	AG (G/T)	CONT. AG (OZ)
Lafleur 2007 Indicated	1,685,925	2.38	129,341	70.3	3,810,507
Lafleur Inferred	2,455,422	2.11	165,901	45.7	3,605,301
Lafleur 2007 Total	**4,141,347**	**2.22**	**295,576**	**55.7**	**7,418,000**
TVI 2010 Tinago	3,022,500	1.29	125,296	39.3	3,815,062
TVI 2010 Miswi/Lalab	495,937	1.41	22,412	45.9	731,906
TVI 2010 Total	**3,518,437**	**1.31**	**147,839**	**40.2**	**4,546,979**
TVI 2011 DOMAIN1	**1,752,927**	**2.40**	**135,259**	**73.4**	**4,136,670**
TVI 2011 DOMAIN2	3,668,557	0.15	17,692	5.4	636,913
TVI 2011 Total	**5,421,484**	**0.88**	**152,951**	**27.4**	**4,773,583**
GSI 2011 DOMAIN1	**1,704,811**	**2.225**	**121,954**	**68.1**	**3,732,625**
GSI 2011 DOMAIN2	3,668,558	0.152	17,928	5.3	625,118
GSI 2011 Total	**5,373,369**	**0.81**	**139,882**	**25.2**	**4,357,743**
This Study DOMAIN1	**1,784,555**	**2.34**	**134,262**	**72.3**	**4,148,196**

Table 2: Historical and this report's resource estimates at Balabag.

6.2 Mining History

The Balabag deposit has been subject to illegal artisanal mining at least since 1998 (Flint, 2005).

As a result of this mining, an area near the center of the Tinago part of the deposit called Warik-Warik has collapsed, and has been excluded from the mineralisation modelling described in Section 7.4 below.

Significant underground mining has also taken place to the west of Warik-Warik, as shown in Figure 2 below, and as discussed in detail in Angeles (2011b). Of concern is the fact that an undetermined extent of mining has taken place in areas where past boreholes contributing to the Balabag borehole DOMAIN1 database were drilled.

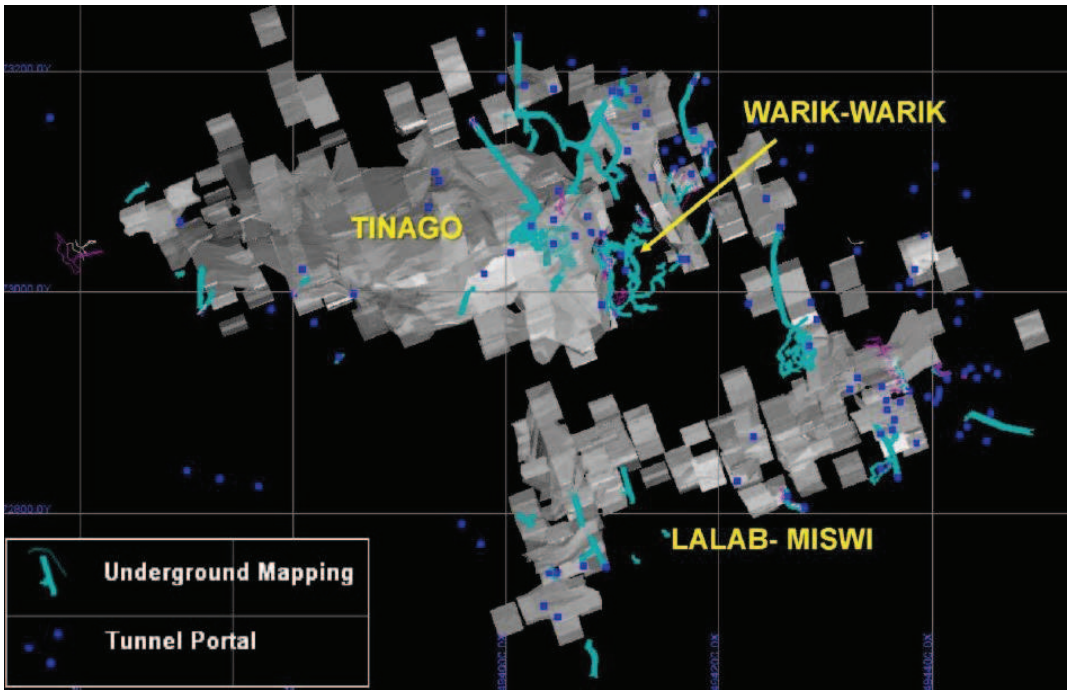

Figure 2: Screenshot showing the relationship between DOMAIN1 wireframe extents, the Warik-Warik area, and underground mining tunnels mapped to the end of September 2011.

Angeles (2011b) reports:

> "Kate did a conservative estimate of the possible depletion of in-house resource to account for the underground workings. A tonnage of about 158,000 at 2.15g/t Au and 134g/t Ag was estimated for [*removal from*] Domain1 (veins of at least 20cm thickness)."
>
> "In September 2011, geological mapping of the artisanal underground workings has been completed as far as could be done (Figure 2). About half of the available undergound workings or more has probably been completed."
>
> "However, it is most probable that the draping [*done as part of the depletion estimation*] is not completely accurate and the underground workings are actually smack into the high grade CVT[3]."
>
> "So if the underground workings are right on the high grade CTV at sections 75W to 50E, then most of the high-grade portion of the deposit may no longer be there."

It is the author's opinion that this situation requires an extraordinary qualification of the resources which can and have been estimated from the current Balabag drilling database. This qualification is provided in Sections 14.4 and 14.5 below.

[3] Central Tinago Vein.

7 GEOLOGICAL SETTING AND MINERALISATION

7.1 Geological Setting

7.1.1 Regional Geology

The Philippines regional geology is dominated by Tertiary and younger plutono-volcanic sequences that are superimposed on both continental and oceanic crust. The regional geology of the Zamboanga Peninsula is less well understood than other parts of the country, and its mineralization potential remains to be quantified as the area continues to be under-explored.

The peninsula is bounded to the west by the Eurasian Plate being subducted southeastward into the Sulu Trench, and on the east by the Philippine Sea Plate being subducted westward into the Philippine Trench. This complexity is further added to by the NE-subducting Cotabato trench that is expressed on-land as a collision zone along the Cotabato-Sindangan Fault, which is believed to connect northwestward to the Negros Trench. This tectonic setting has produced three distinct rock-stratigraphic assemblages, namely: (a) SW- Zamboanga Zone, (b) Cotabato-Sindangan Collision Zone and (c) NE - Zamboanga Zone . These are commented on in the following.

The SW – Zamboanga Zone consists of a generally NE-trending and relatively older suite of rock-stratigraphic units. These include the pre-Tertiary basement complex consisting of Triassic Schists and other metamorphics, Jurassic Granites, Cretaceous Ultramafics and Ophiolitic Rocks, and Paleocene to Eocene Sediments. Oligocene to Miocene sediments and volcanics unconformably overlie the basement complex. Miocene intrusives and hypabyssal rocks intrude the pre-existing rocks. The youngest sequences comprise Quaternary volcanics and finally a young cover of Quaternary sediments, alluvium and terrace gravel.

The Cotabato-Sindangan Collision Zone is characterized mostly by NW-trending braided or anastomosing sinistral faults and similarly-trending lithostratigraphic units. Rock suites comprise Cretaceous ultramafics and ophiolitic rocks, Paleocene-Eocene sediments and Oligocene to Miocene volcanics and sediments. Miocene intrusives and hypabyssal rocks, Quaternary igneous sequences (both intrusive and extrusive), and alluvium comprise the youngest sequences.

The NE-Zamboanga Zone is mostly covered with the Quaternary Malindang Volcanics and related lahar and alluvial deposits.

7.1.2 Local Geology

The Balabag deposit lies in the SW-Zamboanga Zone described above. The oldest rock unit mapped in the project area is an intrusive, mainly diorite porphyry inferred as Pre-Oligocene (Antonio, 1951). This is overlain by late Oligocene to Middle Miocene sediments. The sediments are generally steeply dipping and unconformably overlain by volcanic rocks. A younger intrusive suite of andesite to dacite porphyries intruded the volcanics, sediments and older diorite.

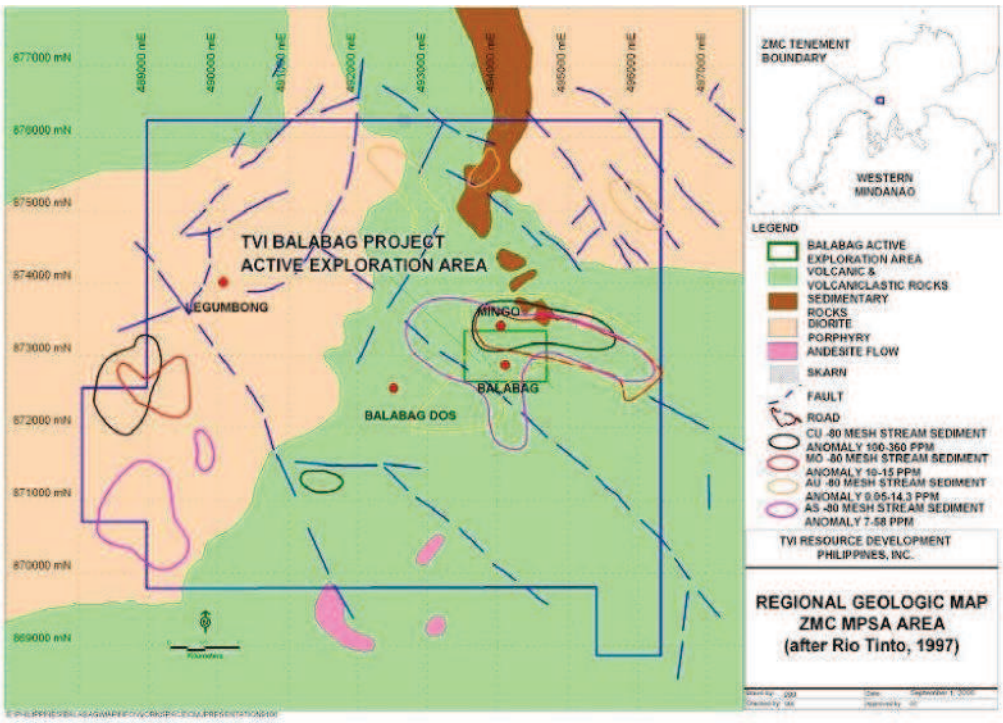

Figure 3: Geological map of the Balabag Project area.

7.2 Mineralisation

The gold-silver mineralization in the Balabag prospect is a low-sulphidation epithermal vein system. The area is characterized by quartz veining and silica replacement in andesitic to dacitic volcanics and fine-grained laminated tuffs. The “true” veins variably exhibit multiphase brecciation, crustiform banding and fine saccharoidal texture (Figures 4 and 6). Occasional stringers and quartz vein stockworks (Figure 6) occur in association with the true veins, oftentimes on the hanging wall side. The stringer and stockwork vein widths ranges from <1cm to 20 cm and have vein densities of 1 to >5 veins per meter. Hydrothermal alteration comprises silicification that grades outward to argillic and propylitic alteration.

Exploration work, which includes mapping, outcrop sampling and diamond drilling, suggests two major vein systems at Balabag, being Tinago, and Miswi-Lalab to the south. The geometry of the veins and the associated stockworks range from sub-horizontal to 60 degrees dip in contrast to the prevalent sub-vertical nature of most Philippines epithermal veins. The “true” vein systems appear to locally consist of several closely-spaced individual veins that vary in total width from less than 1 m to more than 10 m.

The main mineralized zone at Balabag is situated in the Tinago area where a relatively more continuous quartz vein system along strike has been interpreted based on the available drill data of generally 25m spacing.

Figure 4: Quartz vein breccias with undeveloped to developed colloform/ crustiform banding

The thickest mineralized zone exposed at surface is located at the Tinago illegal mining area and is locally called "Warik-Warik" (Figure 5). Outcropping veins are generally banded and crustiform with dark sulphidic bands. The banded portions are about 3 m to 10 m thick and bordered by massive silica-illite/ sericite zones.

Figure 5: Exposed veins at Warik-Warik.

Other outcropping gold mineralized veins are apparent in the Miswi-Lalab area, located on the southern slope of the Balabag Hill, south of Tinago. The vein system in this area is characterized by oxidized sugary quartz veins with vuggy and comb textures. Breccia texture is also common in this zone.

Gold and silver are the only elements of economic interest which have been identified to date within the Balabag project. Gold occurs mainly as high-Ag electrum with minor amounts of native gold. It occurs as fine and coarse-grained particles. Fine-grained Au is mainly locked in non-opaque minerals, and to a lesser extent, pyrite. In some cases, large grain-size and euhedral forms of pyrite contain high concentrations of gold. Silver occurs mainly as acanthite and as native silver.

7.2.1 Mineralized Units

The following ore types have been proposed for the Balabag deposit:

- "True" veins (DOMAIN1) – these better-mineralized veins have more predictable continuity and higher grade. The banded quartz veins are generally higher in Au grade in association with very fine-grained black sulphides seen as streaks and patches. Three types of "true" veins have been observed, and defined, to the extent that they occur on their own or together, as "DOMAIN1" mineralisation:
    - Banded, high Au, quartz veins with banded black sulphides
    - Massive translucent to milky quartz veins
    - Quartz vein breccia with angular andesitic clasts
- Quartz stockworks (DOMAIN2) – this type is generally erratic in thickness and low in grade. It occurs by itself or in close spatial association with the true veins. Zones of this kind of mineralisation have been defined as "DOMAIN2" mineralisation.

Figure 6 below presents photographs of the four different kinds of veins described above.

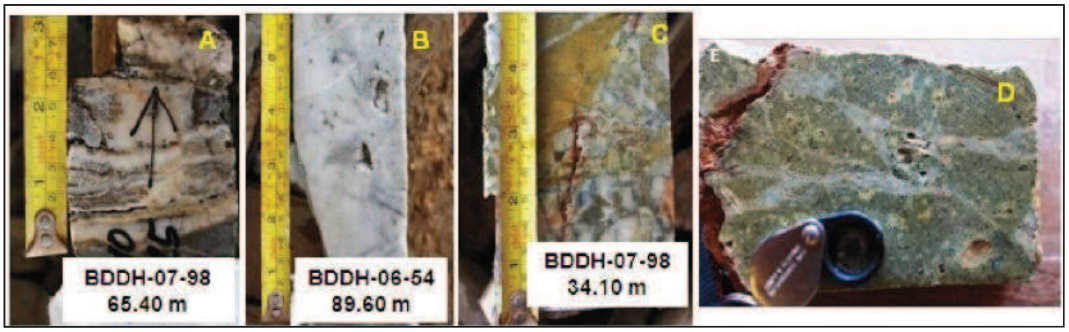

Figure 6: Mineralized units: (A) Banded quartz vein (B) Milky quartz (C) Quartz vein breccia (D) Quartz stockworks in propylitized andesite

7.2.2 Waste Units

The following are defined as waste units given that they generally lack any form of significant mineralization:

- Andesite
- Andesite porphyry
- Dacite

- Volcanic breccia
- Phreatic breccia
- Hydrothermal breccia
- Tuffaceous sandstone

7.3 Structure

Structurally, there are indications that the Balabag system is confined within a series of NW and NE trending normal faults that are down-thrown from north to south, with southernmost block being thrown deepest. These faults are sub-parallel to the vein propagation direction (120 deg) and are interpreted as normal arc faults; tensional in character as reactions to the growth of the volcanic arc pile. The veins themselves appear as growth faults from older arc-parallel fault structures (20 deg). These fault structures can be traced for tens of kilometers in satellite imagery.

Along the dip direction, the Tinago and Miswi-Lalab vein systems appear as discontinuous faulted blocks. There is an inferred "stepping down" effect from north to south which would explain the relationship between the Tinago and Miswi-Lalab as well as the apparent abrupt termination of veins in the lower Tinago area. It is suspected that the possible occurrence of quartz veins at a relatively higher position in the stratigraphy further north has been eroded. Conversely, it is assumed that the "step down" block system continues southward from Lalab vein and proceeds deep into the Miswi Creek area. Several parallel joints which are trending NW-SE and dip steeply to the SW can be also observed.

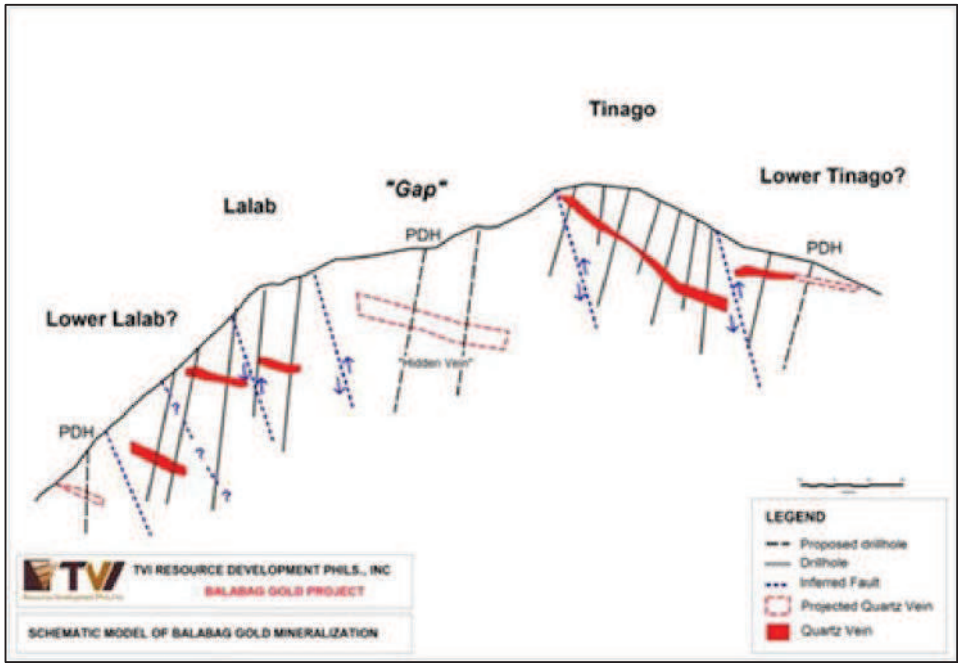

Figure 7: Conceptual cross section of the Balabag Vein System looking west

Relative to Miswi, the Tinago vein is more continuous and consistent. Although not yet conclusive, it is supposed that a number of major structures are cutting the Miswi-Lalab zone that may explain the erratic location of veins as initially interpreted from the available drill data. The gap which separates the down-thrown Miswi-Lalab blocks and the main Tinago vein is yet to be tested through diamond drilling.

Mapping has not yet been conducted in sufficient detail to confirm the continuity of the veins at the surface in the area of Miswi-Lalab. Knowledge of vein configurations in this area largely reflects observations from the openings made by small scale miners in the area. Neither the Tinago nor Miswi veins have been closed off along strike.

7.4 Mineralisation Modelling

"DOMAIN1" mineralisation margins have been identified by TVIRD and digitised on all geological sections, and then connected between sections to form wireframes enclosing the volumes constituting this DOMAIN1 mineralisation.

The same has been done for "DOMAIN2" mineralisation, and wireframes have also been digitised around these zones.

Drilling information and interpreted geological sections at 25m intervals from which these two domains have been derived are presented in highly reduced form in Appendix C to illustrate to the reader the host rock, structural, and alteration complexity of the Balabag deposit.

The polygons enclosing areas of DOMAIN1 mineralisation on each geological section are presented at a similar scale in Appendix F, in-filled with blocks created by the resource modelling system during the August 2011 resource evaluation. These blocks, together with the borehole traces, have been coloured by gold grade.

The correct identification of the boundaries to different domains of mineralisation is a very important first step in resource modelling. While marked "discontinuities" are still observable between the 25m-spaced sections currently[4] available for Balabag, the continuities recognised are considered adequate to support the resource evaluation method and results reported in Section 14 of this Report

8 DEPOSIT TYPES

The complex geology of the Zamboanga Peninsula is host to several styles of mineralization. This ranges from volcanogenic massive sulphides as characterized by TVIRD's Canatuan operation, to epithermal gold mineralization as demonstrated by Philex Gold's Sibutad property that has now been mined-out. Porphyry copper mineralization is exposed at several properties, but these targets have not yet been evaluated.

[4] At the time of the author's visit, TVIRD had prioritised re-interpretation of the geological sections and surface geological map for input into a revised resource model (Angeles (2012)).

The MPSA held by TVIRD is definitely host to two styles of mineralization which may be related. Currently the principal target is at Balabag, and comprises vein-hosted epithermal gold mineralization. Approximately three kilometers north of Balabag, there occurs skarn-type base metal sulfide mineralization related to intrusive activity. There is also considered to be porphyry-style mineralisation potential on the property.

The Zamboanga epithermal gold prospects are believed to have been emplaced during the waning stages of the Miocene and to have continued until the Pliocene. It is believed that the gold mineralization is coeval with the intrusion of hypabyssal rocks consisting of andesite and dacite porphyries.

9 EXPLORATION

The results of historic exploration on the Balabag property are partly reported above (Section 6: History). The Warik-Warik area notably was rock-sampled in detail by RTEPC. Their results indicated high grade epithermal gold mineralisation to be within a north-south trending zone in the Tinago small-scale mining area measuring 20 meters by 130 meters (open to the south). The zone averaged 20 g/t Au and 464 g/t Ag based on 145 1.5m channel samples collected.

TVIRD's first phase of exploration focused on confirming the presence of gold and silver, and quantifying respective values.

Detailed geological mapping was conducted in the southeast of Balabag Hill (Genaro Creek and Minda Creek), and in the west of Balabag Hill (Depore River upstream from the ZMC Settlements) with a total length of 1.441 kilometres traverse lines. On the southeast of Balabag Hill, a major north-trending fault is exposed along Minda Creek. These could represent the northern extension of the silicified-zone/Quartz veining that was previously sampled along the main Genaro creek on the trail leading to Balabag. On the west of Balabag Hill, the previously identified major fault along the Depore River still extends northward. Structures still follow the general NW-SE-trends.

10 DRILLING

Drilling in Balabag was initiated in 2000 when Templar Gold N.L. drilled five shallow holes totalling 593 meters to test three targets within the area (see Section 6 above).

TVIRD commenced a drilling campaign in November 2005 to evaluate the mineralization potential of the Balabag Prospect. By the end of June 2011, a total of 199 exploration drill holes were completed, totalling 23,690 meters. The drill holes are generally dipping -60 degrees at 160 degrees azimuth.

The encouraging results obtained during the early part of the program were used as basis to increase the initial 2006 drilling plan to 60 more drill holes totalling approximately 7,000 m. Drill spacing was at an approximate 50m-spacing in order to delineate the main zones of mineralization.

In 2007, an infill drilling program was designed to increase the sampling density to 25-m-spacing. However, in the second-quarter of 2007, drilling was suspended and an independent consultant was engaged to generate the first resource estimate for Balabag and to prepare a NI 43-101 compliant technical report.

Exploration work focused on detailed mapping and trench sampling during 2008 to 2009.

Infill drilling was resumed by TVIRD in February 2010 to better define the Tinago orebody and to update the initial resource estimate. A total of 54 holes with overall meterage of 7,595 were drilled in 2010.

Further resource drilling continued in 2011 to delineate the extension of the veins in the lower Tinago area and to increase the sampling density in the Miswi-Lalab zone. By June 2011, 44 additional holes with total meterage of 5,120 had been drilled, and these were all used in the August 2011 resource evaluation exercise.

Five sterilization drillholes totalling 529m were also completed in 2011 in the proposed locations of future mine facilities. These drillholes are not included in the resource modeling process.

Balabag resource drilling history is summarised in Table 3 below.

Year	No. of DDH	Meterage
2005	2	131
2006	57	6,823
2007	42	4,021
2010	54	7,595
2011 (to June 30)	44	5,120
Total	199	23.690

Table 3: Resource drilling at Balabag.

Three holes drilled in 2011 were specifically twinned with three holes from earlier drilling campaigns to evaluate the possible effect of core loss in the earlier campaigns (Digdigan, 2011). No significant conclusions regarding positive or negative bias in historical intervals of poor core recovery could be derived from the results of this drilling.

11 SAMPLE PREPARATION, ANALYSIS AND SECURITY

Sample preparation and borehole logging and handling protocols at Balabag are described in detail in Appendix A. The author visited the Balabag project in March, 2012, and was able to observe all the documented protocols in operation, together with significant evidence that these protocols had been adhered to since 2010. Lafleur (2007), reports satisfaction with these aspects to resource evaluation at Balabag in the previous drilling periods.

Analytical protocols, quality control procedures and evaluations at Balabag are described in Appendix B. As is evident in Appendix B, sub-optimal performance by the laboratory responsible for analysing

Balabag samples has, at times, been noted as a result of ongoing QC procedures, with correctional action being taken by the laboratory.

It should be noted that the owner of the Balabag Project is also the owner of the Canatuan Mines assay laboratory used for the majority of assays in the project database. The author visited the Canatuan Mine assay laboratory on un-related business early in 2011 and conducted a quality control test on ten samples which were re-analysed in a Vancouver laboratory. The author was satisfied with the outcome of this small test, and is satisfied that the Balabag Project assay database is of adequate quality for the resource evaluation discussed in this report.

12 DATA VERIFICATION

Verification of data serving as critical input for this report was limited to confirmation, by the author, of the existence, in good order, of:

a) The Balabag drill core remaining after cutting for assay;
b) Photographs of all drill core before cutting;
c) The associated assay results in their paper and digital form and associated drill logs in their digital form (of which there are more than one version);
d) Somewhat limited documentation of quality control carried out on borehole sample assays;
e) Interpreted geological sections drawn onto downhole borehole log and assay plots, which were reviewed in detail with project staff both in Manila and at Balabag,

More thorough data verification was not included in the scope of this report.

The author is satisfied that all the above currently exist in a form readily available for inspection, either in the company's office in Manila, or at its Balabag site office in Zamboanga, and that they are of a quality that supports the accurate estimation of project mineral resources using the methods described in this report.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Mineralogy

A study on the bulk mineralogy and gold deportment was conducted on five Balabag head samples. The results are summarized below:

- Bulk mineralogy are mainly composed of non-opaque minerals (>95%), with minor amounts of sulphides, mainly pyrite, except for one head sample which is mainly composed of non-opaque minerals (>95%) with minor amounts of iron oxide (mainly goethite) and trace amount of sulphate (jarosite).
- The concentration of gold in the five samples ranges from 2.0 g/t to 3.76g/t.

- Gold minerals identified in the five samples include (in order of decreasing abundance) electrum, kustelite, native gold and utenbogaardtite, with high-Ag electrum being the most important gold mineral.
- In addition to electrum and kustelite, silver minerals include acanthite, native silver, mckinstryite, jalpaite, stephanite, pyrargyrite and polybasite.
- In terms of the grain size, gold minerals are fine to coarse with a size range from less than 1 micron to 297 micron.
- At current grinding fineness (80% passing 150 um), gold minerals mainly occur as liberated particles in the sink fraction, and can be recovered with or without flotation or gravity. In the float fraction, gold occurs as locked particles in and attached particles to non-opaque minerals. Attached gold can be recovered by direct cyanidation. To recover the locked gold (mainly in coarse non-opaque minerals), finer grinding would be required.
- Gold minerals are closely associated with silver minerals, particularly acanthite.
- Only trace amounts of As- and Sb-bearing minerals (arsenopyrite, pyrargirite, stephanite, and polybasite) were observed. No other minerals detrimental to processing were identified.
- Sulphide mineralogy of the five head samples is characterized by large grain size and euhedral crystal form of pyrite.
- Mineralogically, the oxidized ore in one of the head sample is distinguished by the presence of iron oxide. Only trace amount of pyrite was observed. Visually, oxidized ore is brownish in color while fresh ores look more grayish.

Figure 8 below presents photomicrographs showing the deportment of gold in the Balabag ore samples. In order, the photomicrographs show: (1) Liberated electrum (2) Liberated electrum (Au) and electrum (inside red circle) locked in between Acanthite (Ac) and chalcopyrite (Cp) (3) Electrum attached to and locked in iron oxide (FeOx) (4) Electrum (indicated by red arrows) locked in pyrite (Py) (5) Electrum (inside red circles) attached to and locked in quartz (6) Electrum (inside red circles) attached to and locked in quartz.

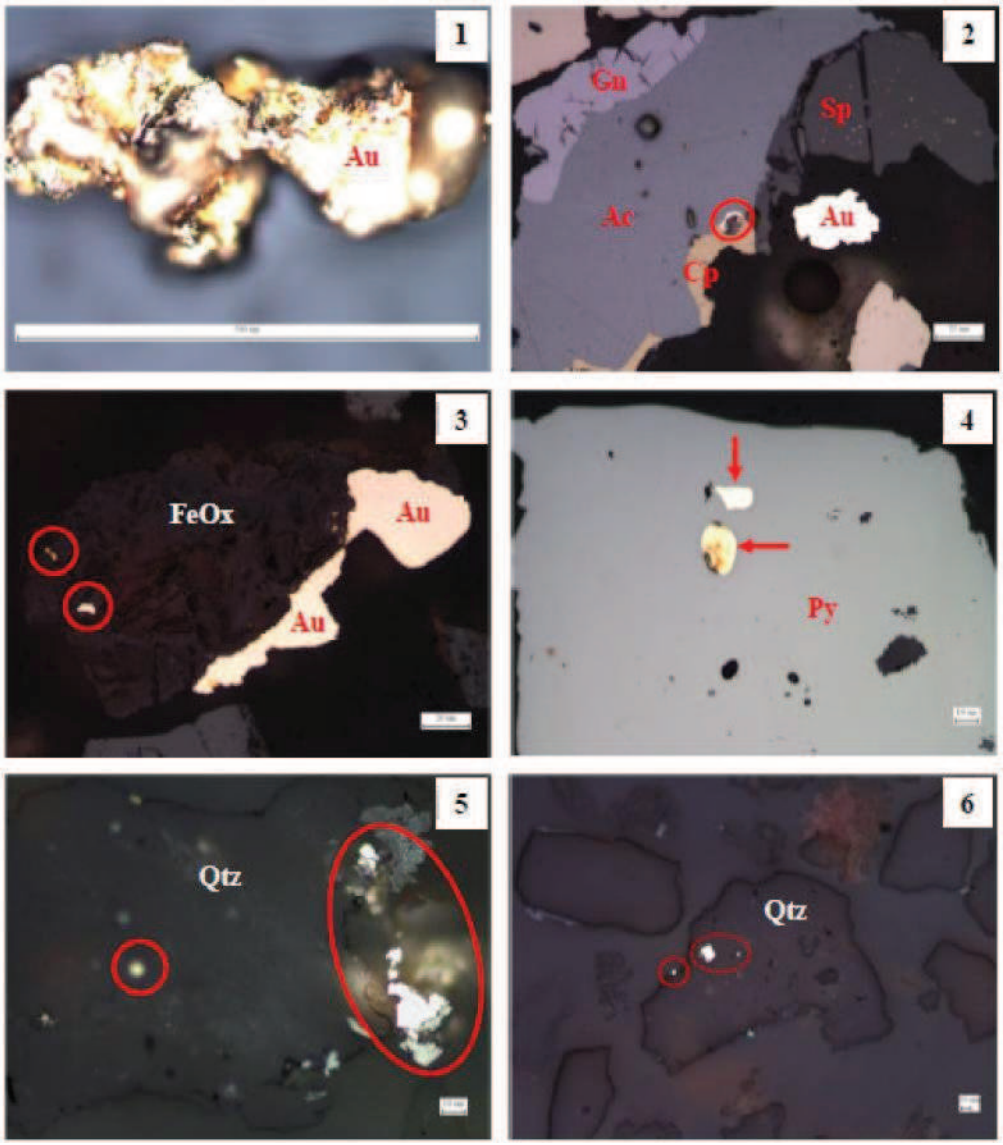

Figure 8: - Photomicrographs showing the deportment of gold in Balabag ore samples.

13.2 Laboratory Testwork

Metallurgical test works[5] conducted at the Canatuan Metallurgical laboratory were formulated first to check the amenability of Balabag ore to the standard cyanidation procedure. From there, further tests were done to improve and determine the most appropriate process to extract the gold and silver from the Balabag ore. The obtained data from these tests would provide the design basis to develop a single processing plant.

[5] This section summarised and revised from Guillermo et al (2012).

As a result of the mineralogical study which noted the locking of gold in coarse-grained non-opaque minerals, all laboratory tests were done at a finer grind of 80% passing 75 microns. These tests included (1) Investigation of the optimum NaCN strength and activated carbon dosage to be applied, (2) Comparison test on straight cyanidation with and without the use of an oxidizing agent, Pb(NO3)2, (3) Sensitivity tests on varying leach and adsorption times, (4) Carbon loading analysis, (5) Exploratory Au – Ag flotation test procedures, and lastly, (6) Evaluation of flotation recoveries at varying head grades and flotation times.

Based on these tests, the following conclusions were obtained.

- A pre-treatment process utilizing a flotation procedure, consisting of a rougher and 2-stage cleaner, is a requisite step in the recovery of gold and silver from the Balabag ore. The flotation concentrate should be leached, while the precious metals (Au and Ag) in the pregnant solution should be recovered, either, by direct powder electrowinning with automatic washing, or by Merrill-Crowe zinc dust precipitation.

Based on a report by SGS Lakefield (Williams 2011), a significant amount of metal can be recovered by gravity concentration that gave an overall recovery of 30-35% Au and 4-5% Ag.

In summary, the following recoveries have been reported as expected for Balabag ore when treated by gravity concentration followed by cyanidation (Williams, 2011):

- 95% – 97% for gold
- 67% – 85% for silver

No distinction has been made with respect to whether these recoveries are specific to oxidised or sulphide zones of the deposit, although both oxidised and sulphide zones are known to exist in the deposit, and work is currently underway to delimit their exact boundaries. Examples of the two ore-types are presented in Figures 9 and 10 below.

Figure 9: Sulphide ore[6] from borehole BLDH-10-101 interval 28.00 to 29.00m

Figure 10: Oxide ore[7] from borehole BDDH-06-40 interval 44.25 to 45.50 (fragments).

[6] ***Quartz Vein Breccia*** composed of angular grey altered wall rock fragments several centimetres in size, all of which are mantled by fine-grained white sulfide-poor quartz ~1 cm thick, firmly cemented by sulfide-rich matrix (pale grey quartz, dark grey to black sulfides) with local centimetre-sized vughs into which clear quartz crystals seem to terminate. ***(0.490g/t Au at 29.00m)***

[7] **Massive Quartz Vein** with moderate proportions of gray to black bands probably sulfidic (?) in composition. Vughs are filled with quartz drusses, and clayey materials. Shows moderate to strong oxidation. ***(104.555 g/T Au at 44.80 to 45.00m)***

14 MINERAL RESOURCES ESTIMATES

14.1 Geological Block Model

Construction of the geological block model focused almost exclusively on modelling mineralisation, and this is described in Sections 7.2 and 7.4 above (Mineralisation and Mineralisation Modelling respectively).

TVI has also created a model of the overburden, but, as this is considered to host negligible mineralisation, it has not been included in this evaluation.

14.2 Density Model

Angeles (2011a) presents the following tabulation of density determinations carried out on samples from different geological domains recognised at Balabag (Table 4):

Geological Domain	No. of Density Determinations	Average Density
DOMAIN1	195	2.46
DOMAIN2	234	2.50
WASTE	363	2.66

Table 4: Average densities of geological domains at Balabag.

On this basis, a density of 2.40 was used for TVIRD's August 2011 resource estimation, and the same value has been used for the estimation presented in this report, the author being satisfied that this is a sufficiently accurately-determined value for global resource evaluation. It is recognised that the density (and hardness and viscosity-influencing characteristics) of ore-grade material will vary locally, primarily as a function of weathering and alteration.

14.3 Grade Model

14.3.1 Compositing

For purposes of their August 2011 resource evaluation, all samples were composited by TVIRD to 1 meter within each domain into a file named DDH_AU_DOMALL before their statistical analysis, geostatistical analysis and interpolation of grades. After evaluation with TVIRD's resource geologist of the derivation of this file, it was considered satisfactory to also use this file as input to the statistical and geostatistical reviews of this study, as well as to the grade interpolation exercise reported in this study.

14.3.2 Statistics

Histograms and scatterplots for both gold and silver were examined for both DOMAIN1 and DOMAIN2 geological domains of the deposit. These histograms are presented in Figures 11 to 16 below.

It is clear that both gold and silver histograms are strongly log-normal in their distributions in both DOMAIN1 and DOMAIN2.

The scatter plots show a very poor correlation between gold and silver.

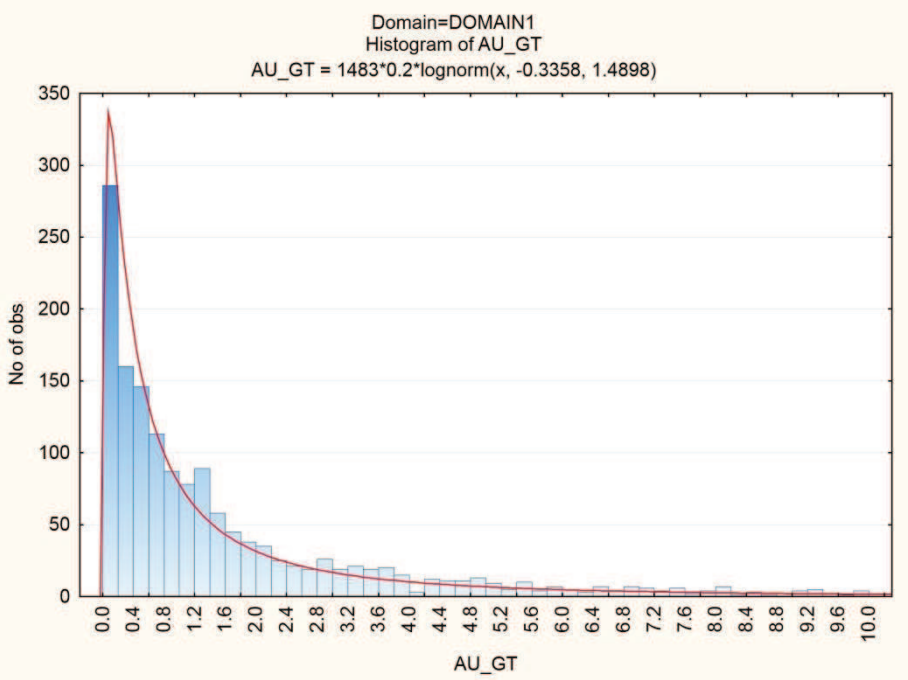

Figure 11: Histogram of gold levels in DOMAIN1.

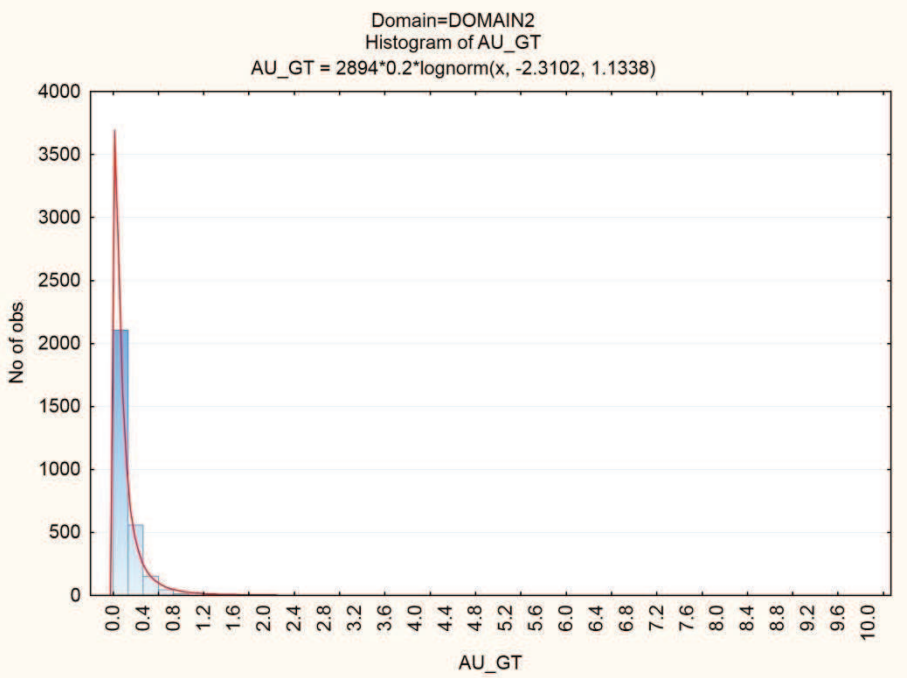

Figure 12: Histogram of gold levels in DOMAIN2.

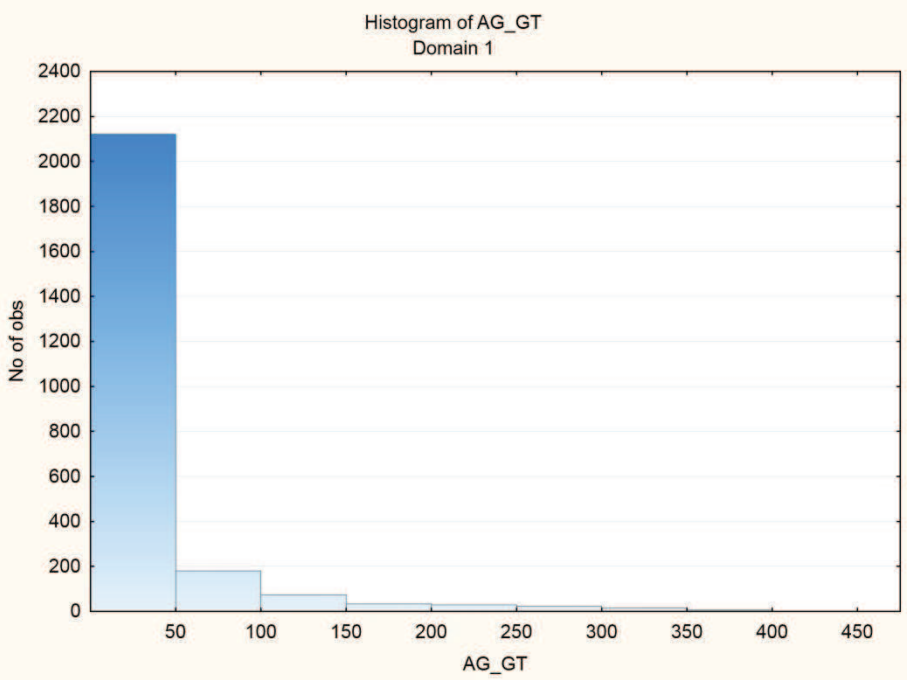

Figure 13: Histogram of silver levels in DOMAIN1.

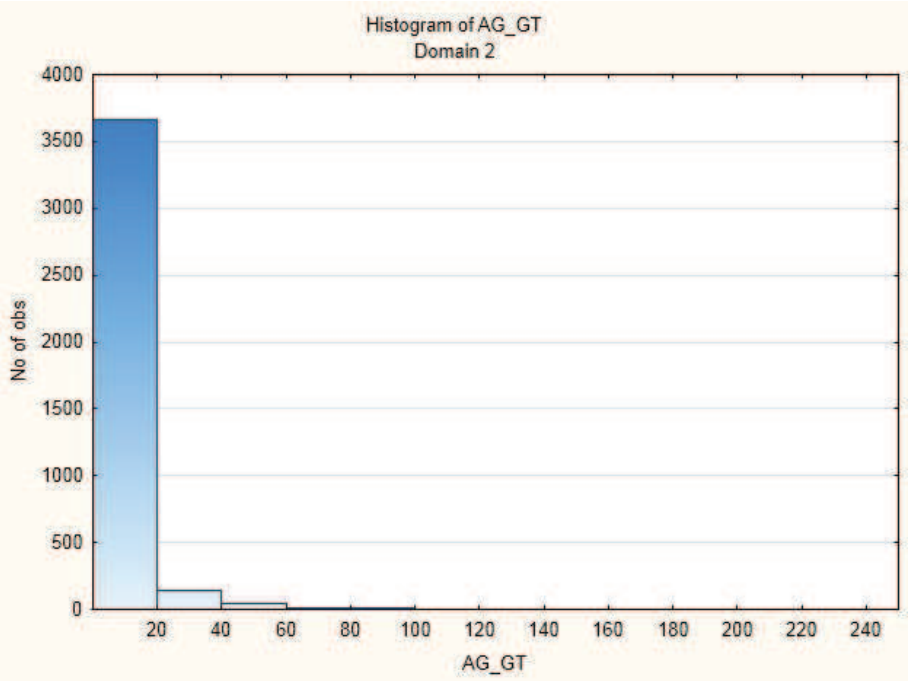

Figure 14: Histogram of silver levels in DOMAIN2.

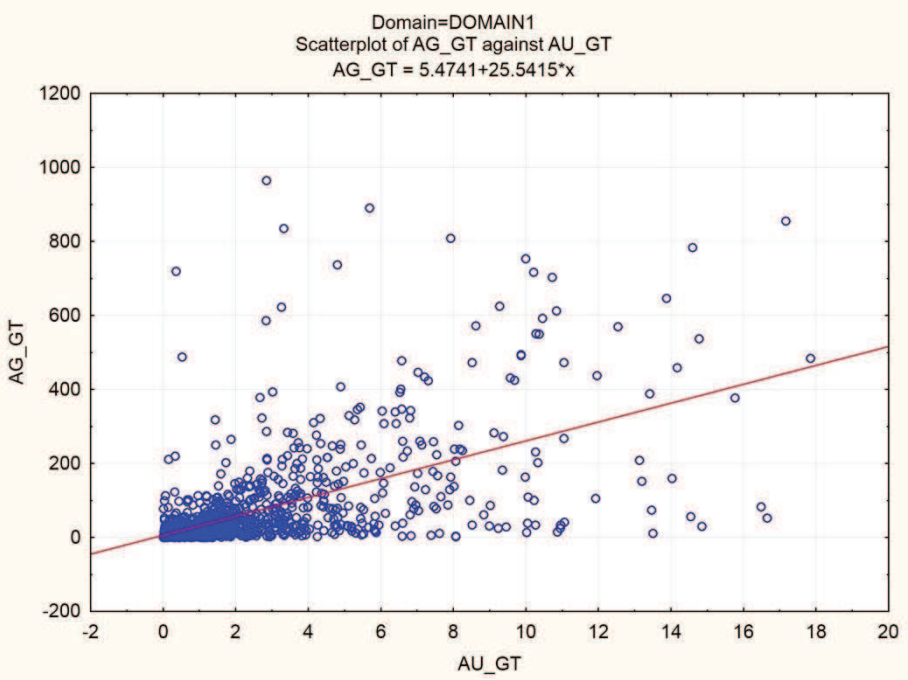

Figure 15: Scatter plots for gold against silver in DOMAIN1.

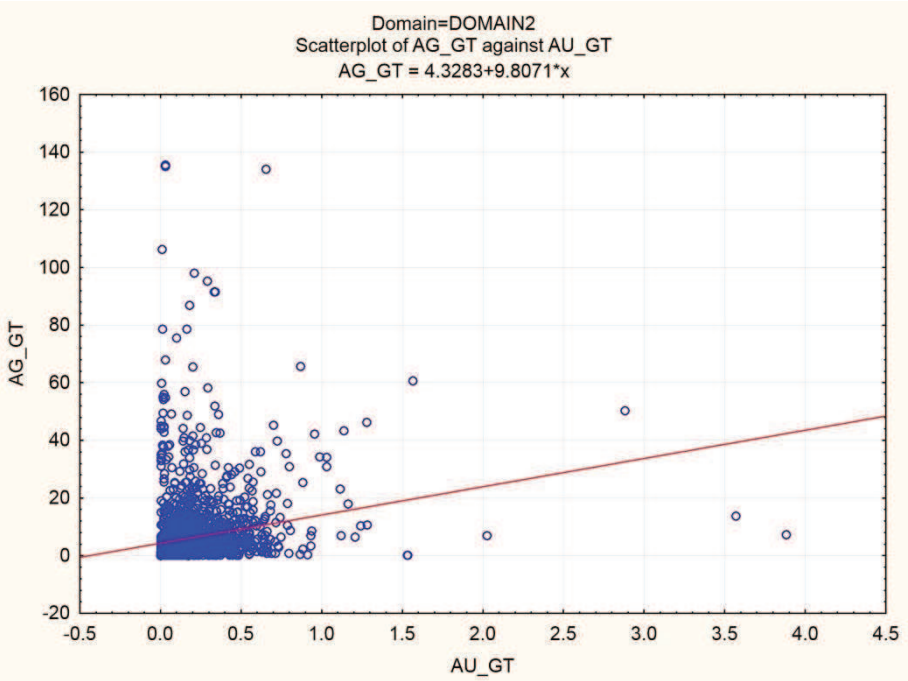

Figure 16: Scatter plot for gold against silver in DOMAIN2.

14.3.3 Spatial Statistics

The author reviewed the results of the most recent Balabag variographic studies (Digdigan, 2012), and found the variograms derived for both Domain 1 and Domain 2 unsuitable for use in kriging. This was

not surprising, given the non-normal distribution of gold and silver values in both these domains (Figures 9 to 12). The variograms of Digdigan (2012) are reproduced in Appendix D for comparison with those produced during this study, and described below.

In view of the problematic variograms reported by Digdigan (2012), the gold assay results for Domain 1 were re-analysed using the VISOR Module of the Snowden Supervisor 8 system (Appendix E). Although, by using log-transformed gold values, more viable variograms were identified for both the Horizontal and Dip planes, after extensive analysis it was not possible to identify viable variograms in the Across Strike plane, and hence this approach was taken no further[8].

Time did not allow re-analysis of DOMAIN2 variograms, although the author's view is that useable variograms will be even more difficult to generate than is the case for DOMAIN1.

14.3.4 Interpolation

Without access to viable variograms for interpolation by kriging, the interpolation method for gold and silver considered most appropriate to Balabag was the "inverse distance squared method".

As stated above, the sample distributions for all elements are strongly positively skewed. This can result in overestimation of interpolated block grades unless some measures are taken to moderate the skewness. A common method for dealing with this issue is the application of top cuts to the samples. A top cut of 15g/t Au (affecting 29 out of 1562 composites) was applied to gold values and 500g/t (affecting 40 out of 1562 composites) to silver values for the estimations reported below.

14.3.4.1 Domain 1- Au

Six different "inverse distance weighting" Au grade model scenarios were evaluated for Domain 1 during the course of this study.

All scenarios used as sample input the DDH_AU_DOMALL (TAG='DOMAIN1'; AU_CUT>-1.0) borehole composites data set (Section 14.3.1). All scenarios used the Datamine "GRADE" procedure.

Gold grades were interpolated into all blocks satisfying search ellipse and "minimum-number-of-sample" thresholds, with sub-celling enabled to half the cell-size in each dimension. These blocks were then overlaid with the DOMAIN1_FINAL.dxf Domain 1 wireframes (Section 14.2) in order to remove any blocks and sub-cells falling outside the wireframes.

The macro used to carry out these actions is presented, for Scenario 2, in Table 5 below.

[8] The reasons for non-identification of a viable Across Strike variogram are thought to lie with the geometry of the available sample positions for variogram derivation, as it is controlled by the stacked nature of discrete clusters of Domain 1 samples separated by significant distances of non-Domain 1 material (and therefore no sample points qualifying for variogram derivation). Computer-modelled unfolding of Domain 1 veins, as well as bringing them into the same plane, before submitting the data to variogram analysis, holds the greatest promise for producing viable variograms. However, it is not clear whether the cost of such work is justified, as it is not clear that the resources resulting from such work will be very much more accurate than the output from the ID2 method.

```
# Scenario 2
# Interpolate Data; Create Model
!GRADE    &PROTO(bal_prot),&IN(dom1_samples),&MODEL(S2_mod0),
        *X(XPT),*Y(YPT),*Z(ZPT),*VALUE(AU_CUT),*NUMSAM(NUMSAM),
        *VARIANCE(VAR),*LENGTH(LENGTH),@SDIST1=50.0,@SDIST2=50.0,
        @SDIST3=10.0,@SANGLE1=340.0,@SAXIS1=3.0,@SANGLE2=40.0,
        @SAXIS2=1.0,@SANGLE3=0.0,@SAXIS3=2.0,@MINNUM=3.0,
        @MAXNUM=20.0,@MINOCT=0.0,@MINPEROC=1.0,@MAXPEROC=0.0,
        @IMETHOD=2.0,@POWER=2.0,@NSTRUCT=1.0,@NUGGET=0.0,
        @ST1VAR=1.0,@ST1RANG1=100.0,@ST1RANG2=100.0,@ST1RANG3=100.0,
        @ST2VAR=1.0,@ST2RANG1=100.0,@ST2RANG2=100.0,@ST2RANG3=100.0,
        @PARENT=0.0,@XPOINTS=3.0,@YPOINTS=3.0,@ZPOINTS=3.0,
        @XSUBCELL=1.0,@YSUBCELL=1.0,@ZSUBCELL=1.0

#Add in sub-cell model from wireframes
!ADDMOD   &IN1(S2_mod0),&IN2(temp_mod0),&OUT(S2_mod1),@TOLERNCE=0.001

# Remove null values, Filter on Zone 1 (Zone 1 = Mineralized material or material within wireframes)
!EXTRA    &IN(S2_mod1),&OUT(S2_mod2),@APPROX=0.0
IF (AU_CUT==ABSENT()) delete() END
IF(ZONE!=1) DELETE() END
GO

# Check for null values in Au_Cut field
!STATS    &IN(S2_mod2),&OUT(S2_mod2_stats),*F1(AU_CUT),*KEY1(ZONE)

# Run Reserves
!TONGRAD  &IN(S2_mod2),&OUT(S2_mod2_res),&CSVOUT(S2_mod_res),
        *F1(AU_CUT),*KEY1(ZONE),@FACTOR=1.0,@DENSITY=2.4,
        @COGSTEP=0.25
```

Table 5: Datamine macro used to generate Scenario 2 in the evaluation of Domain 1 gold resources.

The input parameters for the six scenarios examined are listed in Table 6 below.

Scenario	SDIST1	SDIST2	SDIST3	SANGLE1	SANGLE2	SANGLE3	MINNUM	MAXNUM	POWER
1	**30**	**30**	10	240	40	0	3	20	2
2	*50*	*50*	*10*	*240*	*40*	*0*	*3*	*20*	*2*
3	50	50	**5**	240	40	0	3	20	2
4	50	50	10	240	**50**	0	3	20	2
5	50	50	10	240	**30**	0	3	20	2
6	50	50	10	240	40	0	3	20	**1**

Table 6: Inverse Distance Weighting parameters used for interpolation of gold grades in Domain 1.

Total gold resources (cutoff of 0.00g/t Au) for each of the six scenarios examined are listed in Table 7 below. Also included in Table 7 are the total gold resources for the BAL2011AUGOK_DOM1 model as represented in TVI's Gemcom model, and the total gold resources in the same model as it was imported

into Datamine (and converted to a "sub-cell" model from the "block-proportion" modelling paradigm used in the Gemcom model).

				VARIANCE TO BASE CASE			
	TONNES	AU GRADE (G/T)	CONT. AU (OZ)	TONNES	AU GRADE (G/T)	CONT. AU (OZ)	Comment
Base Case BAL2011AUGOK_DOM1 in Gemcom	1,752,927	2.40	135,259	n/a	n/a	n/a	
BAL2011AUGOK_DOM1 in Datamine	1,777,688	2.31	132,288	1%	-4%	-2%	
BAL2011AUGID2_DOM1 in Gemcom	1,752,927	2.33	131,275	0%	-3%	-3%	
Scenario 1	1,757,728	2.36	133,375	0%	-2%	-1%	SDIST1 & SDIST2 = 30
Scenario 2 (preferred)	1,784,555	2.34	134,262	2%	-2%	-1%	Ellipse-dip 40 deg
Scenario 3	1,767,105	2.32	131,598	1%	-3%	-3%	SDIST3 = 5
Scenario 4	1,782,533	2.35	134,539	2%	-2%	-1%	Ellipse-dip 50 deg
Scenario 5	1,784,425	2.36	135,227	2%	-2%	0%	Ellipse-dip 30 deg
Scenario 6	1,784,555	2.35	135,105	2%	-2%	0%	Inverse distance power 1

Table 7: Total gold resources in Domain 1 calculated by various different software system, interpolation methods and interpolation method parameters.

The small differences in total tonnes, gold grade and contained gold between the Gemcom model base case above (BAL2011AUGOK_DOM1) and the Datamine import of the same model, converted to sub-cells, were considered acceptable, within the scope of this review[9]. It was therefore concluded that this review's Datamine representation of the Domain 1 volumes of the Gemcom model were accurate.

While the variation between scenarios evaluated is not great, Scenario 2 was preferred on account of its SANGLE2 (dip) parameter (40 degrees) being judged the closest to the average dip of DOMAIN1 veins.

14.3.4.2 Domain 1 – Ag

The variograms used to derive previous in-house resource models have not been formally reported, and were therefore not reviewed during this study. In the light of the conclusion, reported above, to estimate the gold resources within DOMAIN1 at Balabag using inverse distance squared (ID2) calculations, it was decided to use the same method to derive the silver resources for DOMAIN1. The

[9] The -4% difference in gold grade is difficult to explain, given that the only difference in the Datamine model should be the replacement of 5x2.5x2.5m "partial" Gemcom blocks with sub-cell tonnage equivalents of the same, at the same grades as the "partial" blocks. Investigation of this difference was considered outside the scope of this review.

ID2 parameters used for the silver resource estimation were the same as those used for the Scenario 2 gold resource estimation, being those shown in Table 6 above.

The resulting total silver resource for DOMAIN1 is shown in Table 9 below.

				VARIANCE TO BASE CASE			
	TONNES	AG (G/T)	CONT. AG (OZ)	TONNES	AG (G/T)	CONT. AG (OZ)	Comment
Base Case BAL2011AUGOK_DOM1 in Gemcom	1,752,927	73.4	4,136,671	n/a	n/a	n/a	
BAL2011AUGID2_DOM1 in Gemcom	1,752,927	71.1	4,007,048	0%	-3%	-3%	
Estimates based on ID2 Scenario 2 parameters	1,784,555	72.3	4,148,196	2%	-1%	0%	

Table 8: : Total silver resources in DOMAIN1 estimated in this study and compared with TVI's 2011 estimate.

Also included in Table 8 are the total silver resources for the BAL2011AUGOK_DOM1 model as represented in TVI's Gemcom model, and the total silver resources in the same model as it was imported into Datamine (and converted to a "sub-cell" model from the "block-proportion" modelling paradigm used in the Gemcom model).

The small differences in silver grade and contained silver between the Gemcom model base case above (BAL2011AUGOK_DOM1) and the Datamine import of the same model, converted to sub-cells, were considered acceptable, within the scope of this review.

14.3.4.3 Domain 2 – Au and Ag

In March 2012 TVIRD reported the following gold and silver resources in DOMAIN2 independently[10] of DOMAIN1 resources (Digdigan 2012a). Silver ounces were not tabulated.

[10] Earlier in 2012 (Guillermo et al 2012) TVIRD had reported its August 2011 estimated DOMAIN2 resources only in combination with DOMAIN1 resources.

ROCKGROUP	GRADEGROUP	Volume	Density	Tonnage	AU_GT	AG_GT	AU_OZ
DOM2	0.0 - 0.1	393,590	2.50	983,975	0.071	4.2	2,246.7
	0.1 - 0.2	690,837	2.50	1,727,093	0.145	5.6	8,071.0
	0.2 - 0.3	300,846	2.50	752,114	0.240	7.1	5,800.8
	0.3 - 0.4	50,823	2.50	127,058	0.336	8.2	1,372.2
	0.4 - 0.5	19,872	2.50	49,679	0.438	13.6	700.0
	0.5 - 1.0	11,455	2.50	28,638	0.557	10.1	512.7
	1.0 - 2.0	0	0.00	0	0.000	0.0	0.0
	>2.0 gt Au	0	0.00	0	0.000	0.0	0.0
	Total	1,467,423	2.50	3,668,558	0.159	5.7	18,703.3

Table 9: TVIRD 2011 estimated gold resources in DOMAIN2.

As a check on the above estimate, the total gold resource for DOMAIN2 was estimated in Datamine using DOMAIN2 wireframes provided by TVIRD and the same parameters used for Scenario 2 of DOMAIN1 (Table 5). This calculation yielded a total of 3,424,189 tons in DOMAIN2 with an average gold grade of 0.16 g/t Au, numbers in good agreement with those estimated by TVIRD.

Based on the extremely low average grade and low grade variance of this domain, and its very low contained gold[11] above 0.3 grams per ton (~ 2,500 ounces), it was not evaluated further for the purposes of this report, and is considered by the author to provide 3.6 million tons of mineralised waste grading 0.16g/t Au and 5.7g/t Ag. Because it has been sampled by more than 100 boreholes, DOMAIN2, unlike certain low grade, sparsely-drilled, inferred resources, has very little potential to be upgraded by additional drilling.

14.4 Resource Classification

"An 'Indicated Mineral[12] Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed."

It is the author's opinion that the above definition applies to the DOMAIN1 resource – exclusive of artisanal mining considerations - at Balabag for the purposes of open pit mine planning contemplating high resolution grade control only. While drill spacing and the resolution of core sampling is adequate

[11] The GSI resource evaluation results recently made available to the author report the resources of DOMAIN2 to be 3,479,685 tons at 0.17 g/t Au and 5.8 g/t Ag, of which 308,448 tons lie above 0.3g/t Au with an average grade of 0.37g/t Au and 8.95g/t Ag for total contained gold of 3,658 oz gold and 88,240 oz silver.

[12] CIM DEFINITION STANDARDS - For Mineral Resources and Mineral Reserves (November 27,2010).

for the determination of the average grade[13] of DOMAIN1 veins in the deposit, it is not adequate for estimation of the correct grade for each vein, or each zone of larger more continuous veins. Neither is it adequate to establish the exact location of each vein – although it is sufficiently accurate to correctly predict how much vein (DOMAIN1) material will be encountered should a large volume (such as an open pit) be mined from the area drilled and evaluated.

"A 'Measured Mineral[12] Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity. "

It is also possible that the resources at Balabag may not qualify as a Measured Mineral Resource because no systematic distinction has been drawn during metallurgical testwork between the metallurgical behaviour of oxide and sulphide ores – the physico-chemical characteristics of which can vary substantially in the same orebody.

"A Mineral Resource[12] is 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."

In view of its very low grade, as discussed in Section 14 above, DOMAIN2 mineralised material is not considered a mineral resource as it does not occur "in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction." At best, its presence may be incorporated into mining dilution considerations in those parts of the deposit where its existence and grade can be reliably modelled.

[13] The current drill spacing is not considered sufficiently close to accurately predict, the majority of times, the location of high/low grade areas within DOMAIN1 volumes (ie: not close enough to reliably apply cutoffs).

14.5 Resources Report

The figures in Table 10 below reflect the author's best estimate of Measured, Indicated and Inferred gold and silver resources at the Balabag – unadjusted for 24 years of underground mining of this resource by illegal miners - based on information reflecting drilling competed to the end of June, 2011, which information the author believes to be of adequate quality to arrive at these estimates.

	TONs	AU (G/T)	CONT. AU (OZ)	AG (G/T)	CONT. AG (OZ)
Inferred	**0**	**-**	**-**	**-**	**-**
Indicated (prior to illegal mining)	**1,784,555**	**2.34**	**134,262**	**72.3**	**4,148,196**
Measured	**0**	**-**	**-**	**-**	**-**

Table 10: Tabulation of gold and silver resources at Balabag based on drilling to June 2011 and unadjusted for 24 years of underground mining of this resource by illegal miners.

It has not been possible for the author to estimate the extent to which this resource has been depleted by its illegal mining, but estimates of this depletion made to date range from 158,000 tons at 2.15g/t Au and 134g/t Ag to double that amount (Angeles 2011b).

15 MINERAL RESERVES ESTIMATES

In the previous section we have declared our level of confidence as "Indicated" with respect to how much gold and silver can be demonstrated to be present in the Balabag deposit. At the same time, we have expressed reservations as to how well we know the exact location of that gold and silver, and also as to the tonnage of ore containing that gold as a function of cutoff grade.

Both of these uncertainties can materially affect the accuracy of estimation of mineable reserves at Balabag.

In regard to the location of the ore as it affects mine design and scheduling at Balabag, it is helpful to examine in detail the spatial distribution of high- and low-grade gold blocks produced by the grade interpolation method recommended and used in this study, together with the pit limits recommended for the mining of these blocks in the In-House feasibility study published in January, 2012 (Guillermo, 2012).

Figure 18 below shows sections on lines 50E and 25E of the deposit, and Appendix F shows fourteen 25m-spaced sections from East to West in the "Starter Pit" proposed in Guillermo, 2012.

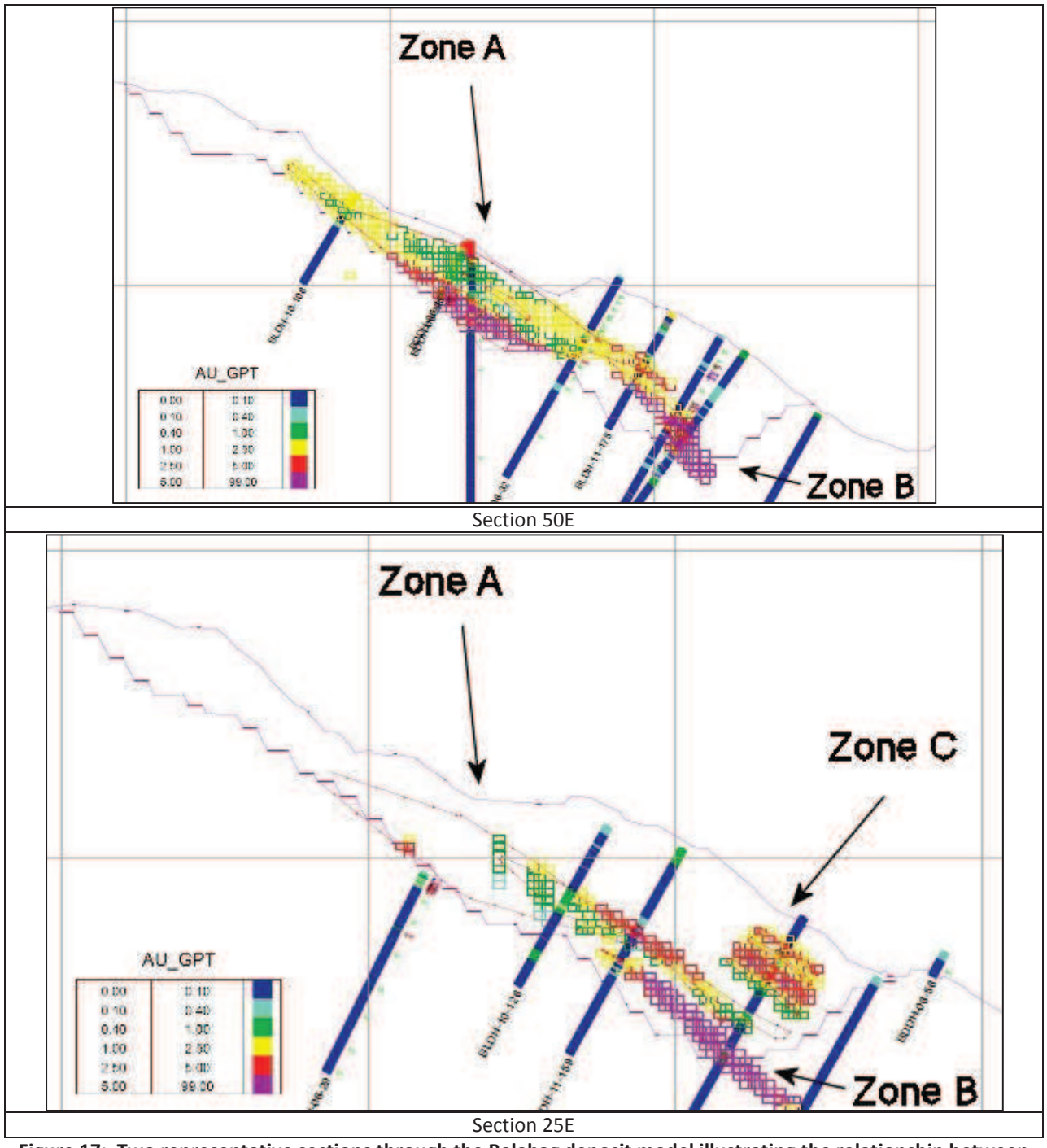

Figure 17: Two representative sections through the Balabag deposit model illustrating the relationship between ore zones and potential pit boundaries.

In Figure 16, it is clear that the pit boundary has been located without allowing for any error in the location of the ore blocks. On mining to these pit limits, one of two scenarios will emerge: either more gold will be encountered than the model portrays, if the model's error was to underestimate the ore present in the area delimited by the designed pit boundary, or less gold will be encountered than portrayed in the model.

Orebody modelling and pit design methodologies need to ensure that the risk of this second outcome is minimal.

The best way to evaluate the potential scale of locational error in ore blocks in a deposit model with the ore block distribution/geometry seen at Balabag is to visually assess the continuity of their boundaries from borehole to borehole.

In this regard the following may currently be observed at Balabag:

(a) Within the Starter Pit volume, Zone A is persistent and continuous for a distance of 275m within the pit from Section 100E to Section 175W, and is sampled by numerous boreholes; it is variable in grade;
(b) Zone B, which may be a continuation of Zone A, is recognised from Section 75E to Section 25E, and is samples by relatively few boreholes; it is high in grade, and appears to have had a significant influence on the design of the pit margin and bottom;
(c) Zone C is recognised on only one borehole shown on Section 25E; it has variable grade, and has no obvious influence on location of the pit boundaries, being entirely contained within the pit outline.

Zone A lends itself to reliable ("measured") calculation of the average grade of the entire zone by weighting all samples according to the proportion of the zone they represent – for example by calculating the average grade of all the blocks within the zone whose grades have been interpolated by the inverse distance squared method. Reliable determination of what proportion of Zone A could be selectively mined above a certain cutoff could be reliably determined only if viable variograms can be determined for the zone.

Zone C could be added to the in-pit indicated resources only if a number of other "pods" of equivalent geological type to Zone C fall within the outline of the pit, and only at the (suitably-calculated) average grade of all those zones. Reliable determination of what proportion of these aggregated zones could be selectively mined above a certain cutoff would be very difficult to estimate because of the difficulty in obtaining variograms for these zones, which, by definition, are seldom sampled by more than one borehole.

Zone B is of a status intermediate between Zones A and C, being more continuous than C, and less so than A. As such, some margin of locational error in Zone B should be allowed for in designing pit limits.

It was considered outside the scope of this assignment to carry out these exercises for the Startup Pit.

16 ADJACENT PROPERTIES

No relevant information.

17 OTHER RELEVANT INFORMATION

The Balabag deposit has, for more than twenty years, been the site of significant illegal mining, with the development of a large settlement on top of the deposit (Figure 19). The occupants of the settlement have recently become strongly opposed to the development of a mine by TVIRD, and TVIRD is currently actively, and with government assistance, seeking a solution to this problem.

Figure 18: Photograph of the Warik-Warik area and part of the informal settlement over the Balabag deposit.

The author has relied upon TVIRD to provide information regarding the existence and extent of any environmental, legal or regulatory liabilities to which the project is subject. Other than the illegal miner situation, the author is not aware of any constraints in this regard at this time that might prevent the mineral resources at Balabag from being exploited should it prove economic to do so.

18 INTERPRETATION AND CONCLUSIONS

Current available information on the Balabag deposit confirms it to be a small, low-sulphidation epithermal gold-silver deposit with mineralisation occurring in veins of variable size, and grade which varies from low to very high, apparently over short distances when sampled with drillcore. As such, it is a difficult deposit to evaluate using geostatistical methods because of the difficulties it presents in allowing the derivation of meaningful variograms.

Fortunately, exploration personnel working on the project have invested significant effort in delimiting the margins of the main mineralised geological unit (DOMAIN1-type veins) based on geological criteria which are independent of gold or silver grade. This allowed the reliable calculation of the average gold

and silver grades of these units using inverse distance squared calculations – although the actual location of the high and low grades will be subject to some error, this error not being so great as to prevent mining feasibility studies being carried out, so long as these take into account the potential scale of locational error in the grade model.

Little attention appears to have been paid to recording the depth of oxidation in the deposit until July, 2011 (Nagrama, 2011), with the result that no distinction has been made between oxide and sulphide resources. At the same time, serious attention has not been paid to the representivity of metallurgical test samples as regards oxide and sulphide ores, or with respect to other possibly metallurgically-relevant characteristics of the resource which may vary as a function of location in the deposit.

In summary, Georeference Online Ltd has reviewed the Mineral Resource estimate for the Balabag Project. The review incorporated the same drilling results and geological interpretations as used by two previous resource estimates.

Georeference Online Ltd draws the following conclusions:

• The recent diamond drilling, logging, sampling, and assaying have been carried out in a manner consistent with industry best practice, although this may not always (before 2010) have been the case.

• The core handling and sample security protocols employed by TVIRD are consistent with industry best practice.

• TVIRD has used its own assay laboratory for most of the Balabag assay database, and implemented only limited QA/QC exercises compared to common industry practice.

• The assay database for the Balabag Project is nevertheless considered appropriate for use in estimation of its mineral resources, and the samples analysed for this database are considered representative of the deposit.

• Based on the results of metallurgical test work completed to date, the expected recoveries from a combined gravity/cyanidation processing plant would be:

- 95% – 97% for gold
- 67% – 85% for silver

although these recoveries need confirmation against variations as a function of possible zonation of the deposit, and as a function of gold grade, silver grade, and possibly gold/silver ratio.

• The wireframe models constructed by TVIRD for Balabag have done a good job of segregating the various zones (domains) within the deposit, enabling a reliable average grade of the mineralised DOMAIN1 veins to be calculated;

• The application of cutoff grades is not appropriate for the Balabag deposit at this stage.

19 RECOMMENDATIONS

Georeference Online Ltd makes the following recommendations:

- TVIRD should complete the mapping of the extent of depletion of the Balabag resource by illegal mining and apply this depletion to realise an “un-qualified” indicated resource for the property;
- TVIRD should complete its current re-interpretation of drill sections, which is focused on recognising the continuity, or lack thereof, of geological elements between sections, and including a boundary between oxidised, partially oxidised, and sulphide mineralisation;
- If there are significant differences between the resulting interpretations and those used as input to the current resource evaluation, the resource evaluation exercise should be repeated;
- TVIRD should compare the metallurgical (recovery and grinding characteristics) of oxide and sulphide ores, and, if these prove to be materially different, build these fields into the orebody model for separate tabulation of oxide and sulphide ores.

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21 CERTIFICATE OF AUTHOR, DATE AND SIGNATURE PAGE

I, Clinton P. Smyth, the author of this report entitled "NI43-101 TECHNICAL REPORT ON THE BALABAG GOLD PROJECT, ZAMBOANGA PROVINCE, PHILIPPINES", prepared for TVI Resource Development Phils. Inc and dated June 23, 2012, do hereby certify that:

1. I am President of Georeference Online Ltd and my office address is Suite 301, 850 West Hastings Street, Vancouver, British Columbia, Canada, V6C 1E1.

2. I am a graduate of the University of Cape Town in 1982 with a Masters of Science degree in Geochemistry and a graduate of Imperial College, London, in 1985 with a Master of Science degree in Computer Science.

3. I am registered as a Professional Geologist with the Association of Professional Engineers and Geoscientists of British Columbia (Lic.# 33259). I have worked as a geologist for a total of 35 years. My relevant experience for the purpose of the Technical Report is:
   - Review and report, as Vice President (Exploration) for the Anglo American Corporation of South Africa, on numerous exploration and mining projects around the world for due diligence and regulatory requirements
   - Head of Anglo American Corporation's New Mining Business Division Resource Evaluation Department from 1990 to 1996, providing expertise in conventional and geostatistical resource estimation for properties throughout Africa
   - Responsible for the resource evaluation and grade control during mining of the Navachab gold deposit in Namibia and for the resource evaluation of the Sadiola gold deposit in Mali

4. I visited the Balabag Project in Zamboanga for one day on the 29th of March, 2012

5. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101, and have had no prior involvement with the Balabag Project.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. To the best of my knowledge and belief, this technical report contains all the scientific and technical information that is required to make the report not misleading.

8. I consent to the filing of this report with any stock exchange or any regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the report.

Dated at Vancouver, BC

June 23, 2012

(Signed & Sealed) "C. P. Smyth"

Clinton P. Smyth, P.Geo

Appendix A Sample Preparation and Borehole Logging and Handling Protocols at Balabag

CORE HANDLING and SAMPLING PREPARATION PROTOCOL

At the Drill Site

Drilling for TVIRD shall always be done using triple tube. At the end of each run, the driller shall mark with a red chinagraph pencil the "notch" made by the core orientation spear at the start top end of the drill. A straight line is also marked with the red chinagraph pencil along the nearest edge of the bottom split tube closest to the notch as core orientation reference. The drill core can only be transferred from the split tubes to the core boxes after the previously described marks had been completed.

Wooden core boxes to hold the drill core are prepared in the following manner:

Each core box are labelled on the side and front end with the **Hole ID** of the drill hole, i.e., **BDDH-YY-XXX** (YY=year; XXX=sequential hole number) and sequential box number as shown in Figure 1. The start end of each core box is marked with a marker pen by the drilling contractor with the word "**START**" written on the upper left hand corner of each core box and an arrow drawn to indicate the direction down hole (Figure 2). The word "**END**" shall also be marked at the diagonally opposite corner with an arrow drawn towards it (Figure 2). For Box 1 the START position is self explanatory but for the succeeding boxes it signifies the continuation of the core from the END of the previous box.

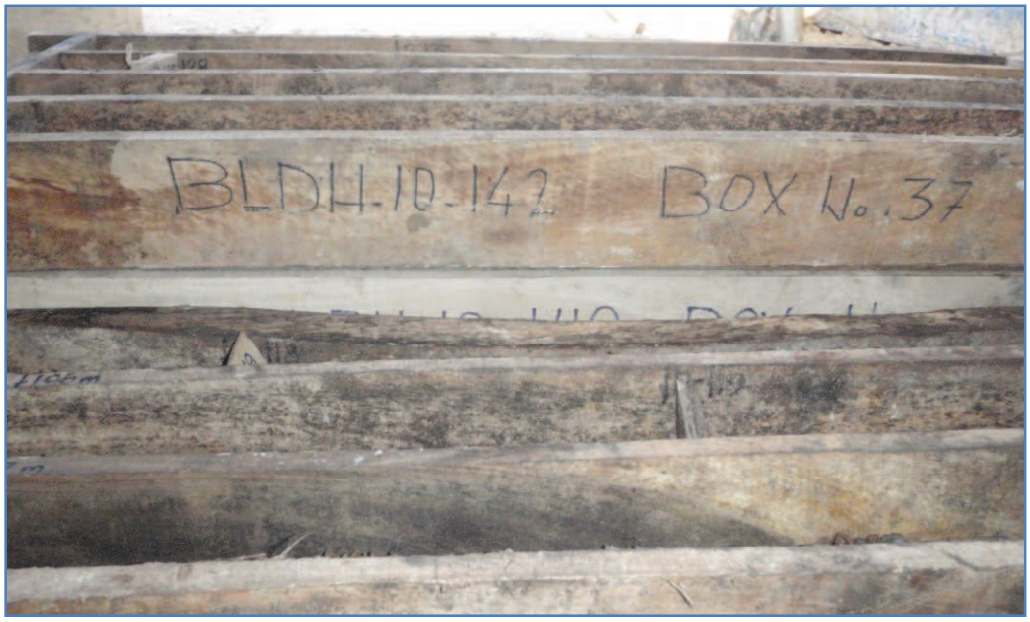


Figure 1. Core box labelled on the side with the whole I.D. of the drill hole and the corresponding box number.

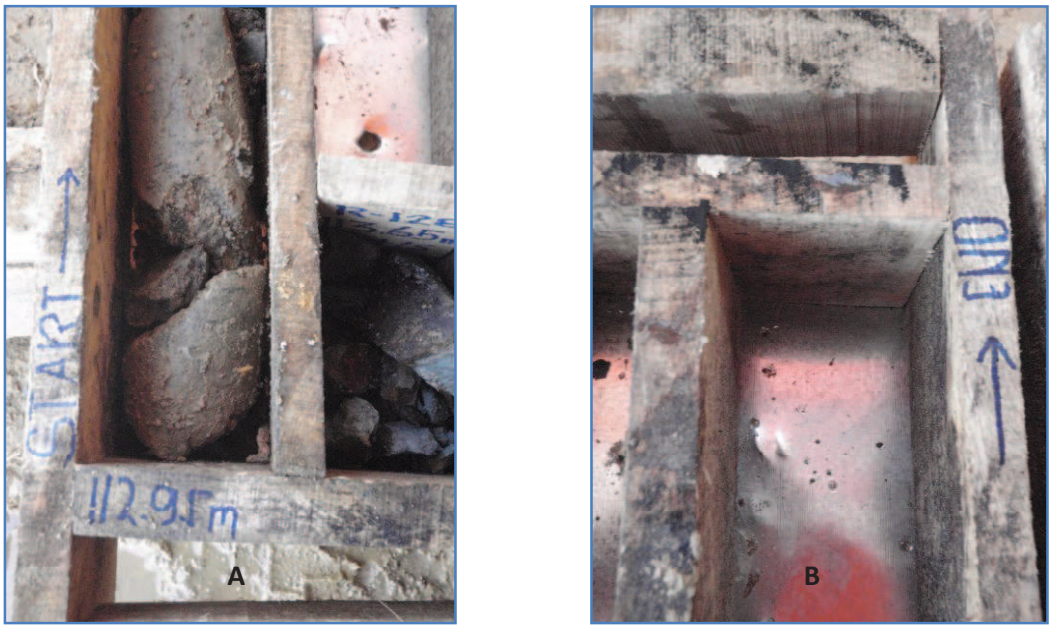


Figure 2. Core box labelled with the word "START" (picture **A**) at the upper left hand corner and the word "END" (picture **B**) on the diagonally opposite corner.

Drill core is retrieved from the split tube and inserted into the core box by the drilling contractor (Figure 3). The core is inserted in the core box in "book fashion" under the supervision of the Driller. Wooden **core blocks** with the run metreage data are inserted at the **down hole end** of the last piece of core taken from the core tube (Figure 4). The core blocks shall be checked accurately against the drill contractors **Daily Drill Report** (DDR). Appendix A shows an example of a DDR. Each filled core box is then covered with lids. Core box and lid are tied together with thick rubber bands, effectively sealing and securing the core for transport to TVIRD's core logging shed (Figure 5). Core can be temporarily stored at the drill site, within view of the driller and the TVIRD's core checker until such time that TVIRD's personnel comes to collect them.

Figure 3. Core checker measuring the length of the core retrieved core (A) and drilling contractor inserting the core into the core box from the core tube (B).

Figure 4. Wooden block with run metereage data inserted at the down hole end of the last portion of the core taken from the core tube.

A **Core Collection Form** (CCF) shown in appendix B shall be filled out and signed by drill contractor's representative (driller or foreman) and TVIRD **Project Geologist** (PG) to formalize the transfer of responsibility for the core. This is part of the drill contract and the Chain of Custody documentation.

Figure 5. Core box filled with cores being covered with lid and sealed together (picture **A**.) Transport of sealed core box by TVIRD personnel to the core house (picture **B**).

Empty core boxes are delivered to the drill site by TVIRD personnel at the same time that core is collected (Figure 6). A **Core Box Delivery** (CBD) form is also filled out and signed accordingly (Appendix C). TVIRD monitors the consumption of core boxes through geologists and the **Project Logistics and Admin Officer** (LAO).

Figure 6. Picture **A** shows empty core boxes about to be delivered to the drill site. While **B** shows properly labelled empty core boxes pilled up at the drill site.

Receipt of Core

Core collection, a task specifically assigned only for some TVIRD personnel should be done as often as practical from the drill rig to the logging shed or core house. TVIRD geologists shall be on hand to supervise the off loading of the core at the logging shed. Core boxes will be placed on specified core logging racks in numerical order (Figure 7). TVIRD logging shed personnel will assist in the off loading.

Figure 6. Off loading of core boxes taken from the drill site to the shed is shown in picture A. In picture B are core boxes taken from current drill holes well pilled up in numerical order.

Removal of Core Box Lids

Core box lids remains on core boxes until their removal is directed by the PG. Only PGs or their designated representatives have the authority to remove core box lids (Figure 7).

Figure 7. PGs designated representative removing the core box lid of a newly delivered core box

Preliminary Summary Logging

The PG shall then verify that metreage of the core blocks are properly inserted and reasonably correct after core box lids are removed (Figure 8). He or she shall then complete a **Daily Summary Log** (DSL) of the core along with DSLs for other current drill holes as well. These DSLs shall be submitted to the **Senior Project Geologist** (SPG) or his designate. The SPG shall then e-mail this information to the **Project Manager** (PM). The summary log should include: **from-to, lithology, alteration and mineralization** (Table 1). The DSL pertinent to each drill hole are filed into the appropriate Drill Hole File.

Figure 8. PG checking the core boxes and their corresponding core blocks at the same time doing a complete daily summary log for the current drill hole.

HOLE_ID	DATE	ADVANCE TODAY (m)	BOTTOM TODAY (m)	COMMENTS
Hole ID **Azimuth** **Inclination** **Rig Type and Number** **Proposed Hole ID** **Target Depth**				**Lithology:** From-To: **Operation:** Drilling Status

Table 1. Daily summary log format.

Geotechnical Logging

After the preliminary examination is completed by the PG, the core is then left with the **Field Technician** (FT) who measures and records a number of geotechnical parameters of the core (Figure 9). In order to ascertain all other characteristics of the core it must first be reassembled.

Figure 9. Field Technician performing a geotechnical logging.

Re-assembling Core

The drill core is re-assembled by physically fitting together as much of the core as possible, run by run.

Core Length

Each core box shall have its START and END metreage determined and labelled accordingly on the side of the core box (Figure 10). While the core is assembled in the core box, **accurate metre marks** are drawn on the core, completely around the core, for reference. This mark shall also be made on the **left side of the core box facing down hole direction**. One should work from known metreage core blocks placed by the drilling contractor at the drill site. These core block positions are also marked on the left

hand side of the core box. If it happens that a core block error is recognized, the PG, SPG and drill supervisor should be notified immediately. Any possible error must then be corrected in consultation with the driller on-duty. If one block is incorrectly labelled, it is expected that all blocks thereafter down the hole are likewise incorrect. All core blocks must be corrected prior to re-commencing core marking.

Figure 10. Core boxes with START and END metreage and accurate metreage marks written on the left side of the core facing down hole direction.

Core Recovery

Core recovery determination is important in resource estimations. Perfect or complete (100%) core recovery is ideal. However it is not always possible as a result of ground conditions or some unforeseen mechanical problems with the equipment. This allows the geologist or engineer to make adjustments for the missing core, determine the reliability of the result and guide decisions regarding re-drilling certain holes.

Core recovery is simply the measurement in metres or centimetres of core measured in the core box divided by the metres or centimetres drilled as recorded on the metreage blocks **[(metres recovered / metres drilled) x 100%]**. The core recovery is recorded in percent. Hence 2.80m of core measured from a reported drilled length of 3.05m would have a core recovery of [(2.80 / 3.05) x 100] equals to 91.8%, rounded and reported as 92%.

Recoveries over 100% are possible, and reflect stick up from the previous run (extra core captured in this run which made the previous run short).

Intervals where there is **no core recovered** shall not be left empty in the core box. Core blocks marking shall be placed at the start and end of the run with no core recovery together with a piece of wood representing the length of the unrecovered core.

The Core Recovery is recorded on the Recovery Core Log Sheet (Appendix D) by hand, and entered into the appropriate column in the drill hole database by the **Data Entry Officer** (DEO).

RQD – Rock Quality Designation

The extent to which rock is broken can be used in mining design and rock stability. The RQD is a measurement used to determine how broken or competent the rock is. It is determined by measuring the sum of all lengths of core greater or equal to 10 cm long, excluding drill contractor induced breaks, and breaks of convenience to place the core in the core box.

Hence the RQD of a 3.05m section of core that contains 2.00m with lengths of pieces greater than 10 cm would be calculated as:

(2.00 m / 3.05 m) x 100% and equal to 65.5%, rounded and reported as 66%.

After the RQD is determined and recorded in the Geotechnical Core Log sheet (Appendix E) the following information is collected by observation and recorded in the appropriate place in the Recovery Core Log sheet.

Core Photography

Digital photographs are taken of the drill core (Figure 11 and 12). A special wood frame apparatus is constructed with the camera attached in such a way to ensure constant focal length and light intensity for all areas of the photographed core. Attached to the wooden apparatus is a white board designating Date, Hole ID, Box Number, from–to (metres), linear metric scale and colour bar to facilitate later colour adjustments if necessary.

The drill core is photographed 4 times:

- Whole core dry,
- Whole core wet,
- Half core wet (after cutting with core saw) with the flat surface to camera,
- Half core dry.

Figure 11. TVIRD personnel taking a photograph of the core.

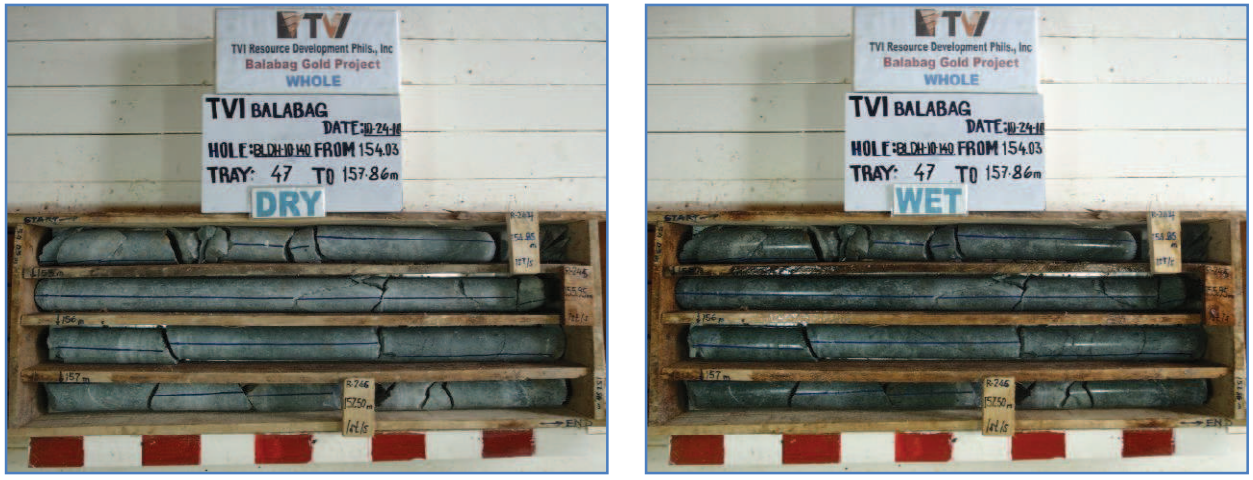


Figure 12. Digital photographs of whole core (dry and wet).

After the drill core is photographed the core is given to the PG for geological logging and sample selection. Photographs are later downloaded into a digital core library data base for reference.

Geological Logging

Structure / Core Orientation

Without systematic core orientation and appropriate quality control there is little point in attempting detailed structural analysis of drill core.

Orientation runs (using spear and crayon) should be undertaken by the driller at least every 6m (Figure 14). In cases of poor quality orientation mark is recorded, another attempt should be made in the next run. This is very critical in ore zones. The quality of the orientation marks should be systematically recorded on structural log sheets.

Figure 14. Spear and crayon used for core orientation (Picture A). PGs doing an orientation run.

Prior to any geological logging, structural measurements shall first be completed to minimize handling of the drill core and preserve structures to be logged and measured. Structures such as bedding planes, mineralization and other planar boundaries, veins, faults, fractures, or any planar entity can be measured and positioned in space from oriented core. To prepare the drill core, the spear orientation marks at the start of the run (notch) shall be extended along the core parallel to the core orientation reference line marked by the driller using a yellow chinagraph pencil or paint pen. This **oriented core line** (OCL) marks the bottom side of the drill hole. Down hole arrows are to be drawn on the OCL at approximately 10cm intervals with at least one arrow mark per piece of core to indicate the top and bottom of the hole.

The core is then to be placed back in the tray with the orientation mark just visible above the right hand side lip of the bottom of the tray (Figure 1.). Intervals of core where no reference line is possible need to

be recorded on the geology log or structural log sheet. If there is minor uncertainty as to whether the orientation is correct, a dashed line is to be used. If no orientation marks are available, then a dotted line is to be used. The entire hole should always be marked up regardless of whether it is to be sampled or not.

If core cannot be orientated, fit the pieces of core together such that you view the core at an angle consistent with the angle of structures present in orientated sections of the core.

The structural measurement apparatus must first be oriented using the drill hole direction and declination (dip) from the horizontal at the collar. The orientation of the apparatus must be modified halfway to the next drill hole survey point if that survey reflects a change in either direction or dip.

Once the apparatus is oriented, a drill core that has a structure to be measured shall be placed on the oriented core apparatus and the core rotated until the OCL coincides and runs parallel to the bottom of the rack holding the core. The core is now oriented in space and all measurements from it using a compass shall be as good as that measured from an outcrop.

This method does away with measuring alpha, beta and gamma angles with respect to the core long axis. Such measurements are not very useful as they correspond to any angle along a double cone because the core being measured is not fixed in space; it is in fact rotating along the core's long axis.

Detailed Geological Logging

Guided by the orientation and metre marks drawn on the core by the FT the PG completes a detailed geological description of the drill core using prepared geological core logging sheets (Appendix F). The geological log includes collar information, intervals, alteration, mineralization, lithology, and structures. The cover page of the drill log also includes down hole survey data in table form.

Detailed geological logging is covered in the TVIRD Geological Logging Protocol document.

The following materials should be available for the logging of drill core:

a. Geologic Drill Log Sheet,
b. Logging Code Sheet,
c. Hand lenses (10x and 20x),
d. Magnet (swing-type),
e. Acid Solution (10%) or enough to make concrete effervesce,
f. Materials to test for hardness such as thick copper wire or coin (softer than quartz but harder than calcite and clay minerals) and steel/nail (harder than quartz),
g. Mineralogy handbook,
h. Grains estimate chart (visual guide to estimate percentages of sulphides, magnetite, etc.)
i. Water bucket or spray bottles (to wet the drill core)

The PG selects and records on the sampling sheet (Appendix G) the core intervals to be sampled during geological core logging. For identified mineralized sections, no sampling interval shall be greater than 1m and less than 0.3m. On the other hand, a sampling interval of no greater than 3m shall be assigned for the unmineralized zone. However, a 6m buffer of 2m sampling interval before and after the identified mineralized zone must be considered. The PG shall also indicate on the sampling sheet where QA/QC samples (certified reference materials or standards, duplicates and blanks) are to be inserted.

Together with the geological log sheet, the sampling sheet shall be an integral part of the particular drill hole file.

Figure 13. PG doing a detailed log of core samples.

Lithology, Alteration and Mineralization

Alteration, mineralization and structure are recorded by the PG in appropriate columns using the core logging sheet (Appendix F). Alteration and mineralization minerals are first recorded in columns, estimated in percent. The style and nature of these are also recorded in sketch form, using various predetermined colours under the graphics columns. Similarly in graphical form structures such as faults, veins and foliations are also recorded.

Bulk Density (S.G.) Measurements

Bulk density (S.G.) measurements are required in order to determine the tonnage of rock volumes, which are required data for resource estimations. Paraffin method is utilized for S.G. measurements Samples are selected every 10m, ensuring that mineralized intersections (these will be epithermal quartz veins in Balabag) are well represented. Long core samples (up to 30cm lengths) make better samples because the bigger the samples the more representative they are of the rocks.

Each sample are placed in an aluminium tray and a S.G. sample card is filled in detailing the Hole ID, core size, from, to, tray number and date. These and following data collected as described in the next paragraphs are tabulated in the **Bulk Density Measurement Sheet** (BDMS) (Appendix H).

Figure 15. Air-cooled/dried S.G. sample tied around with thin thread after it was coated with paraffin wax.

A thin cotton thread is tied around the midpoint of the core sample. The sample is dried and then weighed using an electric digital scale to 0.10g accuracy. It is then totally immersed in liquid paraffin, which has been pre-heated (liquefied) and then cooled to harden the paraffin (Figure 15). Once cooled, the sample is weighed again and this data is recorded in the BDMS.

PVC-pipe, 1m tall 150mm with the bottom 10cm concreted and sealed has a spout fitted at 70cm from the bottom is used for S.G. measurements (Figure 16). The PVC pipe is filled with water up to the level of a spout and the water is drained until there are no more drops dripping from the spout. The paraffin coated sample is totally immersed in the PVC pipe (leaving the untied end of the cotton thread outside the pipe so the sample can be pulled out. The displaced water is collected in a small plastic at the end of the spout and weighed. The plastic bucket is initially weighed empty before being placed under the spout. The weight of the displaced water is calculated from these 2 weights. Once all these data is entered into the BDMS, the S.G. is automatically calculated for each sample using the corresponding mathematical formula.

Figure 16. PVC pipes used for S.G. measurements.

Core Cutting and Sampling

Cutting and sampling of the drill core must be done after logging has been completed. Sampling of the drill core is determined by the PG. Sample intervals are selected during geological core logging, and marked on the wooden core boxes in red marker pen – a red line (Figure 17) where the depth corresponds to a metre interval, otherwise the depth of the from/to of the sample is written on the box. Sample intervals are noted by the PG on the Core Cutting and Sampling Record Sheet, along with QA/QC standards, blanks and duplicates. The drill core is cut and sampled in the core cutting facility.

Figure 17. Cores with marked sample interval ready to be cut.

Core Cutting

Soft core (weathered or clay altered lithologies) is split while still in the box using a butchers cleaver and hammer. This works very effectively and produces a controlled clean cut.

Hard core (fresh lithologies) is cut using an electric powered diamond blade saw affixed with a movable tray for holding cylindrical core in line with the saw blade (Figure 18). **The blade must be properly cooled with water and the operator must wear hearing, hand and eye protection.** A trained core cutter takes pieces of core from the box, one box at a time and cuts the core in half along the previously drawn "down" orientation line. The cut core is returned to the core box in the same position as it was removed so as not to rotate the core or reverse the down-hole direction of the core.

Figure 18. (**A**) Trained core cutters cutting the samples; (**B**) Half-core samples ready to be oven-dried then crushed.

Note that care must be taken to reduce dust and spray getting on other cut and uncut core to eliminate cross contamination.

Core Sampling and QA/QC

The intervals of core to be sampled are selected by the PG and indicated on the completed Core Cutting and Sampling Record Sheet (Appendix G). The sampling sheets shall contain the following information: **Drill hole ID, Sample Number, From, To, Sample Length, Weight, Sampler, Date sampled, and Supervisor**.

The designated FT shall collect the interval to be sampled and place it in an aluminium tray together with a torn off tag from the sample card for the particular sample stapled on a small wooden block. The FT shall consistently select the right half piece of the cut core for sampling and retain the left side in the

core box for storage. The core in the tray is dried (Figure 19) until such time that it is dry enough to be processed through the rock crusher (Figure 20). The core is reduced to minus 5mm by the crusher and returned into the aluminium tray making sure that the numbered wooden block is always with the sample/tray.

Figure 19. Oven-drying of cut samples.

Figure 20. Crushing of dried samples.

The samples/trays are now passed to the splitting room (Figure 21). There it is split so that a split will weigh approximately 1kg (Figure 22). This sample is placed into a plastic bag. Each sample bag shall have stapled inside, the top 5cm of the bag, a sample tag with the same number as that indicated by the tag in the tray. This sample number is also written on the plastic bag with a permanent marking pen and checked against the sampling sheets, the tray tag and the tag stapled to the plastic bag.

Figure 21. Splitting of samples at the splitting room.

Figure 22. Transferring to the calico sample bag and weighing to approximately 1.00kg.

The rest of the minus 5mm sample is placed in a calico sample bag. These bags are put together in sacks and labelled with the drill hole ID and sample number range. These sacks are retained in storage at TVIRD's Balabag camp.

To check sampling repeatability, sample prep contamination, and lab precision, QA/QC samples to be used in sample submittals. The control samples shall comprise standard samples, duplicates and blanks. Commercially purchased certified reference materials shall be used as standards. These samples are inserted at random intervals in the Sampling Sheet at a notional ratio of one control sample for every 19 samples or 5%. The location of the control samples in a typical 40 sample batch (representing one load in the fire assay furnace) shall be randomized to provide greater sample security. It is also wise to fill up a **Sample Submittal Form** (SSF) (Appendix I) no larger than 40 samples to keep close control and ensure minimal effects if the assay results of the control samples are rejected (thereby rejecting the results of all the samples in that batch).

It is also advisable to insert a blank immediately following known or suspected high grade gold mineralization to detect contamination of subsequent core samples during the sample preparation. It is certainly acceptable to submit more than the accepted 5% of control samples when necessary.

Standard samples shall be placed into the same plastic bags used for the core samples. The identifying marks on the packet from the manufacturing lab shall be copied into the appropriate column in the Sampling Sheet are "erased" using methylated spirits or alcohol and replaced (written with a permanent marking pen) with the appropriate sample number assigned to it (Figure 23). It shall then be placed in a numbered plastic bag stapled/sealed with its corresponding tear off tag from the sample card, making sure that the standard packet is not holed.

Figure 23. Writing of the sample number to the sample's calico bag.

Duplicate split (1-kg) samples may be placed randomly but preferably following the sample it is duplicating (preferably one with some mineralization and good core recovery). Duplicate the sample should be prepared as would be a normal sample. At the final split, bag the 2 1-kg splits as separate samples.

Sample Packing and Dispatch

Prior to packing, the samples shall be laid out in order on the floor of the core shed and checked by the SG against the sample sheet before shipping (Figure 24).

An SSF shall be prepared for each batch of about 40samples to instruct the lab on the assaying, and this and any other instructions (such as for sample preparation) will be sealed in a plastic bag and enclosed in the shipping package.

Secure and sturdy containers (steel padlocked chests, wooden nailed boxes or sewn woven sacks) will be addressed clearly with the destination, the origin and contact telephone numbers of both. These shall be numbered as Box 1 of X, where X is the total number of containers being sent, and each container will have its weight marked on it.

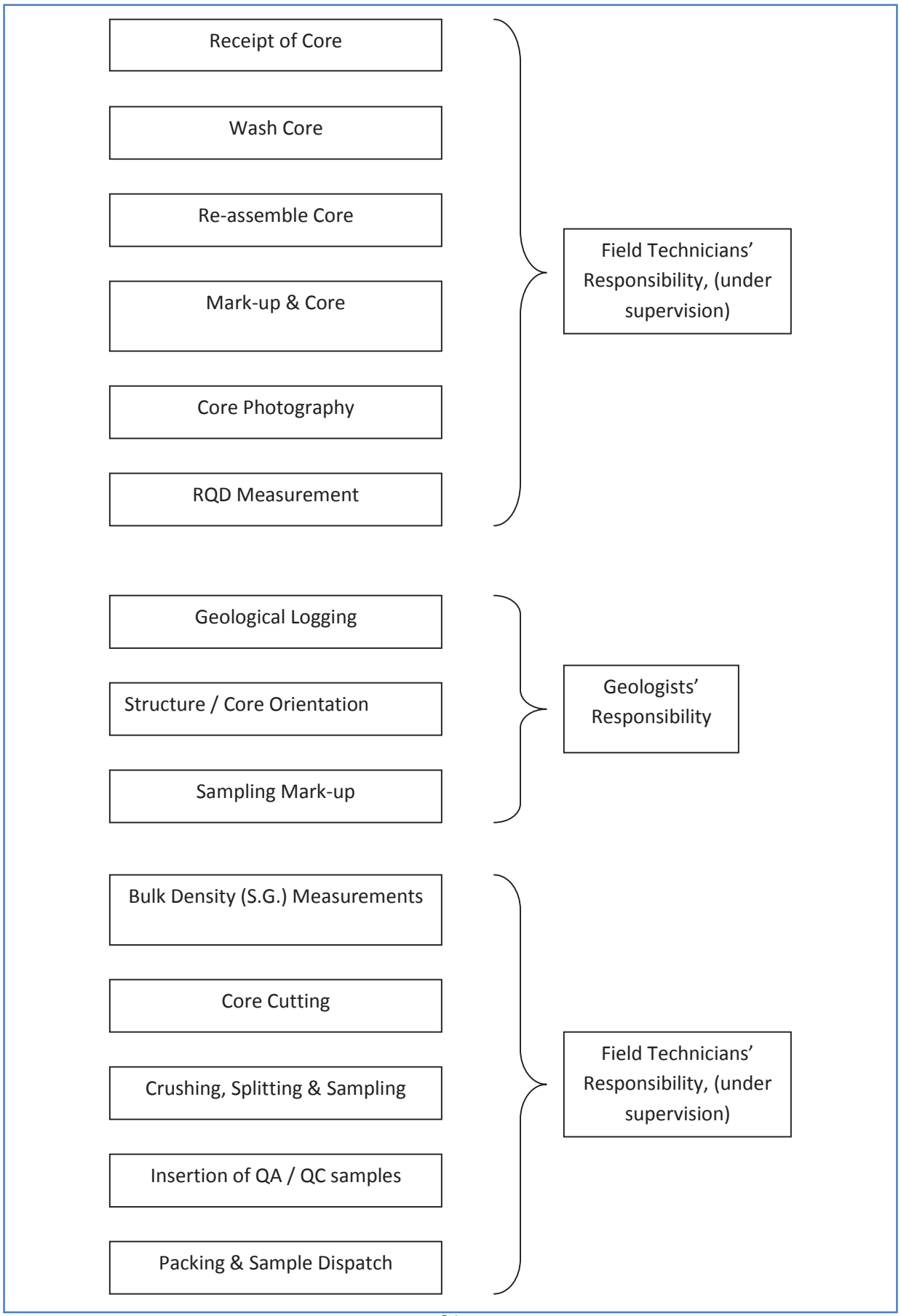
A **Sample Transmittal Form** (STF) shall be completed, signed by the driver and security personnel delivering the samples to Canatuan Assay Lab. The same STF shall be duly signed on receipt by the lab supervisor. The final completed STF is also integral to the documentation of the Chain of Custody.

Figure 24. Crushed samples laid out in order on a table inside the sample preparation room.

Storage of Core

Once logged, the left hand side of the core box is painted white and re-labelled with the Hole ID, Box number and depth From and To (in metres) of the core contained within it (Figure 25). The core boxes are stored inside the core shed and stacked on lengths of timber to raise them from the ground, and sufficient space is allowed between stacks to allow personnel to remove and carry core boxes when needed. Lids are placed on the top core box to prevent the accumulation of dust.

Figure 25. Painted and relabelled core boxes containing logged cores systematically stored inside the shed.


Receipt of Core
Wash Core
Re-assemble Core
Mark-up & Core
Core Photography
RQD Measurement
Field Technicians' Responsibility, (under supervision)
Geological Logging
Structure / Core Orientation
Sampling Mark-up
Geologists' Responsibility
Bulk Density (S.G.) Measurements
Core Cutting
Crushing, Splitting & Sampling
Insertion of QA / QC samples
Packing & Sample Dispatch
Field Technicians' Responsibility, (under supervision)

Appendix B Report on Quality Control of Assays

DATE : April 4, 2012
TO : Balabag Exploration Team
CC : Yulo E. Perez
FROM : Kate T. Digdigan
SUBJECT: Quality Control

1.0 INTRODUCTION

This report details the Assay Quality Assurance and Quality Control routinely undertaken by the TVIRD Exploration Department in the Balabag Gold-Silver Project during the exploration drilling campaign in 2005 to 2007 and in the infill/ resource drilling conducted in year 2010 to 2011.

2.0 ASSAY QUALITY CONTROL

The monitoring of laboratory performance in terms of assay quality was through Quality Assurance (the establishment of systems and standards to ensure quality) and Quality Control. The latter uses statistical checks and balances to ensure required assay quality is attained. Assay Quality Assurance (QA) and Quality Control (QC) measures include:

- Monitoring laboratories performance in terms of analytical accuracy, precision and bias via Certified Reference Materials (CRMs).
- Use of coarse blank material to detect sample preparation contamination.
- Sampling and sample preparation procedures were monitored via analysis of field duplicates and laboratory duplicates.
- Exploration samples were submitted for analysis at umpire laboratory as a check on overall performance.

2.1 QA/QC PROTOCOLS

The QA/QC procedures employed by TVIRD Exploration Department in the pre-2010 drilling campaign vary from the protocols adopted during the resumption of drilling in 2010. The earlier drilling program mainly relied on the quality control materials provided by the analytical laboratory while the more recent drilling campaign included standards, blanks and duplicates upon submission of samples to the laboratory.

2.1.1 Pre-2010 Drilling Program

During the 2005 to mid 2007 drilling campaign, exploration samples were submitted to McPhar Assay Laboratory. The exact quality control procedures applied in this phase of exploration drilling were not documented; therefore analyses were mostly based on the internal quality control results provided by the analytical laboratory. The assay results of the CRM's, blanks and duplicates routinely used by McPhar Lab in their analyses were reported together with the assay certificates of the exploration samples. These data were compiled and evaluated to check the laboratory's performance.

2.1.2 2010 to 2011 Drilling Program

All sample batches were submitted to the Canatuan Mine Laboratory in the 2010-2011 drilling program. These included coarse blanks, certified reference materials (CRM's) and field duplicates.

- Commercially purchased CRM's are used as standards. These samples are inserted at random intervals at a notional ratio of one control sample for every 19 samples. The locations of samples in a typical 40-sample-batch (representing one load in the fire assay furnace) are randomized to provide greater sample security.
- Coarse blanks are inserted immediately following suspected high grade gold mineralization to detect contamination of subsequent core samples during sample preparation.
- Duplicate split (1-kg) samples are placed randomly but preferably following the sample it is duplicating. The duplicates are prepared like a normal sample.
- Check pulp duplicate samples were sent to ALS Chemex in Australia.

The table below summarizes the list of quality control materials employed by TVIRD Exploration Department from March 2010 to July 2011.

Table 1. Quality control materials for Balabag Project

CONTROL MATERIALS	2010	2011	TOTAL
COARSE BLANK	245	207	452
FIELD DUPLICATE	238	189	427
CRM's			
OREAS 18c	47	0	47
OREAS 12a	47	0	47
OREAS 53Pb	42	0	42
OREAS 6Pc	45	0	45
OREAS 15d	7	37	44
OREAS 16a	4	35	39
OREAS 54Pa	5	32	37
OREAS 60b	7	32	39
OREAS 62c	27	8	35
OREAS 16b	0	8	8
OREAS 67a	0	11	11
OREAS 15g	0	13	13
OREAS 62d	0	13	13
OREAS 65a	0	13	13
TOTAL	**714**	**598**	**1,312**

2.1.3 QC Data Evaluation

All analytical data were reviewed on the day of receipt and were examined per batch to ensure that unacceptable delays to the flow of assay data do not occur. The internal QC data generated by the

laboratory in the course of conducting analysis were also supplied to the Exploration Department for examination.

Analytical results for blanks, standards and duplicate samples were monitored and verified along with the bulk of the data being collected. Routine data verification procedures involved checking outliers and abnormal values in duplicates. This procedure was aided significantly by the use of graphs and scatter diagrams.

In the evaluation of standard samples, results should fall inside the 2 x Standard Deviation in order to pass the quality control requirement. The assay data were plotted in a scatter diagram superimposed on the pre-determined running mean value and standard deviations.

Assay results for blank samples which were plotted above the threshold were investigated. Where contamination has occurred higher assay values are obtained for blanks and represent concern about the quality of data in that particular batch.

For the duplicate assay data, a comparison of the original assay and duplicate assay was made. Both assays should return the same value within the limits of the laboratory precision.

Table 2 summarizes the reference material, the target value quality control threshold, the threshold acceptable values and failure criteria.

Table 2. Quality control pass/fail criteria

QC Material	Target Pass Criteria	Acceptable Pass Criteria	Practical Failure Criteria
Certified Reference Materials	<1 Standard Deviation 0% Bias 90% within 5%	<2 Standard Deviations <2.5% Bias 90% within 10%	>2 Standard Deviations >5% Bias <90% within 10%
Coarse Blanks	0.03g/t	<0.05g/t	>0.05g/t
RC Rig Duplicates	90% within 20% 0% Bias	90% within 30% <5% Bias	<90% within 40% >5% Bias
Laboratory Repeats	90% within 5% 0% Bias	90% within 10% <2.5% Bias	<90% within 15% >5% Bias
Independent Check Assays	90% within 10% 0% Bias	90% within 20% <2.5% Bias	<90% within 20% >5% Bias

2.2 QA/QC ASSAY RESULTS

2.2.1 Certified Reference Materials

The insertion of CRM's aims to monitor the accuracy and precision of the assay results relative to the standard values. Significant variations from the recommended values of certified reference materials indicate that bias is present in the laboratory procedure and rectification is in order.

Pre-2010

From November 2005 to first quarter of 2007, exploration samples were submitted to McPhar Assay Laboratory. During this period, there was no clear (standard) quality control procedure implemented by the Exploration team to monitor the performance of the external laboratory. In terms of monitoring the accuracy and precision through standards, assay evaluations were mostly based on the internal CRM results of McPhar Laboratory.

There were eight (8) different CRM's used by McPhar during the analysis of the exploration samples (Tab 3.). These CRM's were obtained from ROCKLABS Ltd. (New Zealand). Table 3 details the certified values and corresponding standard deviations of the CRM's.

Table 3. Certified reference materials used by McPhar Laboratory

Reference Material		Certified Value (Au ppm)	STD	(-) 1SD	(+) 1SD	(-) 2SD	(+) 2SD	(-) 3SD	(+) 3SD
Low Ore Grade	OxC44	0.197	0.013	0.184	0.210	0.171	0.223	0.158	0.236
	OxD43	0.401	0.021	0.380	0.422	0.359	0.443	0.338	0.464
	OxE42	0.610	0.028	0.582	0.638	0.554	0.666	0.526	0.694
Intermediate Ore Grade	OxF41	0.815	0.024	0.791	0.839	0.767	0.863	0.743	0.887
	OxG46	1.037	0.041	0.996	1.078	0.955	1.119	0.914	1.16
	OxH37	1.286	0.039	1.247	1.325	1.208	1.364	1.169	1.403
	OxI40	1.857	0.044	1.813	1.901	1.769	1.945	1.725	1.989
High Ore Grade	OxL34	5.758	0.173	5.585	5.931	5.412	6.104	5.239	6.277

The gold assays of the standards were mostly inside the first degree standard deviation. Bias above the mean value is apparent with the first half of the analyzed CRM's while low bias was evident in the latter portions. A few outliers above the second degree standard deviation were noted with OxH37.

The following control charts demonstrate the performance of the standards used by McPhar Lab.

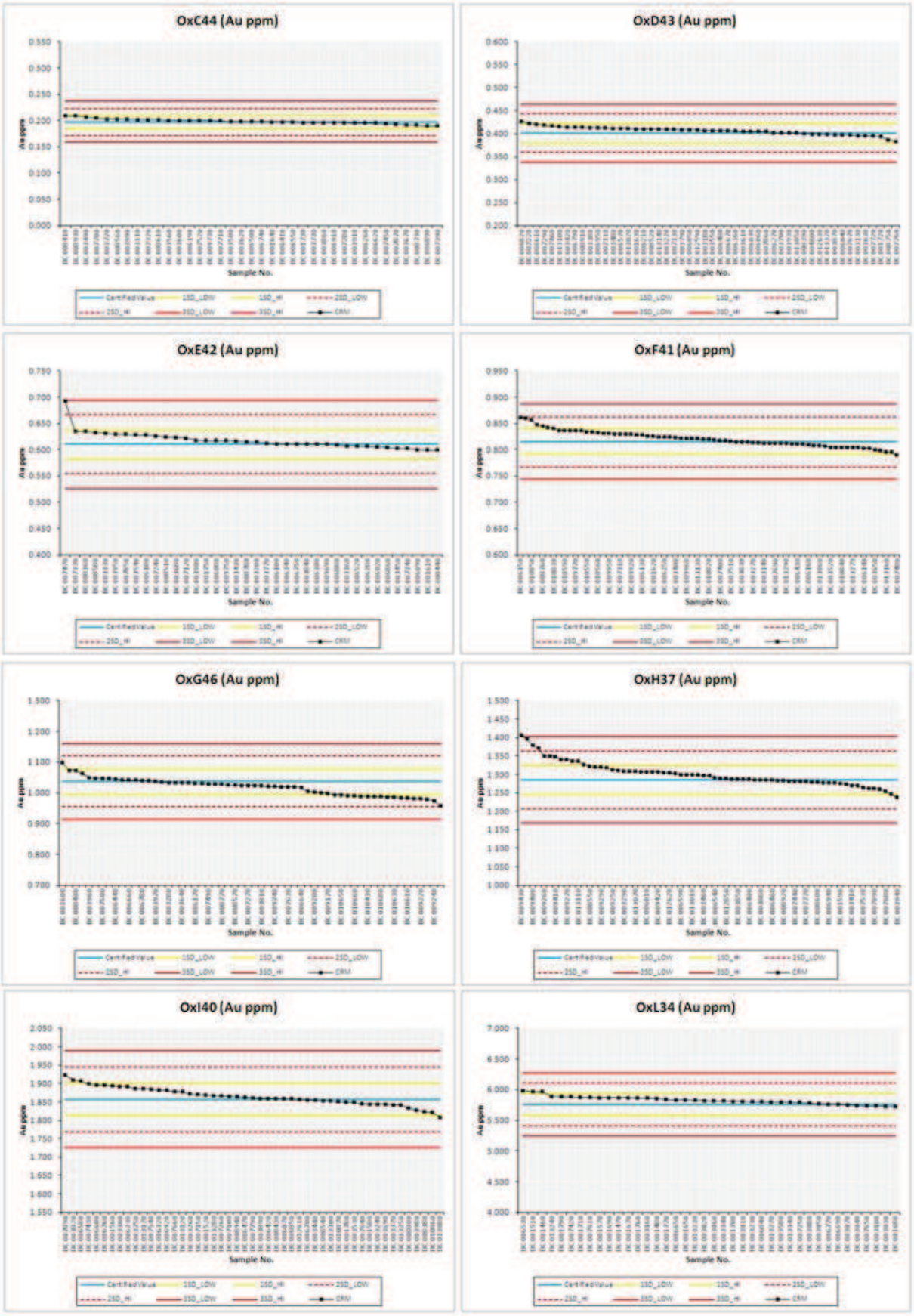


Figure 1. Standard control charts for CRM assays analyzed at McPhar Laboratory

2010 to 2011

The Canatuan Mine Laboratory is the primary laboratory used in analyzing the exploration samples of the drilling program in year 2010 to 2011. Fourteen (14) commercial reference materials or standards were routinely employed from March 2010 to July 2011 drilling (Tab 4). The CRM's used were prepared by Ore Research and Exploration Pty. Ltd. in Australia. Below is a summary of standards which accompanied the drill samples submitted to the laboratory.

Table 4. Summary of OREAS reference materials used in 2010-2011 drilling program

Reference Material		Certified Value (Au ppm)	(-) 1SD	(+) 1SD	(-) 2SD	(+) 2SD	(-) 3SD	(+) 3SD
Low Ore Grade	OREAS 65a	0.52	0.50	0.54	0.49	0.55	0.47	0.57
	OREAS 15g	0.53	0.50	0.55	0.48	0.57	0.46	0.60
	OREAS 53Pb	0.62	0.60	0.64	0.58	0.67	0.56	0.69
Intermediate Ore Grade	OREAS 6Pc	1.52	1.46	1.59	1.39	1.66	1.32	1.72
	OREAS 15d	1.56	1.52	1.60	1.48	1.64	1.43	1.69
	OREAS 16a	1.81	1.75	1.87	1.68	1.93	1.62	1.99
	OREAS 16b	2.21	2.14	2.28	2.06	2.36	1.99	2.43
	OREAS 67a	2.24	2.14	2.33	2.05	2.43	1.95	2.53
	OREAS 60b	2.57	2.46	2.68	2.35	2.78	2.25	2.89
	OREAS 54Pa	2.90	2.79	3.01	2.68	3.12	2.57	3.23
	OREAS 18c	3.52	3.41	3.63	3.31	3.73	3.20	3.84
High Ore Grade	OREAS 62c	8.79	8.58	9.00	8.36	9.21	8.15	9.42
	OREAS 62d	10.50	10.17	10.83	9.84	11.16	9.51	11.49
	OREAS 12a	11.79	11.55	12.03	11.31	12.27	11.07	12.51

Gold Assays (Au)

Standard control charts for the gold CRM's assayed in the Canatuan Mine Laboratory are presented in Figures 2 to 4. The performance of the laboratory on gold CRM's was categorized according to standard grades ranges as summarized below.

- Low grade CRM's were used to monitor assay performance of mineralized materials with grade below 1.0 g/t Au. The average Au grade of the CRM's is 0.56 g/t Au. This includes OREAS 53Pb, OREAS 65a and OREAS 15g (Fig.2).

  OREAS 53Pb was mainly used in year 2010. The CRM results of the said standard were fairly acceptable during the first half of the year with minor deviations. However, pronounced low bias was noted by the second half with significant outliers below second degree standard deviation.

  OREAS 65a and OREAS 15g were then used in 2011, showing relatively precise results yet low bias at second degree standard deviation.

Figure 2. Standard control charts for low grade (Au) CRM assays at Balabag Project

- The second group of CRM's included those with standard values ranging from 1.5 g/t to 3.5 g/t Au. These were categorized as the intermediate grade CRM's which tend to monitor the accuracy of samples in the main mineralized zones with gold grades similar to the aforementioned range. Eight CRM's were analyzed under this class: OREAS 6Pc, OREAS 15d, OREAS 16a, OREAS 16b, OREAS 67a, OREAS 60b, OREAS 54Pa and OREAS 18c.

  These CRM's exhibited variable assay performance and outlying values that are attributed in the most part to mix-ups in the CRM inserted in the batch. Results were generally plotted below the first degree standard deviation indicating significant low bias.

Figure 3. Standard control charts for intermediate grade (Au) CRM assays at Balabag Project

- The high grade CRM's which include OREAS 12a, OREAS 62d and OREAS 62c range from 8.0 g/t Au to 12.0 g/t Au. These standards tend to monitor the laboratory performance in analyzing high grade samples.

  Although some outliers were noted, majority of the CRM results were plotted within first degree standard deviation. Analytical drift was apparent in some of the early OREAS 12a results. Improvements were observed with the latter portions of OREAS 62c and OREAS 62d as the result are within the first degree standard deviation with minor outliers.

Figure 4. Standard control charts for high grade (Au) CRM assays at Balabag Project

Silver Assays (Ag)

The performance of the Canatuan Mine Laboratory on the silver grades were also monitored with four of the CRM's—OREAS 60b, OREAS 67a, OREAS 62d and OREAS 65a. These were also supplemented by the results of the laboratory silver standards.

Generally, the silver values of the Exploration CRM's fall within first degree standard deviation with occasional outliers, possibly due to sample mix-ups (Fig. 5).

On the other hand, the silver grades of the laboratory standards are reasonably accurate with slight low bias as indicated by GBM 300-5 (Fig. 6).

Figure 5. Standard control charts for silver CRM assays at Balabag Project

Figure 6. Standard control charts for Canatuan Mine Laboratory silver CRM assays at Balabag Project

Generally, the number of standards failures was considerably high, particularly with the issue of low bias. Meanwhile, the quality control personnel of TVIRD have monitored the results as the program progressed, investigated suspect batches and requested re-assays. The results of the re-assay were reportedly consistent with the originals, thus suggesting that there were no issues with the database.

However, it is deemed important to continuously monitor the quality of assay results so as to ensure a more accurate resource estimate.

2.2.2 Coarse Blanks

Coarse blanks are used to monitor for contamination introduced during laboratory sample comminution.

Pre-2010

The control chart (Fig. 7) for coarse blanks analyzed at McPhar Laboratory from last quarter of 2005 to early 2007 shows consistent grades below cut-off (0.010 g/t Au) except for few major outliers which were possibly results of erroneous data capture. The assays were generally reported as 'below detection limit' which is 0.005 g/t Au. A value that is half of the detection limit was used for database input.

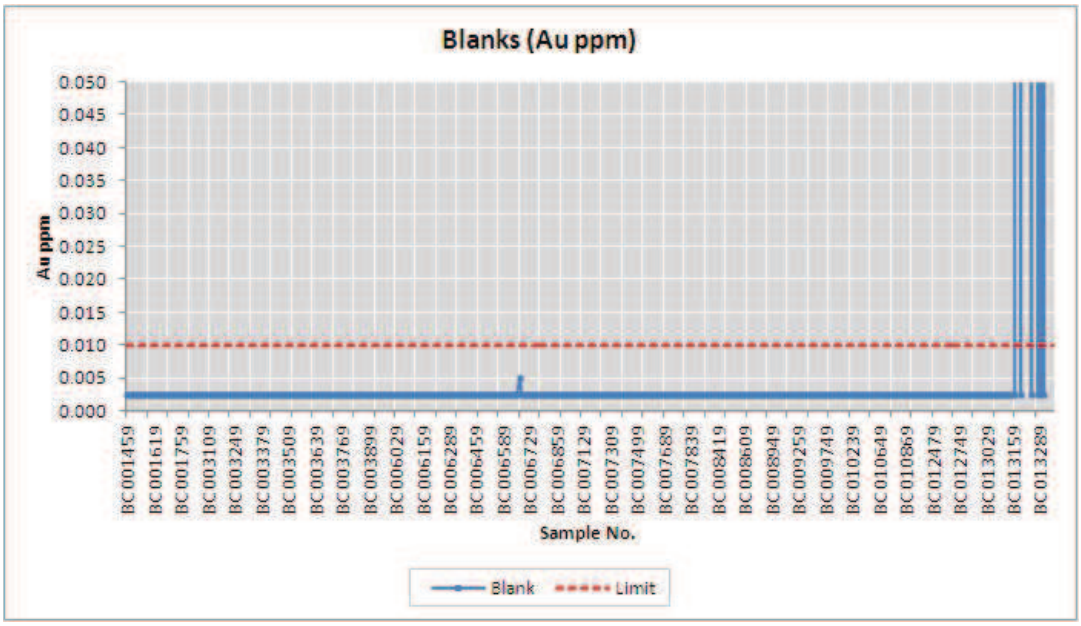


Figure 7. Control chart of blanks analyzed at McPhar Laboratory

2010 to 2011

The control charts for coarse blanks as analyzed at the Canatuan Mine Laboratory used a pass/ fail criteria of 10% of the resource modeling cut-off grade (0.1 g/t Au). From the total number of coarse blanks analyzed, 80% are below the designated limit (0.01 g/t Au) while roughly 17% reached up to 0.03 g/t Au. The remaining 3%, on the other hand were probably results of possible contamination during sample preparation (Fig. 8).

The silver grades of the coarse blanks were also plotted against a cut-off of 0.5 g/t Ag. It has been noted that 75% of the samples are below the assigned limit while the rest fall in the range of 0.5 g/t to 1.0 g/t Ag (Fig. 9).

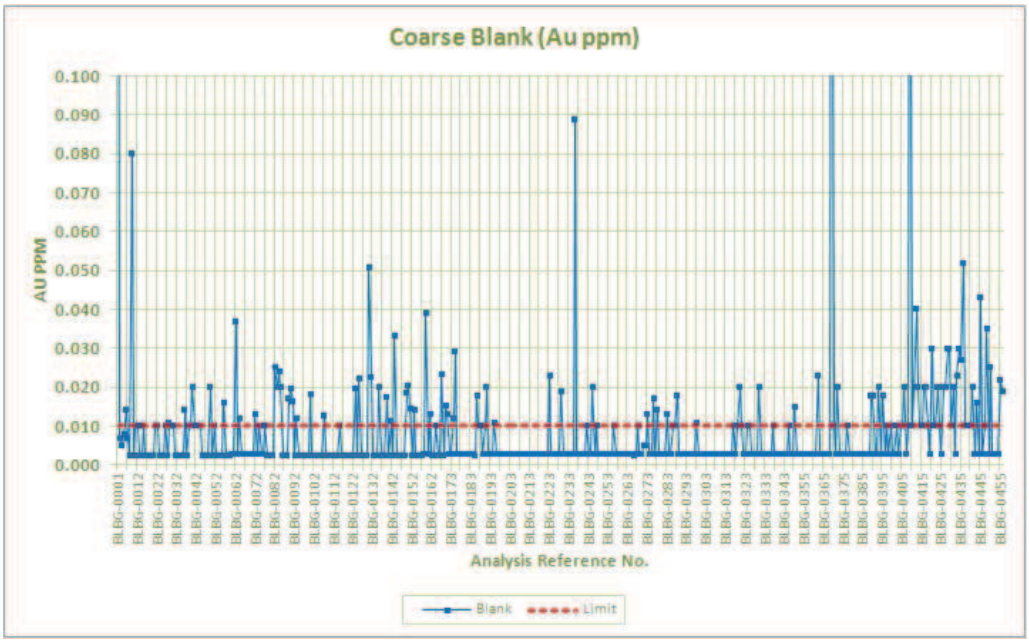


Figure 8. Control chart of coarse blanks (Au) at Balabag Project

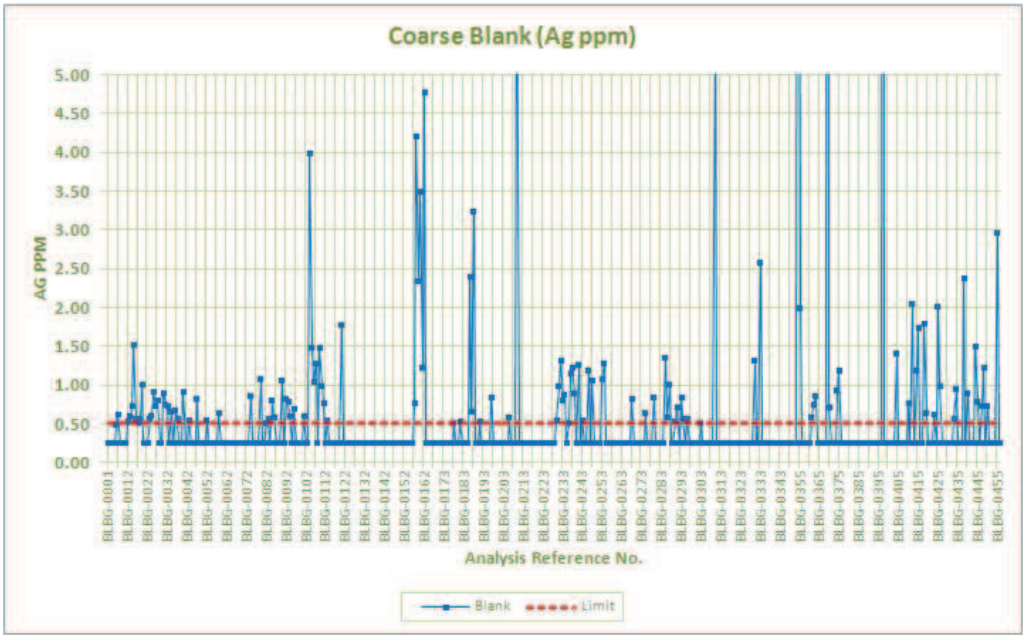


Figure 9. Control chart of coarse blanks (Ag) at Balabag Project

2.2.3 Duplicates

Duplicates were inserted to test the repeatability of assays. The results of the duplicates were compared with the original assay values derived during the first round of analysis and were plotted in percentile chart and relative difference plot.

Pre-2010

Similar to the CRM's, McPhar Laboratory provided the results of its internal quality control on duplicates to the Exploration Department. Both the coarse duplicates and pulps were analyzed to monitor precision.

The **coarse duplicates** (Fig. 10) show fairly acceptable assay results as exhibited in the percentile chart and relative difference plot. Majority of the points are within the passing criteria of ±20%.

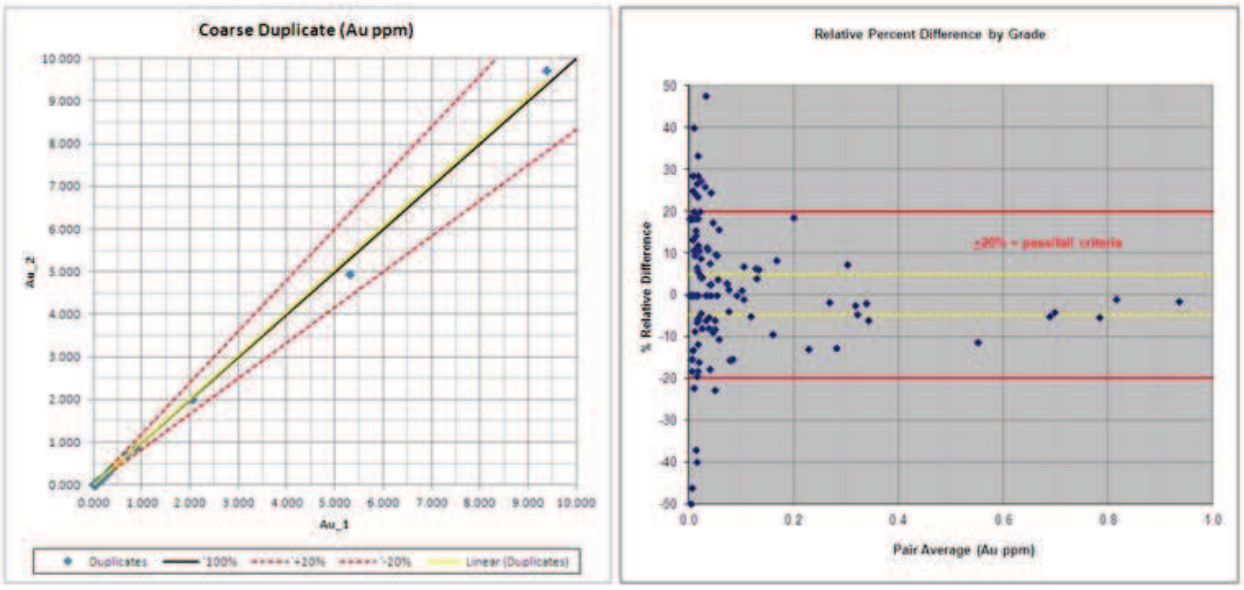


Figure 10. Plots of coarse duplicates analyzed at McPhar Laboratory

Percentile plot of the primary versus re-assay pulps (Fig. 11) demonstrate reasonable precision with values close to the passing criteria of ±10%. No clear bias was noted with the relative difference plot although dispersion beyond ±10% was noted below 0.1 g/t Au.

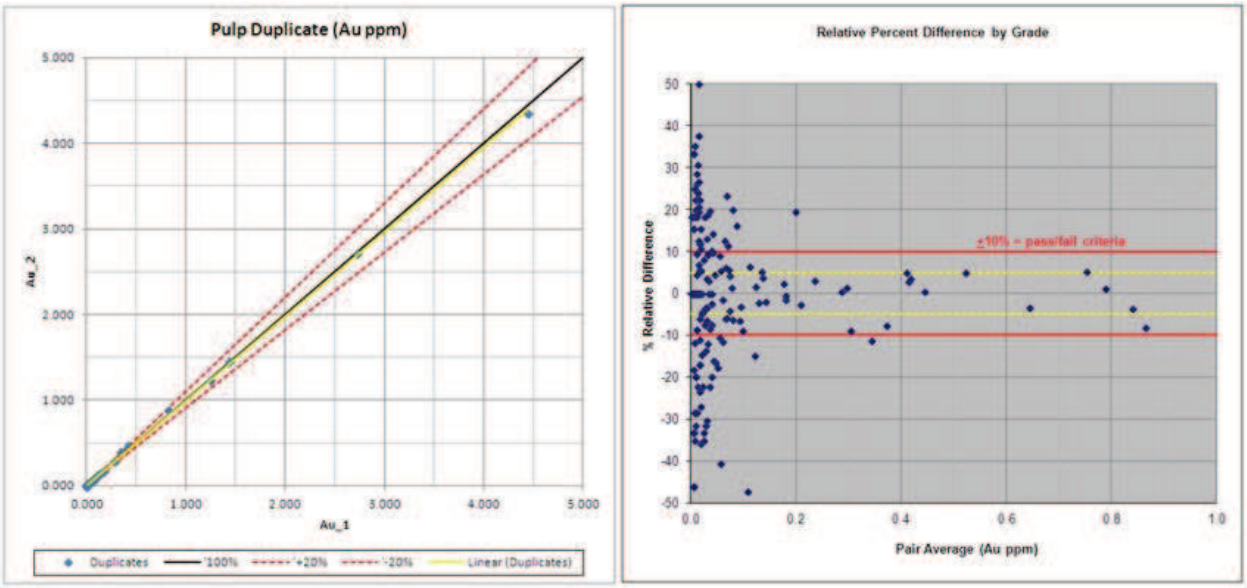


Figure 11. Plots of pulp duplicates analyzed at McPhar Laboratory

2010 to 2011

The percentile plot of the assay results for the primary versus the coarse duplicate sample shows acceptable precision within ±20%. Likewise, majority of the samples fall within the +20% passing criteria as exhibited in the relative-difference plot.

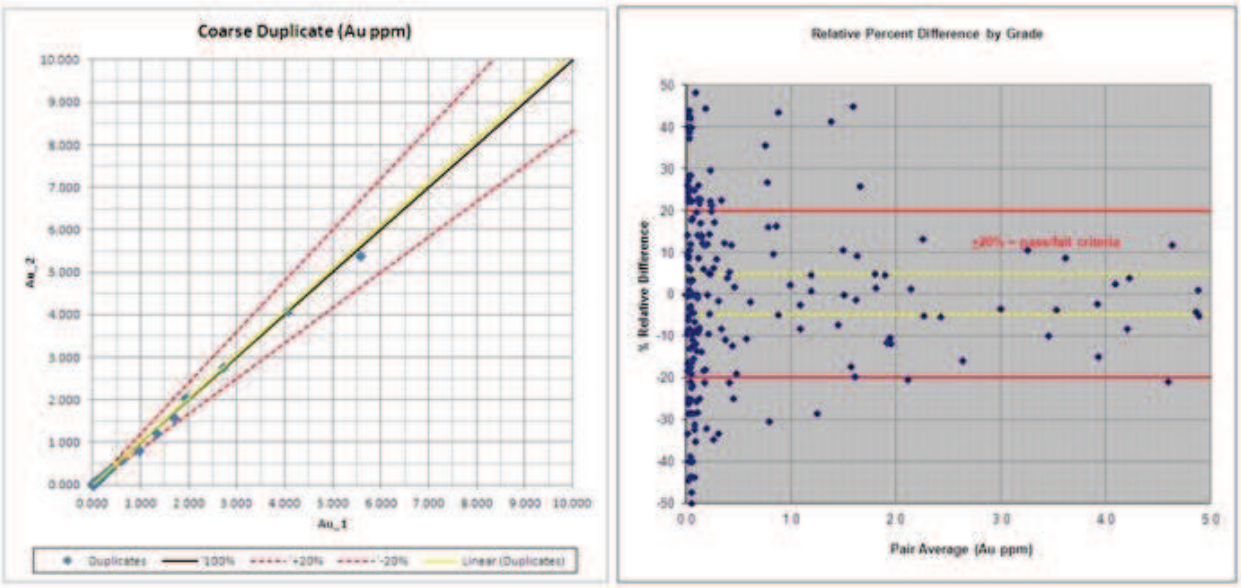


Figure 12. Percentile plot and relative difference plot (Au) of the duplicate samples at Balabag Project

2.2.4 Check Assays

No check assays with umpire laboratories were reported in the pre-2010 drilling and sampling program.

2010 to 2011

Coarse duplicates and pulps from Exploration samples originally submitted to Canatuan Mine Laboratory were re-submitted to ALS Chemex in Australia for independent check assaying. Below is a summary of the number of samples dispatched to ALS Chemex for the year 2010 and 2011.

Table 5. Samples submitted to ALS Chemex for re-analysis

	2010	**2011**
Coarse Duplicate	120	289
Pulp Duplicate	80	148
Total no. of samples for re-assay	**200**	**437**

The relative % difference plot (Fig. 13) of the coarse duplicates shows that ALS Chemex assays returned higher grades than the equivalent Canatuan Mine Lab assays. This is also evident from the percentile chart and scatter plot which may imply bias. Dispersion beyond the ±20% passing criteria is notable at grades below 1.0 g/t Au. At intermediate and higher grades, results are mostly confined within the acceptable limit. Precision as measured using the percentile rank relative difference plot was 80% within

40% which is outside of the acceptable limit of 90% within 20% and implies imprecise assays and poor reproduction of original assay (Fig. 14).

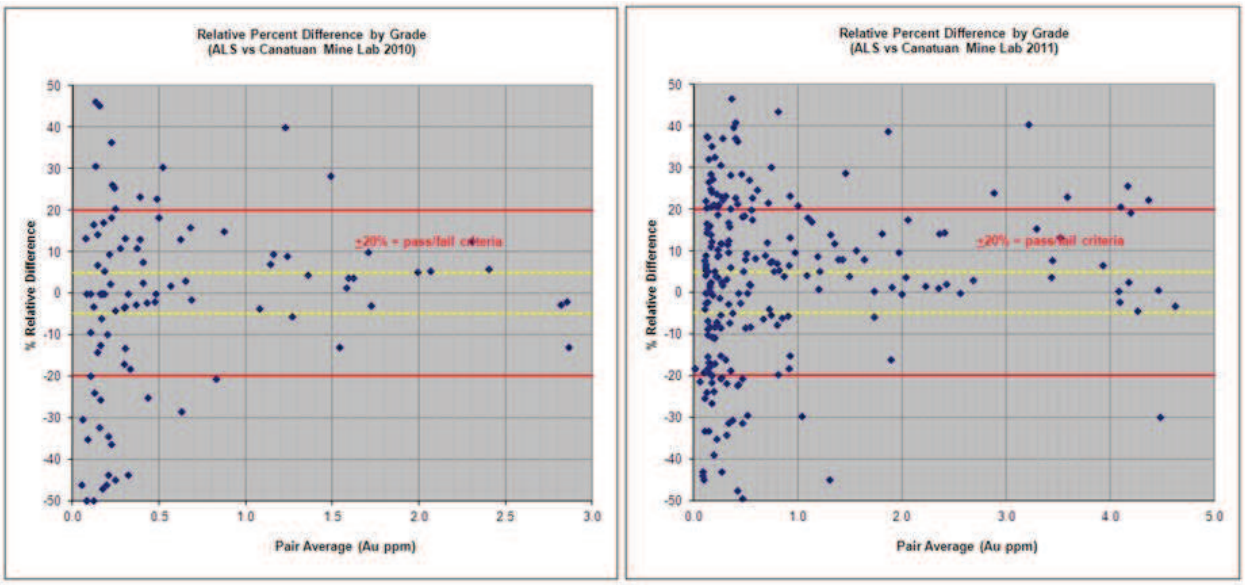


Figure 13. Relative Difference Plot of coarse duplicates from ALS and Canatuan Mine Lab

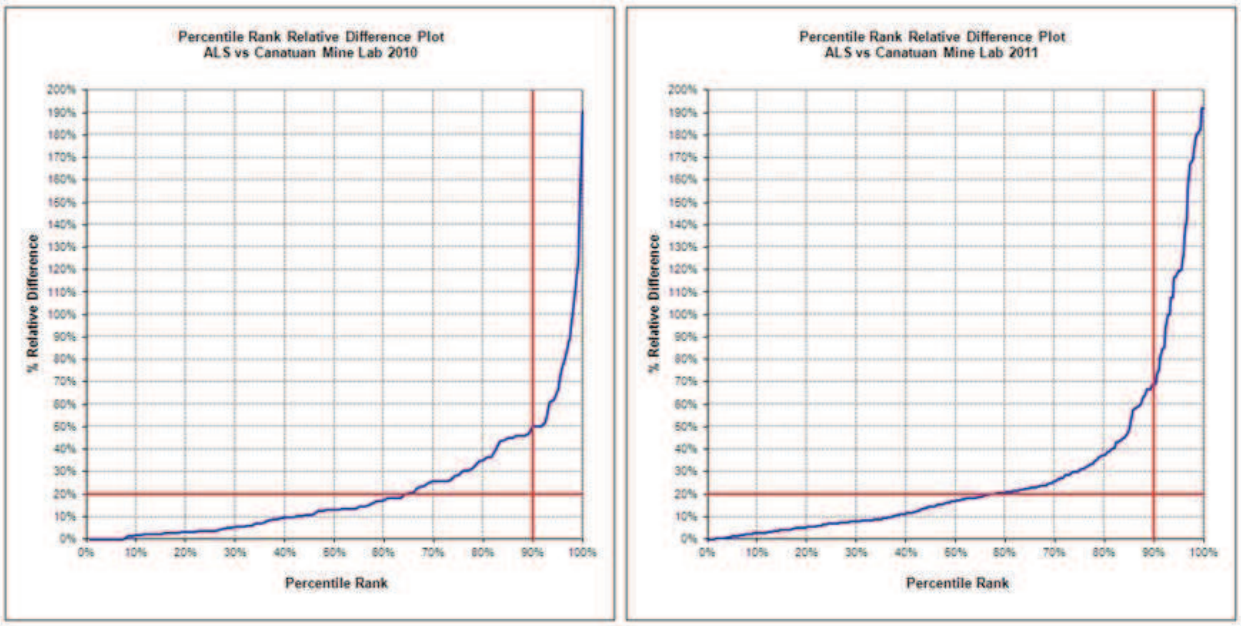


Figure 14. Percentile Rank Relative Difference Plot of coarse duplicates from ALS and Canatuan Mine Lab

Likewise, ALS Chemex assays returned higher grades than the Canatuan Mine Lab assays with the pulp samples. Dispersion beyond the passing ±10% criteria is apparent below 0.5 g/t Au. Percent rank relative difference plots indicate an average of 80% within 30% which is outside the acceptable limit.

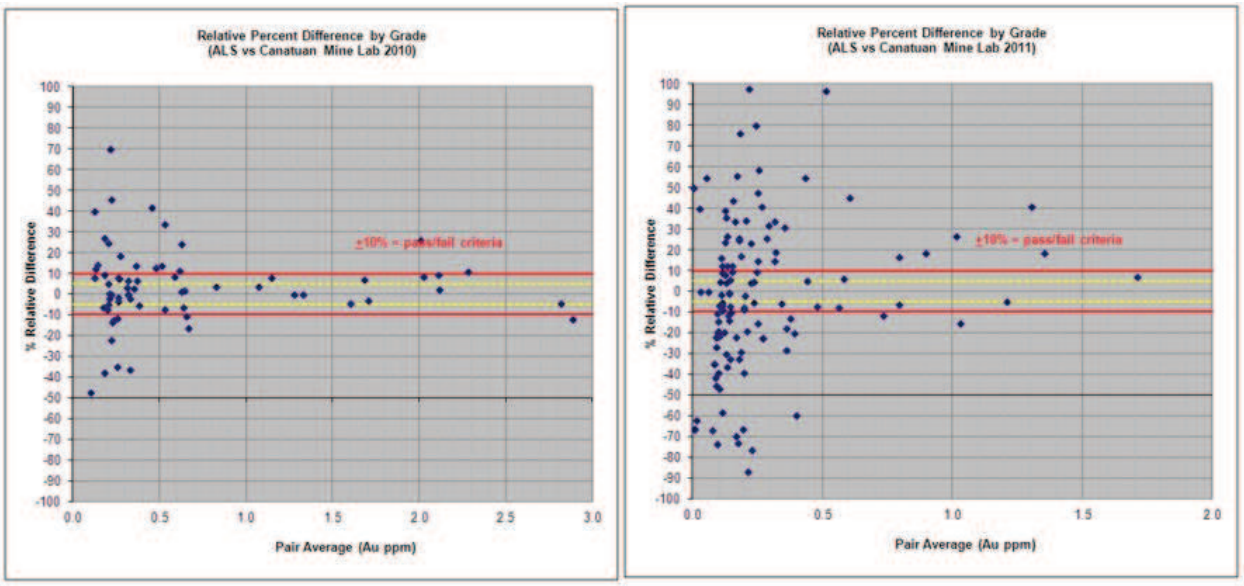


Figure 15. Relative Difference Plot of pulp duplicates from ALS and Canatuan Mine Lab

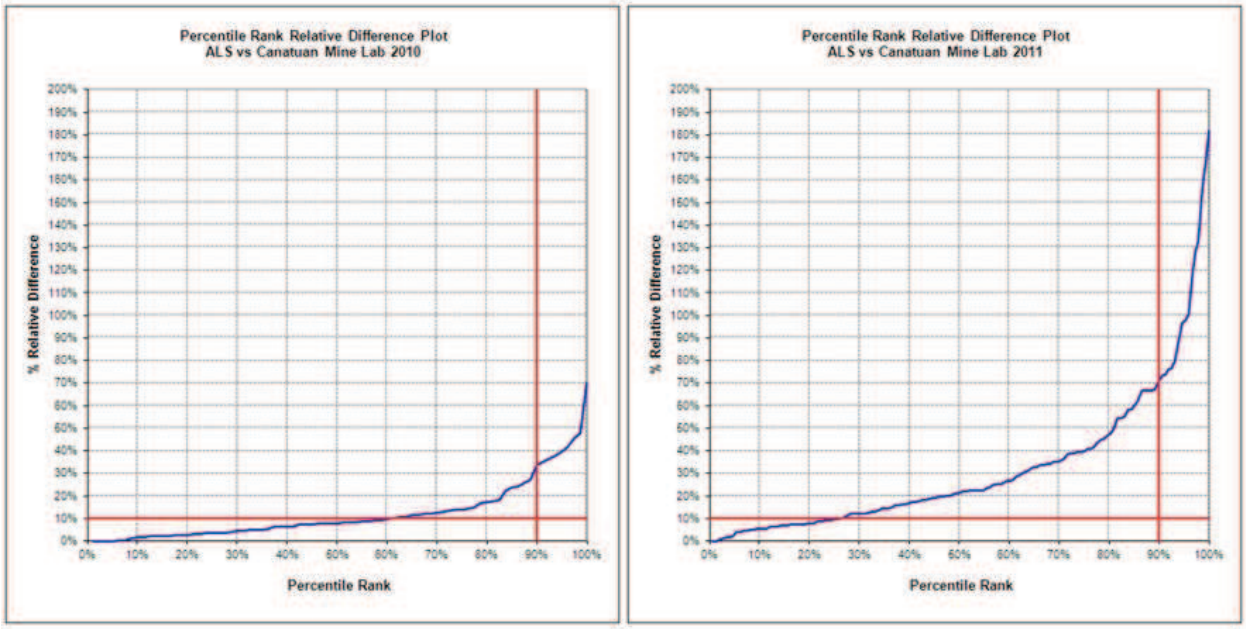
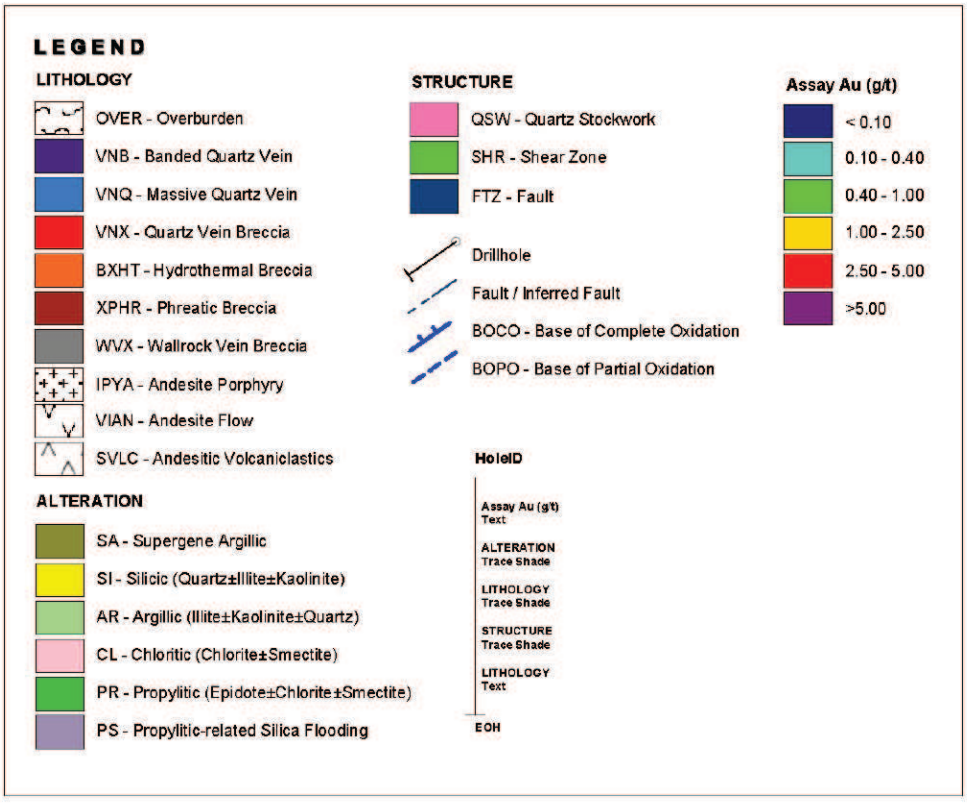
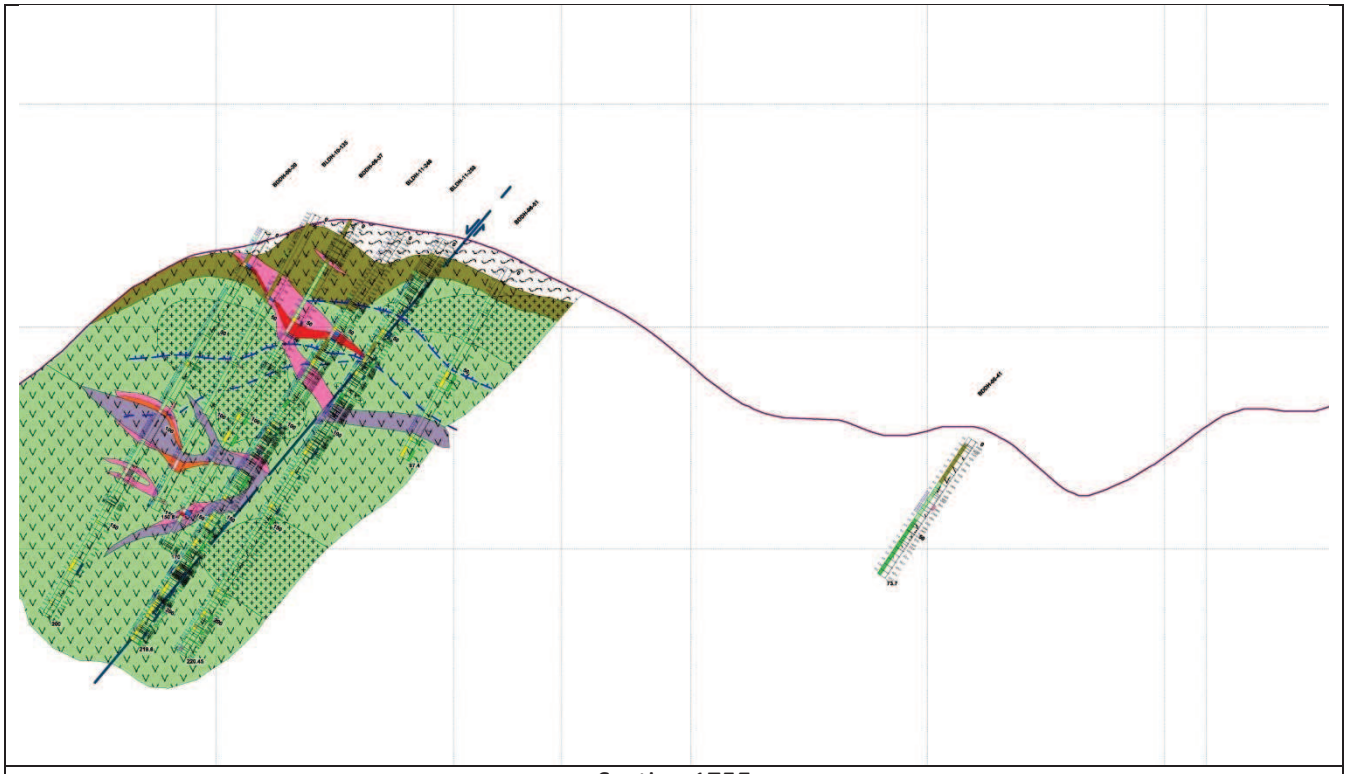


Figure 16. Percentile Rank Relative Difference Plot of pulp duplicates from ALS and Canatuan Mine Lab

Appendix C Geological Interpretations of Drill Sections


LEGEND
LITHOLOGY
OVER - Overburden
VNB - Banded Quartz Vein
VNQ - Massive Quartz Vein
VNX - Quartz Vein Breccia
BXHT - Hydrothermal Breccia
XPHR - Phreatic Breccia
WVX - Wallrock Vein Breccia
IPYA - Andesite Porphyry
VIAN - Andesite Flow
SVLC - Andesitic Volcaniclastics
ALTERATION
SA - Supergene Argillic
SI - Silicic (Quartz±Illite±Kaolinite)
AR - Argillic (Illite±Kaolinite±Quartz)
CL - Chloritic (Chlorite±Smectite)
PR - Propylitic (Epidote±Chlorite±Smectite)
PS - Propylitic-related Silica Flooding
STRUCTURE
QSW - Quartz Stockwork
SHR - Shear Zone
FTZ - Fault
Drillhole
Fault / Inferred Fault
BOCO - Base of Complete Oxidation
BOPO - Base of Partial Oxidation
HoleID
Assay Au (g/t)
Text
ALTERATION
Trace Shade
LITHOLOGY
Trace Shade
STRUCTURE
Trace Shade
LITHOLOGY
Text
EOH
Assay Au (g/t)
< 0.10
0.10 - 0.40
0.40 - 1.00
1.00 - 2.50
2.50 - 5.00
>5.00



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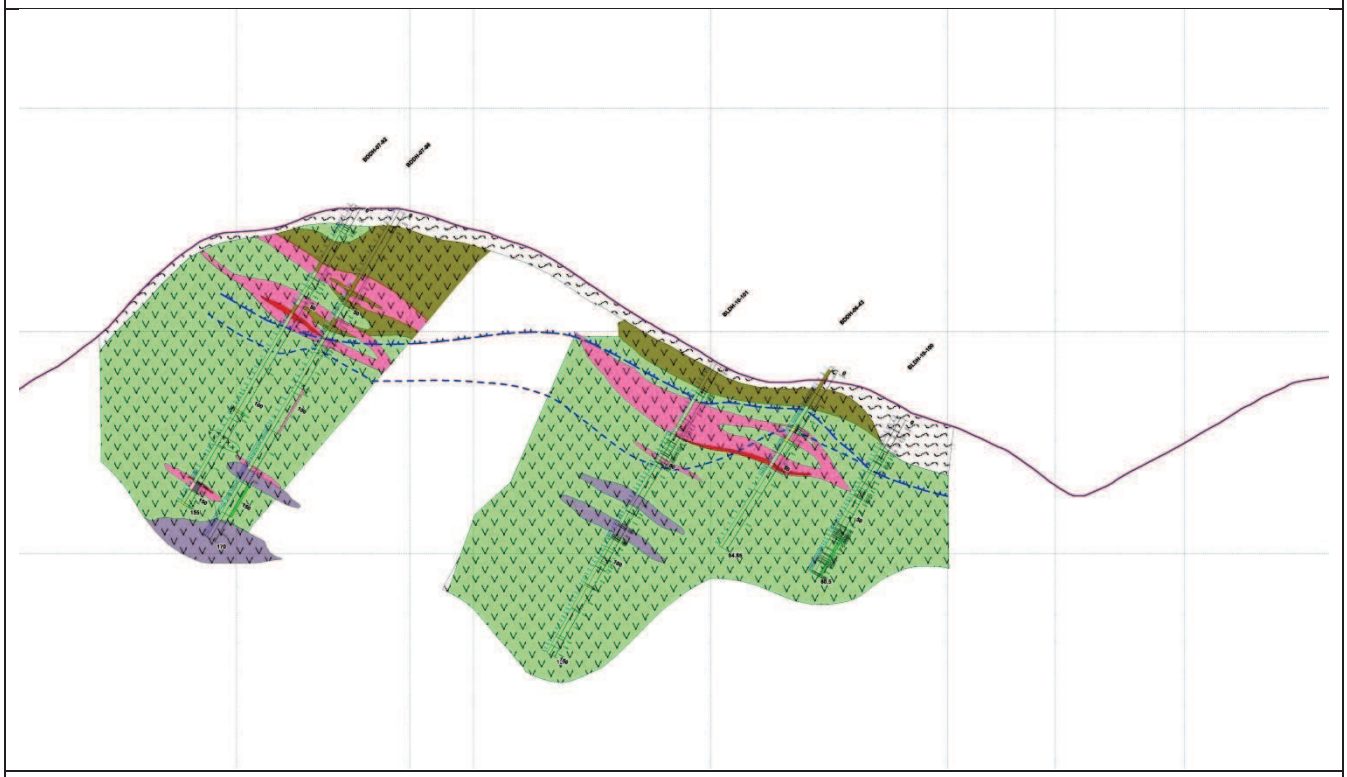

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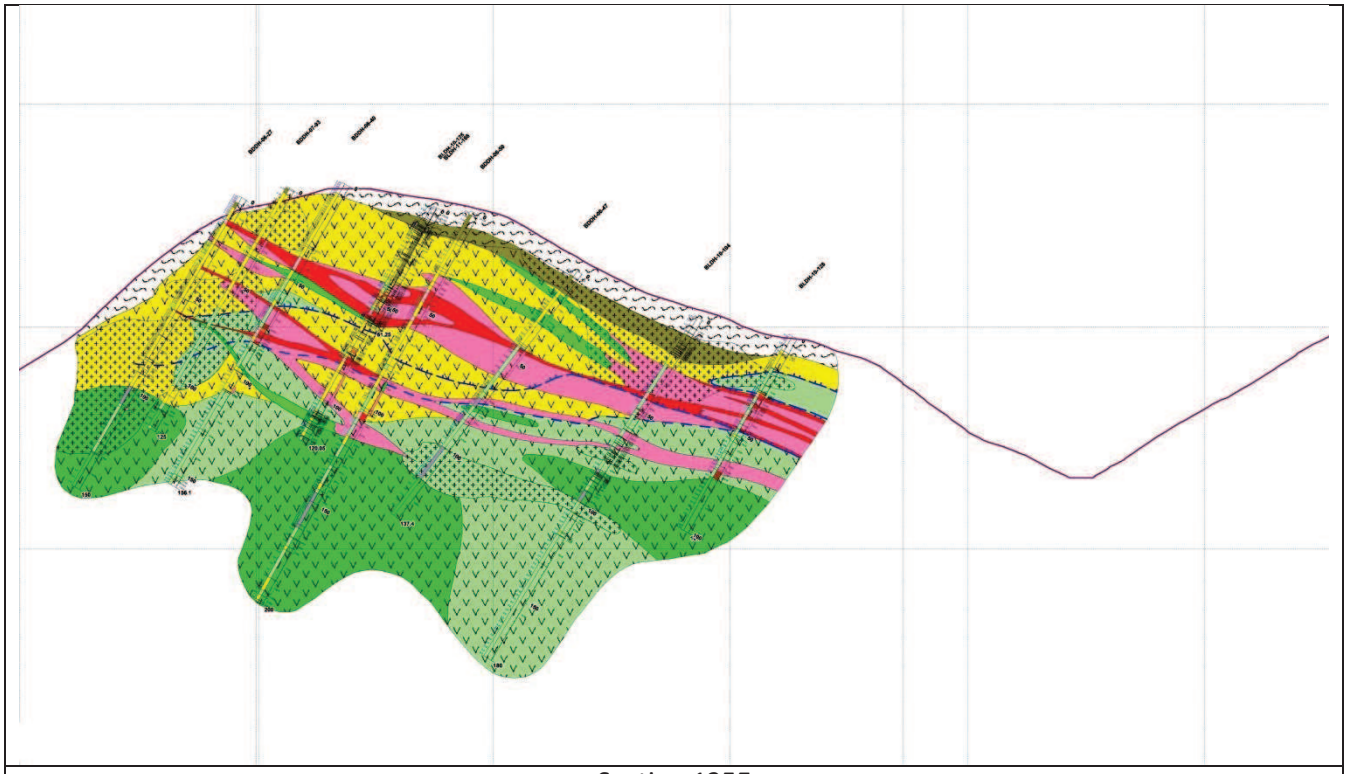

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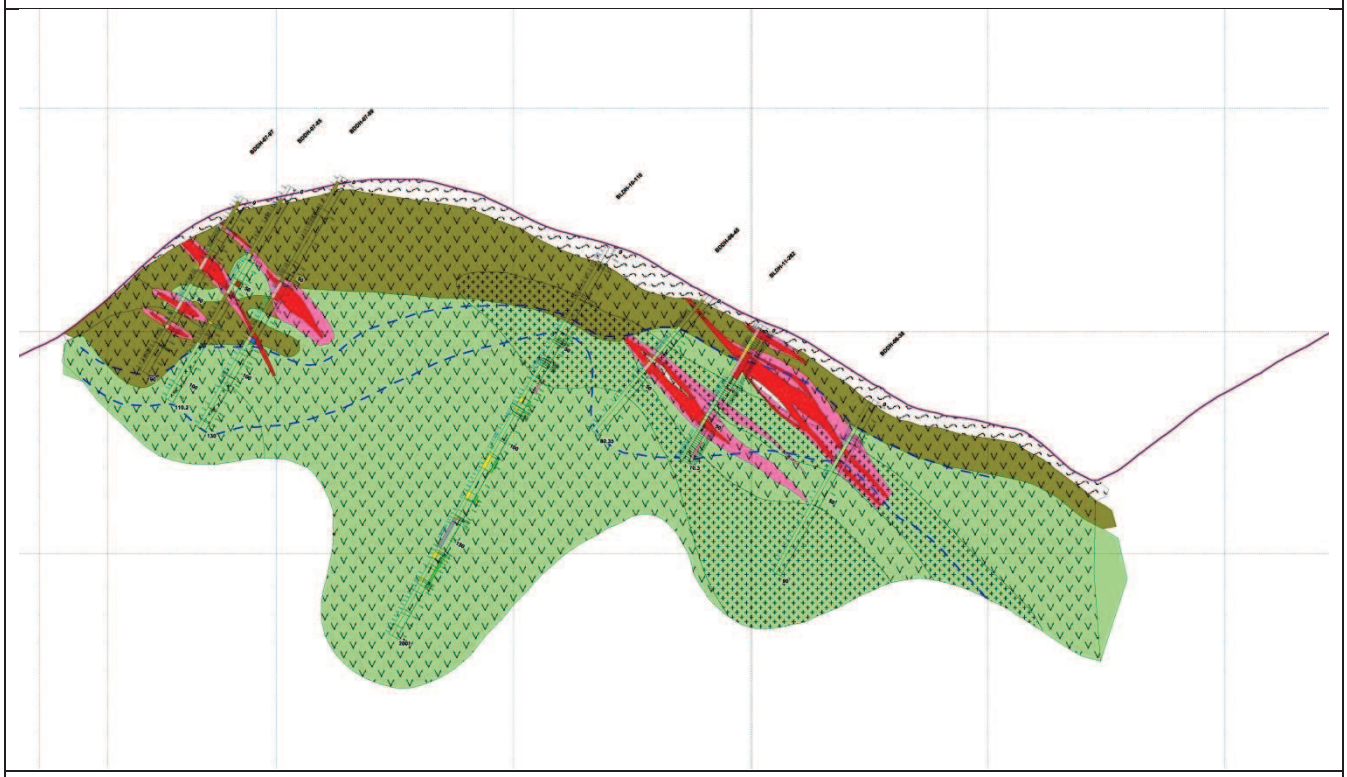

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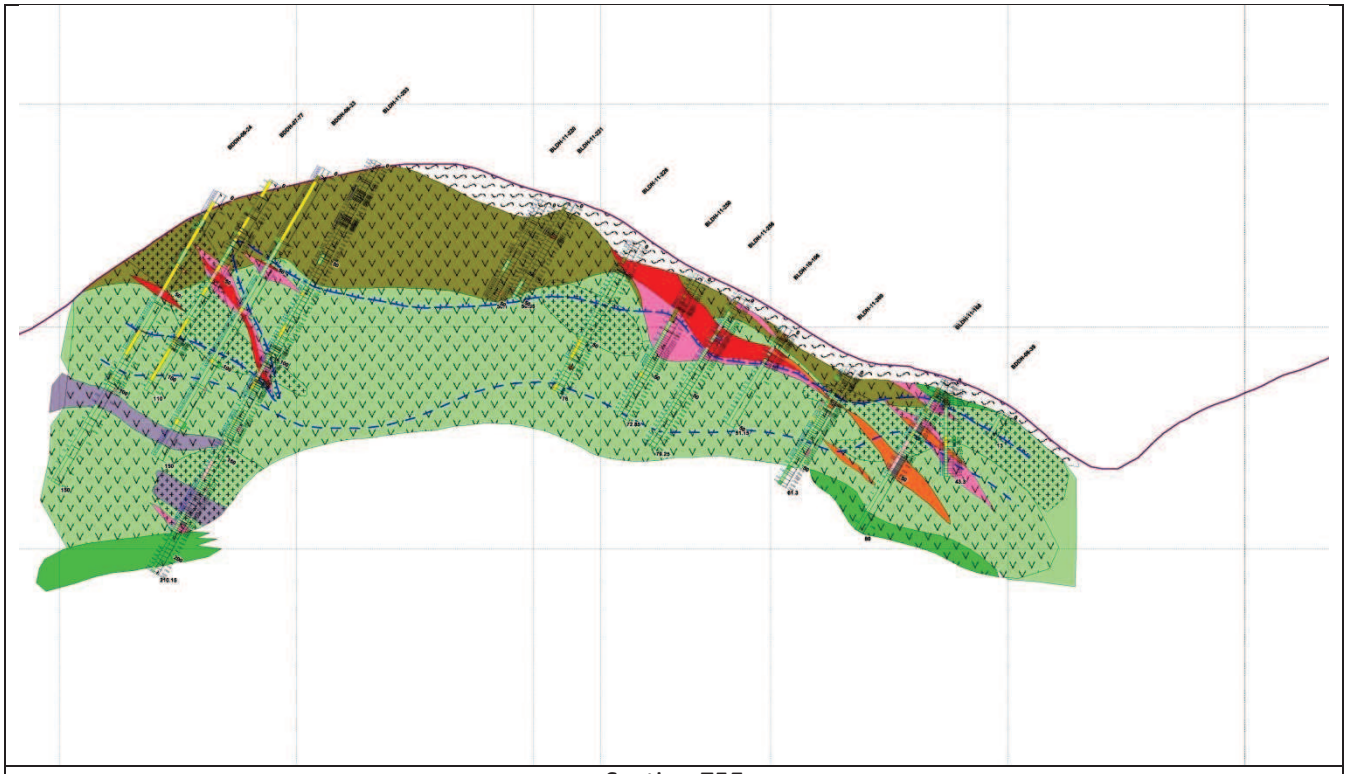

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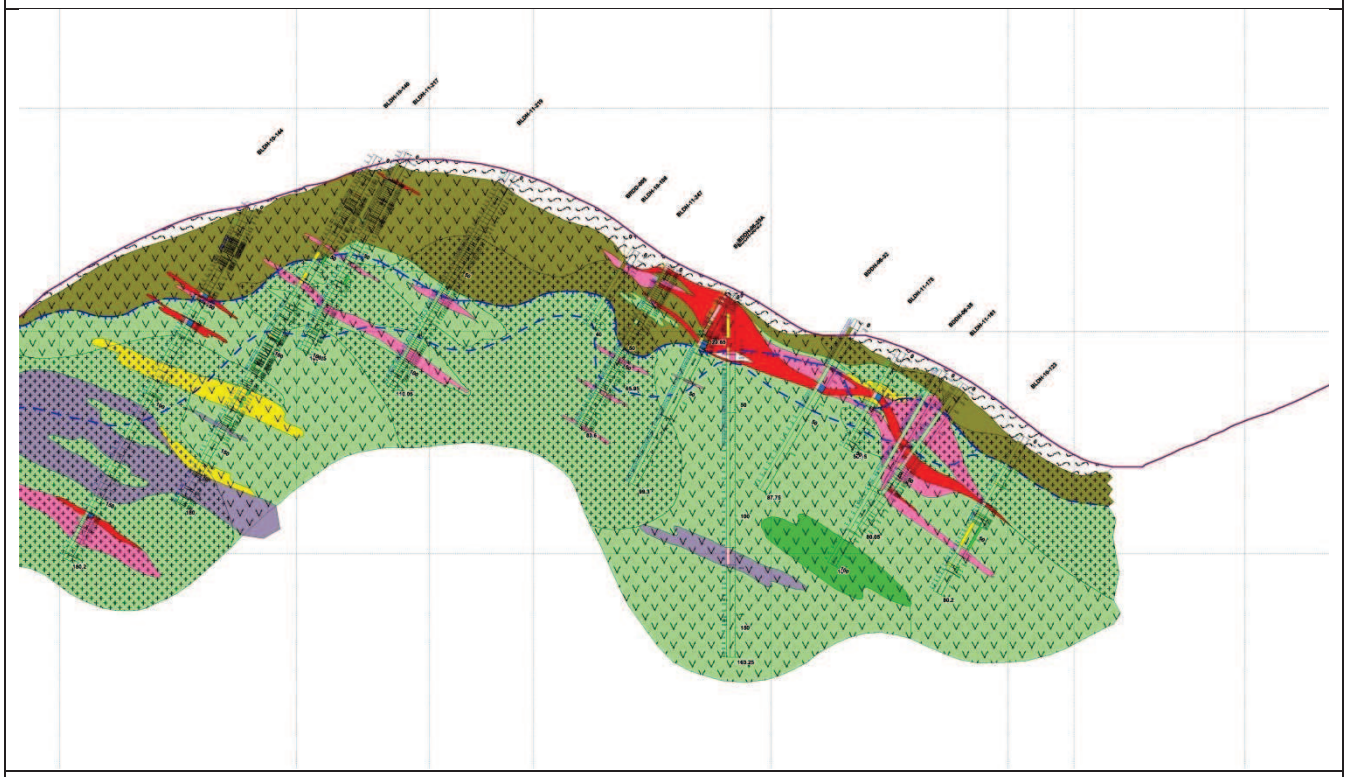

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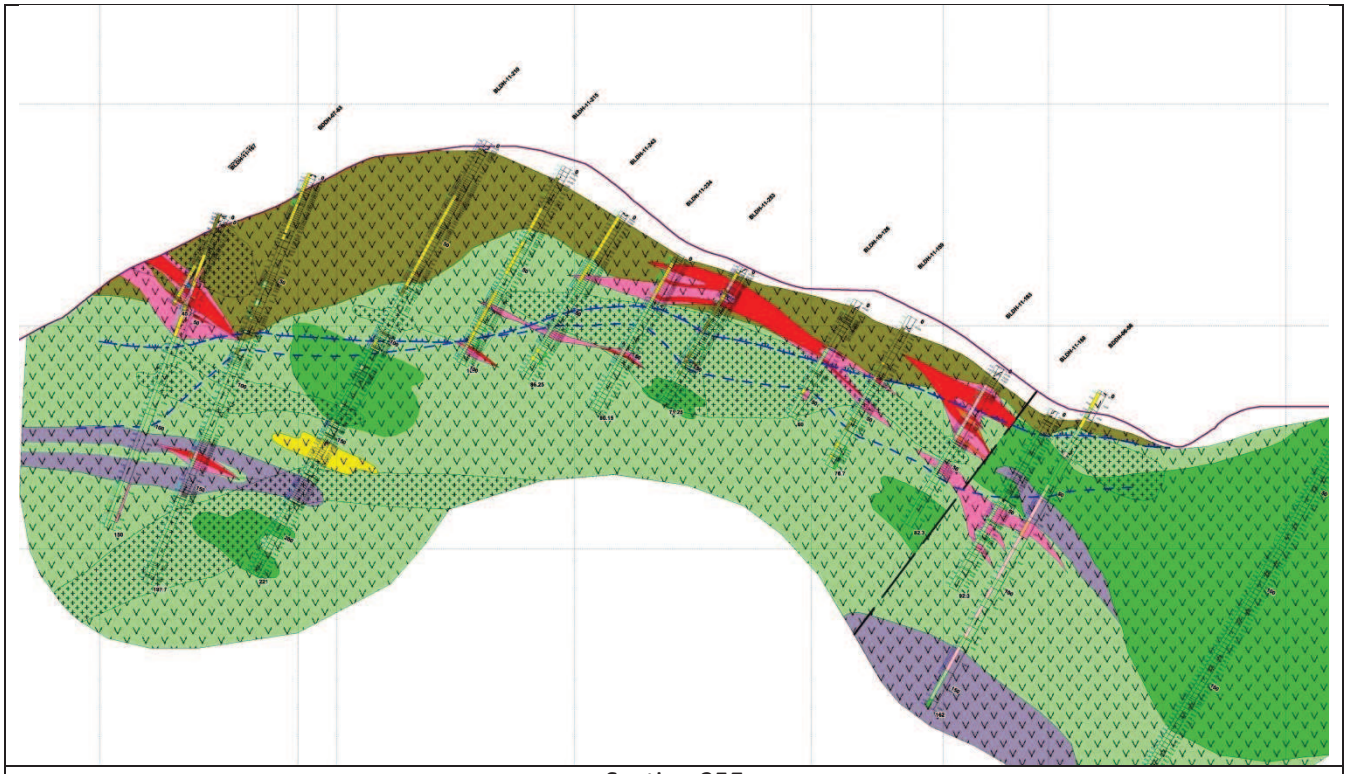

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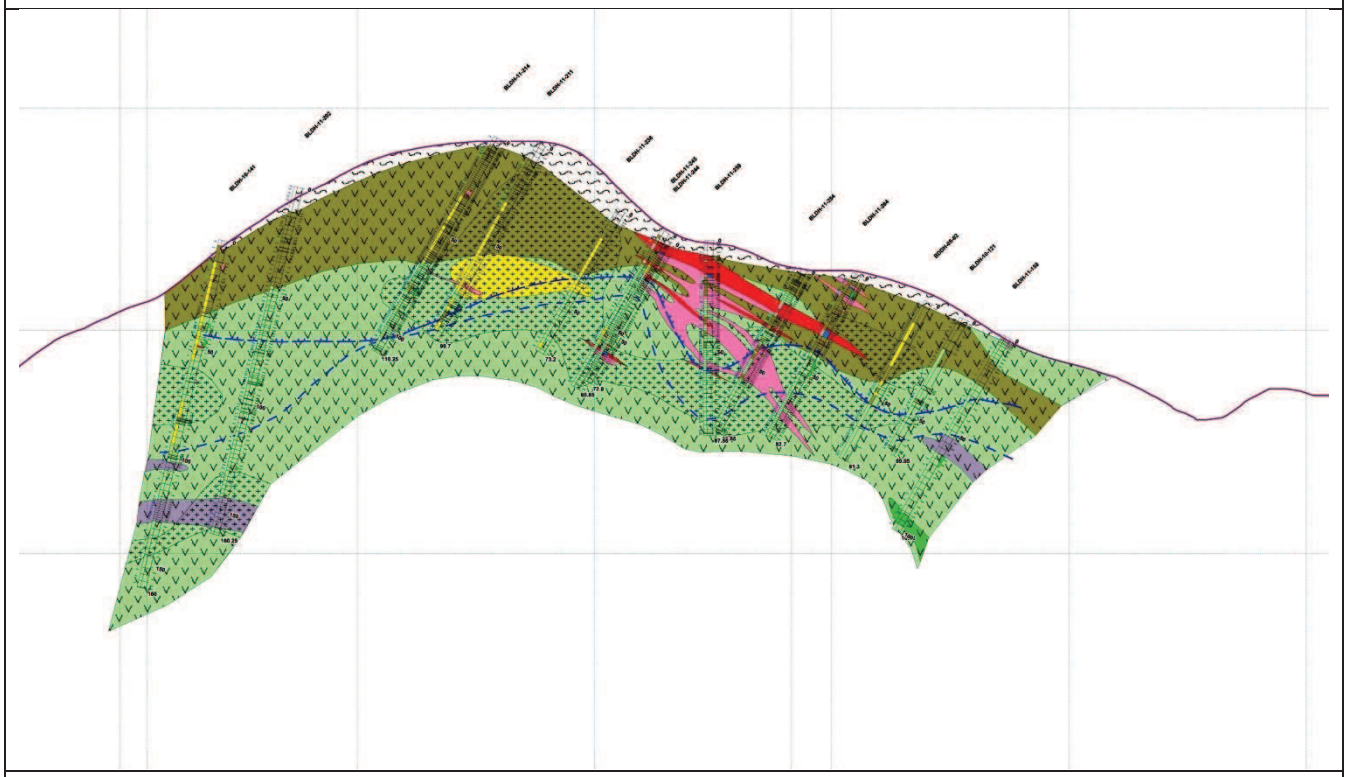

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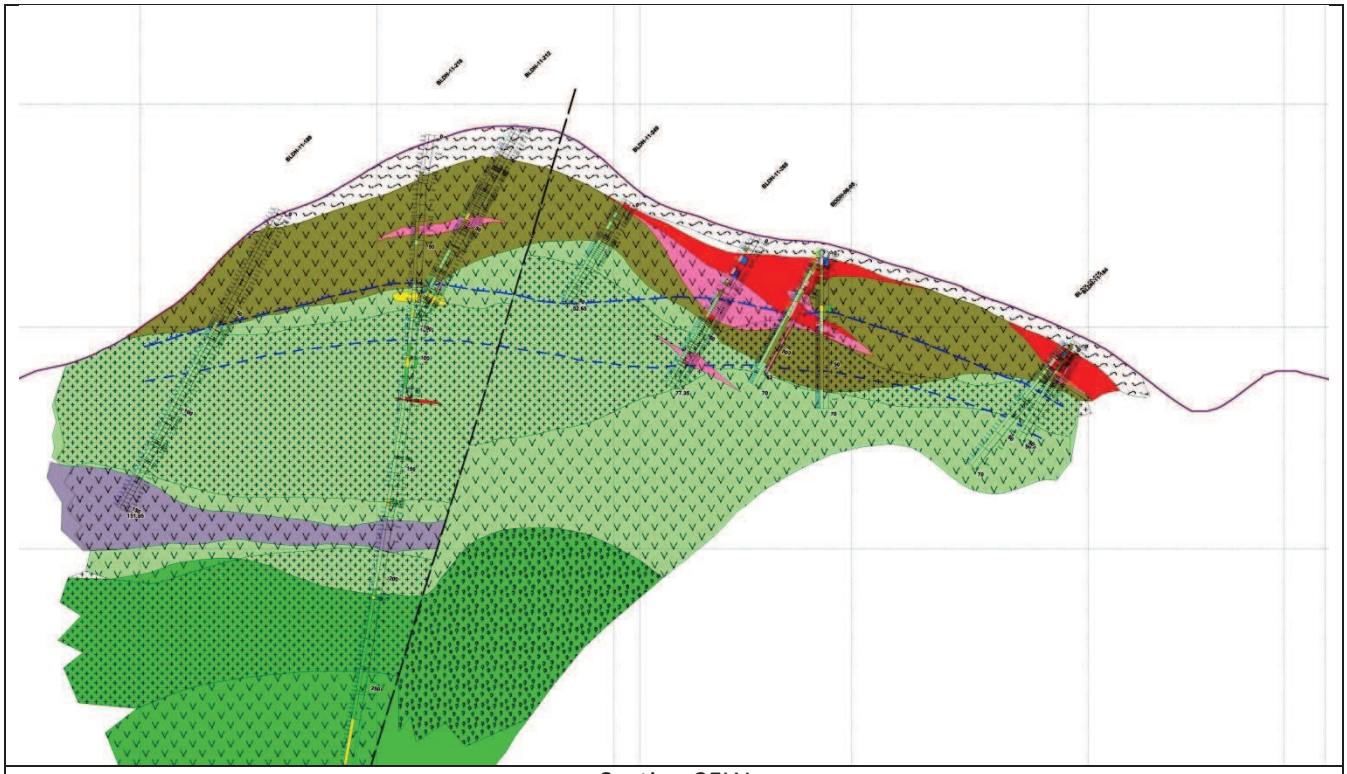

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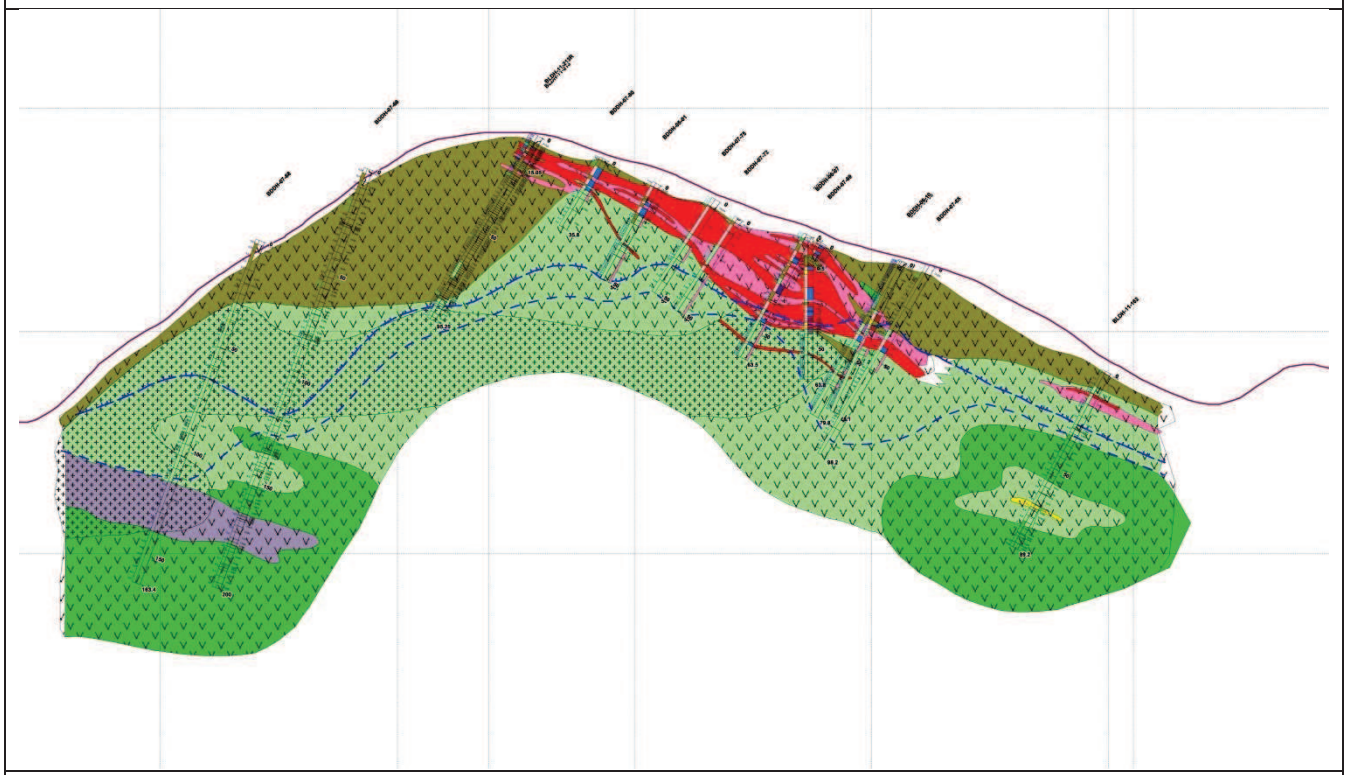

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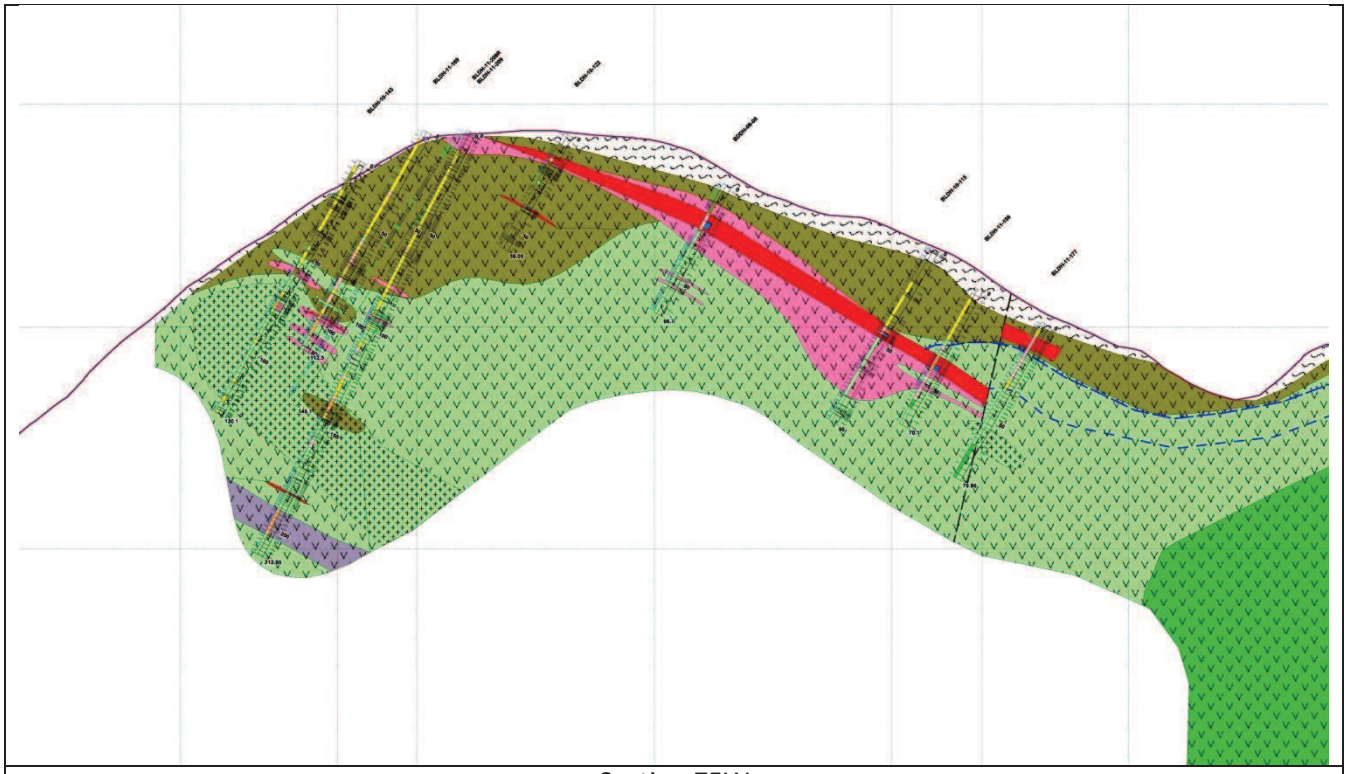

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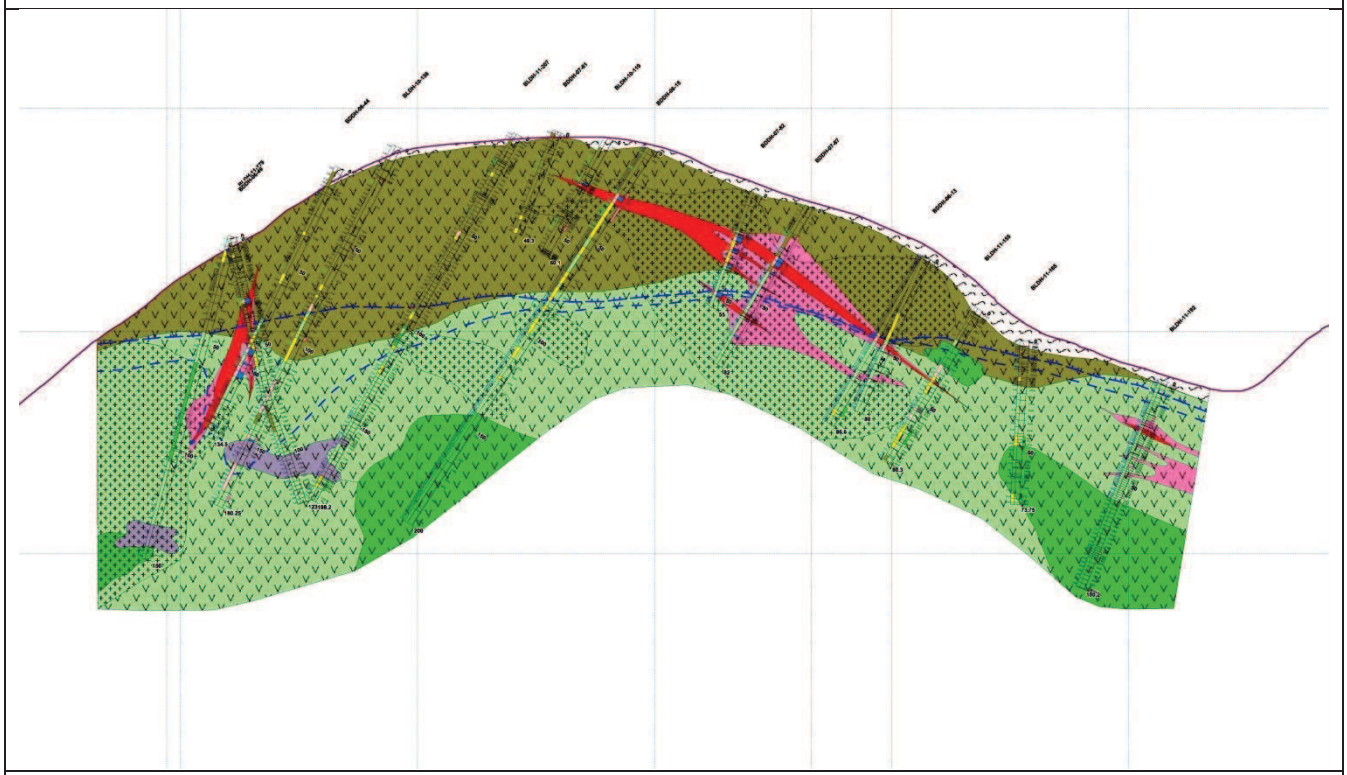

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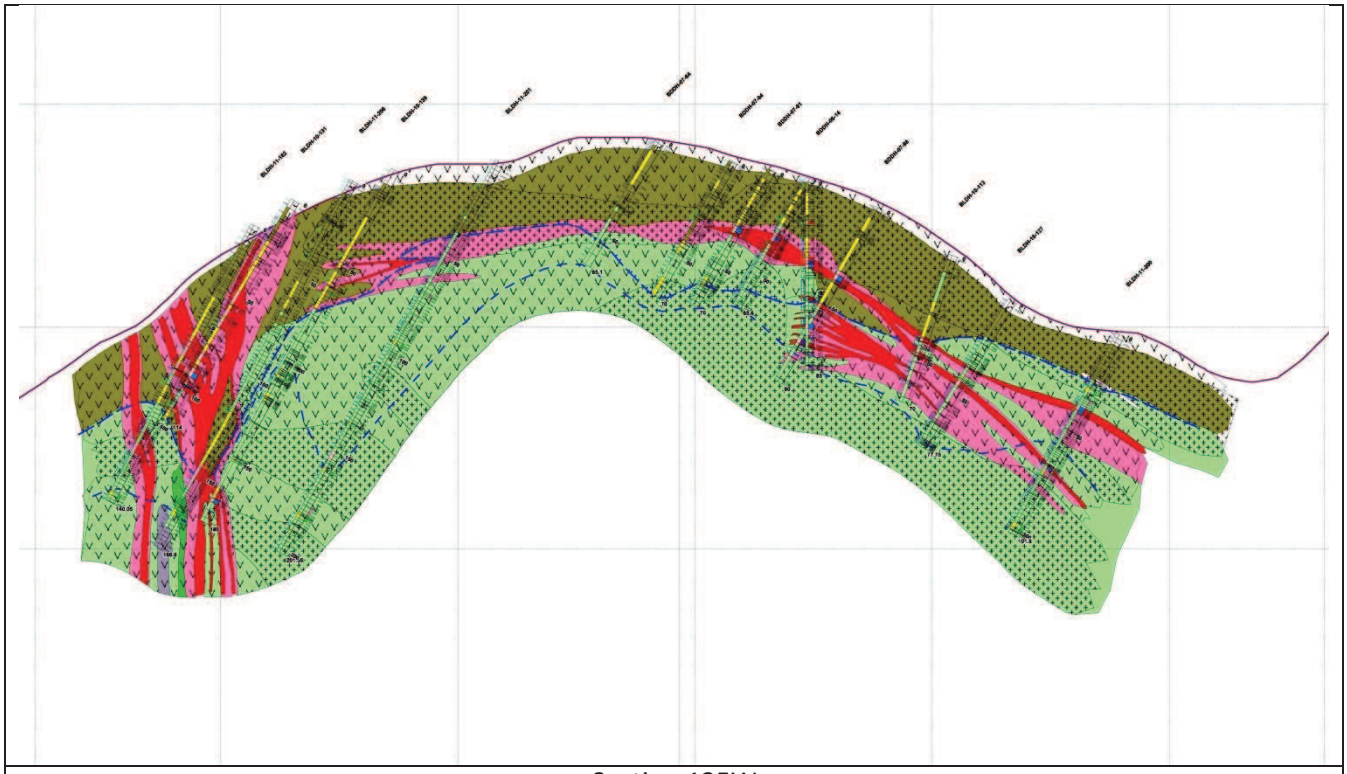

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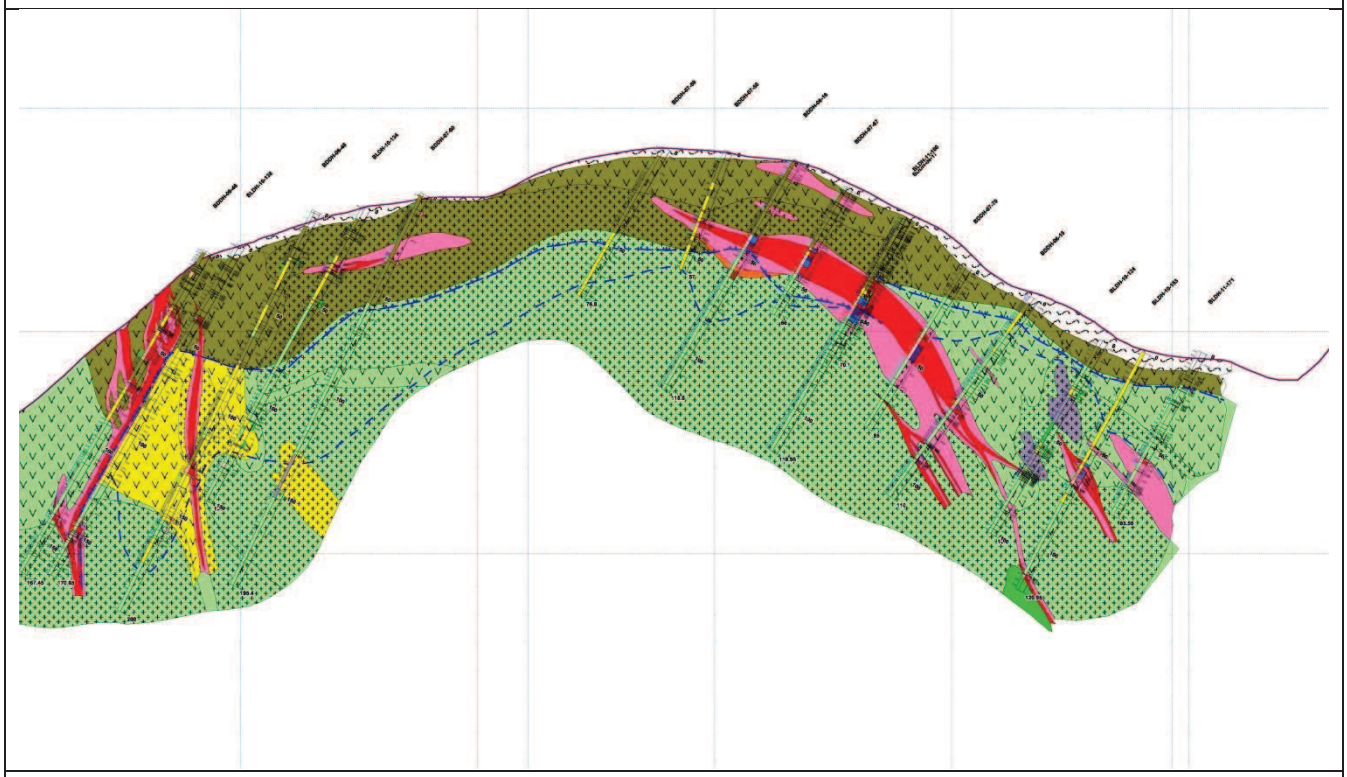

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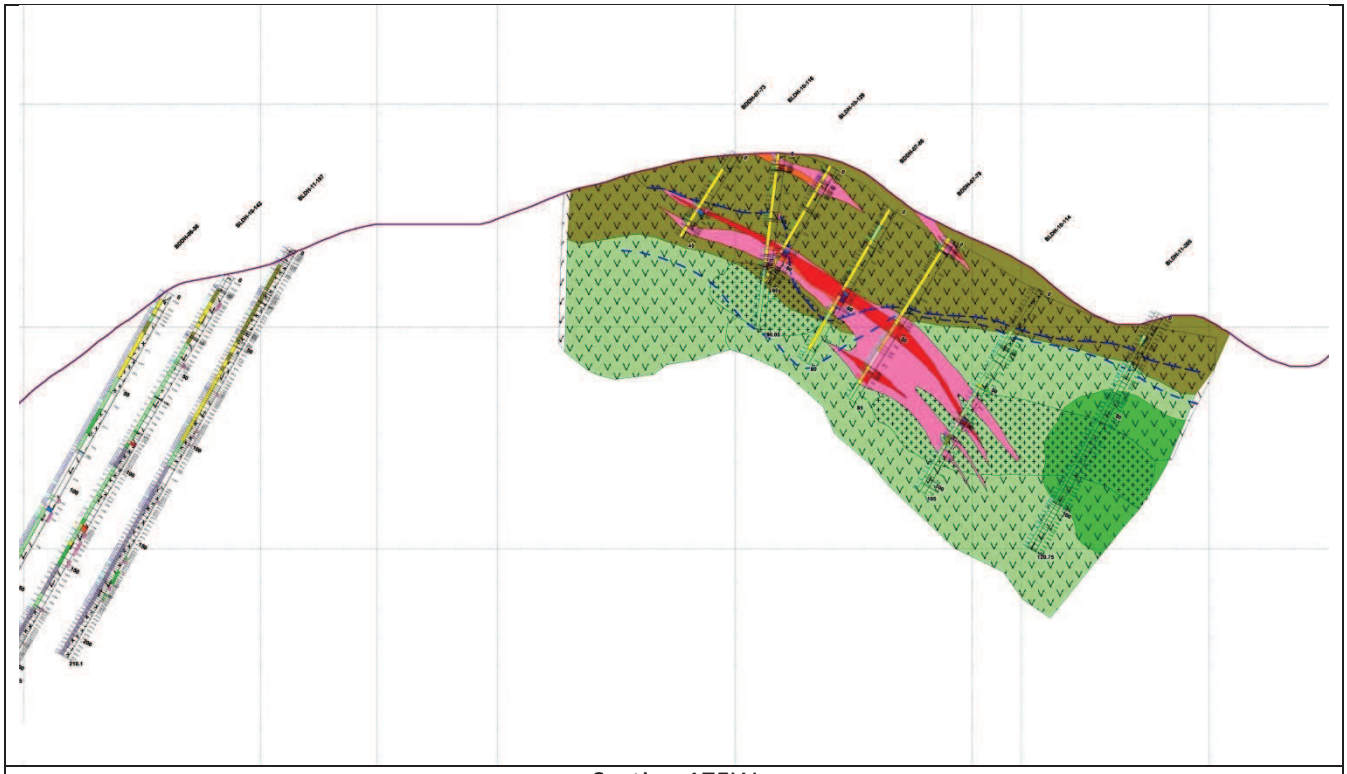

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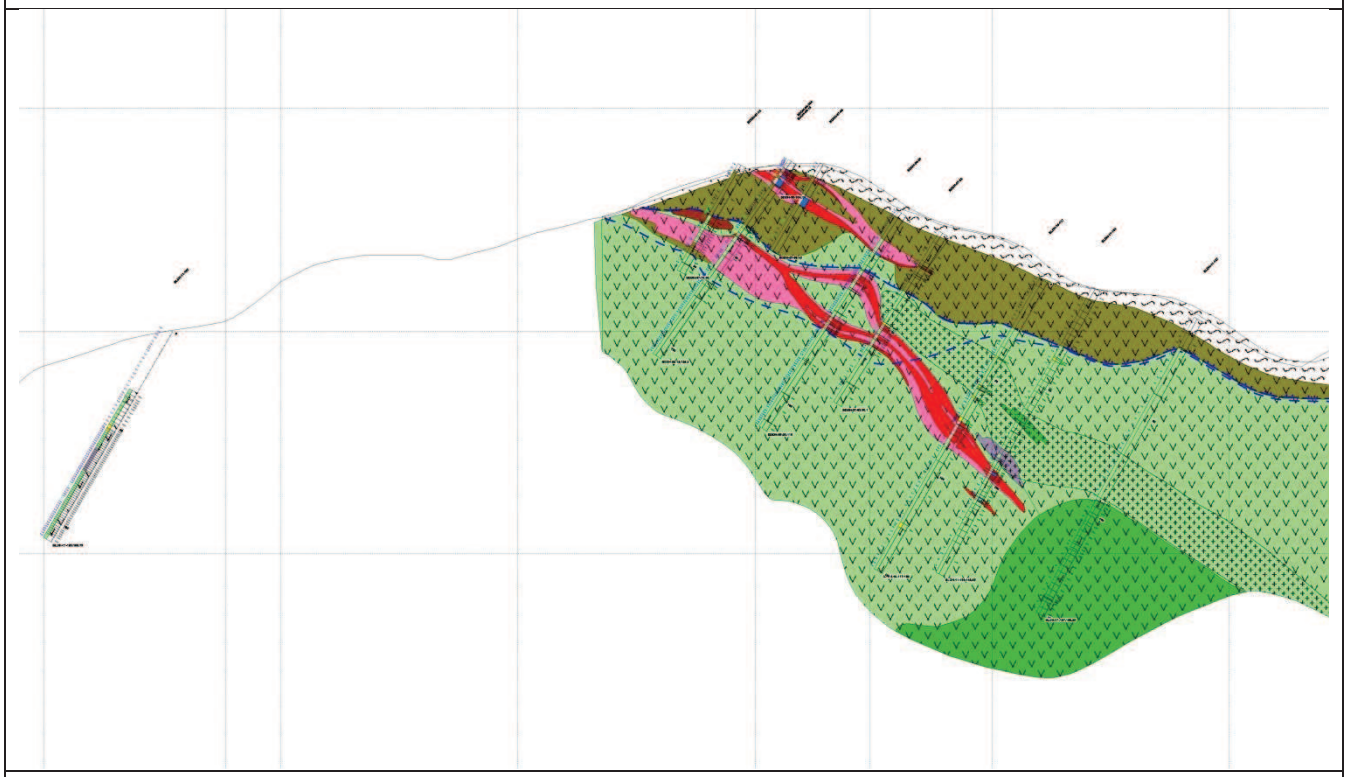

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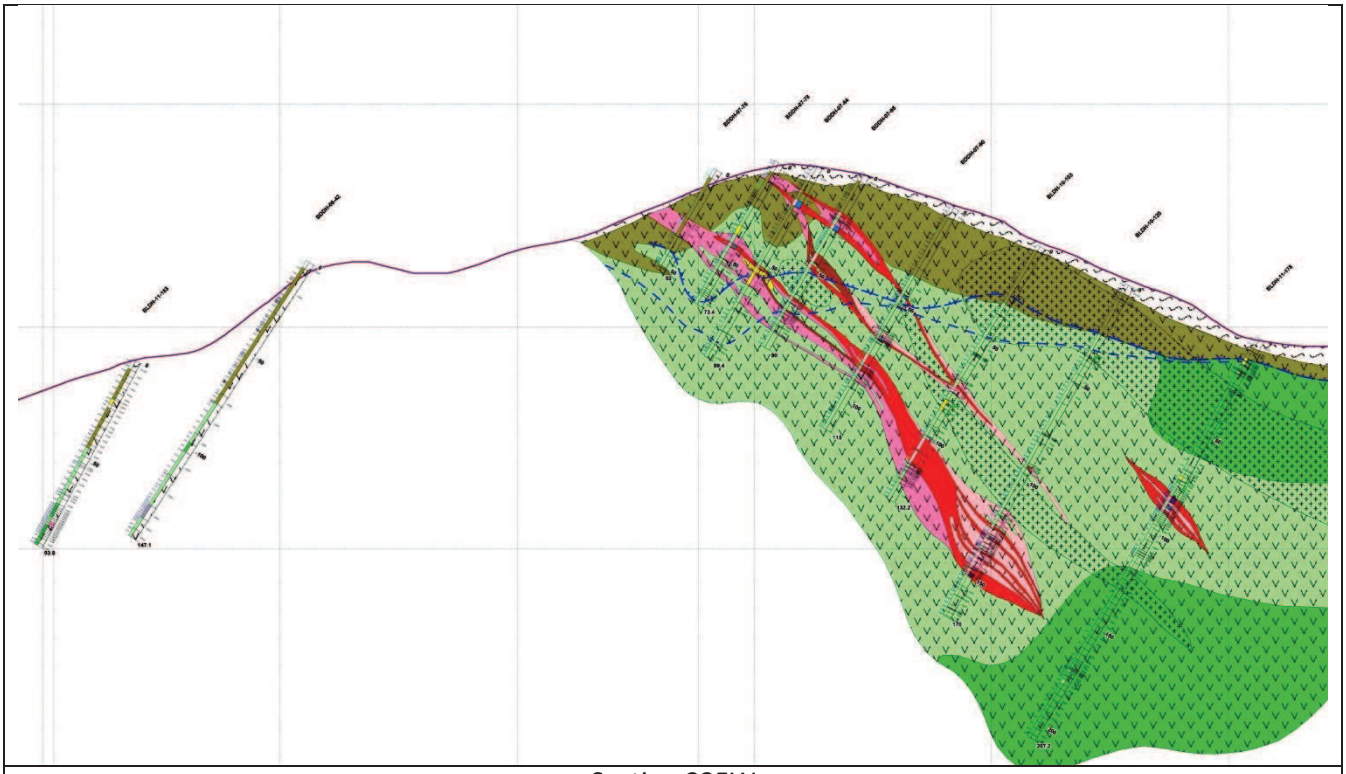

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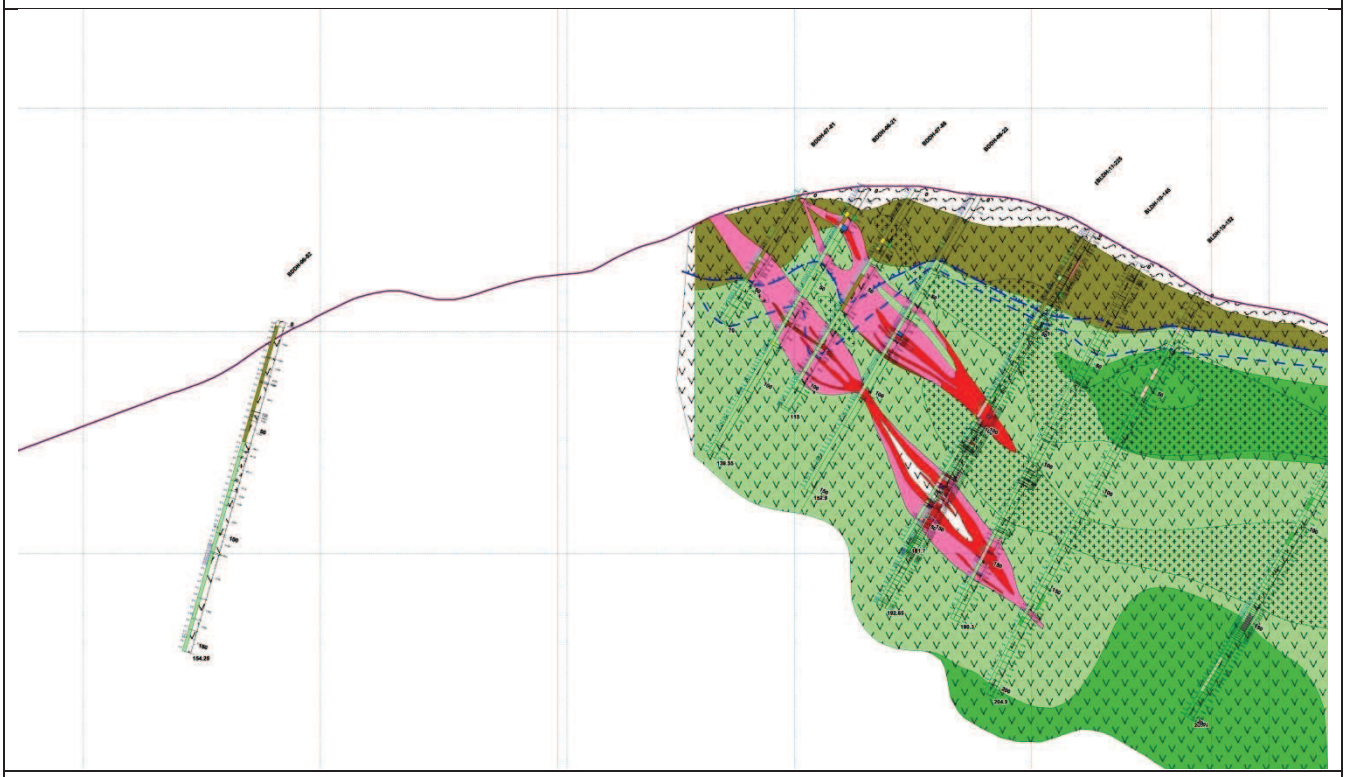

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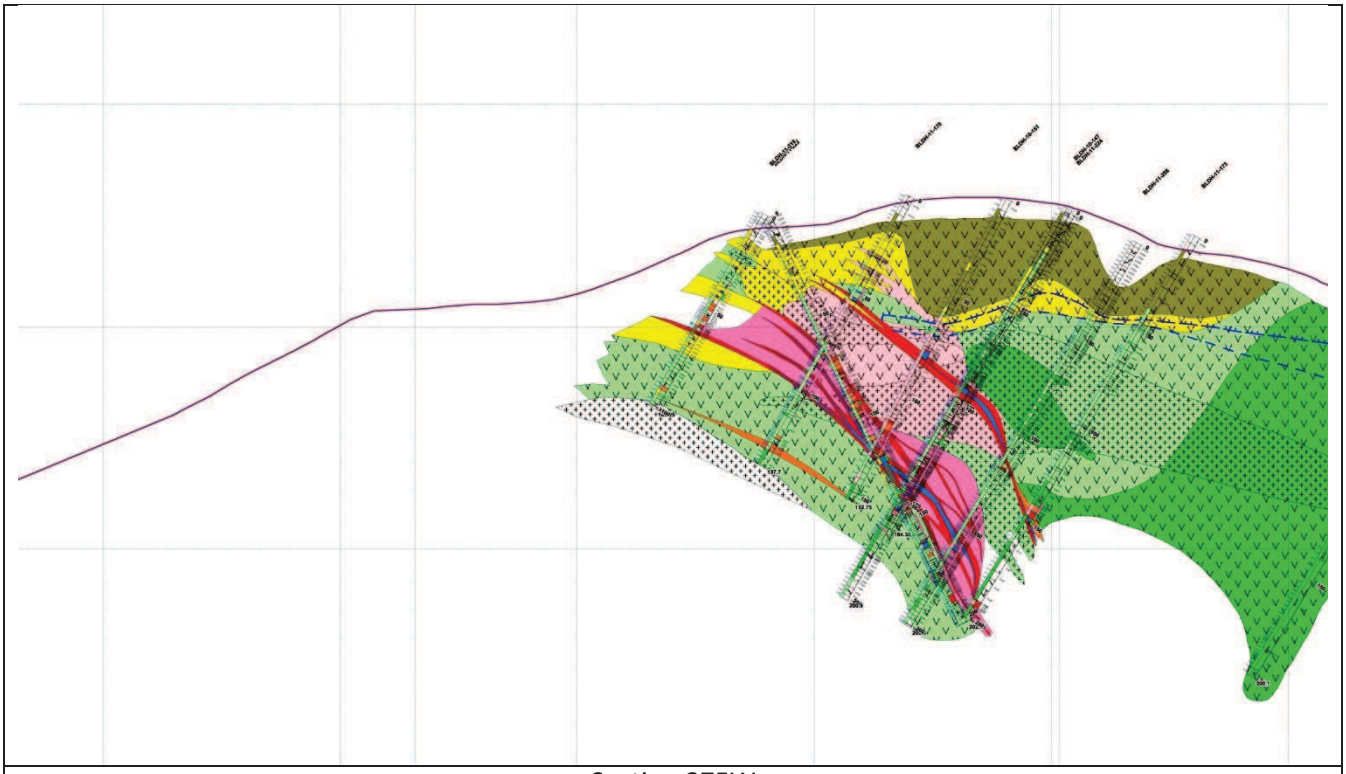

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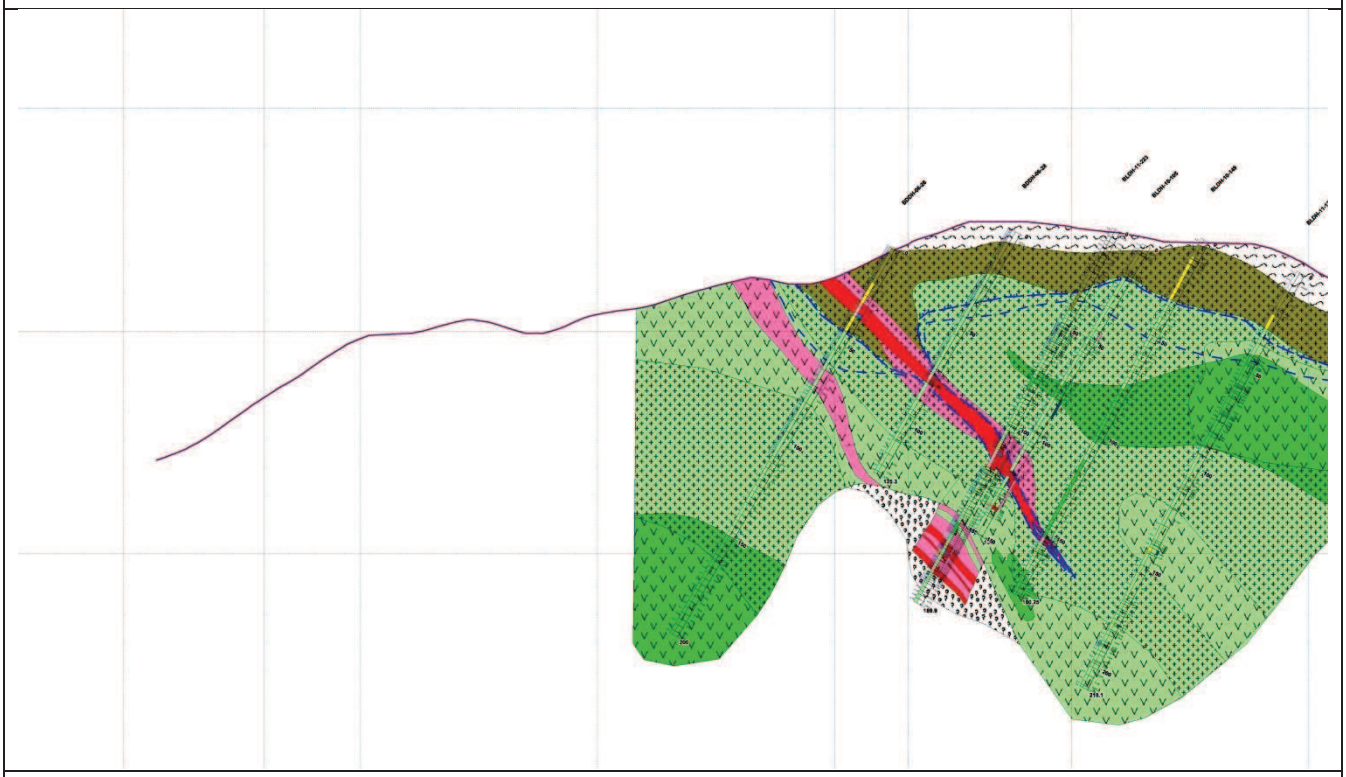

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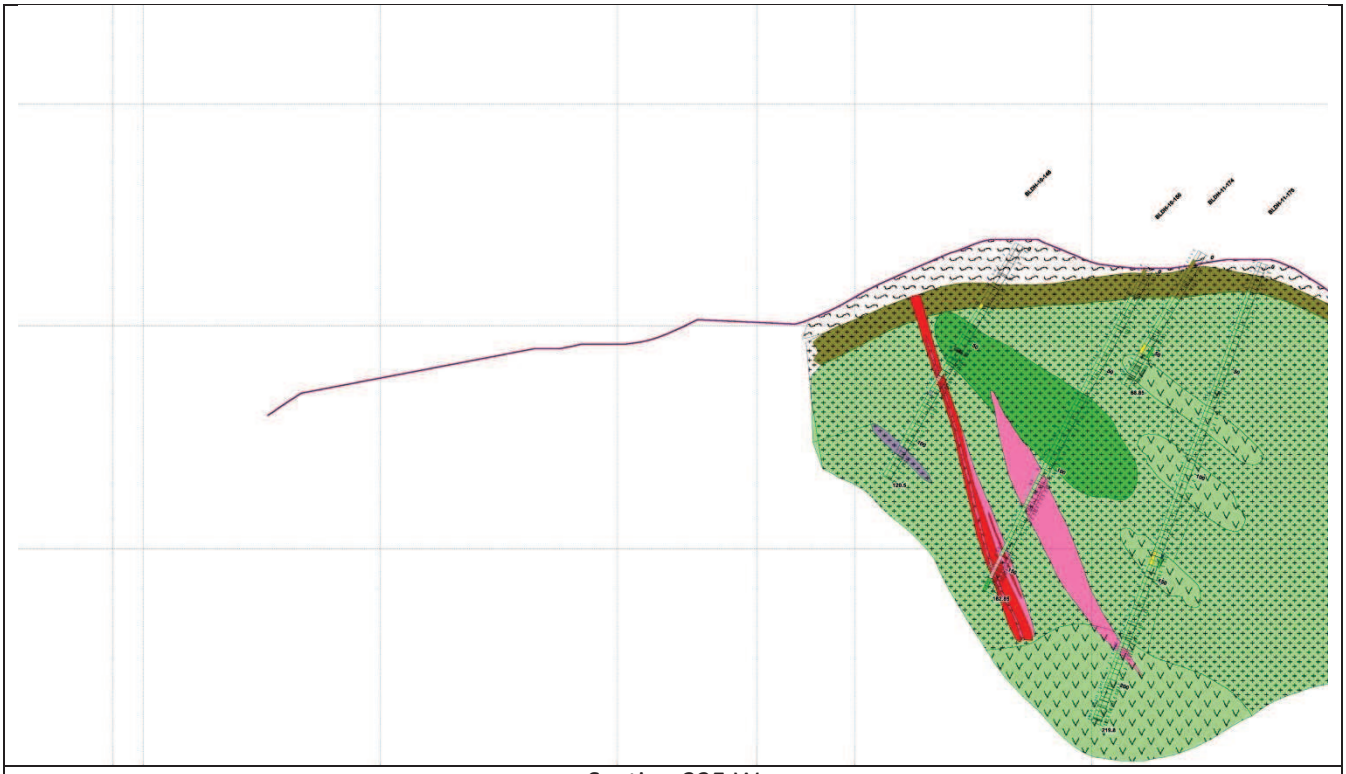

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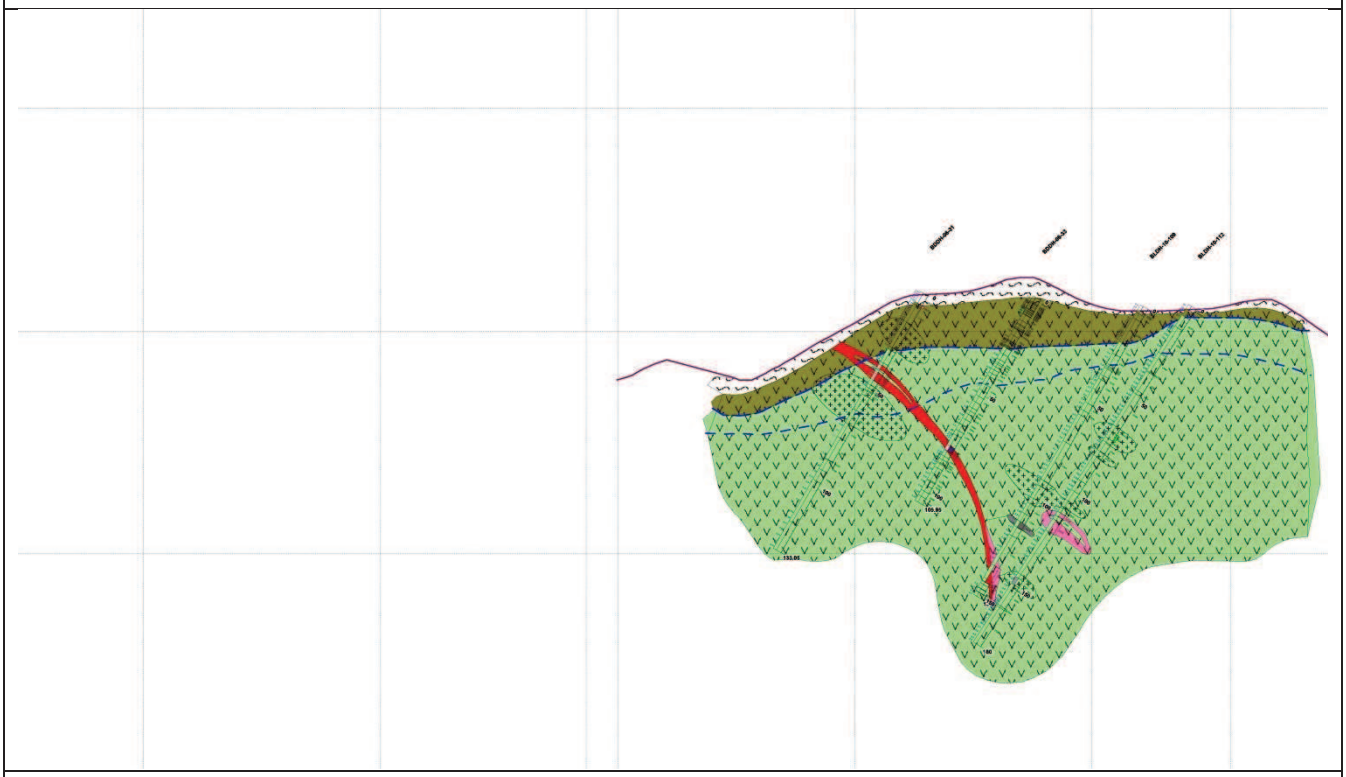

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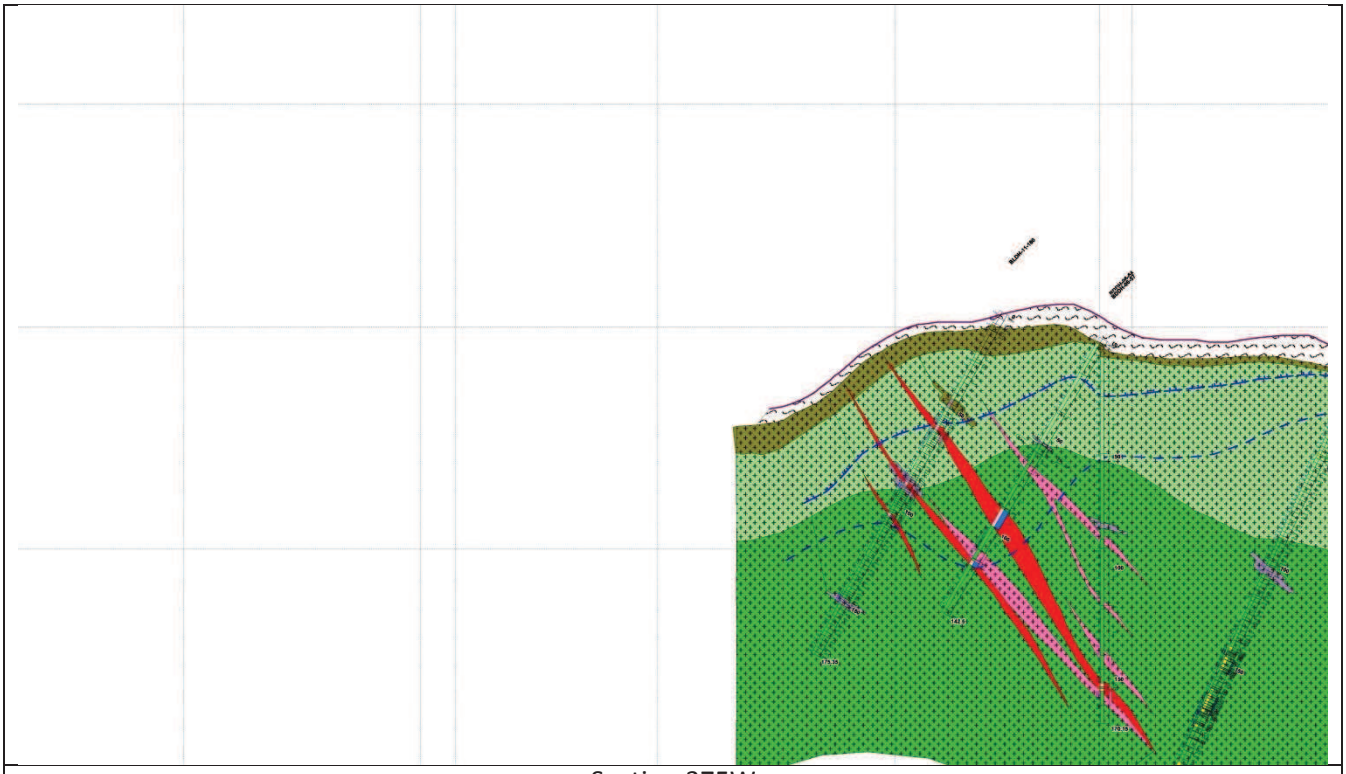

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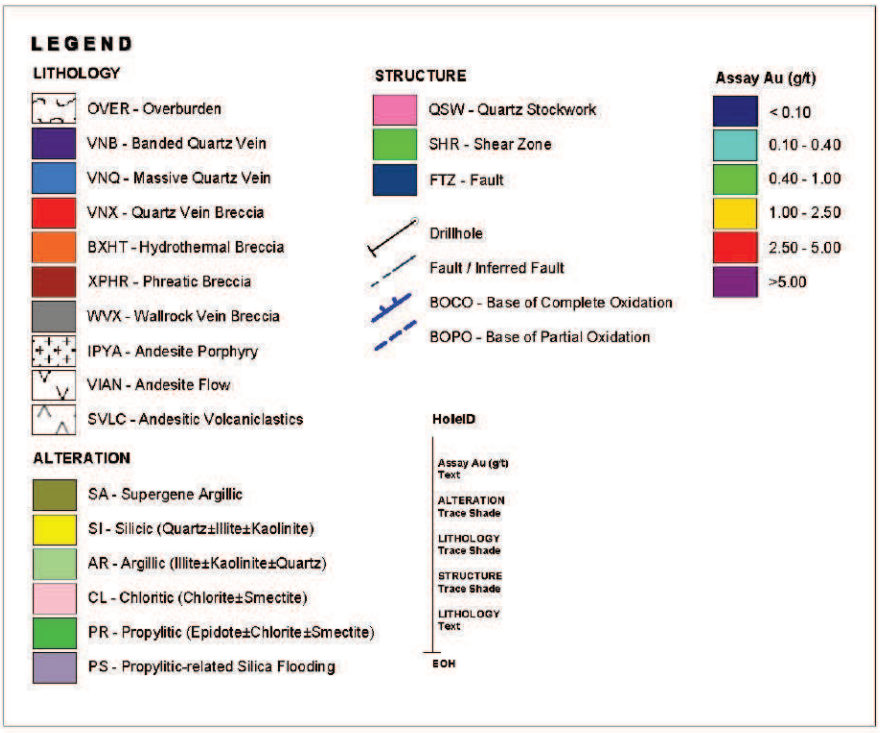


Appendix D Historical Variogram Analysis

The following variograms were reported in Digdigan, K. T. (2012a).

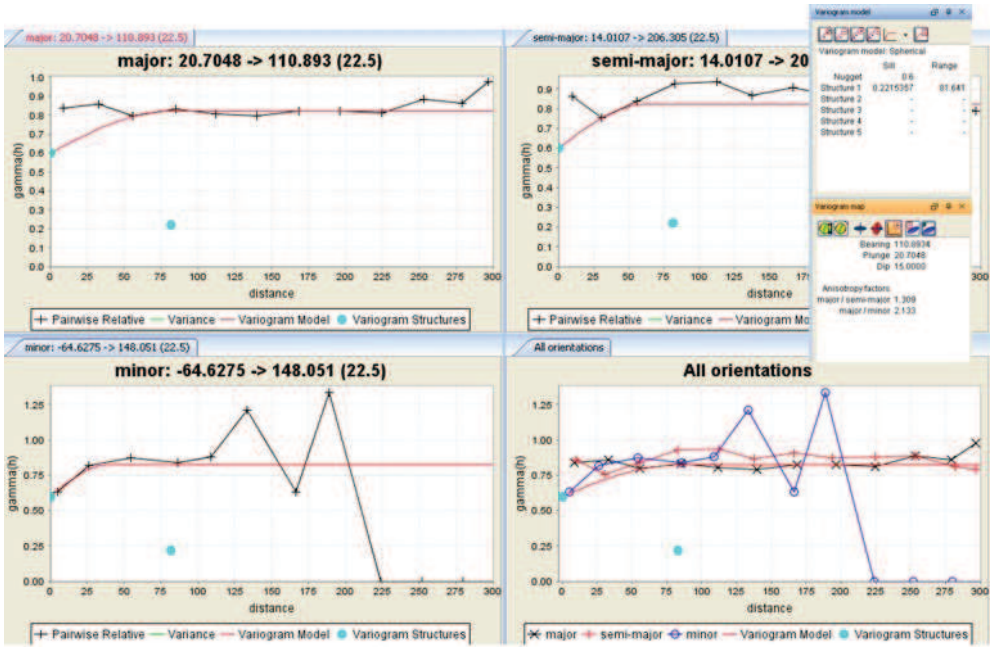


Figure 19: Variogram model for DOMAIN 1 (Point area workspace: DDH_AU_DOM1

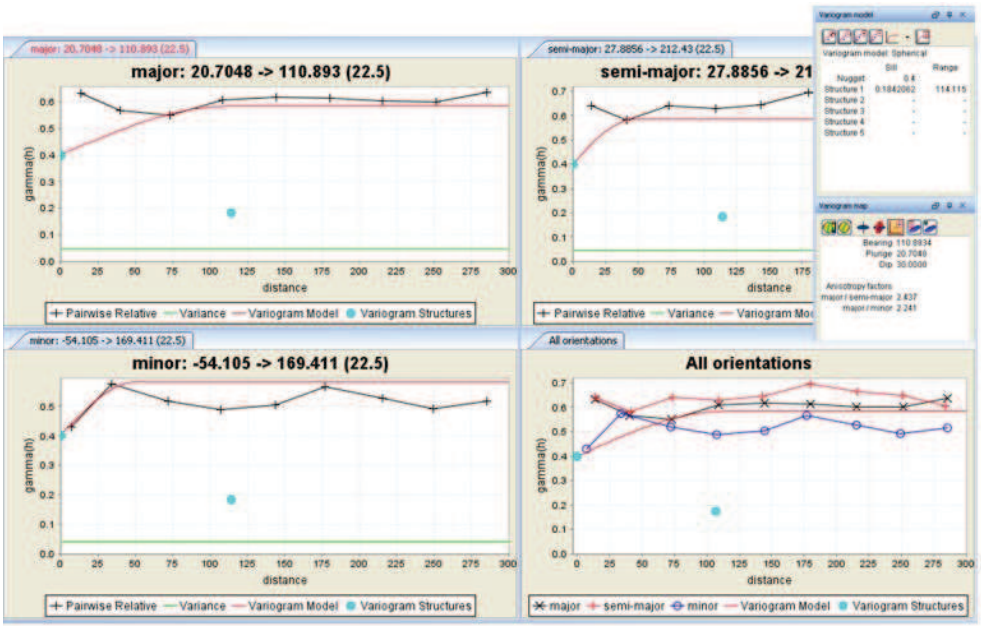


Figure 20: Variogram model for DOMAIN 2 (Point area workspace: DDH_AU_DOM2)

Appendix E Current Study Variogram Analysis

The gold results for Domain 1 were analysed using the VISOR Module of the Snowden Supervisor 8 system .

Shown below are results obtained using log-transformed gold values, which yielded satisfactory variograms for both the Horizontal and Dip planes (as defined in the Supervisor 8 system). However, even after extensive analysis, it was not possible to identify a useable variogram in the Across Strike plane, and hence this approach was taken no further[14].

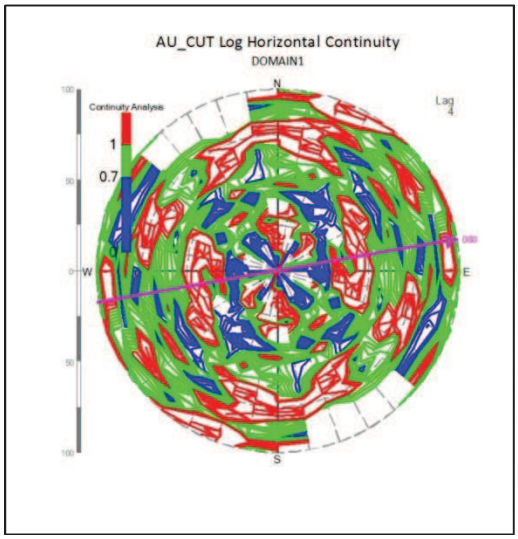


Figure 21: Horizontal Plane variogram fan contour map.

[14] The reasons for non-discovery of a viable Across Strike variogram are thought to lie with the geometry of the available sample positions for variogram derivation, as it is controlled by the stacked nature of discrete clusters of Domain 1 samples separated by significant distances of non-Domain 1 material (and therefore no sample points qualifying for variogram derivation).

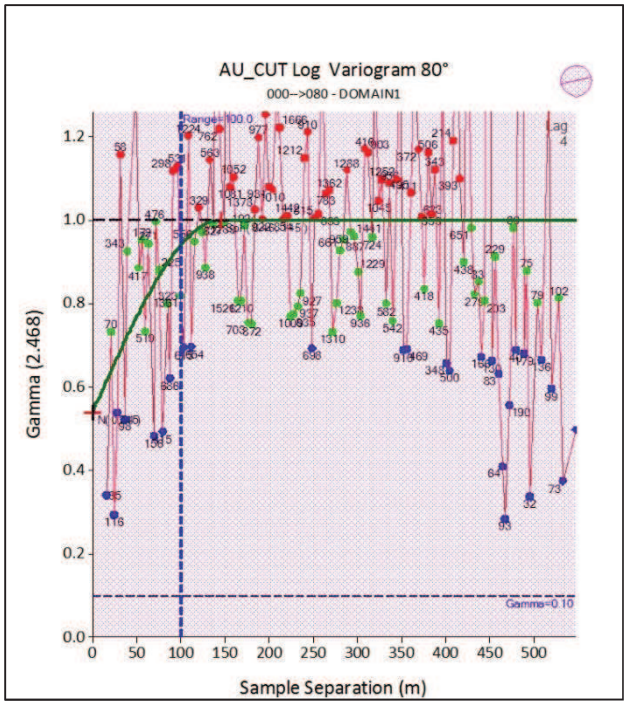


Figure 22: Horizontal Plan variogram in direction 080 degrees.

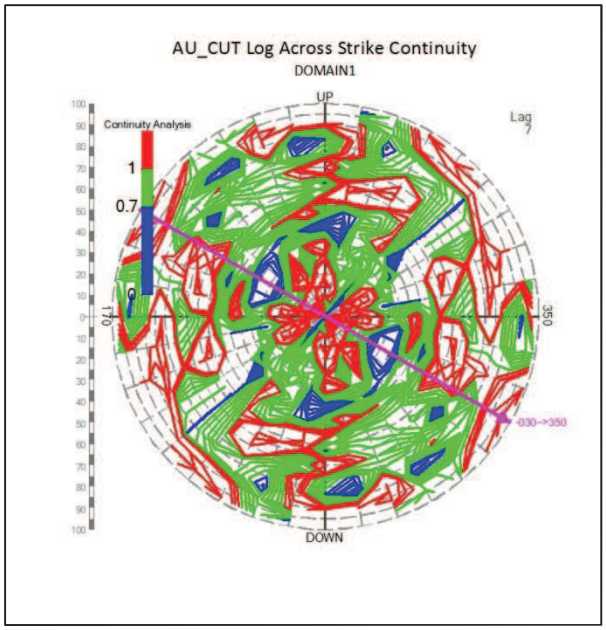


Figure 23: Across Strike Plane variogram fan contour map.

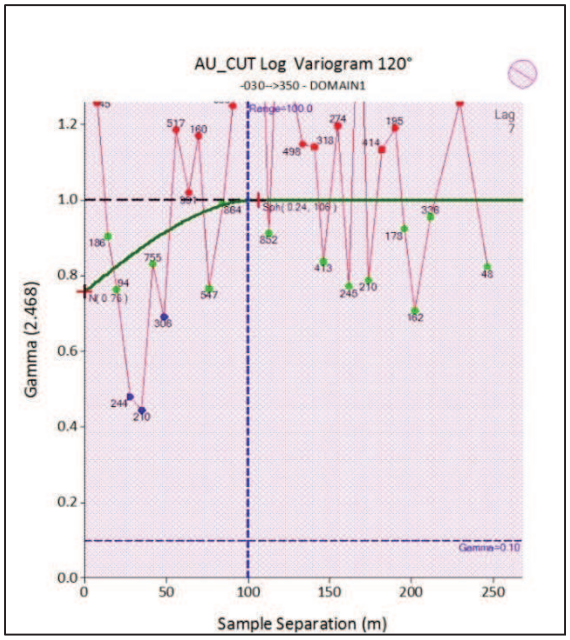


Figure 24: Across Strike Plane variogram (unacceptable) in direction 080 degrees. See Figure X below for the variogram in direction degrees.

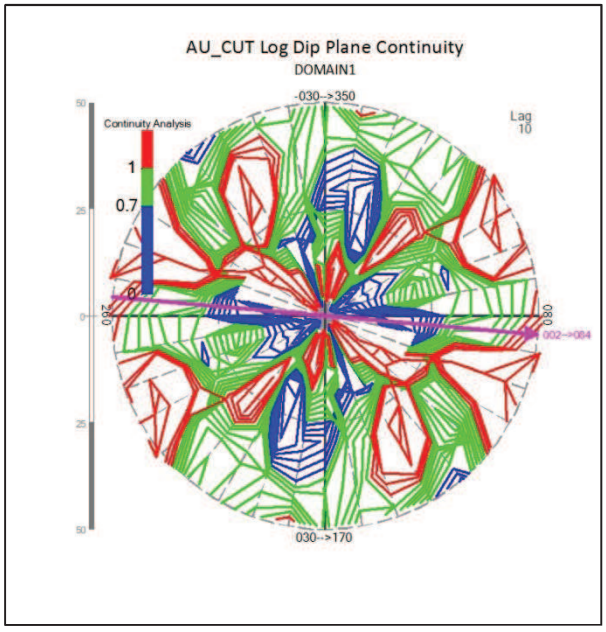


Figure 25: Dip Plane variogram fan contour map

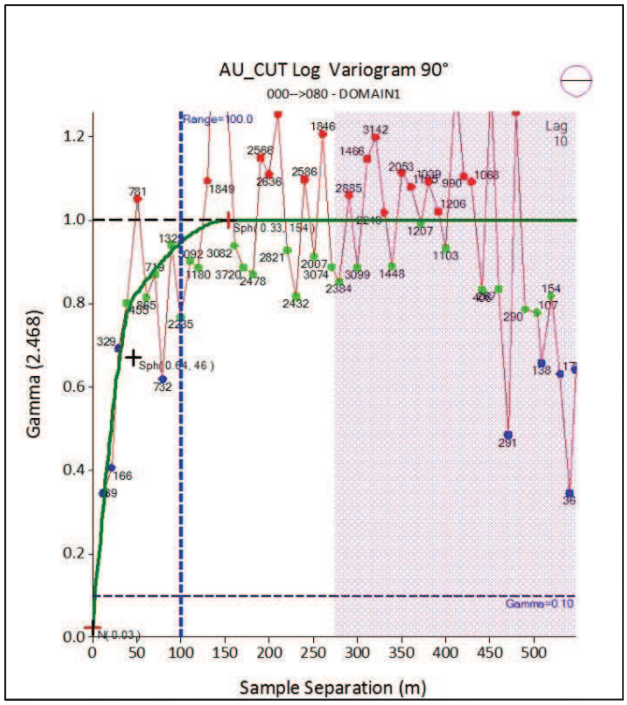


Figure 26: Dip Plane variogram.

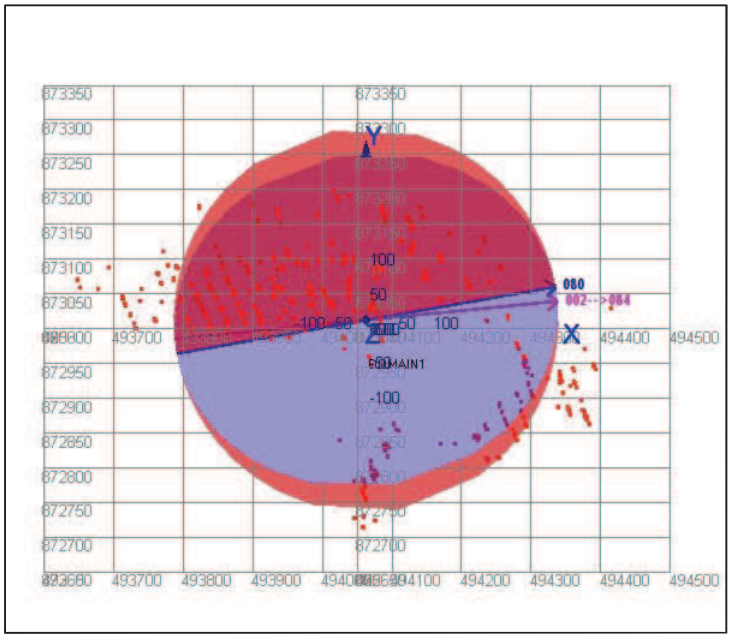


Figure 27: 3D view of plane of maximum continuity of gold grade viewed from above.

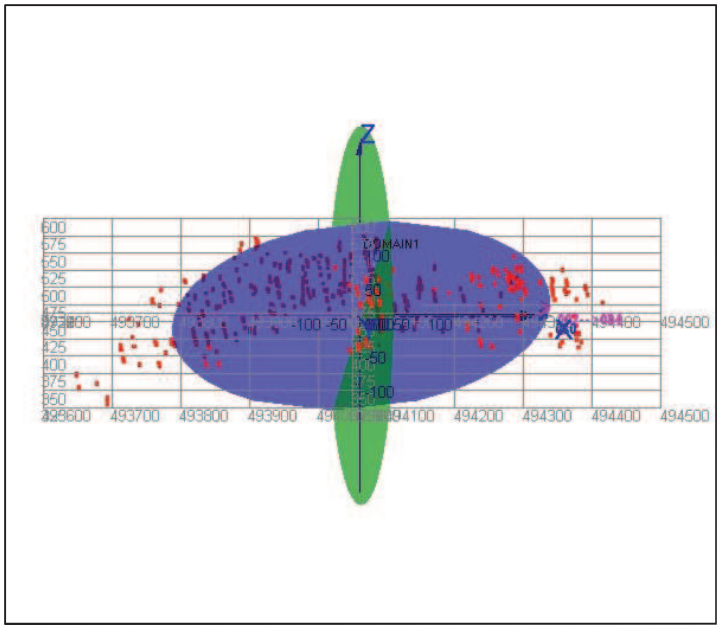


Figure 28: 3D view of plane of maximum continuity of gold grade viewed from the South.

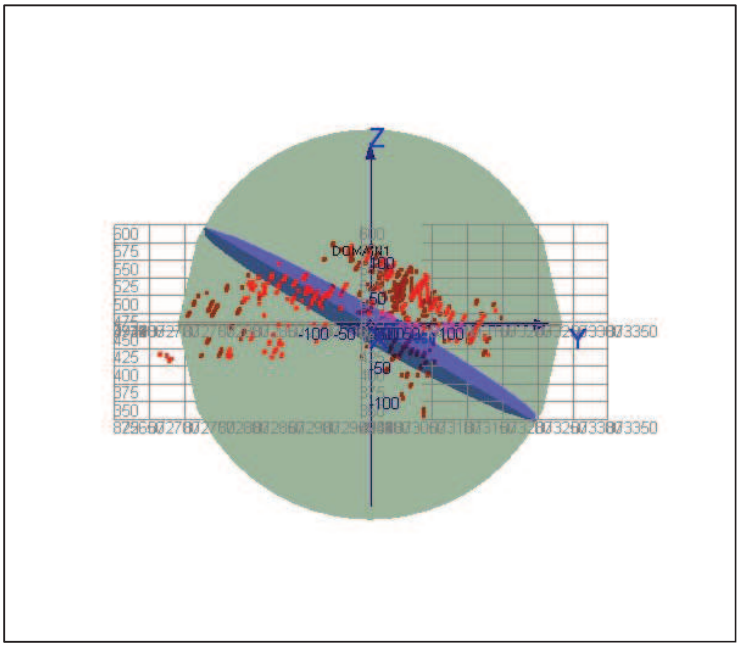


Figure 29: 3D view of plane of maximum continuity of gold grade viewed from the East.

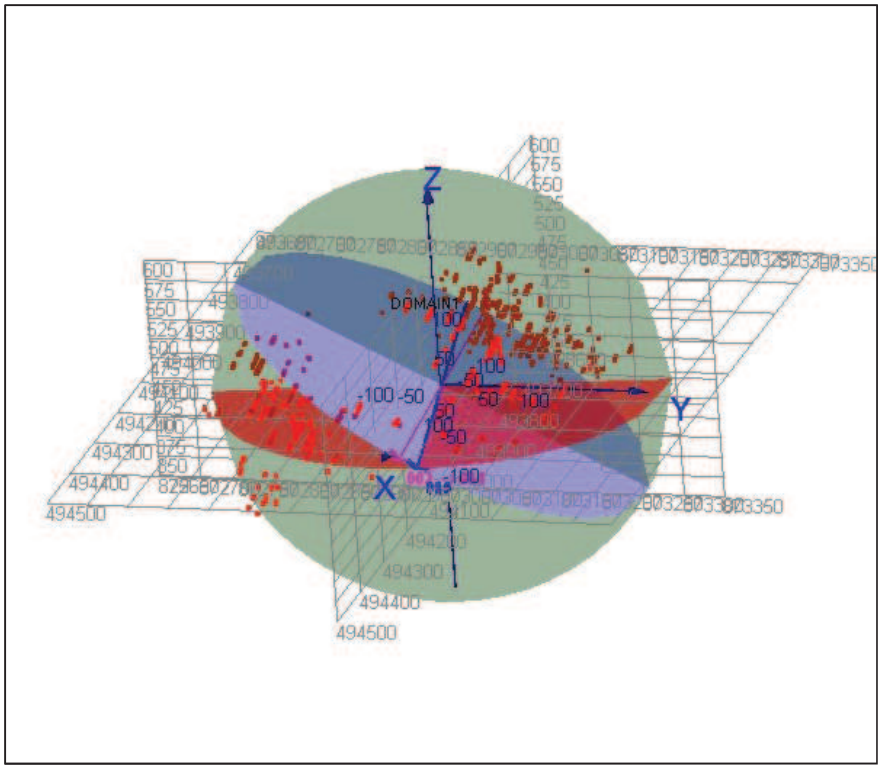


Figure 30: 3D view of plane of maximum continuity of gold grade viewed from the East, rotated.

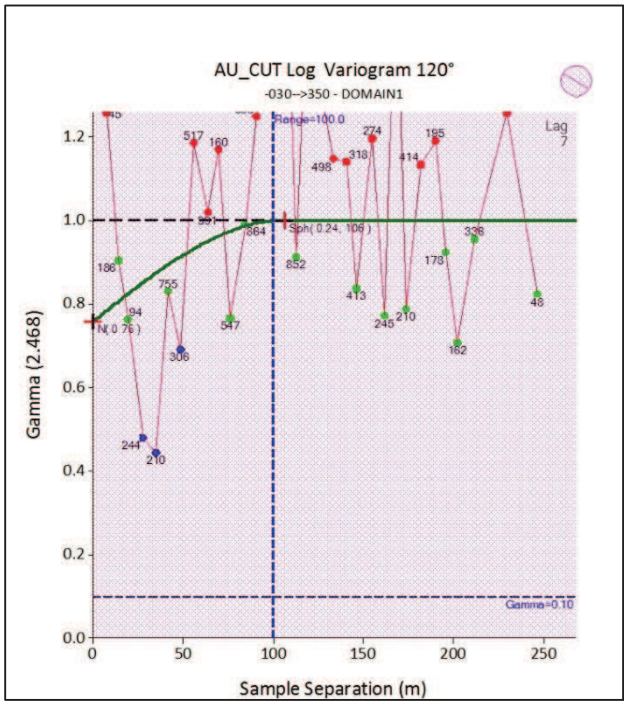
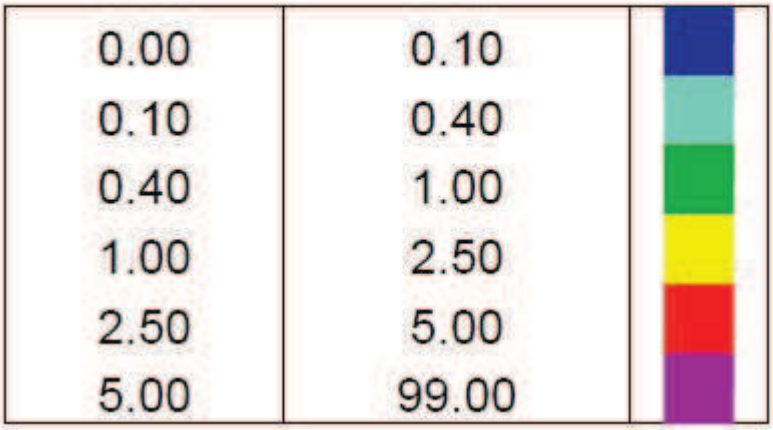
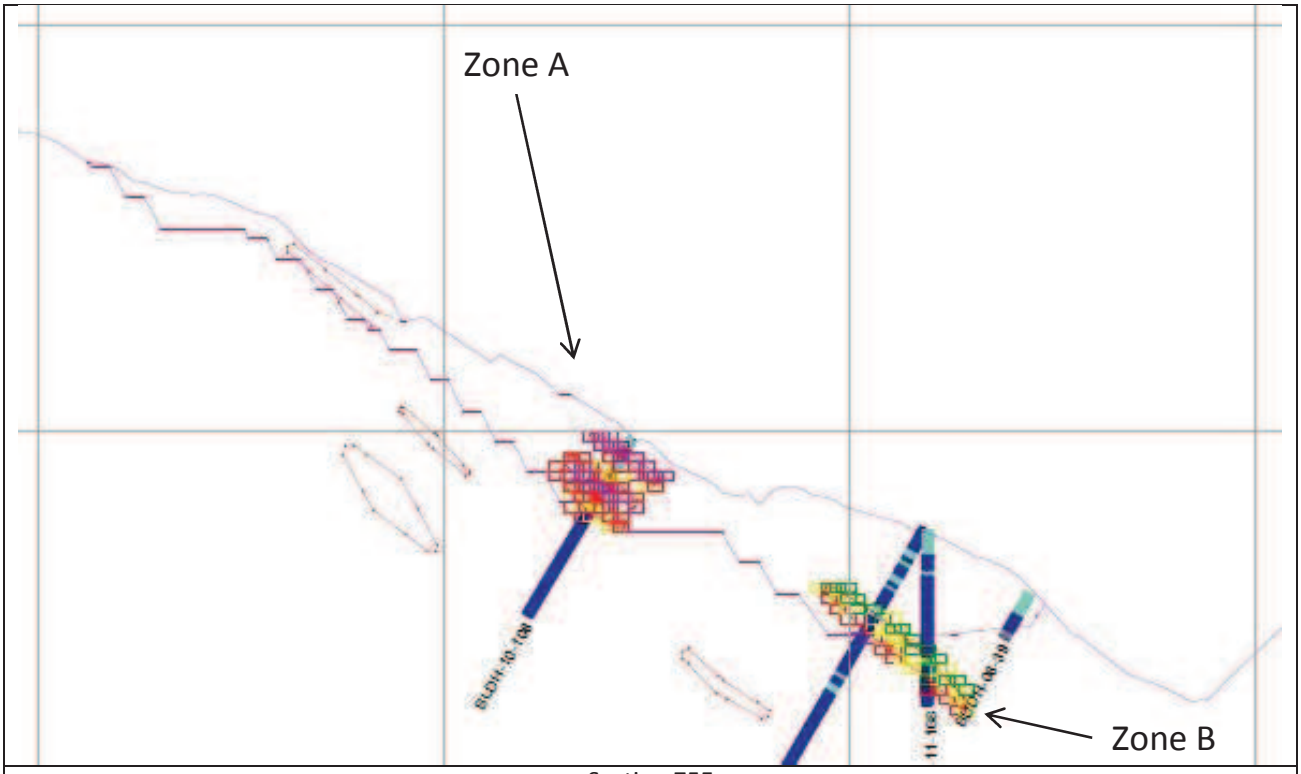


Figure 31: Across Strike Plane variogram in direction 120 degrees. Its quality appears acceptable, but it is in a direction perpendicular to the direction of vein continuity!

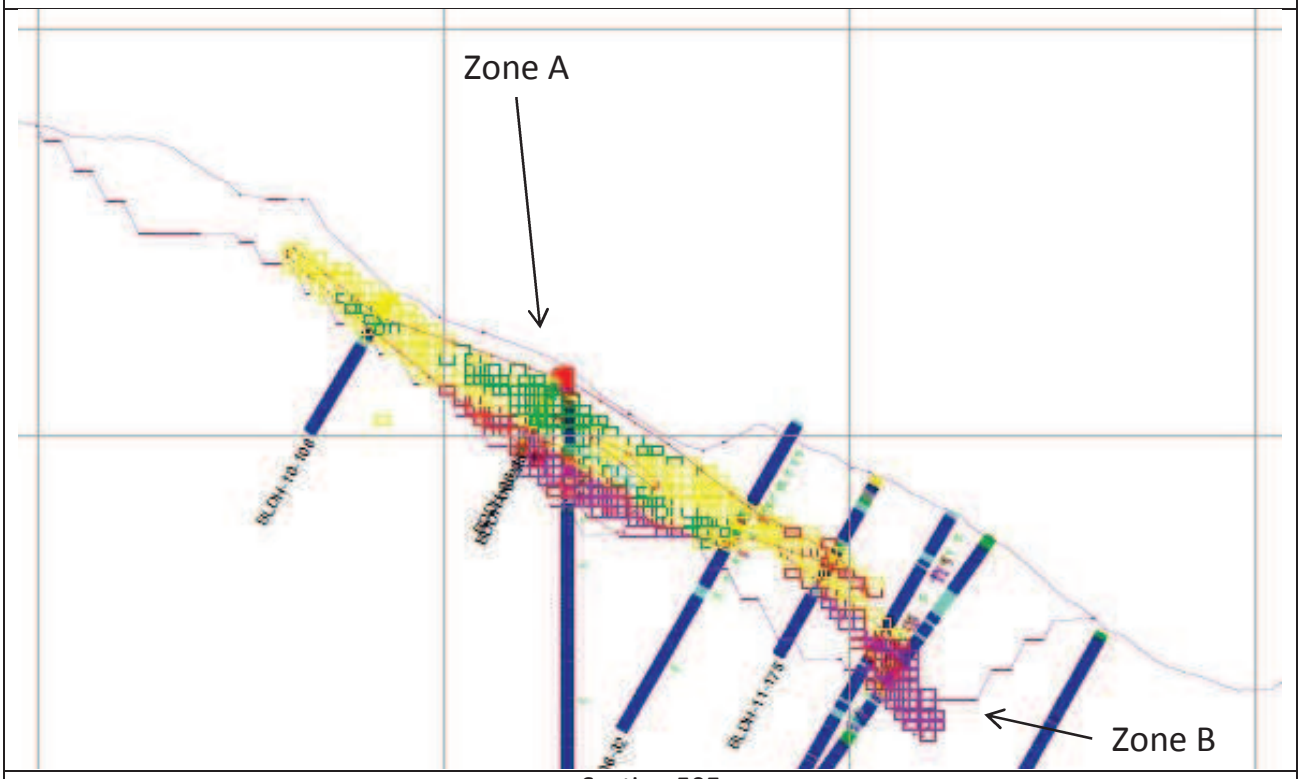
Appendix F Gold blocks produced by the grade interpolation method recommended and used in this study, together with the pit limits recommended for the mining of these blocks



Legend



Section 75E



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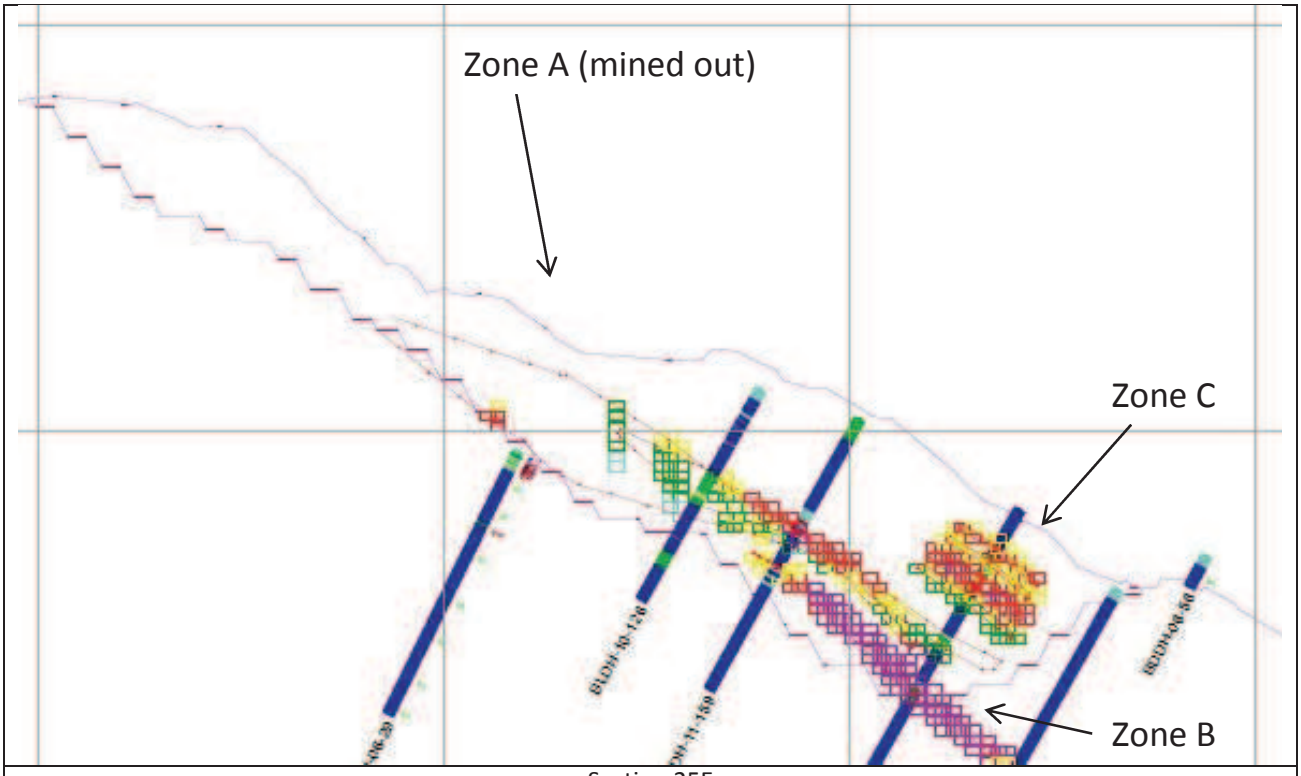

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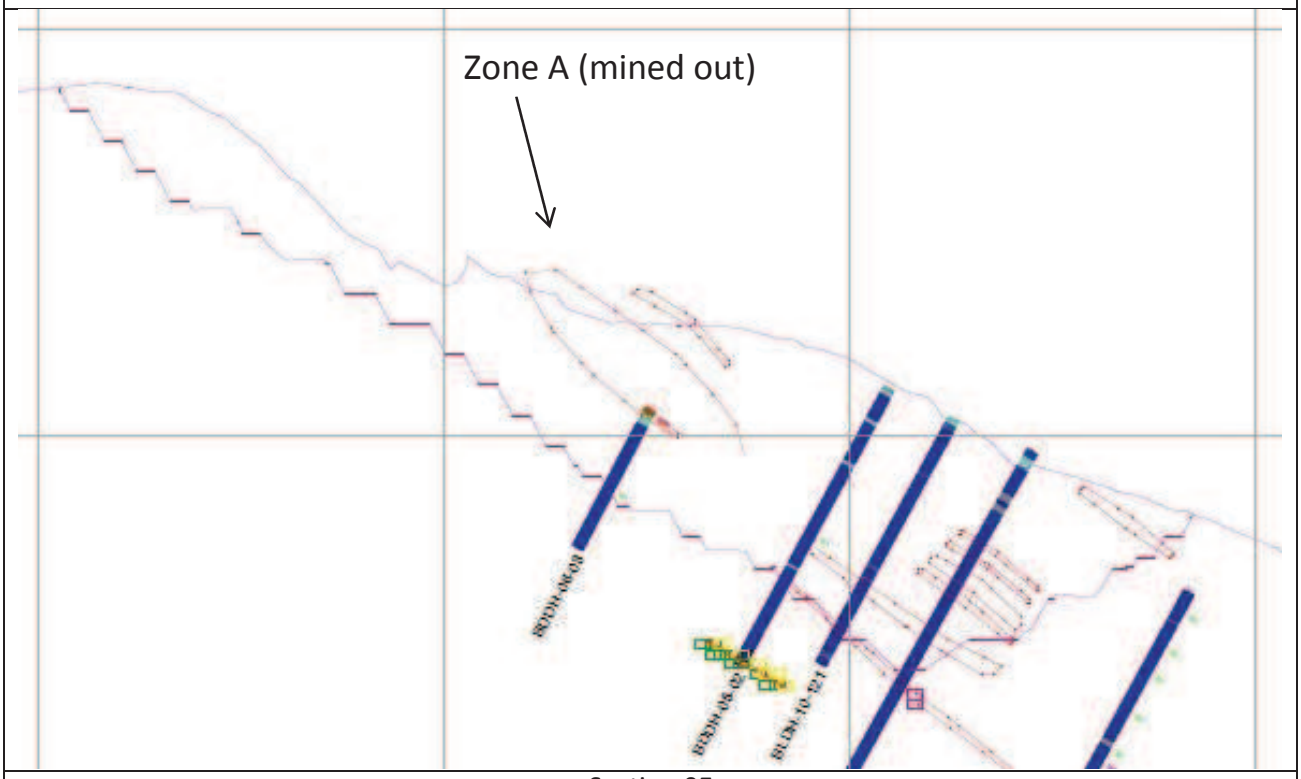

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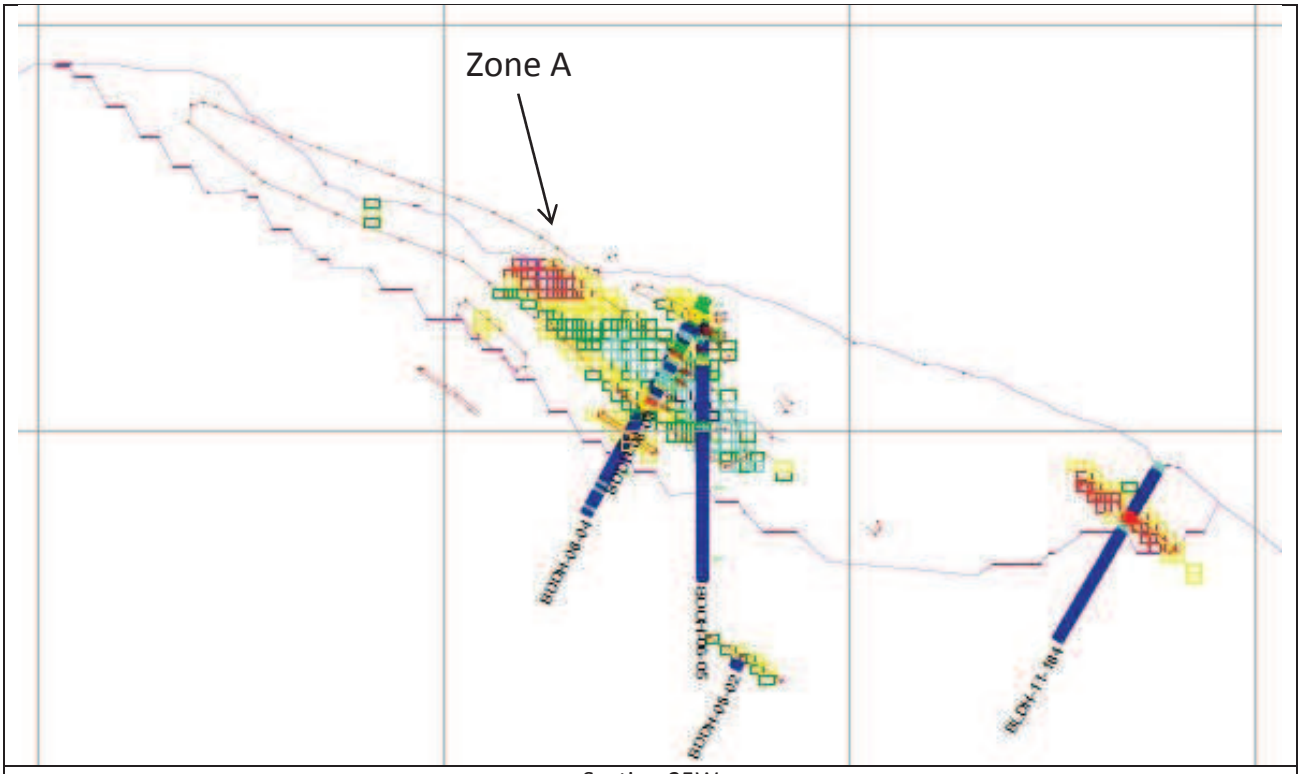

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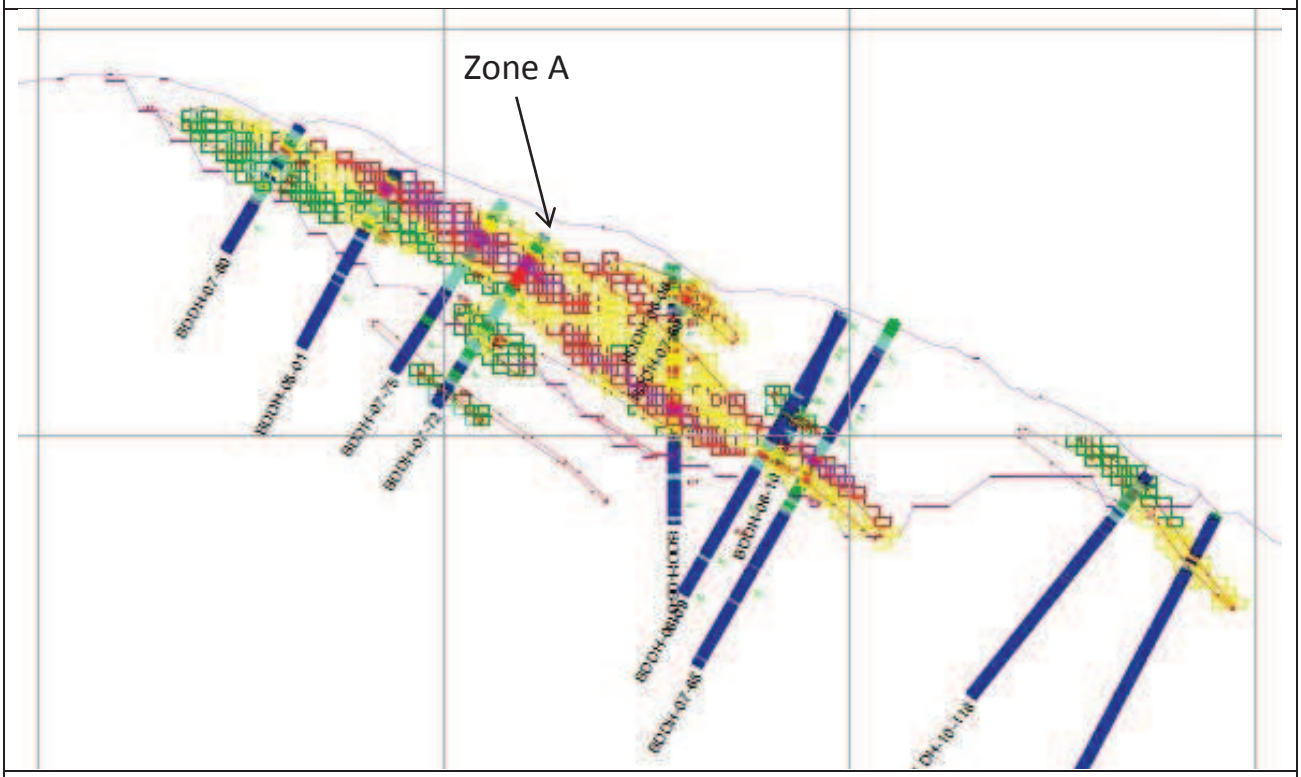

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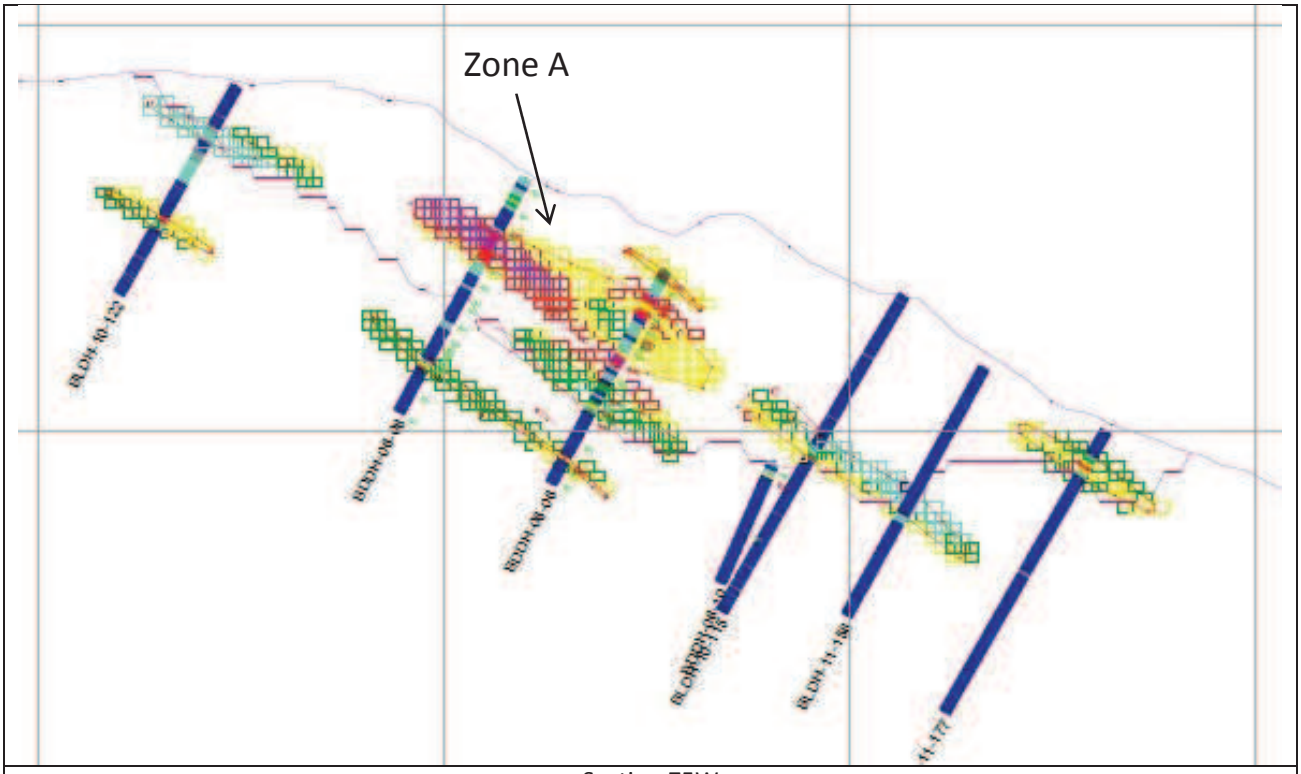

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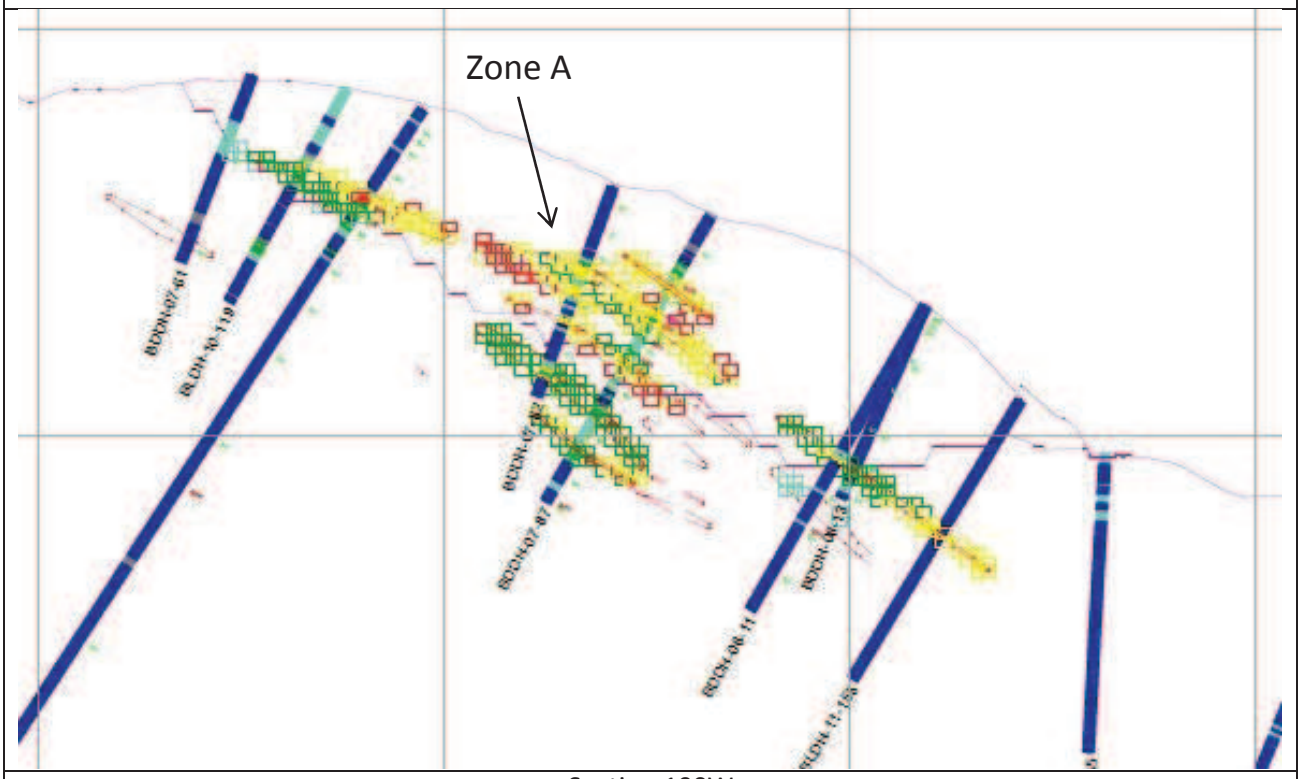

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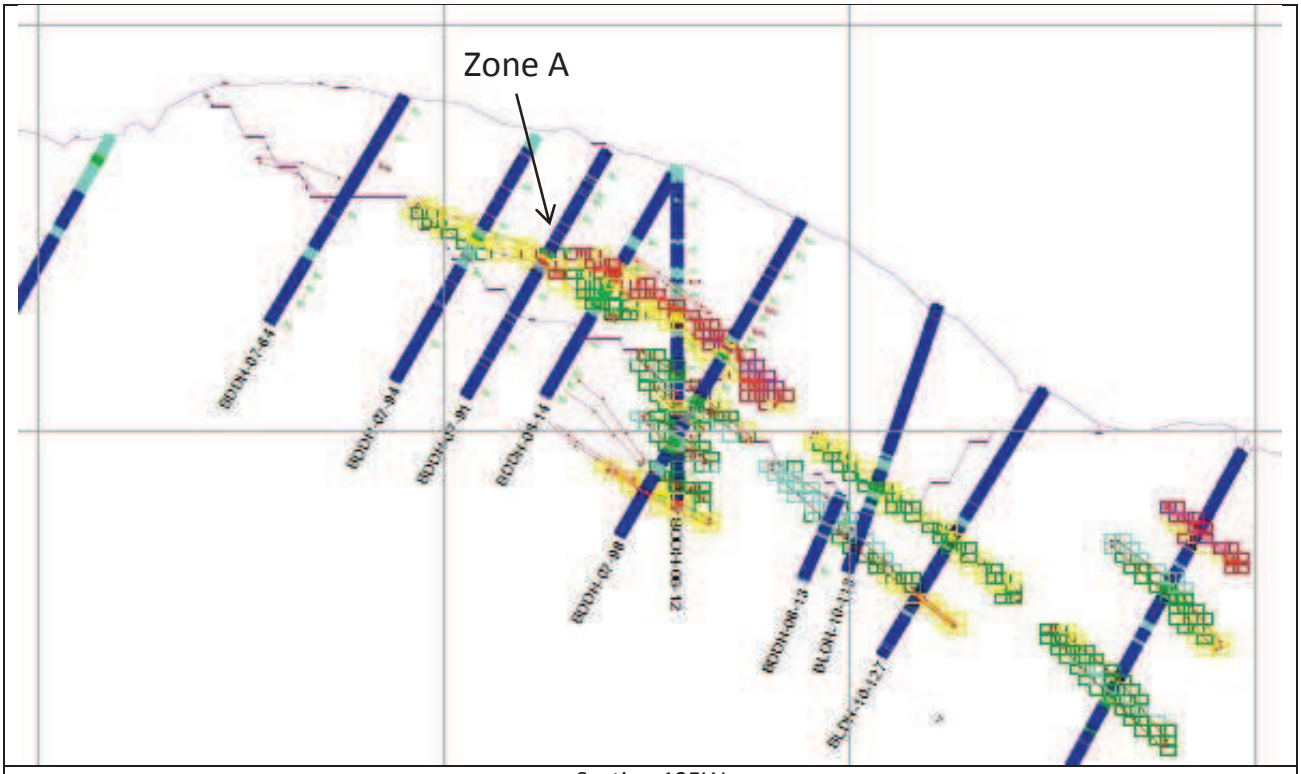

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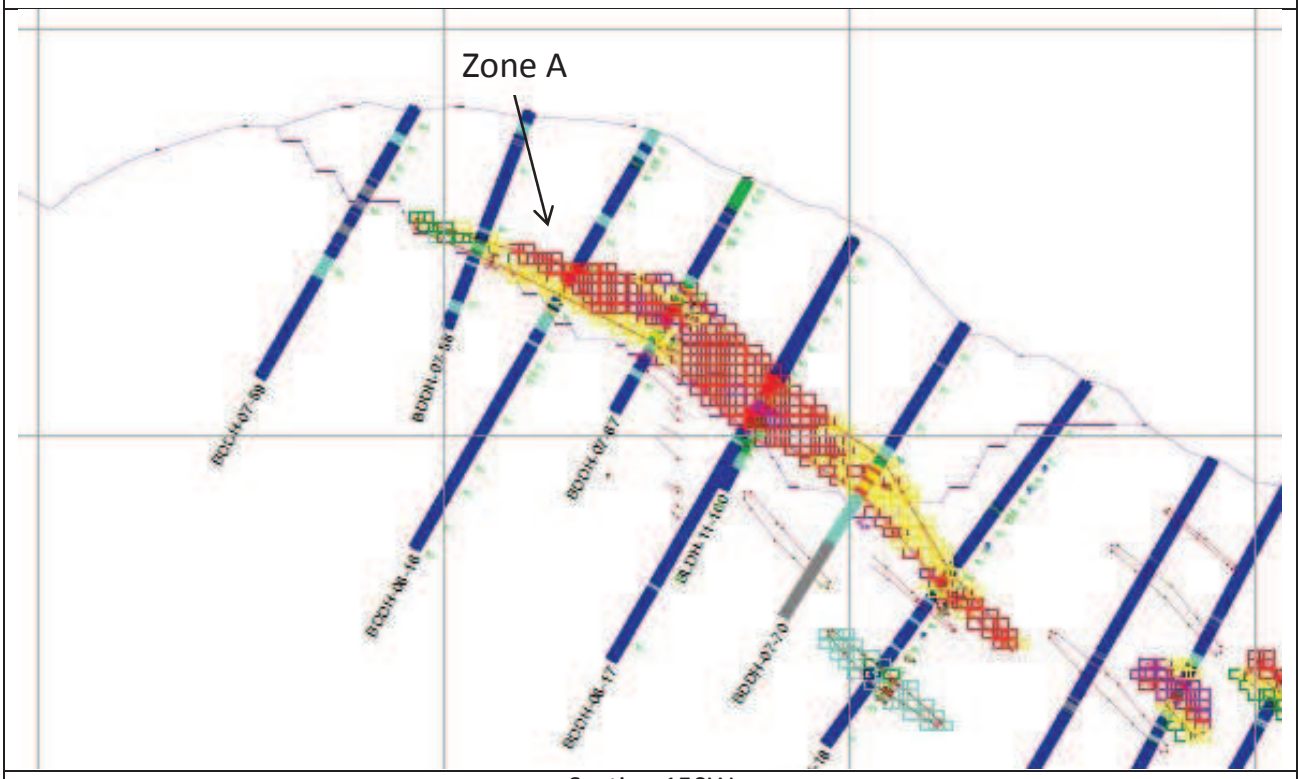

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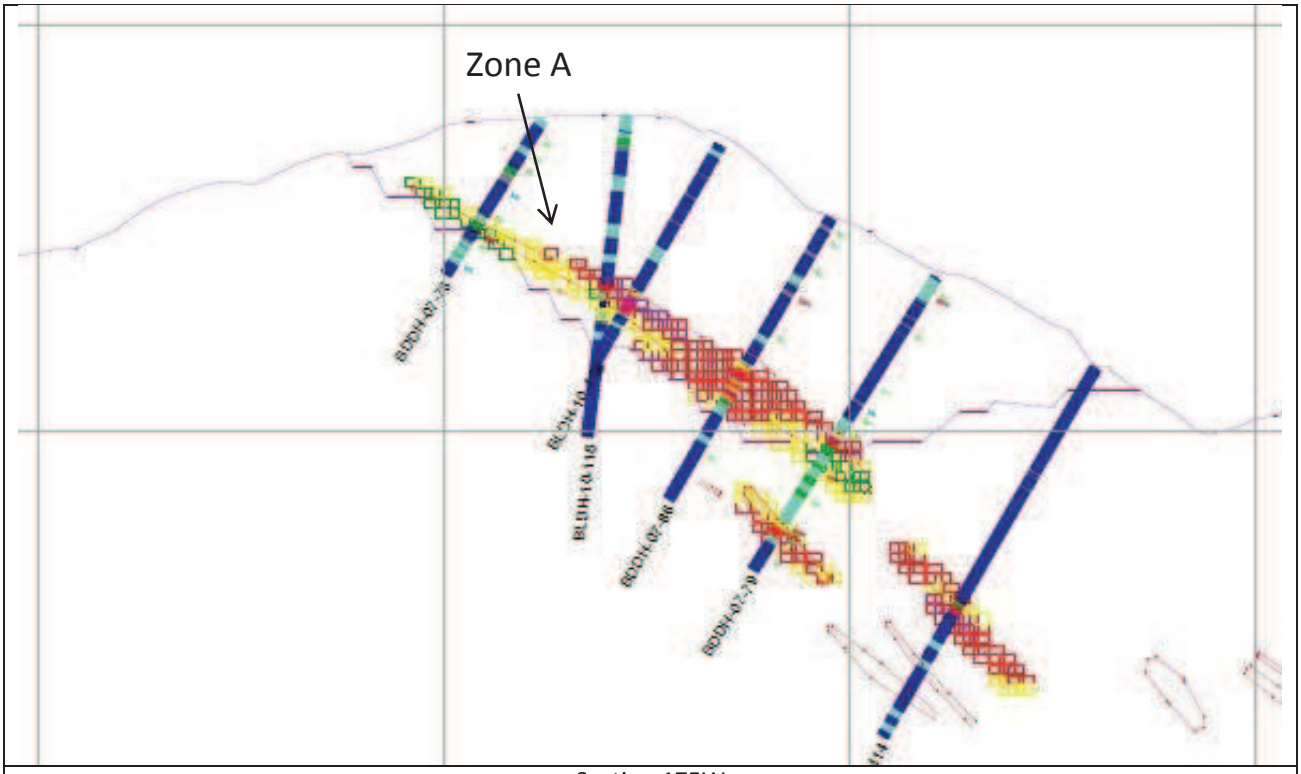

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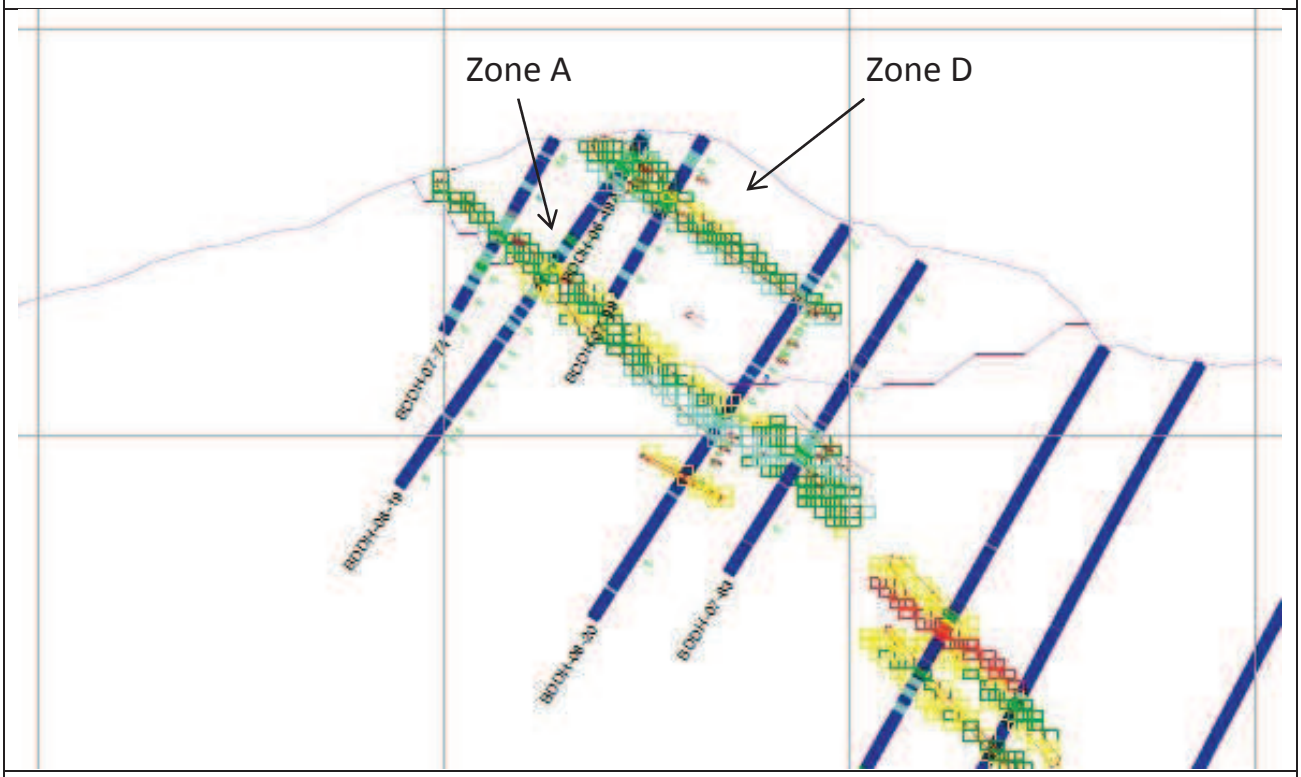

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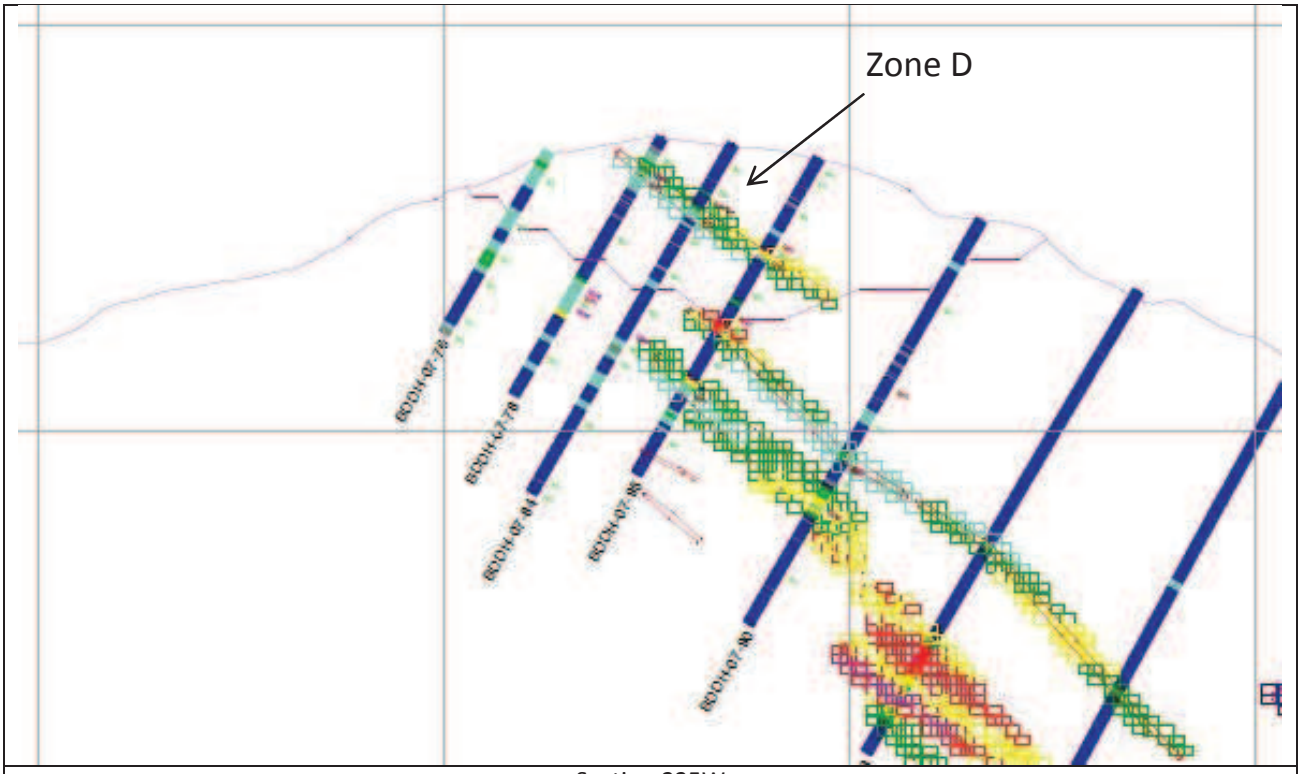

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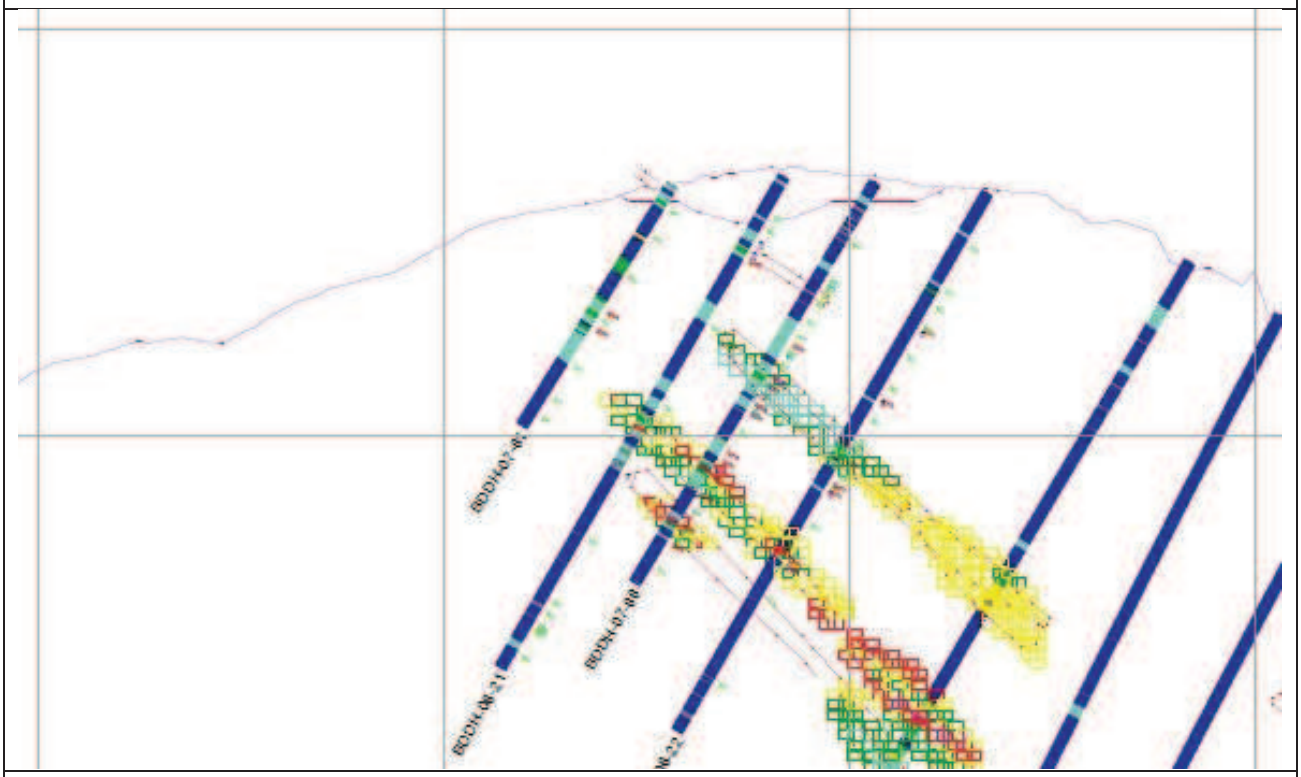

Section 250W