# Mineral Resource Estimate - Cerrado Verde Potash Project, Minas Gerais State, Brazil

## NI 43-101 Technical Report

*On Behalf of* – **Verde Potash Plc.**

*Effective Date* – **27th December 2013**

| | | | |
|---|---|---|---|
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# 1 SUMMARY

## 1.1 Introduction

Andes Mining Services Ltd. (AMS) has been commissioned by Verde Potash Plc. (Verde) to prepare a mineral resource estimate for the Cerrado Verde Potash Project, located in Minas Gerais State, Brazil.

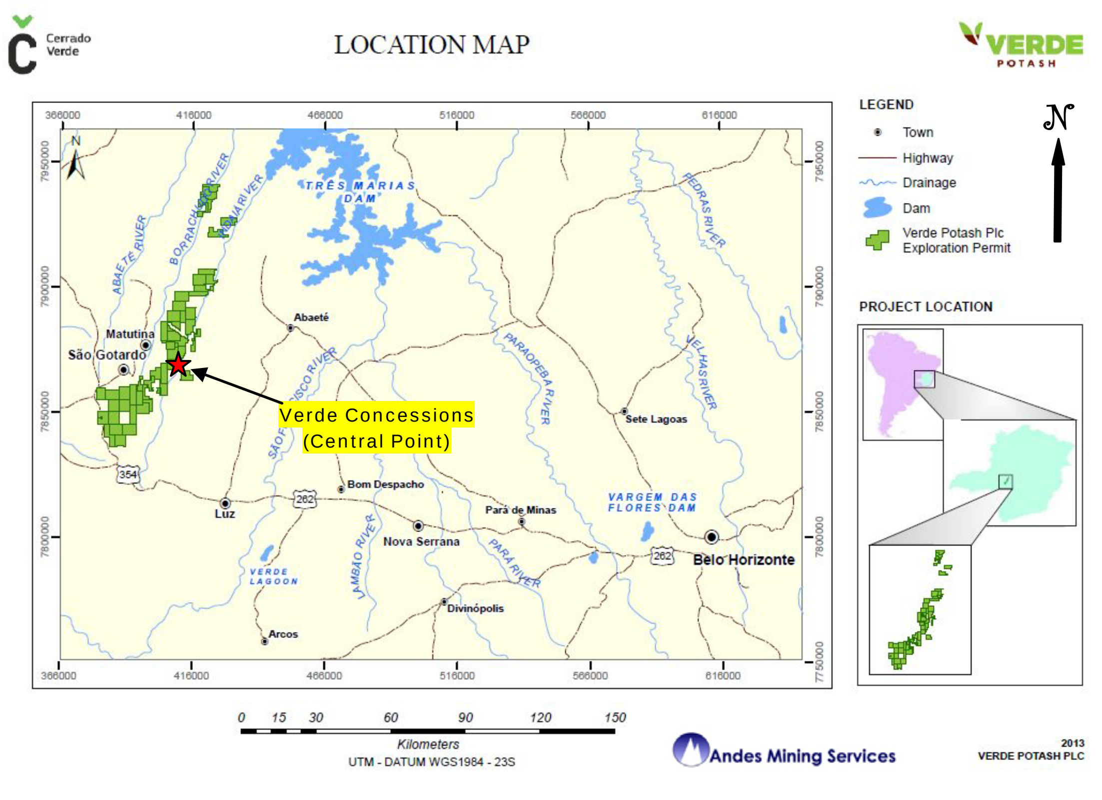
The mineral resource estimate has been prepared under the guidelines of Canadian Institute of Mining (CIM) and National Instrument 43-101 - standards of disclosure for mineral projects and accompanying form 43-101.F1 and companion policy 43-101.CP collectively (NI 43-101).

## 1.2 Location

The Cerrado Verde Potash Project is located in the western Alto Paranaiba region of Minas Gerais State, Brazil (Figure 1.2_1). The Cerrado Verde Project is located in close proximity to the town of Matutina, which is located approximately 320km west from Belo Horizonte (state capital of Minas Gerais) via a good quality paved road (BR-262) (Figure 1.2_1).

The boundaries of the concessions have not been surveyed as this is not a requirement of Brazil's mining code. The tenement boundaries are defined by Universal Transverse Mercator (UTM) coordinates with WGS84 datum. Coordinates for a central point within the Cerrado Verde tenements are: 7,856,531 N and 394,525 E.

**Figure 1.2_1**
**Cerrado Verde Project Location *(Verde, 27th December 2013)***



## 1.3 Ownership

Cerrado Verde mineral rights were originally requested by Verde, by means of applications for exploration licences filed with the Brazilian National Department of Mineral Production (DNPM) between 2008 and 2010. Almost all Cerrado Verde mineral rights have been granted exploration licences as presented in this report.

Verde applied for the mineral rights directly to the DNPM. There was no prior ownership of mineral rights immediately prior to Verde's applications. The areas were available and Verde made the necessary applications to acquire the rights to explore the tenements.

## 1.4 History

The glauconitic meta-argillite has been known as a potential potash resource since the 1960's, although only regional mapping has been undertaken in the permits held by Verde.

There is no data or information available on prior exploration or development previous to the current owner. Verde is not aware of any historic resource estimation work on the property, and no historical resource estimates have been released. No historical mining of the glauconitic meta-argillite formation has been undertaken.

## 1.5 Geology and Mineralization

The Cerrado Verde region is mainly underlain by Neoproterozoic and Cretaceous rock units, which are partly covered by Cenozoic sandstones, lateritic sediments and soils.

The oldest rocks, occurring in the south-western portion of the region, are represented by a nucleus of calcoschists and diamictites of the Ibiá Formation (Araxá Group) surrounded by an undivided domain of the Canastra Group (quartzites, phyllites and micaschists).

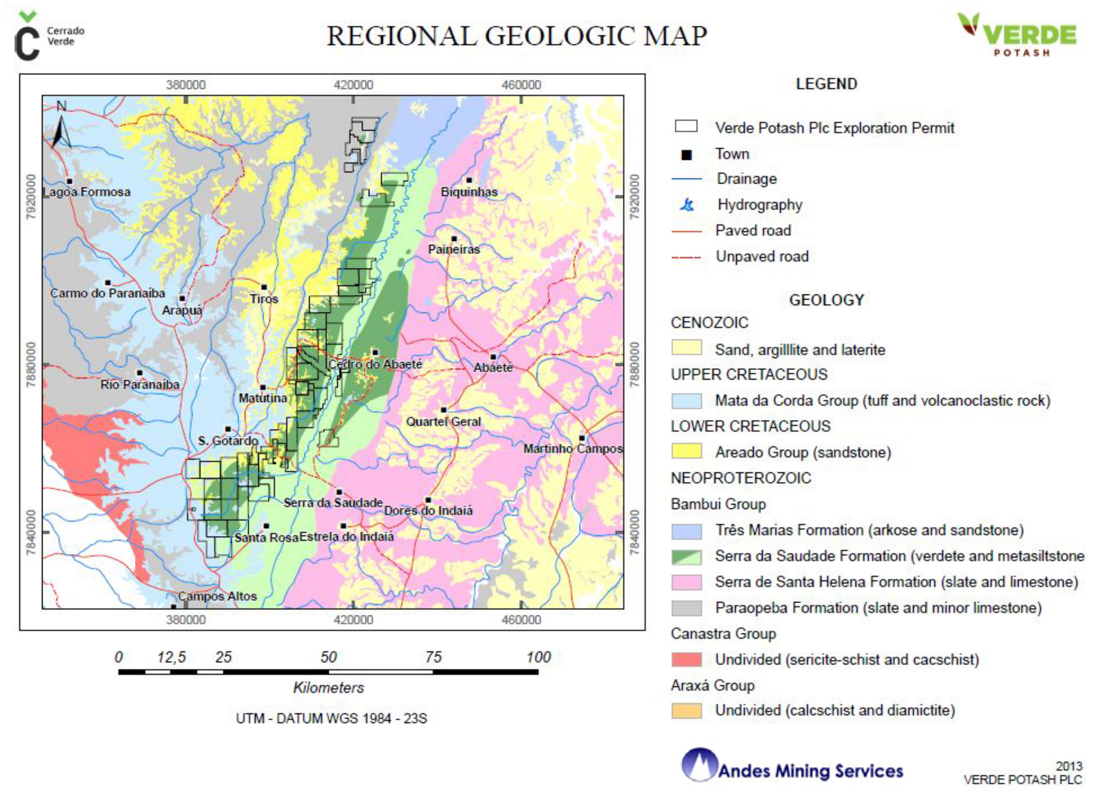
The sequence is followed by the Bambuí Group (600-550m.y.), which comprises the marine deposits of the Paraopeba Formation, the Serra de Santa Helena Formation and the Serra da Saudade Formation which includes the glauconitic meta-argillite unit (Figure 1.5_1). All of these units are dominated by variegated meta-siltstones, and the overlying arkose units (Areado sandstones) of the Três Marias Formation.

Following deposition of the Bambuí Group and the Brasiliano Orogeny, the region was exposed to erosion during the Paleozoic, Triassic and Jurassic periods, giving rise to the development of a remarkable peneplain (flat lying surface). The next stratigraphic phase is recorded by the extensive and dominantly pyroclastic kamafugitic volcanism of the Mata da Corda Group of Upper Cretaceous age (Figure 1.5_1).

With some exceptions, the glauconitic meta-argillite unit (potash rich rock) is predominantly lying on top of the Serra da Saudade Formation, and underlying the lower Cretaceous Areado sandstone(s). Its apparent thickness varies from approximately 20m in the southernmost domain to over 50m in the southern half of the Serra da Saudade and up to 80m in the northern half where it is covered by younger sediments in some locations. The lower contact with the slates and metapelites of the Serra de Santa Helena Formation is transitional (Figure 1.5_1).

Glauconitic meta-argillite is a pelitic metasedimentary rock which is weakly deformed and metamorphosed to lower greenschist facies. Glauconitic meta-argillite displays a lepidoblastic texture, and preserves relict textures from its original clastic origin. The glauconitic meta-argillite unit is classified petrographically as a glauconitic meta-argillite sedimentary rock, and is the target rock type across the Cerrado Verde group of tenements as it has a high content of $K_2O$.

**Figure 1.5_1**
**Regional Geology Map - Cerrado Verde Project *(Verde, 27th December 2013)***




The mineralogy is sometimes difficult to determine due in part to the very fine grained texture of the rocks, especially when aggregates of clay forming minerals are abundant. The approximate $K_2O$ content of the glauconitic meta-argillite ranges from 6% to 12%.

## 1.6 Exploration

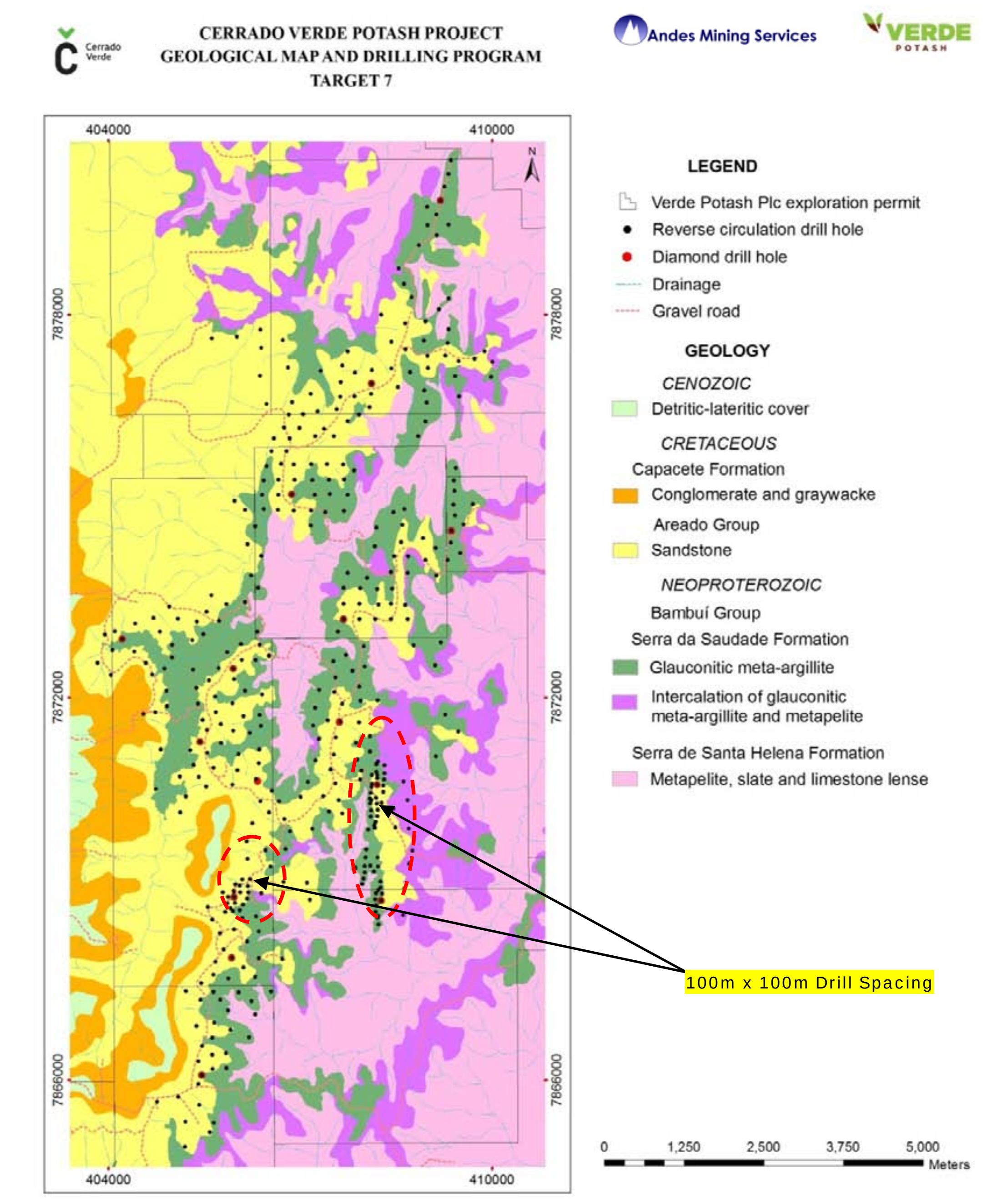
Up until 2011, exploration work was focused upon a number of glauconitic meta-argillite units across the Cerrado Verde group of tenements known as Target 1, Target 2, Target 3, Target 4, Target 5, Target 6, Target 7, Target 10, Target 11, Target 12, Target 13, Target 14, Target 16 and Target 17.

However, in 2012 exploration activities were concentrated on a select number of higher grade $K_2O$ targets. Four specific areas were chosen based on preliminary $K_2O$ grades from exploration drilling, with target areas 7, 10 and 12 selected, in addition to a new area located within exploration permit 830.383/2008 which was acquired by Verde from a third party. Geological mapping suggests these four target areas belong to a single glauconitic meta-argillite 'domain'. Subsequently, these 4 individual target areas were collectively grouped into a single target area known as Target 7 (Figure 1.6_1).

Exploration drilling conducted throughout the 2012 field campaign focused entirely on testing K2O mineralization within the Target 7 mineralized domain.

**Figure 1.6_1**

**Target 7 Exploration Focus - Cerrado Verde Project *(Verde, 27th December 2013)***




## 1.7 Mineral Processing and Metallurgical Testing

The author of this report is not qualified to provide extensive comment on mineral processing, metallurgical testing and recovery methods previously undertaken.

Two separate process routes currently exist for the treatment of glauconitic meta-argillite ore. Verde has developed a process route to produce ThermoPotash TK, a non-chloride, multi-nutrient potash fertilizer and also a process route for the production of conventional potash (KCl) fertilizer grade..

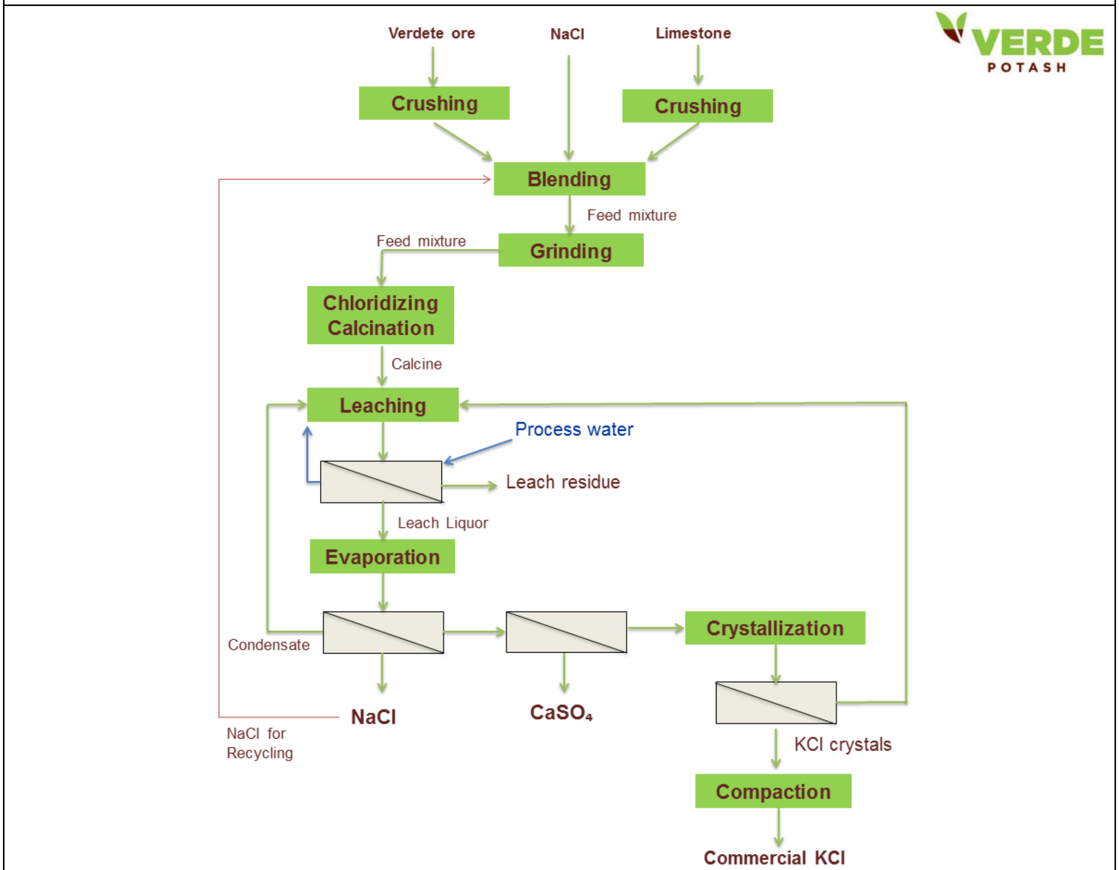
The primary feed material for the production of both ThermoPotash and conventional KCl is a glauconitic meta-argillite typically containing 8 to 11% $K_2O$ as muscovite/illite and microcline.

Test work over the past 18 months involved processing composite glauconitic meta-argillite ore with a cut-off grade of 6% $K_2O$ and an average grade of approximately 10% $K_2O$ to generate a conventional potash (KCl) product; tests carried out according to the TK process route employed ore with an $K_2O$ content somewhat higher.

Process route for KCl production involves calcining a mixture of the glauconitic meta-argillite with limestone and chloride salts (sodium chloride) in predetermined proportions, calcined according to an established temperature profile. Calcine thus obtained is water leached in water to recover soluble salts present or formed during chloridizing calcination (excess sodium chloride and new formed potassium chloride). Leach liquor is evaporated to recover excess salt for recycling; product KCl is recovered by crystallization from the saturated brine.

The results obtained from this series of studies, indicate recoveries of K between 65% and 70% K. A block flow diagram of the process route is presented below in Figure 1.7_1.

**Figure 1.7_1**
**Process Flow Sheet for Commercial KCl Production**



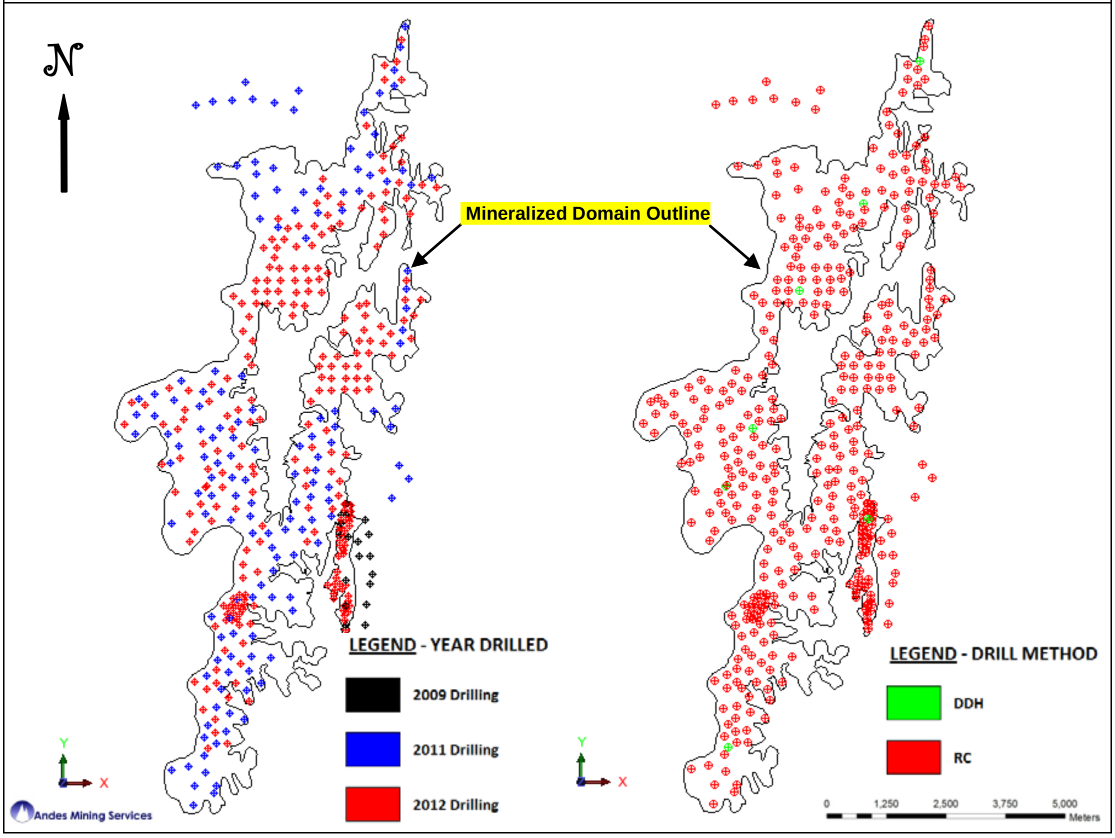
TK production involves grinding the glauconitic meta-argillite and limestone in the defined proportion and calcining it at a high temperature, higher than for the production of KCl calcine. The product of this calcination is already TK, which only needs to be ground for market sale.

## 1.8 Mineral Resources

The Cerrado Verde Project mineral resource estimate is based on 435 drill holes (26,609m) drilled at a nominal spacing of approximately 200m by 200m across Target 7 (Figure 1.8_1).

A total of 420 reverse circulation drill holes (25,563m) have been completed across the resource area, while a further 15 diamond drill holes (1,046m) have also been completed.

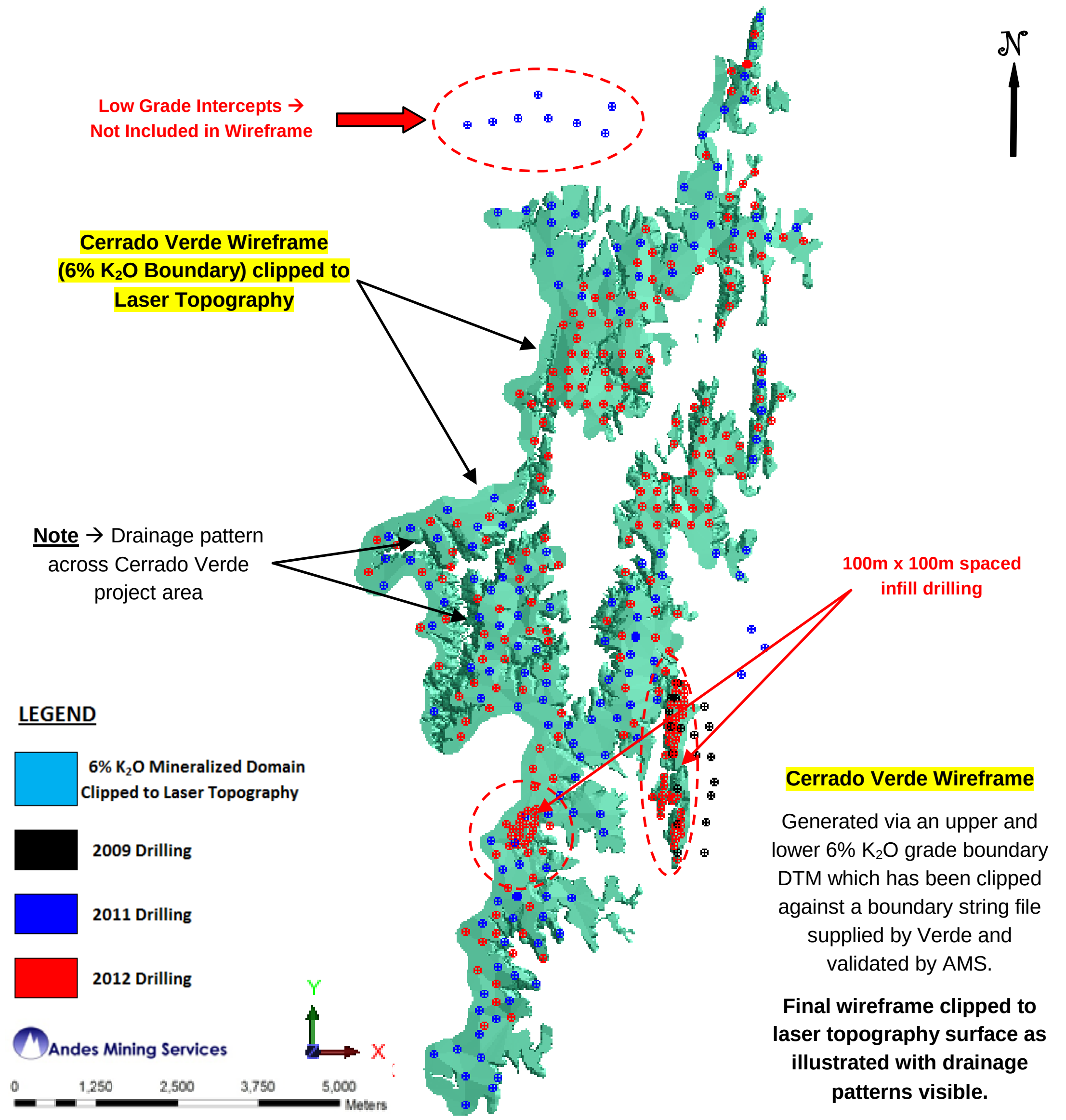
**Figure 1.8_1**
**Plan View of Mineralized Domain Outline (Target 7) with Drillholes** ***(AMS, 27th December 2013)***




Reverse circulation infill drilling to a 100m by 100m spacing has been completed in two separate areas of the resource in an effort to increase the resource category confidence, and provide suitable vectors from variography studies (Figure 1.8_2). In addition, diamond drill holes have been completed as twin holes to pre-existing reverse circulation drilling in an effort to provide suitable QA/QC comparison test work.

Only data received as at December 5th, 2012 has been used in this estimate.

**Figure 1.8_2**
**Cerrado Verde Wireframe (Target 7) and Drilling Clipped to Topography *(AMS, 27th December 2013)***

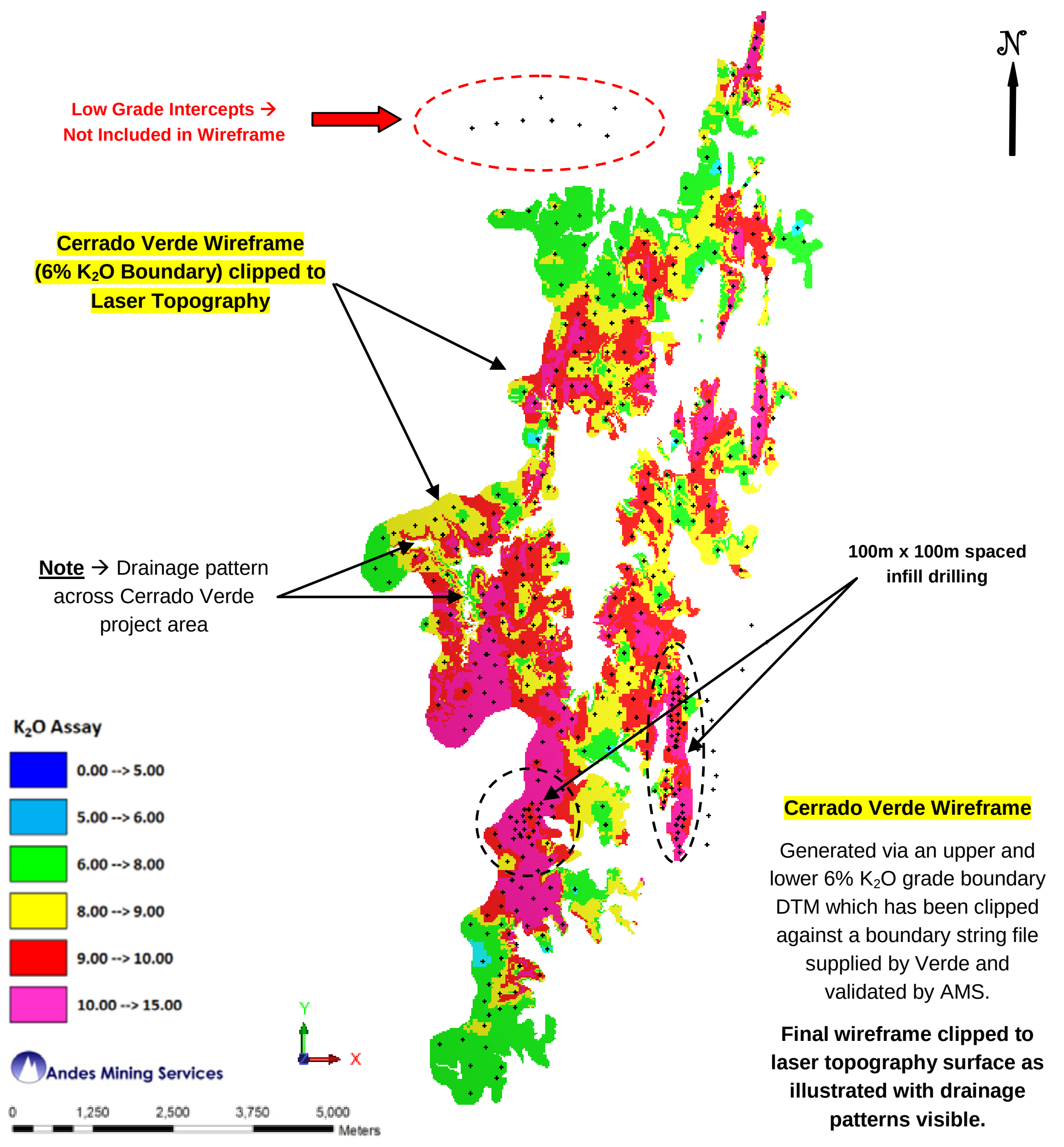



The mineral resource estimate has focused on a flat-lying, sub horizontal mineralized domain which has been defined at surface, and drill tested to depth of mineralization using a nominal 6% $K_2O$ grade cut-off to guide the wireframing process (Figure 1.8_2). As well as a significant density difference between weathered and fresh rock material, there is a sharp increase in $K_2O$ grades across this boundary (into the weathered material).

An independent mineral resource has been estimated for the Cerrado Verde Project comprising a combined Measured and Indicated mineral resource of 1,448 Mt at 9.30% K2O (using a 7.5% K2O cut-off), and an Inferred mineral resource of 305 Mt at 8.89% K2O (using a 7.5% K2O cut-off grade) (Figure 1.8_3).

The statement has been classified by Qualified Person Bradley Ackroyd (MAIG) in accordance with NI 43-101, and accompanying documents 43-101.F1 and 43-101.CP. It has an effective date of 19th of December, 2012.

**Figure 1.8_3**
**Cerrado Verde Block Model – Coded by $K_2O$ Grade (Estimate) *(AMS, 27th December 2013)***




Mineral resources that are not mineral reserves do not have demonstrated economic viability.

AMS and Verde are not aware of any factors (environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors) that may materially affect the Mineral Resource Estimate.

**Figure 1.8_4**
**Cerrado Verde Block Model - Measured, Indicated and Inferred Resource *(AMS, 27th December 2013)***

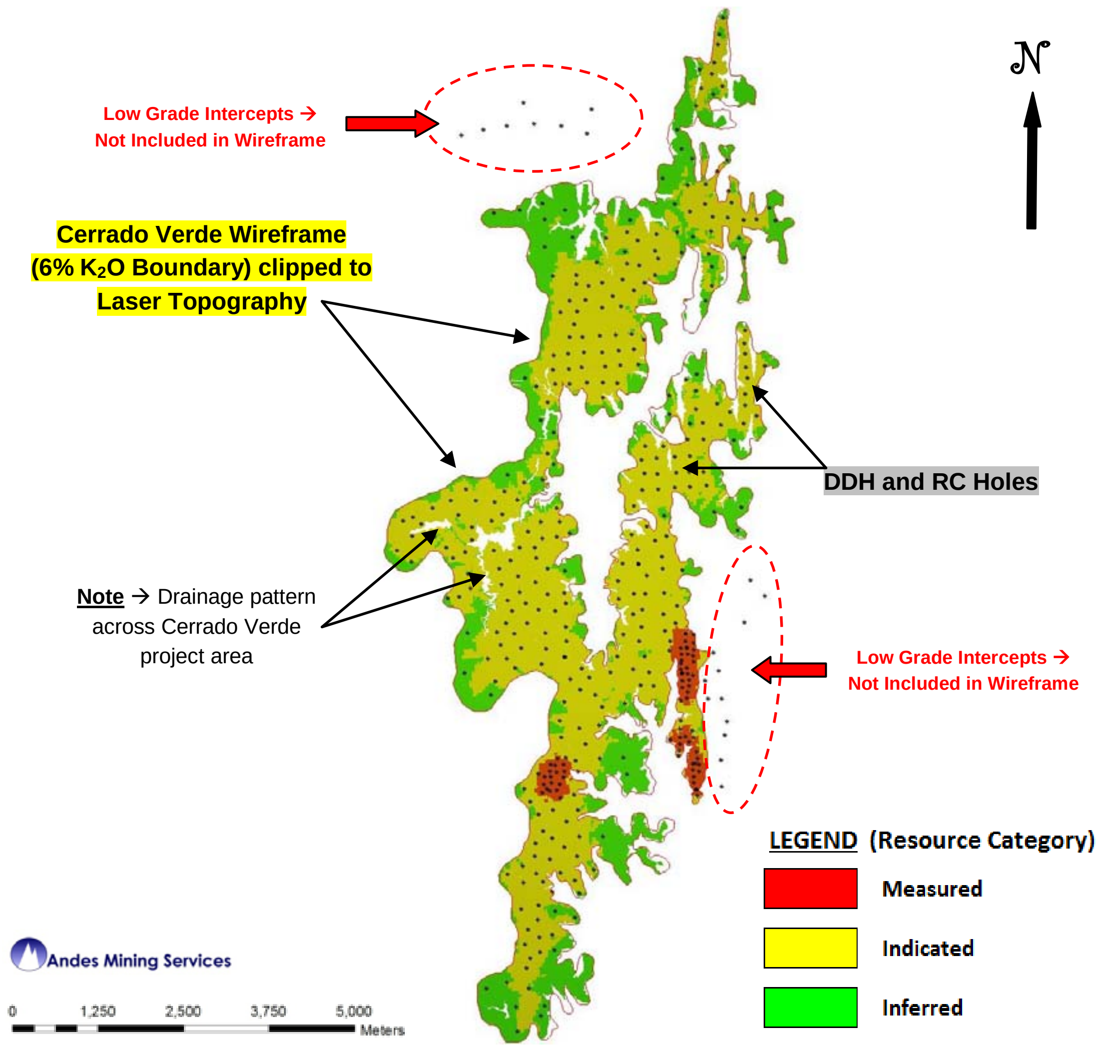



**Table 1.8_1**
**Verde Potash - Cerrado Verde Potash Project**
**Measured, Indicated and Inferred Mineral Resource Grade Tonnage Report - 19th December 2012**
**(Block Model – 50mE X 50mN X 5mRL) – Ordinary Kriging (OK)**

| Cut-Off (% $K_2O$) | Tonnes (Mt) | $K_2O$ | $P_2O_5$ | CaO | $Al_2O_3$ | $Fe_2O_3$ | $SiO_2$ | MgO | $TiO_2$ | MnO | $Na_2O$ | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Measured Resource Category** | | | | | | | | | | | | |
| 7.5 | 83.0 | 10.13 | 0.13 | 0.33 | 15.73 | 6.99 | 58.93 | 2.90 | 0.83 | 0.13 | 0.10 | 3.31 |
| **Indicated Resource Category** | | | | | | | | | | | | |
| 7.5 | 1,365.6 | 9.24 | 0.14 | 0.49 | 15.61 | 6.85 | 59.83 | 2.90 | 0.81 | 0.13 | 0.17 | 3.47 |
| **Measured and Indicated Mineral Resource (7.5% Cut-Off $K_2O$) *** | | | | | | | | | | | | |
| **7.5** | **1,448.6** | **9.30** | **0.14** | **0.48** | **15.61** | **6.86** | **59.78** | **2.90** | **0.81** | **0.13** | **0.16** | **3.46** |
| **Inferred Resource Category** | | | | | | | | | | | | |
| 7.5 | 305.4 | 8.89 | 0.14 | 0.59 | 15.61 | 6.84 | 59.86 | 2.87 | 0.81 | 0.13 | 0.23 | 3.56 |
| **Inferred Mineral Resource (7.5% Cut-Off $K_2O$) *** | | | | | | | | | | | | |
| **7.5** | **305.4** | **8.89** | **0.14** | **0.59** | **15.61** | **6.84** | **59.86** | **2.87** | **0.81** | **0.13** | **0.23** | **3.56** |

** Mineral resources are not mineral reserves and do not have demonstrated economic viability. Appropriate rounding has been applied to Table 1.8_1.*

A combined mineral resource statement which incorporates previously reported resources completed by SRK Consulting has been prepared for the Cerrado Verde Project. A combined Measured and Indicated mineral resource of 1,472 Mt at 9.28% $K_2O$ (using a 7.5% $K_2O$ cut-off), and an Inferred mineral resource of 1,850 Mt at 8.60% $K_2O$ (using a 7.5% $K_2O$ cut-off grade) (Table 1.8_2) is reported for the Cerrado Verde Project.

**Table 1.8_2**
**Verde Potash - Cerrado Verde Potash Project**
**Measured, Indicated and Inferred Mineral Resource Grade Tonnage Report (AMS & SRK Consulting)**
**Ordinary Kriging (OK) & Inverse Distance Weighting With Power Two (IDW2)***
**(Block Model – 50mE X 50mN X 5mRL / 10mRL)***

| Target | Cut-Off (% $K_2O$) | Tonnes (Mt) | Average Grade (% $K_2O$) |
|---|---|---|---|
| **Measured Resource Category** | | | |
| Target 7 | 7.5 | 83.0 | 10.13 |
| **Total Measured** | | 83.0 | 10.13 |
| **Indicated Resource Category** | | | |
| Target 6 | 7.5 | 23.3 | 8.83 |
| Target 7 | 7.5 | 1,365.6 | 9.24 |
| **Total Indicated** | | 1,388.9 | 9.23 |
| **Total Measured & Indicated** | | **1,471.9** | **9.28** |
| Target 1 | 7.5 | 235.9 | 8.72 |
| Target 2 | 7.5 | 11.6 | 8.54 |
| Target 3 | 7.5 | 126.5 | 8.72 |
| Target 4 | 7.5 | 146.7 | 9.03 |
| Target 5 | 7.5 | 27.3 | 8.31 |
| Target 6 | 7.5 | 47.9 | 8.84 |
| Target 7 | 7.5 | 305.4 | 8.89 |
| Target 11 | 7.5 | 46.8 | 8.27 |
| Target 13 | 7.5 | 168.3 | 8.50 |
| Target 14 | 7.5 | 325.2 | 8.65 |
| Target 16 | 7.5 | 257.5 | 8.15 |
| Target 17 | 7.5 | 150.9 | 8.19 |
| **Total Inferred** | | **1,849.8** | **8.60** |

*Mineral resources are not mineral reserves and do not have demonstrated economic viability.*
** IDW2 Estimate (Block Model - 50mE x 50mN x 10mRL) --> Targets 1,2,3,4,5,6,11,13,14,16 and 17*
** OK Estimate (Block Model - 50mE x 50mN x 5mRL) --> Target 7*
*Effective Date of Targets 1,2,3,4,5,13,14,16 and 17 is December 21, 2011*
*Effective Date of Targets 6 and 11 is August 3, 2011*
*Effective Date of Target 7 is December 19, 2012*
*Appropriate rounding has been applied to Table 1.8_2*

## 1.9 Conclusions and Recommendations

Drilling and studies completed to date have defined a Measured, Indicated and Inferred mineral resource for the Cerrado Verde project.

AMS considers that the proposed exploration and development strategy has been entirely appropriate and reflects the potential of the Cerrado Verde Project.

Given the extensive resource base available; the majority of which lies within the Measured and Indicated category, an initial mine life of 30 years has been proposed for 3Mtpa production rates. This clearly demonstrates the encouraging economics for the project based on the scoping study concepts, cost projections and price assumptions as presented in the PEA prepared in early 2012.

AMS recommends that the Cerrado Verde Project be advanced to a Definitive Feasibility Study (DFS) level of evaluation and design. The approximate cost estimate for the recommended definitive feasibility work program was proposed by SRK Consulting as part of a PEA completed for the Cerrado Verde Project, and is presented below in Table 1.9_1.

**Table 1.9_1**
**Cerrado Verde Project**
**Recommended Definitive Feasibility Study Work Program (SRK Consulting, February 2012)**

| **Activity** | **Total (US$)** |
|---|---|
| Infill Drilling | $ 1,700,000 |
| Engineering Studies | $ 1,000,000 |
| Environmental Baseline | $ 750,000 |
| Other | $ 250,000 |
| **Total** | **$ 3,700,000** |

AMS considers this cost estimate to be at the low end of the scale for a large DFS that is required for a project of this magnitude and potential complexity, and suggest that additional capital in the order of 50% greater than that proposed by SRK may be required.

This is a considered statement only, and is not based on any detailed functional costing.

# 2 INTRODUCTION

## 2.1 Scope of Work

AMS has been commissioned by Verde to prepare a mineral resource estimate for the Cerrado Verde Project, located in Minas Gerais State, Brazil.

The Cerrado Verde Potash Project is located 300km from Belo Horizonte city, in Minas Gerais State, Brazil.

The Mineral Resource Estimate has been prepared under the guidelines of Canadian Institute of Mining (CIM) National Instrument 43-101 and accompanying documents Form 43-101.F1 Technical Report and Companion Policy 43-101.CP (collectively NI43-101).

## 2.2 Forward Looking Information

This report contains "forward looking information" within the meaning of applicable Canadian securities legislation. Forward-looking information may include, but is not limited to, statements related to the capital and operating costs of the Cerrado Verde Project, the price assumptions with respect to KCl materials, production rates, the economic feasibility and development of the Cerrado Verde Project and other activities, events or developments that AMS expects or anticipates will or may occur in the future. Forward-looking information is often identified by the use of words such as "plans", "planning", "planned", "expects" or "looking forward", "does not expect", "continues", "scheduled", "estimates", "forecasts", "intends", "potential", "anticipates", "does not anticipate", or "belief", or describes a "goal", or variation of such words and phrases or state that certain actions, events or results "may", "could", "would", "might" or "will" be taken, occur or be achieved.

Forward-looking information is based on a number of factors and assumptions made by AMS and the management of Verde, which are considered reasonable at the time such statements are made, and forward-looking information involves known and unknown risks, uncertainties and other factors that may cause the actual results, performance or achievements to be materially different from those expressed or implied by the forward-looking information. Such factors include, among others, obtaining all necessary financing, licences to explore and develop the project; successful definition and confirmation based on further studies and additional exploration work of an economic mineral resource base at the project; as well as those factors disclosed in Verde's current Annual Information Form and Management's Discussion and Analysis, as well as other public disclosure documents, available on SEDAR at www.sedar.com.

Although AMS have attempted to identify important factors that could cause actual actions, events or results to differ materially from those described in forward-looking information, there may be other factors that cause actions, events or results not to be as anticipated, estimated or intended. There can be no assurance that forward-looking information will prove to be accurate. The forward-looking statements contained herein are presented for the purposes of assisting investors in understanding Verde's plan, objectives and goals and may not be appropriate for other purposes. Accordingly, readers should not place undue reliance on forward-looking information. Neither AMS nor Verde undertakes to update any forward-looking information, except in accordance with applicable securities laws.

## 2.3 Principal Sources of Information

In addition to a site visit undertaken by Mr Bradley Ackroyd (AMS) to the Cerrado Verde Project between 7th and 10th of August 2012, the author of this report has relied extensively on information provided by Verde along with discussions with Verde technical personnel and further discussions with Mr Beau Nicholls (Amazon Geoservices).

The site inspection undertaken by AMS included a review of the geological outcrop, surrounding infrastructure, available drill core, historical drill hole collars in the field and the office set-up / core processing facilities.

A full listing of the principal sources of information is included at the end of this report and a summary of the main documents is provided below:

- SRK Consulting (February 2012) – NI 43-101 Preliminary Economic Assessment – Cerrado Verde Project, Minas Gerais State, Brazil.

- Coffey Mining (March 2010) - Technical Report for Cerrado Verde Potash Project, Brazil on behalf of Amazon Mining Holding Plc.

AMS has made enquiries to establish the completeness and authenticity of the information provided and identified. AMS has taken all appropriate steps in their professional judgement, to ensure that the work, information or advice contained in this report is sound and AMS does not disclaim any responsibility for this report.

## 2.4 Independence

Neither AMS nor the author of this report has or has had previously any material interest in Verde or related entities or interests. Our relationship with Verde is solely one of professional association between client and independent consultant. This report is prepared in return for fees based upon agreed commercial rates and the payment of these fees is in no way contingent on the results of this report.

## 2.5 Qualifications and Experience

The “qualified person” (as defined in NI 43-101) for this report is Mr Bradley Ackroyd.

Mr Ackroyd is the principal consulting geologist for AMS with 11 years experience in exploration and mining geology. Mr. Ackroyd is also a Member of the Australian Institute of Geosciences (MAIG) and is responsible for all sections of this report.

## 2.6 Units of Measurements and Currency

Metric units are used throughout this report unless noted otherwise. Currency is United States dollars ("US$").

## 2.7 Abbreviations

A full listing of abbreviations used in this report is provided in Table 2.7_1 below.

**Table 2.7_1**

**List of Abbreviations**

| | **Description** | | **Description** |
|---|---|---|---|
| $ | United States of America dollars | $km^2$ | square kilometres |
| “ | inches | LOI | loss on ignition |
| µ | microns | $l/hr/m^2$ | litres per hour per square metre |
| 3D | three dimensional | M | million |
| AAS | atomic absorption spectrometry | m | metres |
| Au | gold | Ma | thousand years |
| bcm | bank cubic metres | MIK | multiple indicator kriging |
| CC | correlation coefficient | ml | millilitre |
| CFEM | financial compensation for exploitation of mineral resource | mm | millimetres |
| cfm | cubic feet per minute | MMI | mobile metal ion |
| CIC | carbon in column | Moz | million ounces |
| CIL | carbon-in-leach | Mtpa | million tonnes per annum |
| cm | centimetre | m.y. | million years |
| $cm^2$ | Square centimetre | N (Y) | northing |
| $cm^3$ | cubic centimetre | NaCN | sodium cyanide |
| COG | cut-off grade | NATA | national association of testing authorities |
| cusum | cumulative sum of the deviations | NI43-101 | canadian national instrument 43-101 |
| CRM | certified reference material or certified standard | NPV | net present value |
| CV | coefficient of variation | $NQ_2$ | Size of diamond drill rod/bit/core |
| DC | diamond core | NSR | net smelter return |
| DDH | diamond drill hole | ºC | degrees centigrade |
| DNPM | national department of mineral production | OK | ordinary kriging |
| DTM | digital terrain model | Oz | troy ounce |
| E (X) | easting | P80 -75µ | 80% passing 75 microns |
| EDM | electronic distance measuring | PAL | pulverise and leach |
| EIA | environmental impact assessment | PEA | preliminary economic assessment |
| EV | expected value | % | percent |
| G | gram | ppb | parts per billion |
| $g/m^3$ | grams per cubic metre | ppm | parts per million |
| g/t | grams per tonne | psi | pounds per square inch |
| ha | hectare | PVC | poly vinyl chloride |
| HARD | half the absolute relative difference | QA/QC | quality assurance / quality control |
| HDPE | high density poly ethylene | Q-Q | quantile-quantile |
| $HQ_2$ | size of diamond drill rod/bit/core | RAB | rotary air blast drilling |
| Hr | hours | RC | reverse circulation drilling |
| HRD | half relative difference | RL (Z) | reduced level |
| ICP-AES | inductivity coupled plasma atomic emission spectroscopy | ROM | run of mine |
| ICP-MS | inductivity coupled plasma mass spectroscopy | RQD | rock quality designation |
| ID | inverse distance weighted | SD | standard deviation |
| $ID^2$ | inverse distance squared | SG | specific gravity |
| IPS | integrated pressure stripping | SGS | SGS mineral services laboratory |
| IRR | internal rate of return | Si | silica |
| ISO | international Standards Organisation | SMU | selective mining unit |
| ITS | inchcape testing services | SRTM | shuttle radar topography mission |
| K2O | potassium oxide | t | tonnes |
| K | potassium | $t/m^3$ | tonnes per cubic metre |
| KCl | potassium chloride, also known as muriate of potash | tpa | tonnes per annum |
| kg | kilogram | w:o | waste to ore ratio |
| kg/t | kilogram per tonne | XRD | x-ray diffraction |
| km | kilometres | XRF | x-ray fluorescence spectrometer |

# 3 RELIANCE ON OTHER EXPERTS

Neither AMS nor the authors of this report are qualified to provide comment on legal issues associated with the Cerrado Verde Potash Project included in Section 4 of this report. In assessing legal aspects, the author of this report has relied heavily on information provided by Verde, which has not been independently verified by AMS.

Similarly, the author of this report is not qualified to provide extensive comment on any engineering, metallurgical, hydrological and / or environmental issues which may be associated with the properties referred to in this report (Section 13). In assessing these aspects, the author of this report has relied heavily on information provided by SRK Consulting and its consultants, along with reports previously prepared by other independent consultants.

In addition to this, AMS are not qualified to verify the costs associated with the DFS which are presented in Sections 1 and 18 of this report.

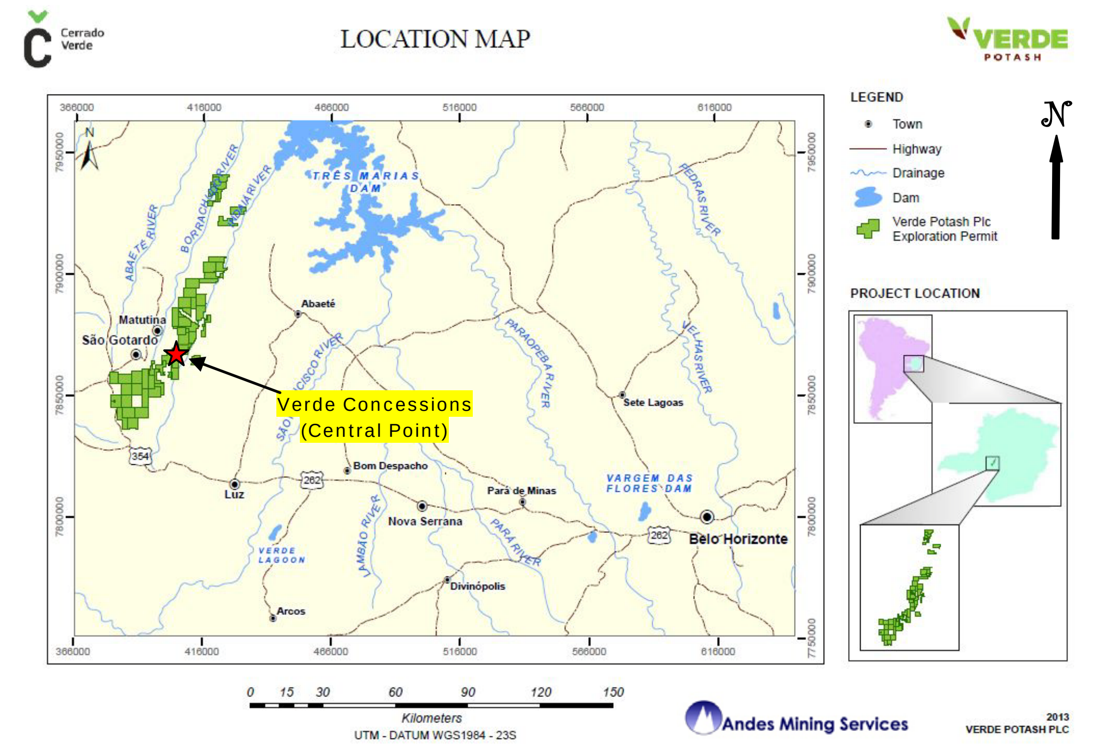
# 4 PROPERTY DESCRIPTION AND LOCATION

## 4.1 Project Location

The Cerrado Verde Potash Project is located in the western Alto Paranaiba region of Minas Gerais State, Brazil (Figure 4.1_1). The Cerrado Verde Project is located in close proximity to the town of Matutina which is located approximately 320km west from Belo Horizonte (state capital of Minas Gerais) via a good quality paved road (BR-262) (Figure 4.1_1). From Matutina, the project area is accessed via a number of secondary gravel roads which connect the farming region.

The tenement boundaries are defined by UTM coordinates with WGS84 datum (Zone 23S). Coordinates for a central point within the Cerrado Verde tenements are: 7,856,531 N and 394,525 E.

**Figure 4.1_1**
**Location Plan for the Cerrado Verde Potash Project *(AMS, 27th December 2013)***




## 4.2 Tenement Status

Cerrado Verde mineral rights were originally requested by Verde, by means of applications for exploration licences filed with DNPM between 2008 and 2010. Almost all Cerrado Verde mineral rights have been granted exploration licences as presented in this report.

Verde applied for the mineral rights directly to the DNPM. There was no prior ownership of mineral rights immediately prior to Verde's applications. The areas were available, and Verde made the necessary applications.

The Cerrado Verde project area comprises a total of 45 exploration licences covering an aggregate area of 73,919.95ha as shown below in Table 4.2_1 and Figure 4.2_1.

Verde have a further 7 exploration licences under application which total 11,301.21ha and are highlighted red within Table 4.2_1.

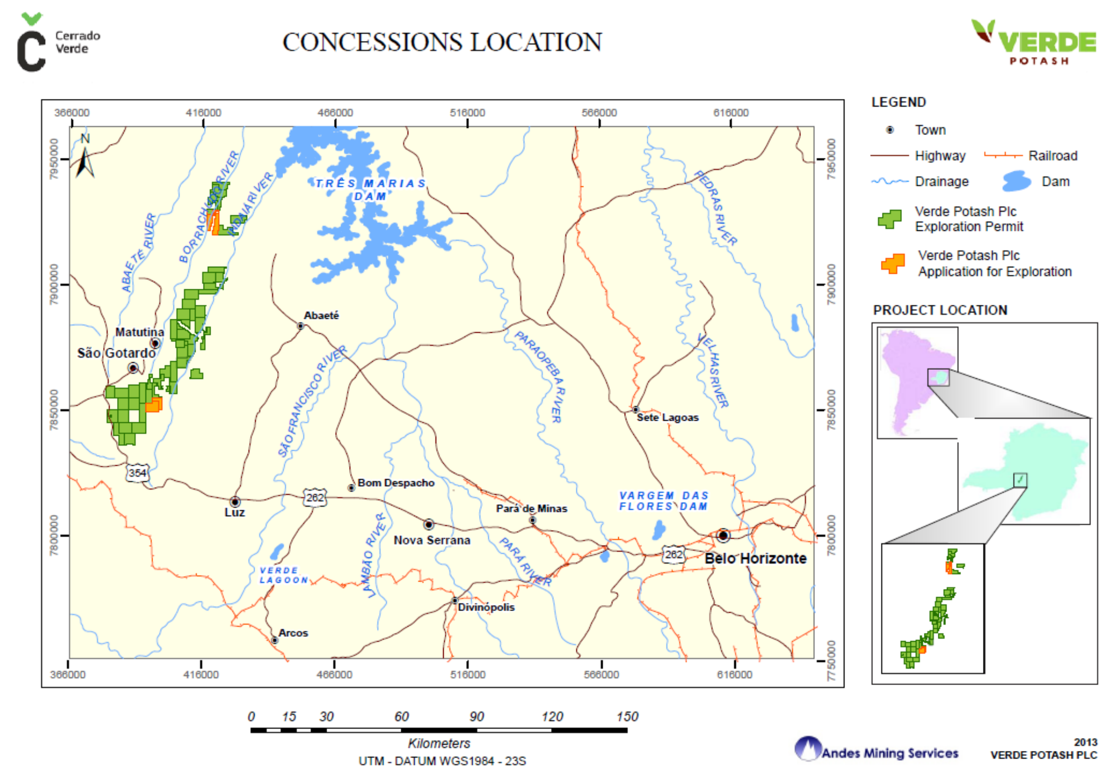
**Table 4.2_1**

**Summary of Verde Exploration Licences (Granted and Under Application)**

| Tenement Number | Area (Ha) | Owner | Status of Mining Right |
|---|---|---|---|
| 830383/2008 | 900 | Verde | Application for mining concession filed on 06/07/2013 |
| 830402/2011 | 945.16 | Verde | Application filed on 02/11/2011 |
| 830404/2011 | 1856.44 | Verde | Application filed on 02/11/2011 |
| 830406/2010 | 1548.73 | Verde | Final exploration report filed on 09/24/2012 |
| 830947/2011 | 1895.73 | Verde | Final exploration report filed on 09/24/2012 |
| 831025/2010 | 1853.68 | Verde | Final exploration report filed on 09/18/2012 |
| 831038/2013 | 1274.50 | Verde | Application filed on 04/10/2013 |
| 833257/2008 | 1993.84 | FVS | Final exploration report filed on 08/22/2012 |
| 833259/2008 | 1476.58 | FVS | Final exploration report filed on 08/22/2012 |
| 833263/2008 | 1844.23 | FVS | Final exploration report approved on 04/16/2013 |
| 833264/2008 | 1511.58 | FVS | Final exploration report filed on 08/22/2012 |
| 833268/2008 | 966.82 | FVS | Final exploration report approved on 04/16/2013 |
| 833270/2008 | 1991.78 | FVS | Application for mining concession filed on 06/07/2013 |
| 833272/2008 | 1587.61 | FVS | Final exploration report approved on 04/02/2013 |
| 833273/2008 | 1994.32 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833274/2008 | 1994.84 | FVS | Final exploration report filed on 08/22/2012 |
| 833275/2008 | 1994.06 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833276/2008 | 1334.71 | FVS | Final exploration report approved on 04/16/2013 |
| 833277/2008 | 1992.24 | FVS | Final exploration report filed on 08/23/2012 |
| 833278/2008 | 1993.88 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833279/2008 | 1952.53 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833280/2008 | 1742.04 | FVS | Final exploration report approved on 07/04/2013 |
| 833281/2008 | 1549.26 | FVS | Relinquishment requested filed on 04/16/2010 |
| 833286/2008 | 1943.82 | FVS | Final exploration report filed on 08/22/2012 |
| 833289/2008 | 1928.55 | FVS | Application for mining concession filed on 03/19/2013 |
| 833293/2008 | 1793.65 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833294/2008 | 1492.78 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833295/2008 | 1571.46 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833297/2008 | 1985.37 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833305/2008 | 1555.92 | FVS | Final exploration report filed on 08/22/2012 |
| 833306/2008 | 1712.36 | FVS | Application for mining concession filed on 06/07/2013 |
| 833308/2008 | 1990.91 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833311/2008 | 1993.88 | FVS | Final exploration report filed on 08/22/2012 |
| 833315/2008 | 1992.07 | FVS | Final exploration report filed on 08/22/2012 |
| 833316/2008 | 1994.21 | FVS | Final exploration report filed on 08/22/2012 |
| 833319/2008 | 1993.72 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833320/2008 | 1886.15 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833321/2008 | 1138.08 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833322/2008 | 1992.7 | FVS | Final exploration report filed on 08/22/2012 |
| 833323/2008 | 1536.42 | FVS | Application for mining concession filed on 06/07/2013 |
| 833324/2008 | 1932.31 | FVS | Final exploration report filed on 08/28/2012 |
| 833326/2008 | 1920.21 | FVS | Final exploration report filed on 08/28/2012 |
| 833330/2008 | 1464.51 | FVS | Relinquishment requested filed on 12/09/2013 |
| 833335/2008 | 1575.41 | FVS | Relinquishment requested filed on 12/09/2013 |

| Tenement Number | Area (Ha) | Owner | Status of Mining Right |
|---|---|---|---|
| 833648/2008 | 1784.49 | FVS | Final exploration report filed on 11/29/2012 |
| 844136/2012 | 1910.5 | Verde | Relinquishment requested filed on 12/14/2012 |
| 871831/2012 | 1904.44 | Verde | Relinquishment requested filed on 02/14/2013 |
| 896438/2012 | 1884.07 | Verde | Relinquishment requested filed on 02/19/2013 |

**Figure 4.2_1**
**Verde Concession Locations - Cerrado Verde Potash Project** ***(AMS, 27th December 2013)***




Once an exploration licence is granted, Verde must make annual fee payments to maintain the licence, as explained in Section 4.4 of this report.

The boundaries of the concessions have not been surveyed as this is not a requirement of Brazil's mining code (Figure 4.2_1).

## 4.3 Location of Mineralization

The mineralized zones of the Cerrado Verde Project are located within glauconitic meta-argillite metasiltstone of the Serra da Saudade Formation, Bambuí Group. The known mineralization is located in the concessions owned by Verde.

## 4.4 Agreements and Encumbrances

The tenements are owned 100% by FVS Mineração Ltda. that is a subsidiary of Verde. The Cerrado Verde Project was staked in the third quarter of 2008.

Verde's subsidiary Amazon Pesquisa Mineral e Mineração Ltda (APMM – as of 30th December, 2010, the name of this subsidiary has changed to Verde Fertilizantes Ltda) entered into a discovery contract (the "Cerrado Verde Project Discovery Contract") dated 29th September, 2008 (with retroactive term for July 26, 2008) with Ysao Munemassa (Ysao) pursuant to which Ysao performed, at Verde's expense, preliminary geological surveys and research studies on the Cerrado Verde Project area and the Cerrado Verde Project. The Cerrado Verde Project Discovery Contract was subsequently amended on 27th July, 2010 to provide that APMM shall pay to Ysao: (a) 100,000 Stock Options one year after the application for exploration permits over the Cerrado Verde Project area to the National Department of Mineral Production (DNPM), (b) US$500,000 upon approval of a bankable feasibility study, and (c) a 3% royalty on the net result of production. APMM has the right to purchase the royalties due to Ysao at a cost of US$1,000,000 for each 1% of the protected right of royalty to Ysao.

## 4.5 Taxes and Royalties

In Brazil, the DNPM, Brazil's Department of Mines and Energy, monitors exploration, mining, and mineral processing. This body also administers mineral exploration licences and mining concessions. Mineral exploration licences are issued by DNPM and mining concessions by the Ministry of Mining and Energy.

Exploration licences are granted for a maximum period of three years. As prerequisite, the requestor should provide all requirements and evidence that the area of interest does not overlap with an existing licence. There is an annual fee of R$2.36 per hectare during the initial period. It is possible to request for an extension, in which case this annual mineral rights tax (TAH) will increase to R$3.58 during this extension period. Those values are applicable since March 2012, before that it was respectively R$2.02 and R$3.06. The mineral rights tax should to be paid to the Brazilian government. Exploration licences can be extended for a second period no longer than three years. DNPM has the discretion of the whether to grant the requested renewal.

A mining concession carries a royalty payment obligation to the federal government, the Financial Compensation for the Exploitation of Mineral Resources (CFEM), which is established at 3% of the net sales price of the mineral product. Verde's legal counsel has formally advised that the royalty will be applied to the costs of preparing an interim, rather than final mineral product. In this case, the royalty will be 3% of the mining and crushing costs. SRK have previously cautioned that should this interpretation be incorrect, and a higher royalty applied, this could have a potentially material effect on the economic outcome relative to that previously reported in the PEA. There is also a statutory royalty to the landowner in the case that the landowner is a different entity. This royalty amounts to 50% of CFEM. However, it is common practice to negotiate a separate compensation agreement, if this amount may not be sufficient for the landowner.

## 4.6 Environmental Liabilities and Permitting

AMS is unaware of any environmental liabilities to which the Cerrado Verde Project is subject.

Environmental regulations and general environmental rules and obligations in Brazil are relatively similar to those applicable in Canada. The Brazilian environmental policy is the responsibility of the Ministry of the Environment and is executed at three levels: federal, state, and municipal. Verde intends to file an Environmental Impact Assessment and associated documentation required to advance the project from exploration to the exploitation phase.

## 4.7 Permitting

Verde has acquired all the appropriate land owner and environmental permits to undertake drilling across tenements of interest.

No additional permits are required at the current stage of exploration.

AMS is unaware of any other factors risking the development of the exploration works.

# 5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

## 5.1 Topography, Elevation and Vegetation

The peneplain developed by the glauconitic meta-argillite unit, i.e., the ground over which the Areado Group was deposited, undulates between an altitude of 850m and 1,000m. Higher elevations of peneplain development are found in the more southern parts of the Serra da Saudade range. In the middle portion of the Serra da Saudade range (location of Cerrado Verde project), the peneplain is placed between 880m and 920m. Therefore, it is reasonable to infer that all of the surface exposures of the glauconitic meta-argillite unit were the result of the Tertiary erosion cycles that stripped off the Mesozoic rocks (Mata da Corda and Areado groups) (Figure 5.1_1).

The local vegetation consists of relicts of the primitive savannah (cerrado) still preserved between soya and coffee plantations and commercial plantation forests of eucalyptus and pine trees. The farms are mainly confined to the fertile soil of the Mata da Corda Group that forms a plateau around 1,000m.

**Figure 5.1_1**
**Panoramic View Looking across the Cerrado Verde Project Area (August, 2012)**

## 5.2 Climate and Length of Operating Season

The climate of the region is classified, according to the Brazilian Institute of Geography and Statistics (IBGE) annual report in 2002, as half-humid warm tropical, with annual average temperatures of 22°C. Annual rainfall in the area averages between 1,300mm and 1,800mm, 84% of which falls during the rainy season between October and March, with the highest rainfall between December and January. Exploration and mining operations can be conducted year round.

## 5.3 Physiography

The Cerrado Verde region is located within the hydrographic basin of Indaiá River, a tributary river on the left hand margin of the São Francisco River. According to SECTES – Secretaria do Estado de Ciência e Tecnologia de Minas Gerais – (1938), the Indaiá River basin is part of the geomorphological unit known as São Francisco Plateau, where the edges of the hills and the crest points dip towards the NE with high structural controls (COSTA-FILHO et al, 2007).

The main drainages across the Cerrado Verde project area are the rivers Indaiá, Abaeté, Borrachudo and their tributaries. These rivers have a meandering channel style morphology, with predominantly dendritic drainage patterns evident in areas where pelitic rocks dominate. To the north of the project area lies the Três Marias dam which constitutes the main mouth / confluence point of the rivers in the region.

The main topographic feature across the Cerrado Verde project area is the Serra da Saudade ridge. The landscape can be separated into three domains that may be correlated to typical South American surfaces as defined by King (1956):

- **Upper Surface**: Older stage of the group that has exposed the Areado Group Sandstones and Mata da Corda Group;
- **Intermediate Surface**: Refers to the second stage of the group after the dissection of the Upper Surface (triggered by the resumption of the erosive process). The average altitude of the intermediate surface is 750 to 850m ASL. The intermediate surface presents as an irregular surface which stretches along a N-S strike and is developed over the Serra da Saudade Formation represented by psammitic lithotypes; and
- **Basal Surface**: the youngest, bordering the São Francisco River, with elevation ranging from 570 to 630m. Exposure occurs in pelites of the Serra de Santa Helena and Serra da Saudade formations.

**Figure 5.3_1**
**Panoramic View Looking across the Cerrado Verde Project Area (August, 2012)**


## 5.4 Access to Property

The project can be accessed by air from Rio de Janeiro, São Paulo, Brasilia and other cities, to Patos de Minas, and then overland from Patos de Minas to Matutina (approximately

126km), via good quality paved roads (BR-354 and BR-352). From Belo Horizonte, the project site is accessed by 320 km through BR-352. From the town of Matutina the project area is accessed by a number of secondary gravel roads that traverse the farming region.

The unpaved roads are in reasonable condition although some sections require improvement.

## 5.5 Surface Rights

According to Brazilian law, surface rights are separate from mining rights. Therefore, the land owner has no title to the minerals contained in the soil or in the sub-soil, which are deemed a property of the federal government. The federal government can grant to private companies or individuals, the right to exploration and / or exploitation of sub surface minerals.

Private companies or individual holders of an Exploration Permit are supposed to enter into an agreement with the landowner, allowing them access to the area in order to conduct exploration activities. In case an agreement is not reached, Brazilian Mining Code establishes a judicial procedure by means of which the mining company or individual secures access to the area by paying to the land owner compensation for damages to his or her property and loss of income due to exploration.

Verde has agreements in place with certain land owners, which allows them to perform exploration in the target area(s) specifically selected by the company. These areas are included within the following permits, as issued by the DNPM:

830.002/2010, 830.406/2010, 830.791/2010, 830.792/2010, 830.794/2010, 830.795/2010, 830.947/2011, 831.025/2010, 833.257/2008, 833.259/2008, 833.263/2008, 863.264/2008, 833.268/2008, 833.270/2008, 833.272/2008, 833.274/2008, 833.276/2008, 833.277/2008, 833.280/2008, 833.286/2008, 833.289/2008, 833.295/2008, 833.305/2008, 833.306/2008, 833.315/2008, 833.316/2008, 833.322/2008, 833.325/2008, 833.324/2008, 833.326/2008, 830.383/2008.

Private companies or individuals holding a Mining Concession are entitled to surface rights on the area necessary for the mine and ancillary structures. Such surface rights are obtained by agreement with the land owner, providing for compensation for the price of the land and additional losses caused by the occupation of such land. In case such agreement is not reached, surface rights are granted by the local Court based upon precedent payments by the mining company or individual according to the amount judicially determined for such compensation.

In addition to compensation for damages, the landowner is entitled to a royalty equal to 50% of the Financial Compensation for the Exploitation of Mineral Resources (CFEM). A mining concession carries a royalty payment obligation to the federal government. The CFEM has been established at 3% of the net sale price of the mineral product, as discussed in Section 4.5 of this report.

Verde's legal counsel has formally advised that the royalty will be applied to the costs of preparing an interim, rather than final mineral product. In this case, the royalty will be 3% of the mining and crushing costs. SRK have previously cautioned that should this interpretation be incorrect, and a higher royalty applied, this could have a potentially material effect on the economic outcome relative to that previously reported in the PEA.

Verde has not yet started to negotiate agreements with land owners for establishing exploitation and production activities.

## 5.6 Local Resources and Infrastructure

São Gotardo and Matutina are the closest towns with a significant population to provide manpower for a potential mining operation, having a population of around 40,000 combined. São Gotardo also has good infrastructure, with domestic power and telephone service available. Also, the project is very close to Patos de Minas (129km away), the main city in the Alto Paranaiba area, which has a strong economic, cultural, educational and social environment.

Belo Horizonte, located about 320km from the project site, is the capital and also the largest city in the state, with a population above 4 million. It is the major centre for the Brazilian mining industry, with infrastructure for mining equipment and services available. There is a large commercial airport with domestic and international flights services. Several state and federal government agencies are based there, in addition to private businesses that provide services to the mining industry. Skilled labour is readily available in Belo Horizonte as well as at the towns of São Gotardo and Matutina near the site of the Project.

# 6 HISTORY

## 6.1 Exploration History

The glauconitic meta-argillite occurrence has been known as a potential Potash resource since the 1960's, although only regional mapping has been undertaken in the permits held by Verde over the years.

Cerrado Verde Mineral Rights were originally requested by Verde, by means of application for exploration licences filed with DNPM between 2008 and 2010. Most of the Cerrado Verde Mineral Rights have previously been granted as exploration licences, but those licences have since expired and subsequently been relinquished. There was no ownership of mineral rights in this area, immediately prior to Verde's applications. The areas were available and Verde made the necessary applications to the DNPM.

Verde does not have data with respect to past owners or any prior exploration work. Verde is not aware of any historic resource estimation work on the property. There has been no historical mining on the property. There is no data or information available on prior exploration or development previous to the current owner.

## 6.2 Resource Estimation History

### 6.2.1 Coffey Mining (March 2010)

Verde commenced drilling across the Cerrado Verde Project in late 2009. In March 2010, Coffey Mining Pty Ltd (Coffey Mining) was commissioned by Amazon Mining Holding Plc (Amazon Mining - former subsidiary of Verde) to complete a resource estimate for the Cerrado Verde Potash Project in Brazil.

The maiden mineral resource estimate was based upon 19 reverse circulation (RC) drill holes (997m), which targeted only a select portion of the regional glauconitic meta-argillite within the Amazon Mining tenements. All holes were successful in intersecting the glauconitic meta-argillite.

Coffey Mining estimated a Preliminary Mineral Resource for the Cerrado Verde Potash Project with an effective date reported to the 27th February 2010. All grade estimations were completed using Ordinary Kriging (OK) for $K_2O$. The estimation was constrained within the mineralization interpretations.

A total Inferred resource of 161Mt at 8.75% $K_2O$ was determined (no cut-off grade applied) as shown in Table 6.2.1_1 below.

**Table 6.2.1_1**
**Cerrado Verde Deposit –27th February 2010**
**Inferred Grade Tonnage Report**

| Domain | Cut-Off Grade (% $K_2O$) | Million Tonnes | Average Grade (% $K_2O$) |
|---|---|---|---|
| Low Grade | 0 | 67.82 | 6.22 |
| High Grade | 0 | 92.74 | 10.61 |
| **Total (High + Low Grade)** | **0** | **160.56** | **8.75** |

Coffey Mining considered the Amazon Mining permits to have the potential to host a very large tonnage potash resource within the glauconitic meta-argillite unit. This was demonstrated by the preliminary resource numbers generated from an initial drilling program, as well as regional mapping and grab sampling across the tenement package.

Coffey Mining recommended that a preliminary economic assessment (PEA) be undertaken on the Cerrado Verde Project prior to undertaking any additional resource definition drilling.

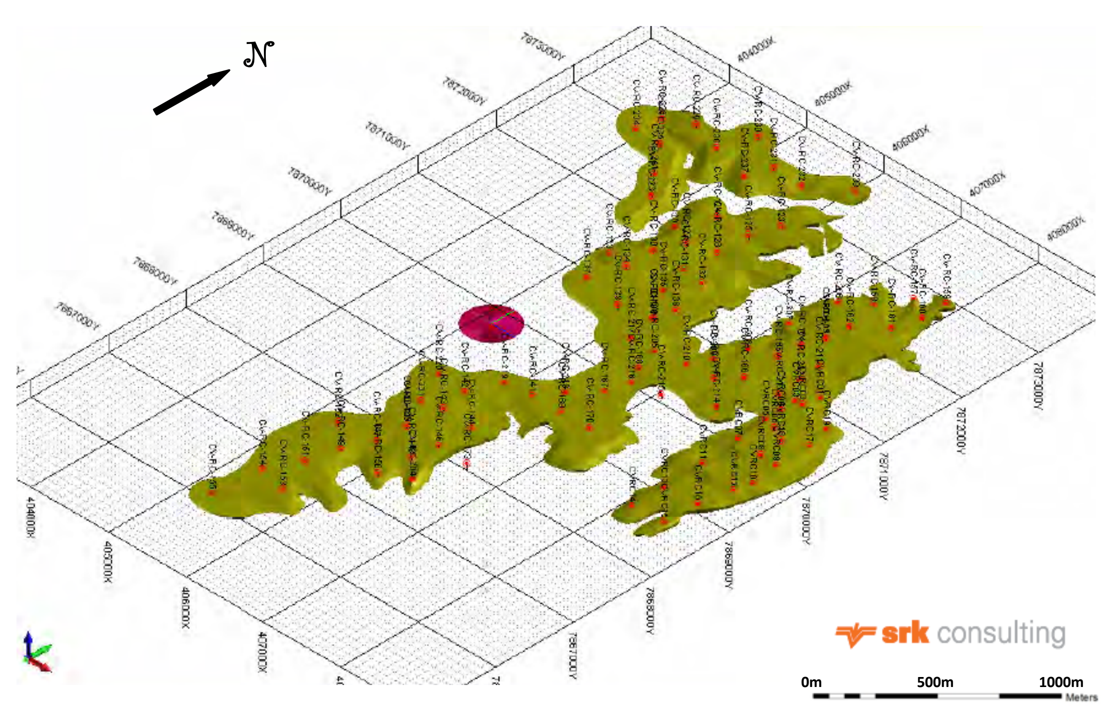
### 6.2.2 SRK Consulting (December 2011)

In late December 2011, Verde Potash Plc (Verde), formerly Amazon Mining Holding Plc., commissioned SRK Consulting (SRK) to prepare a National Instrument 43-101 (NI 43-101) Preliminary Economic Assessment (PEA) on the Cerrado Verde Project.

As part of the PEA, SRK reported an updated resource estimate for the Cerrado Verde Potash Project based on drilling completed throughout the 2010 and 2011 field seasons.

Geological / mineralized domains were constructed for a number of target areas across the Cerrado Verde project area. Resource estimation(s) of the glauconitic meta-argillite mineralization were carried out for the following target areas; Target 1, Target 2, Target 3, Target 4, Target 5, Target 6, Target 7, Target 10, Target 11, Target 12, Target 13, Target 14, Target 16 and Target 17. Resource estimation for each target area were performed using the $K_2O$ values obtained from laboratory submitted samples collected from recently completed drill holes (2010 / 2011 field seasons).

**Figure 6.2.2_1**
**Oblique View Looking across Target 7 of the Cerrado Verde Project Area (December, 2011)**



A total Indicated resource of 71Mt at 9.22% $K_2O$ was determined by SRK Consulting (7.5% $K_2O$ cut-off grade applied) with an addition Inferred resource totalling 2,764Mt at 8.91% $K_2O$ (7.5% $K_2O$ cut-off grade applied) as shown in Table 6.2.2_1 below.

**Table 6.2.2_1**
**Cerrado Verde Deposit –17th December 2011**

| Target | Cut-Off Grade (% $K_2O$) | Tonnage (Mt) | Average Grade (% $K_2O$) |
|---|---|---|---|
| **INDICATED RESOURCE** | | | |
| Target 6 | 7.5 | 23.25 | 8.83 |
| Target 7 | 7.5 | 47.83 | 9.55 |
| **TOTAL INDICATED** | | **71.08** | **9.22** |
| **INFERRED RESOURCE** | | | |
| Target 1 | 7.5 | 235.86 | 8.72 |
| Target 2 | 7.5 | 11.63 | 8.54 |
| Target 3 | 7.5 | 126.52 | 8.72 |
| Target 4 | 7.5 | 146.67 | 9.03 |
| Target 5 | 7.5 | 27.27 | 8.31 |
| Target 6 | 7.5 | 47.85 | 8.84 |
| Target 7 | 7.5 | 955.20 | 9.50 |
| Target 10 | 7.5 | 28.50 | 10.10 |
| Target 11 | 7.5 | 46.79 | 8.27 |
| Target 12 | 7.5 | 235.68 | 8.80 |
| Target 13 | 7.5 | 168.25 | 8.50 |
| Target 14 | 7.5 | 325.20 | 8.65 |
| Target 16 | 7.5 | 257.49 | 8.15 |
| Target 17 | 7.5 | 150.89 | 8.19 |
| **TOTAL INFERRED** | | **2,763.80** | **8.91** |

Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
Inverse Distance Weighting with power two (IDW2) estimate (Block Model - 50mE X 50mN X 10mRL).
Effective date of Targets 1, 2, 3, 4, 5,12, 13, 14, 16, 17 is 21st December, 2011.
Effective date of Targets 4, 6, 10 and 11 is 3rd August, 2011.
Effective date of Target 7 is 10th February, 2012.

The resource estimate has been undertaken in compliance with accepted CIM definitions for indicated and inferred resources in accordance with NI 43-101 Standards of Disclosure for Mineral Projects.

## 6.3 Mining History

No historical mining of the glauconitic meta-argillite has been undertaken.

# 7 GEOLOGICAL SETTING AND MINERALIZATION

## 7.1 Regional Geology

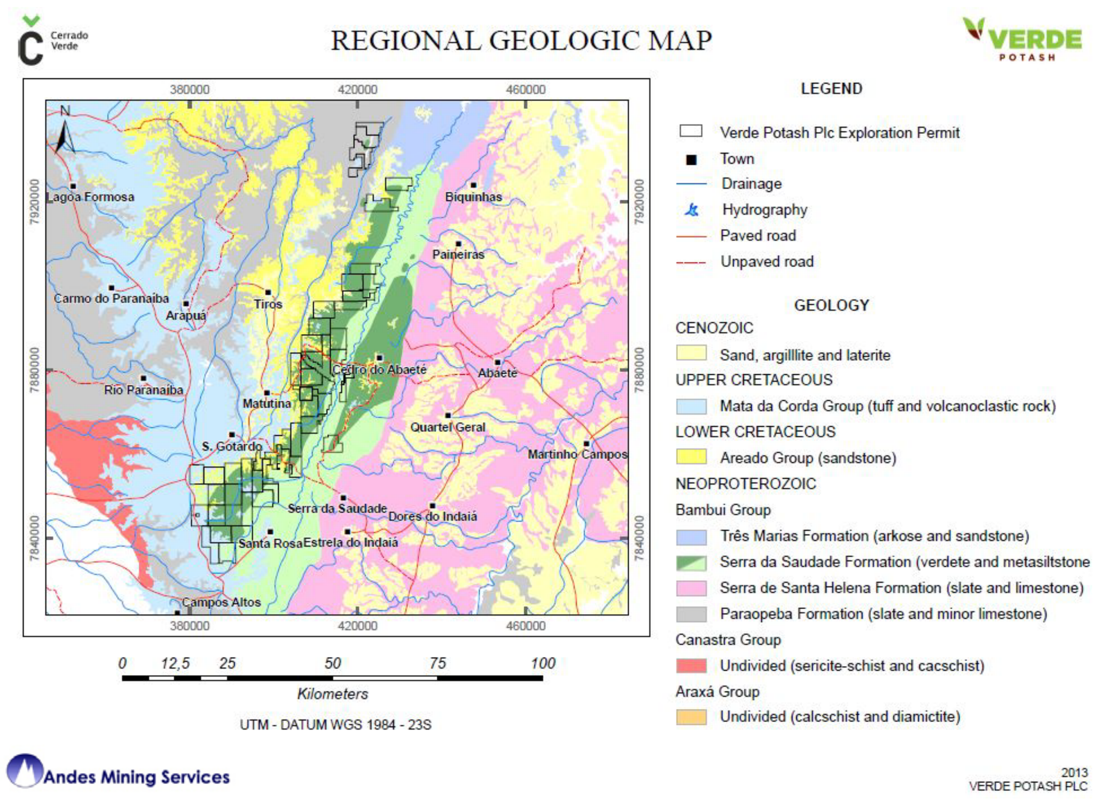
The region is mainly underlain by Neoproterozoic and Cretaceous rock units, which are partly covered by Cenozoic sandstones, lateritic sediments and soils (Figure 7.1_1). The oldest rocks, occurring in the southwestern portion of the region are represented by a nucleus of calcoschists and diamictites of the Ibia Formation (Araxa Group) surrounded by an undivided domain of the Canastra Group (quartzites, phyllites and micaschists).. A modal age of 1,000m.y. (207Pb / 206Pb) has been determined for the Canastra Group, which was initially metamorphosed together with the Araxa Group during the Brasiliano Orogeny (600m.y.).

The sequence is followed by the Bambui Group (600-550m.y.), which comprises the marine deposits of the Paraopeba Formation, the Serra de Santa Helena Formation and the Serra de Saudade Formation, including the glauconitic meta-argillite unit. Variegated slates dominate all of these units. The overlying Três Marias Formation is composed of arkosic sandstones.

Following the deposition of the Bambui Group, and the Brasiliano Orogeny, the region was exposed to a long period of erosion during the Paleozoic, Triassic and Jurassic periods, giving rise to the development of a mature, deeply eroded peneplain. The terrigenous sediments of the Areado Group were deposited during the Lower Cretaceous on this extensive, flat peneplain. The next stratigraphic phase is recorded by the extensive and dominantly pyroclastic kamafugitic volcanism of the Mata da Corda Group of Upper Cretaceous age.

**Figure 7.1_1**

**Cerrado Verde Regional Geological Setting *(Verde, 27th December 2013)***

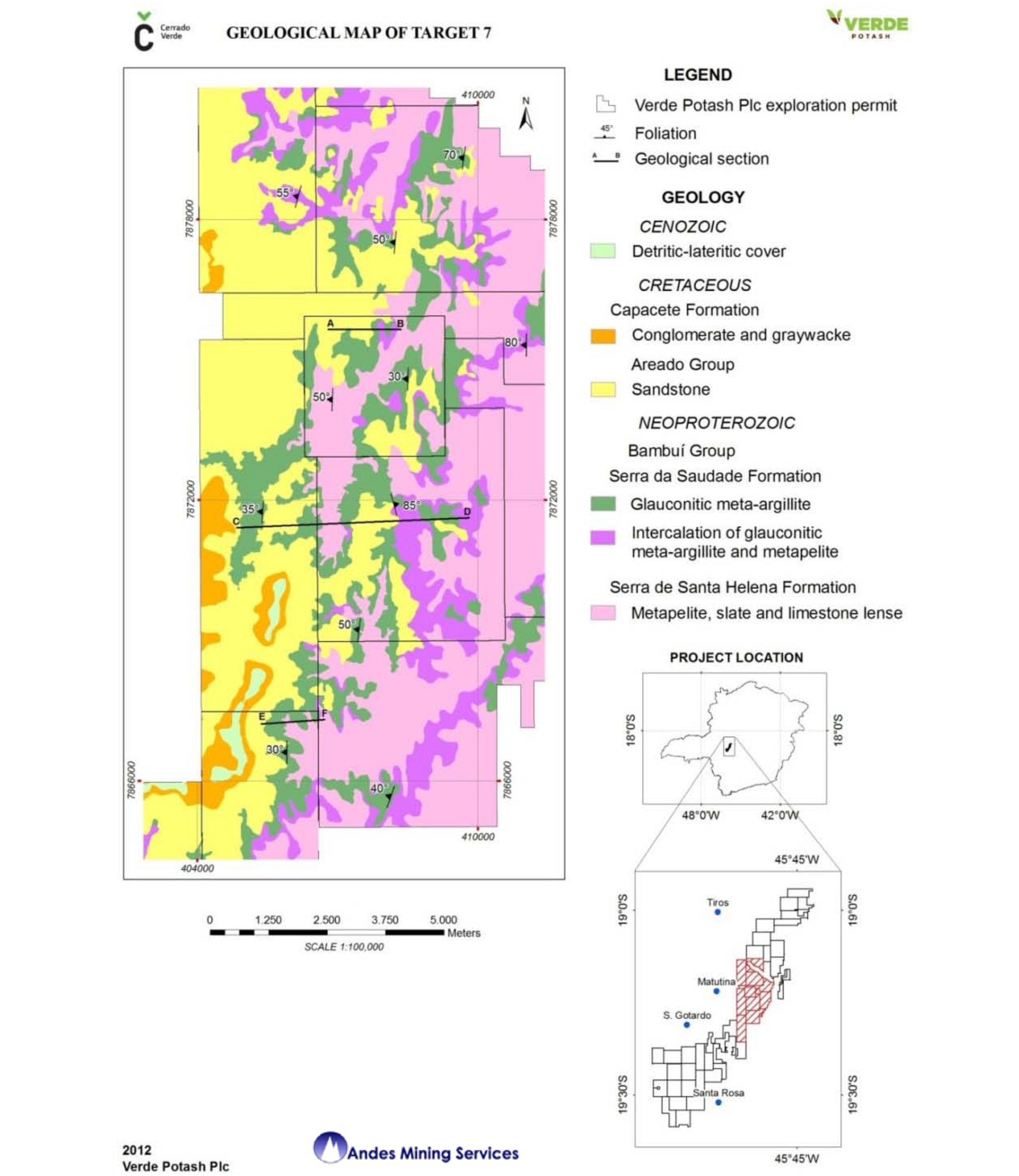


## 7.2 Local and Project Geology

### 7.2.1 The Glauconitic Meta-Argillite Unit

The glauconitic meta-argillite unit occurs mainly at the top of the Serra da Saudade Formation and underlies the Areado Group sandstone (Figure 7.2.1_1). The Serra da Saudade Formation consists of carbonate and siliclastic sediments that were deposited in an epicontinental platform in the late Neoproterozoic (700 – 600Ma). The glauconitic meta-argillite occurs in extensive outcrops, along both banks of Indaiá River, in a trend approximately 120km x 20km in area. It covers the regions and municipalities of Santa Rosa da Serra, São Gotardo and Guarda dos Ferreiros (SW), Matutina, Quartel São João and Cedro do Abaeté (centre), Paineiras and Biquinhas (NE), in the State of Minas Gerais.

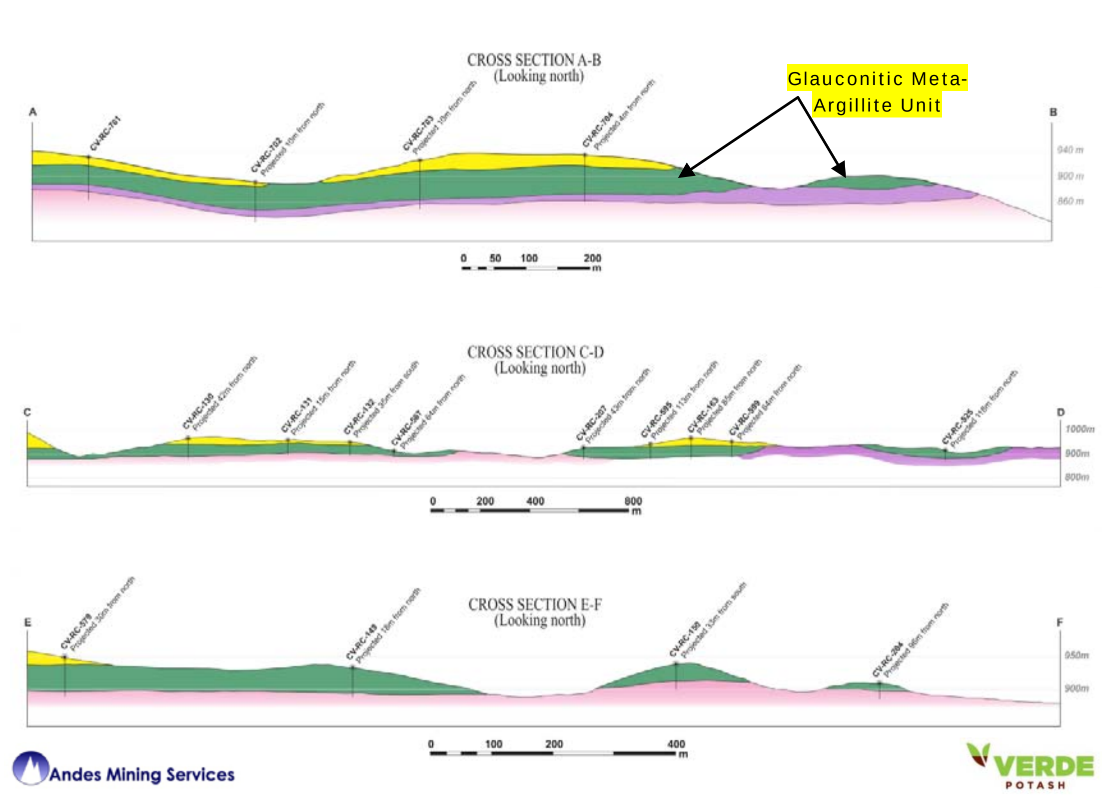
**Figure 7.2.1_1**
**Cerrado Verde Local Setting for Glauconitic Meta-Argillite Unit** ***(Verde, 27th December 2013)***



The thickness of the glauconitic meta-argillite unit varies from 15 to 80m in the southernmost domain, to over 50m in the northern half of the Serra da Saudade range. The lower contact with the metasiltstone of the Serra da Saudade Formation is transitional (2 to 3m in width) and contains intercalations of limestone lenses and calciferous metasiltstone.

**Figure 7.2.1_2**

**Cross Section through Target 7 - Cerrado Verde Project Area *(Verde, 27th December 2013)***




The Serra da Saudade Formation was eroded during the Gondwana Cycle (King, 1956) of probably Jurassic age, and it was over this extensive peneplain that the Cretaceous sandstone beds of the Areado Group were deposited.

The upper contact is transitional with rhythmic intercalations of glauconitic meta-argillite and metasiltstone with various colours (predominantly pink when weathered), defined informally as the Transition Zone. These intercalations vary from millimetres to metres in thickness.

### 7.2.2 Structural Setting

The glauconitic meta-argillite unit and the Transition Zone underwent two main phases of folding. The first resulted in the development of pervasive concentric and chevron folds, in which the axial planes dip NNW. The strike of the foliation is NNE. The second phase formed folds with nearly vertical axial planes and sub-horizontal folding axis. In a regional scale, the folded glauconitic meta-argillite and the transition zone display a sub-horizontal relationship (Figures 7.2.2_1 and 7.2.2_2).

The largest extension of the glauconitic meta-argillite unit occurs where the erosion has been less intense, and is marked by the presence of remnants of the Areado Group sandstones. This occurs mainly in the central part of the outcropping glauconitic meta-argillite.

**Figure 7.2.2_1**
**Folding throughout Transition Zone**

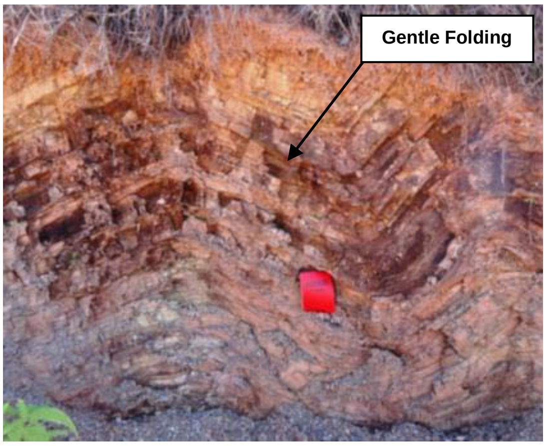
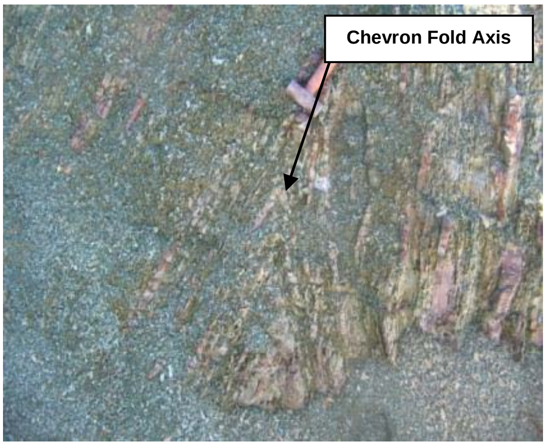



**Figure 7.2.2_2**
**Chevron Folding - Glauconitic Meta-argillite Unit**




### 7.2.3 Elevation and Erosion Level

The peneplain developed on the glauconitic meta-argillite unit, i.e., the ground over which the Areado Group was deposited, undulates between the elevation of 1,000m and 850m. Higher elevations of peneplain development are found in the southern portions of the Serra da Saudade Formation. In the middle portion of the ridge, the peneplain is placed between 880m and 920m. Therefore, it is fair to assume that all of the surface exposures of the glauconitic meta-argillite unit were the result of the Tertiary erosion cycles that stripped off the Mesozoic rocks (Mata da Corda and Areado groups).

## 7.3 Mineralization

Glauconitic meta-argillite is a pelitic metasedimentary rock which is weakly deformed and metamorphosed to lower greenschist facies. Glauconitic meta-argillite displays a lepidoblastic texture, and preserves relict textures from its original clastic origin. The glauconitic meta-argillite unit is the target rock type across the Verde group of permits as it contains a high content of $K_2O$.

The glauconitic meta-argillite unit shows millimetre to centimetre bands rich in chlorite, interbedded with quartz-rich layers (Figures 7.3_1 and 7.3_2).

**Figure 7.3_1**
**Layered Intercalations of Glauconitic Meta-Argillite**

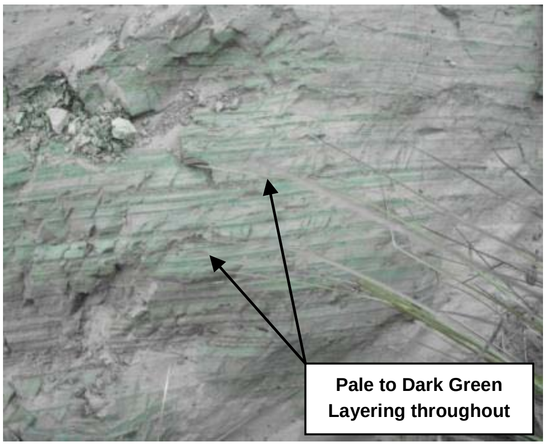
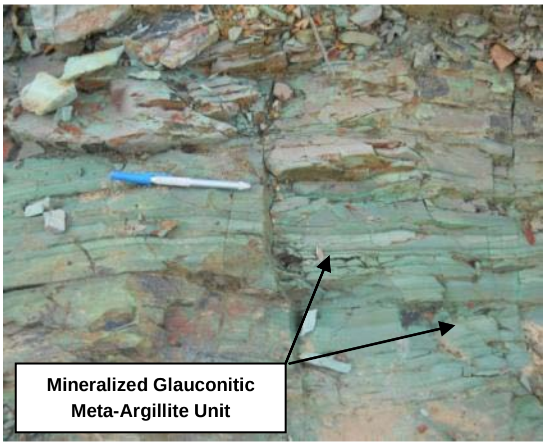



**Figure 7.3_2**
**Mineralized Glauconitic Meta-Argillite Unit**



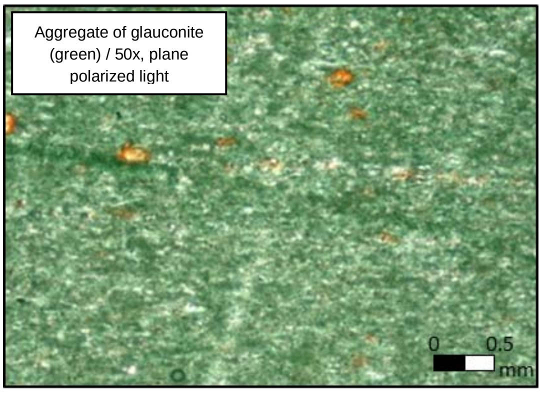
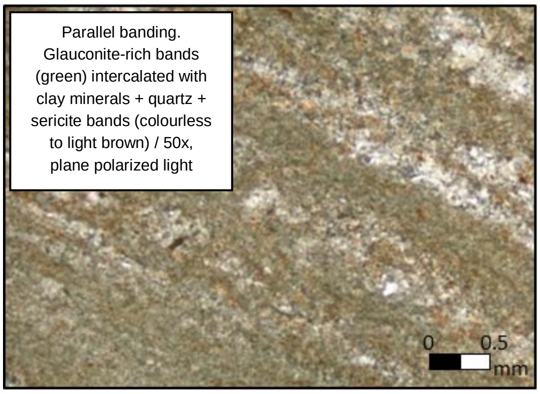
A sample of glauconitic meta-argillite containing 10.7% $K_2O$ showed the following modal composition: quartz (10%), microcline (20%), biotite-chlorite (60%) and muscovite (10%).

Samples submitted for X-ray diffraction showed the following minerals: quartz, muscovite-fengite, microcline-orthoclase and clinochlore (magnesium chlorite).

A petrographic study was carried out upon 6 samples of glauconitic meta-argillite collected from diamond drilling ½ core samples. Thin section studies detected significant quantities of K-bearing minerals and quartz which are highlighted below (Figures 7.3_3 and 7.3_4):

- **CV-WG-51**: Glauconite (59%), quartz (20%), k-feldspar (12%), sericite-illite (8%), hydrobiotite (< 1%);
- **CV-DH-01** (20m – 22m): Clay minerals including glauconite (84%), quartz (10%);
- **CV-DH-02** (39m – 41m): Clay minerals including glauconite (61%), quartz (15 – 25%), sericite (3 – 6%);
- **CV-DH-03** (54m – 56m): Glauconite (75%), quartz (8 – 10%), sericite (8%);
- **CV-DH-04** (76m – 78m): Glauconite (80 – 84%), quartz (6 – 12%), sericite (3 – 5%), k-feldspar (3%);
- **CV-DH-05** (32m – 34m): Glauconite (55 – 74%), quartz (10%), sericite (8 – 9%), hydrobiotite (< 1%), k-feldspar (< 1%).

Due to the very fine grained texture of the rocks, sometimes it is difficult to identify the mineralogy, especially when forming an aggregate of clay minerals. The $K_2O$ content of the glauconitic meta-argillite ranges approximately from 6 % to 12 %.

| **Figure 7.3_3**<br>**Photomicrograph of sample CV DH 04 (76m – 78m)** | **Figure 7.3_4**<br>**Photomicrograph of sample CV DH 05 (32m – 34m)** |
|---|---|
|   |   |

### 7.3.1 Mineralized Zones

As stated previously, potash mineralization occurs as mineral forming elements of microcline-orthoclase and muscovite-fengite minerals that are rock forming mineral constituents of the glauconitic meta-argillite formation.

The glauconitic meta-argillite held within the Verde tenements can be traced for the entire 120km strike length with a potential width of up to 500m. Grab samples along the entire strike length range from 5% to 12% $K_2O$ (Figures 7.3.1_1 and 7.3.1_2).

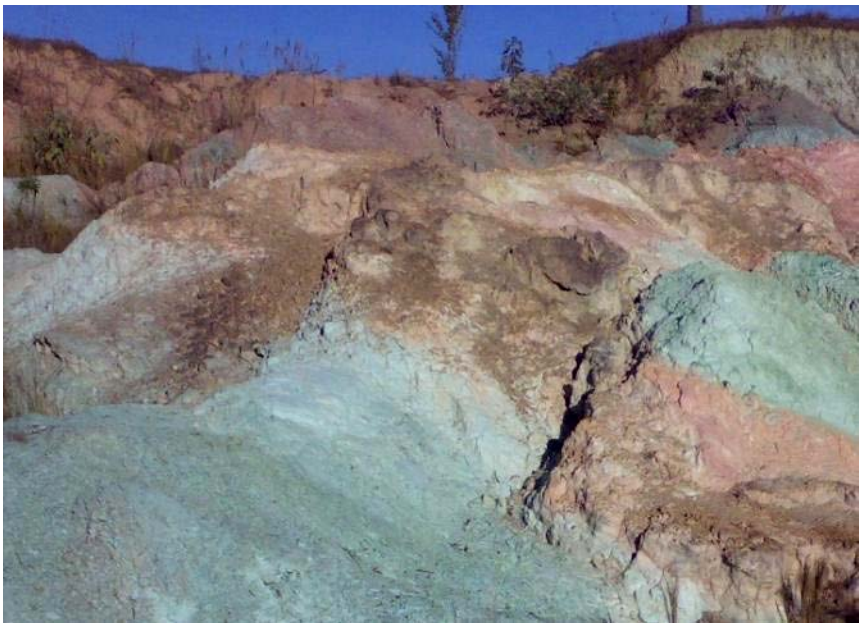
**Figure 7.3.1_1**
**Outcrop of Glauconitic Meta-Argillite in the Cerrado Verde Project Area**

**Figure 7.3.1_2**
**Mineralized Glauconitic Meta-Argillite in the Cerrado Verde Project Area**

### 7.3.2 Surrounding Rock Types

The glauconitic meta-argillite unit is partially covered by a thin layer of sandstone of Cretaceous age in its central part. To the east it is intercalated with red to yellow metapelites (argillites, rhythmites and siltstones), which forms the transition zone (Figure 7.3.2_1). The transition zone is the basal part of the glauconitic meta-argillite unit and outcrops by a combination of gentle folding and erosion. To the west, the glauconitic meta-argillite is eroded by a N-S running creek which exposes the underlying carbonaceous slate. To the north the glauconitic meta-argillite unit is again intercalated with metapelites. To the south the glauconitic meta-argillite is abruptly eroded, occurring only as the metapelites and slates.

**Figure 7.3.2_1**
**Transition Zone with Intercalations of Glauconitic Meta-Argillite and Reddish Siltstones**



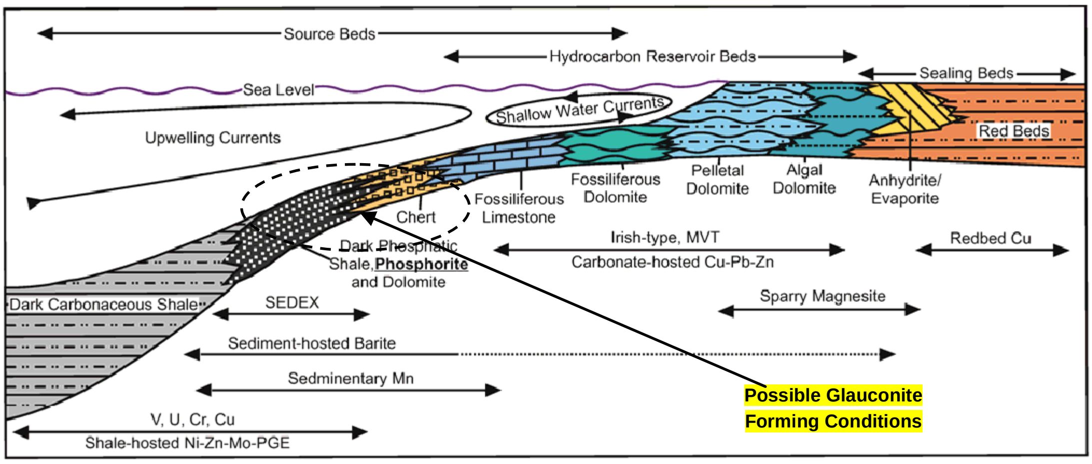
# 8 DEPOSIT TYPES

Normally, glauconite is considered a diagnostic element indicative of continental shelf marine environments with slow rates of accumulation. It develops as a consequence of diagenetic alteration of sedimentary deposits, bio-chemical reduction and subsequent mineralogical changes affecting iron-bearing micas such as biotite, and is also influenced by the decaying process of organic matter degraded by bacteria in marine animal shells. Glauconite forms under reducing conditions in sediments (Figure 8_1).

No geological model has yet been proposed for the potash-rich glauconitic meta-argillite metasiltstone. It is a unique type of mineralization that is known only in the Serra da Saudade Formation in the western part of the state of Minas Gerais.

Presently, the glauconitic meta-argillite unit is not a commercial source of potash.

**Figure 8_1**
**Potash Deposits - Possible Genetic Setting for Cerrado Verde (Sheldon, 1963)**



# 9 EXPLORATION

## 9.1 Historical Exploration

Up until 2011, exploration work was focused upon a number of glauconitic meta-argillite units known as Target 1, Target 2, Target 3, Target 4, Target 5, Target 6, Target 7, Target 10, Target 11, Target 12, Target 13, Target 14, Target 16 and Target 17 (Figures 9.1_1 and 9.1_2).

Exploration activities included field and laboratory studies; geological mapping; outcrop studies and their correlation; drilling across the glauconitic meta-argillite unit; systematic sampling; chemical and physical analysis of the rock samples / drill core samples; metallurgical characterization and processing testwork.

**Figure 9.1_1**
**2010 / 2011 Historical Target Areas for Drilling - Southern Targets *(Verde, 27th December 2013)***

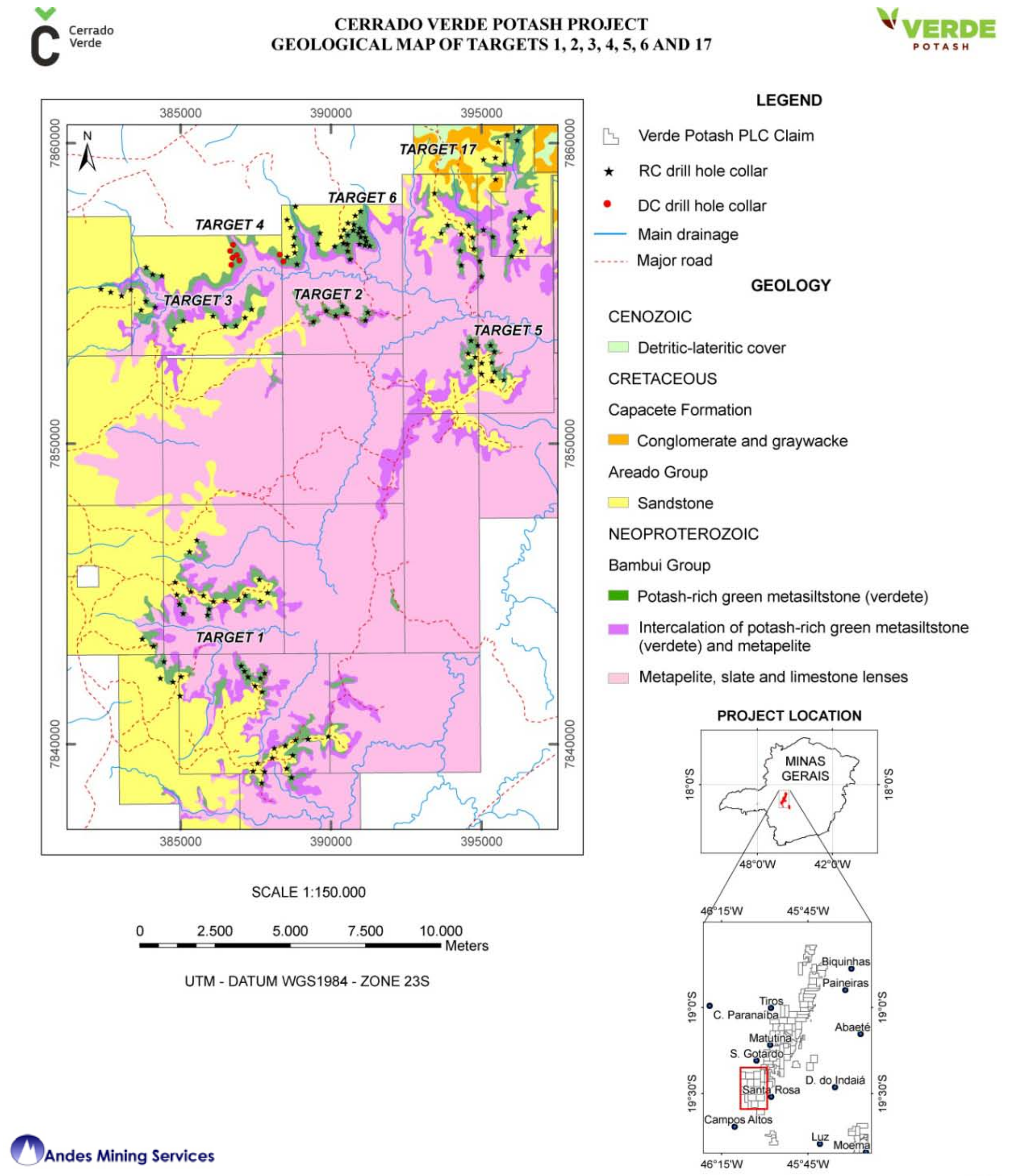
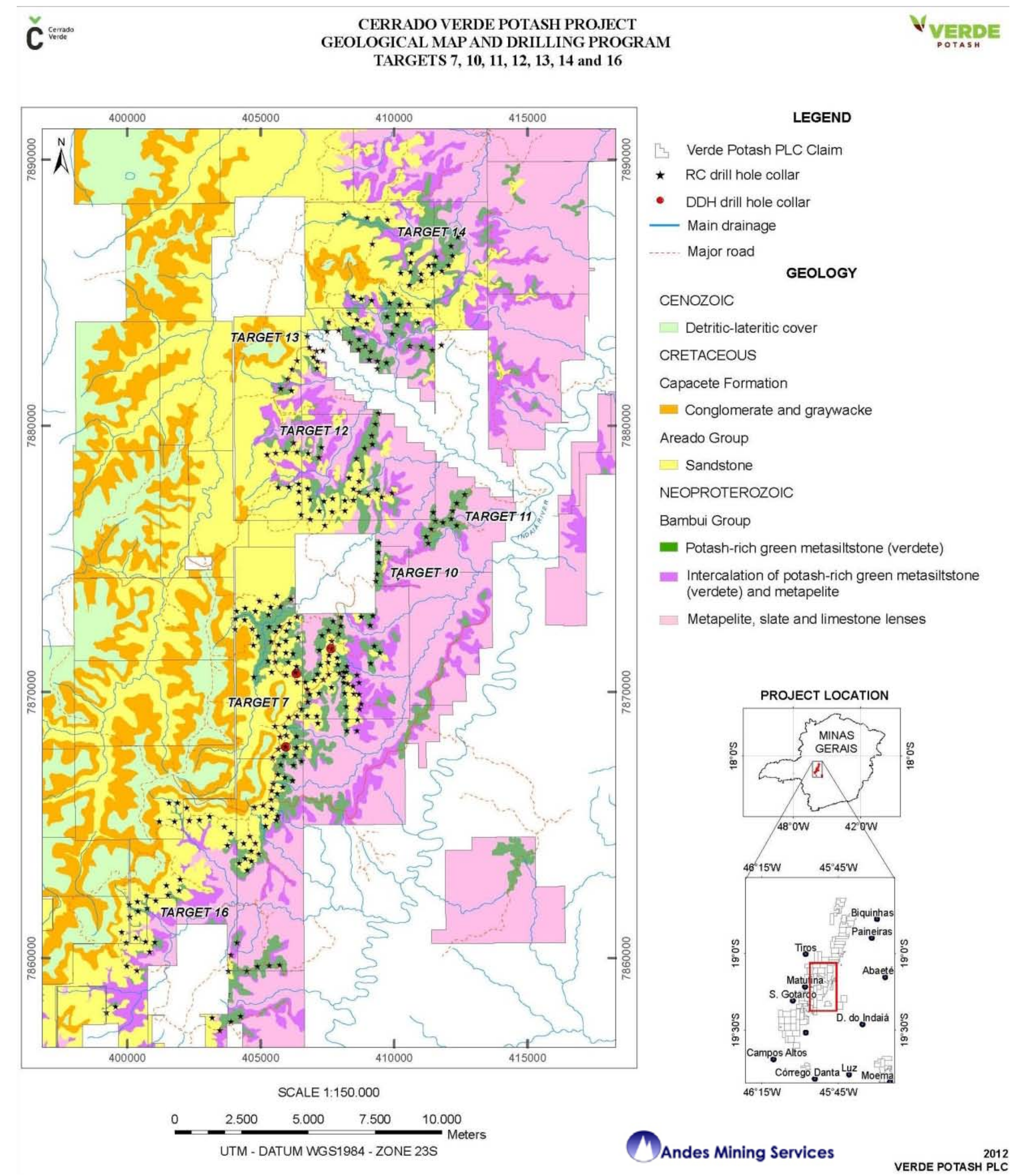


**Figure 9.1_2**
**2010 / 2011 Historical Target Areas for Drilling - Central Targets *(Verde, 27th December 2013)***




Initially, a bibliographic compilation (literature review) was performed upon all of the material relating to the project and surrounding areas, along with studies of economic exploitation of the potash present in silicate rocks such as the glauconitic meta-argillite. This study also included technological and marketing aspects for producing and selling a potash product.

The maps used as a cartographic base were the topographic map SE-23-Y-D-II, SE-23-Y-D-I and SE-23-Y-D-IV, in scale 1:100,000 (Dores do Indaiá, São Gotardo and Campos Altos sheets, respectively) edited by IBGE, the geological maps SE-23-Y-D 1:250.000 (Bom Despacho Sheet) and SE-23-YD-II 1:100,000 (Dores do Indaiá Sheet) from the Projeto São Francisco, as well as maps from various theses and dissertations.

Subsequently, the geological, geophysical and geochemical information was integrated on a regional scale, followed by the analysis and interpretation of digital satellite images for the visualization of the regional structures and occurrences of glauconitic meta-argillite across permits held by Verde.

The outcrop of the glauconitic meta-argillite unit can be distinguished on satellite images by its characteristic bluish colour.

In the preliminary survey, the targets were defined using Google Earth images and data from SRTM (Shuttle Radar Topography Mission). This data can be found freely available on the website of EMBRAPA (government company), in the form of a land numerical model grid, with 90m resolution.

In the first field research, undertaken in 2008, mapping of the main rock types present in the region was performed, on a 1:25,000 scale, as well as a survey of the main access, drainage and farms within the areas of interest. For this survey GPS devices from Garmin ®, model GPSMAP 76 CSX were used.

A preliminary evaluation of the potash levels on outcrop samples were made through a portable X-ray fluorescence device, followed by chemical analysis at ALS Minerals, Bureau Veritas, Brasil, FRX Service, SGS Geosol laboratories in Vespasiano and Belo Horizonte, Minas Gerais State, and at the São Paulo University.

Later stages of field involved the generation of geological cross sections (regional scale), especially in the areas of glauconitic meta-argillite exposure, and semi-detailed mapping campaigns for recognition of the main lithofacies and stratigraphic relationships and structural aspects. During the mapping, the samples collected were used to make thin sections and subjected to lithochemical / mineralogical analysis. Structural data and some stratigraphic section surveys were made throughout the area.

## 9.2 Recent Exploration

Up until 2011, exploration work was focused upon a large number of glauconitic meta-argillite target areas known informally as Target 1, Target 2, Target 3, Target 4, Target 5, Target 6, Target 7, Target 10, Target 11, Target 12, Target 13, Target 14, Target 16 and Target 17.

In 2012 however, exploration activities were concentrated on a select number of higher grade $K_2O$ targets. Target areas included 7, 10 and 12, and a new area located within exploration permit 830.383/2008 which was acquired by Verde from a third party.

Geological mapping suggested these targets belonged to a single glauconitic meta-argillite body. Subsequently, these 4 individual target areas were collectively grouped into a single target area known as Target 7.

### 9.2.1 Geological Mapping

The glauconitic meta-argillite unit is the main rock-type of interest to be mapped across the Verde tenements, and has a marked bluish colour which can be observed from Google Earth images (Figure 9.2.1_1). Zones of glauconitic meta-argillite outcrop were interpreted on Google

Earth images, converted into shapefiles in ArcGIS and then inserted on PDAs (Trimble and GETAC personal digital assistant) with GPS and ArcPad programs installed. The topographic maps, the legal status and the existing geological maps were also inserted into the PDA units.

Geological mapping was carried out with the PDAs (Figure 9.2.1_2) into which the outcrops of glauconitic meta-argillite and other lithologies, float material, soil points, geological structures and lithological contacts were inserted and exported to ArcGIS software. Only once this was completed, was a final geological map was produced.

Glauconitic meta-argillite outcrops were routinely sampled, and the $K_2O$ values were assayed with Innov-X Delta X-ray fluorescence (XRF) spectrometer. Glauconitic meta-argillite zones which returned greater than 6 % $K_2O$ were mapped in more detail in preparation for drill testing.

**Figure 9.2.1_1**
**Google Earth Image - Glauconitic Meta-Argillite Unit marked by a typical bluish Colour**

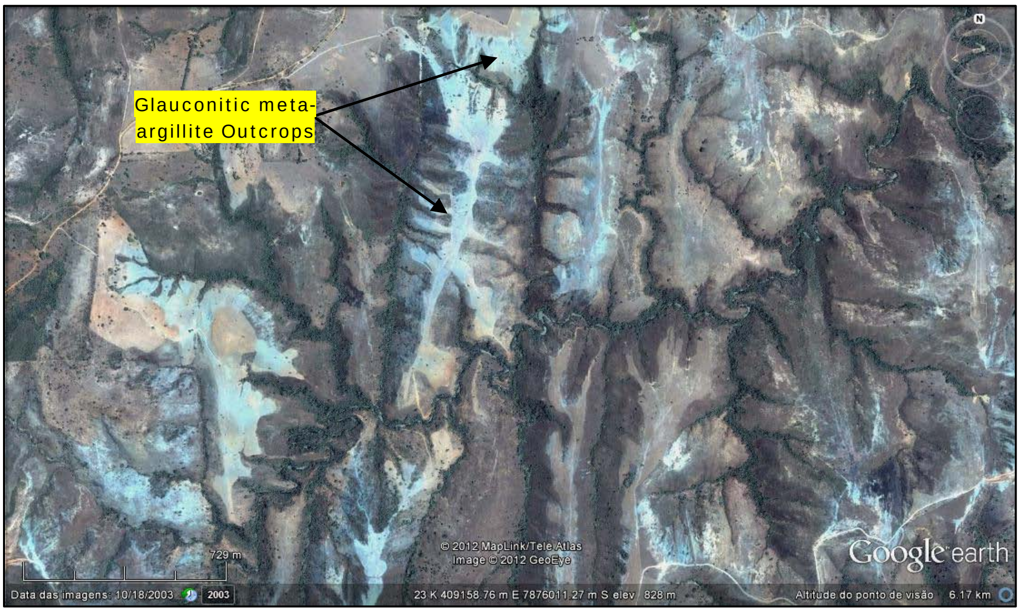



**Figure 9.2.1_2**
**Geological Mapping using GETAC PDA's with ArcPad Software *(Verde, 31st March 2013)***

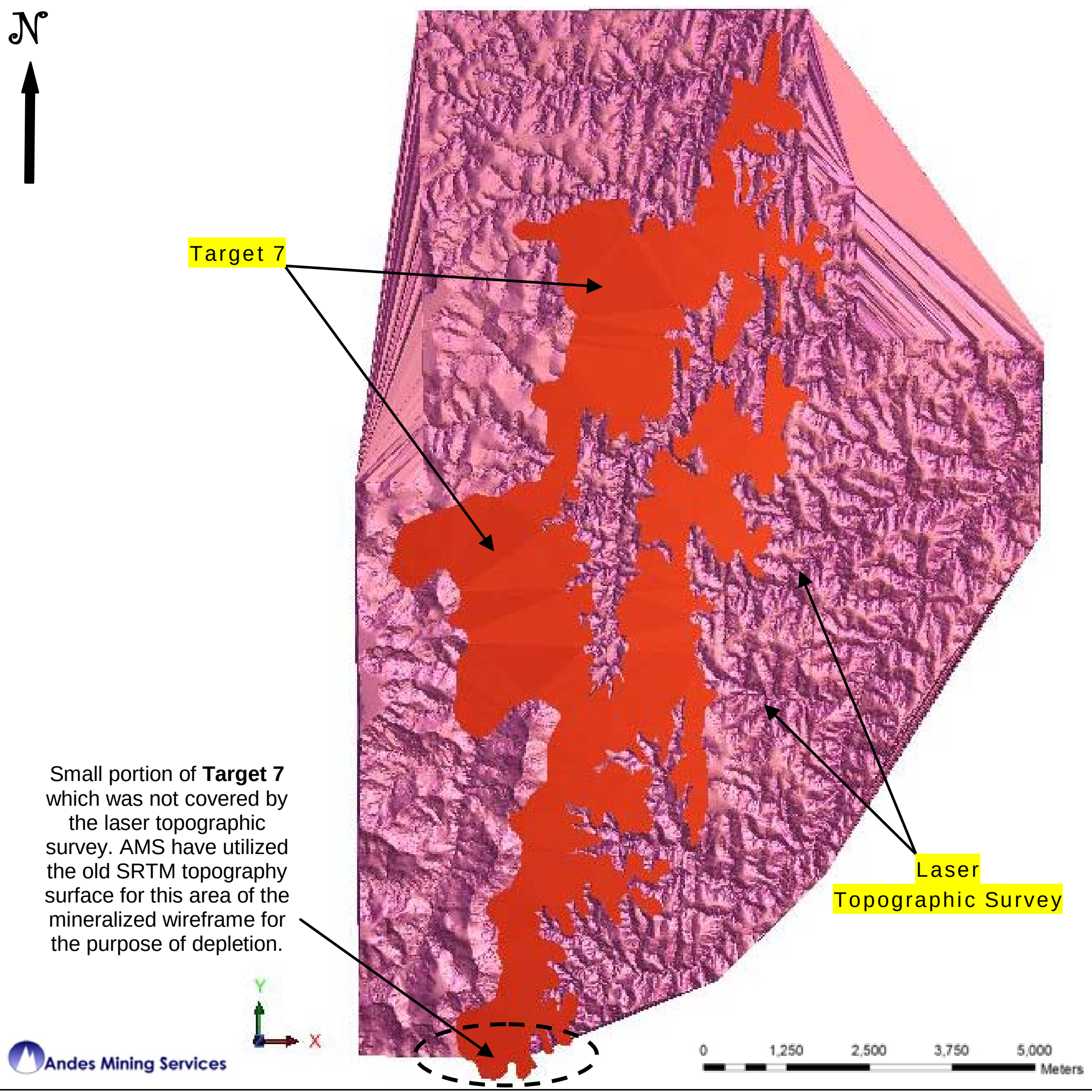
### 9.2.2 Airborne Surveys

Verde contracted Geoid Laser Mapping Ltda to conduct an airborne laser scanning survey across an area measuring 116.72 km$^2$. The main objective of the survey was to cover Target 7 and its immediate surroundings in which the company plans to develop an open pit mine, the concentration plant and the tailing disposal areas studies. A laser contour map was generated at 1m intervals with a 1:1,000 scale map produced and utilized to accurately plot the geology and the drill hole collar locations (Figure 9.2.2_1).

The drill holes collar coordinates were measured using a differential global positioning system (DGPS) instrument (Trimble® R4 with RTK radio system). A double frequency L1/L2 Global Navigation Satellite System of geodesic pair was utilized. The equipment collect data in real time with a horizontal accuracy of 3mm + 0.1mm and up to 3 times the horizontal accuracy for vertical measurements.

The grid system was based on Universal Transverse Mercator (UTM) coordinates, in World Geodetic System 1984 (WGS84) applied to Zone 23S.

**Figure 9.2.2_1**
**Detailed Airborne Topographic Laser Survey *(AMS, 31st March 2013)***



### 9.2.3 Reverse Circulation and Diamond Drilling

A total of four drilling campaigns were performed across the Cerrado Verde Potash Project with the first campaign commencing in late 2009.

The principal drilling methods utilized, include rotary-percussion reverse circulation drilling (RC) and diamond core drilling (DC). Drilling was initially carried out at a nominal spacing of 100m x 400m grid spacing across a number of specific target areas identified by Verde (Figures 9.2.3_1 and 9.2.3_2).

Details regarding individual RC and DC drilling programs have been covered in Section 10 of this report.

**Figure 9.2.3_1**
**2010 / 2011 Geological Map and Drilling Program - Targets 1, 2, 3, 4, 5, 6 and 17** ***(Verde, 27th December 2013)***

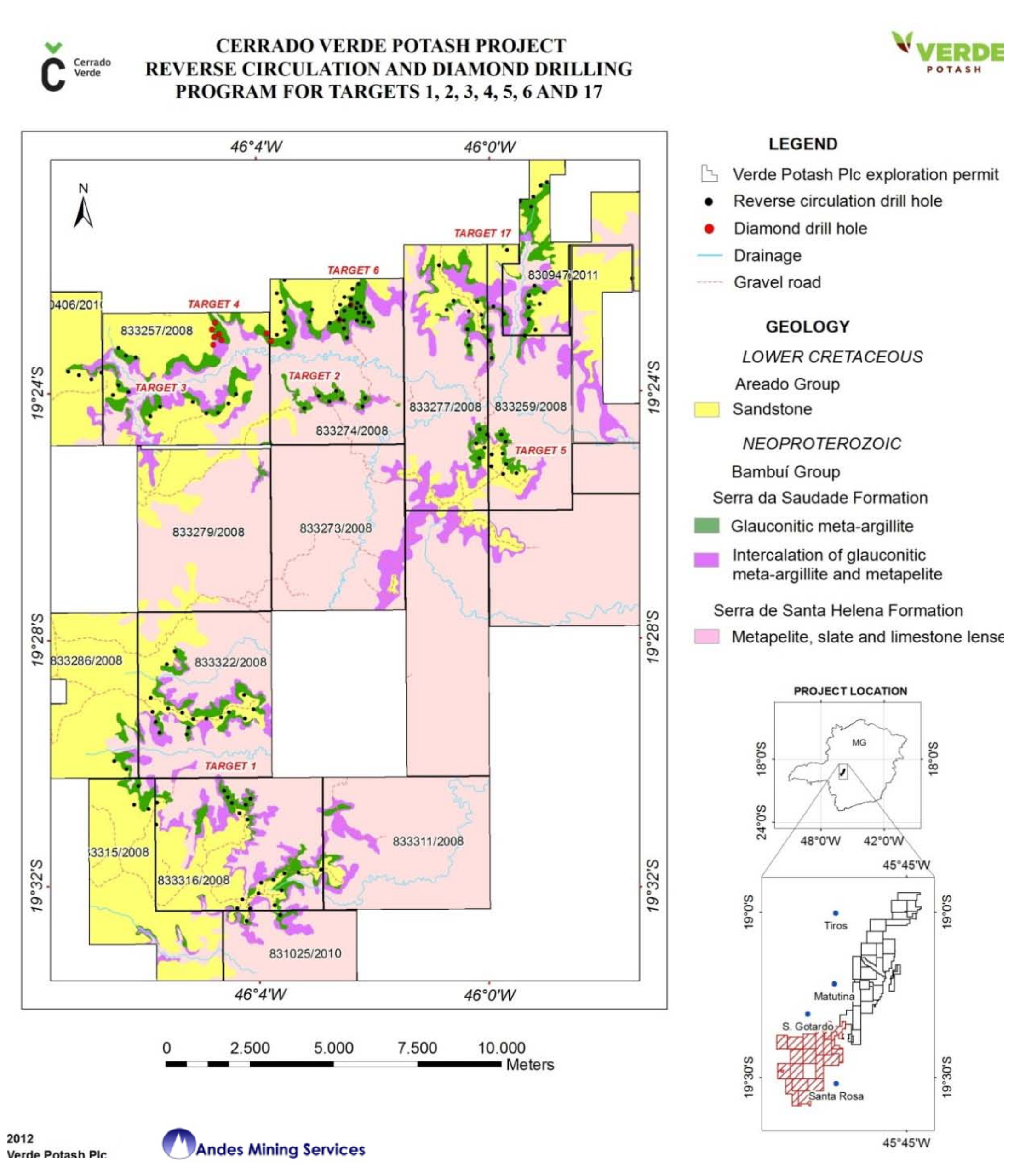
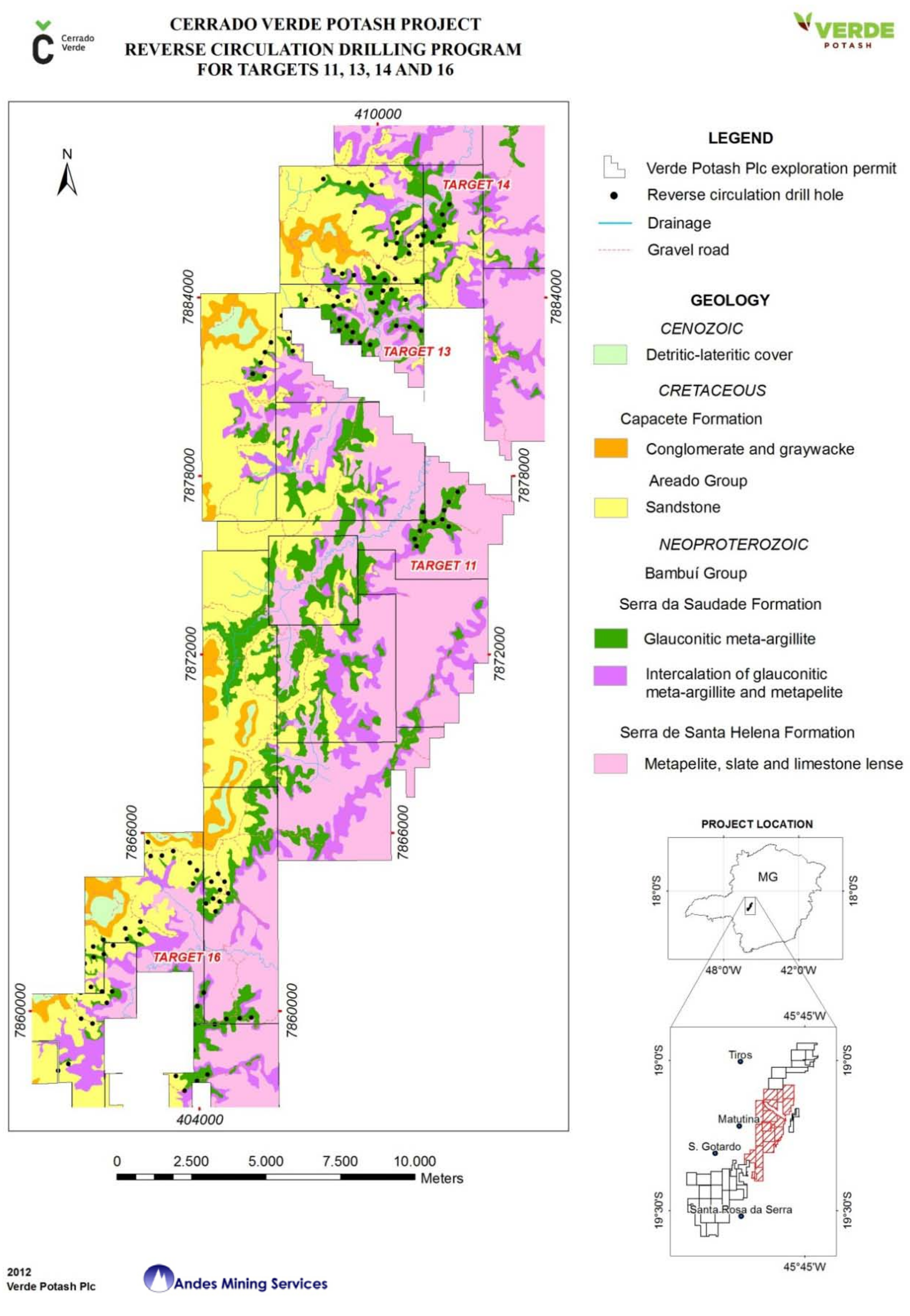
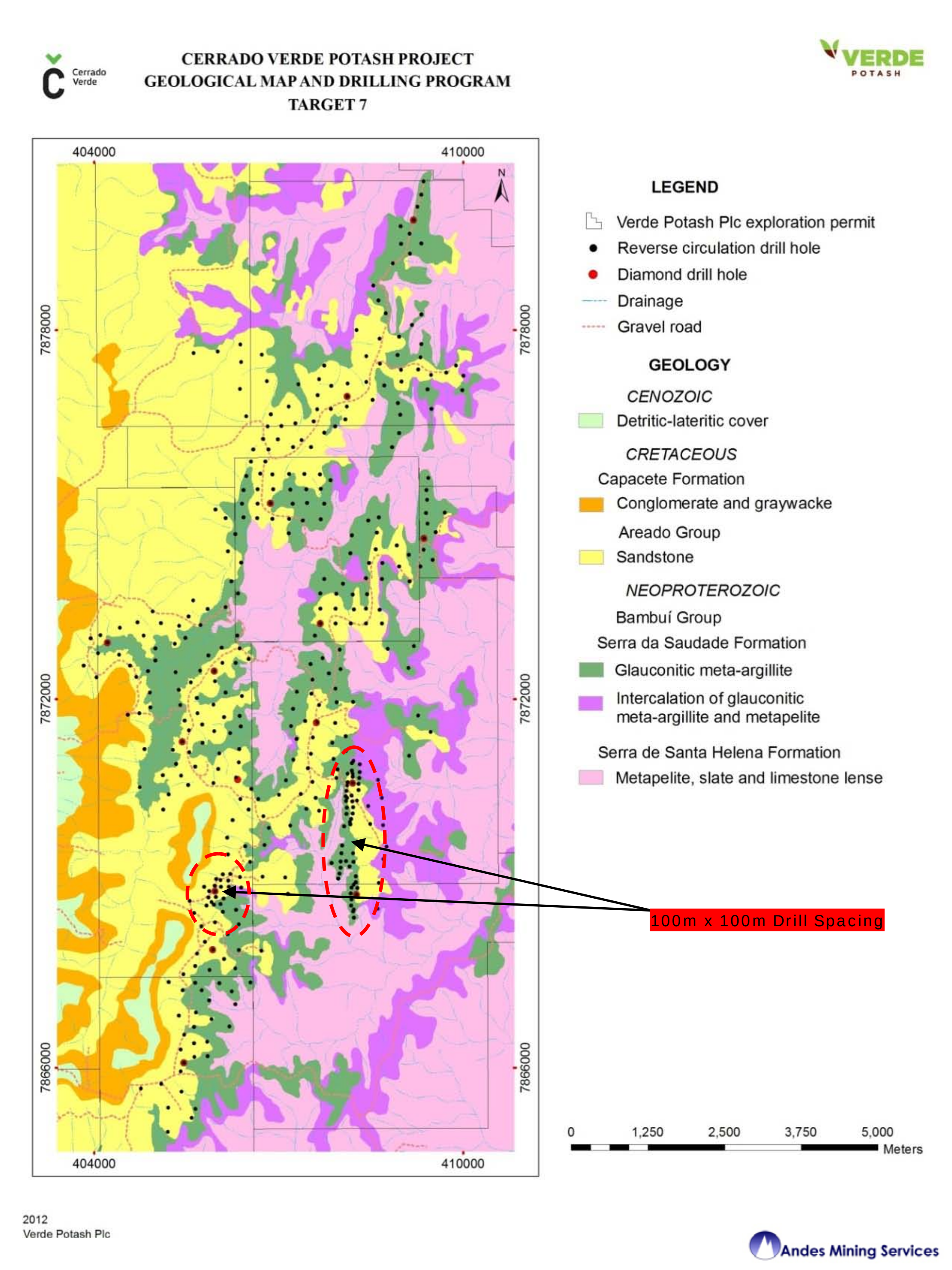


**Figure 9.2.3_2**
**2010 / 2011 Geological Map and Drilling Program for Targets 11,13, 14 and 16 *(Verde, 27th December 2013)***




In 2012, infill drilling was completed across Target 7 down to a 100m x 100m grid spacing in some areas in order to increase the resource category confidence (Figure 9.2.3_3).

**Figure 9.2.3_3**
**2012 Geological Map and Infill Drilling Program for Target 7 *(Verde, 27th December 2013)***



# 10 DRILLING

A total of four drilling campaigns were performed across the Cerrado Verde Potash Project.

The principal drilling methods utilized, include rotary-percussion reverse circulation drilling (RC) and diamond core drilling (DC). Initial drilling was carried out at a nominal grid spacing of 100m x 400m across the majority of individual target areas. In 2012, infill drilling was completed across Target 7 with certain higher grade portions selected for infill 100m x 100m drilling in order to increase the resource category confidence.

Table 10_1 highlights the number of holes, the average depth reached, and the amount of meters drilled across each target area.

**Table 10_1**
**Verde Drilling Summary Statistics - Cerrado Verde Project Area**

| Prospect | Number of Holes | Average Depth (m) | Metres Drilled | Number of Holes | Average Depth (m) | Metres Drilled |
|---|---|---|---|---|---|---|
| Target 1 | 44 | 54 | 2352 | 0 | 0 | 0 |
| Target 2 | 7 | 47 | 329 | 0 | 0 | 0 |
| Target 3 | 17 | 69 | 1,172 | 0 | 0 | 0 |
| Target 4 | 10 | 66 | 662 | 8 | 65 | 520 |
| Target 5 | 13 | 57 | 738 | 0 | 0 | 0 |
| Target 6 | 22 | 57 | 1,255 | 2 | 76 | 151 |
| Target 7 | 375 | 61 | 22,805 | 15 | 70 | 1,046 |
| Target 10 | 5 | 50 | 250 | 0 | 0 | 0 |
| Target 11 | 11 | 50 | 542 | 0 | 0 | 0 |
| Target 12 | 40 | 63 | 2,508 | 0 | 0 | 0 |
| Target 13 | 45 | 49 | 2,181 | 0 | 0 | 0 |
| Target 14 | 21 | 58 | 1,218 | 0 | 0 | 0 |
| Target 16 | 54 | 50 | 2,691 | 0 | 0 | 0 |
| Target 17 | 31 | 49 | 1,522 | 0 | 0 | 0 |
| **TOTAL** | **695** | **56** | **40,225** | **25** | **70** | **1,717** |

## 10.1 Campaign #1 (Late 2009)

In late 2009, a drilling program was undertaken across a select portion of Target-7. A Prominas R1-H drill rig (belonging to Fuad Rassi Engenharia Indústria e Comércio Ltda) drilled a total of 19 vertical RC holes for a total of 997m with an average drill hole depth of 52m.

## 10.2 Campaign #2 (January 2011 - June 2011)

Three RC drill rigs (belonging to Geosedna Perfurações Especiais S/A) were used in the second campaign which started in January 2011 and finished in June 2011. These three rigs (Foremost, Prominas and Explorac), drilled a total of 424 vertical RC holes for a total of 24,148m of drilling (Figures 10.2_1 and 10.2_2). The RC boreholes were drilled using 4¾" and 5" hammers to an average depth of 56m across a 400m x 400m grid spacing (approximately). Of the 424 holes drilled, 104 holes did not intercept typical glauconitic meta-argillite mineralization.

These holes intercepted the transition zone (lower grade material, below 7% $K_2O$) which is the intercalation of glauconitic meta-argillite and metasiltstone. These drill holes were used in the wireframe modelling to determine the mineralized area, however were not used for resources estimation purposes given their lower grade $K_2O$ values.

| **Figure 10.2_1**<br>**Foremost RC Drill Rig (Early 2011)** | **Figure 10.2_2**<br>**Explorac RC Drill Rig (Early 2011)** |
|---|---|
|  |  |

## 10.3 Campaign #3 (February 2011 - August 2011)

The third drilling campaign, carried out between February 2011 and April 2011, accounts for 5 twinned RC/DC holes totalling 412m of drilling. All holes were drilled vertical, and drilled to an average depth of 82m. The rig used was a Diakor II (belonging to Isoágua Perfurações Especiais Ltda,) with HQ and NQ diameter coring capabilities (Figure 10.3_1).

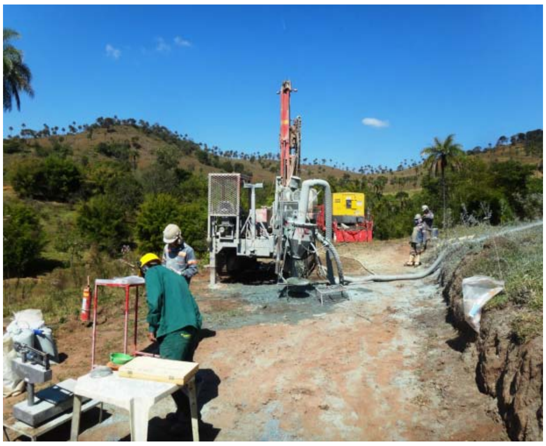
**Figure 10.3_1**
**Diakor II Diamond Drill Rig (Early 2011)**

The purpose of the twinned holes was to confirm the geology and highlight, in detail, the lithological and mineralogical variations of the intercepted units, besides providing material for bulk density measurements. In August 2011, a total of 8 DC holes were drilled into Target 4, using a Mach 1200 rig (belonging to Rede Engenharia e Sondagens S/A). All holes were drilled vertically with a total of 520m drilled giving an average depth of 65m.

## 10.4 Campaign #4 (May 2012 - September 2012)

Three RC drill rigs (belonging to Geosedna Perfurações Especiais S/A) were used in the fourth drilling campaign, which started in May 2012 and finished in September 2012. These three rigs (Fordcarro and Explorac), drilled a total of 252 vertical RC holes for a total of 15,080m of drilling (Figures 10.4_1 to 10.4_4). The RC boreholes were drilled using 4¾" and 5" hammers to an average depth of 60m in a 200m x 200m and 100m x 100m grid pattern.

Of the 252 drill holes, only 1 drill hole (CV-RC-609) did not intercept the typical glauconitic meta-argillite mineralization. This drill hole intercepted the transition zone, which is an intercalation of glauconitic meta-argillite and metasiltstones. This drill hole was used to help guide the wireframe modelling to determine mineralized area. Drill hole assays from CV-RC-609 were used for estimation purposes to give a better estimate on the margins of the typical glauconitic meta-argillite mineralized unit.

| **Figure 10.4_1**<br>**Fordcarro RC Drill Rig (May 2012)** | **Figure 10.4_2**<br>**RC Drilling #1 - CV Target 7 (August 2012)** |
|---|---|
|  |  |

| **Figure 10.4_3**<br>**RC Drilling #2 - CV Target 7 (August 2012)** | **Figure 10.4_4**<br>**RC Drilling #3 - CV Target 7 (August 2012)** |
|---|---|
|  |  |

Between August 2012 and September 2012, 12 DC holes were drilled in Target 7, using a Mach 1200 rig (belonging to Rede Engenharia e Sondagens S/A). All holes were drilled vertically and twinned existing RC/DC holes, with an average depth of 65m, totalling 785m of drilling. Diamond drill core samples (HQ and NQ) provided suitable material for further bulk density measurements.

## 10.5 Surveying

All holes have been drilled vertically, and downhole deviation surveys are not required in view of the shallow depth to which the holes have been drilled.

The drilling was carried out perpendicular to the mineralization and reflects the true thickness.

AMS completed an inspection of the historical drilling completed during a site visit in August 2012. AMS noted an excellent correlation between historical drill collar coordinated in the field and those reported within the database.

AMS note that reputable companies were involved in this drilling, and samples were analysed at internationally recognised laboratories. AMS has no reason to doubt the integrity of all drilling to date, and for the purpose of the current mineral resource estimate, both diamond and RC drilling have been included for the current mineral resource update.

**Figure 10.5_1**
**AMS Drill Collar Field Check**


**Figure 10.5_2**
**Yard Storage of RC Drill Chips**

**Figure 10.5_3**
**Warehouse Storage of RC Drill Chip Trays**

**Figure 10.5_4**
**Warehouse Storage of Diamond Drill Core**

Drill hole collars were surveyed using a Trimble® Pathfinder Pro XR DGPS. The data had post-correction validated by the IBGE with reference to the Santiago & Cintra station in Belo Horizonte (vertex 93,621; East 608,308.23m, North 7,799,827.00m, 879.06m altitude (HAE) – recording rate: 0.5s, C/ A code + L1). All azimuth, distances, areas and perimeters were calculated following the UTM planar projection system, WGS84 datum, MC –45W and 23S zone. The accuracy of the measurements (borehole and surface) is within acceptable standards, considering the type of mineralization. The accuracy is approximately 1cm after 45 minutes of satellites tracking and meets acceptable industry standards for the style of mineralization.

The drilling data was interpreted and compiled into a 3D geological model which is described and discussed in Section 14 of this Technical Report.

## 10.6 Logging

The RC chip samples were sieved at the project site with small amounts of chip sample retained and stored in labelled chip trays (Figure 10.6_1). Chip samples were described by lithology, colour and degree of weathering, and were analysed by a portable X-ray fluorescence spectrometer (XRF).

Diamond drill core was placed in core boxes for storage and future reference (Figure 10.6_2). The weathering, regolith and lithology, including the petrographic features were logged by the geologists, as well as the recording of basic geotechnical observations (rock quality designation (RQD), weathering degree and impact resistance degree). Information was entered into a digital database (Microsoft Excel). Logging was performed in the core shed where the drill core is stored. After the logging, the core boxes were photographed as a precaution against loss and/or deterioration.

| **Figure 10.6_1**<br>**Reverse Circulation Sample Logging Box** | **Figure 10.6_2**<br>**Glauconitic Meta-Argillite Diamond Core Storage** |
|---|---|
|  |  |

## 10.7 Recovery Calculations

For the RC drilling, the recovery determinations were made by the relationship between the interval weight and the reference value, using the formula below:

$$\textbf{\% Rec} = \frac{(x)kg * 100}{Cv}$$

Where, the cylinder volume (Cv) considers the average density of 2.30 g/cm$^3$:

$$Cv = \pi * R^2 * h = \pi * 6.35^2 * 100 = 3.1415 * 40.32 * 100 = 12{,}666.5\ cm^3 * 2.30\ g/cm^3 = 29.132\ kg$$

For DC, recovery determinations are made by the sum of length of core pieces compared with the total length of the core run.

AMS have reviewed recoveries for all diamond drilling completed across the Cerrado Verde project area and note excellent core recoveries throughout, with no material issues noted.

## 10.8 Diamond Drilling (DC) Sampling

After logging, the selected diamond drill core was cut lengthwise using a diamond core saw. One half of the core was sent for analysis and the other half was retained in the core box for future reference.

The samples, with a length of 2m, were packed in a plastic bag, with the identification number written with a marker on the sample together with an identification tag. The bag was placed inside another, sealed with clamps and likewise identified. All data related to sampling was recorded into an excel database for subsequent correlation with analytical results once returned from the laboratory.

## 10.9 Reverse Circulation (RC) Sampling

As part of the first drilling campaign, samples were taken on 2m intervals and riffle split down to an approximate 3kg sample through a 3 tier riffle splitter (1:7 splitting ratio).

For the 2011 and 2012 drilling programs, RC samples were collected every 1 to 3m intervals, placed in a large plastic bag and weighed on a balance scale. A small sample was taken from the bag and placed into a chip tray for visual inspection and logging by the geologist. The main water intersections encountered by drilling were also noted and entered into spreadsheets by the supervisor on the project site. The cyclone was cleaned by compressed air after every rod drilled.

Sampling intervals were selected after a preliminary analysis by the portable Innov-X Delta X-ray fluorescence equipment (XRF). Intervals which contained greater than 6% $K_2O$ were selected for analysis. A safety margin was given for these intervals. This margin ranged from 1 to 5m, taking as reference the content of 6% $K_2O$ and variations up to 2% below this level. The results obtained were integrated into an excel spreadsheet and passed via a personal digital assistant (PDA) to a responsible individual at the core shed.

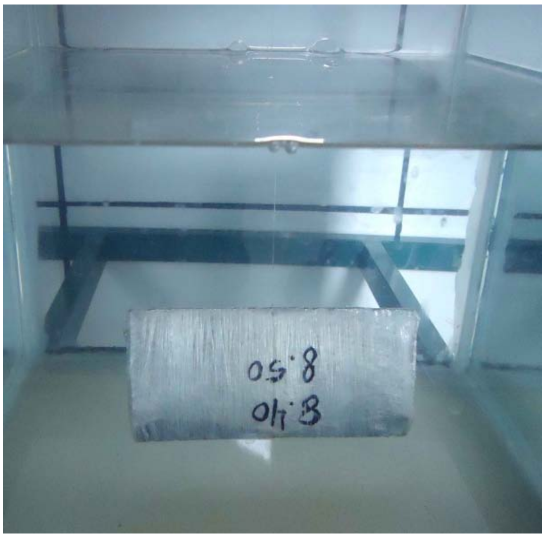
At the project site, the sample was split repeatedly in a riffle splitter until a representative sample of approximately 1.3kg was obtained. This sample was destined for preparation and laboratory analyses. The riffle splitter was beaten with a rubber mallet and cleaned with compressed air after every sample, to avoid sample contamination. The wet and moist samples were split using a hollow plastic cylinder with a sharpened tip (approximately 5-10% of samples from the 2011 program. No wet sampling completed as part of the 2012 field program). This cylinder was projected into the sample bag, in order to perforate it in several different places. The material from the bag that was returned within the cylinder was then sampled. Approximately six punches were sufficient to obtain a representative sample of the 1 to 3m sample interval drilled based upon observations made from the site visit while drilling was in progress. These samples were transported to the laboratory facilities for further processing.

## 10.10 Bulk Density

For the resource estimation, dry bulk densities values were calculated from select samples of diamond drill core. After the geological description, the drill core was sawn in half. The weathered and fresh lithological units were chosen for density measurements. Intervals of 10 to 15cm were selected from the half core. The top and the base from each section of drill core was marked and the depth recorded on the density spreadsheets for each hole.

Each sample interval was wrapped in transparent film (vinyl polychloride resin) and weighed in air by an OHAUS Adventurer® digital balance, approved by INMETRO (the National Institute of Metrology, Quality and Technology), with a precision of at least 0.02gm (Figure 10.10_1). The sample was then completely immersed in water by way of a suspended steel hook attached to the central beam of the balance. The immersed sample weight was then recorded.

The transparent film was removed, and the sample was placed in a labelled aluminium tray and then dried in an electric oven at a temperature of approximately 95°C for 24 hours. After cooling, the sample was wrapped again in transparent film (vinyl polychloride resin) and weighed in air on top of the digital balance. The sample was then completely immersed in water by way of a suspended steel hook attached to the central beam of the balance (Figure 10.10_2). The immersed weight was then recorded.

| **Figure 10.10_1**<br>**Wrapped Sample Weighed in Air** | **Figure 10.10_2**<br>**Wrapped Sampled Weighed in Water** |
|---|---|
|  |  |

Thereafter, the sample was returned to its respective place in the drill core box. The wet and dry densities calculations were made using the Archimedes Principle.

During the 2011 diamond drilling campaign, only the dry densities measurements of the glauconitic meta-argillite were performed on holes drilled into Targets 4, 6 and 7. As part of the 2012 drill program, wet and dry measurements of the glauconitic meta-argillite samples were completed on diamond drill cores for Target 7. Table 10.10_1 display the average values of the weathered and fresh glauconitic meta-argillite samples obtained for Targets 4, 6 and 7. Figures 10.10_3 and 10.10_4 illustrate the bulk density distribution of samples taken from both fresh and weathered material across Target 7.

**Table 10.10_1**
**Drill Core Density Measurements (Targets 4, 6 and 7)**

| Lithological Unit | Type of Density | Target 4 | Target 6 | Target 7 |
|---|---|---|---|---|
| **Weathered Glauconitic meta-argillite** | Wet Density (g/cm$^3$) | - | - | 1.74 (14 samples) |
| | **Dry Density (g/cm$^3$)** | **1.52 (28 samples)** | **1.43 (4 samples)** | **1.64 (15 samples)** |
| **Fresh Glauconitic meta-argillite** | Wet Density (g/cm$^3$) | - | - | 2.29 (123 samples) |
| | **Dry Density (g/cm$^3$)** | **2.14 (33 samples)** | **2.08 (10 samples)** | **2.18 (178 samples)** |

**Figure 10.10_1**
**Density Measurement Histogram – Fresh Rock Material from Target 7 (average 2.18g/cm$^3$)**

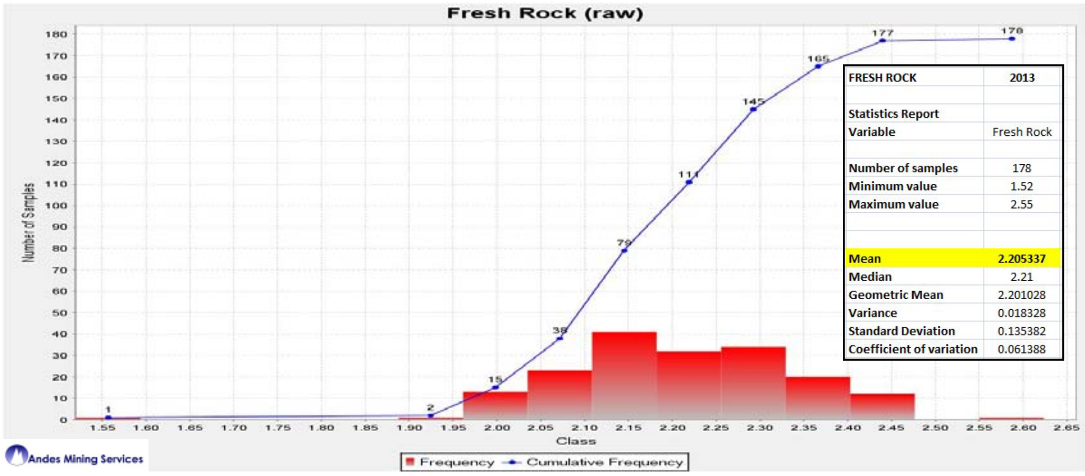
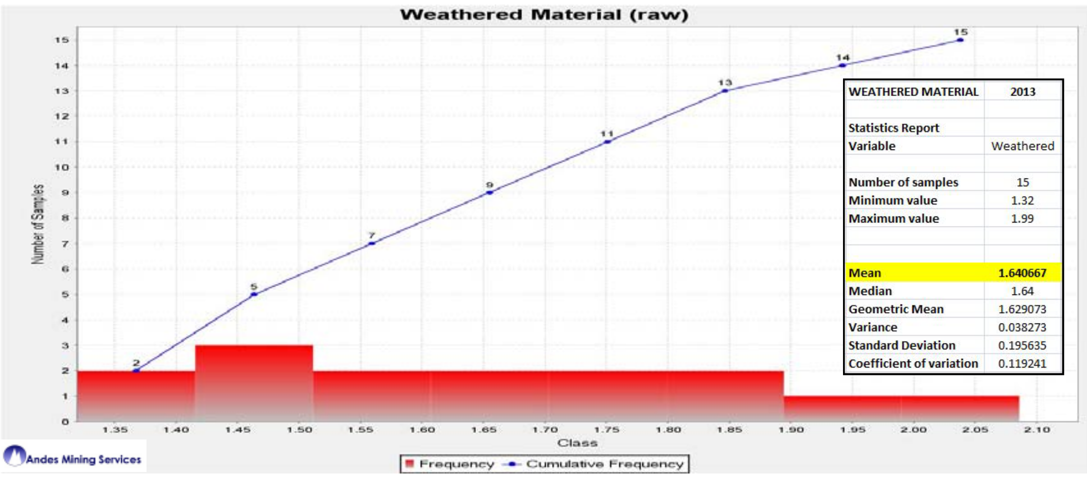



**Figure 10.10_2**
**Density Measurement Histogram – Weathered Material from Target 7 (average 1.64g/cm$^3$)**




Density determinations were made from a number of diamond drill core samples selected from Target 7. A total of 178 samples were collected from the "fresh" glauconitic meta-argillite material with an average bulk density value of 2.18 $g/cm^3$ recorded. In addition, a further 15 samples were collected from the "weathered" glauconitic meta-argillite material with an average bulk density value of 1.64 $g/cm^3$ recorded.

# 11 SAMPLE PREPARATION, ANALYSES AND SECURITY

## 11.1 Sampling Method

Samples for laboratory analyses were prepared at the project site by Verde technicians and sent in a Verde vehicle to the respective laboratories. A summary of the current drilling completed by Verde, along with the laboratories utilised for each phase of drilling is shown in Table 11.1_1 below.

**Table 11.1_1**
**Laboratories Used in Analysing Verde Drilling**

| Year | Company Name | Type of Drilling | Number of Holes | Meters Drilled | Lab Used |
|---|---|---|---|---|---|
| 2009 | VERDE | RC | 19 | 997m | Bureau Veritas (Brazil) |
| 2011 | VERDE | RC / DDH | 452 | 26,609m | SGS Geosol |
| 2012 | VERDE | RC / DDH | 264 | 15,865m | SGS Geosol |

## 11.2 Sample Preparation and Assaying Methods

### 11.2.1 2009 Program

For the initial RC drilling program, samples were taken on 2m intervals and then riffle split down to 3kg samples for submission.

Samples were sent to Bureau Veritas laboratory in Vespasiano, Minas Gerais State, Brazil. The samples were received, dried, crushed to 2mm, riffle split and analysed by XRF for $Fe_2O_3$, $SiO_2$, $Al_2O_3$, CaO, MgO, MnO, $TiO_2$, $Na_2O$, $K_2O$, BaO, $P_2O_5$, $Cr_2O_3$, SrO and LOI.

While no quality control was undertaken by Verde for this initial drilling program, Bureau Veritas inserted duplicates, blanks and certified standards at a rate of 5% to maintain their own quality control.

### 11.2.2 2011 and 2012 Programs

RC samples were generally taken on 1 to 3m intervals and then riffle split down to 1.3kg samples for submission. DC samples were taken on 2m intervals (half core samples collected) and submitted to the laboratory.

Approximately 96% of the total drill metres are accounted for by RC drilling, of which a total of 12% were drilled moist and further 4.7% were drilled wet (Table 11.2.2_1). AMS have reviewed the sampling procedure, quantity and spatial location of wet drill samples across the Cerrado Verde project area, and believe there to be no significant bias within the database, which is material to the overall resource reported. In addition, AMS make note of a number of DC twin holes to original RC drilling (include moist and wet sampling), and note no significant bias between DC and RC sampling. A full discussion of the study completed for twin hole drilling is covered in covered Section 12.2.4 of this report.

| Table 11.2.2_1<br>RC and DDH Sampling (2011 and 2012 Programs - Wet vs Dry Sampling) | | | | |
|---|---|---|---|---|
| | Drill Type | | | |
| | DDH | % | RC | % |
| Holes | 15 | 3.55 | 408 | 96.45 |
| Metres (m) | 1,046.4 | 4.09 | 24,566 | 95.91 |
| Drill Type | % of Database | Sample Quality | | |
| | | Dry (%) | Moist (%) | Wet (%) |
| RC | 95.91 | 83.35 | 11.96 | 4.69 |
| DDH | 4.09 | 100.00 | 0.00 | 0.00 |

## RC Drilling

For the 2011 and 2012 drilling programs, RC samples were collected every 1 to 3m intervals, placed in a large plastic bag and weighed on a balance scale. A small sample was taken from the bag and placed into a chip tray for visual inspection and logging by the geologist. The main water intersections encountered by drilling were also noted and entered into spreadsheets by the supervisor on the project site. The cyclone was cleaned by compressed air after every rod drilled.

Sampling intervals were selected after a preliminary analysis by the portable Innov-X Delta X-ray fluorescence equipment (XRF) (Figure 11.2.2_1). Intervals which contained greater than 6% $K_2O$ were selected for analysis, with a safety margin in length surrounding these intervals. This margin ranged from 1 to 5m, taking as reference the content of 6% $K_2O$ and variations up to 2% below this level. The results obtained were integrated into an excel spreadsheet and passed via a personal digital assistant (PDA) to a responsible individual at the core shed.

**Figure 11.2.2_1**
**XRF Analysis of Powdered Dry RC Samples (August 2012)**

At the project site, the sample was split repeatedly in a riffle splitter until a representative sample of approximately 1.3kg was obtained (Figures 11.2.2_2 to 11.2.2_5). This sample was then destined for preparation and laboratory analyses. The riffle splitter was beaten with a rubber mallet and cleaned with compressed air after every sample, to avoid sample contamination.

The wet and moist samples were split using a hollow plastic cylinder with a sharpened tip. This cylinder was projected into the sample bag, in order to perforate it in several different places. The material from the bag that was returned within the cylinder was then sampled. Approximately six punches are sufficient to obtain a representative sample of the 1 to 3m sample interval drilled. These samples were transported to the laboratory facilities for further processing.

| **Figure 11.2.2_2**<br>**Cleaning Riffle Splitter** | **Figure 11.2.2_3**<br>**Preparing Samples for Submission** |
|---|---|
|  |  |

| **Figure 11.2.2_4**<br>**Preparing RC Samples for Despatch** | **Figure 11.2.2_5**<br>**Riffle Splitting RC Samples** |
|---|---|
|  |  |

**<u>Diamond Drilling (DC) Sampling</u>**

After logging, the selected diamond drill core was cut lengthwise using a diamond core saw. One half of the core was sent for analysis and the other half was retained in the core box for future reference.

The samples, with a length of 2m, were packed in a plastic bag, with the identification number written with a marker on the sample together with an identification tag. The bag was placed inside another, sealed with clamps and likewise identified. All data related to sampling was recorded into an excel database for subsequent correlation with analytical results once returned from the laboratory.

**Sample Submission**

Both RC and DC samples were sent to SGS Geosol Laboratórios Ltda (SGS) laboratory in Vespasiano, Minas Gerais State, Brazil. SGS maintains ISO 9001:2008 and ISO 14001:2004 certifications. The samples were received, dried, crushed to 2mm, riffle split and analysed by XRF for $Fe_2O_3$, $SiO_2$, $Al_2O_3$, CaO, MgO, MnO, $TiO_2$, $Na_2O$, $K_2O$, BaO, $P_2O_5$, and LOI. AMS did not complete a laboratory site visit as part of the site visit completed in early August 2012.

Once received by the laboratory, samples were manually checked for sequential numbering before being logged into the laboratory system for tracking. Physical preparation quality controls were introduced by the laboratory, which include a preparation blank (quartz) and duplicate at every 20 samples. Samples were dried at 105 ± 5°C and passed through a crusher with 95% of the sample passing at 2mm. Once crushed, the fractionation of the sample was made to approximately 600gm. The pulverizing of the 600gm sample was made so that 95% passes through 150 mesh (110 micron) screen, forming the laboratory aliquot (500gm) and the reserved pulp. At this stage, the laboratory quality control was obtained by the inclusion of a reagent blank, certified reference materials and a laboratory duplicate within each analytical run. The blank was inserted at the beginning, standards at every 20 samples and a duplicate was inserted at random intervals. All data gathered for quality control samples was automatically captured by the laboratory software, sorted and retained in the quality assurance/quality control (QA/QC) database. The SGS quality management system complies with the requirements of International Standards ISO 9001:2008.

After the loss on ignition (LOI) analysis, the analytical aliquot preparation was made by fusion with lithium tetraborate in the fusion machine with oxygen enriched flame – Phoenix® (XRF Scientific). In this method, a calcined sample (0.5gm) is added to the lithium borate fusion (50% $Li_2B_4O_7$ – 50% $LiBO_2$), mixed and fused between 1,050° and 1,100° C. The machine uses a mould which incorporates a crucible shape in which both mixing and mixing and moulding is performed. When mixing was complete, the molten material was cooled in the mouldable and the bead was removed using a suction cup. The analysis of the fused tablet was made by X-Ray Fluorescence Spectrometer – AxiosmAX-Minerals® (PANalytical). The samples were analysed for $Fe_2O_3$, $SiO_2$, $Al_2O_3$, CaO, MgO, MnO, $TiO_2$, $Na_2O$, $K_2O$, $P_2O_5$, and LOI. Detection limits for XRF analysis completed by SGS are highlighted in Table 11.2.2_2 below.

**Table 11.2.2_2**

**Detection Limits of XRF Analysis**

| Item | $Al_2O_3$ | CaO | $Fe_2O_3$ | $K_2O$ | MgO | MnO | $Na_2O$ | $P_2O_5$ | $SiO_2$ | $TiO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Limit of Detection | <0.10 | <0.01 | <0.01 | <0.01 | <0.10 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |

## 11.3 Quality Controls and Quality Assurance

Before May 2010, the company did not have appropriate internal QA/QC systems for the drilling campaign.

In May 2010, Verde introduced a QA/QC program. For the internal control reference, at every 20 routine samples, a certified standard, a powder blank and a duplicate were inserted and sent to the laboratory. In this program, as the analytical results were received, they were immediately imported into the respective sampling spreadsheets, where any undesirable analytical deviations of standards, blanks, duplicates, or inconsistency between the sample result and its respective lithology could be easily compared. Simple inversions of sample results and typographical errors of the spreadsheets compiled after receiving the assay certificates were common. As a result, all the results of all samples from this program were checked one by one by Verde personnel (database manager).

| **Figure 11.3_1**<br>**RC Samples ready for Dispatch** | **Figure 11.3_2**<br>**Blanks and Standards Included for Submission** |
|---|---|
|  |  |

Initially, duplicates were prepared from the splitting of the previous sample pulps. After analysis at the SGS laboratory, the pulps were returned and forwarded for analysis at the ALS Brasil Ltda laboratory, located at Vespasiano, Minas Gerais State. From there, the pulps were sent to the ALS laboratory located in Lima, Peru for analysis. The pulps were analysed by XRF and LOI. The ALS quality management system complies with the requirements of the International Standards ISO 9001:2008 and ISO/IEC 17025:2005. Quality control samples were inserted within each analytical run. For XRF methods, the minimum number of QA/QC samples are 2 standards, 1 duplicate and 1 blank, introduced every 39 samples. The blank was inserted at the beginning, standards were inserted at random intervals, and duplicates were analysed at end of the batch. Every batch of samples analysed has a dual approval and review process. The individual analytical runs were monitored and approved by the analyst. The results were compared with the initial values of SGS in graphics for duplicate controls like Thompson and Howarth, QQ and Correlation plots. This procedure was adopted until sample CV-RCS-2151 (March 2011).

From March 2011 onwards, starting at the sample CV-RCS-2171, the duplicate was obtained by quartering the routine sample prepared by Verde personnel in the field to assist in verifying the entire laboratory sample preparation process.

For the accuracy control, the Australian GeoStats Pty Ltd certified reference material and IPT - Brazilian Instituto de Pesquisas Tecnológicas reference material were used. These were submitted to SGS for conventional XRF analysis. The standards certificates are attached at the end of this report.

The blank material was prepared from pulverized quartz obtained from a Brazilian laboratory Sulfal Química Ltda. At the time, the company did not have appropriate internal contamination control. Gravel blanks composed of quartz was suggested as a suitable alternative to verify the contamination of the sample preparation stage of sample processing.

For the external control reference, after analysis at the SGS laboratory, pulps were selected each 20 routine samples, and sent for analysis at ALS Minerals laboratory or at Bureau Veritas Brasil.

Further details regarding QA/QC protocol is discussed in Section 12 of this report.

## 11.4 Adequacy of Procedures

Regular inspections of Geosol SGS laboratory are undertaken by Verde personnel, with the last inspection completed on April 2nd, 2012. This inspection included a check for sample preparation, assaying methods, equipment calibration and QA/QC analysis which proved to be satisfactory. The preparation rooms and equipment are kept clean, and upon the completion of each shift, these rooms are thoroughly cleaned. All laboratories and equipment are provided with a ventilation system and exhaust fans. All instruments are in serviceable condition. The laboratory operates according to international standards and the risk of error in chemical analysis can be assessed as low.

The Verde sampling methods, chain of custody procedures, and analytical techniques are all considered appropriate and are compatible with accepted industry standards.

## 11.5 Sample Security

Verde diamond drill core and reverse circulation drill cuttings are currently stored in an office and warehouse in Matutina town that Verde has rented (Figure 11.5_1). After logging, core samples are marked for splitting and sampling by Verde geologists. Each RC and diamond core sample is placed in a plastic bag which in turn is placed in a nylon bag for transporting via truck to the ALS or SGS Geosol sample preparation laboratories located in Belo Horizonte.

AMS considers the sampling security implemented by Verde to meet current industry best practice.

**Figure 11.5_1**
**Verde Office and Sample Storage Yard / Preparation Area (Matutina) (August 2012)**

# 12 DATA VERIFICATION

Quality control and quality assurance programs (QA/QC) were limited during early exploration programs conducted across Cerrado Verde target areas. Quality control procedures implemented during the 2009 drilling campaign were essentially internal laboratory QAQC procedures. Routine laboratory QAQC procedures included the addition of certified analytical standards, duplicates and blanks in the sample sequence.

Bureau Veritas used the following certified reference standard materials:

- **IPT 146** – Iron Ore VALE (low FeO content);
- **IPT 53** – K-feldspar;
- **Composite Standard**: IPT 53 + IPT 146.

For every 20 samples submitted, 4 control samples were placed by the laboratory. These include, 1 certified reference material, 1 blank (quartz), 1 preparation blank ($Li_2B_4O_7$ chip) and one duplicate sample.

In May 2010 (following the completion of the first drilling program), Verde introduced an internal QAQC program. For internal control reference, at every 20 routine samples, a certified standard, a powder blank and a duplicate sample were inserted by Verde into the sample sequence.

Current QA/QC practice implemented by Verde includes the addition of duplicates, gravel blanks, certified reference materials and a program of umpire laboratory check samples. As part of the most recent drilling program(s) completed in 2012, as soon as analytical results were received they were immediately imported into the respective sampling spreadsheets, and any undesirable analytical deviation of standards, blanks, duplicates, or inconsistency between the sample result and respective lithology were easily compared. Simple inversion of sample results due to typing errors of the spreadsheets after receiving the certificates, are also common and, therefore, all the results of all samples were checked one by one and not only for the control samples introduced.

Further details regarding the integrity of the Verde database are provided below in Sections 12.1 and 12.2.

## 12.1 Geological Database

The drill hole information was organized on the personal digital assistant (PDA) and the data were exported directly to the database in *.xls format. The results of chemical analysis were received in *.xls format and compiled for each drill hole with reference to the respective log sheet. It underwent a double check with the data compiled by the database manager (Verde employee). The local data validation was performed by Verde.

Verde have provided AMS with an excel database, complete with collar, survey, geology and assay information. AMS have validated the database using the database audit tools, with no material inconsistencies noted. In addition, AMS have made a manual check of the database, and any minor inconsistencies noted were promptly rectified by Verde personnel.

The following checks were performed;

- Holes that had no collar data;
- Overlaps in sample intervals;
- Gaps in sample intervals;
- Matching the geological logging length to the drill hole sample length;
- The first sample does not correspond to 0m in the database analysis;
- The azimuth is not in the range from 0 to 360 degrees;
- The dip angle is not in the range from 0 to 90 degrees;
- Azimuth or dip angle of the drill hole is missing; and
- The drill hole total depth is less than the depth of the last sample.

There were no material errors noted within the database. Only two overlapping samples were noted which were correctly by AMS before importing the database into Access.

The Excel database was converted into an Access format database which is compatible with most commercial geological modelling software, and allows key relationship based changes / modifications to be easily made (for example – application of average density grades across geological boundaries).

Hardcopy assay data from SGS and ALS was made available to AMS, and a comparison of these results with the data supplied in the Verde database was completed as part of the validation checks. AMS checked a total of 10% of the Verde drill holes for validation purposes. No material errors were identified with the original log and the digital database.

## 12.2 Quality Analysis / Quality Control (QA/QC)

Verde has set in place a QA/QC programme for reverse circulation and diamond drilling programs which includes the submission of blanks, duplicates (field and pulp), certified standards and umpire assays.

Verde has undertaken quality control on approximately 5% of the total samples prepared. This includes the submission of approximately 5% duplicates (field and pulp), 5% certified standards and 5% blanks. Blanks and standards are inserted routinely into the prepared samples for despatch to the laboratory. In addition, umpire assays have also been completed on approximately 10% of the total samples prepared and assayed.

All QA/QC results returned from the laboratory to-date have been made available to AMS for review. QA/QC results and graphs were compared with hardcopy original data from both the SGS and ALS laboratories.

### 12.2.1 2009 Drilling Program

During the 2010 drilling campaign, Verde did not carry out a proper QA/QC program. The QA/QC analysis was the internal Bureau Veritas Brazil program. To undertake an umpire sample analysis, 5% of samples sent to the Bureau Veritas Brazil and were then sent to SGS in Belo Horizonte. The accuracy, precision and contamination of the analysis was evaluated. Verde personnel have reviewed the QA/QC results returned by Bureau Veritas Brazil as presented below in Table 12.2.1_1.

**Table 12.2.1_1**
**Standards Utilized by Bureau Veritas Brazil**

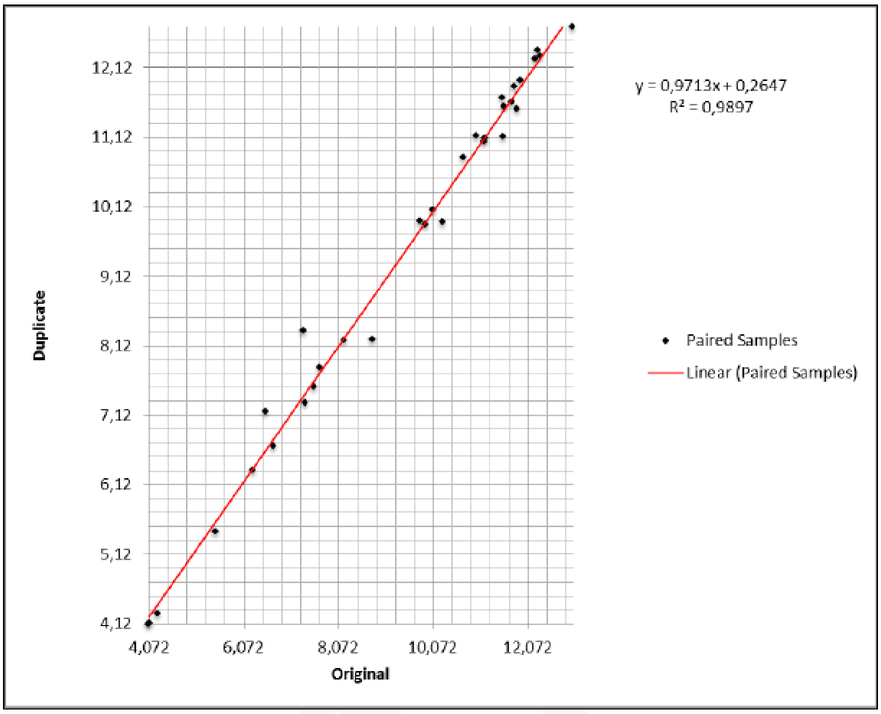
| Standard | Expected Value (K2O %) | +/- 10% (EV) | Failed | No of Analyses | Minimum (%) | Maximum (%) | Mean (%) |
|---|---|---|---|---|---|---|---|
| IPT 146 | 0.04 | 0.034 and 0.042 | 5 | 6 | 0 | 0.07 | 0.05 |
| IPT 53 | 12.10 | 10.89 and 13.31 | 0 | 6 | 11.95 | 12.61 | 12.18 |
| IPT 53 + IPT 146 | 6.07 | 5.46 and 6.67 | 0 | 6 | 5.84 | 6.36 | 6.07 |
| Pulp Blanks | 0 | <0.30 | 2 | 30 | - | - | - |

With the exclusion of IPT 146 (which is less than the quoted detection limit for $K_2O$) all blanks and standards inserted by Bureau Veritas Brasil are within a 10% tolerance level.

**<u>Sampling Precision</u>**

Pulp duplicate samples were taken by Bureau Veritas Brazil every 20 samples. The results of these duplicates are shown below in Figure 12.2.1_1.

**Figure 12.2.1_1**
**Pulp Duplicate Samples - 2009 RC Drilling Campaign**



**Inaccuracy**

At the time of the 2009 drilling program, no QA/QC data was supplied by Verde. It was recommended that Verde adopt a QA/QC program which includes the use of certified standards, blanks and pulp duplicates. In addition, it was recommend that field duplicates be taken which would require the re-splitting of the RC field reject sample and submitted at a rate of approximately 5%.

**Conclusions**

The results show excellent precision for $K_2O$ with 97% of the data being within 10% HARD. The Bureau Veritas Brazil QA/QC data shows good precision and accuracy, despite the limited QA/QC completed for the field campaign.

### 12.2.2 2011 Drilling Program

In May 2010, Verde introduced an internal QA/QC program. For internal control reference, at every 20 routine samples, a CRM, a powder blank and a duplicate sample were inserted by Verde.

**Sampling Precision**

SGS was used as the main laboratory by Verde for the Cerrado Verde Project.

The sampling precision was evaluated using the method of repeated analysis of field duplicates for $K_2O$, $P_2O_5$, CaO, $Al_2O_3$, $Fe_2O_3$, $SiO_2$, MgO, $TiO_2$, MnO, $Na_2O$ and LOI. From a total of 3,244 samples, 66 were re-examined, representing 2% of the total number of tests.

One of the parameters used in the analysis of the results was the precision. Precision is a measure of how well the Y value represents the X value. It is most commonly used in assay quality control, where X is the first assay value and Y is the matching repeat assay. A perfect result has a precision of zero. Values of greater than zero represent an increasing amount of deviation; for example a precision of 10% indicates that the difference between X and Y varies by around 10% of X. The tests for $K_2O$, $P_2O_5$, $Al_2O_3$, $Fe_2O_3$, $SiO_2$, MgO and $TiO_2$, had a high quality and accuracy in the statistical analysis, with precision accuracy lower than 5%. For MnO and $Na_2O$, the tests showed a precision accuracy lower than 15%, and for CaO, the tests showed a precision accuracy higher than 15%. The number of tests provided are considered sufficient to be statistically representative.

**Precision of the Chemical Analysis**

The sampling precision was evaluated using the method of repeated analysis for $K_2O$, $P_2O_5$, CaO, $Al_2O_3$, $Fe_2O_3$, $SiO_2$, MgO, $TiO_2$, MnO, $Na_2O$ and LOI. From a total of 3,244 samples, 108 were re-examined, representing 3.3% of the total number of tests.

Information on internal quality control was presented as a single data batch, without separation of the samples by grade ranges. Two evaluation methods were used, simple linear regression and QQ (Quantile Quantile) plot.

In general, the tests for $K_2O$, $Al_2O_3$, $Fe_2O_3$, MgO, $TiO_2$ and $SiO_2$, had a high quality and accuracy in the statistical analysis, with accuracy higher than 5%. For $P_2O_5$, CaO, MnO and $Na_2O$, tests showed a precision up to 12%.

The correlation coefficient of the sample values of regular control is above 0.9, confirming that the tests for the most important elements for the mineralization were conducted with a satisfactory and acceptable accuracy.

**Inaccuracy**

The inaccuracy was determined as a difference in $Fe_2O_3$, $SiO_2$, $Al_2O_3$, $P_2O_5$, MnO, $TiO_2$, CaO, MgO, $K_2O$, $Na_2O$ and LOI in samples, between the values determined by SGS and those determined by an independent laboratory ALS.

The external control was conducted for the purpose of determination of systematic inaccuracy in the results from the principal analytical laboratory. The value of the systematic inaccuracy was estimated by the same formula as used for the internal control.

The number of repeated tests is 119, which is 3.6% of the total number of tests 3,244. In summary, the analysis of data for each laboratory demonstrates good precision of data with a high coefficient of correlation $R > 0.98$.

The total number of external control tests is considered sufficient to be statistically representative. According to the analysis of external control data, the accuracy of principal laboratories is considered satisfactory.

**Standards**

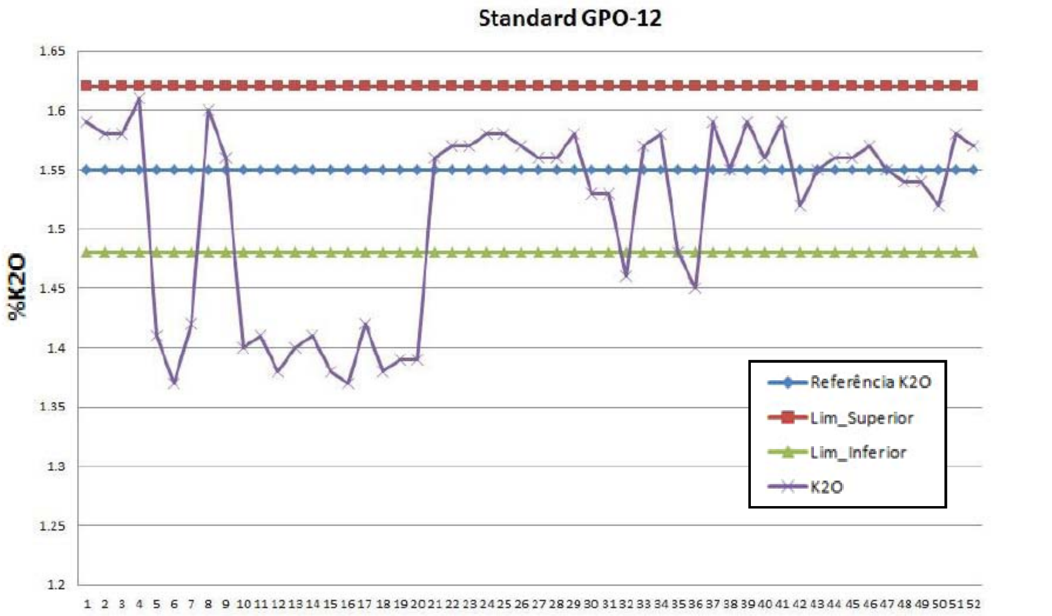
For quality control 174 standard samples were used, which represent 5.3% of the total number of analysed samples.

- Standard GPO-11 (53 analysis results / 9 samples outside tolerance limits);
- Standard GPO-12 (52 analysis results / 16 samples outside tolerance limits);
- Standard GPO-13 (87 analysis results / 0 samples outside tolerance limits);
- Standard GIOP-27 (29 analysis results / 1 samples outside tolerance limits);
- Standard IPT-18B (89 analysis results / 3 samples outside tolerance limits);
- Standard IPT-53 (84 analysis results / 0 samples outside tolerance limits); and
- Standard IPT-72 (43 analysis results / 43 samples outside tolerance limits).

Seven types of standards were analysed, and the results were analysed using the Shewhart Control Chart. Statistical analysis was performed for the following elements $Fe_2O_3$, $SiO_2$, $Al_2O_3$, $P_2O_5$, MnO, $TiO_2$, CaO, MgO, $K_2O$ and $Na_2O$.

The analysed results provided by SGS, present problems when compared with known results. It was reported by Verde that inadequate results were occurring before March 2011 due to XRF equipment that was poorly calibrated during this period. In almost all cases, standard results were reporting lower than reference material results. An example from standard reference material GPO-12 is presented below in Figure 12.2.2_1.

**Figure 12.2.2_1**
**Standard GPO-12 Samples Results (Purple Line) - 2011 Drilling Campaign**




## Blank Samples

For quality control 174 blank samples were used, representing 5.3% of the total number of samples analysed.

When discussing the methodologies of the blank samples with the Verde team, it was certified that powder material was sent to the laboratory.

The purpose of using blank samples is to attempt to quantify the contamination of samples during the sample preparation process. This objective was not achieved whereas the blank samples were sent to a laboratory as powder, not subject to potential contamination involved in the preparation process and reduction of other samples. This makes it unnecessary to analyse the results obtained for the blank samples to quantify the possible errors in the preparation of other samples.

## Conclusions

It was certified that the tests relating to duplicate samples were conducted with an acceptable and satisfactory accuracy for the most important elements of the mineralization under study.

There is potential error in the methodology of sample analysis, since the results of sample analysis with known grades were not within the expected mean range. Also, the methodology for the use of blank samples, is not correct. Notwithstanding this, AMS considers the risk in chemical analysis to be low given vastly better controlled sampling completed by Verde.

### 12.2.3 2012 Drilling Program

**Summary**

For the 2012 drilling campaign, all assays results are derived from analyses performed at SGS Geosol (Belo Horizonte) and ALS (Lima) laboratories. The control samples, inserted at every batch of 20 routine samples, were:

- 1 field duplicate;
- 1 pulp duplicate;
- 1 certified standard;
  - o GPO-11
  - o ITAK-904
  - o ITAK-905
- 1 blank (chipped quartz, crushed, homogenized and certified by Bureau Veritas, without K2O contents);
- 1 umpire (pulp sample re-analysed at ALS).

The standards were submitted as 10g sachets for conventional XFR analysis. The assay data for all standards show acceptable results within 3 standard deviations. Precision of the duplicates for XRF method is considered very good. The assay data for all duplicates show acceptable results within 10% accuracy.

**Methodology**

QAQC for standard samples was made considering the 3 standard deviation limits. Shewart control charts were used to evaluate the accuracy and dispersion. The analysis for duplicates and umpires was made according to the orientation given by the SGS Geosol. The maximum acceptable value for the difference between the result of the routine sample (V1) and its duplicate (V2) is given by the following equations;

$$Precision = \frac{100*LDE}{Mean\ (V1:V2)} + LR$$

Where LDE is the Statistic detection Limit (0.025% for $K_2O$) and LR is the repeatability limit (7% for $K_2O$). The relative percentage difference between V1 and V2 is given by the equation;

$$\%\ Diff_{V1,V2} = Abs\ \frac{V1-V2}{Mean\ (V1:V2)} * 100$$

If $\%Diff_{V1\&V2}$ is bigger than the maximum acceptable value (given by "Precision" on the equation above), the duplicate result is an "inadequate" result. This relative difference was also analysed considering 5 or 10% tolerance and by linear regression plots.

**DC (Diamond Drilling)**

A total of 12 diamond drill holes for 785.40m were drilled as part of the 2012 drilling program. A total of 257 drill core samples were submitted to SGS for analysis, with the inclusion of an additional 12 CRMs, 12 field duplicates, 12 pulp duplicates, 12 blanks and a further 12 umpire assays as part of standard QAQC implemented by Verde.

Results for CRMs submitted to the laboratory for analysis are presented below in Table 12.2.3_1 and Figures 12.2.3_1 to 12.2.3_3;

**Table 12.2.3_1**

**CRMs Submitted by Verde to SGS Laboratories (Diamond Drilling)**

| CRM Id | Supplier | $K_2O$ (Max) | $K_2O$ (Min) | $K_2O$ (Mean) | Number | Outside +/- 3 x SD Limits |
|---|---|---|---|---|---|---|
| **GPO-11** | Geostats | 3.06 | 3.01 | 3.03 | 4 | 0 |
| **ITAK-904** | ITAK | 7.47 | 7.43 | 7.45 | 4 | 0 |
| **ITAK-905** | ITAK | 10.30 | 10.10 | 10.18 | 4 | 0 |

**Figure 12.2.3_1**
**Shewhart Control Chart for Standard GPO-11**

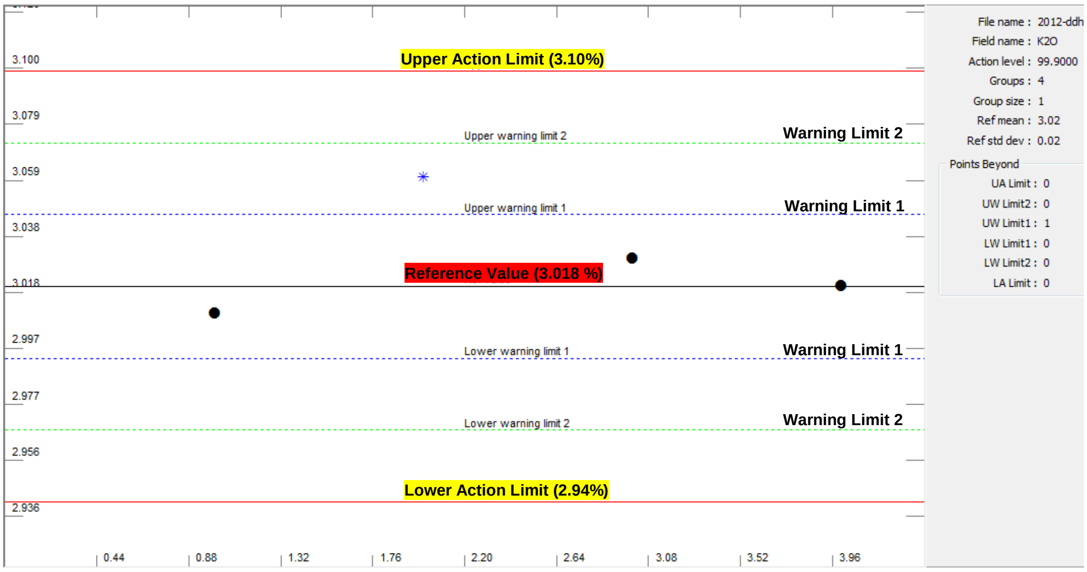



**Figure 12.2.3_2**
**Shewhart Control Chart for Standard ITAK-904**

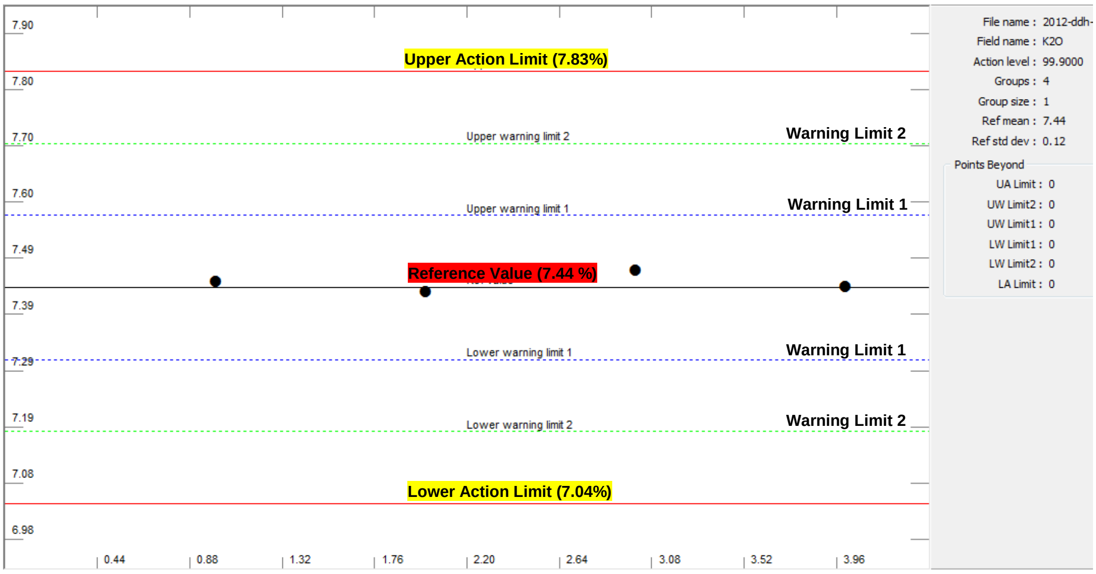
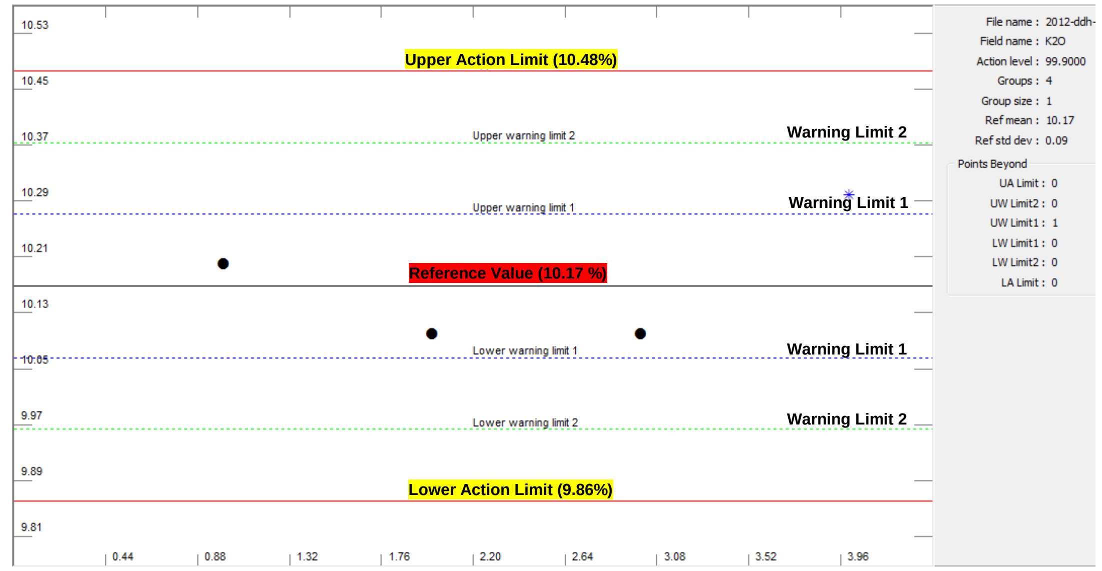


**Figure 12.2.3_3**
**Shewhart Control Chart for Standard ITAK-905**




On the whole, CRMs submitted by Verde display excellent accuracy, with no outstanding issues which require attention. AMS is satisfied with the current procedure in place for submission of certified standards.

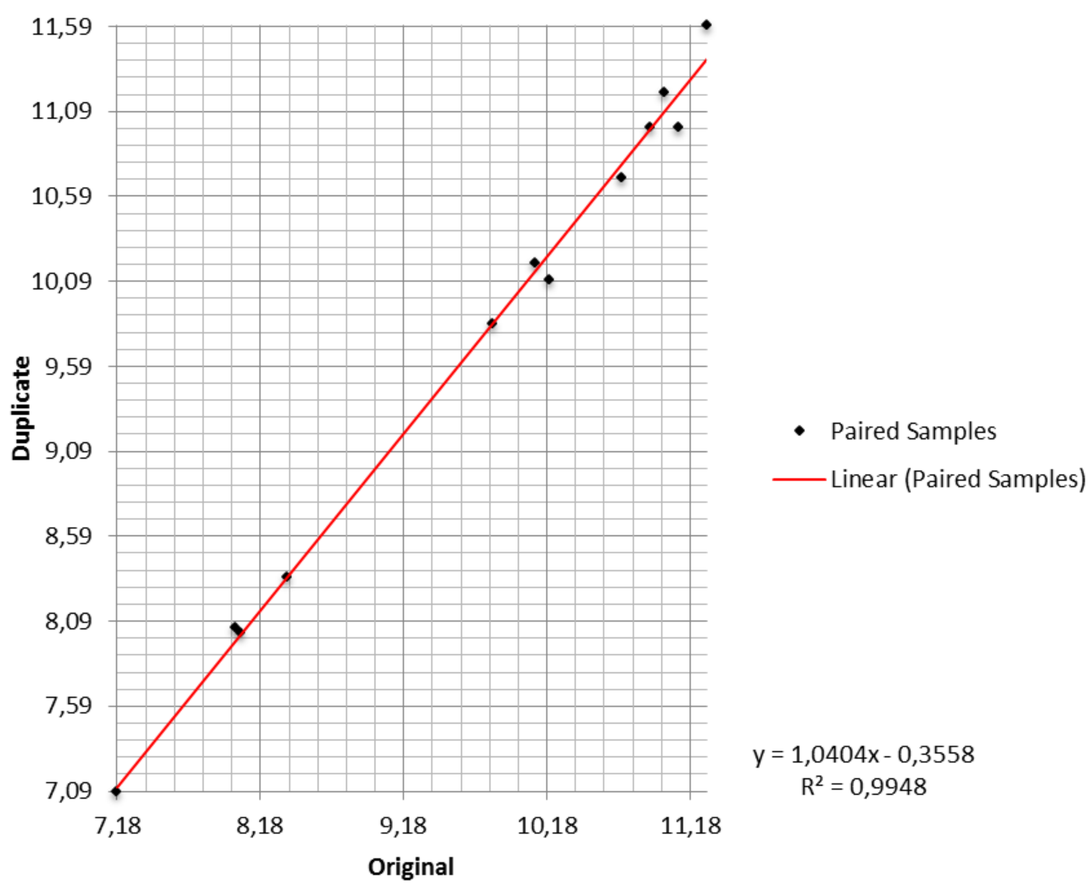
A total of 12 field duplicates were submitted by Verde based on the recent diamond drilling program. The objective of this was to determine relative precision levels between various sets of assay pairs and the quantum of relative error. This directly reflects on the precision of the sampling technique utilised.

Based on the analysis, AMS concludes that the precision of field duplicates is acceptable as shown in Table 12.2.3_2 and Figure 12.2.3_4 below;

**Table 12.2.3_2**
**Field Duplicates Submitted by Verde to SGS Laboratory (Diamond Drilling)**

| **Population** | **12** | |
|---|---|---|
| **Correlation Coefficient** | 0.997417255 | |
| **Covariance** | 2.155931818 | |
| **Precision** | 1.26% | |
| | **Original (X)** | **Duplicate (Y)** |
| **Mean** | 9.73 | 9.76 |
| **Variance** | 2.07 | 2.25 |
| **Standard Deviation** | 1.44 | 1.50 |
| **Max** | 11.30 | 11.60 |
| **Min** | 7.18 | 7.09 |

**Figure 12.2.3_4**
**Linear Regression for Field Duplicates (Diamond Drilling)**




All blank samples returned $K_2O$ values consistent with certificate provided by Bureau Veritas.

## RC (Reverse Circulation Drilling)

A total of 252 reverse circulation (RC) drill holes for 15,080m were drilled as part of the 2012 drilling program. A total of 4,733 RC samples were submitted to SGS for analysis, with the inclusion of an additional 250 standards, 250 field duplicates, 242 pulp duplicates, 250 blanks and a further 254 umpire assays as part of standard QA/QC implemented by Verde.

Results for standards submitted to the laboratory for analysis are presented below in Table 12.2.3_3 and Figures 12.2.3_5 to 12.2.3_7;

**Table 12.2.3_3**
**Standards Submitted by Verde to SGS Laboratories (Reverse Circulation Drilling)**

| Standard Name | Supplier | $K_2O$ (Max) | $K_2O$ (Min) | $K_2O$ (Mean) | Number | Outside +/- 3 x SD Limits |
|---|---|---|---|---|---|---|
| **GPO-11** | Geostats | 3.08 | 2.96 | 3.02 | 74 | 0 |
| **ITAK-904** | ITAK | 7.56 | 7.28 | 7.42 | 89 | 0 |
| **ITAK-905** | ITAK | 10.30 | 9.95 | 10.15 | 87 | 0 |

**Figure 12.2.3_5**
**Shewhart Control Chart for Standard GPO-11**

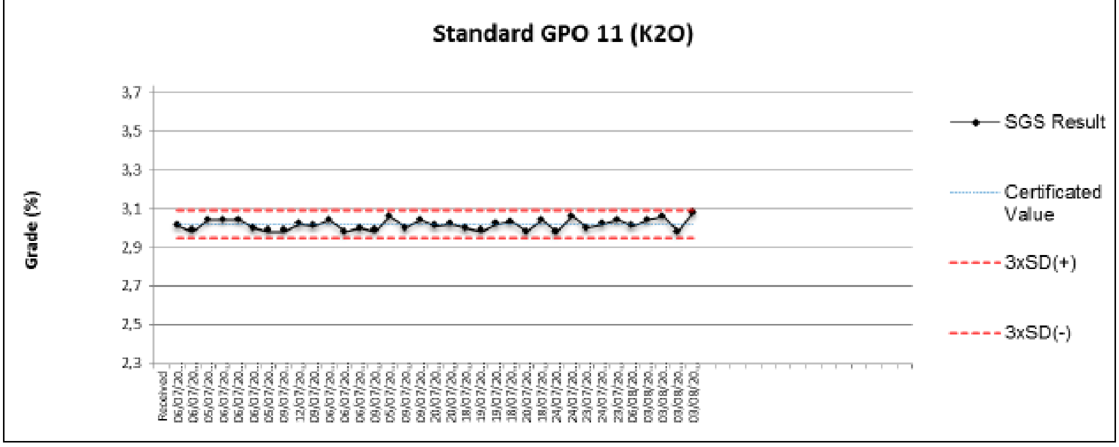



**Figure 12.2.3_6**
**Shewhart Control Chart for Standard ITAK-904**

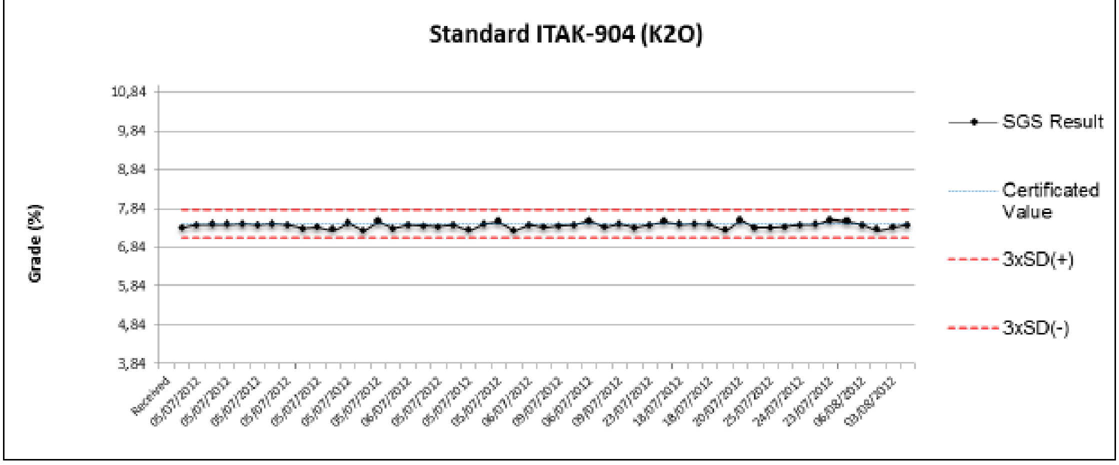
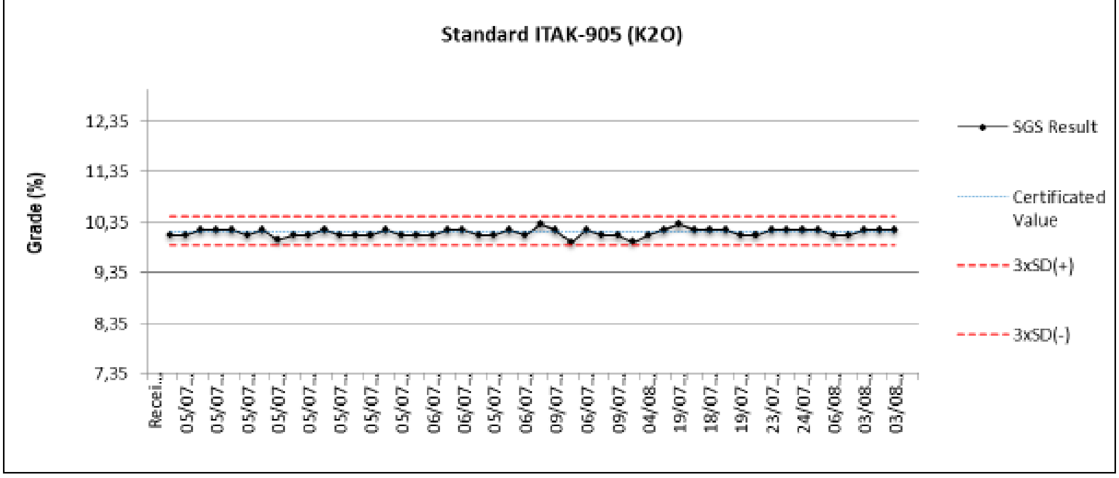



**Figure 12.2.3_7**
**Shewhart Control Chart for Standard ITAK-905**



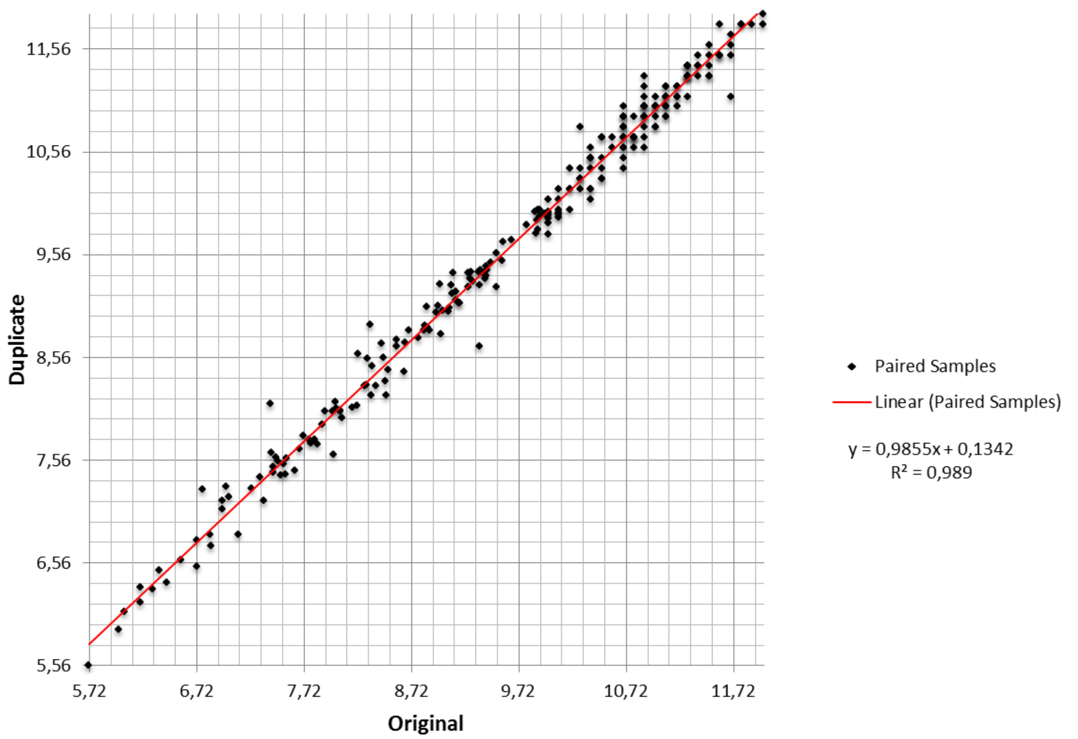

A total of 250 field duplicates were submitted by Verde based on the recent reverse circulation drilling program.

Based on the analysis, AMS concludes that the precision of field duplicates is acceptable as shown in Table 12.2.3_4 and Figure 12.2.3_8 below;

**Table 12.2.3_4**
**Field Duplicates Submitted by Verde to SGS Laboratory (Reverse Circulation Drilling)**

| **Population** | **250** | |
|---|---|---|
| **Correlation Coefficient** | 0.994492172 | |
| **Covariance** | 2.257993116 | |
| **Precision** | 1.64% | |
| | **Original (X)** | **Duplicate (Y)** |
| **Mean** | 9.69 | 9.68 |
| **Variance** | 2.29 | 2.25 |
| **Standard Deviation** | 1.51 | 1.50 |
| **Max** | 12.00 | 11.90 |
| **Min** | 5.72 | 5.56 |

**Figure 12.2.3_8**
**Linear Regression for Field Duplicates (Reverse Circulation Drilling)**




All field duplicates are inside the 10% tolerance level.

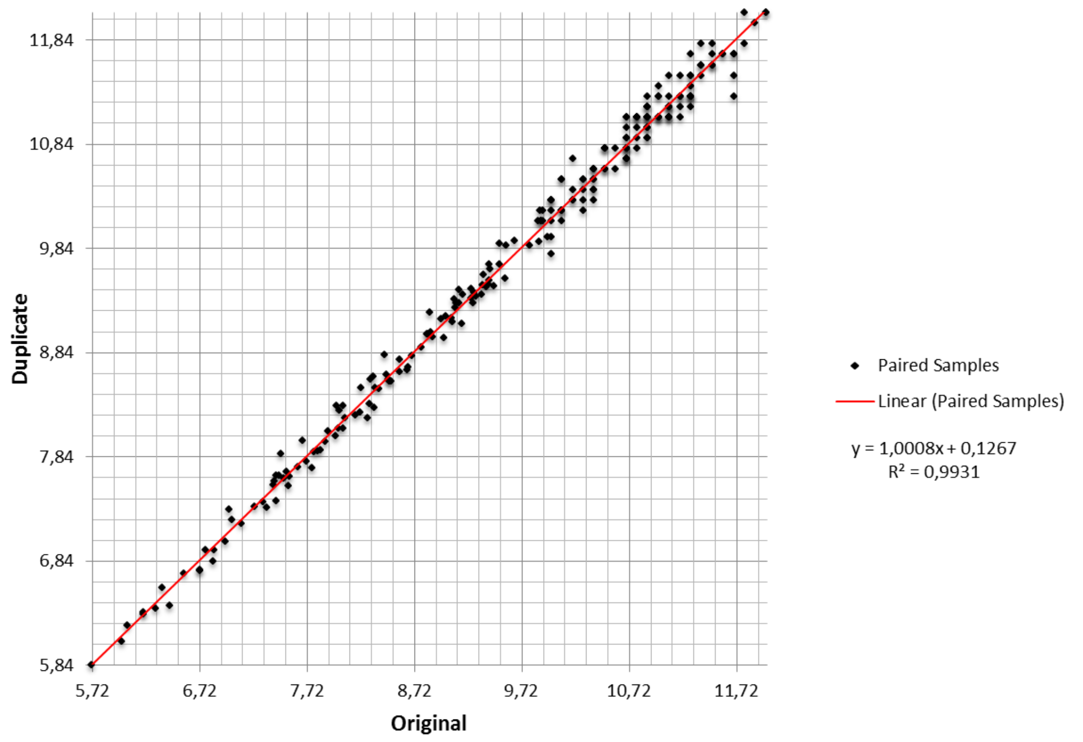
A total of 242 pulp duplicates were submitted by Verde based on the recent reverse circulation drilling program.

Based on the analysis, AMS concludes that the precision of pulp duplicates is acceptable as shown in Table 12.2.3_5 and Figure 12.2.3_9 below;

**Table 12.2.3_5**
**Pulp Duplicates Submitted by Verde to SGS Laboratory (Reverse Circulation Drilling)**

| Population | 242 | |
|---|---|---|
| Correlation Coefficient | 0.996531627 | |
| Covariance | 2.290954549 | |
| Precision | 1.31% | |
| | Original (X) | Duplicate (Y) |
| Mean | 9.68 | 9.81 |
| Variance | 2.29 | 2.31 |
| Standard Deviation | 1.51 | 1.52 |
| Max | 12.00 | 12.10 |
| Min | 5.72 | 5.84 |

**Figure 12.2.3_9**
**Linear Regression for Pulp Duplicates (Reverse Circulation Drilling)**




All pulp duplicates are inside the 10% tolerance level.

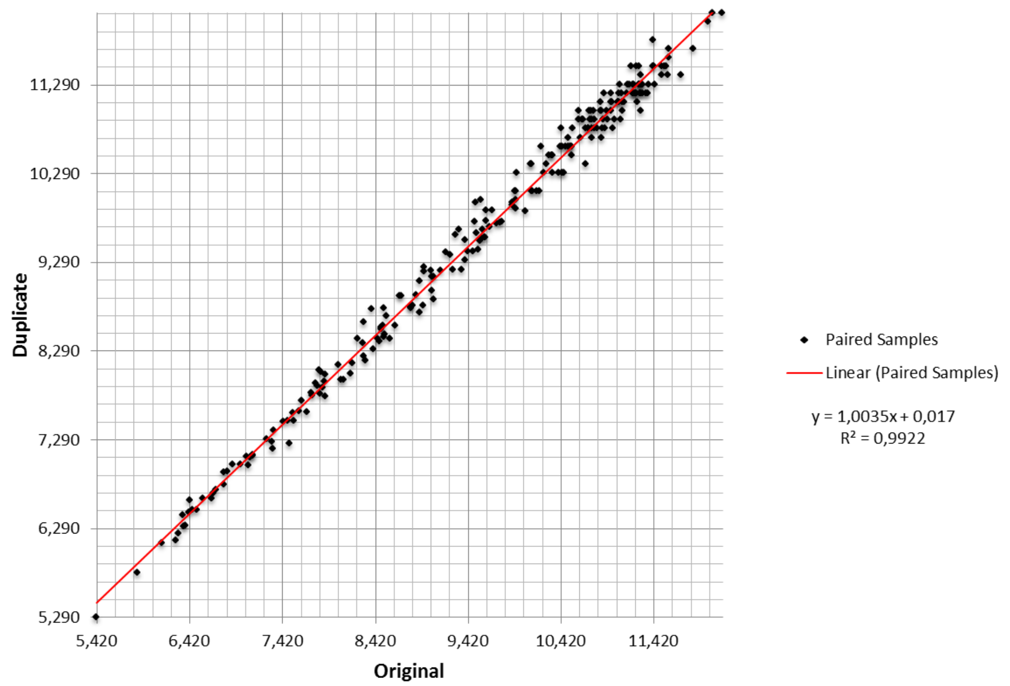
A total of 242 umpire assay samples were submitted by Verde based on the recent reverse circulation drilling program.

Based on the analysis, AMS concludes that the precision of assay results between laboratories is acceptable as shown in Table 12.2.3_6 and Figure 12.2.3_10 below;

**Table 12.2.3_6**
**Umpire Samples Submitted by Verde to ALS Laboratory (Reverse Circulation Drilling)**

| Population | 242 | |
|---|---|---|
| **Correlation Coefficient** | 0.996077628 | |
| **Covariance** | 2.557619772 | |
| **Precision** | 1.49% | |
| | **Original (X)** | **Duplicate (Y)** |
| **Mean** | 9.57 | 9.62 |
| **Variance** | 2.53 | 2.59 |
| **Standard Deviation** | 1.59 | 1.61 |
| **Max** | 12.16 | 12.10 |
| **Min** | 5.42 | 5.29 |

**Figure 12.2.3_10**
**Linear Regression for Umpire Samples (Reverse Circulation Drilling)**

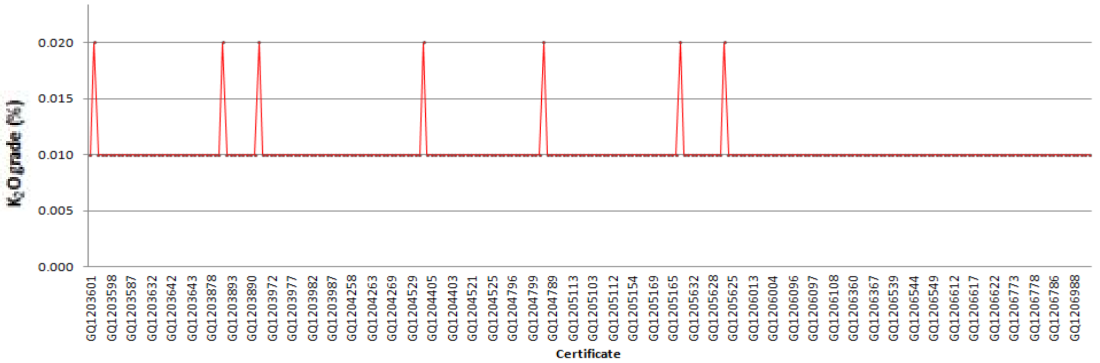



All umpire assay results are inside a 5% tolerance limit.

All blank samples returned $K_2O$ values consistent with certificate provided by Bureau Veritas (Figure 12.2.3_11). Minor variation were noted with 7 samples reporting slightly anomalous results of 0.02% $K_2O$, however this in the opinion of AMS this is not material to the overall resource estimate.

Verde should ensure that SGS maintain best practice sample preparation techniques going forward to minimize the effects of any sample preparation contamination.

**Figure 12.2.3_11**
**Blank Samples Submitted (Reverse Circulation Drilling)**




### 12.2.4 Twin Hole Comparisons

Twelve reverse circulation (RC) and diamond drill holes (DC) were drilled at between 1m and 3.5m intervals. The objective was to compare the lithological descriptions and the analytical results of both drilling techniques, given that a number of RC holes were drilled either moist or wet. A total of 785m drilled into Target 7 between August and September 2012 were sampled at intervals of 2m and sent for assays at SGS Geosol lab. Due to the low $K_2O$ results obtained in the CV-RC-575C and CV-DH-34 pair (average grade of 5% $K_2O$) those holes are not used in the comparison. The lithologies logged are equivalent on both core samples. The difference is $K_2O$ grades between both drilling techniques are shown in Table 12.2.4_1 below;

**Table 12.2.4_1**
**Twin Hole Comparisons (DC vs RC Drilling)**

| Holes | UTM WGS84 23S X | Y | Distance Between Holes | Elevation (m) | % $K_2O$ (ore) | % Difference |
|---|---|---|---|---|---|---|
| CV-RC-535 | 404219.48 | 7872932.95 | 1.0m | 936.73 | 6-32m @ 9.65% K2O | 0.2% |
| CV-DH-28 | 404219.60 | 7872933.91 | | 936.83 | 6-32m @ 9.63% K2O | -0.2% |
| CV-RC-553 | 405958.82 | 7872458.65 | 2.1m | 941.19 | 30-88m @ 10.08% K2O | -0.7% |
| CV-DH-29 | 405958.46 | 7872458.37 | | 941.39 | 30-88m @ 10.15% K2O | +0.7% |
| CV-RC-563 | 405434.59 | 7871312.26 | 2.9m | 964.40 | 30-70m @ 10.69% | -1.2% |
| CV-DH-30 | 405433.44 | 7871309.65 | | 964.26 | 30-70m @ 10.82% | +1.2% |
| CV-RC-607 | 409368.90 | 7874619.64 | 2.2m | 909.32 | 0-46m @ 10.86% | +1.8% |
| CV-DH-26 | 409368.77 | 7874621.81 | | 909.08 | 0-46m @ 10.66% | -1.8% |
| CV-RC-621 | 408211.46 | 7870647.59 | 0.9m | 952.03 | 15-85m @ 10.20% | -0.8% |
| CV-DH-31 | 408211.26 | 7870648.42 | | 952.35 | 15-85m @ 10.28% | +0.8% |
| CV-RC-648 | 408271.18 | 7868815.12 | 2.5m | 927.48 | 9-51m @ 9.57% | -2% |
| CV-DH-33 | 408268.83 | 7868815.89 | | 927.22 | 9-51m @ 9.76 % | +2% |
| CV-RC-669 | 405967.04 | 7868889.22 | 1.1m | 968.81 | 18-68m @ 10.20% | -1.2% |
| CV-DH-32 | 405967.35 | 7868890.26 | | 968.78 | 18-68m @ 10.32% | +1.2% |
| CV-RC-680 | 409216.66 | 7879790.43 | 3.5m | 894.71 | 0-30m @ 10.57% | -1.2% |
| CV-DH-23 | 409219.95 | 7879789.17 | | 895.49 | 0-30m @ 10.70% | +1.2% |
| CV-RC-711 | 406866.85 | 7875195.04 | 2.4m | 921.24 | 12-56m @ 10.13% | -2.3% |
| CV-DH-25 | 406866.85 | 7875192.62 | | 921.50 | 12-56m @ 10.36% | +2.3% |
| CV-RC-721 | 407679.56 | 7873233.78 | 2.0m | 943.10 | 16-42m @ 8.71% | -2.3% |
| CV-DH-27 | 407677.64 | 7873234.57 | | 942.87 | 18-40m @ 8.91% | +2.3% |
| CV-RC-789 | 408118.71 | 7876931.67 | 2.2m | 923.86 | 13-37m @ 8.73% | -3.6% |
| CV-DH-24 | 408120.77 | 7876932.62 | | 924.13 | 13-37m @ 9.04% | +3.6% |

The results show a good comparison of grades between moist / wet RC samples and dry diamond drilling. Results strongly suggest that reverse circulation drilling is suitable for inclusion in the resources estimate for the Cerrado Verde Project.

### 12.2.5 Data Quality Summary

As part of the 2011/2012 work program undertaken across the Cerrado Verde Project area, Verde have implemented an internal QA/QC protocol which includes the insertion of reference materials in the sample series (certified analytical standards and blanks). The QA/QC program also included analysis of field and pulp duplicates on a systematic basis, and the re-analysis of selected sample pulp duplicates in a second analytical laboratory for verification (umpire assays).

Reported results for the 2011 program highlight a number of issues with respect to standards and blanks material submitted. Upwards of 10 - 20% of standards plot outside tolerance levels set by Verde, and this has been attributed to poor calibration of XRF equipment by the laboratory (SGS). AMS make note of the fact that in almost all cases, the laboratory standard results returned were reporting lower than the standard reference material certified values. In addition to this, it was noted that powdered blank material was submitted throughout the 2011 drilling campaign. AMS consider this material as being ineffective in testing for sample preparation contamination issues as part of the sample submission process implemented by Verde.

Significant QA/QC improvements were noted during the 2012 drilling campaign, with reported results for the certified analytical standards showing a very good correlation for all three standards utilized. There were no reported issues with any of the standard results returned from the laboratory.

Additionally, all blank samples returned $K_2O$ values<0.02% $K_2O$, with previous issues regarding the submission of powdered blank samples rectified during the 2012 drilling campaigns through the use of a quartz gravel blank.

The results of duplicate test work completed (both field and pulp duplicates) show a good correlation with the original analytical values and provide acceptable data variance.

The re-analysis of pulp duplicate from selected mineralised samples (umpire assays) showed an excellent correlation which indicates very little laboratory bias between both ALS and SGS laboratories.

It is the author's opinion that despite some QA/QC concerns for the 2011 drilling campaign, Verde is now operating according to industry standard with respect to QA/QC protocol for the insertion of controlled reference material into the stream of samples submitted for the Cerrado Verde Project.

The overall data package is considered of sufficient quality to be used for mineral resource estimation.

# 13 MINERAL PROCESSING, METALLURGICAL TESTING AND RECOVERY METHODS

The author of this report is not qualified to provide extensive comment on mineral processing, metallurgical testing and recovery methods previously undertaken.

## 13.1 Introduction

In previous studies, two process routes have been discussed for the treatment of the glauconitic meta-argillite ore. The primary feed material for the two processing routes is a meta-siltstone typically containing 8 to 11% $K_2O$ as muscovite/illite and microcline.

The first process route considered for treating is a glauconitic meta-argillite ore with a cut-off grade of 6% $K_2O$ and an average grade of 9.87% $K_2O$ to generate a conventional 'KCl' potash product. This process route involves calcining the glauconitic meta-argillite with limestone and chloride salts (mainly sodium chloride) followed by water leaching of the potassium chloride new formed and excess sodium chloride contained in the calcine thus obtained. NaCl is recovered from the resultant brine by evaporation / crystallization and KCl, the potash fertilizer product, by crystallization from the mother liquor of the sodium chloride recovery.

Test work has been completed by Verde in late 2012 / early 2013 for the conventional production of KCl (first processing route). A significant quantity of glauconitic meta-argillite ore was collected and submitted for metallurgical test work.

The second process investigated was the production of thermopotash (TK). This product is a slow release K-fertilizer with around 7% $K_2O$, and has good properties as a non-saline fertilizer (chloride-free). TK is a new product in the market, and not yet a proven industry standard.

The production of TK involves calcining the glauconitic meta-argillite ore with limestone in a predetermined proportion at high temperature according to a temperature profile. The "calcine" obtained is the product TK, which is ground coarse and ready to be marketed.

Based on preliminary metallurgical test work completed by Verde, there is potential for production of TK from higher grade material (10.5% $K_2O$), with the use of ore grading around 9.5-10% $K_2O$ in the KCl production process.

TK process was tested in a direct-fired rotary kiln with capacity for 150 kg/h in Santa Luzia – Minas Gerais State, Brazil, operated by Verde's personnel. It produced over 90 tonnes of product. Later, between the end of October beginning of November 2013, it was also tested for a week at FLSmidht pilot plant in Allentown PA. ThermoPotash was approved for use as a potash fertilizer by the Brazilian Ministry of Agriculture ("MAPA") on June 24, 2013 - its registration number is MG - 90. 773 10000-3. The product is now eligible for sale in Brazil. Over the past four years the Company and a number of research partners have conducted 41 lab tests and 15 field tests with 12 different crops on more than 23 hectares (230,000$m^2$). The results of these tests have demonstrated the product's efficacy as a source of potassium, silicon and calcium, as well as its ability to address the acidity of Brazilian soils.

## 13.2 Historical Test Work (Late 2011 / Early 2012)

Process route development for KCl production started at Cambridge University, where process route was selected. The studies carried out a laboratory scale were tested and scale-up at Hazen Research Inc., aiming to define the most adequate conditions to achieve a high recovery of KCl in the calcine. The measurement of the degree of the reaction was done by standardized leaching procedures with samples of the calcine, which had been subjected to the chloridizing calcination.

At that time, GEA Messo, Germany (specialized in evaporation / crystallization), was contracted to carry out tests with this calcine in order to design a conceptual process route to recover KCl grade fertilizer.

From these initial studies, a patent application (GB1118622.8) was filed for the production of KCl from potassium silicates (Verde Potash, 2011).

A four-day exploratory pilot program was completed (January 2012) at FLSmidth, Bethlehem, PA. Conventional test work generated a desirable industrial product (KCl) with total potassium recoveries reported to be around 70% (FLSmidth, February 2012).

Several photos of the research facility and pilot plant are presented below in Figure 13.2_1.

**Figure 13.2_1**
**Pilot Plant Testwork - Glauconitic Meta-Argillite Ore Processing**

In conclusion, it was suggested that the recovery process could be further improved by running pilot plant tests, in a more systematic fashion, as well as improving recycling of reagents and waste heat to minimize costs and maximize revenue.

Although the process was found to be cost intensive when compared with conventional KCl conventional mining and processing (evaporitic deposit, where Sylvinite is the main ore mineral), a substantially less costly logistics for Brazilian domestic market makes this alternative more competitive, in a delivered cost basis.

ThermoPotash (TK) test work started at Verde`s laboratory and was soon after tested a few times in the direct rotary kiln at Verde`s premises in Santa Luzia.

TK production is much simpler as compared to KCl calcine, as it just involves calcination of a mixture containing meta argillite glauconitic (verdete) with limestone in predetermined proportion (and limestone purity).

## 13.3 Current Test Work (August - September 2012 / February - March 2013)

Verde contracted AMEC in April 2012 to start engineering work for the Cerrado Verde Project and also to manage the metallurgical test work for glauconitic meta-argillite ore. The QP for comminution and pyro processing test work is Mr Wilson Chow (AMEC).

Two test work campaigns were carried out at FLSmidth pilot plant facilities in Allentown (Pennsylvania, USA) with the participation of Mr Chow. The first campaign lasted 4 weeks, operating 24 hours per day, 5 days a week, to obtain parameters in a pilot scale with all controls necessary to obtain data for scaling up to an industrial project; and also confirming some data obtained in Verde's laboratory in Santa Luzia. The second campaign was carried out for 2 weeks, to confirm recoveries.

Tests carried out at FLSmidth generated approximately 90 tonnes of KCl calcine.

During test campaigns samples were taken every 2 hours from various points of the pyro metallurgical system to allow for mass balance and process control. Soluble K was analysed all for samples of the calcine discharge. Two complete mass balances for the main elements were done per each 12h.

All samples were brought back to Verde`s laboratory for complete chemical analyses and mass balance for the main elements, including Na, K, $Cl^-$,Ca.

Hydrometallurgical work was carried out by Veolia Water Solutions & Technologies-HPD Technology. The QP for this work is Mr Paul O'Hara from AMEC office in Saskatoon (Canada). Approximately 600 - 800 kg of calcine was shipped to HPD for hydrometallurgical test work, which also included solid liquid separation tests performed by suppliers.

A pilot test campaign of 5 days was also run at FLSmidth in system similar to an industrial one, with all process control etc.

In total some 90 t of TK were produced considering all continuous tests carried out (Santa Luzia rotary kiln and FLSmidth). Most of it was used in agronomical tests to prove its improved properties as a K_fertilizer.

Samples used for these two pyro metallurgical campaigns as well as for all the other test work carried out at Verde's laboratory were representative of likely normal operating conditions at the proposed plant site for the Verde project.

A substantial quantity of glauconitic meta-argillite ore was collected from different locations and depths across Target 7 and submitted by Verde for metallurgical test work in late 2012 up until present.

### 13.3.1 Sample Locations

A total of 24 RC drill samples with varying $K_2O$ grades collected at different depths, have been selected from 11 reverse circulation drill holes within the Target 7 ore resource (Figure 13.3.1_1 and Table 13.3.1_1).

**Table 13.3.1_1**
**RC Drill Hole Samples Collected for Metallurgical Testwork**

| Sample # | Sample Details | Sample # | Sample Details |
|---|---|---|---|
| **1** | CV - RC - 126 (6 to 8m) | **13** | CV - RC - 165 (73 to 76m) |
| **2** | CV - RC - 126 (14 to 16m) | **14** | CV - RC – 207 (2 to 4m) |
| **3** | CV - RC - 142 (12 to 14m) | **15** | CV - RC - 205 (2 to 4m) |
| **4** | CV - RC - 142 (26 to 28m) | **16** | CV - RC - 205 (6 to 8m) |
| **5** | CV - RC - 142 (40 to 42m) | **17** | CV - RC - 205 (18 to 20m) |
| **6** | CV - RD - 148 (12 to 14m) | **18** | CV - RC - 205 (30 to 32m) |
| **7** | CV - RD - 148 (18 to 20m) | **19** | CV - RC - 237 (24 to 26m) |
| **8** | CV - RD - 148 (34 to 36m) | **20** | CV - RC - 237 (38 to 40m) |
| **9** | CV - RC - 149 (2 to 4m) | **21** | CV - RC - 237 (50 to 52m) |
| **10** | CV - RD - 153 (24 to 26m) | **22** | CV - RC - 241 (16 to 18m) |
| **11** | CV - RC - 161 (61 to 64m) | **23** | CV - RC - 241 (40 to 42m) |
| **12** | CV - RC - 165 (43 to 46m) | **24** | CV - RC - 241 (26 to 28m) |

RC drill hole samples account for a composite sample of approximately 3 tonnes with an average $K_2O$ grade of 10.15%.

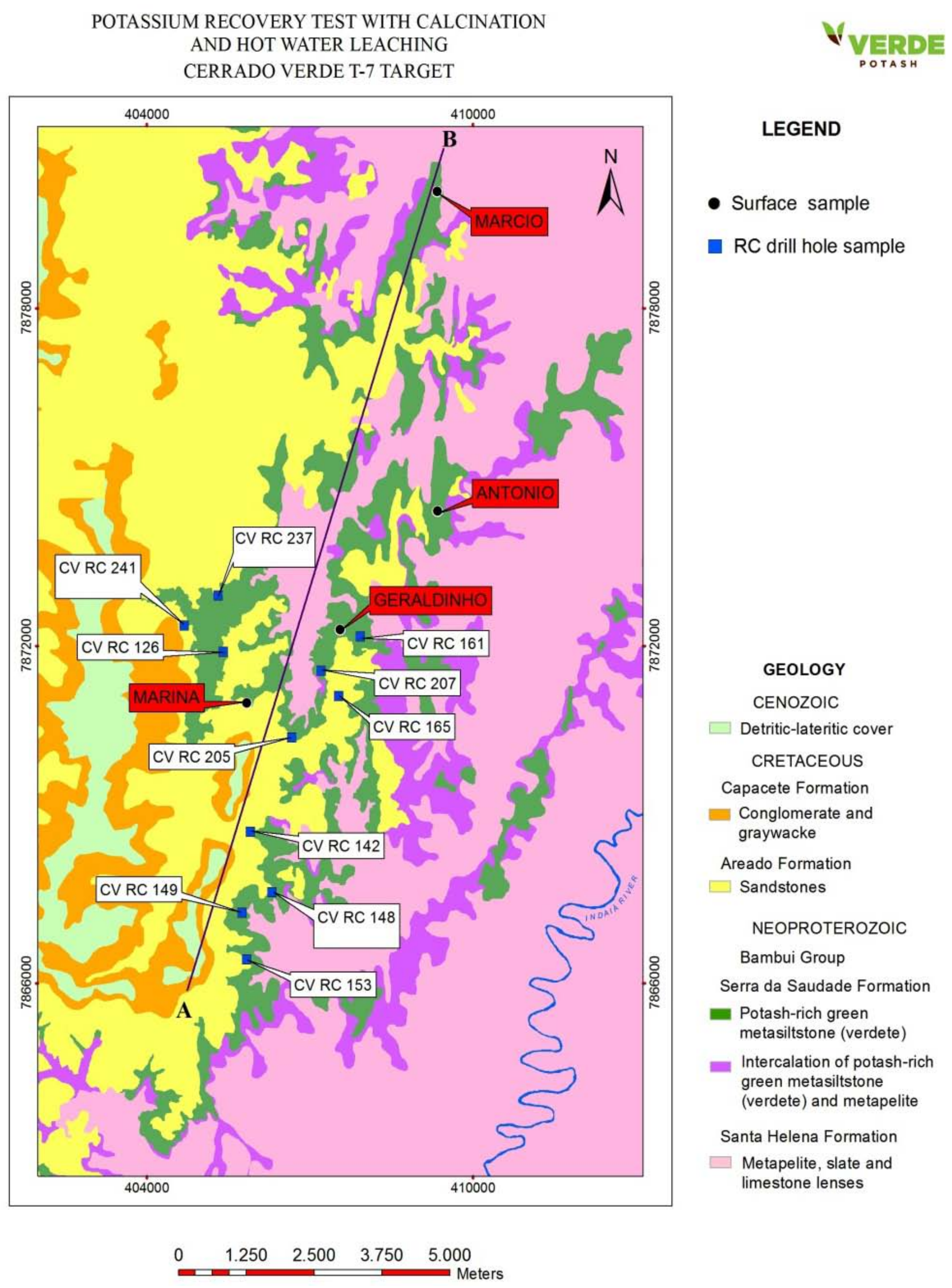
In addition a total of 4 locations within Target 7 were selected for the collection of bulk samples for metallurgical test work. Localities include Marcio, Antonio, Geraldinho and Marina (Figure 13.3.1_1 and Table 13.3.1_2).

**Table 13.3.1_2**
**Bulk Outcrop Samples Collected for Metallurgical Testwork**

| Location | Coordinates | Sample Weight (tonnes) |
|---|---|---|
| **Marina** | **X**: 405850 **Y**: 7871002 | Composite sample comprising **6.8 tonne** of material at approximately **10.0% $K_2O$** |
| **Geraldinho** | **X**: 407532 **Y**: 7872501 | |
| **Antônio** | **X**: 409399 **Y**: 7874474 | |
| **Marcio** | **X**: 405850 **Y**: 7871002 | |

These four areas were selected because of their easy access, well preserved and fresh glauconitic meta-argillite outcrops and % $K_2O$ similar to the average grade of the overall Cerrado Verde potash deposit.

**Figure 13.3.1_1**
**Bulk Composite Sample Selection Sites (RC Drilling and Outcrop)**




### 13.3.2 Composite Material Processing

Figures 13.3.2_1 to 13.3.2_8 illustrate the sampling process employed to collect and process samples.

**Figure 13.3.2_1**
**Surface Glauconitic Meta-Argillite Collected**

**Figure 13.3.2_2**
**Surface Verde placed in Plastic Bags**

**Figure 13.3.2_3**
**Sample being Assayed by Portable XRF**

**Figure 13.3.2_4**
**Samples Stored in Plastic Bags**


**Figure 13.3.2_5**
**Sample Transport to Preparation Site**

**Figure 13.3.2_6**
**Sample Pile at Preparation Site**

| **Figure 13.3.2_7**<br>**Crushing with Wood and Nylon Screen Sieve** | **Figure 13.3.2_8**<br>**Sampled being Sieved in Nylon Screen** |
|---|---|
|  |  |

Composite samples were crushed with wooden rafters. Ten grab samples of the composite sample were collected and assayed for all elements ($K_2O$, $P_2O_5$, CaO, $Al_2O_3$, $Fe_2O_3$, MgO, $TiO_2$, $Na_2O$) plus minor elements at Bureau Veritas analytical laboratory by ICP-OES method (Table 13.3.2_1).

**Table 13.3.2_1**

**Representative Grab Samples (Assay Check) - ICP-OES Results (Bureau Veritas)**

| Sample Number | Sample ID | $K_2O$ % | $P_2O_5$ % | CaO % | $Al_2O_3$ % | $Fe_2O_3$ % | MgO % | $TiO_2$ % | MnO % | $Na_2O$ % |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 12YS-01 | 7.35 | 0.046 | 0.011 | 15.78 | 6.80 | 3.37 | 0.860 | 0.037 | 0.079 |
| **2** | 12YS-02 | 7.30 | 0.067 | 0.021 | 19.87 | 7.99 | 4.42 | 1.01 | 0.050 | 0.100 |
| **3** | 12YS-03 | 10.83 | 0.080 | 0.042 | 16.53 | 8.21 | 3.54 | 0.736 | 0.069 | 0.078 |
| **4** | 12YS-04 | 8.62 | 0.049 | 0.008 | 17.73 | 7.47 | 4.16 | 0.934 | 0.052 | 0.086 |
| **5** | 12YS-05 | 10.39 | 0.020 | 0.009 | 16.06 | 6.97 | 3.28 | 0.783 | 0.019 | 0.074 |
| **6** | 12YS-06 | 11.56 | 0.072 | 0.024 | 17.18 | 7.94 | 3.42 | 0.907 | 0.161 | 0.080 |
| **7** | 12YS-07 | 7.30 | 0.182 | 0.038 | 15.97 | 6.40 | 3.09 | 0.853 | 0.087 | 0.059 |
| **8** | 12YS-08 | 10.87 | 0.015 | 0.014 | 17.29 | 7.66 | 3.65 | 0.678 | 0.084 | 0.079 |
| **9** | 12YS-09 | 9.97 | 0.158 | 0.031 | 15.62 | 6.66 | 3.36 | 0.827 | 0.050 | 0.076 |
| **10** | 12YS-10 | 10.76 | 0.189 | 0.032 | 15.68 | 6.60 | 3.59 | 0.862 | 0.078 | 0.096 |
| **Average Grade -->** | | **9.50** | **0.088** | **0.023** | **16.77** | **7.27** | **3.59** | **0.845** | **0.0687** | **0.081** |

The crushed composite sample was stored in large bags and transported to Fragminas whom are an outsourced supplier of grinding services to Verde for metallurgical testwork (Figure 13.3.2_9).

At Fragminas (a milling facility processor), the sample was ground in a ball mill with the use of high alumina ceramic balls to eliminate any potential for contamination (Figure 13.3.2_10).

| Figure 13.3.2_9<br>Sieved Sample Transported to Fragminas | Figure 13.3.2_10<br>High Alumina Ceramic Balls used for Pulverising |
|---|---|
|  |  |

### 13.3.3 Metallurgical Processing (Conventional Production)

Initial metallurgical processing research was carried out at Hazen Research Laboratories, where process parameters were adjusted and refined for the improvement of the process route selected. Hazen Research Laboratories are a well know R&D Centre in extractive metallurgy.

At the same time, Verde started to assemble a laboratory facility at Santa Luzia for bench scale test work, on the outskirts of Belo Horizonte, Minas Gerais State, where Verde has its offices. This facility was assembled by Verde in late 2011 to perform metallurgical testwork in an effort to develop Verde's production process. The Santa Luzia facility has a direct fired kiln with a feed rate of 150 to 250 kg/h used for confirmation chloridizing calcination tests in continuous batch runs (Figure 13.2_1). Process parameters were adjusted and refined based upon continuous test work undertaken by Verde.

In Santa Luzia tests were carried out with samples of all drill holes in order to evaluate how these ores, from deeper locations, would behave in relation to Verde's process route and different proportion of reagents used in the feed mixtures compared to outcropping samples.

RC as well as blended outcrop samples (as outlined in Section 13.3.1) were pulverized to 100% below 90 microns, controlled by dry sieving. The pulverized mass was quartered in a sampler divider to obtain a mass of approximately 500g, from which 350g was used for preparation for testing. Unused samples of glauconitic meta-argillite ore were divided into two parts: one of them was sent for chemical analyses at Bureau Veritas, while the other portion was stored for future reference.

Feed mixtures prepared with all RC samples individually were calcined at 900°C for 90 minutes in a muffle furnace. Test procedure comprises preparation of the feed mixture containing the right proportion of reagents, homogenization weighing out the feed mixture, and then placing it inside a crucible which was then placed in the pre-heated furnace (900°C). After 90 minutes (the required time to reach maximum conversion under the conditions), the crucible was removed from the kiln and cooled down carefully with a spray of water.

Calcine was disaggregated (passed through a 0.30mm sieve) and leached with hot water with mechanical stirrer under reflux at 95°C for 60 minutes using the proportion of 1 part in mass of solid to 3 parts in mass of distilled water. Solid-liquid separation was carried out in a dry vacuum filtration kit (filtrate was separated and solid residue was washed thoroughly with hot water and dried).

The ore and each reagent (NaCl and $CaCO_3$) were weighted out separately, mixed and homogenized. After, a total of 120g of the mixture was weighed for each test. This was the initial feed mixture and the mass considered for balance. Calcine and leach residue were also weighted out and the volume of leach liquor was measured for mass balances purposes, from which it was possible to calculate the metallurgical recoveries of K and Na. Sodium was also controlled in the tests, as it is recovered for recycling; part of it is consumed and remains in the residue.

Sodium Chloride (NaCl) and Calcium Carbonate ($CaCO_3$) are added to the feed mixture as reagents to react and release K. There is also the formation of simpler silicates with Na and Ca in their structure, as has been shown in mineralogical studies of samples taken along the processing route (ore, calcine and leach residue samples submitted).

Chemical analyses were done by XRF on samples from the run of mine, feed mixture, calcine and leach residue. Leach residue liquor was analysed by Flame Photometry. For each test, a mass balance was completed (K balance and Na balance). All mass balance results obtained within 95% and 105% are considered acceptable, and were used to calculate K recoveries.

The most recent metallurgical processing testwork has been carried out at FLSmidth's pilot plant in Allentown-PA. Three campaigns of testwork were completed: in early 2012 for 4 continuous days; in August - September 2012 for 4 continuous weeks; and in February - March 2013 for 2 continuous weeks.

The first test at FLSmidth was more of a trial test to prove that process route selected was acceptable, with good performance and the results were used for the PEA released in the first quarter of 2012. The second and third tests were more specific at evaluating more detailed parameters such as grain size of the ore; different proportions of reagents in the feed mixture fed to the rotary kiln. Second and third tests campaign were carried out with representative ore collected from the 4 points indicated in Section 13.3.1.

Most of the parameters evaluated at FLSmidth had already been studied at Verde's Santa Luzia laboratory, with a very good correlation of results. The procedure to evaluate K-recovery was standardized by Verde, and is used as routine for all tests carried out. This same procedure was also used at FLSmidth pilot plant to follow up performance during operation.

The responses to the tests were very good and outcropping samples and surface samples presented very similar behaviour.

Testwork was carried out with representative composite samples obtained from the selected outcropping samples.

### 13.3.4 Results from Metallurgical Processing

The average $K_2O$ grade for the 7 blended surface samples utilized for the testwork was 10.34%.

The average % K extraction obtained with the RC samples with an average $K_2O$ content of 10.15% was comparable with those blended from surface samples.

### 13.3.5 Conclusions from Metallurgical Processing

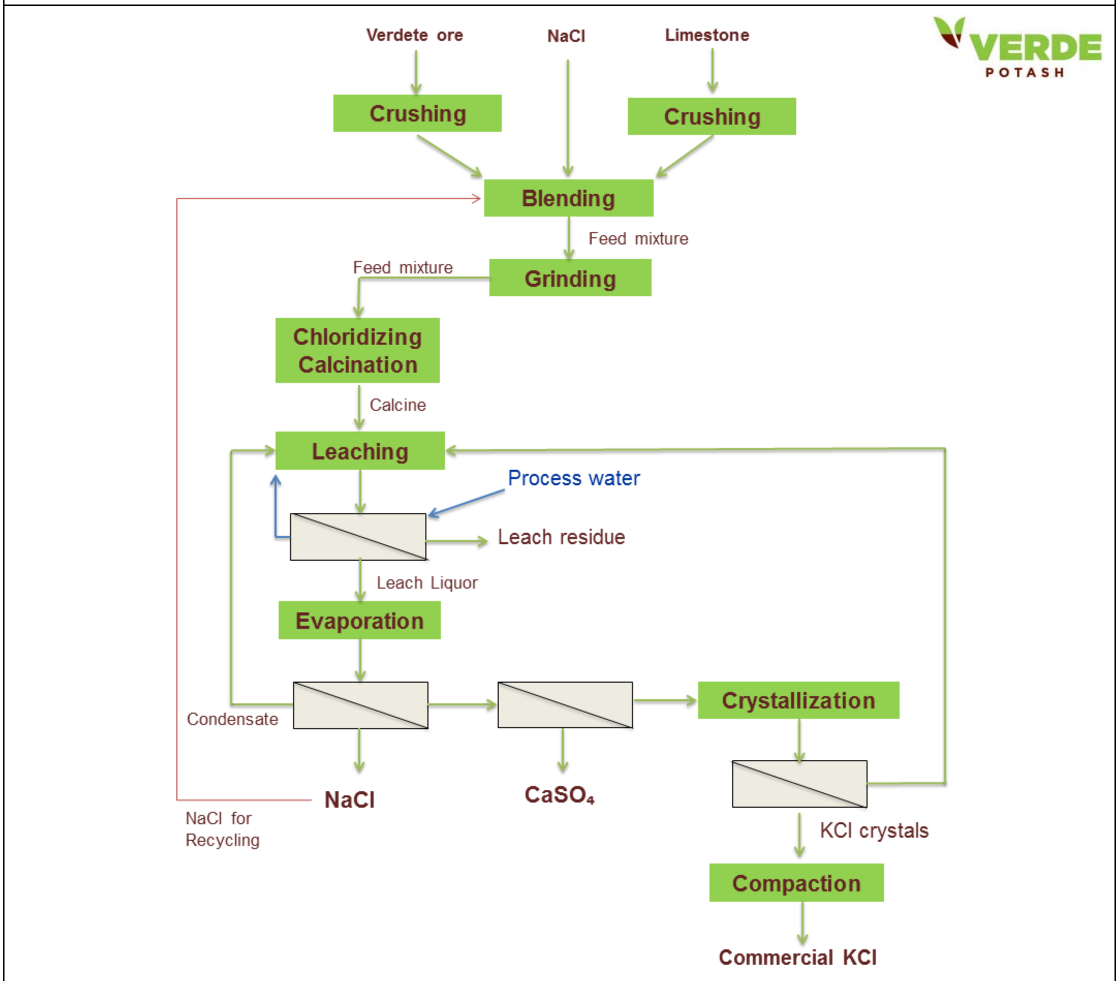
The results obtained from this series of studies, indicate recoveries of between 65% and 70% K are achievable.

Tests allowed Verde to establish the most adequate proportions of reagents and ore in the feed mixture; temperature profile of calcination in the direct fired kiln, which is another extremely important parameter for the process performance, as well as residence time according to the profile.

## 13.4 Proposed Process Flow for KCl Production

A block flow diagram of the process route is presented below in Figure 13.4_1.

**Figure 13.4_1**
**Process Flow Sheet for Commercial KCl Production**



A brief summary of the proposed process flow route for KCl production is presented below;

1. **Glauconitic Meta-Argillite Ore Crushing and Transport**

   - Glauconitic meta-argillite ore is delivered to the hopper (via trucks), from which it will feed a two stage crushing circuit.

2. **Limestone Crushing and Transport**

   - Limestone is mined and crushed at the mine and then transported to the plant site by trucks. Crushing is carried out in a two stage circuit.

3. **Blending**

   - Glauconitic meta-argillite ore and limestone are pre-blended in an open mixing pile.

   - Glauconitic meta-argillite ore, NaCl (part recycled from evaporation stage, part complemented by suppliers), and limestone are fed to the grinding mill.

4. **Feed Mixture Grinding**

   - The feed mixture is ground together in a vertical roller mill. Ore and other reagents are fed simultaneously in order to grind to a predetermined grain size distribution and homogenize the ore / reagent mixture.

5. **Chloridizing Calcination**

   - Ground and homogenized feed mixture, is fed into the rotary kiln for calcining where conditions such as temperature and residence time are kept within a specified range of values. High temperature reactions occur among solid phases with the formation of HCl (hydrochloric acid), part of which participates in the reaction with the remainder in the gas phase; this one is recovered in the dry gas scrubbing stage with $Ca(OH)_2$; reaction products contain silicates of Na, Ca, excess NaCl and the product KCl, as well as some unreacted ore and CaO obtained by the decomposition of the limestone.

   - Exhaust gases from the kiln pass through cyclones and a bag house filter to retain most of the solid particles carried over by the gas. Finally, exhaust gas, which contain some HCl formed during the reaction in the kiln, is fed into a dry scrubber that operates with $Ca(OH)_2$. In the $Ca(OH)_2$ bed, HCl reacts forming $CaCl_2$. Within the scrubber, any residual $SO_2$/$SO_3$ gases (due to the sulphur in the petroleum coke) are removed.

6. **Leaching**

   - Leaching is carried out at 95ºC, using the mother liquor from the KCl crystallizer and fresh process water which is added to dissolve all the excess NaCl and the newly formed KCl present in the calcine.

- Leach liquor containing $K^+$, $Na^+$ and $Cl^-$ values has to be separated from leach residue, with this operation carried out in a filter.

- Filter cake is washed with fresh process water; wash water is pumped into the leaching stage; leach liquor is pumped to the evaporation / crystallization plant.

7. **Evaporation**

- Leach liquor is fed to a mechanical evaporation system, which operates as an evaporative crystallizer for NaCl.

- The pulp of NaCl is centrifuged and mother liquor flows to the crystallization system where KCl is obtained.

- NaCl recycles to the feed mixture preparation stage.

8. **Crystallization**

- KCl crystallization is obtained by cooling down the saturated brine.

- The crystals are drawn off in concentrated slurry, centrifuged and then dried.

- The mother liquor recycles to leaching step.

9. **Compaction**

- Granular KCl product is obtained by the use of roller press compactors, with the solid KCl flake processed into the required size range by crushing and screening.

## 13.5 Proposed Production Schedule (Review after TK/KCl Phase 1)

A preliminary schedule for the production of KCl from glauconitic meta-argillite ore was outlined as part of the PEA prepared by SRK Consulting (February 2012).

Three phases of production were initial proposed, with the required mining rate of glauconitic meta-argillite, average metallurgical recovery of 70% potassium (K) and production rate of KCl as dry solid crystals highlighted.

AMS have presented this information in Table 13.5_1 below.

**Table 13.5_1**

**Proposed Process Plant Expansion Schedule and Capacity**

| Phase | Year | # of Years Operating at Each Phase | Desired KCl Production (Mt) | Required Glauconitic Meta-Argillite Production * (Mt) |
|---|---|---|---|---|
| 1 | 2015 | 2 | 0.6 | 5.6 |
| 2 | 2017 | 2 | 1.6 | 14.8 |
| 3 | 2019 | 26 | 3.0 | 27.7 |

*Assuming average 10.2% $K_2O$ grade

The reported production schedule above is preliminary in nature, and Verde are currently in the process of revising the production schedule based on updated economies of scale following a recent resource upgrade.

# 14 MINERAL RESOURCE ESTIMATES

## 14.1 Introduction

AMS have estimated the Mineral Resource for the Cerrado Verde Project using recent drilling data completed by Verde during the 2011 and 2012 field campaigns. In addition, a small number of drill holes have been included from a drill program undertaken in late 2009. The database is current to the 5th of December 2012. The final database used to produce the mineral resource estimate totals 435 drill holes which comprise 420 reverse circulation drill holes and a further 15 diamond drill holes.

The mineral resource estimate is derived from a computerised resource block model. The construction of the block model starts with the modelling of 3D wireframe envelopes or solids of the mineralization using drill hole $K_2O$ analytical data and lithological information. Once the modelling has been completed, the analytical data contained within the wireframe solids is normalised to generate fixed length composites. The composite data is used to interpolate the grade of blocks regularly spaced on a defined grid that fills the 3D wireframe solids. The interpolated blocks located above the bedrock interface and outside the default waste solid comprise the mineral resources. The blocks are then classified based on confidence level using proximity to composites, composite grade variance and mineralised solids geometry. The 3D wireframe modelling was initially interpreted by Verde, and then modified by the author based on final assay results. The block model and mineral resource estimation were conducted by AMS based on information provided by Verde.

All grade estimation was completed using Ordinary Kriging (OK) for $K_2O$ as well as $Al_2O_3$, CaO, $Fe_2O_3$, MgO, MnO, $Na_2O$, $P_2O_5$, $SiO_2$, $TiO_2$ and LOI. This estimation approach was considered appropriate based on a review of a number of factors, including the quantity and spacing of available data, the interpreted controls on mineralization, as well as the style of mineralization under consideration.

The estimation was constrained entirely within both the fresh rock and weathered domains. Weathered regolith is generally well developed across the Cerrado Verde Project area (typically 5-20m in depth), with all 435 drill holes noted to intersect significant $K_2O$ mineralization within fresh rock and to a lesser extent weathered material across the project area. Drilling into the fresh rock across the Cerrado Verde Project area almost always results in a sharp increase in the $K_2O$ grades across the regolith boundary (weathered to fresh rock).

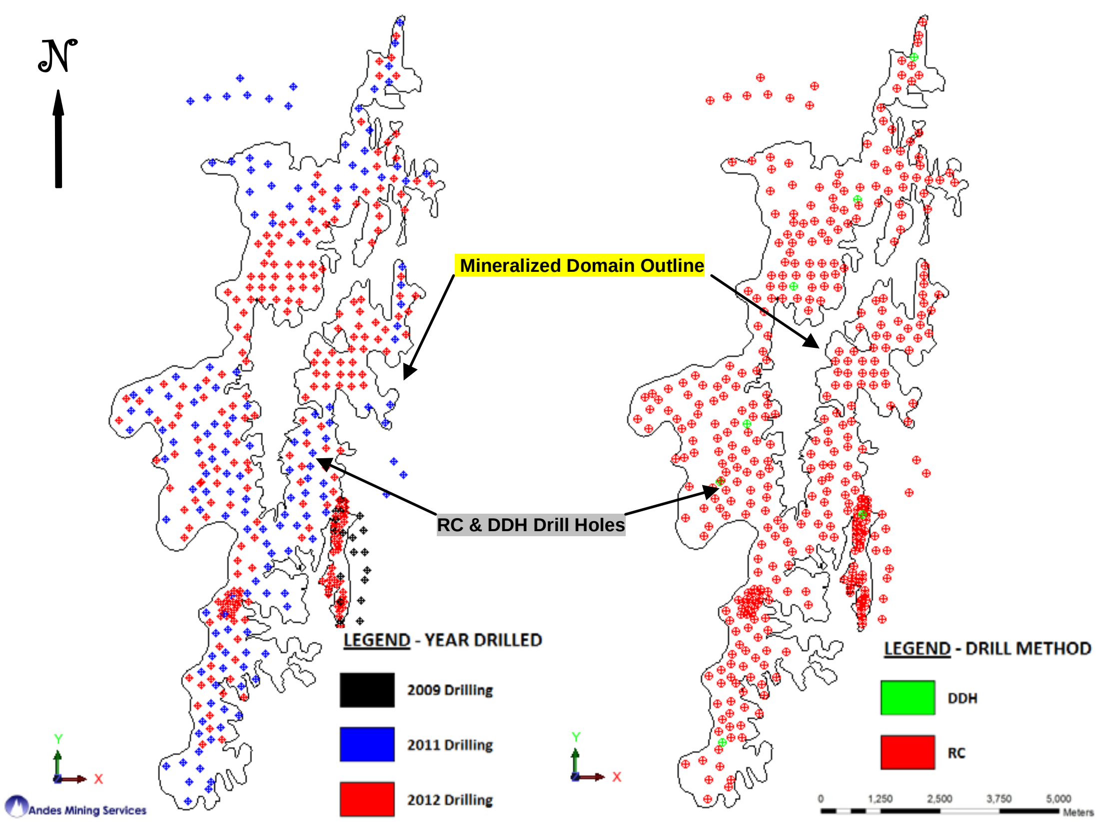
The Cerrado Verde Project mineral resource estimate is based on 435 drill holes (26,609m) drilled at a nominal spacing of approximately 200m by 200m. A total of 420 reverse circulation drill holes (25,563m) and 15 diamond drill holes (1,046m) have been completed across the resource area. Diamond drill holes have been completed as twin holes to pre-existing reverse circulation drilling in an effort to provide suitable QA/QC comparison test work. Infill drilling to a 100m by 100m spacing has been completed in two separate areas of the resource in an effort to increase the resource category confidence, and provide suitable vectors from variography studies.

Drilling included within the Cerrado Verde resource is listed below in Table 14.1_1 and illustrated in Figure 14.1_1;

| Table 14.1_1<br>Cerrado Verde Resource - Drilling Summary Statistics | | |
|---|---|---|
| **Year** | **Drilling Technique** | **Summary** |
| **2009** | - | - |
| | RC | 19 Holes (997m Total) |
| **2010*** | - | - |
| | - | - |
| **2011** | DDH | 3 Holes (261m Total) |
| | RC | 149 Holes (9,486m Total) |
| **2012** | DDH | 12 Holes (785.4m Total) |
| | RC | 252 Holes (15,080m Total) |

*No drilling was completed by Verde during 2010.

**Figure 14.1_1**
**Plan View of Mineralized Domain Outline (Target 7) with Drillholes *(AMS, 27th December 2013)***




## 14.2 Geological Modelling

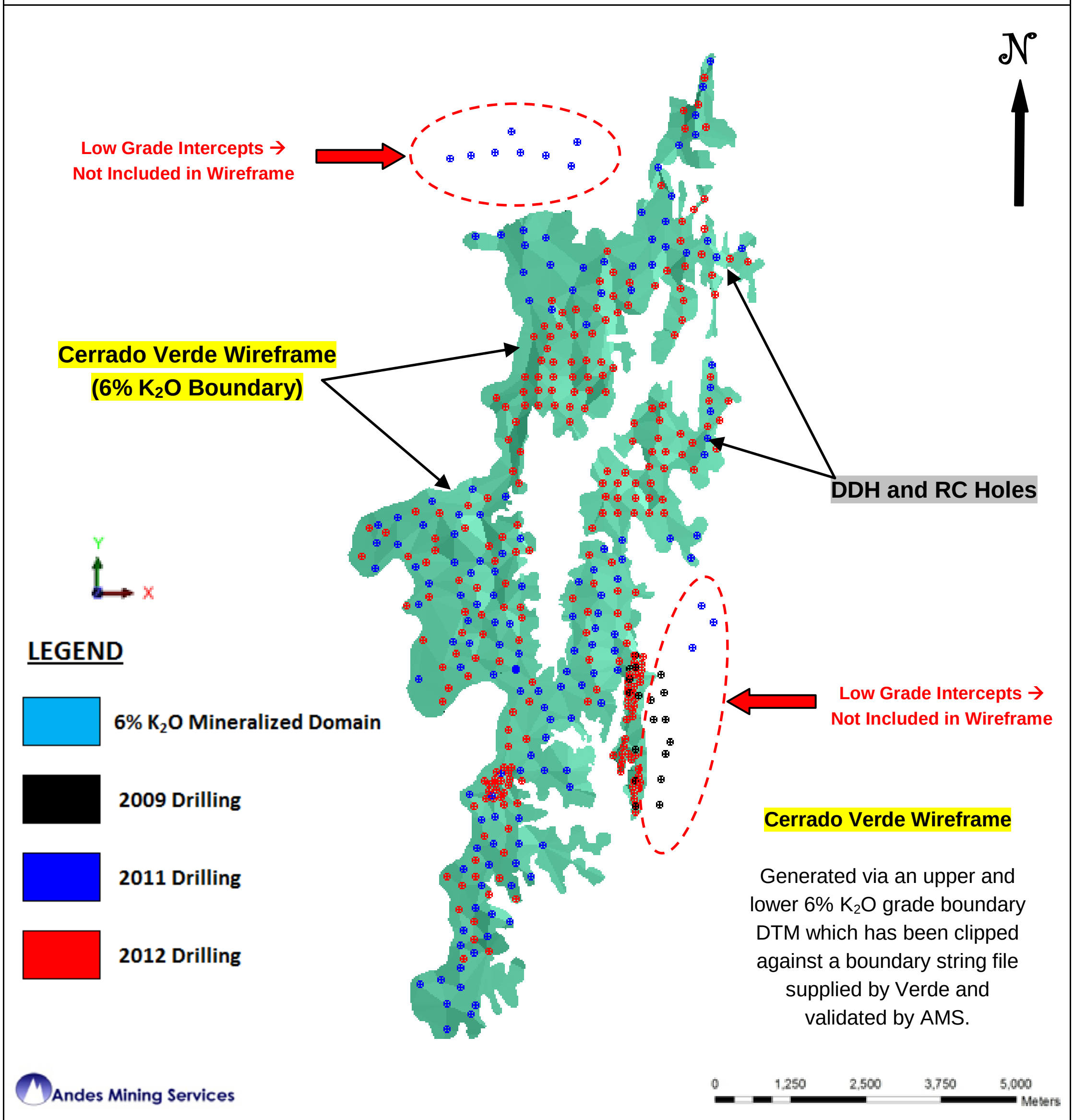
Given the extensive number of drill holes across the Cerrado Verde Project, a detailed geological model has been developed by Verde personnel as a basis for resource estimation work completed by AMS.

AMS note the majority of drilling completed by Verde has been within the fresh rock profile of the glauconitic meta-argillite unit where the $K_2O$ is enriched, and subsequent geological modelling has focused on mineralized intervals within this fresh rock unit.

AMS have generated a mineralized domain for the Cerrado Verde project area based upon an interpretation of drill hole data as well as geological mapping data supplied by Verde personnel. AMS and Verde have interpreted a mineralized $K_2O$ domain (which has been utilised for the estimation of $Al_2O_3$, CaO, $Fe_2O_3$, MgO, MnO, $Na_2O$, $P_2O_5$, $SiO_2$, $TiO_2$ and LOI also) utilizing a 6% $K_2O$ lower grade limit to guide the interpretation (Figure 14.2_1 to 14.2_4).

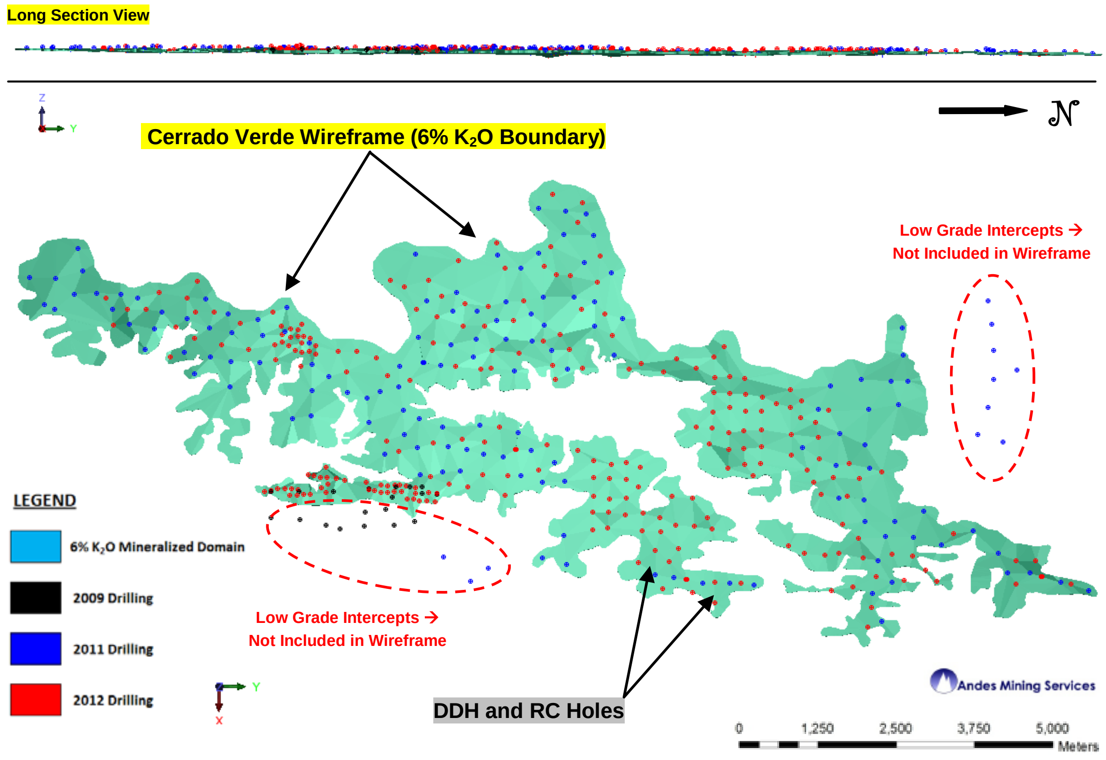
An upper and lower digital terrain model (DTM) surface was generated for the 6% $K_2O$ grade boundary based on the 435 drill holes included in the database. Some lower grades were selectively included within the mineralized boundary, where the grade data was logically interpreted to form part of the mineralized shape.

**Figure 14.2_1**
**Plan View of Cerrado Verde Wireframe *(AMS, 27th December 2013)***



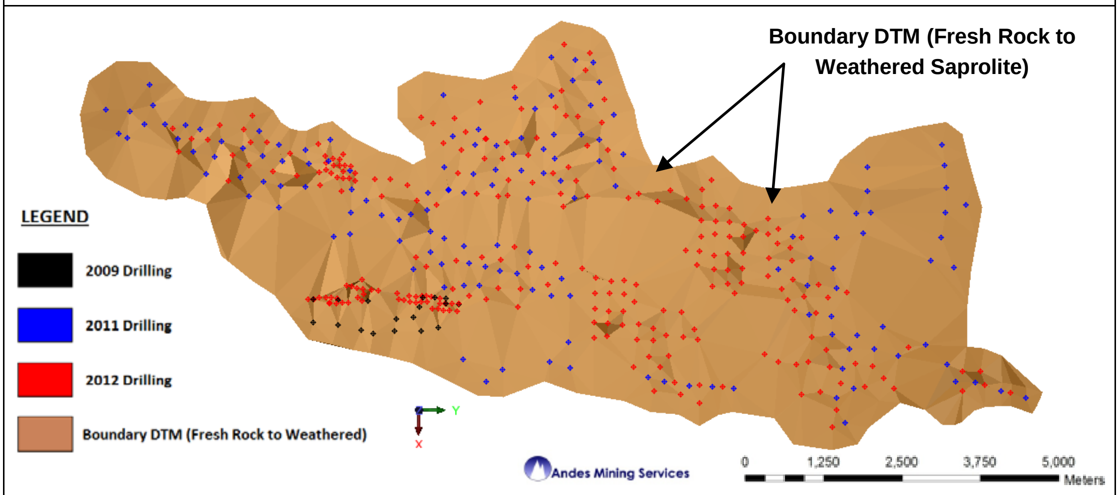

Upper and lower DTM surfaces representing a 6% $K_2O$ mineralized package were then clipped to a mineralized boundary surface supplied by Verde which has been generated from a ground based survey of outcropping glauconitic meta-argillite in conjunction with satellite imagery.

**Figure 14.2_2**
**Long Section and Plan View of the Cerrado Verde Wireframe *(AMS, 27th December 2013)***



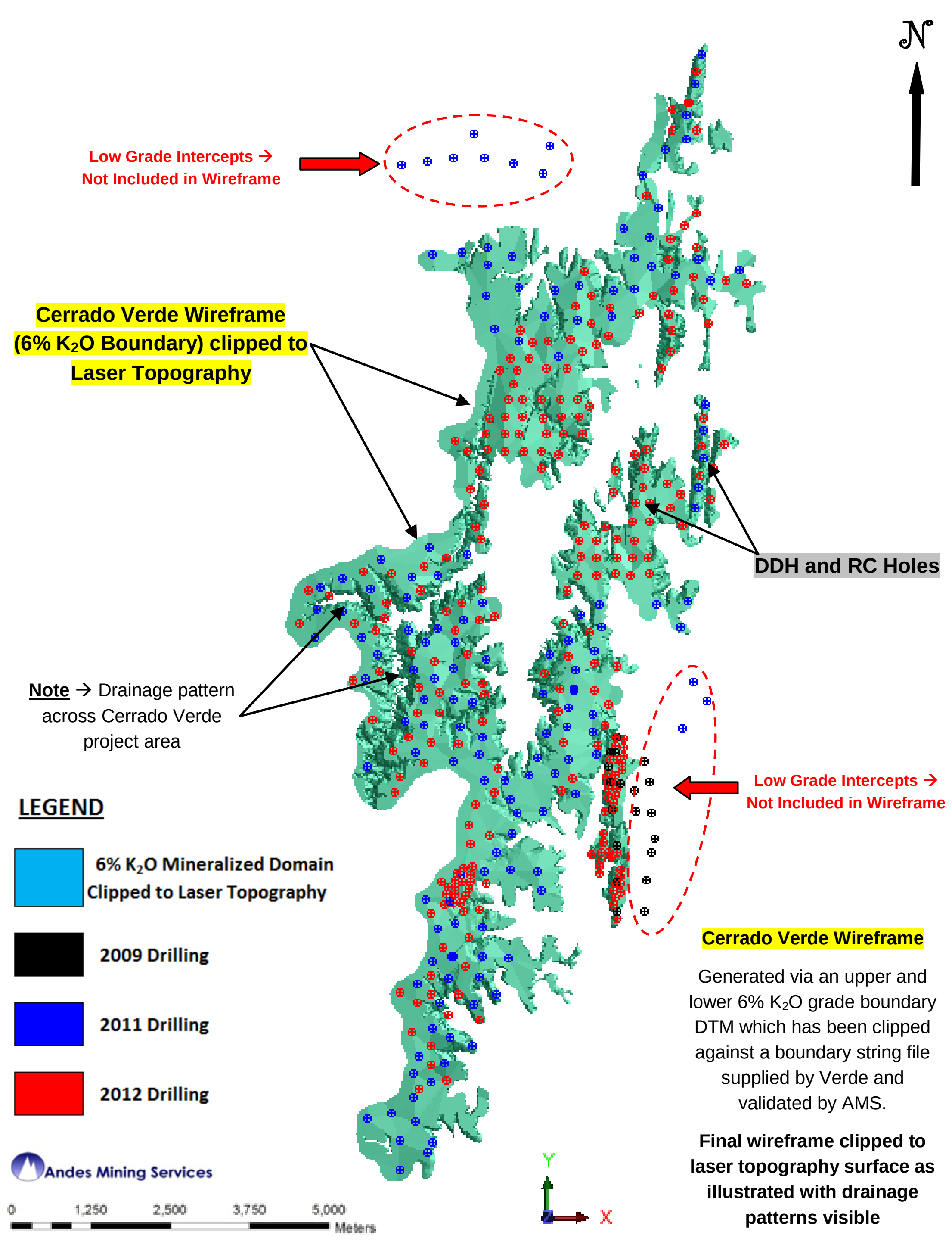

In addition to a 6% $K_2O$ mineralized domain, AMS have generated a DTM surface between weathered material and the underlying fresh rock material to take into consideration differences in bulk density (Figure 14.2_3 and Figure 14.2_4). As well as a significant density difference between weathered and fresh rock material, there is a sharp increase in $K_2O$ grades across this boundary.

**Figure 14.2_3**
**Bounding DTM Surface between Fresh Rock and Weathered Material *(AMS, 27th December 2013)***




AMS have utilized a recent detailed airborne laser scanning topographical survey across the Cerrado Verde Project area as an upper boundary surface for the Cerrado Verde wireframe (Figure 14.2_4). Drill holes were adjusted to the topographic surface before wireframing commenced.

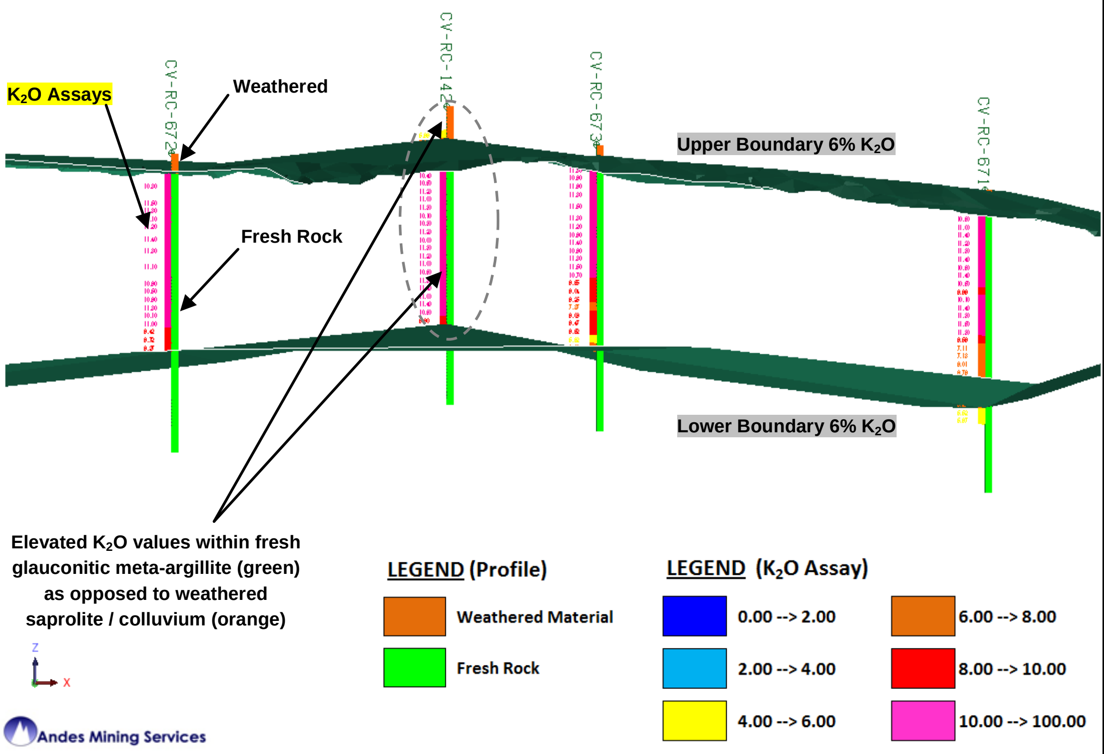
**Figure 14.2_4**
**Plan View of Cerrado Verde Wireframe and Drilling clipped to Topography *(AMS, 27th December 2013)***




Density values were assigned appropriately downhole with an average value of 2.18g/cm$^3$ assigned to the fresh rock material, while all other weathered material (saprolite and colluvium) was assigned a density value of 1.64g/cm$^3$ as per discussions in Section 10.10.

It is quite clear that $K_2O$ values are more elevated within the fresh rock glauconitic meta-argillite material as shown in the section below (Figure 14.2_5).

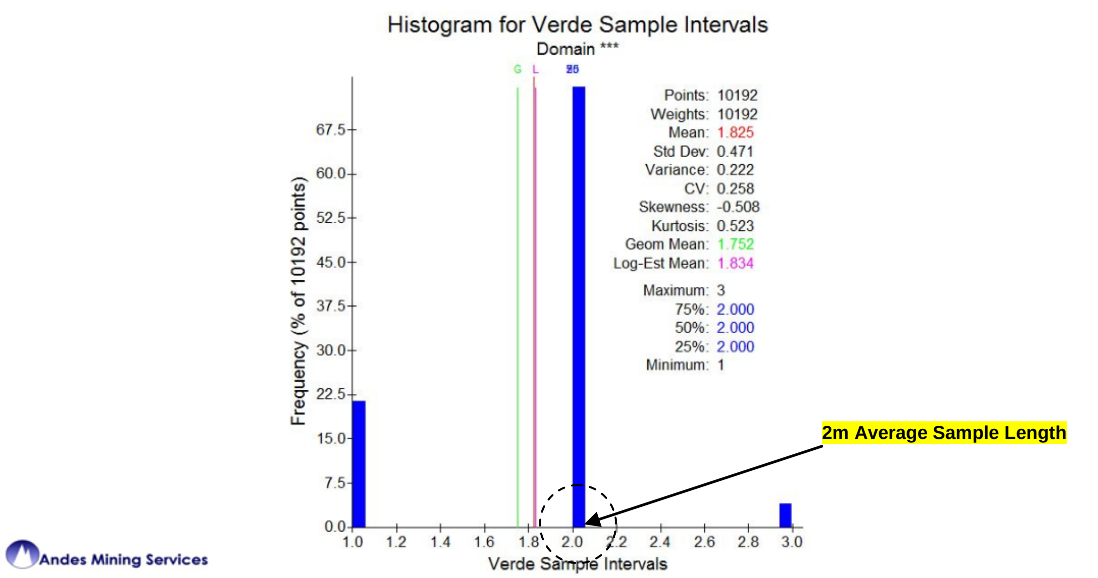
**Figure 14.2_5**
**Cross Section View of Wireframe & Drill Holes at 7,868,700N (+/-50m) *(AMS, 27th December 2013)***




## 14.3 Sample Selection and Sample Compositing

Samples were selected for the mineral resource estimate from within the mineralized wireframe generated from the geological and grade based domain. Samples intervals were assigned a nominal 'intersection code' which reflected the mineralized domain from which those intervals were derived. The average sample length utilized for Cerrado Verde is 2m (Figure 14.3_1 below).

**Figure 14.3_1**
**Average Sample Length Graph – Cerrado Verde Drilling Program(s)**



Selected samples were visually compared back to the interpretation to ensure that the flagging was correct and appropriate.

Block model grade interpolation is conducted on composited analytical data. Selected sample intervals were composited downhole to 5m intervals which AMS considers is the likely mining bench height for a large scale open pit mining operation of this geometry and grade variability.

Composites were generated to 5m intervals based on a "best fit" approach and hence no residual samples were discarded. Given the bulk mining approach that will be adopted, this method of generating composites was considered appropriate.

No capping was applied to the assays before compositing.

The composite file was used as the basis for geostatistics and 3D modelling and estimation.

## 14.4 Statistical Analysis

The drill hole database was composited to a 5m down-hole composite interval, with the 5m composite used for all statistical, geostatistical and grade estimation studies.

Statistical analysis of 5m composites from the mineralized domain is presented below in Table 14.4_1.

**Table 14.4_1**

**Summary Statistics – 5m Composites within Cerrado Verde Mineralized Domain**

| | Element | Count | Minimum | Maximum | Mean | Std. Dev. | CV |
|---|---|---|---|---|---|---|---|
| Mineralized Domain "TARGET 7" | $Al_2O_3$ | 3256 | 5.05 | 19.31 | 15.56 | 1.36 | 0.09 |
| | CaO | 3256 | 0.01 | 21.84 | 0.50 | 1.19 | 2.38 |
| | $Fe_2O_3$ | 3256 | 2.53 | 10.60 | 6.86 | 0.62 | 0.09 |
| | **$K_2O$** | **3387** | **2.50** | **12.89** | **9.27** | **1.71** | **0.18** |
| | LOI | 3150 | 1.28 | 29.93 | 3.50 | 1.26 | 0.36 |
| | MgO | 3256 | 1.40 | 13.03 | 2.90 | 0.46 | 0.16 |
| | MnO | 3150 | 0.02 | 1.45 | 0.13 | 0.06 | 0.46 |
| | $Na_2O$ | 3150 | 0.05 | 1.99 | 0.19 | 0.25 | 1.33 |
| | $P_2O_5$ | 3150 | 0.01 | 3.44 | 0.14 | 0.10 | 0.70 |
| | $SiO_2$ | 3256 | 23.15 | 77.10 | 59.79 | 3.01 | 0.05 |
| | $TiO_2$ | 3150 | 0.30 | 2.93 | 0.82 | 0.10 | 0.12 |

No top cut has been applied to $K_2O$ and $Al_2O_3$ composite data based on a review of histogram and log probability curves show below (Figures 14.4_1 and 14.4_2 respectively). Top cuts have been applied to all other elements which include CaO, $Fe_2O_3$, LOI, MgO, MnO, $Na_2O$, $P_2O_5$, $SiO_2$ and $TiO_2$ based on a review of histogram and log probability curves show below (Figures 14.4_3 to 14.4_11).

Individual top cuts applied to each element are presented below in Table 14.4_2.

**Table 14.4_2**
**Top Cuts Applied to 5m Composite Data for Cerrado Verde**

| | Element | Count | Minimum | Maximum | Mean | Top Cut Applied (%) |
|---|---|---|---|---|---|---|
| **Mineralized Domain** **"Target 7"** | **$Al_2O_3$** | 3256 | 5.05 | 19.31 | 15.56 | No Top Cut Applied |
| | **CaO** | 3256 | 0.01 | 21.84 | 0.50 | 8.0 |
| | **$Fe_2O_3$** | 3256 | 2.53 | 10.60 | 6.86 | 9.0 |
| | **$K_2O$** | **3387** | **2.50** | **12.89** | **9.27** | **No Top Cut Applied** |
| | **LOI** | 3150 | 1.28 | 29.93 | 3.50 | 10.5 |
| | **MgO** | 3256 | 1.40 | 13.03 | 2.90 | 3.8 |
| | **MnO** | 3150 | 0.02 | 1.45 | 0.13 | 0.58 |
| | **$Na_2O$** | 3150 | 0.05 | 1.99 | 0.19 | 1.6 |
| | **$P_2O_5$** | 3150 | 0.01 | 3.44 | 0.14 | 0.8 |
| | **$SiO_2$** | 3256 | 23.15 | 77.10 | 59.79 | 73.0 |
| | **$TiO_2$** | 3150 | 0.30 | 2.93 | 0.82 | 1.3 |

**Figure 14.4_1**
**Histogram and Log Probability Plot – $K_2O$ Composite Data (5m)**

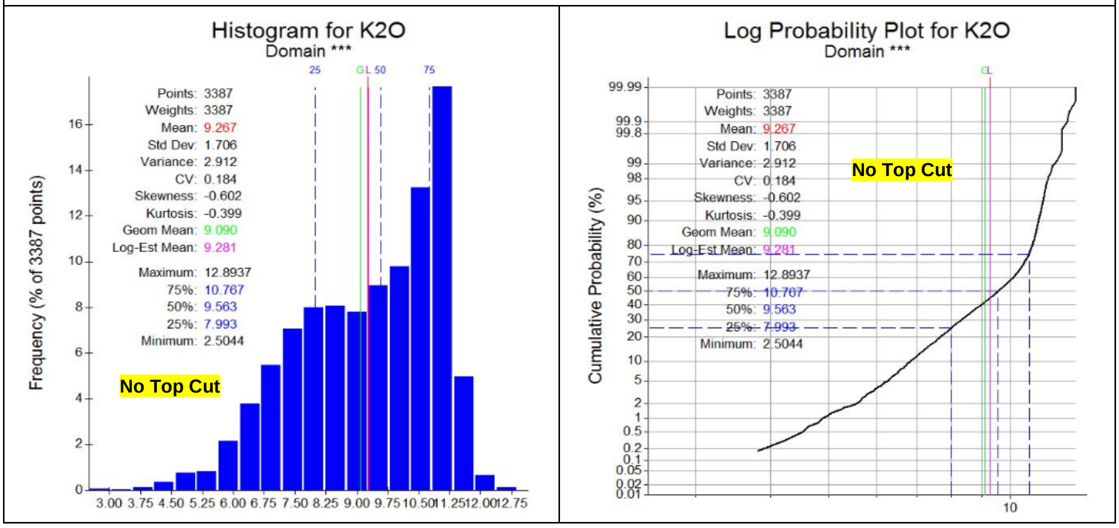



**Figure 14.4_2**
**Histogram and Log Probability Plot – $Al_2O_3$ Composite Data (5m)**

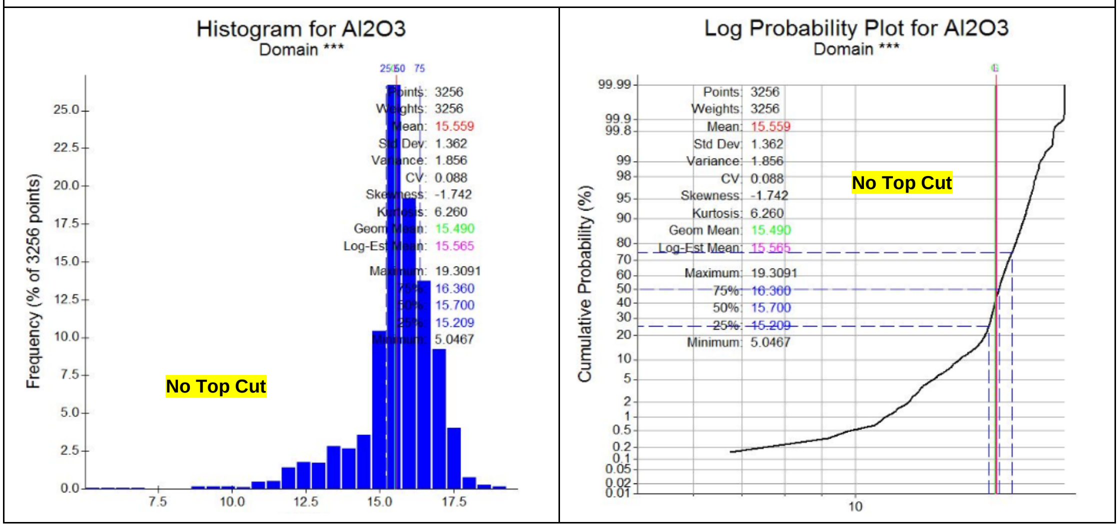


**Figure 14.4_3**
**Histogram and Log Probability Plot – CaO Composite Data (5m)**

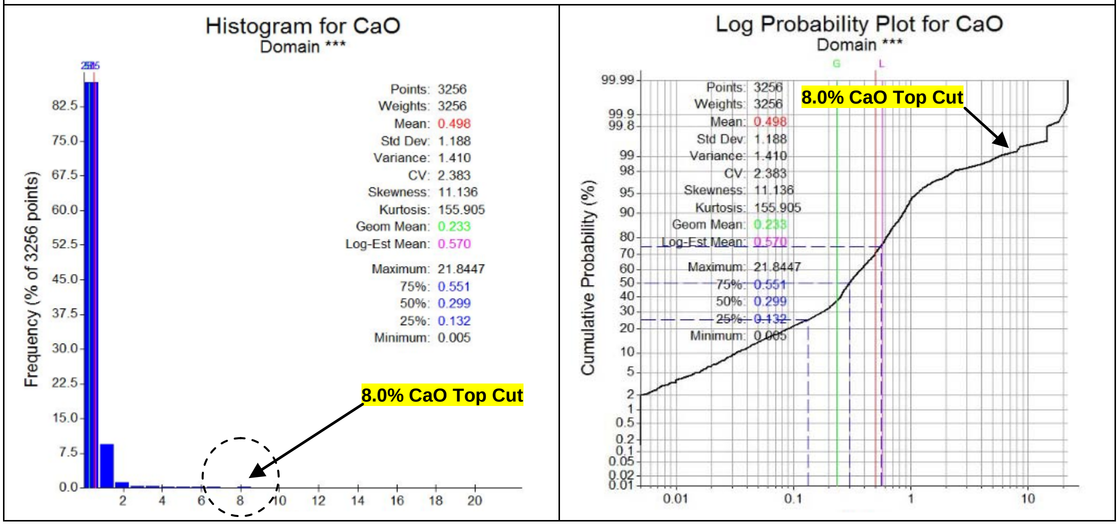



**Figure 14.4_4**
**Histogram and Log Probability Plot – $Fe_2O_3$ Composite Data (5m)**

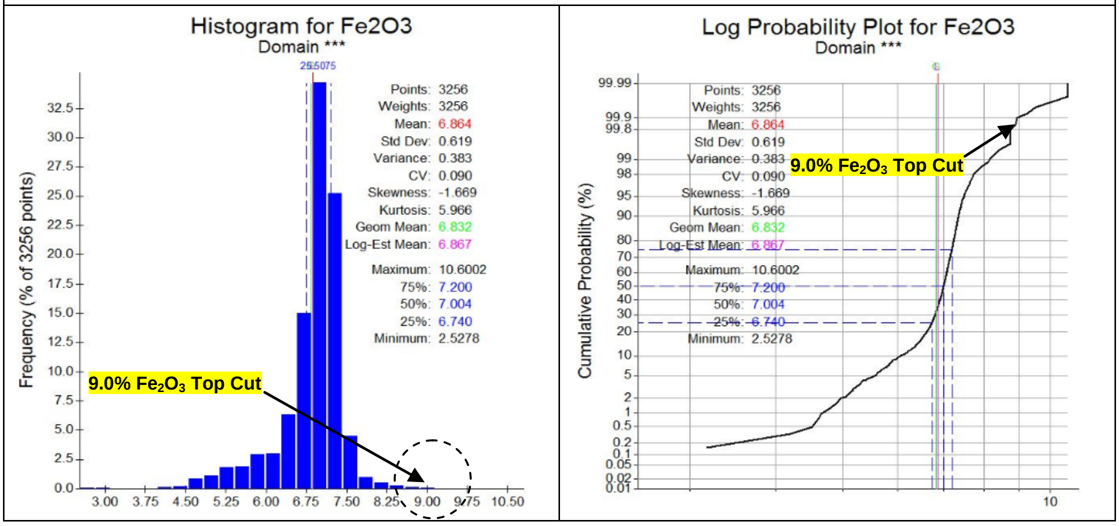



**Figure 14.4_5**
**Histogram and Log Probability Plot – LOI Composite Data (5m)**

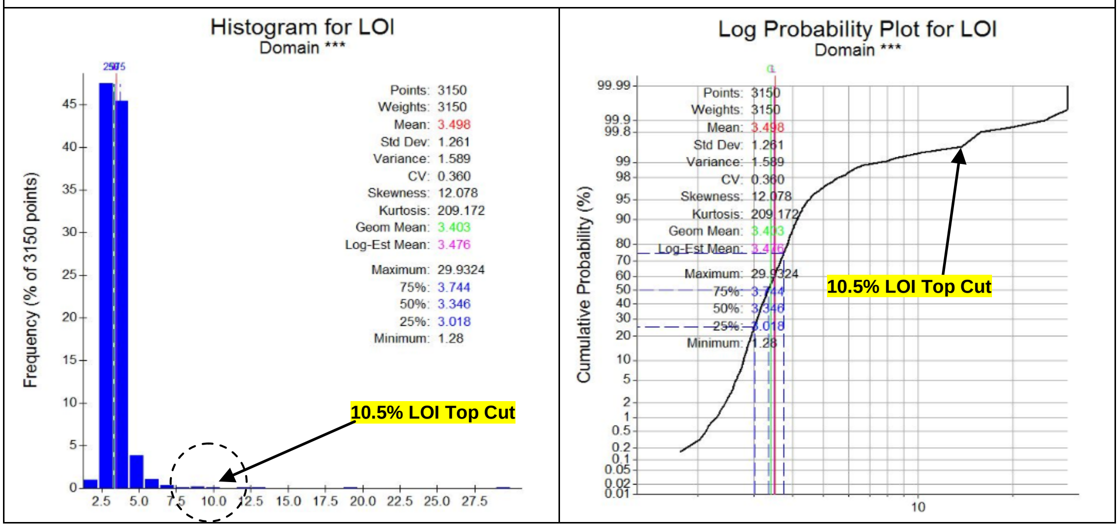


**Figure 14.4_6**
**Histogram and Log Probability Plot – MgO Composite Data (5m)**

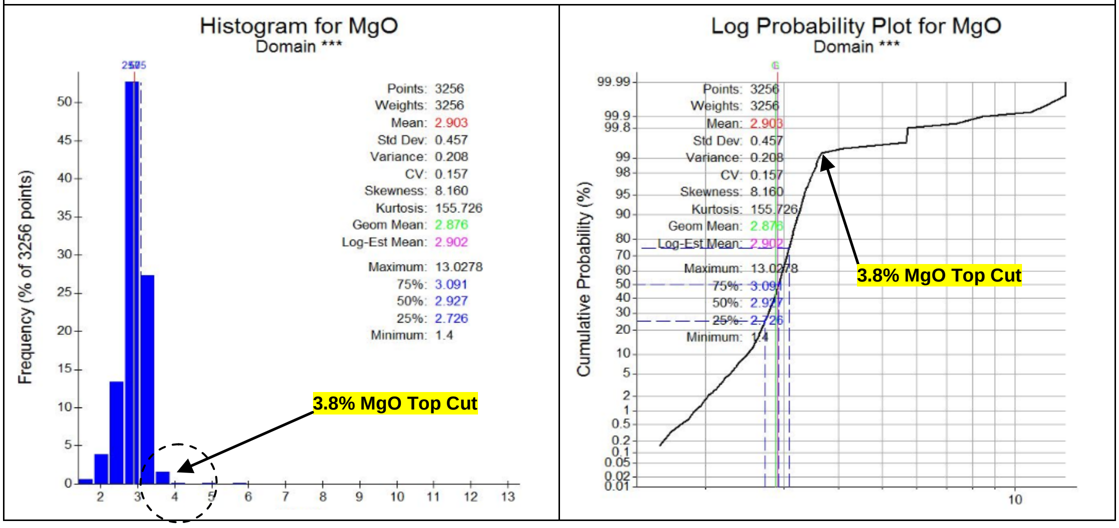



**Figure 14.4_7**
**Histogram and Log Probability Plot – MnO Composite Data (5m)**

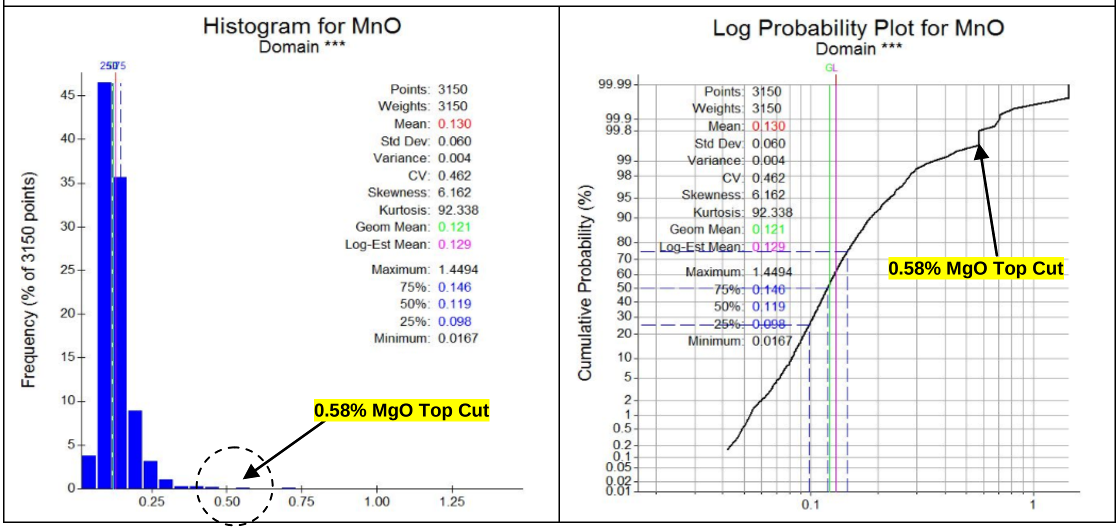



**Figure 14.4_8**
**Histogram and Log Probability Plot – $Na_2O$ Composite Data (5m)**

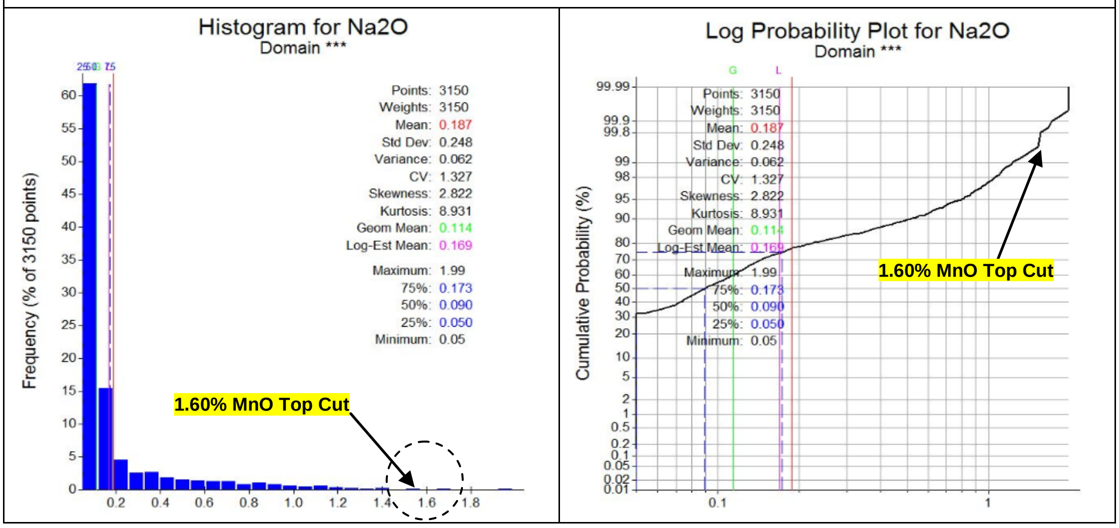


**Figure 14.4_9**
**Histogram and Log Probability Plot – $P_2O_5$ Composite Data (5m)**

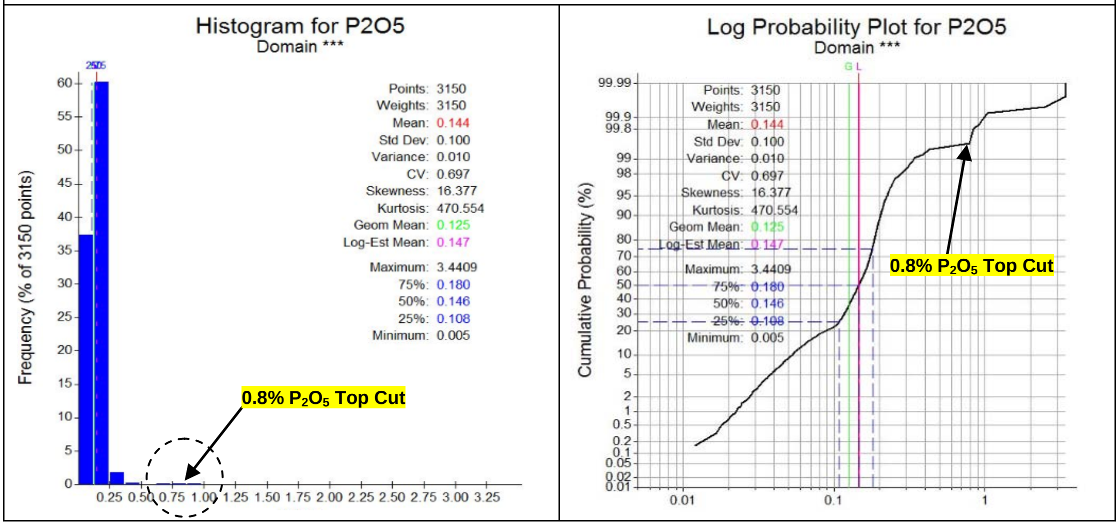



**Figure 14.4_10**
**Histogram and Log Probability Plot – $SiO_2$ Composite Data (5m)**

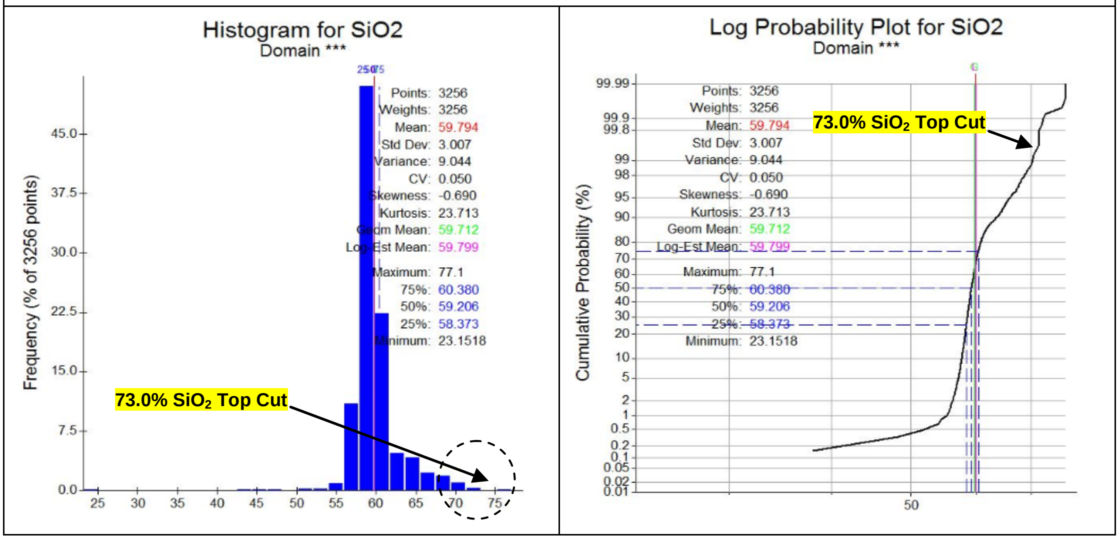
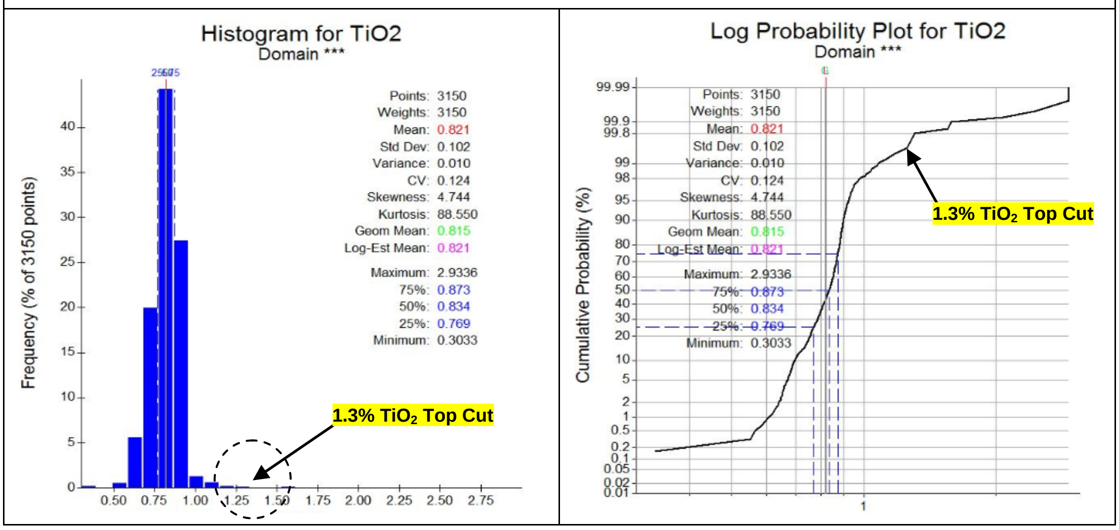



**Figure 14.4_11**
**Histogram and Log Probability Plot – $TiO_2$ Composite Data (5m)**



## 14.5 Variography

The spatial continuity of composite grades for $K_2O$ as well as $Al_2O_3$, CaO, $Fe_2O_3$, LOI, MgO, MnO, $Na_2O$, $P_2O_5$, $SiO_2$ and $TiO_2$ were assessed by means of a variety of types of variograms.

Normal variograms were not stable. Therefore pairwise relative variograms were computed and modelled for the 5m composites. Variogram fans were analysed for $K_2O$ in order to identify potential anisotropies in the grade continuity within the modelled mineralised envelope. The variogram parameters determined for $K_2O$ were applied to all other elements.

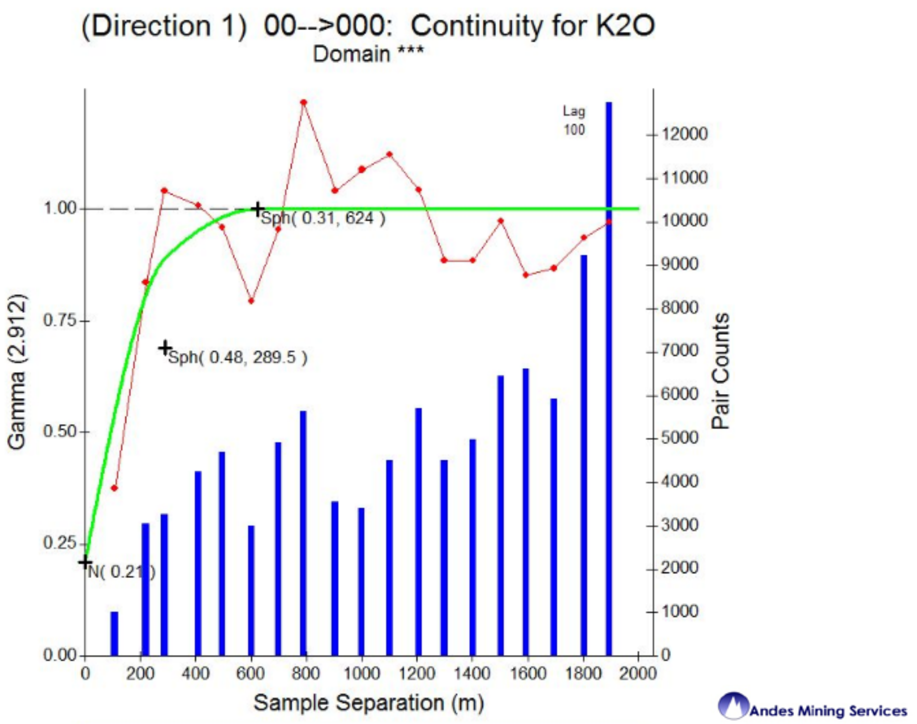
Table 14.5_1 below presents the variogram model of $K_2O$ and Figure 14.5_1 shows the pairwise relative variogram graph for $K_2O$.

**Table 14.5_1**

**Variogram Model of $K_2O$ Grade for 5m Composites**

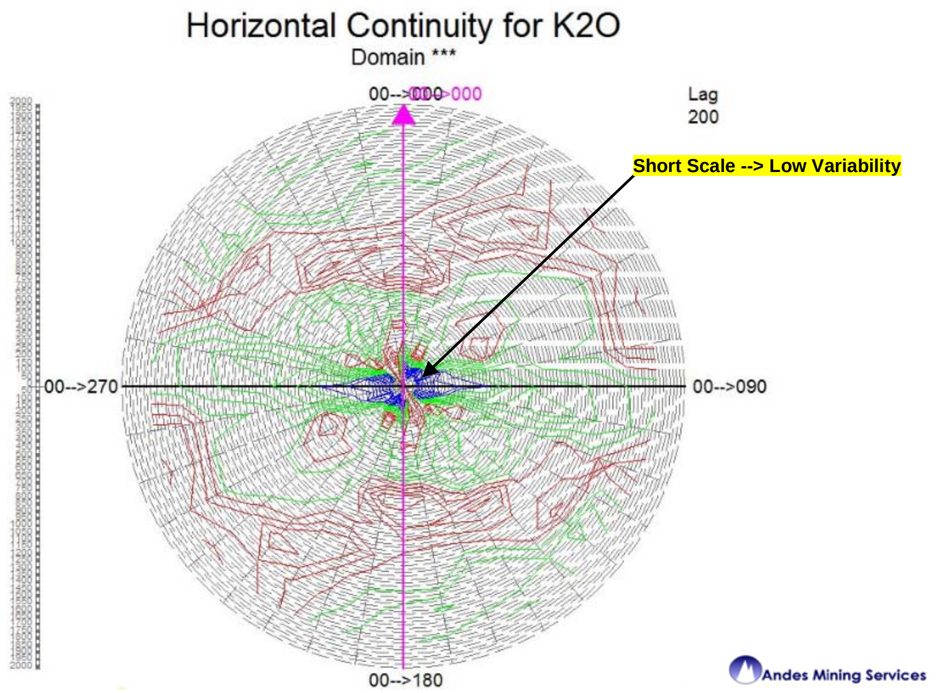
| Nugget Effect | First Spherical Variogram Component | | | | | | | Second Spherical Variogram Component | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sill (C) | Ranges (in metres) | | | Orientation (in degrees) | | | Sill (C) | Ranges (in metres) | | | Orientation (in degrees) | | |
| | | Max | Interm | Min | Azi | Dip | Spin | | Max | Interm | Min | Azi | Dip | Spin |
| Glauconitic meta-argillite Ore Domain (Target 7) | | | | | | | | | | | | | | |
| 0.21<br>21% | 0.48<br>48% | 290 | 290 | 72.5 | 0 | 0 | 0 | 0.31<br>31% | 620 | 620 | 155 | 0 | 0 | 0 |

**Figure 14.5_1**
**Pairwise Relative Variogram Graph for $K_2O$**




Generally, the variography is suggesting some anisotropy at relatively short distances (less than 300m) but is isotropic at longer distances (upwards to 600 - 650m) (Figure 14.5_2). The best continuity in the analytical data, was observed on a horizontal plane (azimuth 0° and dip at 0°) while the direction of least continuity was perpendicular to the plane of best continuity (azimuth 90° and dipping towards 90°). The nugget effect is low (21%) which is normal for deposits of this style and nature.

**Figure 14.5_2**
**Horizontal Continuity Plot for $K_2O$**




## 14.6 Block Model Development

A three-dimensional block model was defined for the Cerrado Verde Project, covering the interpreted $K_2O$ mineralized domain. A parent block size of 50mE x 50mN x 5mRL has been used with variable sub-blocking utilized in order to capture the relatively thin nature of the interpreted sub-horizontal mineralized glauconitic meta-argillite. A sub-block size of 6.25mN x 6.25mE x 1.25mRL has been utilized. Estimation was only carried out into parent blocks, with sub-blocks assigned the parent cell grade estimates.

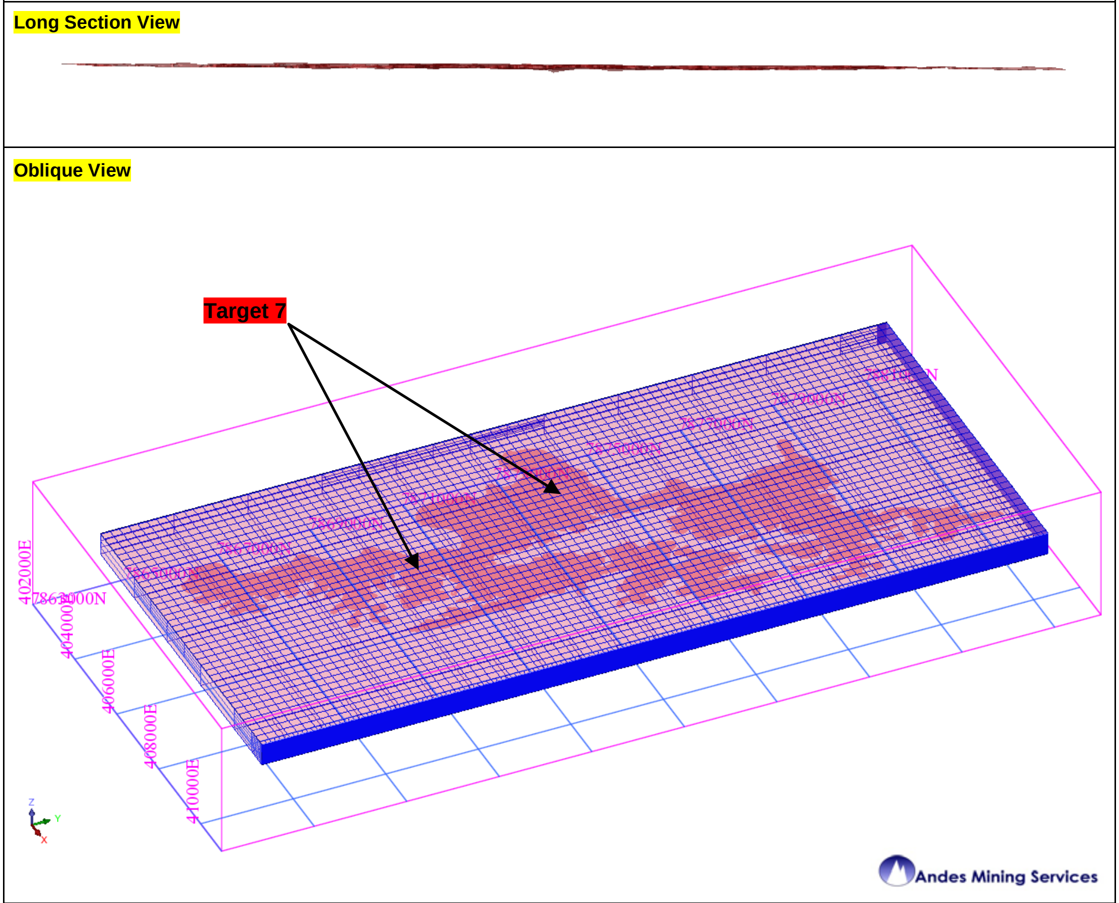
Table 14.6_1 below shows the summary of the 3D block model created for the Cerrado Verde $K_2O$ Project.

**Table 14.6_1**
**Block Model Summary – Cerrado Verde Project**

| | Y | X | Z |
|---|---|---|---|
| Minimum Coordinates | 7864000 | 403000 | 600 |
| Maximum Coordinates | 7881000 | 410700 | 1100 |
| User Block Size | 50 | 50 | 5 |
| Sub-Block Size | 6.25 | 6.25 | 1.25 |
| Rotation | 0 | 0 | 0 |
| No. Blocks | 340 | 154 | 100 |

A visual review of the wireframe solids and the block model indicates robust flagging of the block model (Figure 14.6_1).

**Figure 14.6_1**
**Block Model for the Cerrado Verde Project**




AMS have also completed basic volume checks upon the mineralized wireframe domain and the block model reported volume, with results presented below in Table 14.6_2.

**Table 14.6_2**
**Volume Check - Mineralized Wireframe vs Block Model Ore Domain**

| | Reported Volume (bcm) | | |
|---|---|---|---|
| | **Ore Wireframe** | **Block Model Domain** | **% Difference** |
| **Cerrado Verde Ore Zone** | 1,127,912,679 | 1,127,806,006 | 0.01 |

The attributes coded into the block models include all elements ($K_2O$, $Al_2O_3$, CaO, $Fe_2O_3$, LOI, MgO, MnO, $Na_2O$, $P_2O_5$, $SiO_2$ and $TiO_2$), density, topography, weathering, resource category, domain code, as well as a number of kriging attributes and sample variance data.

A full list of attributes coded to the model is listed below in Table 14.6_3.

**Table 14.6_3**
**Attributes Assigned to 3D Model – Cerrado Verde Project** ***(AMS, 27th December 2013)***

| Attribute Name | Type | Decimal | Background | Description |
|---|---|---|---|---|
| al2o3 | Real | 6 | 0 | Aluminium (Oxide) |
| avg_dist_k2o | Real | 1 | -99 | Average Distance to Find Samples |
| cao | Real | 6 | 0 | Calcium (Oxide) |
| density | Real | 6 | 0 | Density Value (Assigned) |
| domain | Character | - | waste | Ore Domain Assigned |
| fe2o3 | Real | 6 | 0 | Iron (Oxide) |
| k2o | Real | 6 | 0 | Potassium (Oxide) |
| loi | Real | 6 | 0 | Loss On Ignition (LOI) |
| mgo | Real | 6 | 0 | Magnesium (Oxide) |
| min_dist_k2o | Real | 1 | -99 | Minimum Distance to Find Samples |
| mno | Real | 6 | 0 | Manganese (Oxide) |
| na2o | Real | 6 | 0 | Sodium (Oxide) |
| num_samp_k2o | Integer | - | -99 | Number of Samples for Estimate |
| p2o5 | Real | 6 | 0 | Phosphorous (Oxide) |
| pass_no | Integer | - | 0 | Pass Number (1, 2 or 3) |
| pass_no_k2o | Integer | - | 0 | Pass Number for $K_2O$ Estimate |
| pod | Character | - | 999 | Pod Number |
| rescat | Character | - | none | Measured, Indicated, or Inferred |
| sio2 | Real | 6 | 0 | Silica (Oxide) |
| tenement_status | Character | - | outside | Either Inside or Outside |
| tio2 | Real | 6 | 0 | Titanium (Oxide) |
| topo | Integer | - | 0 | Assign 1 if Underneath Laser Topo |
| weathering | Character | - | none | Either Fresh or Weathered |

## 14.7 Grade Estimation

The grade interpolation for all elements for the Cerrado Verde mineral resource block model was estimated using Ordinary Kriging (OK). Anisotropic search ellipsoids were selected for the grade interpolation process based on the analysis of the spatial continuity of $K_2O$, $Al_2O_3$, CaO, $Fe_2O_3$, LOI, MgO, MnO, $Na_2O$, $P_2O_5$, $SiO_2$ and $TiO_2$ grades using variography and on the general geometry of the modelled mineralized saprolite envelope. Limits are set for the minimum and maximum number of composites used per interpolation pass, and restriction are applied on the maximum number of composites used from each hole.

The interpolation process was conducted using 3 successive passes with relaxed search conditions from one pass to the next until all blocks were interpolated. The orientation of the search ellipsoids, which is identical for each interpolation pass, is 0° azimuth, 0° dip and 0° plunge consistent with a relatively uniform, sub-horizontal (flat lying) mineralized domain (Table 14.7_1).

In the first pass, the search ellipsoid distance was 200m (long axis) by 200m (intermediate axis) by 20 m (short axis). Search conditions were defined with a minimum of 8 composites and a maximum of 16 composites with a maximum of 2 composites selected from each hole. For the second pass, the search distance was increased to 400m (long axis) by 400m (intermediate axis) by 20m (short axis) and composites selection criteria were kept the same as the first pass, however with a lowering of the minimum number of samples required to make an estimate set at 6. Finally, the search distance of the third pass was increased to 1500m (long axis) by 1500m (intermediate axis) by 60m (short axis) and again the same composites selection criteria were applied with a lowering of the minimum number of samples to 4.

All blocks within the Cerrado Verde mineralized domain were estimated as part of the three pass estimate.

Table 14.7_1 outlines the search direction and parameters used for the 3 pass interpolation, while Table 14.7_2 highlights the percentage of blocks estimated within each of the estimation passes completed.

**Table 14.7_1**
**Summary of Search Direction and Parameters for 3 Pass Interpolation**

| Zone | Search Directions | | | |
|---|---|---|---|---|
| | Strike (degrees) | | | Dip / Dip Direction (degrees) |
| **$K_2O$ Ore Domain** | **000** | | | **0 / 000** |
| | **1st Pass** | **2nd Pass** | **3rd Pass** | **Descritization** |
| **X** | 200m | 400m | 1500m | 4 |
| **Y** | 200m | 400m | 1500m | 4 |
| **Z** | 20m | 20m | 60m | 2 |
| **MIN SAMPLE** | 8 | 6 | 4 | - |
| **MAX SAMPLE** | 16 | 16 | 16 | - |

**Table 14.7_2**
**Percentage of Blocks Estimated for 3 Pass Interpolation**

| Pass # | Percentage of Blocks Estimated |
|---|---|
| **1st Pass** | 19.9% |
| **2nd Pass** | 74.5% |
| **3rd Pass** | 5.6% |

The search ellipse was configured to match the main mineralization direction, which is sub-horizontal given the geological understanding at the time of this mineralization. Figure 14.7_1 shows the interpolation results visually for the three respective passes across the Cerrado Verde project area.

**Figure 14.7_1**
**Cerrado Verde Block Model – Coded by Pass Number with Drill Holes** ***(AMS, 27th December 2013)***

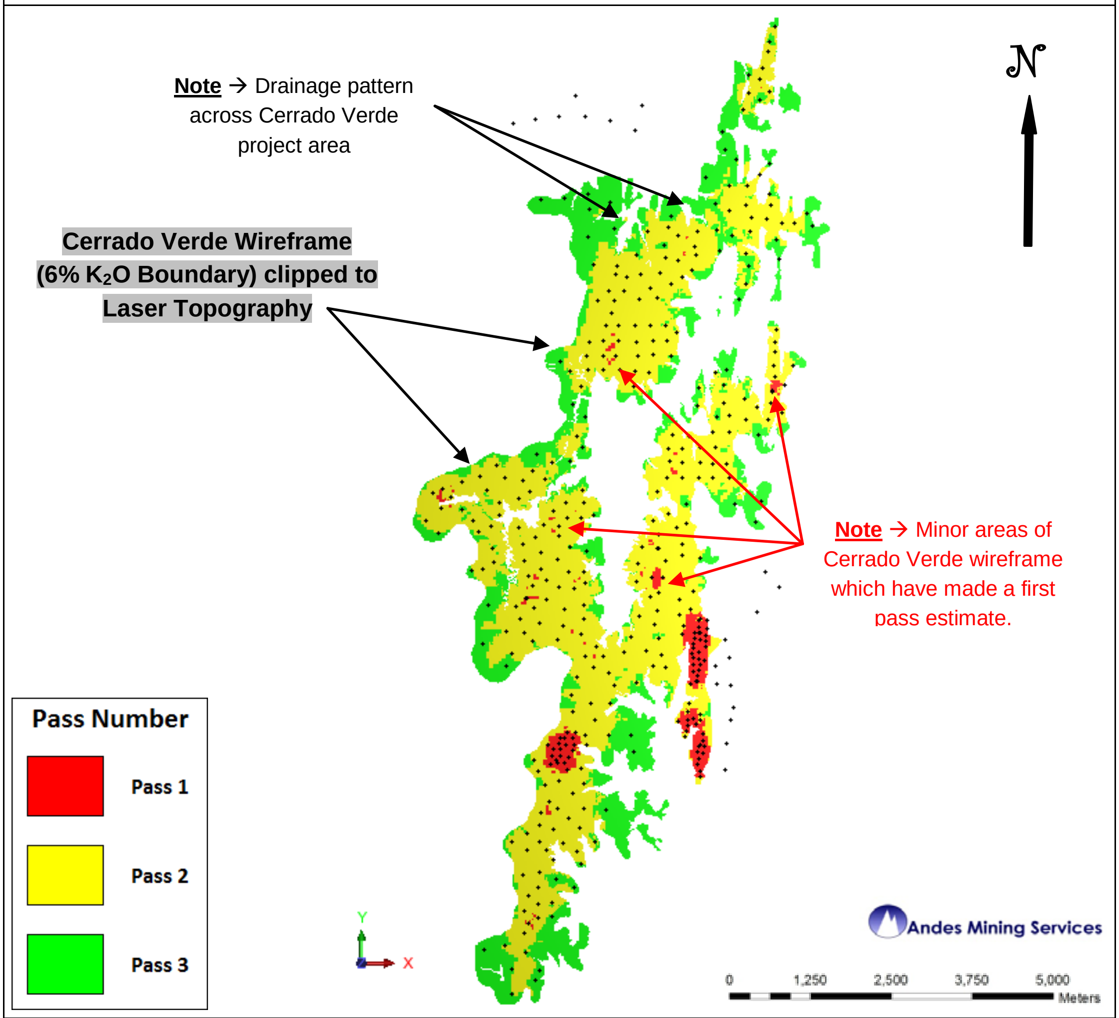
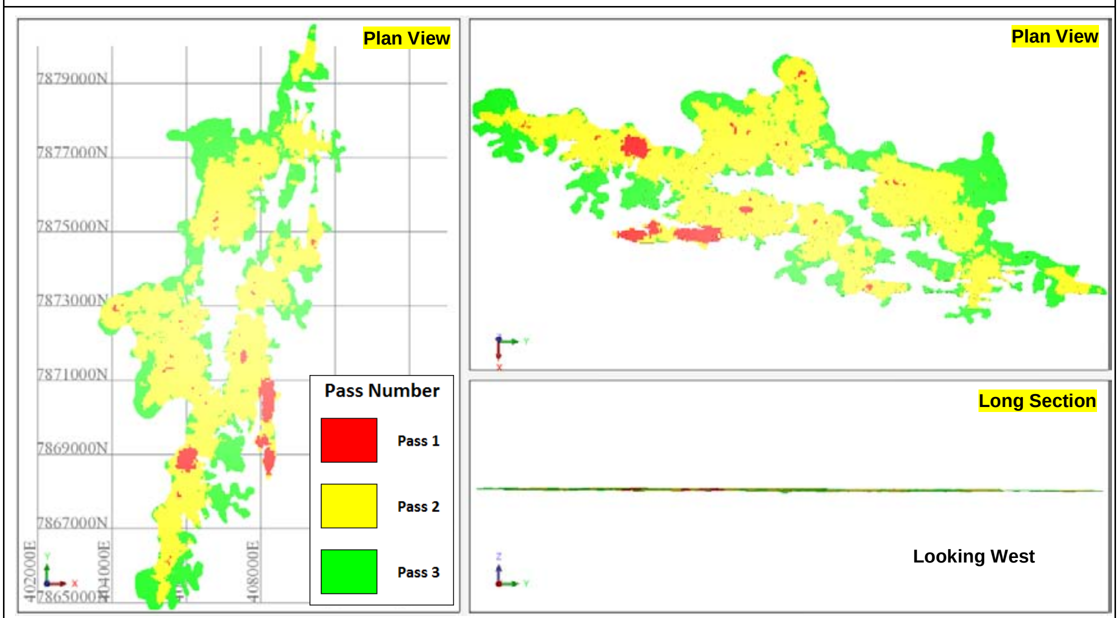



**Figure 14.7_2**
**Cerado Verde Block Model Composite – Coded by Pass Number** ***(AMS, 27th December 2013)***



Figures 14.7_3 and 14.7_4 below illustrates grade variations across the block model (mineralized domain) for $K_2O$.

**Figure 14.7_3**
**Cerrado Verde Block Model – Coded by $K_2O$ Grades (Estimate)** ***(AMS, 27th December 2013)***

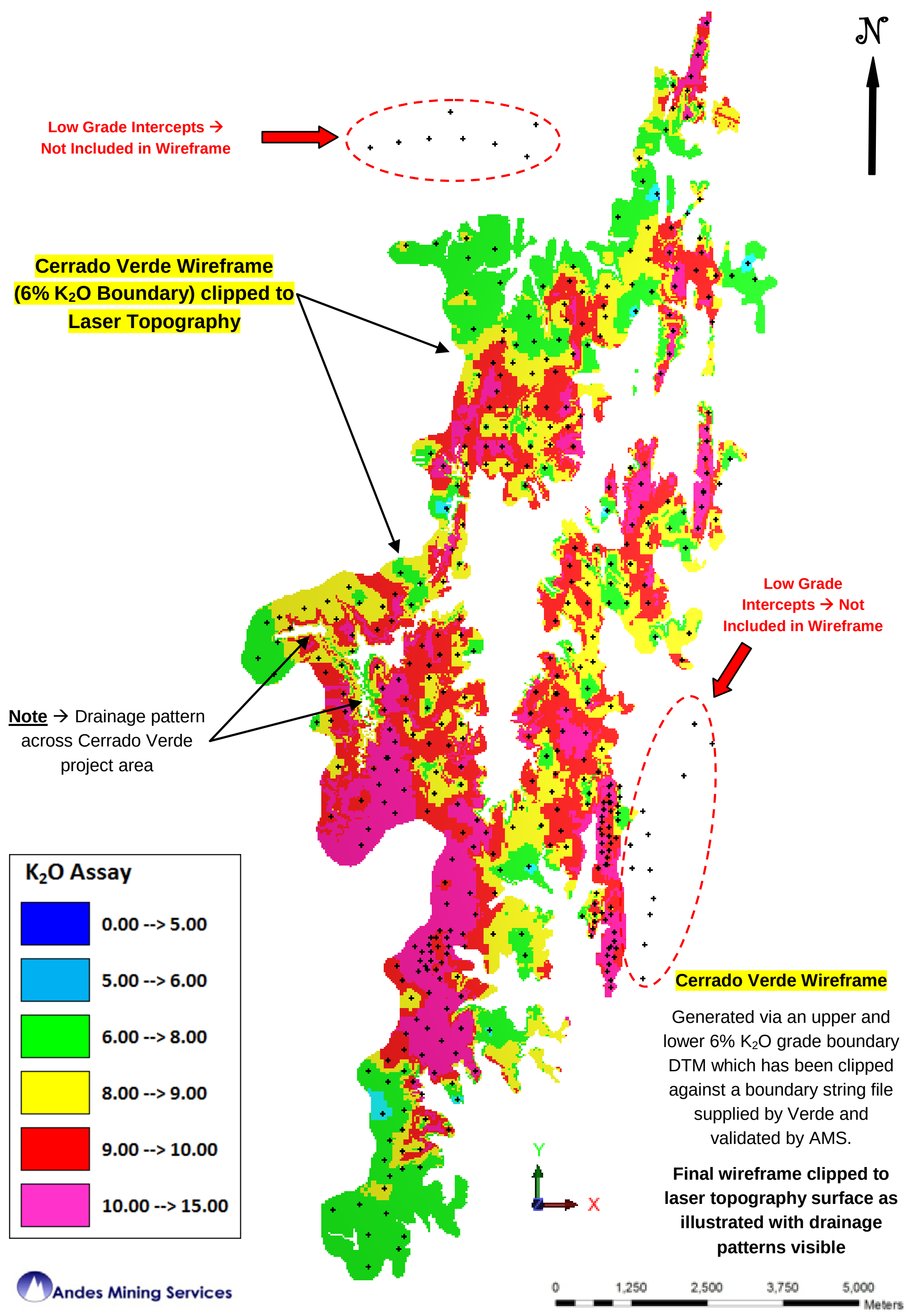
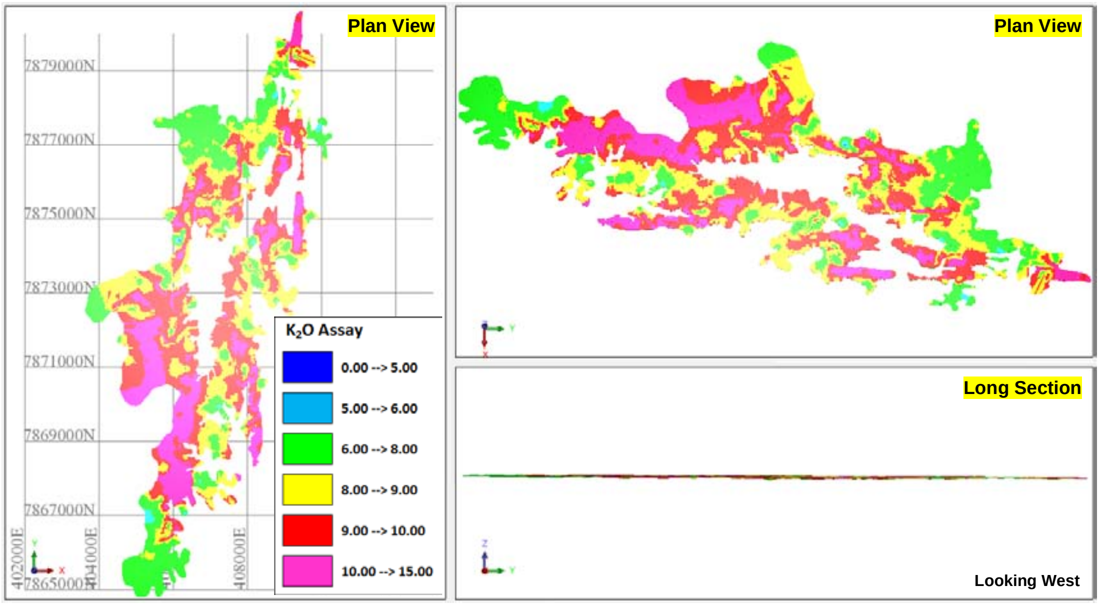


**Figure 14.7_4**
**Cerrado Verde Block Model Composite – Coded by $K_2O$ Grades (Estimate)** ***(AMS, 27th December 2013)***




## 14.8 Model Validation

A validation of the mineral resource $K_2O$ grade as well as all other elements ($Al_2O_3$, CaO, $Fe_2O_3$, LOI, MgO, MnO, $Na_2O$, $P_2O_5$, $SiO_2$ and $TiO_2$) was conducted as part of the verification process. The validation includes: 1) a visual comparison of the colour-coded block values versus the composites data in the vicinity of the interpolated blocks, and; 2) a comparison of the grade average parameters for the composite data and the block model data.

Table 14.8_1 summarises the comparative statistics of the composite and block model datasets without any cut-off grades.

**Table 14.8_1**
**Comparative Statistics of the Composite and Block Model Datasets**

| Dataset | Count | Average Grade (%) - Composites vs Block Model Comparison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $Al_2O_3$ | CaO | $Fe_2O_3$ | $K_2O$ | LOI | MgO | MnO | $Na_2O$ | $P_2O_5$ | $SiO_2$ | $TiO_2$ |
| **Composites** | 3387* | 15.56 | 0.50 | 6.86 | **9.27** | 3.50 | 2.90 | 0.13 | 0.19 | 0.14 | 59.79 | 0.82 |
| **Block Model** | 2958191 | 15.52 | 0.54 | 6.80 | **8.95** | 3.51 | 2.86 | 0.13 | 0.21 | 0.15 | 60.06 | 0.81 |

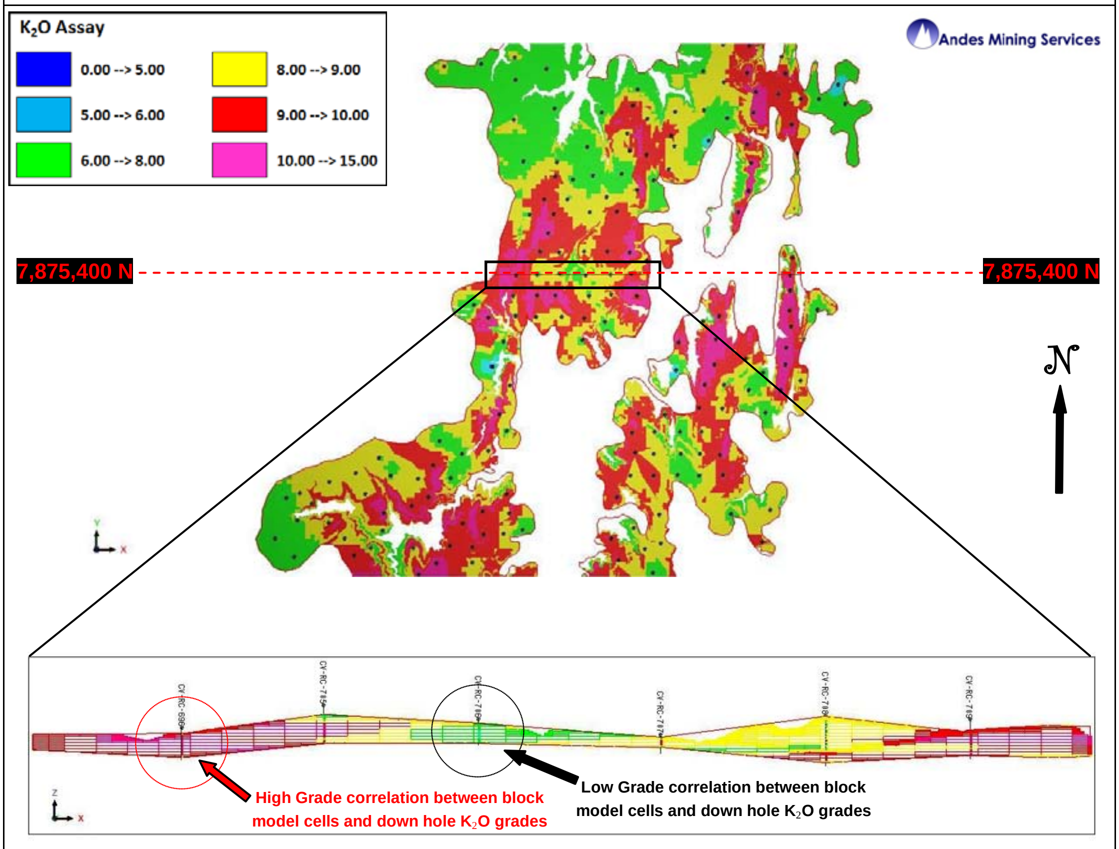
* Various number of composites available for each element. See Table 14.4_1 for details.

The variation in grade from the average composite value of 9.27% $K_2O$ to the block model grade of 8.95% $K_2O$, is reflected in the tendency for drilling to be more tightly spaced across the highest grade portions of the mineral resource. The effect of this is to give an overall average composite grade that is biased higher due to the uneven spread of assay data. A slightly lower block model grade is to be expected, given that a tightly controlled search ellipse acts to limit the spread of higher grade samples concentrated in a number of small areas and the OK interpolation process in effect declusters the data.

In order to check that the estimation has worked correctly, the model has been validated through a visual comparison of down hole drilling grades (assays) and estimated blocks in close proximity to those drill holes.  A total of 20 east-west vertical sections have been generated and used to validate the block model.

An example of the visual validation is shown below with a cross section of the block model (7,875,400 N) compared against the drill hole results.  There is an excellent correlation in block grades with down hole drilling assays for $K_2O$, with grade spreading both laterally and vertically found to be consistent with the input parameters for the block modelling.

**Figure 14.8_1**
**Block Model Validation against Drilling – Section at 7,875,400 N *(AMS, 27th December 2013)***




## 14.9 Mineral Resource Classification

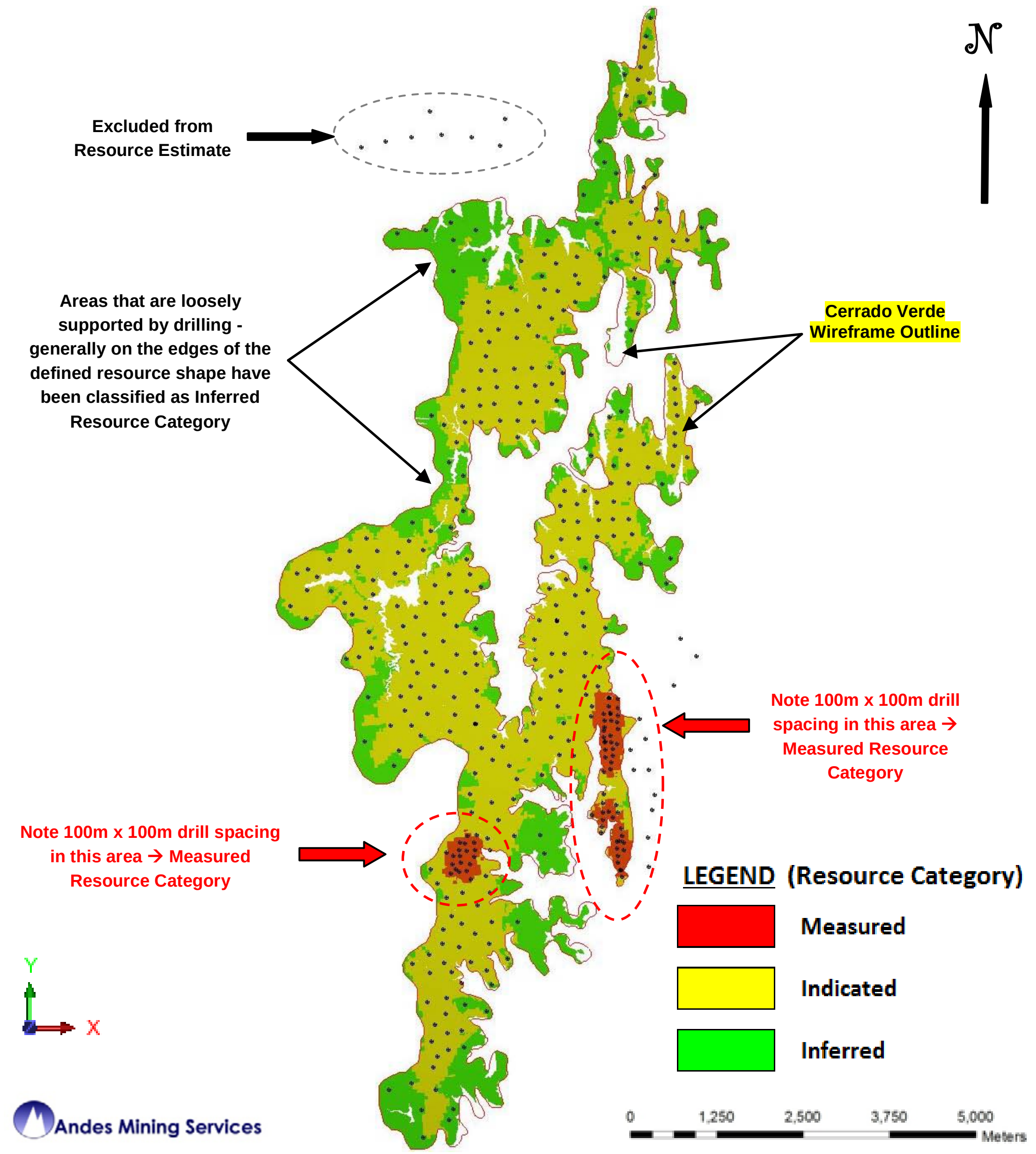
The mineral resources at the Cerrado Verde Project have been classified as Measured, Indicated and Inferred.  The parameters used to determine the mineral resource classification include, but are not limited to; drilling density, estimation pass number, number of samples used to make a block estimate as well as the average distance to find samples to make a block estimate.

Table 14.9_1 below highlights some of the specific factors considered in the classification of the Cerrado Verde Project resource.

Figures 14.9_1 and 14.9_2 show the resource classification across the Cerrado Verde Project area.

| Table 14.9_1<br>Resource Classification Considerations - Cerrado Verde Project | | |
|---|---|---|
| | **Considerations** | **% Estimated** |
| **Measured** | Block MUST estimate in 1st Pass and have minimum 8 composites to be considered applicable. In addition, drill density in immediate vicinity of applicable blocks must be in order of 100m x 100m spacing in order for blocks to classify as "**MEASURED**" | 4.29 |
| **Indicated** | Block must estimate within either the 1st or 2nd Pass to be considered "**INDICATED**". Blocks already classified as MEASURED resources were excluded. | 75.82 |
| **Inferred** | Any block that made an estimate in the three passes, but has not already been assigned Measured or Indicated Status has been assigned "**INFERRED**" | 19.89 |
| **Unclassified** | Any block that **did not** make an estimate in the 3 Passes has been assigned "**UNCLASSIFED**" | 0.00 |

**Figure 14.9_1**
**Cerrado Verde Block Model – Resource Classification *(AMS, 27th December 2013)***



The lateral extent of both Measured and Indicated resources for the Cerrado Verde project are highlighted below in Figures 14.9_2 and 14.9_3. With both the Indicated and Inferred resource category removed, Figure 14.9_3 shows the true extent of Measured resource categories and highlights the close spaced 100m x 100m drilling pattern in these areas.

**Figure 14.9_2**
**Measured, Indicated and Inferred Resource Classification - Cerrado Verde *(AMS, 27th December 2013)***

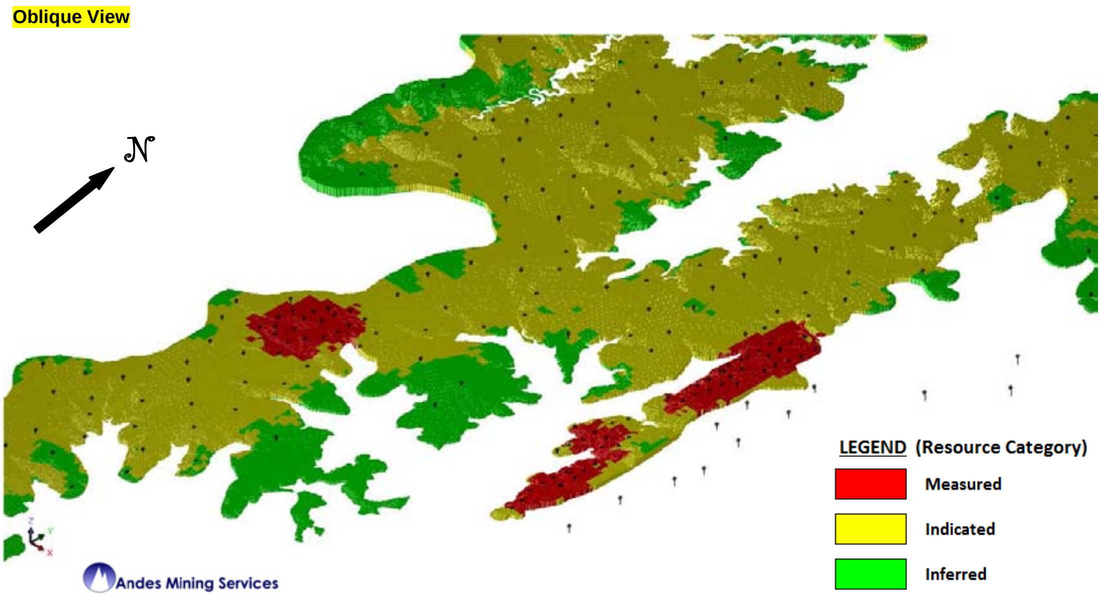
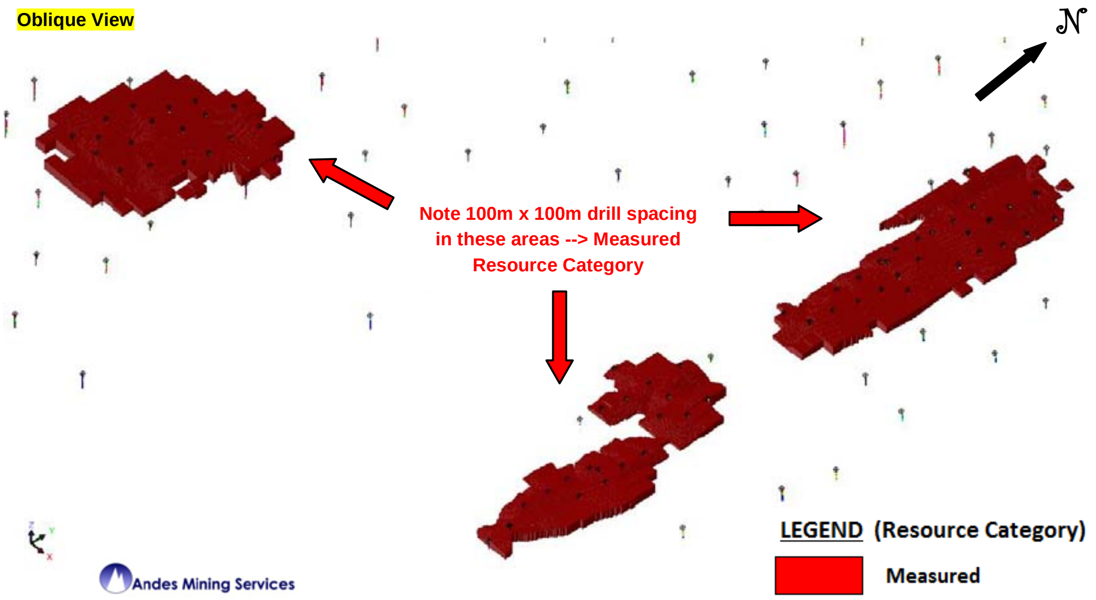



**Figure 14.9_3**
**Cerrado Verde Block Model – Measured Resource Classification *(AMS, 27th December 2013)***




## 14.10 Mineral Resource Reporting

The grade estimates for the Cerrado Verde Project has been classified as a Measured, Indicated and Inferred mineral resource in accordance with NI 43-101 guidelines based on the confidence levels of the key criteria that were considered during the mineral resource estimation. Key criteria are tabulated below in Table 14.10_1.

**Table 14.10_1**
**Cerrado Verde Project**
**Confidence Levels of Key Categorisation Criteria**

| Items | Discussion | Confidence |
|---|---|---|
| Drilling Techniques | Diamond drilling is industry standard with good recoveries exhibited throughout. | High |
| Logging | Standard nomenclature used. Minor overlaps noted within database. | High |
| Drill Sample Recovery | Excellent recoveries recorded for new drilling. Moderate recovery levels noted for RC drilling programs completed in 2009. | High |
| Sub-sampling Techniques & Sample Preparation | DC sampling completed on 2m intervals or to geological boundaries where they exist. Majority of RC sampling completed on 2m sample intervals, however early programs (2009 and portions of 2011) completed on both 1m and 3m sample intervals. Sample preparation has been completed to industry standards. | High |
| Quality of Assay Data | Excellent for standards, blanks and duplicates (2012 Program). Umpire assay test work is excellent with no bias observed between laboratories. | Moderate / High |
| Verification of Sampling and Assaying | Duplicate sample data shows excellent correlation (coarse reject duplicates). DDH twin hole drilling with pre-existing RC holes shows excellent correlation for grade with no grade bias observed. | High |
| Location of Sampling Points | A detailed laser topography survey has been completed by Verde with excellent accuracy. Drill hole collar locations have been surveyed (DGPS pick-up). | High |
| Data Density and Distribution | Drill spacing of approximately 200m by 200m. Within three areas of the resource, drill spacing has been reduced to 100m by 100m in an effort to increase the resource category confidence in these areas. | Moderate / High |
| Audits or Reviews | SRK completed a site visit and resource update for the Cerrado Verde project in February, 2012. No further reviews / audits have been completed since this time. | N/A |
| Database Integrity | Only DDH and RC holes are considered for the resource. Verde completed initial handheld XRF assay test work on samples. Samples which assayed >6% $K_2O$ via handheld were sent to laboratory for complete XRF analysis. AMS have included a small number of drill holes in the resource which are ONLY supported by handheld XRF results. This was necessary in order to give a representative estimate for the entire mineralized domain (glauconitic meta-argillite). | Moderate / High |
| Geological Interpretation | Entirely within saprolite and fresh rock. Strong geological understanding with much of the mineralized domain outcropping at surface. Orebody is visual (green appearance on satellite photos). | High |
| Estimation and Modelling Techniques | Ordinary Kriging (OK) utilized which is appropriate given the distributions observed in the data. | High |
| Cut-Off Grades | A 7.5% $K_2O$ cut-off grade has been applied to the final reported resource numbers. This is consistent with the 7.5% cut-off grade used by SRK consulting for the February 2012 resource estimate which formed part of a Preliminary Economic Assessment (PEA). Recent metallurgical test work has proven this cut-off grade to be economic. | High |
| Mining Factors or Assumptions | 50mE by 50mN by 5mRL SMU. | High |

A detailed summary (various cut-off grades) of the estimated Measured, Indicated and Inferred mineral resources for the Cerrado Verde Project is provided below in Table 14.10_2, with a more detailed summary table provided in Table 14.10_3.

The statement has been classified by Qualified Person Bradley Ackroyd (MAIG) in accordance with the guidelines of NI 43-101. It has an effective date of 19th of December, 2012. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

| Table 14.10_2<br>Verde Potash - Cerrado Verde Potash Project<br>Measured, Indicated and Inferred Mineral Resource Grade Tonnage Report - 19th December 2012<br>(Block Model – 50mE X 50mN X 5mRL) – Ordinary Kriging (OK) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cut-Off (% $K_2O$) | Tonnes (Mt) | $K_2O$ | $P_2O_5$ | CaO | $Al_2O_3$ | $Fe_2O_3$ | $SiO_2$ | MgO | $TiO_2$ | MnO | $Na_2O$ | LOI |
| Measured Resource Category | | | | | | | | | | | | |
| 0.0 | 85.52 | 10.04 | 0.13 | 0.34 | 15.72 | 6.98 | 58.95 | 2.90 | 0.83 | 0.13 | 0.10 | 3.33 |
| 6.0 | 85.52 | 10.04 | 0.13 | 0.34 | 15.72 | 6.98 | 58.95 | 2.90 | 0.83 | 0.13 | 0.10 | 3.33 |
| 6.5 | 85.42 | 10.05 | 0.13 | 0.34 | 15.72 | 6.98 | 58.95 | 2.90 | 0.83 | 0.13 | 0.10 | 3.33 |
| 7.0 | 84.71 | 10.07 | 0.13 | 0.34 | 15.73 | 6.98 | 58.94 | 2.90 | 0.83 | 0.13 | 0.10 | 3.33 |
| 7.5 | 83.00 | 10.13 | 0.13 | 0.33 | 15.73 | 6.99 | 58.93 | 2.90 | 0.83 | 0.13 | 0.10 | 3.31 |
| 8.0 | 80.15 | 10.21 | 0.13 | 0.33 | 15.73 | 6.99 | 58.89 | 2.90 | 0.83 | 0.13 | 0.10 | 3.30 |
| 8.5 | 76.53 | 10.31 | 0.13 | 0.31 | 15.73 | 6.99 | 58.87 | 2.90 | 0.83 | 0.13 | 0.09 | 3.27 |
| 9.0 | 71.96 | 10.41 | 0.13 | 0.30 | 15.71 | 6.98 | 58.84 | 2.90 | 0.83 | 0.13 | 0.09 | 3.24 |
| 9.5 | 64.66 | 10.53 | 0.13 | 0.28 | 15.69 | 6.98 | 58.81 | 2.90 | 0.83 | 0.13 | 0.09 | 3.21 |
| 10.0 | 52.78 | 10.70 | 0.13 | 0.27 | 15.68 | 6.96 | 58.75 | 2.89 | 0.83 | 0.13 | 0.09 | 3.15 |
| 11.0 | 14.20 | 11.17 | 0.14 | 0.24 | 15.65 | 6.94 | 58.57 | 2.88 | 0.82 | 0.14 | 0.09 | 3.01 |
| Indicated Resource Category | | | | | | | | | | | | |
| 0.0 | 1,512.31 | 9.02 | 0.15 | 0.53 | 15.55 | 6.82 | 59.99 | 2.89 | 0.81 | 0.13 | 0.20 | 3.50 |
| 6.0 | 1,504.99 | 9.04 | 0.15 | 0.52 | 15.56 | 6.82 | 59.98 | 2.89 | 0.81 | 0.13 | 0.19 | 3.50 |
| 6.5 | 1,489.35 | 9.07 | 0.15 | 0.52 | 15.57 | 6.83 | 59.96 | 2.89 | 0.81 | 0.13 | 0.19 | 3.50 |
| 7.0 | 1,447.26 | 9.13 | 0.15 | 0.51 | 15.59 | 6.84 | 59.90 | 2.90 | 0.81 | 0.13 | 0.18 | 3.49 |
| 7.5 | 1,365.62 | 9.24 | 0.14 | 0.49 | 15.61 | 6.85 | 59.83 | 2.90 | 0.81 | 0.13 | 0.17 | 3.47 |
| 8.0 | 1,220.39 | 9.42 | 0.14 | 0.46 | 15.62 | 6.87 | 59.74 | 2.90 | 0.81 | 0.13 | 0.15 | 3.43 |
| 8.5 | 1,021.75 | 9.65 | 0.14 | 0.42 | 15.64 | 6.88 | 59.61 | 2.90 | 0.81 | 0.13 | 0.14 | 3.39 |
| 9.0 | 794.02 | 9.90 | 0.14 | 0.39 | 15.67 | 6.90 | 59.41 | 2.90 | 0.81 | 0.13 | 0.12 | 3.34 |
| 9.5 | 562.71 | 10.17 | 0.14 | 0.36 | 15.71 | 6.92 | 59.16 | 2.91 | 0.82 | 0.13 | 0.11 | 3.29 |
| 10.0 | 333.18 | 10.46 | 0.14 | 0.35 | 15.77 | 6.94 | 58.89 | 2.90 | 0.81 | 0.13 | 0.10 | 3.24 |
| 11.0 | 25.10 | 11.21 | 0.13 | 0.37 | 16.24 | 6.93 | 57.80 | 2.90 | 0.74 | 0.13 | 0.08 | 3.15 |
| Measured and Indicated Mineral Resource (7.5% Cut-Off $K_2O$) * | | | | | | | | | | | | |
| **7.5** | **1,448.62** | **9.30** | **0.14** | **0.48** | **15.61** | **6.86** | **59.78** | **2.90** | **0.81** | **0.13** | **0.16** | **3.46** |
| Inferred Resource Category | | | | | | | | | | | | |
| 0.0 | 396.75 | 8.45 | 0.15 | 0.66 | 15.35 | 6.70 | 60.54 | 2.83 | 0.81 | 0.13 | 0.29 | 3.59 |
| 6.0 | 393.41 | 8.47 | 0.15 | 0.66 | 15.35 | 6.70 | 60.52 | 2.83 | 0.81 | 0.13 | 0.29 | 3.59 |
| 6.5 | 386.48 | 8.51 | 0.15 | 0.66 | 15.36 | 6.71 | 60.48 | 2.83 | 0.81 | 0.13 | 0.28 | 3.59 |
| 7.0 | 357.30 | 8.65 | 0.15 | 0.64 | 15.44 | 6.74 | 60.28 | 2.84 | 0.81 | 0.13 | 0.26 | 3.58 |
| 7.5 | 305.38 | 8.89 | 0.14 | 0.59 | 15.61 | 6.84 | 59.86 | 2.87 | 0.81 | 0.13 | 0.23 | 3.56 |
| 8.0 | 247.58 | 9.15 | 0.14 | 0.55 | 15.72 | 6.89 | 59.51 | 2.89 | 0.81 | 0.13 | 0.19 | 3.54 |
| 8.5 | 183.88 | 9.46 | 0.14 | 0.51 | 15.80 | 6.93 | 59.20 | 2.91 | 0.80 | 0.13 | 0.16 | 3.51 |
| 9.0 | 124.51 | 9.80 | 0.14 | 0.48 | 15.91 | 6.96 | 58.83 | 2.92 | 0.80 | 0.14 | 0.14 | 3.47 |
| 9.5 | 75.02 | 10.17 | 0.13 | 0.41 | 15.99 | 6.96 | 58.63 | 2.90 | 0.79 | 0.13 | 0.11 | 3.37 |
| 10.0 | 40.89 | 10.54 | 0.13 | 0.41 | 16.13 | 6.95 | 58.23 | 2.89 | 0.76 | 0.14 | 0.09 | 3.31 |
| 11.0 | 4.84 | 11.27 | 0.13 | 0.41 | 16.46 | 6.95 | 57.25 | 2.94 | 0.71 | 0.14 | 0.08 | 3.15 |
| Inferred Mineral Resource (7.5% Cut-Off $K_2O$) * | | | | | | | | | | | | |
| **7.5** | **305.38** | **8.89** | **0.14** | **0.59** | **15.61** | **6.84** | **59.86** | **2.87** | **0.81** | **0.13** | **0.23** | **3.56** |

*Mineral resources are not mineral reserves and do not have demonstrated economic viability.*
*Appropriate rounding has been applied to Table 14.10_2.*

| Table 14.10_3<br>Verde Potash - Cerrado Verde Potash Project (Summary Report) (AMS)<br>Measured, Indicated and Inferred Mineral Resource Grade Tonnage Report - 19th December 2012 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cut-Off (% $K_2O$)** | **Tonnes (Mt)** | **$K_2O$** | **$P_2O_5$** | **CaO** | **$Al_2O_3$** | **$Fe_2O_3$** | **$SiO_2$** | **MgO** | **$TiO_2$** | **MnO** | **$Na_2O$** | **LOI** |
| **Measured Resource Category** | | | | | | | | | | | | |
| 7.5 | 83.00 | 10.13 | 0.13 | 0.33 | 15.73 | 6.99 | 58.93 | 2.90 | 0.83 | 0.13 | 0.10 | 3.31 |
| **Indicated Resource Category** | | | | | | | | | | | | |
| 7.5 | 1,365.62 | 9.24 | 0.14 | 0.49 | 15.61 | 6.85 | 59.83 | 2.90 | 0.81 | 0.13 | 0.17 | 3.47 |
| **Measured and Indicated Mineral Resource (7.5% Cut-Off $K_2O$) *** | | | | | | | | | | | | |
| **7.5** | **1,448.62** | **9.30** | **0.14** | **0.48** | **15.61** | **6.86** | **59.78** | **2.90** | **0.81** | **0.13** | **0.16** | **3.46** |
| **Inferred Resource Category** | | | | | | | | | | | | |
| 7.5 | 305.38 | 8.89 | 0.14 | 0.59 | 15.61 | 6.84 | 59.86 | 2.87 | 0.81 | 0.13 | 0.23 | 3.56 |
| **Inferred Mineral Resource (7.5% Cut-Off $K_2O$) *** | | | | | | | | | | | | |
| **7.5** | **305.38** | **8.89** | **0.14** | **0.59** | **15.61** | **6.84** | **59.86** | **2.87** | **0.81** | **0.13** | **0.23** | **3.56** |

** Mineral resources are not mineral reserves and do not have demonstrated economic viability.*
*Appropriate rounding has been applied to Table 14.10_3.*

The mineral resource estimate has focused on a flat-lying, sub horizontal mineralized domain which has been defined at surface and drill tested to depth of mineralization using a nominal 6% $K_2O$ grade cut-off to guide the wireframing process.

An independent mineral resource has been estimated for the Cerrado Verde Project comprising a combined Measured and Indicated mineral resource of 1,448.62 Mt at 9.30% $K_2O$ (using a 7.5% $K_2O$ cut-off), and an Inferred mineral resource of 305.38 Mt at 8.89% $K_2O$ (using a 7.5% $K_2O$ cut-off grade).

Grade tonnage curves for the Measured, Indicated and Inferred portions of the Cerrado Verde Project are shown below in Figures 14.10_1 to 14.10_3 respectively.

**Figure 14.10_1**
**Grade Tonnage Curve – Measured Resource Category *(AMS, 27th December 2013)***

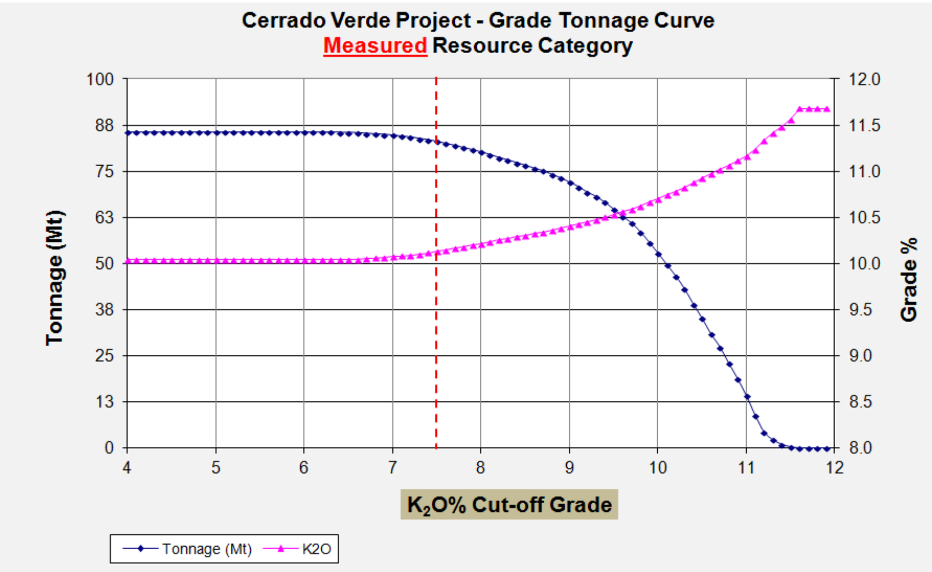


**Figure 14.10_2**
**Grade Tonnage Curve – Indicated Resource Category *(AMS, 27th December 2013)***

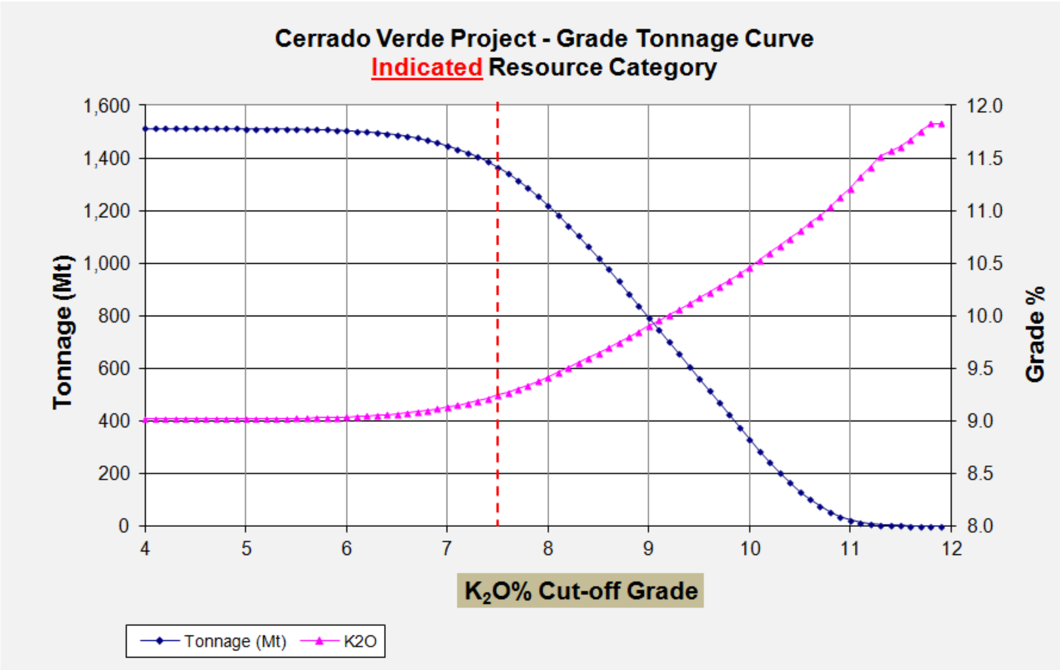
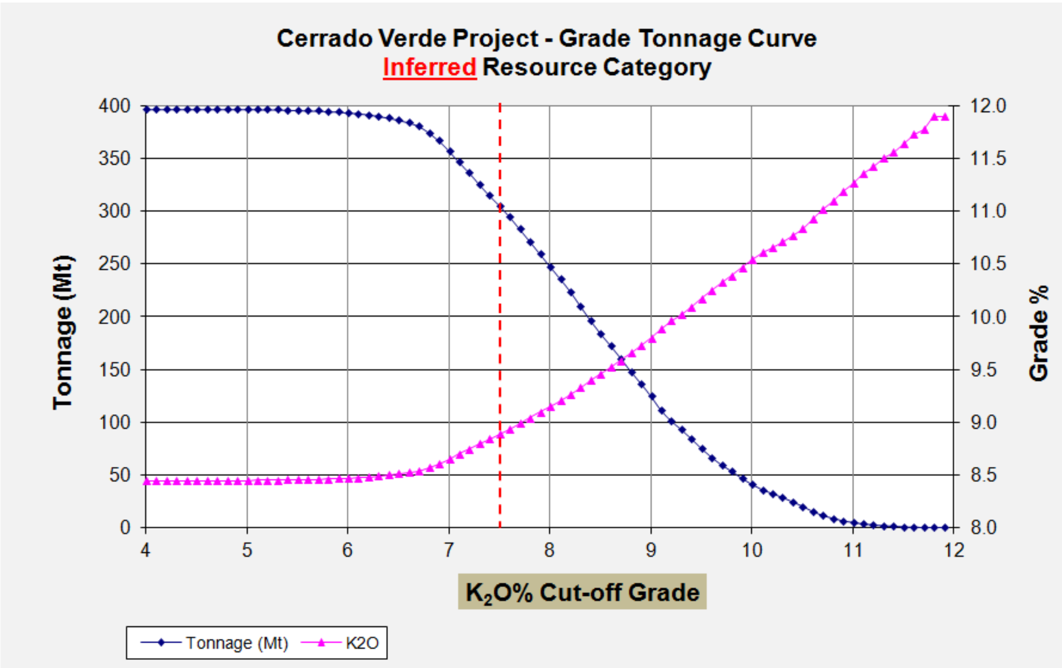



**Figure 14.10_3**
**Grade Tonnage Curve – Inferred Resource Category *(AMS, 27th December 2013)***




Additional grade tonnage curves for combined Measured and Indicated as well as the total combined resource are presented in Figures 14.10_4 and 14.10_5.

**Figure 14.10_4**
**Grade Tonnage Curve – Measured and Indicated Resource Category *(AMS, 27th December 2013)***

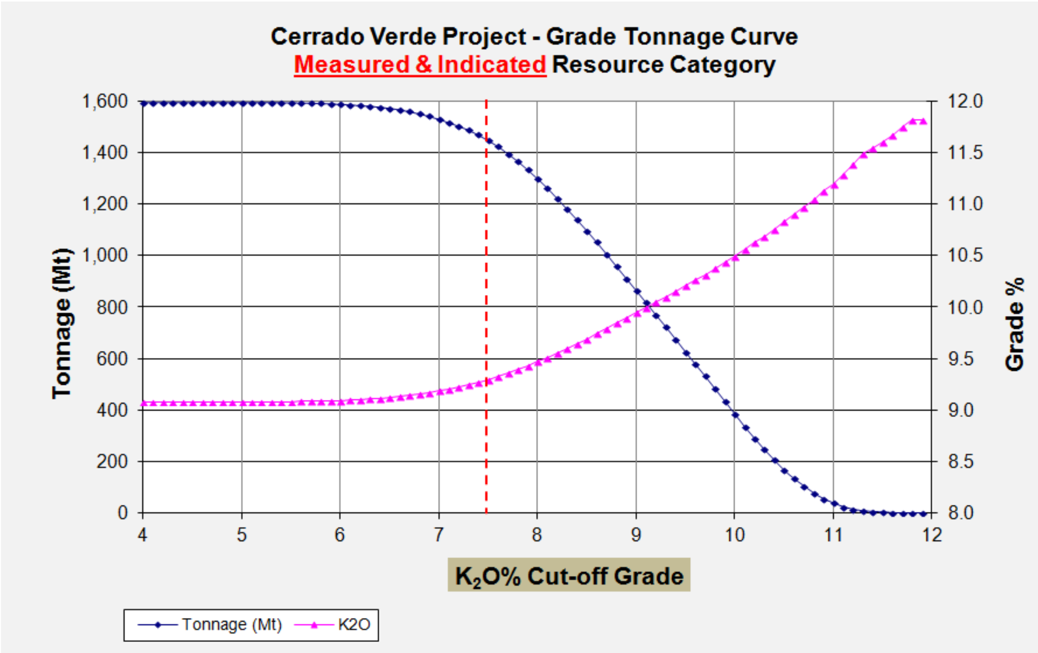
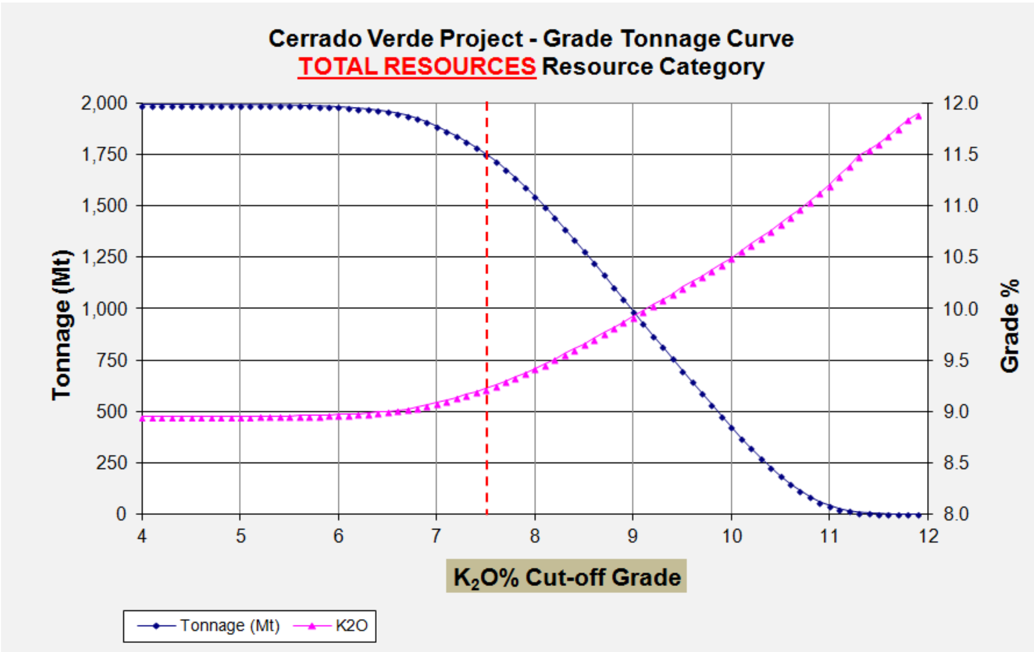



**Figure 14.10_5**
**Grade Tonnage Curve – Total Resource Category *(AMS, 27th December 2013)***




A combined mineral resource statement which incorporates previously reported resources completed by SRK Consulting has been prepared for the Cerrado Verde Project. A combined Measured and Indicated mineral resource of 1,472 Mt at 9.28% $K_2O$ (using a 7.5% $K_2O$ cut-off), and an Inferred mineral resource of 1,850 Mt at 8.60% $K_2O$ (using a 7.5% $K_2O$ cut-off grade) (Table 14.10_4) is reported for the Cerrado Verde Project.

**Table 14.10_4**
**Verde Potash - Cerrado Verde Potash Project**
**Measured, Indicated and Inferred Mineral Resource Grade Tonnage Report (AMS & SRK Consulting)**
**Ordinary Kriging (OK) & Inverse Distance Weighting With Power Two (IDW2)***
**(Block Model – 50mE X 50mN X 5mRL / 10mRL)***

| Target | Cut-Off (% $K_2O$) | Tonnes (Mt) | Average Grade (% $K_2O$) |
|---|---|---|---|
| **Measured Resource Category** | | | |
| Target 7 | 7.5 | 83.0 | 10.13 |
| **Total Measured** | | 83.0 | 10.13 |
| **Indicated Resource Category** | | | |
| Target 6 | 7.5 | 23.3 | 8.83 |
| Target 7 | 7.5 | 1,365.6 | 9.24 |
| **Total Indicated** | | 1,388.9 | 9.23 |
| **Total Measured & Indicated** | | **1,471.9** | **9.28** |
| Target 1 | 7.5 | 235.9 | 8.72 |
| Target 2 | 7.5 | 11.6 | 8.54 |
| Target 3 | 7.5 | 126.5 | 8.72 |
| Target 4 | 7.5 | 146.7 | 9.03 |
| Target 5 | 7.5 | 27.3 | 8.31 |
| Target 6 | 7.5 | 47.9 | 8.84 |
| Target 7 | 7.5 | 305.4 | 8.89 |
| Target 11 | 7.5 | 46.8 | 8.27 |
| Target 13 | 7.5 | 168.3 | 8.50 |
| Target 14 | 7.5 | 325.2 | 8.65 |
| Target 16 | 7.5 | 257.5 | 8.15 |
| Target 17 | 7.5 | 150.9 | 8.19 |
| **Total Inferred** | | **1,849.8** | **8.60** |

*Mineral resources are not mineral reserves and do not have demonstrated economic viability.*

** IDW2 Estimate (Block Model - 50mE x 50mN x 10mRL) --> Targets 1,2,3,4,5,6,11,13,14,16 and 17*

** OK Estimate (Block Model - 50mE x 50mN x 5mRL) --> Target 7*

*Effective Date of Targets 1,2,3,4,5,13,14,16 and 17 is December 21, 2011*

*Effective Date of Targets 6 and 11 is August 3, 2011*

*Effective Date of Target 7 is December 19, 2012*

*Appropriate rounding has been applied to Table 14.10_4*

AMS and Verde are not aware of any factors (environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors) that may materially affected the viability of the mineral resource estimate. The Cerrado Verde Project is a greenfield site and therefore is not affected by any mining, metallurgical or infrastructure factors.

# 15 ADJACENT PROPERTIES

To the best of our knowledge, there are no other potash properties in the immediate vicinity of the Cerrado Verde Project.

# 16 OTHER RELEVANT DATA AND INFORMATION

AMS is not aware of any other relevant data and or information pertaining to the Cerrado Verde Project area that has not been presented within the appropriate sections of this report.

# 17 INTERPRETATION AND CONCLUSIONS

The Verde deposit is a large, shallow, tabular potash deposit located in the western Alto Paranaiba region in Minas Gerais, Brazil.

In early 2012, SRK completed a preliminary economic assessment (PEA) with key recommendations suggesting further additional exploration drilling would be required in order to increase the resource category confidence across the project area. Infill drilling was recommended, in an effort to lift the current the Inferred and Indicated resource base to majority Indicated and Measured resource category classification.

Verde has undertaken a systematic exploration program over the past 12 months which has been successful in defining significant additional resources of $K_2O$ mineralization, as well as providing confidence in the existing resource base highlighted in early 2012.

AMS is of the opinion, that Verde has successfully confirmed the mineral resource potential of the Cerrado Verde Project based on the 2011 and 2012 exploration programs.

The mineral resources have been estimated and classified using logic consistent with the CIM definitions incorporated in NI 43-101. AMS suggest that the exploration data is sufficient to support both Measured and Indicated resource categories across the majority of the resource defined to-date.

The author considers the project to be sufficiently robust to warrant: 1) the undertaking of further metallurgical studies to better characterise processing parameters and the recovery of a saleable potash product, and 2) completing a DFS of the project for the start-up of an open pit mining operation.

The pertinent observations and interpretations which have been developed in producing this report are detailed in the sections above.

# 18 RECOMMENDATIONS

## 18.1 Resource and Development

Drilling and studies completed to date have defined a Measured, Indicated and Inferred mineral resource at the Cerrado Verde Potash Project. The most recent drilling data collected is considered to be of high quality and suitable for mineral resource classification to a Measured and Indicated status within a large portion of the mineralized domain termed Target 7 within the Cerrado Verde tenement package.

Further scope exists to improve the geological and mineral resource estimation confidence in the regions currently defined as an Inferred mineral resource (margins of the mineralized domain), however AMS would suggest this is not required given the significant tonnages already defined for Measured and Indicated resource categories.

Given the extensive resource base available; the majority of which lies within the Measured and Indicated category, an initial mine life of 30 years has been proposed for 3Mtpa production rates. This clearly demonstrates the encouraging long term potential for the project based upon previous scoping study concepts, cost projections and price assumptions as presented in the PEA prepared in early 2012.

AMS recommends that the Cerrado Verde Project be advanced to a Definitive Feasibility Study (DFS) level of evaluation and design.

AMS make the following specific recommendation in order to advance the Cerrado Verde project;

- Undertake further metallurgy test work to confirm recovery levels and variability for potash.
- Collect bulk samples (with mining equipment) to review variability in the ore product.
- Complete a DFS of the project for the start-up of an open pit mining operation.

## 18.2 Evaluation Budget

AMS recommends that the Cerrado Verde Project be advanced to a Definitive Feasibility Study (DFS) level of evaluation and design.

The approximate cost estimate for the recommended definitive feasibility work program was proposed by SRK Consulting (February, 2012) as part of a PEA completed for the Cerrado Verde Project.

AMS has provided the cost estimate recommended by SRK for the definitive feasibility work program below in Table 18.2_1 below;

**Table 18.2_1**
**Cerrado Verde Project**
**Recommended Definitive Feasibility Study Work Program *(SRK Consulting, February 2012)***

| **Activity** | **Total (US$)** |
|---|---|
| Infill Drilling | $ 1,700,000 |
| Engineering Studies | $ 1,000,000 |
| Environmental Baseline | $ 750,000 |
| Other | $ 250,000 |
| **Total** | **$ 3,700,000** |

AMS considers this cost estimate to be at the low end of the scale for a large DFS that is required for a project of this magnitude and potential complexity, and suggest that additional capital in the order of 50% greater than that proposed by SRK may be required.

This is a considered statement only, and is not based on any detailed functional costing.

# 19 REFERENCES


| | |
|---|---|
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# 20 DATE AND SIGNATURE PAGE

The "qualified person" (within the meaning of NI43-101) for the purposes of this report is Bradley Ackroyd, who is an employee of Andes Mining Services Ltd. The effective date of this report is 31st March 2013.

(signed by)
Bradley Ackroyd B.Sc Geol. Member (MAIG)
Regional Manager & Principal Consulting Geologist
Andes Mining Services

Signed on the 31st March 2013

# 21 CERTIFICATES OF QUALIFIED PERSONS

**Andes Mining Services Limited**

## Certificate of Qualified Person

I, Bradley Ackroyd, do hereby certify that:

**1.** I have been working since 2012 as a Principal Consulting Geologist with the firm Andes Mining Services Ltd. of Avenue Diagonal 550, Departmento 203, Miraflores, Lima, Peru 18. My residential address is Jose Pardo 1040, Miraflores, Lima, Peru 27.

**2.** I am a practising geologist with 11 years of Mining and Exploration geological experience. I have worked in Australia, PNG, West Africa and the Americas. I am a member of the Australian Institute of Geoscientists - Member (MAIG).

**3.** I am a graduate of the University of Western Australia (UWA) and hold a Bachelor of Science Degree in Geology (Hons) (2000).

**4.** I have practiced my profession continuously since 2001.

**5.** I am a "qualified person" as that term is defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (the "Instrument").

**6.** I have visited the Cerrado Verde Potash Project between the 7th and 10th of August 2012.

**7.** I am responsible for all sections of the technical report dated effective 31st March 2013 and titled "Mineral Resource Estimate - Cerrado Verde Potash Project, Minas Gerais State, Brazil" (the "Report").

**8.** I am independent of Verde Potash Plc pursuant to section 1.5 of the Instrument.

**9.** I have read the Instrument and Form 43-101F1 (the "Form") and the Report has been prepared in compliance with the Instrument and the Form.

**10.** I do not have nor do I expect to receive a direct or indirect interest in the Cerrado Verde Potash Project of Verde Potash Plc. and I do not beneficially own, directly or indirectly, any securities of Verde Potash Plc. or any associate or affiliate of such company.

**11.** I have not had any prior involvement with the Cerrado Verde Potash Project of Verde Potash Plc.

**12.** As of the effective date of this report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

Dated in Lima, Peru, on the 31st March 2013.

(signed by)

Bradley Ackroyd BSc(Geo) Member (MAIG)
Principal Consulting Geologist

Andes Mining Services