Updated Technical Report
Itafós Arraias SSP Project, Tocantins State, Brazil

On Behalf of - **MBAC Fertilizer Corp**

Effective date - **March 27 2013**

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1 SUMMARY

1.1 Introduction

Andes Mining Services Ltd (AMS), NCL Brasil Ltda. (NCL) and HDA Serviços S/S Ltda (HDA) have been commissioned by MBAC Fertilizer Corp (MBAC) to update the technical report for the Arraias Phosphate Project, located in the municipality of Arraias, Tocantins state, Brazil, since renamed Itafós-Arraias SSP Project (the "Itafós Project").

The Technical Report has been prepared under the guidelines of Canadian Institute of Mining (CIM) National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP ("NI43-101").

1.2 Location

The Itafós Project (Arraias) is located in Brazil in an easily accessible region of Goiás and Tocantins states approximately 400 km northeast of Brazil's federal capital, Brasilia.

1.3 Ownership

MBAC Fertilizer Corp. ("MBAC"), through its 100% owned Brazilian subsidiary Itafós Mineração Ltda. (Itafós), is the sole registered and beneficial holder of 36 exploration permits, 5 mining applications and one mining permit for a total of 69,561.17ha.

1.4 Geology and Mineralization

Phosphate mineralization on the project property occurs in lower siltstone sections of the Sete Lagoas Formation belonging to the Bambuí Group, a Neoproterozoic carbonate sequence that developed in an intra-cratonic basin on the margins of granitic craton basement (São Francisco craton). The favourable siltstone sequence has been identified for several tens of kilometers to the N and S of the original Itafós showings, and host several other phosphate occurrences in addition to those around Itafós Arraias.

The mineralization at Itafós Arraias is found exclusively within a basal siltstone unit of the Sete Lagoas Formation of Neoproterozoic age lying directly on granitic basement. On section, this basal contact appears as an undulating or locally rolling surface (possibly related to local embayments or paleo-channels developed over basement structures); however the overall pattern of mineralization can be described as stratiform.

MBAC is currently focussed on the commissioning of the plant and no additional exploration is underway.

1.5 Mineral Processing and Metallurgical Testing

Crushing & Comminution

All of the grinding parameters for the Itafós Project were determined by HDA services in Brazil (1). The mill sized by HDA services was a low aspect SAG mill with dimensions of 16.5' Internal Diameter x 29' EGL and with installed motor capacity of 3500 kW.

Process Flotation Definition

Studies were conducted to evaluate the flotation process route to recover phosphate contained in the siltstone of the Itafos targets (Arraias Tocantins deposit) commenced in the second quarter of 2008.

Several bench and pilot plant tests have been performed over the past two years using material from the main defined resource targets of the Arraias Tocantins deposit. A consistent and reproducible processing flotation flow-sheet was developed to treat the various sources from the deposit. This process allows the beneficiation of phosphate ore containing 4.5% to 6.0% P2O5 to concentrates containing 28% P2O5 whilst recovering 55 to 58% of the contained P2O5.

The pilot tests were conducted using material from the Coité and São Bento deposits, using both mechanical and column flotation cells. In addition to this, samples of drilled material from several other areas of the Arraias Tocantins mineral deposit were tested at bench scale with the results confirming the validity of the process route selected for the entire Arraias Tocantins deposit.

Conclusions

Considering all the tests performed with several phosphate rock concentrations (P2O5, Fe2O3/Al2O3 or Fluorine) with different granulometry, variations in the A/R ratio and sulphuric acid concentration, it is possible to conclude the following:

1) The production of ammoniated SSP with 1% of nitrogen and 17% of soluble P2O5 in NAC with Itafos' rocks with of 27-28% of P2O5 is viable and it is the most suitable solution for the specific acidulation process. It is possible, with the addition of the ammonium (N), to obtain a product with its quality improved because of its reduced free acidity and because the granules in the granulation plant become harder, allowing for the SSP to be mixed with urea and other raw materials without creating parallel reactions that can provoke the final NPK to become a paste

2) It is also viable to obtain SSP (single superphosphate) with 18% of soluble P2O5 in neutral ammonium citrate, without the addition of ammonia, from rocks with a grades of 28% of P2O5 and lower levels of Fe2O3 (1.5% or below). The solubility of P2O5 in water is close to the limit of minimal guarantee of 15%. This solution was not chosen because the lower flexibility and poor product physical quality.

3) At this point it must be considered that the ammoniated SSP production with 2% of nitrogen and 16% of P2O5 NAC is also one possible option, as it allows for a greater flexibility in regards to the grades of P2O5 and provides even lower free acidity when compared to the chosen solution.

4) It is better to produce SSP from the "pulp" of a phosphate rock with the addition of water before the sulphuric acid dosage, to optimize the process reactivity.

5) Rock with granulometry 95% below the 200# is adequate to the process reactivity.

6) With low fluorine levels in the phosphate rock, the emissions of this effluent are easier to be absorbed in the gas scrubber system.

7) The sulphuric acid consumption is lower than the usually utilized in other rocks to obtain the best possible conversion.

8) The optimum sulphuric acid concentration is equal or inferior to 65% to guarantee an aqueous phase, appropriated to the process reactivity.

1.6 Mineral Resources

The updated mineral resource estimate has been classified effective as of December 20, 2011 by Bradley Ackroyd (BSc (Geo) MAIG) principal consulting geologist for Andes Mining Services Ltd ("AMS"), a qualified person, in accordance with National Instrument 43-101.

Table 1.6_1
Itafós Project
Measured, Indicated and Inferred Mineral Resource Grade Tonnage Report - 20 December 2011
Ordinary Kriging (OK) Block Model – 12.5mE X 12.5mN X 3mRL

Target	Tonnage (Mt)	P_2O_5 %
Near Mine (Wardrop July 9, 2010)	**2.8% cut off grade applied**	
Measured	15.2	4.38
Indicated	9.4	4.12
M&I	24.6	4.28
Inferred	3.8	3.99
Canabrava (MBAC - Nov 2011)	**2.8% cut off grade applied**	
Measured		
Indicated	20.4	5.53
M&I	20.4	5.53
Inferred	3.7	4.94
Domingos (MBAC Nov 2011)	**1.5% cut off grade applied**	
Measured	5.6	6.04
Indicated	28.4	4.87
M&I	34.0	5.06
Inferred	5.2	2.99
TOTAL M&I	**79.0**	**4.94**
TOTAL Inferred	**12.7**	**3.85**

(1) The effective date of the Mineral Resource is December,20 2011
(2) The Mineral Resource Estimate for the Arraias Tocantins deposit was constrained within lithological and grade based solids within the top 80m from surface.
(3) Mineral Resources for the Arraias Tocantins deposit have been classified according to the "CIM Standards on Mineral Resources and Reserves: Definitions and Guidelines (July 2011) and reviewed by Bradley Ackroyd (BSc (Geo) MAIG) an independent Qualified Person as defined by National Instrument 43-101.

The measured and indicated mineral resource estimate comprises 79.0 million tonnes grading 4.94% P2O5 (using a 1.5% cut-off for the Domingos target and a 2.8% cut-off for all other targets).

Drilling, sampling and QAQC procedures were established at the beginning of the resource drilling campaign and conform to acceptable industry standards. QAQC procedures include inclusion of 5% certified phosphate standards, 5% field duplicates and 9 twin drill holes comparing reverse circulation and diamond drilling. Results have returned acceptable precision and accuracy. All recent drilling has been analysed at ALS Chemex Ltd laboratory.

Given increased geological knowledge from current mining activity (which will allow more detailed domain modelling mainly focussed on the limits of breccia zones), along with minor limitations identified by AMS in the current mineral resource estimate, AMS recommends that an updated mineral resource for all domains be undertaken.

1.7 Mineral Reserve

NCL was provided with three updated resource block models: Near Mine, dated July 2010 and developed by Wardrop; Cana Brava, dated December 2011 and developed internally by Itafós personnel; and Domingos, dated December 2011 and developed by MBAC and supervised by AMS.

Block models included resources classified as measured, indicated and inferred. Contained measured resources are transferred to proven reserves and contained indicated resources are transferred to probable reserves. Inferred mineral resources are not converted to reserves and are instead treated as waste for mine planning purposes.

It is the opinion of NCL that the mine production schedule defines the mineral reserve for a mining project. Table 15_1 reports the mineral reserve of the Itafós Project based on the production schedule used for this study.

Table 1.7_1 – Total Mining Reserve Summary (1)(2)

Ore Source	Ktonnes	P_2O_5 (%)	
Proven Reserve	15,954	5.09	
Probable Reserve	48,857	5.07	
Total Reserve	**64,811**	**5.07**	
Total Material	**253,017**	**Strip ratio**	**2.90**

(1) The Mineral Reserves as set out in the table above have been estimated by Carlos Guzmán of NCL Brasil Ltda, who is a Qualified Person under NI 43-101, Fellow Member of the AusIMM and Registered Member of the Chilean Mining Commission.

(2) Numbers may not add up due to rounding.

1.8 Mining Methods

The final pit design was based on the economic shells generated at a revenue factor equal to 1.0 and minimum cut-off grades of 1.8% P2O5 for Domingos and 2.8% P2O5 for Cana Brava and Near Mine. A constant 49.0° inter ramp angle. Table 1.8_1 shows the key open pit design parameters.

Table 1.8_1 – Culture Analysis

Bench Height	6 m (two stacked 3m benches)
Berm Width	3 m
Batter Angle	82.0°
Inter-ramp Angle	49.0°
Ramp Width	15 m
Ramp Gradient	10%

Geotechnical information is not available, but mining activity is already developed in the area which supports the adopted parameters shown in

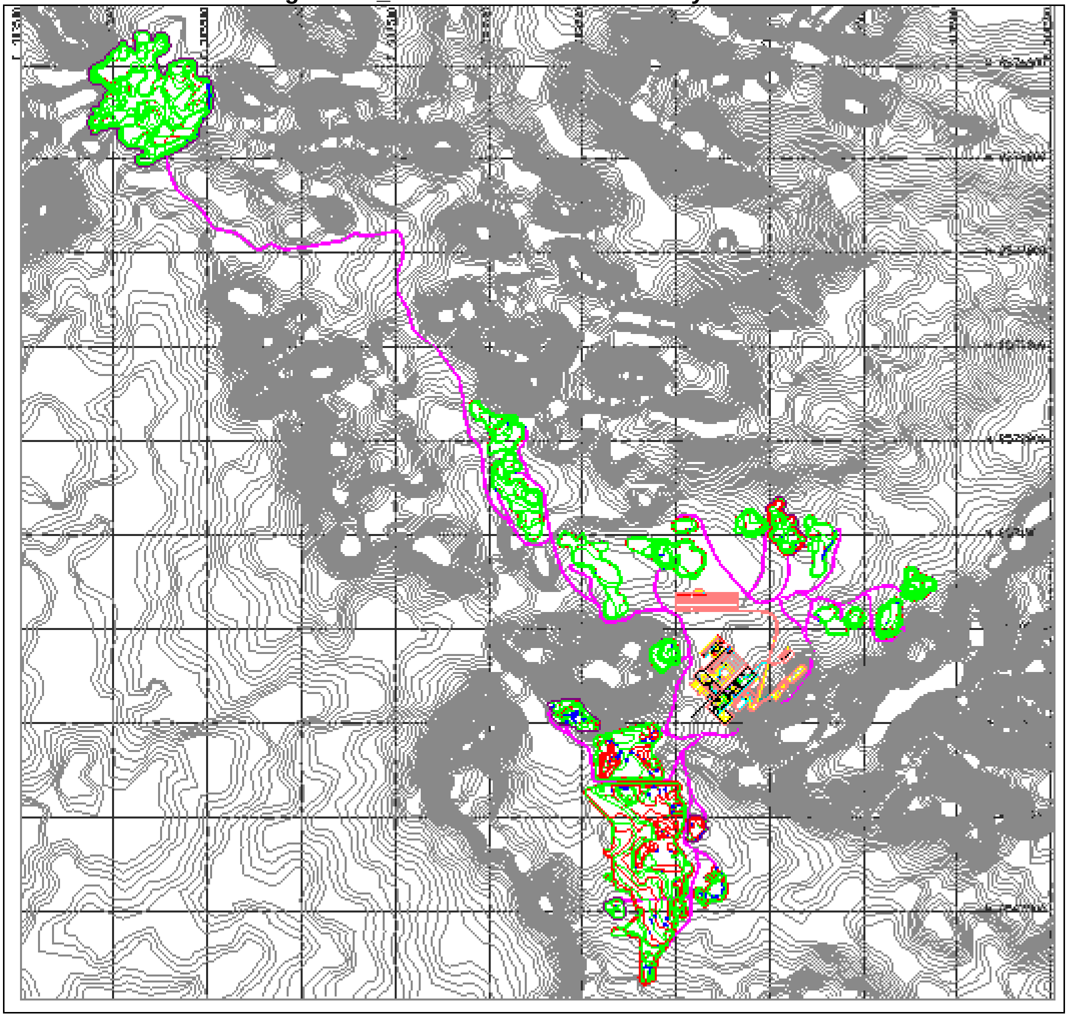
The ramps width of 15 meters can accommodate up to 50 tonne trucks. NCL used the 10% road gradient, which is common in the industry for this type of trucks.

The current mine plan is designed with 3m benches stacked to 6 meters (i.e. two stacked benches).

For the required mining rate the appropriate loading equipment is medium size front end loaders or hydraulic excavators, ranging between 3.5 m3 to 4.3m3 capacities. The minimum operating widths to achieve the required productivities with this equipment is about 25m.

Figure 1.8_1 shows the final pit design which is a result of different pits for the seven sectors (five in Near Mine, Domingos and Cana Brava), designed according to the obtained pit shell of the optimization process. The pit exits were orientated to the selected position of the processing plant. The total area disturbed by the pits is about 670 hectares

Figure 1.8_1 – Plan view – General Layout



A mine production schedule was developed to show the ore tonnes, grades, total material and waste material by year throughout of the life of the mine. The distribution of ore and waste contained in each of the mining sectors was used to develop the schedule, assuring that criteria such as continuous ore exposure, mining accessibility, and consistent material movements were met.

The proposed mining method considers the backfilling of the previously mined strips. This concept can be theoretically applied for all of the mine life, except at the beginning of each sector. Five waste storage facilities were designed, one for Domingos, one for Cana Brava and three in Near Mine.

Mine equipment requirements were calculated based on the annual mine production schedule, the mine work schedule, and equipment annual production capacity estimates.

The study is based on operating the Itafós Project mine with excavators of 3.5m3 capacities for ore and excavators of 4.3m3 for waste. Trucks with a nominal capacity of 39 tonnes and effective capacity of 27 tonnes were considered, for both, ore and waste. The difference in capacity between nominal and effective is due to the low density of the material.

According to the geotechnical characteristics of the rock, was estimated that only 10% of the material will require drill and blast. An allowance had made for the cost, considering US$2.0/t, as part of the general mining cost.

Major auxiliary equipment refers to the major mine equipment that is not directly responsible for production, but which is scheduled on a regular basis. Equipment operating requirements, operating hours and personnel requirements were estimated for this equipment.

The primary function of the auxiliary equipment is to support the major production units, and provide safe and clean working areas.

1.9 Recovery Methods

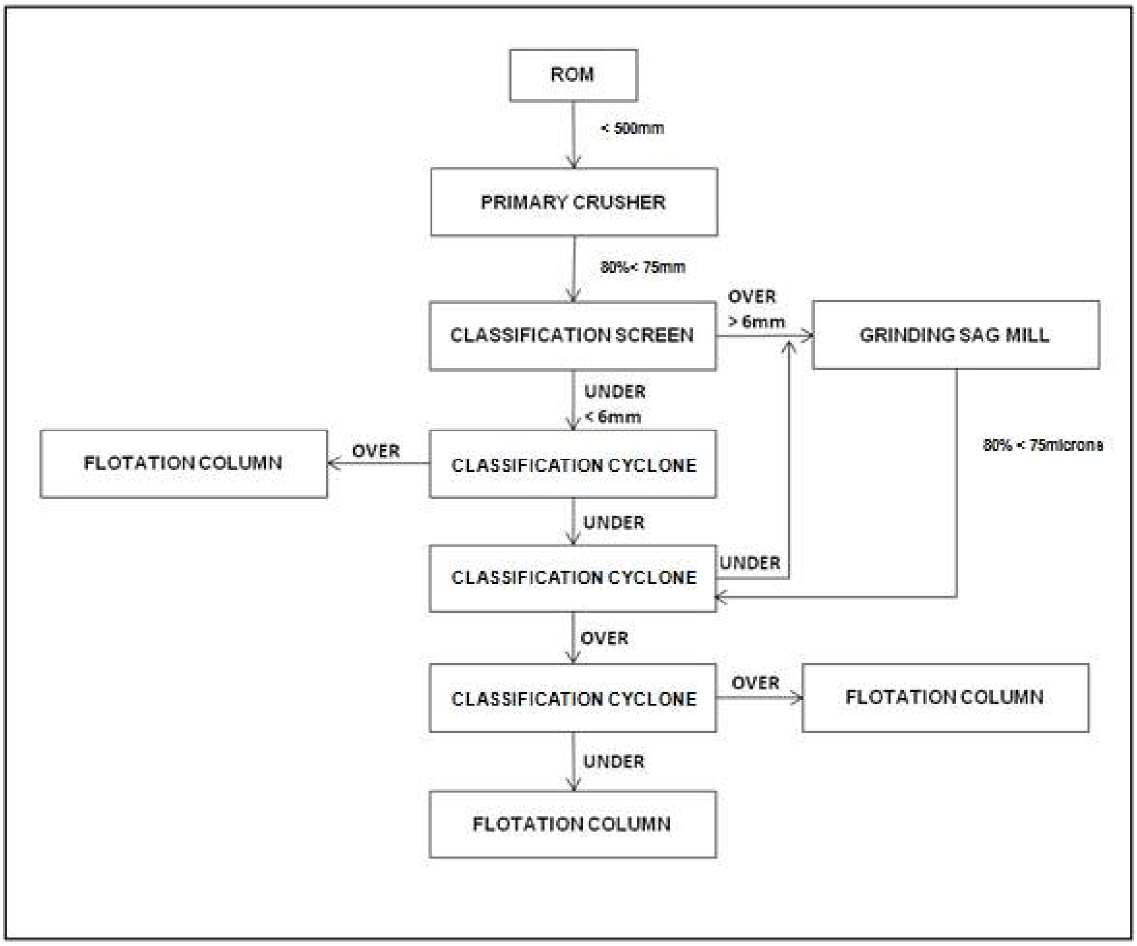
The mineral processing plant was designed based on the metallurgical test work completed and consider the following main design parameters:

- An ore with a feed grade of 5.32 % P2O5;
- Production of 330,000 t/year of concentrate assaying 28% P2O5 with a metallurgical recovery of 54% from the column flotation of the conventional and produced slimes fractions;
- Production of 94,000 t/year of concentrate assaying 15% P2O5 with a metallurgical recovery of 8.4% from the column flotation of the natural slimes; and
- Total availability of 89%.

The plant has been designed to treat 3.5 million tonnes/year of run of mine ("ROM"), considering the parameters above. The samples tested in the pilot plant had grades varying from 4.4 to 6.3% P2O5 and the average mass and P2O5 partition obtained in the steps of the process was used to calculate the material balance.

The process adopted consists of the following steps, as shown in the figure below:

- Primary crushing of the ROM material;
- Grinding of the coarse fractions in a SAG mill; and
- Classification of the ore into three size fraction streams to produce the materials denominated as natural slimes, produced slimes and conventional.



Each one of these size fractions is floated in columns to produce the three concentrates.

Natural slimes concentrate with a grade of 15% will be dewatered in a thickener and a press filter. The cake will be dried in rotary drier and sent for shipment.

Produced slimes concentrate will be thickened in a pond and the underflow will be pumped to the acidulation plant.

Conventional concentrate will be reground to 95% passing 44 microns to improve reactivity, submitted to magnetic separation to reduce iron content and then will be dewatered in a thickener and a press filter. The cake will be stock piled and reclaimed to the acidulation plant where it will be combined with the slimes concentrate produced.

All the tailings are combined and sent to the tailings dam by gravity. The crushing plant was designed to avoid dry operations as much as possible in order to maximize plant availability, due to the sticky characteristics of the Arraias Tocantins ore. Therefore, it was decided to use only one crushing stage followed by a SAG milling circuit to avoid clogging conveyor belts and screens which can occur when secondary and tertiary crushing stages are utilized.

Pilot plant results showed that column flotation presented a better performance than mechanical cells. For this reason column cells were selected as the flotation equipment.

The major equipment items including the crusher, SAG mill, thickeners and filters were sized based upon specific laboratory test results conducted on samples of the ore, mill feed and concentrates.

In the Sulphuric Acid Plant Process phases are as follows:

- Storage of sulphur;
- Sulphur melting and filter;
- Sulphur burning in reaction with oxygen air;
- SO2 conversion into SO3
- SO3 gases scrubber and absorption in appropriate tower;
- Cooling and storage of acid product.

The phosphate rock from the stockpile will be reclaimed by a front end loader to a belt conveyor to feed the repulping tank. After being repulped, the slurry will be pumped to the intensive mixer where sulphuric acid (H2SO4) will be introduced. By the end of the process the single superphosphate powder (SSP) will be transferred to the cure warehouse.

Then the single superphosphate powder (SSP) from the cure warehouse will be transferred to the granulator drum where ammonia, water, and slurry from the gas treatment system will be introduced. The gases produced in the granulator will direct to the gas treatment system while the product will direct to the rotary dryer.

When drying operation is completed, the granulated SSP will be stockpile in the granular product pile. Finally, a front end loader will transfer the granulate product from the stockpile into a hopper fitted with a belt conveyor to feed the big bags system located on the trucks. The trucks will be positioned in a road scale to assure they load correct weight.

1.10 Market Studies

In order to analyse the fertilizer market in the MBAC target region, MB Agro, a consulting company specialized in the Brazilian Fertilizer Market, has prepared a study, forecasting future fertilizer demand and analysing domestic supply as well as local infrastructure.

MBAC target region is represented by the central-northern and north-eastern Brazil, including the main MBAC potential regions as western Bahia state, Northern Goiás state, North-eastern Mato Grosso State and Tocantins state as marked in blue in Figure 1.10_1.

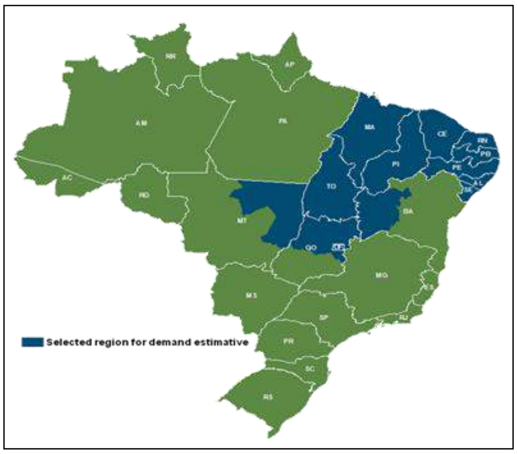


Figure 1.10_1 – Selected Region for the Demand Estimate

Within the Brazilian territory, which has 851 million hectares, the present study focuses its analysis on states with important agricultural potential. The area under consideration totals 308 million hectares.

Brazil, being one of the countries with the world's largest agricultural area and one of the few countries that still has room to expand the production area, is facing growing global demand for food and biofuel. All of these factors are very favourable for growth in agriculture in Brazil.

The consumption of fertilizers in Brazil has increased 5.0% every year for the last 23 years. In 2008, it reached, according to the National Association for the Promotion of Fertilizers ("ANDA"), 9.4 million tonnes of nutrients (NPK), which means a volume of 22.4 million tonnes of intermediate products. The internal production made up 40% of this demand totalling 8.8 million tonnes.

Although there is available area for expansion in Brazil, the traditional regions, especially the South region, there is no more room for expansion. In these states, the supply growth will be driven by productivity more than area. This variable was also controlled in our projections and results.

For production, it is estimated that the region should increase from 96 million tonnes to 360 million until 2040, with sugarcane and soy primarily responsible for the increase. To meet expected demand, the sugarcane production should grow 260% and soybean, 435% in the target region of the study.

Given the areas and expected productivities in question, we estimated that demand for NPK should rise from 1 million tonnes in 2008 to 4.7 million tonnes in 2040. The demand will continue to grow driven largely by the need for phosphate and potash.

The values for nutrients are shown in the Table 1.10_1 which also provides information on sulphur demand, which is expected to grow 255% and reach 689 thousand tonnes in 2040.

Table 1.10.10_1 – NPK Consumption – Target Region (thousand tonnes)

Year	N	P_2O_5	K	Total	S
2,008	172	404	464	1,041	194
2,012	212	506	564	1,283	216
2,017	239	664	686	1,589	255
2,020	259	763	772	1,793	285
2,025	300	959	969	2,227	346
2,030	353	1,226	1,231	2,810	428
2,035	423	1,596	1,588	3,608	538
2,040	517	2,106	2,075	4,698	689

Source: MB Agro

The Brazilian soils are known to be poor in nutrients especially in the region. These soils have a deficit of sulphur. It can be affirmed that there are few alternatives for sulphur nutrition. In practice, basically you have the option of the SSP and the gypsum, which is a scarce product in a lot of areas of the country, especially in the interest area of the project.

So, due to the expected demand of Sulphur and Phosphate, we believe that the development of the agricultural area in the region will require much greater use of SSP and represents an unique opportunity to the company.

1.11 Environmental Studies

An Environmental Impact Study (EIS) about the potential impacts over the project's site, including a detailed Operations Plan description, is required by the NATURATINS (Environmental Agency of Tocantins State) before any construction and mine operations can begin. The Operations Plan consists of the basic mine plan, infrastructure, and operational aspects of the Project. The EIS consists in the reviewing of the Plan of Operations to understand the project impact over the natural resources, fauna, flora and the neighbouring communities, including its cultural and historical heritage. The Environmental Impact Report (EIR) consists of a document that presents only the most important parts of all content of the Environmental Study, written in a colloquial language, in order the matter to be easily understood and discussed by the population.

The Environmental Study was submitted to the NATURATINS, in July, 2010. The NATURATINS has up to six months to evaluate the Environmental Study and deliver the Impact Report to National Environmental Agencies i.e. IBAMA and other environmental related regulatory agencies that are required to review the project viability.

The Public Hearing, in accordance with the CONAMA 009/1987 (the Federal Council that rules the Brazilian environmental licensing process) have the objective to show to all the people living near from the project area, the environmental impacts and other changes that will be potentially caused by the project In this Public Hearing the Company must be present to present information about the project and answer all questions from the people who live around the project and representatives of governmental and nongovernmental organizations, and collect comments and suggestions about the project. The public hearing shall occur according to the criteria of the NATURATINS. Additional Public Hearings could occur if requested by authority of the civil prosecutor or by manifestation signed from more than 50 people from the community that live near from the project. The company has the responsibility to facilitate the location and transportation to the proposed Public Hearing site.

Actually, the Public Hearings occurred in September 21, 2010, at the Arraias Church Hall, when were present almost 600 people, discussing and debating about the EIR of Arraias Project. Based on this event and after the studies presented evaluation, the NATURATINS issued the Preliminary License (permit) in December 2010. This document means that the project is feasible from an environmental standpoint.

The next step was to present the Basic Environmental Project (BEP) which consists of a set of actions, plans and programs that aims to prevent, reduce or avoid the environmental impacts that could be caused by the project's construction over the surrounding natural resources and the communities.

The BEP was approved after review by NATURATINS, which issued the Installation License (permit) for the project in March 2011, which enabled the start of construction. Others permits were necessary and obtained, like water grant from National Water Agency, because the project uses a federal water to obtain water, and deforestation permits.

During the construction, environmental teams were working to ensure compliance with the environmental commitments. Thus, with the approaching end of construction and environmental commitments executed, the company requested the NATURATINS the Operating License (permit) to start to produce. Itafós has received operating permits for the water dam, the tailings dam and the beneficiation plant. The remaining licenses will be issued in the next weeks as construction is completed.

1.12 Capital and Operating Expenditures

The Capital Cost Expenditure (CAPEX) and Operating Cost Expenditure (OPEX) have been updated since the previous report. The new estimative for Itafós Project development have been estimated to February/2013 rates. The accuracy assumed to prepare the CAPEX and the OPEX is ±5% due the advanced stage of the plant construction. The exchange rates applied to the CAPEX calculation was US$ 1.00 = R$ 2.086 and the OPEX was US$ 1.00 = 2.10.

The CAPEX and OPEX assumed for the Arrais project are summarised in table 1.12_1 and table 1.12_2 below (see appendix 1 for detailed CAPEX):

Table 1.12_1 – Capex Assumptions

Account	Description	OVERALL TOTAL		%
Equipment	Electrical	R$	29,457,000	4.4%
	Mechanical	R$	198,385,000	29.4%
	Spare Parts	R$	366,780	0.1%
Materials	Electrical	R$	6,041,424	0.9%
	Miscelaneous, including electrical equipment	R$	7,736,800	1.1%
	Steel Structure	R$	53,450,000	7.9%
	Instrumentation / Telecommunication	R$	5,104,029	0.8%
	Miscelaneous	R$	34,234,123	5.1%
	Piping	R$	19,765,345	2.9%
	Cataliser	R$	7,507,200	1.1%
Erection	Electro-mechanical erection	R$	103,000,000	15.3%
Civil Works	Civil	R$	53,000,000	7.9%
	Archtecture	R$	16,453,423	2.4%
	Dams	R$	29,000,000	4.3%
	Infrastructure	R$	27,456,987	4.1%
Indirect	Comissioning and training	R$	1,557,390	0.2%
	Land Acquisition	R$	8,000,000	1.2%
	MECS Technology	R$	4,311,200	0.6%
	Engineering	R$	29,000,000	4.3%
	First fill / Start Up	R$	1,356,197	0.2%
	Management	R$	11,342,999	1.7%
	Engineering Insurance	R$	2,100,000	0.3%
	Erection Supervision	R$	1,302,413	0.2%
	Owner team	R$	15,171,690	2.3%
	Social projects	R$	1,600,000	0.2%
	Legal Costs	R$	1,800,000	0.3%
	Environment	R$	5,500,000	0.8%
Contingency		R$	-	0.0%
Total		**R$**	**674,000,000**	**100%**
%		**USD**	**323,106,424**	

Table 1.12_2 – Opex Assumptions

DESCRIPTION	UNIT	2013	2014	2015	2016	2017	2018	2019
Mining Cost	USD/t SSP	56.20	31.98	31.11	33.08	38.04	33.86	35.28
Labour Cost	USD/t SSP	26.22	12.53	12.55	12.55	12.59	12.83	12.59
Maintenance Cost	USD/t SSP	8.52	4.26	4.26	4.26	4.28	4.36	4.28
Energy Cost	USD/t SSP	15.39	10.46	10.54	10.55	10.55	10.54	10.55
Reagents Cost	USD/t SSP	39.99	35.08	34.96	34.96	34.97	34.94	34.96
Sulfur Cost	USD/t SSP	36.62	28.05	26.97	26.97	26.97	26.95	26.97
Ammonia Cost	USD/t SSP	13.02	14.64	14.62	14.62	14.63	14.61	14.62
CFEM	USD/t SSP	2.19	1.29	1.28	1.32	1.42	1.33	1.36
TOTAL	USD/t SSP	198.15	138.29	136.29	138.30	143.44	139.44	140.61

1.13 Economic Analysis

MBAC team used the discounted cash flow model to estimate the "fair value" of the Itafós Project relying on the technical, commercial and economic information and data available by the time of this release.

When constructing the model we considered all prices FOB MBAC site (Arraias – TO). The current Single Super Phosphate ("SSP") price is considered in the model as a projected price for the life of the mine levied by 2% inflation (CPI) on a yearly basis after 2014. All costs in Brazilian Reais were levied by the estimated inflation of 4.5% (IGPM) on a yearly basis.

We are also assuming that the recovery of P_2O_5 during the mine life is 53% and that the increase in the operating cost after the first years is a result of the estimated decrease of the P2O5 grade during the mine life.

The principal assumptions made in the DCF model are summarised in Table 1.13_1:

Table 1.13_1 – Input Factors for DCF Model

DESCRIPTION	Value
Proven and probable reserves (million tonnes)	64.8
Mine life (years)	19
CAPEX ($ millions)	$323.1
Payback period (years)	4.5
SSP Selling Price 2013 per tonne (FOB Arraias – US$)	$280
SSP Selling Price 2014 per tonne (FOB Arraias – US$)	$325
Sulphur Price per tonne (CIF Arraias – US$)	$240
Ammonia Price per tonne (CIF Arraias – US$)	$1,200
Grinding Ball Price per tonne (CIF Arraias – US$)	$1,781
Sodium Silicate Price per tonne (CIF Arraias – US$)	$352
Caustic Soda Price per tonne (CIF Arraias – US$)	$467
Soybean Oil Price per tonne (CIF Arraias – US$)	$1,514
Energy (US$/Mwh)	$87
Operating cost (SSP) p/tonne – first 5 years (excl. 2013)	139
Operating cost (SSP) p/tonne – over mine life (US$ 2013)	162
Foreign exchange (BRL/USD)	2.1
Average run-of-mine ("ROM") P_2O_5 grade – first 10 years	5.56%
Average run-of-mine ("ROM") P_2O_5 grade – over mine life	5.08%
Discount Rate (WACC)	10.00%
CPI per year	2.00%
Brazilian CPI per year (IGPM)	4.50%
Plant Recovery for P2O5	53.0%

After applying all the assumptions, the DCF model has a NPV of USD 254.2m, an IRR of 21% and payback period of 4.5 years. The cash flow forecast can be seen in Table 22_2.

1.14 Conclusions and Recommendations

AMS considers that the proposed exploration and development strategy is entirely appropriate and reflects the potential of the Itafós Project.

AMS has made a number of recommendations within this report to increase the mineral resource confidence and project development with key recommendations listed below:

- Infill drilling across the Domingos and Canabravas domains to a 50m by 50m spacing in order to quantify further Measured resource category material;
- Given increased geological knowledge from current mining activity (which will allow more detailed domain modelling mainly focussed on the limits of breccia zones) ,

along with minor limitations identified by AMS in the current mineral resource estimate, AMS recommends that an updated mineral resource for all domains be undertaken.

The cost estimate for the recommended work program is shown in Table 1.14_1 below;

Table 1.14_1
Itafós Project
Proposed Resource and Evaluation Expenditure

Activity	**Total (US$)**
Infill Drilling (50 x 50m Grid)	$ 300,000
Assay Testwork	$ 30,000
Updated Resource Studies	$ 40,000
Travel and accommodation	$ 20,000
Field supervision and support	$ 30,000
Administration	$ 30,000
Sub-total	**$** 450,000

MBAC has undertaken a systematic exploration program that has been successful in defining significant resources of phosphate in close proximity to one of the largest agricultural centres in Brazil.

Further scope exists to improve the geological and mineral resource estimation confidence in the regions currently defined as an inferred mineral resource.

Given increased geological knowledge from current mining activity along with minor limitations identified by AMS in the current mineral resource estimate, AMS recommends that an updated mineral resource for all domains be undertaken.

AMS concludes that there are no fatal flaws in the current resource data.

The mine plan has not been fully optimized and it is likely that further scheduling work will smooth out some of the grade and ore extraction variations seen in this study. The optimized mine plan may mean that higher-grade ore is available to the mill sooner in the schedule, thus having a positive effect on the discounted cash flow.

Finally, the economics of the project present a very positive rate of return for the investment. Even considering possible variations in the sales price, operating costs and others as seen in the sensitivity analysis the project economics can be considered very attractive

2 INTRODUCTION

2.1 Scope of Work

Andes Mining Services Ltd (AMS), NCL Brasil Ltda. (NCL) and HAD Serviços S/S Ltda (HDA) have been commissioned by MBAC Fertilizer Corp (MBAC) to update the technical report for the Itafós-Arraias SSP Project, in the municipality of Arraias, Tocantins state, Brazil (“Itafós Project”).

The Technical Report has been prepared under the guidelines of Canadian Institute of Mining (CIM) National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP (“NI43-101”).

2.2 Forward Looking Information

This report contains "forward-looking information" within the meaning of applicable Canadian securities legislation. Forward-looking information includes, but is not limited to, statements related to the capital and operating costs of the Itafós Project, the price assumptions with respect to phosphate materials, production rates, the economic feasibility and development of the Itafós Project and other activities, events or developments that the MBAC 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 the authors and management, and considered reasonable at the time such information is 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, licenses 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 MBAC’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 MBAC has 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 MBAC’s plan, objectives and goals and may not be appropriate for other purposes. Accordingly, readers should not place undue reliance on forward-looking information. MBAC does not undertake to update any forward-looking information, except in accordance with applicable securities laws.

2.3 Principal Sources of Information

In addition to site visits undertaken by Mr. Bradley Ackroyd (AMS) between 25th and 27th February 2013 and Mr. Carlos Guzmán on 6th April 2010, the authors of this report has relied extensively on information provided by MBAC along with discussions with MBAC technical personnel. A full listing of the principal sources of information is included in Section 27 of this report and a summary of the main documents is provided below:

- MBAC (Oct, 2010) - Technical Report on Arraias Tocantins Feasibility Study
- Letter dated 20 September 2011 - Magma Serviços de Mineração Ltda, of Brasilia, Brazil

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

2.4 Qualifications and Experience

The "qualified persons" (as defined in NI 43-101) for this report are Mr. Beau Nicholls (AMS) Mr. Bradley Ackroyd (AMS), Mr Carlos Guzman (NCL) and Mr. Homero Delboni (HDA).

Mr. Nicholls is an associate consulting geologist for AMS with 17 years experience in exploration and mining geology. Mr. Nicholls is a Member of the Australian Institute of Geosciences (MAIG) and is responsible for sections 7 to 12, and jointly responsible for sections 1 to 7 and 23 to 26.

Mr. Ackroyd is the principal consulting geologist for AMS with 11 years experience in exploration and mining geology. Mr. Ackroyd is a Member of the Australian Institute of Geosciences (MAIG) and is responsible for section 14 and jointly responsible for sections 7 to 12.

Mr Guzman has 21 years of experience with main field of expertise in open pit mine design and planning. Mr Guzmán is a Member of the AusIMM since July 2007 (229036), and elected to the Fellow grade (FAusIMM) since July 2012; and Registered Member of the Chilean Mining Commission since August 2011. Mr. Guzmán is responsible for sections 15 to 16 and 23 to 26.

Mr Delboni has 30 years of experience in metallurgy process design and major mining projects engineering and implementation. Mr Delboni is a practicing engineer and a registered member of the CIM - Canadian Institute of Mining, Metallurgy and Petroleum; and of the SME - Society for Mining, Metallurgy and Exploration. Mr. Delboni is responsible for sections 13 and 17 to 22.

Neither the authors of this report have or have had previously any material interest in MBAC or related entities or interests. Our relationship with MBAC 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 Units of Measurements and Currency

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

2.6 Abbreviations

A full listing of abbreviations used in this report is provided in Table 2.6_1 below.

Table 2.6_1
List of Abbreviations

	Description		**Description**
$	United States of America dollars	l/hr/m^2	litres per hour per square metre
“	Inches	M	million
µ	Microns	m	metres
3D	three dimensional	Ma	thousand years
AAS	atomic absorption spectrometry	Mg	Magnesium
Au	Gold	ml	millilitre
bcm	bank cubic metres	mm	millimetres
CC	correlation coefficient	Mtpa	million tonnes per annum
cm	Centimetre	N (Y)	northing
Co	Cobalt	Ni	nickel
CRM	certified reference material or certified standard	NPV	net present value
Cu	Copper	NQ_2	Size of diamond drill rod/bit/core
CV	coefficient of variation	ºC	degrees centigrade
DDH	diamond drillhole	OK	Ordinary Kriging
DTM	digital terrain model	P80 -75µ	80% passing 75 microns
E (X)	Easting	Pd	palladium
EDM	electronic distance measuring	ppb	parts per billion
Fe	Iron	ppm	parts per million
G	Gram	psi	pounds per square inch
g/m^3	grams per cubic metre	PVC	poly vinyl chloride
g/t	grams per tonne of gold	QC	quality control
HARD	Half the absolute relative difference	QQ	quantile-quantile
HDPE	High density poly ethylene	RC	reverse circulation
HQ_2	Size of diamond drill rod/bit/core	RL (Z)	reduced level
Hr	Hours	ROM	run of mine
HRD	Half relative difference	RQD	rock quality designation
ICP-AES	inductivity coupled plasma atomic emission spectroscopy	SD	standard deviation
ICP-MS	inductivity coupled plasma mass spectroscopy	SG	Specific gravity
ISO	International Standards Organisation	Si	silica
kg	Kilogram	SMU	selective mining unit
kg/t	kilogram per tonne	t	tonnes
km	Kilometres	t/m^3	tonnes per cubic metre
km^2	square kilometres	tpa	tonnes per annum
kW	Kilowatts	UC	Uniform conditioning
kWhr/t	kilowatt hours per tonne	w:o	waste to ore ratio

3 RELIANCE ON OTHER EXPERTS

AMS has relied on the independent lawyers Magma Serviços de Mineração Ltda., of Brasilia, Brazil for their opinion on the title for the Itafós Project mineral permits and AMS have received a memorandum from them dated 20 September 2011, supporting MBAC's claims.

MBAC is utilizing a number of experts in respects to the Itafós Project. They are listed below:

- Andes Mining Services – Exploration, Geology and Mineral Resource Estimates.
- NCL Brasil Ltda – Mine design and planning, Mineral Reserves Estimates
- HDA Serviços S/S – Metallurgy design and performance

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Project Location

The project is located in Brazil and straddles the state limit between Tocantins to the north and Goiás to the south (see Figure 4.1_1). The exploration field office, sample preparation laboratory and other facilities are located ~7 km northeast from Campos Belos, the nearest settlement of any size (19,000 inhabitants).

The roads connecting the project to the main cities and commercial centres in the region are paved and in good conditions. The field office and most exploration areas are easily accessible from Campos Belos all year round through a good network of gravel roads.

Figure 4.1_1
Project Location

4.2 Tenement Status

MBAC, through its 100% owned Brazilian subsidiary Itafos Mineracao Ltda (Itafós), is the sole registered and beneficial holder of 36 exploration permits, 5 mining applications and one mining permit for a total of 69,561.17ha. Details of MBAC permits in the Arraias region are found in Table 4.2_1 and Figure 4.2_1.

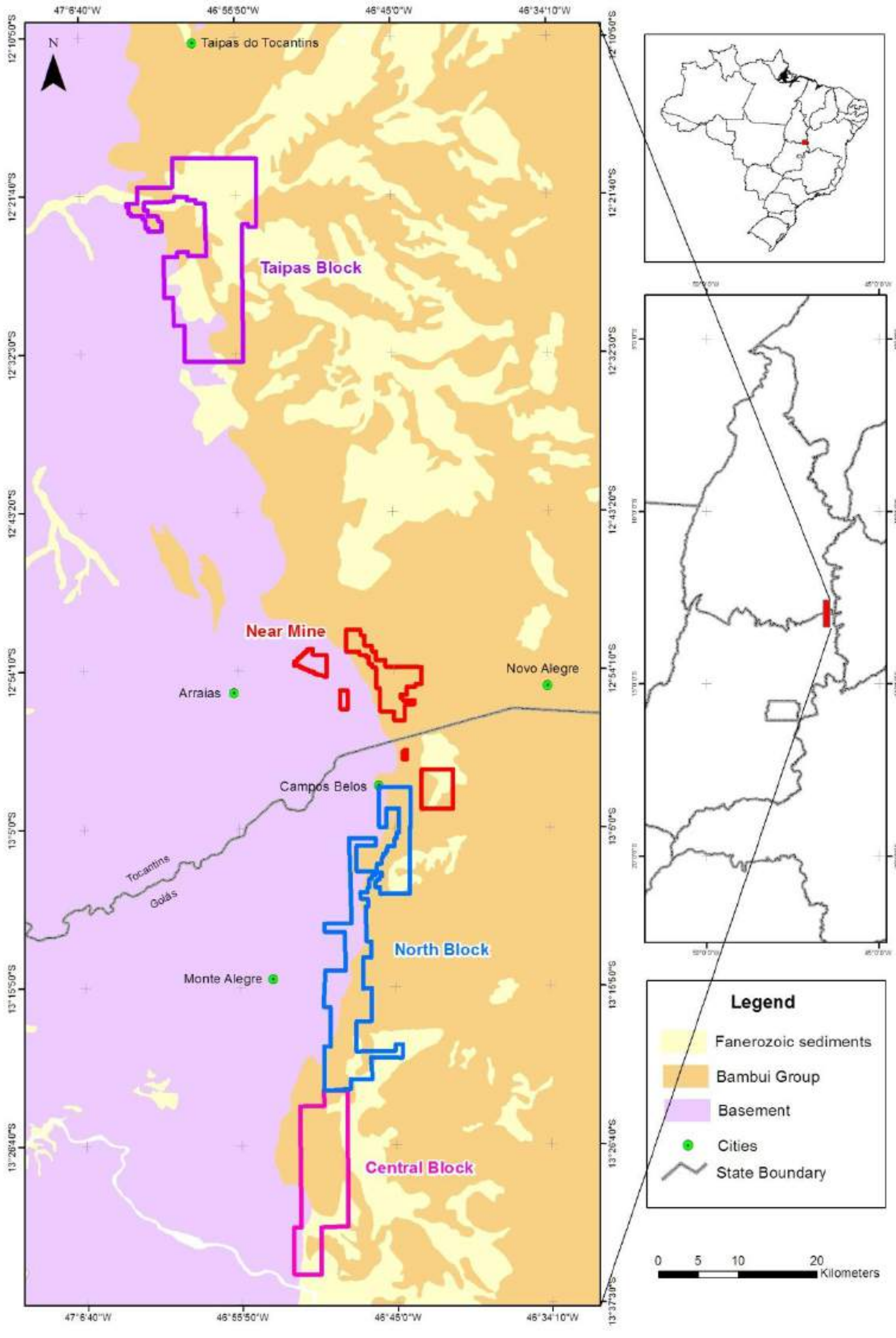
The exploration permits are valid for three years and are renewable for up to an equal period. MBAC are required to pay $ 2.36 Brazilian Reais per hectare per year to the DNPM for permit annual maintenance fee.

Table 4.2_1
Summary of MBAC Permits Status in the Arraias Region

Permit Type	Permit No.	Project	Holder	Area (Ha)	Comments
Mining Permit	864.113/03	ARRAIAS	ITAFÓS	1,062.56	Mining Permit
Mining Application	864.173/04	ARRAIAS	ITAFÓS	122.95	Mining Application registered
Mining Application	864.174/04	ARRAIAS	ITAFÓS	1,152.44	Mining Application registered
Mining Application	864.175/04	ARRAIAS	ITAFÓS	989.32	Mining Application registered
Mining Application	864.176/04	ARRAIAS	ITAFÓS	404.18	Mining Application registered
Mining Application	861.009/04	ARRAIAS	ITAFÓS	45.54	Mining Application registered
Research Permit	860.101/09	ARRAIAS	ITAFÓS	1,812.27	Research permit 3 yr
Research Permit	860.103/09	ARRAIAS	ITAFÓS	1,053.09	Research permit 3 yr
Research Permit	860.125/09	ARRAIAS	ITAFÓS	1,533.32	Research permit 3 yr
Research Permit	860.714/08	ARRAIAS	ITAFÓS	78.54	Research permit 3 yr
Research Permit	860.821/08	ARRAIAS	ITAFÓS	1,980.00	Research permit 2 yr
Research Permit	860.822/08	ARRAIAS	ITAFÓS	1,949.23	Research permit 2 yr
Research Permit	860.823/08	ARRAIAS	ITAFÓS	1,943.76	Research permit 2 yr
Research Permit	860.824/08	ARRAIAS	ITAFÓS	1,608.01	Research permit 2 yr
Research Permit	860.825/08	ARRAIAS	ITAFÓS	1,800.00	Research permit 3 yr
Research Permit	860.826/08	ARRAIAS	ITAFÓS	1,978.98	Research permit 2 yr
Research Permit	861.111/08	ARRAIAS	ITAFÓS	1,555.51	Research permit 2 yr
Research Permit	861.112/08	ARRAIAS	ITAFÓS	1,980.00	Research permit 2 yr
Research Permit	864.347/09	ARRAIAS	ITAFÓS	5,266.66	Research permit 3 yr
Research Permit	864.350/09	ARRAIAS	ITAFÓS	7,500.90	Research permit 3 yr
Research Permit	861.463/09	ARRAIAS	ITAFÓS	1,850.81	Research permit 2 yr
Research Permit	861.582/09	ARRAIAS	ITAFÓS	1,043.05	Research permit 2 yr
Research Permit	860.979/10	ARRAIAS	ITAFÓS	1,666.71	Research permit 3 yr
Research Permit	860.991/10	ARRAIAS	ITAFÓS	1,696.84	Research permit 3 yr
Research Permit	860.126/11	ARRAIAS	ITAFÓS	1,627.99	Research permit 3 yr
Research Permit	864.550/10	ARRAIAS	ITAFÓS	321.17	Research permit 3 yr
Research Permit	864.551/10	ARRAIAS	ITAFÓS	287.16	Research permit 3 yr
Research Permit	864.552/10	ARRAIAS	ITAFÓS	98.69	Research permit 3 yr
Research Permit	864.553/10	ARRAIAS	ITAFÓS	54.73	Research permit 3 yr
Research Permit	864.585/10	ARRAIAS	ITAFÓS	4,249.69	Research permit 3 yr

Research Permit	860.300/11	ARRAIAS	ITAFÓS	791.56	Research permit 3 yr
Research Permit	860.303/11	ARRAIAS	ITAFÓS	1,607.24	Research permit 3 yr
Research Permit	860.304/11	ARRAIAS	ITAFÓS	1,889.52	Research permit 3 yr
Research Permit	860.516/11	ARRAIAS	ITAFÓS	1,464.65	Research permit 3 yr
Research Permit	860.519/11	ARRAIAS	ITAFÓS	1,974.79	Research permit 3 yr
Research Permit	860.520/11	ARRAIAS	ITAFÓS	1,991.50	Research permit 3 yr
Research Permit	860.521/11	ARRAIAS	ITAFÓS	1,959.44	Research permit 3 yr
Research Permit	860.522/11	ARRAIAS	ITAFÓS	1,911.51	Research permit 3 yr
Research Permit	860.523/11	ARRAIAS	ITAFÓS	1,962.79	Research permit 3 yr
Research Permit	860.524/11	ARRAIAS	ITAFÓS	1,853.96	Research permit 3 yr
Research Permit	860.525/11	ARRAIAS	ITAFÓS	1,908.95	Research permit 3 yr
Research Permit	860.526/11	ARRAIAS	ITAFÓS	1,531.16	Research permit 3 yr
Total				**69,561.17**	

Figure 4.2_1
Permit Location



4.3 Royalties and Agreements

There are no royalties or agreements in place for the Itafós Project which AMS are aware of.

4.4 Environmental Liabilities

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

4.5 Permitting

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

AMS is unaware of any other factors risking the development of the project.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Project Access

The project site can be easily accessed in 4-5 hours drive from Brasilia some 450 km distance via paved highways (BR-020 and GO-118) to the town of Campos Belos and from there for a few km via unpaved roads and small farm roads that are generally in good condition except for a few days during the peak of the rainy season. Campos Belos can also be reached by small aircraft landing at a 1,400m long, paved airstrip (Lat 13^{o} 00’00” South [S] and Long 46^{o} 42’40” West [W]).

Campos Belos is a municipality of the Goiás state of Brazil with approximately 19,000 inhabitants, most living in the town. The town has one college and hotels and therefore has a reasonable infrastructure base to support the MBAC workforce and day to day operations.

5.2 Physiography and Climate

The project is located in an area known as Central Brazilian Highlands at an average elevation of 750 m above sea level. The local topography is usually flat to gentle slopes underlain by siltstones and limestones with a few higher elevations of granitic and quartzitic basement. Dolomite bodies form remnant hills with typical karstic dissection.

The climate is tropical with a well-defined dry winter (May to August) followed by a wet summer season (September to April). Yearly average temperatures are 20 to 22 degrees Celsius (^{o}C) with rainfall typically 1,000 to 1,500 millimeters (mm) during the summer period. Vegetation across this region of Brazil is typical of savannah regions of the world (known in Brazil as “cerrado”) much of which has now been substituted by cattle or crop pasture; the local economy depends largely on cattle grazing.

5.3 Local Infrastructure and Services

Campos Belos is a municipality of the Goiás state of Brazil with approximately 19,000 inhabitants, most living in the town. Skilled labour is readily available in Campos Belos.

Studies are now complete for initial mining areas, with a new processing facility currently under construction. Purchase of surface rights over areas selected for open pit mining, process plant, etc., began in April 2009 and to the best of the authors knowledge, negotiations are now completed.

6 HISTORY

The phosphate occurrences around the Campo Belos region were first explored in the 1960s by METAGO, the Goiás State Mining Company. In 2004, MBAC acquired the mineral properties and started mining operations, producing two low-cost pulverized rock products (24 % and 12 % P_2O_5), both for direct application to the soil; production of rock P_2O_5 products from MBAC in 2008 was 70,000 tonnes (t).

As described earlier, MBAC (at that time a private company) acquired Itafós (the original local owner of the high-grade quarry) in late 2008 and immediately started a grassroots mapping and drilling campaign aimed at defining large volume but lower grade P_2O_5 resources. This first campaign focused on the priority zones at Coité, Juscelino and São Bento, targets that were initially explored using 50 m and 100 m spaced drilling (auger and core).

In March 2009, MBAC started a second mapping and drilling campaign (this time mainly in Mateus and Gaucho targets using a 100 m and 200 m spaced grid drilling) while expanding its regional holdings north (N) and south (S) along the 150 km long contact between granitic basement to the west (W) and the favourable siltstone lithologies to the east (E). Exploration drilling focused on the Near Mine Blocks where initial production of an expanded process plant will be based, while exploration of the outlying Regional Blocks continued to expand the extent of the siltstone host rock.

In addition to drilling, field work has included trench and pit sampling, geochemistry, and geophysics including several tests of Ground Penetrating Radar (GPR), resistivity and seismic methods without significant success in terms of providing a useful exploration tool to guide the drilling programs.

A third drilling program using four RC drills began in late 2009. Around this same time, the certified international laboratory ALS Chemex Ltd. (ALS) established a sample preparation laboratory at the project site for handling core and RC drill samples. By early 2010, six RC drills and three diamond drills were operating at the project.

In April and May 2010, additional drilling was completed by MBAC in the Canabrava and Domingos zones. In November 2009, MCB Serviços e Mineração Ltda. (MCB) of Belo Horizonte, Brazil prepared a mineral resource estimate for the Itafós Project, based on a 3.5 % P_2O_5 cut-off grade, summarized in Table 6_1.

Table 6_1

MCB Resource Estimate (3.5% P_2O_5 Cut-off Grade)

	Near Mine		Other Areas		Totals	
	Mt	% P_2O_5	Mt	% P_2O_5	Mt	% P_2O_5
M & I	12.84	5.23	-	-	12.84	5.23
Inferred	21.37	-	70.19	5.23	91.56	5.23

A report prepared by MCB comprises information compiled for Sandwell on behalf of Itafós as part of the due diligence requirement for the Reverse Take-Over business arrangement with MBAC in November 2009. This report was submitted to and accepted by the regulatory authorities in British Columbia in November 2009.

In April 2010, Wardrop completed a Mineral Resource Estimate for the Itafós Project as follows:

Table 6_2 Mineral Resources, Near Mine Blocks (2.8% Cut-off grade, April 2010)							
	Density	**Tonnage (Mt)**	**P_2O_5 (%)**	**Al_2O_3 (%)**	**CaO (%)**	**Fe_2O_3 (%)**	**SiO_2 (%)**
Measured	1.54	16.5	4.4	9.1	7.8	4.4	63.4
Indicated	1.54	11.8	4.2	9.0	7.6	4.2	63.1
M & I	1.54	28.3	4.2	9.0	7.6	4.2	63.1
Inferred	1.55	4.2	4.1	8.7	6.5	4.6	65.0

In April 2010, Wardrop also issued Inferred Mineral Resources for five outlying areas estimated using a 2D polygonal method:

Table 6_3 Inferred Mineral Resources for Five Outlying Areas		
	Tonnage (Mt)	**P_2O_5 (%)**
Avião	554,000	5.66
Brejo	14,377,000	6.00
Canabrava	30,925,000	6.12
Cabeçuda	807,000	4.75
Domingos	10,897,000	6.04
Total	**56,930,000**	**6.05**

AMS has not reviewed these historical mineral resource estimates although significant drilling and updated mineral resource estimates have been completed since the disclosure of the mineral resource estimates listed in the tables above.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The western limits of the Bambuí basin along the Proterozoic crystalline basement are marked by a N-S trending erosional discontinuity with the phosphate mineralization being hosted in laminated and sub-horizontal siltstone, phosphorites and silexites (silica-rich units); the sequence also includes lenses of dolomite, limestone and immature chemical sediments.

At this region, the Bambuí group was affected by asymmetrical folding, with eastward convergence, formed under compressive ductile-brittle conditions developed as part of a thin skinned crust and fold belt overlying the western margin of the São Francisco Craton. The metamorphic grade in the craton basement varies from greenschist to mid-grade metamorphism.

On a regional scale, the development of the higher-grade P_2O_5 mineralization in the Bambuí sediments is associated with slumping and early diagenetic features.

According to the geological maps available at 1:100,000 scale (Monte Alegre de Goiás and Nova Roma charts – CPRM 2007), from top down the Bambuí Group comprises the following units:

- Lagoa do Jacaré Formation: Marls, siltstone and limestone (oolites and pisolites).

- Serra de Santa Helena Formation: Siltstone (argillaceous and laminate) and fine rhythmite, with massive siltstone and very fine sandstone intercalations. This unit represents a relatively deep and calm water environment.

- Sete Lagoas Formation (host to the mineralization): Comprises four sub-units deposited in a sub-coastal environment primarily marls, dolomites, limestones and a lower marl-siltstone sequence.

- Jequitaí Formation: The lowest unit formed by diamictites with intercalations of pelites and sandstone (glacial deposition).

7.2 Project Geology

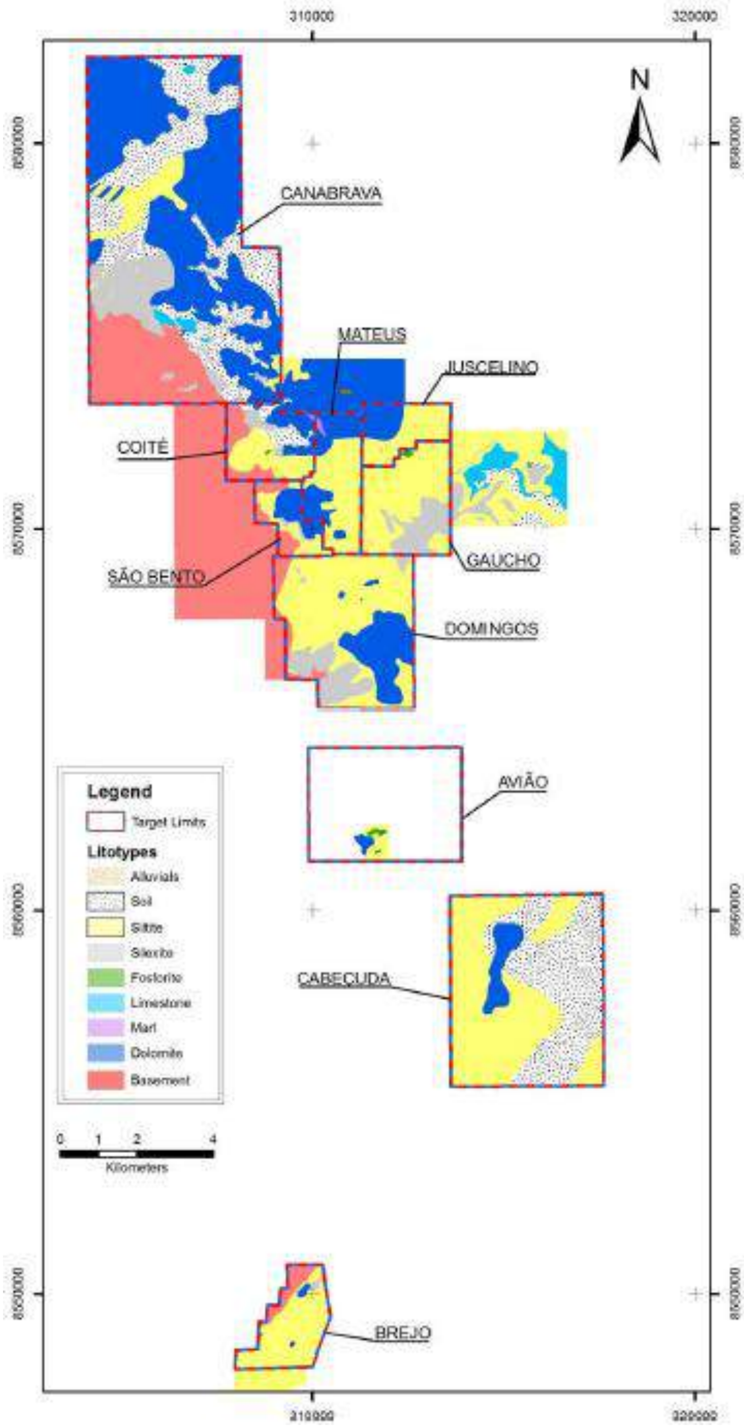
Phosphate mineralization on the project property occurs in lower siltstone sections of the Sete Lagoas Formation belonging to the Bambuí Group, a Neoproterozoic carbonate sequence that developed in an intra-cratonic basin on the margins of granitic craton basement (São Francisco craton). The favourable siltstone sequence has been identified for several tens of kilometres to the N and S of the original Itafós mineralization and host several other phosphate occurrences in addition to those around the Itafós Project.

In the project area, silica-rich boulders are common and have been mapped as silexites. These areas were initially considered as sterile for phosphate mineralization, but samples collected by MBAC have returned high-grade P_2O_5 results.

Despite the staged mineralization events contributing to the remobilization of silica and phosphate, the overall geometry of the mineralization is stratiform with local zones of less continuous breccia material.

Other occurrences of sedimentary phosphate close to the Arraias-Campos Belos area in northeast of Goiás (also considered as part of the Sete Lagoas Formation) were found in Monte Alegre de Goiás and Nova Roma (East, North and Central blocks). Other less important occurrences of phosphate-rich rocks are known to occur within the Serra da Saudade Formation (Bambuí Group), nearby the cities of Formosa and Cabeceiras, both in Goiás and Coromandel in the Minas Gerais state of Brazil.

Figure 7.2_1
Project Geology Map



The phosphate mineralization is shown in the figure below hosted in a flat lying siltstone unit.

Figure 7.2_2
Outcrop showing main Phosphate Bearing Siltstone

7.3 Mineralization

Phosphate mineralization at Arraias is found exclusively within a basal siltstone unit of the Sete Lagoas Formation of Neoproterozoic age lying directly on granitic basement. On section, this basal contact appears as an undulating or locally rolling surface (possibly related to local embayments or paleo-channels developed over basement structures); however the overall pattern of mineralization can be described as stratiform. Within MBAC's claim boundaries (Near Mine and Regional), the host siltstone unit covers some 281 km^2 of area, with the principal Near Mine blocks approximated to have an area extent of ~48 km^2.

Some broad geometric parameters of the siltstone-hosted phosphate mineralization in the Near Mine Blocks of interest to define a mineral resource are summarised below:

- Total Near Mine Siltstone defined: 48.2 km^2
- Siltstone Unit Thickness: 10 to 75 m
- Mineralized Thickness: 2 to 35 m (2 % P_2O_5 cut-off)
- High-Grade Breccia Thickness: 1 to 6 m (10 % P_2O_5 cut-off)

8 DEPOSIT TYPES

The phosphate deposits in the project area are sedimentary-hosted, deposited in a restricted marine environment during regressive-transgressive cycles of sea levels. Paleo-channels or embayments within the granitic basement may have had some influence on the distribution of the mineralization.

The depositional environment of the phosphorites was such that block collapse and disruption in a compressive environment caused landslides on flank channels, which in turn promoted escape features and reworking of sediments that generated sedimentary breccias. The evolution of weathering processes led to lateritization of the phosphorites with phosphate leaching and re-deposition.

Based on thin section descriptions, observation of the local geology and research investigations, current opinion favours a syngenetic origin for the mineralization within the siltstone horizons, with some secondary processes producing local zones of higher-grade mineralization. This “secondary enrichment” has been attributed to:

1. Syn-sedimentary reworking of a portion of the chemical sediments;
2. early diagenetic circulation of low temperature (> 200 ^{o}C) hydrothermal fluids;
3. recent lateritization caused by weathering and/or
4. possible remobilization caused by hydrothermal fluids circulating along fracture and fault structures.

Local “breccia” zones, principally in the Coité deposit, host the higher-grade mineralization that has been the source of the small-scale production to date, however it is the adjacent and lower grade mineralization that will be the source for MBAC’s expansion plans.

In summary; the phosphate deposits of Itafós Project can be classified as sedimentary-hosted with some characteristics of upwelling models, with local secondary enrichment related to weathering or possibly circulation of hydrothermal solutions along fracture structures into lower crystalline basement rocks.

9 EXPLORATION

In 2008, MBAC commenced regional exploration and claims staking along the favourable siltstone-basement for approximately 50km to the N and 150km to the S of the Near Mine blocks. Two new zones were discovered at Covanca and Lucia. Exploration activities included:

- Geological mapping at 1:20,000 scale and surface sampling along roads and tracks to identify new exploration targets;
- Acquisition of government-sponsored airborne geophysical survey data (with radiometrics) to assist geological mapping
- Regular surface sampling over the targets, trenches and isolated shallow pits;
- Mechanical Auger drilling at 25 m x 25 m or 50 m x 50 m spacing, typically down to 10 m depth, over sub-cropping phosphorites;
- Aster satellite imagery acquired for regional exploration work;
- Detailed topography surveying using total station units with accuracy to 1 m;
- Several ground geophysical methods tried to assist with target screening ahead of drill programs, basement mapping, etc., with inconclusive results. Methods tested were GPR, resistivity and seismic, however none of these produced conclusive results that could be used with confidence to assist bedrock mapping or interpreting potential zones of mineralization, such as the breccias zones, prior to drilling.

9.1 Bulk Density Determinations

MBAC has taken a total of 1238 bulk density determinations from weathered and fresh DC (Mateus and Gaucho).

Bulk Density measurements were undertaken by MBAC technicians using the following procedure:

- 20cm full core is wrapped in plastic film on the drill rig;
- Sample is weighed wet and then dried in a small oven;
- Dry core sample is weighed on electronic scale to determine mass of dry core and then weighed immersed in water to determine the volume (Archimedes method);
- Both wet and dry bulk densities are then determined.

AMS revised the density data utilised which prior consultants removed outlier data prior to determining the average bulk density. The Dry bulk density used in the resource estimation is summarized in the following table:

Table 9.1_1
Bulk Density for Itafós Project

Material	Density g/cm^3
Overburden	1.70
Siltstone	1.53
Breccia	2.28

10 DRILLING

Table 10_1 sets out the Reverse Circulation (RC) and Diamond Core (DC) drilling completed until November 28th, 2011 on the property. Drilling was completed by two principal companies contracted in Brazil:

- Geológica Serviços de Sondagem: Core drilling with Sandwick UDR 200 drill rigs and HQ (67 mm) diameter core.
- Servitec: RC using Atlas Copco R50 rigs and 5.375 inch (") drill bits.

Table 10_1
Summary Drilling Statistics for Itafós Project
As of 28 November 2011

Method	Campaign	Number of Drillholes	Metres Drilled
Diamond Drilling	2008	198	7,013.6
	2009	373	14,505.3
	2010 - 2011	186	5,522.5
TOTAL		**757**	**27,041.4**
Reverse Circulation	2008	0	0
	2009	3	63
	2010 - 2011	1,158	41,903.9
TOTAL		**1,161**	**41,966.9**

Drilling has been completed on a square grid basis as follows:

- Coité & Juscelino: 25 m x 25 m in the core areas of breccias mineralization, 50 m and 100 m towards the deposit fringes.
- Mateus North & Central: Some 25 m grid for higher grade areas, balance at 50 m and 100m.
- Mateus South: 100 m grid.
- Gaucho: 50 m, 100 m and 200 m on fringes.
- Canabrava and Domingos: 100 m grid, 400 m grid on fringes.
- Avião, Brejo, Cabeçuda: 400 m grid.

All drilling has been undertaken and/or supervised by MBAC technical personnel.

Figure 10_1
Typical Concrete Collar Marker - Twin Holes (DOMI-RC242 & DOMI-DD0020)

MBAC completed a Rotary Air Blast (RAB) drill program in 2006 to early 2007, to test for mineralization at depth below the surface showings. This scout drilling campaign did not follow a regular grid and usually reached no more than 20 m deep, often stopping due to high moisture content. The results of this drilling campaign were not properly documented and RAB results showed downhole contamination / smearing. Therefore, these results were not included in the Mineral Resource Estimate.

10.1 RC Drilling

Drilling was contracted to Servitec Sondagens. RC Drill rigs used on the project included an Explorak R50 RC rig and a 5.5 inch face sampling hammer.

Holes were drilled vertical and have not been surveyed downhole. AMS does not consider that these holes would deviate enough to make a material difference.

Observations:

- Samples taken and weighed on meter by meter basis;
- Cyclone is cleaned on a rod by rod basis;
- Samples split to around 3kg via a single tier splitter;
- Logging of alteration, lithology and weathering;
- Hole collar coordinates picked up utilising a hand held GPS (accuracy +/- 10m).

10.1.1 RC Drilling Results and Quality

On inspection of the bag farm AMS noted that a large number of RC samples were saturated (Figure 10.1.1_1below). The exact amount is not known as the sample humidity has not been clearly identified in the database (This is now in progress as it has been recorded for new RC drilling) AMS estimates that around 20% of RC samples are wet.

Figure 10.1.1_1
Wet RC Samples at bag farm

This is a material issue as wet RC samples in the saprolitic material can ultimately create a sample bias. AMS has seen examples of phosphate being washed out of the sample (such as Apatite mineralisation along fractures) which ultimately can result in underestimation of the phosphate grade.

A total of 8 twin holes (RC and DC holes within 5m) have been undertaken to allow a comparative analysis of the results to determine the precision of the RC versus the DC. The comparative results can be seen in figures 10.1.1_2 to 10.1.1_9.

Figure 10.1.1_2
Twin Drill Results - (DOMI-RC-0124 & DOMI-DD-0016, 2.78m apart)

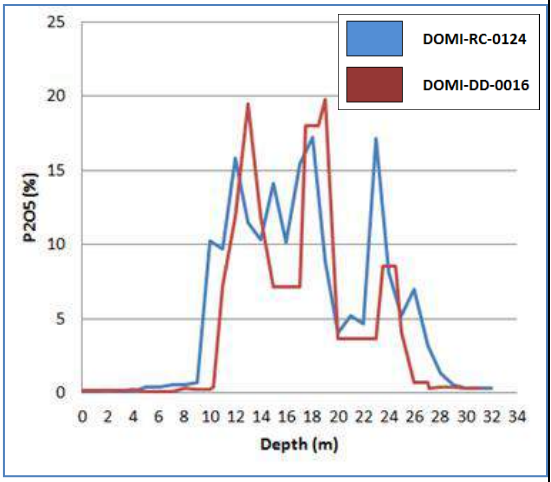


Figure 10.1.1_3
Twin Drill Results - (DOMI-RC-0200 & DOMI-DD-0014, 2.05m apart)

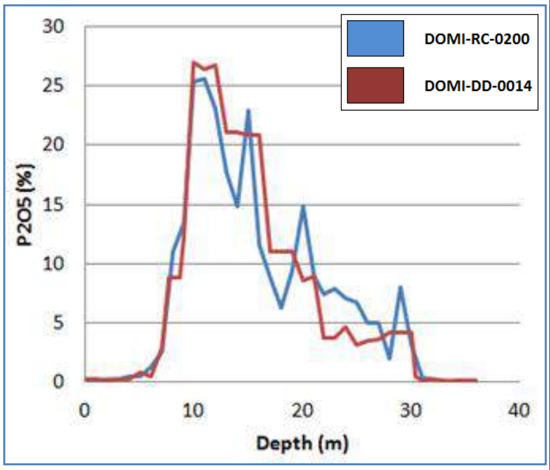


Figure 10.1.1_4
Twin Drill Results - (DOMI-RC-0197 & DOMI-DD-0015, 2.60m apart)

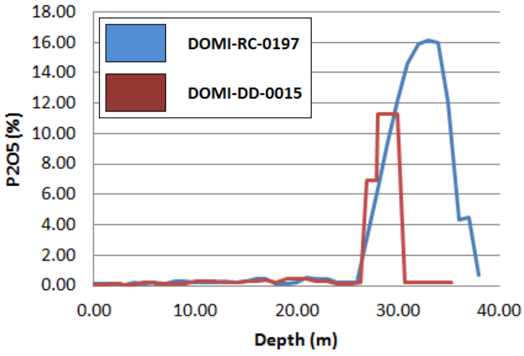


Figure 10.1.1_5
Twin Drill Results - (DOMI-RC-0241 & DOMI-DD-0024, 3.15m apart)

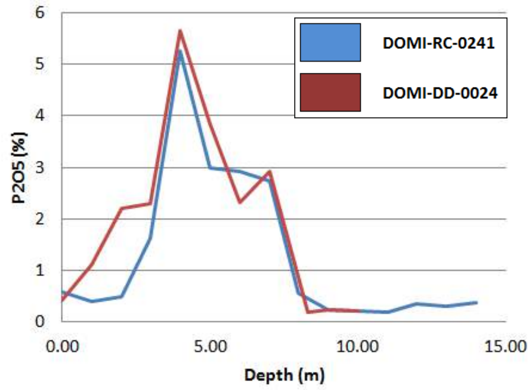


Figure 10.1.1_6
Twin Drill Results - (DOMI-RC-0298 & DOMI-DD-0036, 2.80m apart)

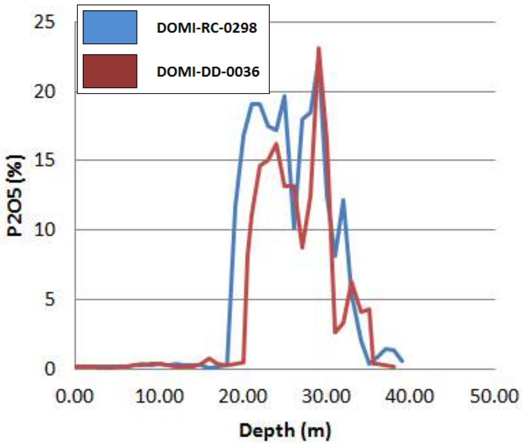


Figure 10.1.1_7
Twin Drill Results - (DOMI-RC-0198 & DOMI-DD-0037, 1.60m apart)

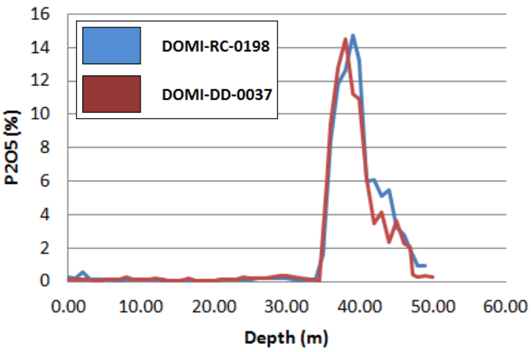


Figure 10.1.1_8
Twin Drill Results - (SBEN-RC-0001 & SD-029, 1.05m apart)

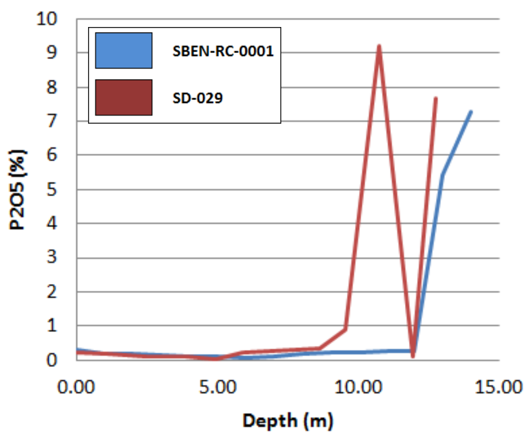
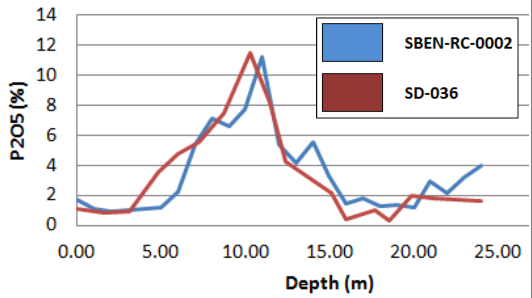


Figure 10.1.1_9
Twin Drill Results - (SBEN-RC-0002 & SD-036, 2.11m apart)



The results of the twin holes as shown graphically in the figures above does not indicate any material bias between the DC and RC.

10.2 DC Drilling

DC drilling was initially conducted by Geosonda who utilised a Chinese rotary drill called Drill XY-4. Productivity was poor after less than 900m drilled, so MBAC changed contractors to Servitec Sondagens. Servitec utilised a Boart Longyear DB-525 and a Maquesonda FS-320. Both Geosonda and Servitec drilling is dominantly HQ sized core with minor NQ sized core utilised on holes greater than 100m in depth and HW utilised to collar some holes.

Holes were drilled vertical and have not been surveyed downhole. AMS does not consider that these holes would deviate enough to make a material difference. Core has not been oriented as all holes are vertical.

Observations:

- Storage of all core in wooden core boxes at drill site and then transported to the base for logging and sampling;
- Run markers with metal tags indicating drilled depth and recovery;
- Measurement and recording of core recovery for each drilling run;
- Photography and detailed logging of core before splitting;
- Detailed logging of alteration, lithology, structures and sulphides;
- Hole collar picked up utilising a hand held GPS (accuracy +/- 10m).

10.2.1 DC Drilling Results and Quality

From observations of drilling and 6 drillholes reviewed during the site visit, AMS noted that MBAC DC procedures are to high quality with > 85% recovery returned in both saprolite and fresh material.

AMS considers the DC drilling procedures to be of an acceptable industry standard.

Significant drill results have not been individually reported as this is a mineral resource estimate and would involve an extensive table that is summarised in the resource section of this report. Drilling was orientated to enable perpendicular intercepts of the main trend of mineralisation but once again the three dimensional modelling has ensured that this is accounted for.

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

The Itafós Project sampling programs have followed acceptable industry good practices as briefly summarized in the following paragraphs.

11.1 Sampling Method

11.1.1 Diamond Core

MBAC geologists supervised all core sampling undertaken. Core samples were taken normally on 1m intervals with some taken between 0.75 m and 1.25 m intervals based on the geological logging.

Core is split in half using a blade in the weathered material and via a diamond saw in the fresh material. The ½ core is bagged and sent for preparation while the remaining ½ core is returned to the core box and a ply wood lid is nailed on and the box is stored for future reference.

AMS recommends that the practice of irregular sample intervals should not be continued. The mineralization in the Itafós Project is often subtle with no clearly defined visible geological controls and as such a regular 1m sample interval for all the drill core is recommended.

11.1.2 Reverse Circulation

MBAC utilise a single tier riffle splitter and pass the dry sample approximately 3 times to get a 3kg sample. AMS have recommended that MBAC purchase or fabricate a 3 tier riffle splitter to reduce the work load and reduce potential error. The single tier splitter MBAC was utilising was of poor design.

Figure 11.1.2_1
Single Tier Splitter

Figure 11.1.2_2
Typical 3 Tier Splitter Recommended by AMS

For wet RC samples MBAC are drying the full sample in an oven (on a flat galvanised tin surface) and then using a quartering technique to determine a 3kg sample. AMS recommended that they utilise the riffle splitter for all bar saturated samples. AMS also recommended utilising a spear technique to sample the wet samples, but more importantly AMS recommended that the wet samples be removed from contention by increasing the drill rigs air capacity (by either employing a bigger compressor or adding a booster unit).

Figure 11.1.2_3
Original Wet RC Sample

Figure 11.1.2_4
Wet Samples Drying in Oven

Figure 11.1.2_5
Manual Quartering

11.2 Sample Security

All half core (HQ size) is kept in three row wooden boxes with an average capacity 3m of core per box. Complete holes are stored according to hole/box number and by drill sector in core rack modules. All drill holes are individually catalogued and their exact locations noted.

Figure 11.2_1
Core Storage at Site

Figure 11.2_2
Pulp Storage at ALS Site Lab

Core storage warehouses at site have the capacity for 40,000m of HQ core. Reject samples are placed in bags and stored at the site. Pulp samples are kept at the assaying facility of ALS in Belo Horizonte. Assaying is carried out at either ALS or SGS Geosol laboratories; both recognized assay laboratories at an international level that operate within all the necessary standards and certifications for the mineral exploration industry.

Figure 11.2_3
Reject Sample Storage at Site

11.3 Laboratory Sample Preparation and Analysis

The drill samples from the 2008 and most from 2009 were securely sealed, bagged and trucked by MBAC and ALS staff to the ALS laboratory located in Belo Horizonte. Here all sample preparation from rock to final pulp was completed. Final pulps were then sent to the ALS laboratory in Peru for assaying.

In late 2009, ALS was contracted to set up a sample preparation facility at the project site under contract to MBAC; the preparation laboratory has a capacity of approximately 200-300 samples per day.

In brief, the preparation procedure involves:

- Two stages of coarse and fine crushing to 2 mm (10 mesh), pulverising to -200 mesh and followed by riffling to produce a 10 gram sub-sample for shipment;
- The samples are prepared in a clean, covered facility in the MBAC office compound facility near Campos Belos;
- Cleaning of all equipment by compressed air is carried out after processing each sample and additionally on a periodic basis using crushed quartz;
- Composite rejects of each sample are bagged and stored at the sample preparation facility.

In early 2010, the drill programs were increased substantially with the introduction of up to six RC drills during January, February and March. At this stage, sample preparation requirements increased beyond the capacity of the facilities at site, so samples were sent out to an additional 4 laboratories for preparation and subsequent assaying. These laboratories were:

- SGS Geosol, Belo Horizonte;
- SGS Carajás;
- ALS, Belo Horizonte;
- ALS, Goiás.

11.3.1 Assay Laboratories

The assaying protocols used for assaying at each of these laboratories are summarised in the Table below:

Table 11.3_1 – Assaying Protocols

	ALS		SGS	
Location	Belo Horizonte	Goiás	Belo Horizonte	Carajás
Principal Method	XRF	XRF	XRF	XRF
Fusion	Lithium Tetraborate	Lithium Tetraborate	Lithium Tetraborate	Lithium Tetraborate
Sample Size				
Analysis Method	XRF	XRF	XRF	XRF
Detection Limit, P_2O_5	0.01%	0.01%	0.01%	0.01%

All laboratories use a common fusion step prior to analysis. Each laboratory produces a suite of oxide analyses, plus a Loss-On-Ignition analysis (separate procedure).

11.4 Adequacy of Procedures

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

12 DATA VERIFICATION

12.1 Geological Database

AMS validated the Itafós Project access database using the Gemcom Surpac Software System Database Audit tool with no inconsistencies noted.

A comparison of hardcopy assay and geological logging versus the digital database was performed on a total of 10% of the MBAC drillholes. No errors were identified with the original log and the digital database.

12.2 QAQC

MBAC has set in place a QAQC programme that included the submission of blanks, field duplicates and standards.

MBAC undertake quality control at approximately 10% of the total samples prepared. This includes three blanks, three duplicates and three certified standards for every 90 rock samples. The first sample in each lot should be a blank to check that the system was clean.

Several control procedures have been in place to varying degrees of consistency during the MBAC exploration programs beginning in early 2009. The earlier parts of the program in 2009 relied mainly on insertion of field blanks and internal laboratory procedures to monitor QA/QC. Beginning in late 2009, a consulting company (Wardrop) provided input into this QAQC procedure.

The quality control measures applied at MBAC have been as follows:

12.2.1 Certified Standards and Blanks

Certified Standards

In late 2009, an internal standard was prepared from siltstone mineralization collected from São Bento pit outcrop and prepared as a pulp standard material at the laboratories of the state laboratory facility in Brasilia, METAGO. In January 2010, homogenized sub-samples were shipped to six round-labs laboratories (ALS and SGS) of which only two laboratories have returned results. Until all the round-robin analyses are received from the external laboratories, the METAGO internal assays of the six sub-samples shipped have been used as the average standard values shown in Table 12.2.1_1.

Table 12.2.1_1
Series #1 Standard Statistics

Initial Standards	% P_2O_5		
	Average	SD	Variance
P1	1.31	0.015	0.0002
P2	5.93	0.047	0.002
P3	8.47	0.080	0.006

With the significant increase in drilling for resource estimation (some 27,000 m between late 2009 and March 2010), additional standards material was required. With drill core again from São Bento, the SGS Geosol laboratory (Belo Horizonte) was contracted to prepare and certify three standards with sub-samples sent to 10 domestic and foreign labs for round-robin analysis. Averages from results received to date have been used to monitor accuracy (one standard every 25 samples), results are shown in Table 12.2.1_2 below.

Table 12.2.1_2
Series #2 Standards Statistics

Latest Standards (2010)	**Labs**	**% P_2O_5**		
		Average	SD	Variance
PFA	6	12.99	0.157	0.025
PFB	6	2.49	0.034	0.001
PFM	3	11.09	0.200	0.040

Note: Padrão Fosfato Alto (PFA), Padrão Fosfato Baixo (PFB) and Padrão Fosfato Médio (PFM) refer to high, low and medium grade standards.

The control charts covering the most recent 2010 drilling are shown from Figure 12.2.1_1 to Figure 12.2.1_9 for both RC and DD drilling campaign and show the one and two standard deviations (SD) on either side of the average grade for the standard results.

In the case of RC drilling, the control charts demonstrate good accuracy within two standard deviations either side of the mean for both low and high grade ranges. Monitoring using the standards has not identified any samples or lots of samples requiring re-assaying.

AMS prepared the charts from data provided by MBAC staff and checked for accuracy against the certificates for the corresponding sample data MBAC utilized mainly 3 standards (these standards have been prepared and certified by SGS- Geosol) which were analysed by AMS.

Except for the PFB standard in the diamond drilling campaign, in general the standard assay result indicated acceptable accuracy was being achieved, with the majority of standards falling within 80% of the Standard Tolerance Values (Table 12.2.1_3). The problems observed with PFB are potentially associated with poor equipment calibration. The minor outliers identified are potentially associated with sample submission errors (mixing of samples).

<u>Blanks</u>

Blank sample inserted every 40 samples at the sample preparation stage. The blank sample consists of silica quartz material collected from outcrop in the project area. A total of 399 blanks have been submitted in the sample stream since late March 2009.

AMS performed an analysis on blanks data provided by MBAC. The blank material was sourced by MBAC from un-mineralized Itafós Project Granites collected at one specific site at the project and submitted at a frequency of about five percent (in the beginning of every hole/batch).

There are results for blanks up to 0.27% of P_2O_3 with the average of the results being 0.012% for RC and 0.015% (majority of the blank samples returning results <10ppb Au) as can be seen in Table 12.2.1_3. The following causes are possible for the minor outliers:

- The blank material used had variable background P_2O_3 values (this is the most likely cause as the blank material was sourced from a local granite source);
- There is contamination in the sample preparation stage;
- There is sampling handling errors either in the field or at the laboratory.

Overall the blank data is within acceptable limits. The results are presented in Figure 12.2.1_1 and Figure 12.2.1_2 below.

Table 12.2.1_3
Standards Utilized by MBAC
Submitted Blanks and Standards (Date Range)

Standard Name	Expected Value (EV) (%)	+/- 2SD (EV) (%)	Drill Type	No of Analyses	Minimum (%)	Maximum (%)	Mean (%)	% Within +/- 2 SD of EV
MBAC Submitted Blanks								
Blank	0.01	0.00 to 0.045	RC	336	0.005	0.27	0.012	97.32
Blank	0.01	0.00 to 0.048	DD	63	0.005	0.16	0.015	95.24
SGS Certified Standards								
PFA	12.99	12.74 to 13.24	RC	86	12.7	13.25	12.94	96.51
PFM	11.09	10.84 to 11.34	RC	115	10.77	11.50	11.18	86.08
PFB	2.49	2.42 to 2.56	RC	320	2.39	2.61	2.51	92.19
PFA	12.99	12.69 to 13.29	DD	3	12.7	13.00	12.85	100.00
PFM	11.09	10.90 to 11.27	DD	9	11.05	11.35	11.20	88.88
PFB	2.49	2.43 to 2.55	DD	21	2.48	2.57	2.53	61.90

Figure 12.2.1_1
RC Blank Results

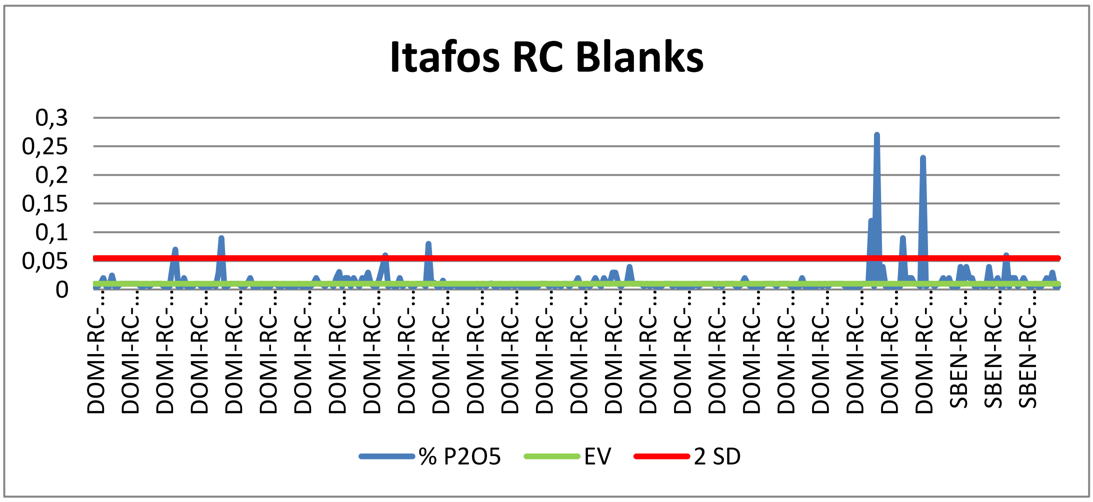


Figure 12.2.1_2
DD Blank Results

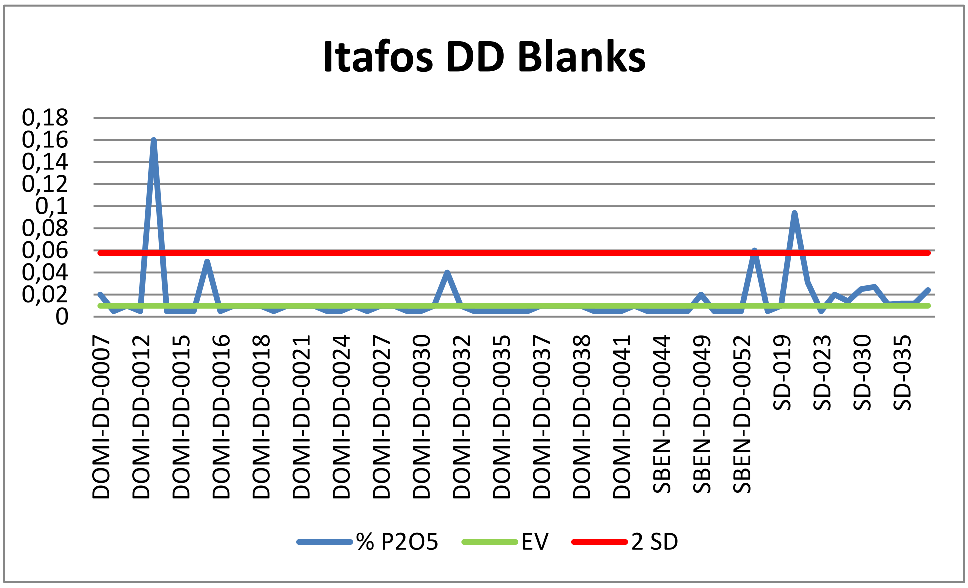


Figure 12.2.1_3
PFA Standard Results for RC Drilling

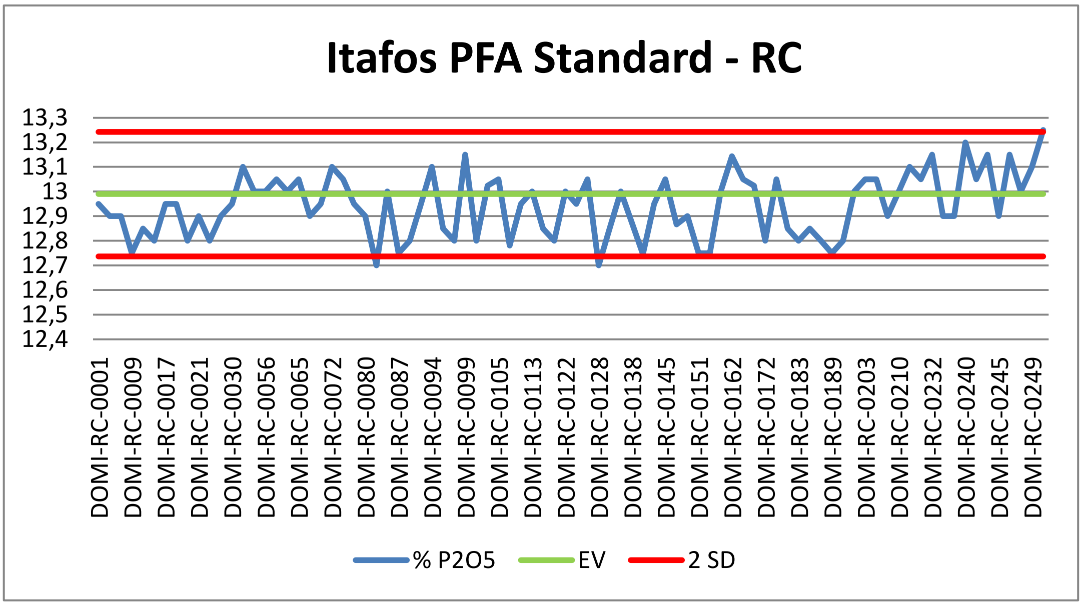


Figure 12.2.1_4
PFM Standard Results for RC Drilling

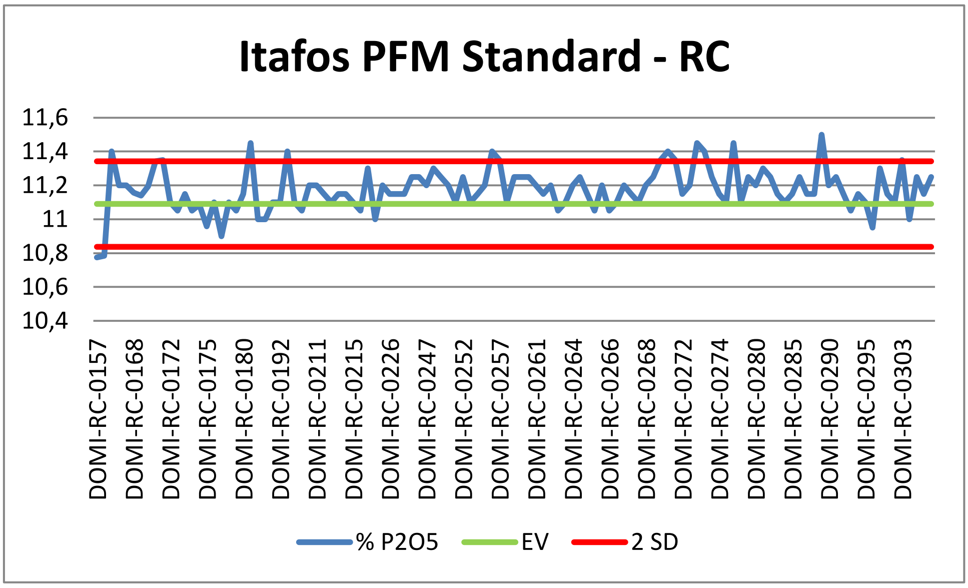


Figure 12.2.1_5
PFM Standard Results for DD Drilling

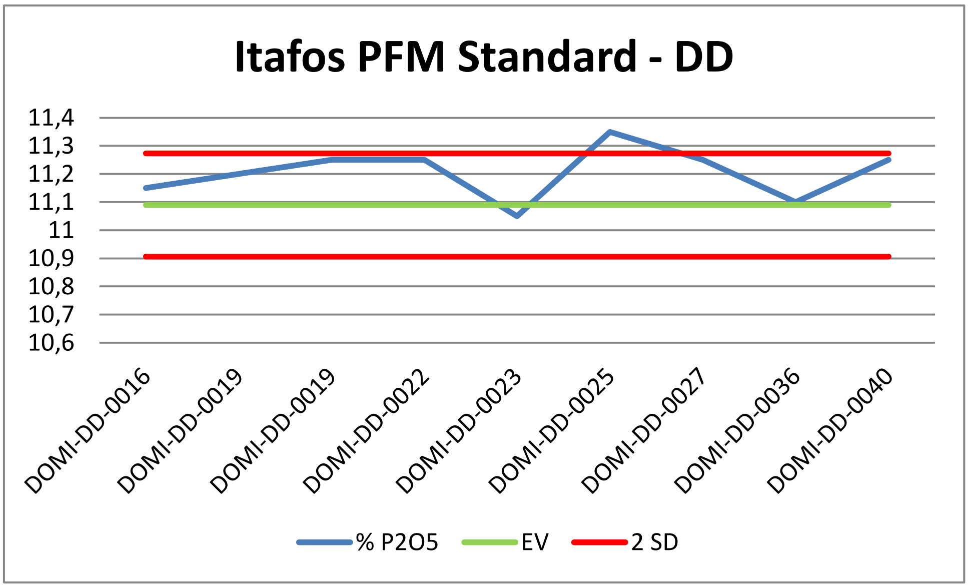


Figure 12.2.1_6
PFB Standard Results for RC Drilling

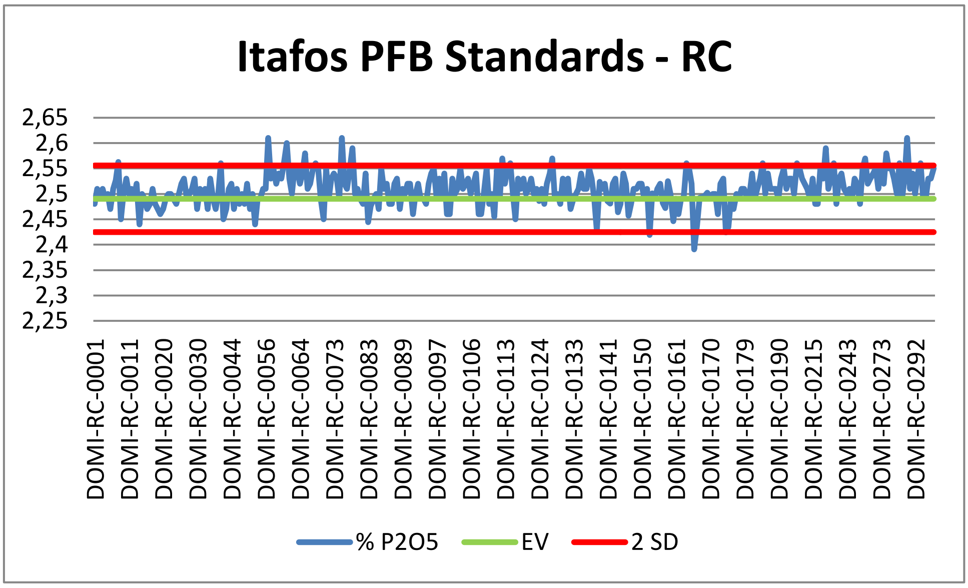


Figure 12.2.1_7
PFB Standard Results for DD Drilling

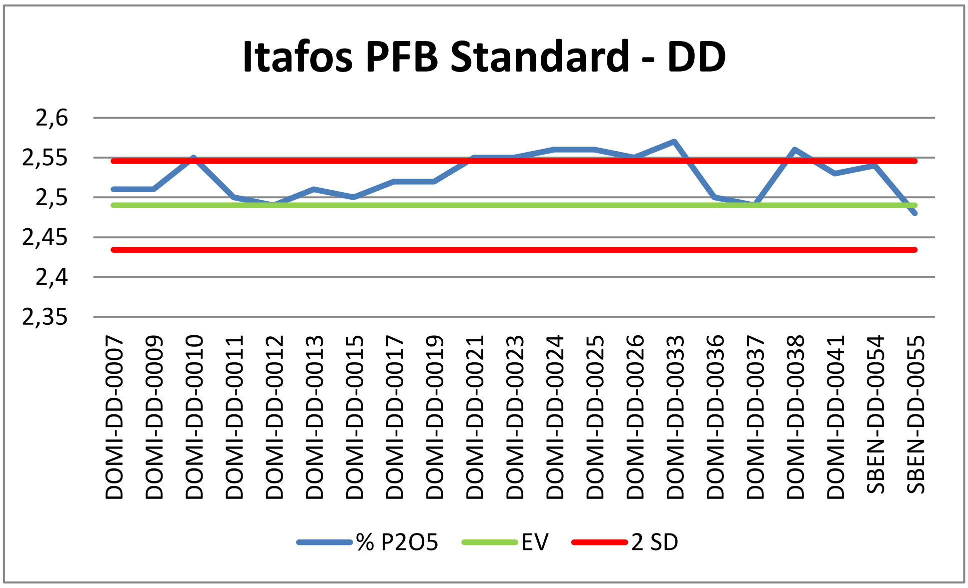


Figure 12.2.1_8
P-1 Standard Results from Series #1 for RC Drilling

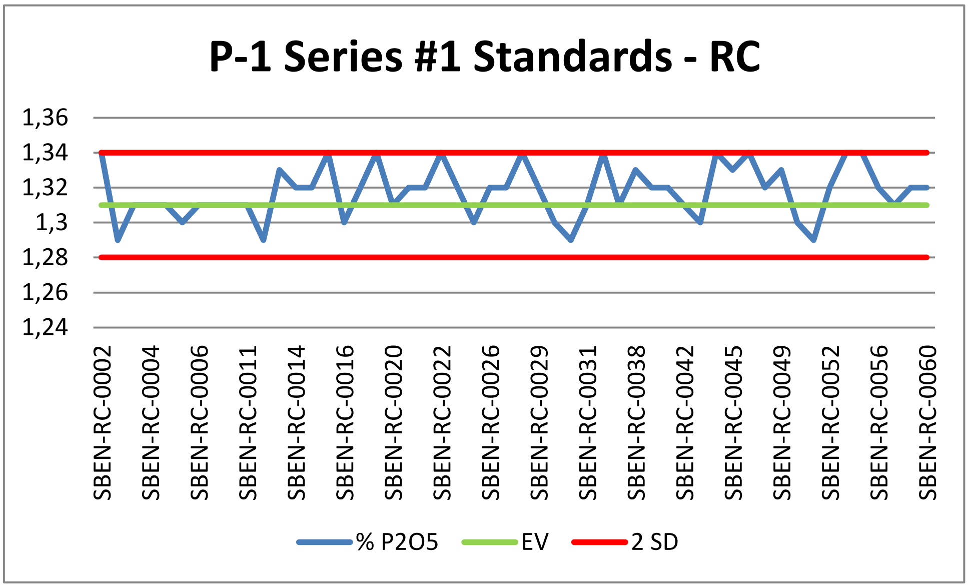
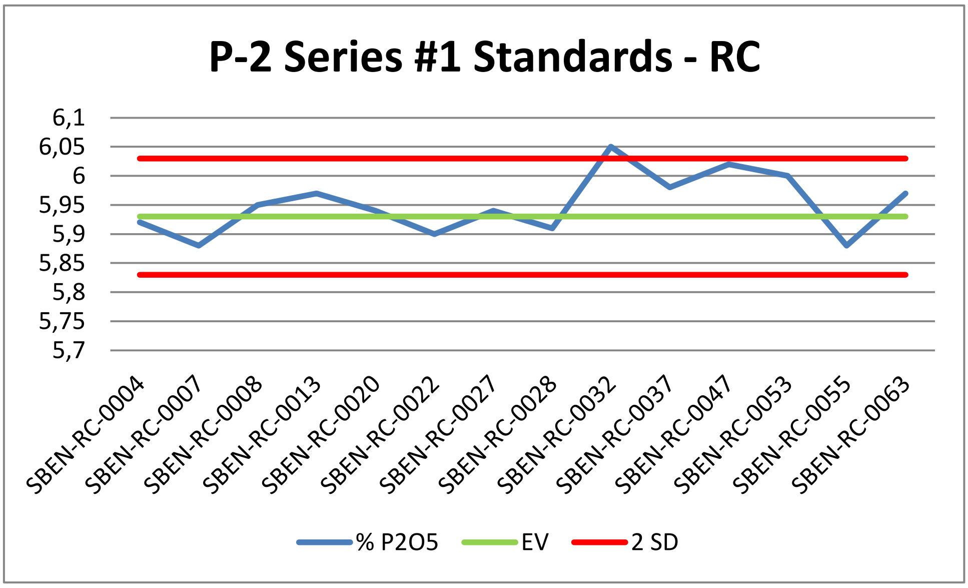


Figure 12.2.1_9
P-2 Standard Results from Series #1 for RC Drilling

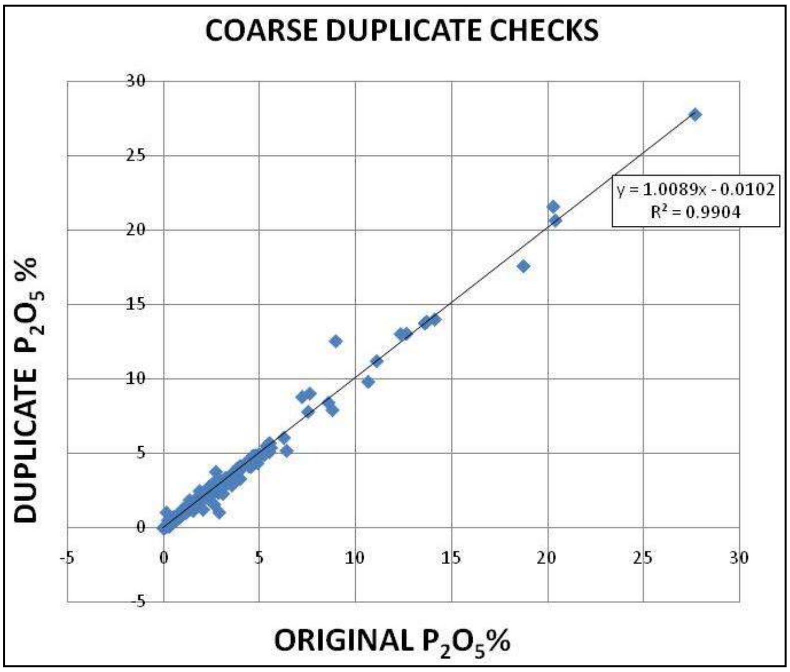


12.2.2 Field Duplicates

The field duplicate data has been analysed by AMS using a number of graphical comparative analyse methods. The objective of this is 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.

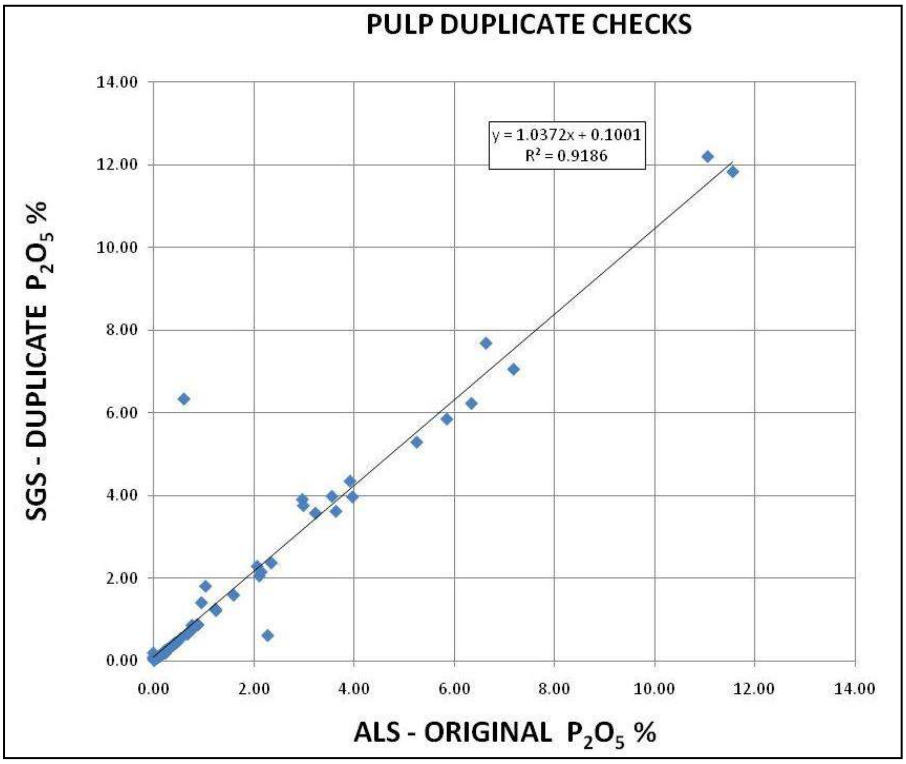
Itafós Project field duplicates were inserted approximately every 40 samples. These field duplicates consist of quartered core material for DC drill samples and coarse reject in the case of the RC samples, both termed Coarse Duplicates here. A total of 562 field duplicates have been re-assayed at a secondary laboratory for comparison against the primary laboratory covering the period March 2009 to early 2010 shown graphically in Figure 12.2.2_1.

Figure 12.2.2_1
Field Duplicate Data (¼ NQ sized Core)



In late 2009, over 200 sample pulps stored at the onsite ALS preparation laboratory were selected from cross-checking of the primary lab (ALS) against a secondary lab at SGS Geosol; the results are shown graphically in Figure 12.2.2_2.

Figure 12.2.2_2
Pulp Duplicate Data



AMS considers the practice of comparing ¼ core with ½ core to not be representative as it does not represent the normal ½ NQ core submitted and creates a bias in the sample size submitted. There is however no bias shown in the results suggesting there is no issue with the precision of the assays.

12.2.3 Data Quality Summary

The QAQC measures employed during the drilling and sampling programs demonstrate good reproducibility using a combination of standards, blanks, coarse field duplicates and pulp duplicates.

The standards data has shown a high accuracy has been returned by the SGS Geosol laboratory although it should be noted that SGS supplied the standards to MBAC.

The field duplicate data determined by the analysis of the ¼ NQ core returned relatively high precision suggesting no sample bias is present.

AMS concludes that the sample database is of sufficient quality and accuracy for use in the subsequent steps of resource estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Metallurgical Testwork

13.1.1 Crushing & Comminution

All of the grinding parameters for the Itafós Project were determined by HDA services in Brazil (1). The mill sized by HDA services was a low aspect SAG mill with dimensions of 16.5' Internal Diameter x 29' EGL and with installed motor capacity of 3500 kW.

13.1.2 Process Flotation Definition

Studies were conducted to evaluate the flotation process route to recover phosphate contained in the siltstone of the Itafos Project targets (Arraias Tocantins deposit) commenced in the second quarter of 2008. Initially two samples from the surface of the Coité deposit were utilised. The first sample had a grade of 6,6% P2O5 and underwent initial bench scale tests. The second sample, weighting approximately 20 metric tonnes, had a P2O5 grade of 4,96%, and was referred to as pile 6, was used initially for bench scale testing and subsequently for a pilot plant campaign using both mechanical and column flotation cells.

The first bench scale campaign involved 300 tests and was conducted in the Goiais state of Brazil at the FUNMINERAL laboratory. The tests conducted by "Geometal" showed that the ore presented a large proportion of phosphate in the finer size fractions and that it was necessary to grind the coarser size fractions to 95% passing in 53 micron. Various reagents systems were tested and at different pH levels. The anionic flotation of the Apatite minerals in the de-slimed ore after grinding showed promising results. Selected results reported for the first cleaner concentrate of the de-slimed sample are presented below in Table 13.1_1.

Table 13.11_1 – Bench flotation results with a sample from Coité mine

Test	Weight	Assay P_2O_5 (%)	Flotation Recovery	Overall Recovery
	(%)	(%)	P_2O_5(%)	P_2O_5(%)
ITA 236	8,2	22,1	50,8	26,7
ITA 240	18,8	23,4	55,2	29,0
ITA 243	21,4	18,0	57,0	30,0
ITA 245	20,0	22,0	65,0	34,2
ITA 249	23,4	23,5	83,2	43,8
ITA 256	21,2	17,5	56,2	29,6
ITA 260	14,6	23,7	52,3	27,5
ITA 261	20,1	21,0	64,0	33,7
AVERAGE	18,5	21,4	60,5	31,8

The bench scale results presented a large variability and the results obtained were worse than those achieved during the pilot plant campaign with the same sample as described below.

Pilot Plant Tests Using Mechanical Cells

At the beginning of 2009, a pilot flotation plant campaign was conducted using mechanical cells. The results of the testing showed that the separation of the natural fines and the generated slimes after grinding the ore improved the concentrate grade of phosphate. One hundred continuous tests were conducted varying the cut size of the de-sliming steps, the amount and type of reagents added, circuit flow-sheet configuration and the grind size. The conventional flotation feed size was at a size of 95% passing 44 micron. It was possible to achieve concentrate grades over 28% of P2O5 during some of the tests conducted. The average concentrate results for the best tests gave an overall P2O5 recovery of 46.5% and with a concentrate grade of 26.2% after flotation of the conventional size fraction.

Table 13.11_1 – Pilot plant results with a sample from Coite Mine

Test	Weight (%)	Assay P_2O_5 (%)	Flotation Recovery P_2O_5 (%)	Overall Recovery P_2O_5 (%)
T53	9,1	25,8	90,3	47,5
T57	9,1	25,2	84,4	44,4
T60	6,9	27,8	70,7	37,2
T61	12,0	24,7	95,7	57,4
T63	7,5	28,8	79,1	41,6
T64	9,4	25,7	91,1	47,9
T73	8,7	26,8	90,9	47,8
T74	9,4	25,1	92,4	48,6
AVERAGE	9,0	26,2	86,8	46,6

Flotation feed contained only 52% of the total contained P2O5 content of the sample. The large amount of the phosphate contained in the finer size fractions indicated that it was necessary to have a process to recover the P2O5 contained in the finer fractions. Flotation tests using the mechanical cells for the natural slimes and the generated slimes gave promising results.

Pilot Plant Tests Using Column Cells

Based on the tests from the mechanical cells, it was decided to test the ore in column flotation cells, which are more appropriate for the treatment of fine minerals. Approximately 6 tonnes of the sample (pile 6) was processed at the FUNMINERAL pilot plant to generate the natural slimes, obtained from the 40 mm cyclone overflow of the crushed ore, the conventional fraction obtained from the 40 mm cyclone underflow of the ground de-slimed ore, and the generated slimes obtained from the 40 mm cyclone overflow of the ground ore. These slurry samples were packed as received from the FUNMINERAL pilot plant and sent to Belo Horizonte for column flotation cell continuous tests at the CDTN laboratory.

The columns tests commenced in May 2009. For each of the three fractions produced the following variables were studied:

- The reagents system;
- Slurry pH;

- Air hold up;
- Bubble size; and
- Circuit flow-sheet configuration.

The overall metallurgical balance achieved when considering the sample preparation and the column concentrates produced is displayed below in Table 13.1_3.

Table 13.1_2 – Overall P_2O_5 recovery from the column pilot plant with a sample from Coite mine

Products	Weight (%)	Assay P_2O_5 % (*)	Recovery P_2O_5 (%)	Test
Feed	100	4,96	100	
Conventional concentrate	8,0	27,6	45,9	FI-51
Generated slimes concentrate	2,8	27,0	11,8	LG-23
Natural slimes concentrate	1,9	14,9	8,5	LN-09

The sample assay of the conventional concentrate considered was obtained from a 6 kg sample used for the magnetic separation tests. Assays of the natural slimes and generated slimes were re-analysed using gravimetric methods in May 2010.

This pilot plant tests showed that the results using column cell flotation were improved compared to use of mechanical flotation cells.

Due to the iron content in the concentrate of 3.38% Fe2O3, that could retrogradate the chemical reaction with sulphuric acid, 6 Kg of the conventional concentrate was submitted for high intensity magnetic separation tests in July 2010 at the Eriez laboratories in São Paulo. It was possible to achieve a non-magnetic product with a P2O5 grade of 28.5% and Fe2O3 grade of 1.98% recovering more than 98.3% of the P2O5 contained in the original feed concentrate.

Additional bench scale flotation tests were conducted in October and December 2009 at the FUNMINERAL Laboratories on a sample of 1 tonne comprising 5% Phosphorite and 95% Siltite collected from the São Bento deposit (5). The testing evaluated the grind size, the necessity to separate produced slimes from the conventional size fractions, cationic flotation to eliminate silica from the concentrates produced, reagents conditioning time, starch utilization requirements, concentrate grade versus P2O5 recovery curve and regrinding of the first concentrate produced with the objective of obtaining a cleaning stage concentrate with a higher P2O5 content.

The results showed that it is not necessary to grind the ore to less than 80% passing 74 microns. The separation of the produced slime from the conventional fractions was important in increasing P2O5 concentrate grades. Cationic flotation of silica did not improve metallurgy. Typical results achieved were a concentrate grade of 26.9% P2O5, recovering 49.5% of the contained P2O5 in the sample (average of results of tests TS5 and TS5R).

Second Campaign of Pilot Plant Tests – Mechanical Flotation Cells

In January 2010 a second pilot plant campaign was conducted to evaluate the optimum feed flotation grind size for a composite sample from the São Bento and Coité deposits. Approximately 20 tonnes of mineralized siltstone from the surface of these deposits was selected based upon the canal assays of the geology. It was used the FUNMINERAL pilot plant and the CDTN column flotation plant as before. The same process flow-sheet was utilized, except that the feed sample was ground coarser, around 80-85% passing 74 microns. The ore was prepared in Goiais to generate the three size fractions which were packed and then sent to Belo Horizonte for the column flotation tests. The following results were achieved. See Table 13.1_4.

Table 13.11_3 – Pilot Plant Column Flotation Results
(composite sample from São Bento and Coite)

Products	Weight (%)	Assay P_2O_5 % (*)	Recovery P_2O_5 (%)	Test
Feed	100	6,48	100	
Conventional concentrate	13,41	26,3	57,2	FI-55
Generated slimes concentrate	3,71	14,0	7,0	LG-29
Natural slimes concentrate	2,9	14,4	6,5	LN-13

Reduction on the grinding size promoted an increase of the P2O5 contained in the conventional fraction. This made possible to produce a higher recovery on the conventional concentrate.

Third Pilot Plant Campaign – Mechanical Flotation Cells

In May and June 2010, another pilot plant campaign was conducted at FUNMINERAL with two samples of siltstone from the base of the Coité deposit, collected at a depth of three meters at various locations of the deposit, to evaluate the metallurgical response according to the P2O5 feed grade. Each of the samples weighted around 15 tonnes, one sample with a grade of 3.6% P2O5 referred to as the "poor" sample and the other sample with a grade of 6.5% P2O5 and referred to as the "rich" sample. The tests were conducted on different blends of both the rich and poor samples. The recovery of P2O5 to the conventional concentrate was also investigated based upon the feed grind size. Table 13.1.5 below presents the results:

Table 13.1.4 – Flotation Recovery of the Conventional Fraction (different blends of rich and poor samples from Coité Mine)

TEST	SAMPLE	FEED	+ 74 MICRA	P_2O_5	FLOTATION	CONV CONCENTRATE	
		GRADE	IN	DISTRIB	RECOVERY	GRADE	DISTR.
		P_2O_5 (%)	CONV (%)	CONV(%)	P_2O_5 (%)	P_2O_5 (%)	P_2O_5 (%)
3	6345	4,5	11,8	50,45	26,36	29,6	13,3
4	6345	4,2	19,5	43,4	73,04	24,1	31,7
5	6345	4,3	14,6	51,43	71,75	23,4	36,9
7	6345	4,9	17,9	50,82	71,23	24,5	36,2
8	RICH	6,1	7,9	54,9	90,71	22,2	49,8
9	RICH	7,0	6,3	53,1	91,34	22,7	48,5
10	POOR	3,6	28,4	58,3	75,13	22,3	43,8
11	POOR	4,0	20,4	54	72,59	23,0	39,2
12	RICH	6,1	10,3	56	80,54	25,1	45,1
13	RICH	6,6	6,6	57,5	84,17	24,0	48,4
14	3340	5,2	12,4	49	81,22	25,2	39,8
15	3340	5,0	7,8	49,2	75,20	25,3	37,0
16	3340	5,4	5	47,2	76,69	21,3	36,2
17	3340	5,3	3,4	39,6	83,84	23,9	33,2
18	3340	4,9	0,2	36,3	85,40	22,8	31,0
19	3340	5,3	0,1	43,8	85,84	22,9	37,6
20	3340	5,1	0,8	40,7	90,91	23,6	37,0
22	3340	4,7	2,1	55,7	85,46	26,1	47,6
23	3340	4,8	2,2	54,6	80,22	24,3	43,8

Tests 1 to 13 were done with the same rod charge used in the rod mill. The rod charge was increased for tests 14 to 20. In tests 12, 13, 22 and 23, the ore was ground and de-slimed once. The following observations were noted:

The poor sample is harder than the rich one. The weight% above 74 microns increased from 7% in tests 8 and 9 to 24% in tests 10 and 11;

Total P2O5 recovery in the conventional fraction does not increase with grind size;

Total P2O5 recovery and concentrate grade of the flotation of the conventional fraction did not change with the different blends.

Better results were obtained when the ore was totally ground and de-slimed once.

Variability Testing of the Different Resource Targets

With the evolution of the mineral resources evaluation a program was initiated to check the variability of the new target materials compared to more developed process. In the beginning of 2010 several mineralized diamond drill core samples from different depths of the Juscelino, Mateus, Coité and São Bento deposits were obtained. These samples weighed around 2 kg each and were separately crushed to minus 4 mm, de-slimed using hydrociclones and the underflow was ground to 80% passing 75 microns and floated in a laboratory flotation cell at the FUNMINERAL laboratories.

Table 13.1_6 below shows the results of selected tests.

Table 13.1_5 – Selected Tests

COITÉ TARGET

Sample	Depth		Head	Rougher Concentrate		Cleaner Concentrate	
	From (m)	To (m)	P2O5 (%)	P2O5(%) grade	P2O5(%) recovery	P2O5(%) grade	P2O5(%) recovery
9497	9,8	12,4	7,4	12,8	63,9	19,2	49,8
9498	2,9	5,1	8,4	13,9	63,4	20,2	56,5
9501	9,7	12,7	5,5	13,3	52,7	21,4	44,8
9508	11,1	13,2	6,3	12,5	66,4	21,1	47,7
9511	17,0	20,6	6,8	14,8	58,1	22,1	48,1
9514	16,8	18,6	5,8	18,7	62,3	28,5	53,1
9518	17,3	19,3	7,7	16,2	65,7	21,6	21,6
9519	19,3	21,8	7,2	14,1	68,0	19,9	19,9
	Averages		**6,9**	**14,6**	**62,6**	**21,8**	**42,7**

SÃO BENTO TARGET

Sample	Depth		Head	Rougher Concentrate		Cleaner Concentrate	
	From (m)	To (m)	P2O5 (%)	P2O5(%) grade	P2O5(%) recovery	P2O5(%) grade	P2O5(%) recovery
9537	6,0	7,3	4,8	17,6	50,4	32,1	42,2
9541	20,9	22,2	8,6	14,7	63,6	23,3	50,5
	Averages		**6,7**	**16,1**	**57,0**	**27,7**	**46,4**

MATEUS TARGET

Sample	Depth		Head	Rougher Concentrate		Cleaner Concentrate	
	From (m)	To (m)	P2O5 (%)	P2O5(%) grade	P2O5(%) recovery	P2O5(%) grade	P2O5(%) recovery
9548	23,4	26,2	8,0	16,7	60,7	25,3	43,2
9550	45,6	48,3	4,5	14,3	56,9	24,4	37,2
9551	48,3	49,4	6,5	15,6	59,0	27,9	31,4
9555	29,7	32,5	7,5	15,8	66,8	23,7	33,3
9560	8,7	11,7	8,5	14,3	50,3	23,8	26,7
	Averages		**7,0**	**15,3**	**58,8**	**25,0**	**34,4**

JUSCELINO TARGET							
Sample	Depth		Head	Rougher Concentrate		Cleaner Concentrate	
	From (m)	To (m)	P2O5 (%)	P2O5(%) grade	P2O5(%) recovery	P2O5(%) grade	P2O5(%) recovery
9590	23,2	25,8	5,6	11,6	70,3	21,1	41,1
9591	31,9	33,6	9,0	16,5	85,4	22,4	44,1
9593	11,3	14,5	7,5	16,1	68,6	24,6	35,5
9597	46,7	49,0	6,4	16,2	54,7	22,1	19,2
	Averages		**7,1**	**15,1**	**69,8**	**22,6**	**35,0**

DOMINGOS TARGET							
Sample	Depth		Head	Rougher Concentrate		Cleaner Concentrate	
	From (m)	To (m)	P2O5 (%)	P2O5(%) grade	P2O5(%) recovery	P2O5(%) grade	P2O5(%) recovery
T128	BLENDED		8,3	16,9	42,7	20,1	35,6
T131	BLENDED		8,3	14,8	49,3	19,1	43,4
	Averages		**8,3**	**15,9**	**46,0**	**19,6**	**39,5**

CANA BRAVA TARGET							
Sample	Depth		Head	Rougher Concentrate		Cleaner Concentrate	
	From (m)	To (m)	P2O5 (%)	P2O5(%) grade	P2O5(%) recovery	P2O5(%) grade	P2O5(%) recovery
T137	BLENDED		5,6	12,6	42,1	19,5	35,6
	Averages		**5,6**	**12,6**	**42,1**	**19,5**	**35,6**

From these tests results it was possible to conclude that the underground material from these targets responded well to the flotation process selected for the original deposits tested.

The results obtained were similar or better than those achieved at bench scale for the first sample, pile 6, indicating the projected metallurgical results at full scale should be similar or better than those obtained for the first sample. Also the Fe2O3 content was low in these tests (< 2.0%). The same processing route was used including a flotation rougher step and one step of cleaning flotation.

Conclusions - Flotation

Several bench and pilot plant tests have been performed over the past two years using material from the main defined resource targets of the Arraias Tocantins deposit. A consistent and reproducible processing flotation flow-sheet was developed to treat the various sources from the deposit. This process allows the beneficiation of phosphate ore containing 4.5% to 6.0% P2O5 to concentrates containing 28% P2O5 whilst recovering 55 to 58% of the contained P2O5.

The pilot tests were conducted using material from the Coité and São Bento deposits, using both mechanical and column flotation cells. In addition to this, samples of drilled material from several other areas of the Arraias Tocantins mineral deposit were tested at bench scale with the results confirming the validity of the process route selected for the entire Arraias Tocantins deposit.

13.1.3 Thickening and Filtration

MBAC commissioned FLSMIDTH to conduct solid-liquid separation tests (laboratory scale tests) on the samples from the flotation concentrates (3) with the objective to direct the technical-economic analysis on equipment purchase for the thickening stage.

Tests were performed on samples produced in the CDTN pilot plant in Belo Horizonte (MG) during March and July 2009.

13.1.4 Technological Characterization

A characterization study on phosphate ore processing samples were conducted by FUNDESPA ("Fundação de Estudos e Pesquisas Aquáticas") via LCT ("Laboratório de Caracterização Tecnológica da EPUSP") for MBAC.

Liberation level studies indicated that approximately 50% of the apatite present is found to be liberated in the conventional flotation feed and concentrate samples. It was also noted that the liberation levels in the +53, -53+37, -37+20 and 20+10 micron size zones do not increase to the finer size zones, indicating that a finer grinding will not be favorable in obtaining concentrates with a higher P2O5 content and recovery.

13.1.5 Acidulation

Acidulation tests were conducted in Prosolo laboratories located in Catalão, state of Goiás from May to September 2009, and in CELQA Analises Técnicas Ltda (which is accredited by Agricultural Ministry located in Sorocaba), state of São Paulo from December 2009 to February 2010.

The tests were aimed at checking the production of single super phosphate ("SSP") from the Itafós Project phosphate rock concentrate in a laboratory scale.

Test results showed that it would be viable to obtain the following single SSP products: ammoniated SSP and sulphur acidulated phosphate and is dependent upon the phosphate rock content.

Conclusions

Considering all the tests performed with several phosphate rock concentrations (P2O5, Fe2O3/Al2O3 or Fluorine) with different granulometry, variations in the A/R ratio and sulphuric acid concentration, it is possible to conclude the following:

9) The production of ammoniated SSP with 1% of nitrogen and 17% of soluble P2O5 in NAC with Itafos' rocks with of 27-28% of P2O5 is viable and it is the most suitable solution for the specific acidulation process. It is possible, with the addition of the ammonium (N), to obtain a product with its quality improved because of its reduced free acidity and because the granules in the granulation plant become harder, allowing for the SSP to be mixed with urea and other raw materials without creating parallel reactions that can provoke the final NPK to become a paste

10) It is also viable to obtain SSP (single superphosphate) with 18% of soluble P2O5 in neutral ammonium citrate, without the addition of ammonia, from rocks with a grades of 28% of P2O5 and lower levels of Fe2O3 (1.5% or below). The solubility of P2O5 in water is close to the limit of minimal guarantee of 15%. This solution was not chosen because the lower flexibility and poor product physical quality.

11) At this point it must be considered that the ammoniated SSP production with 2% of nitrogen and 16% of P2O5 NAC is also one possible option, as it allows for a greater flexibility in regards to the grades of P2O5 and provides even lower free acidity when compared to the chosen solution.

12) It is better to produce SSP from the "pulp" of a phosphate rock with the addition of water before the sulphuric acid dosage, to optimize the process reactivity.

13) Rock with granulometry 95% below the 200# is adequate to the process reactivity.

14) With low fluorine levels in the phosphate rock, the emissions of this effluent are easier to be absorbed in the gas scrubber system.

15) The sulphuric acid consumption is lower than the usually utilized in other rocks to obtain the best possible conversion.

16) The optimum sulphuric acid concentration is equal or inferior to 65% to guarantee an aqueous phase, appropriated to the process reactivity.

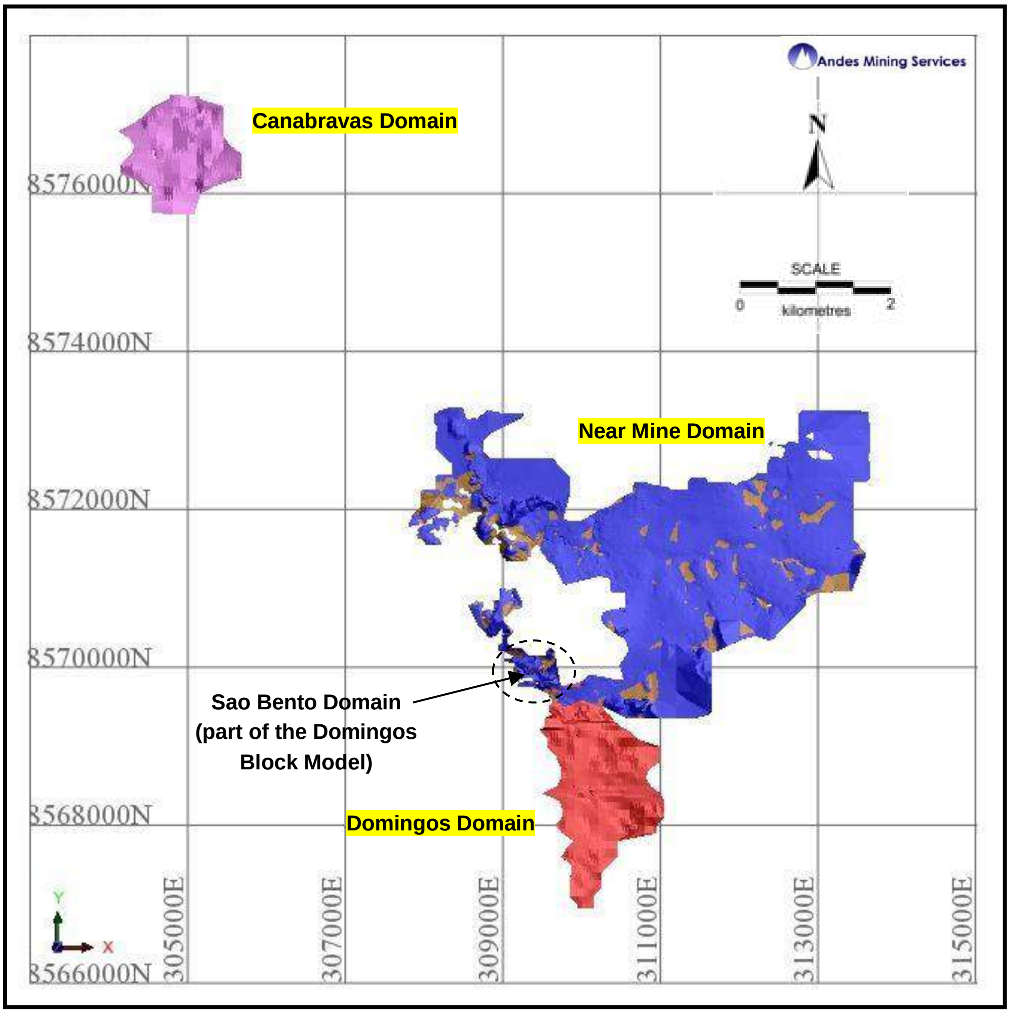
14 MINERAL RESOURCE ESTIMATES

14.1 Introduction

AMS has reviewed the Mineral Resource Estimates competed for the Itafós Project as follows:

- Near Mine Domain – Completed by Callum Grant (Wardrop) in July 2010;
- Domingos Domain (includes Sao Bento) – Completed by Leandro Silva (MBAC) in November 2011;
- Canabrava Domain – Completed by Leandro Silva (MBAC) in November 2011.

Figure 14.1_1
Plan View of Block Model Domains



14.2 Near Mine Block

The original block model completed by Wardrop 2010 has been utilized for resource reporting across the Near Mine domain discussed in the following section below.

14.2.1 Drill Hole Database

The original Near Mine domain was modelled by Wardrop on data received from MBAC comprising of 612 diamond drill holes and 650 RC drill holes equalling 28,673 assays and 2,207 density values. At the time assay values for 135 drill holes were outstanding.

The updated block model by Wardrop in July 2010, includes this original data, plus the outstanding assay values from the 135 RC drill holes, plus an additional 14 drill holes (12 diamond drill holes and two RC drill holes). Additionally, six drill holes were re-sampled and the new values were updated in the database.

The complete database, received from Itafós, consisted of 624 diamond drill holes and 652 RC drill holes for a total of 1,276 drill holes.

The database consisted of a total of 33,795 assay results.

<u>DATA VERIFICATION</u>

Wardrop reviewed the 135 new assay results and the assay results of the 14 drill holes.

A 10% check was made of these assay values and found that the errors in the database were <0.01%.

The errors were found in the sample interval lengths and corrected in the database.

14.2.2 Geological Interpretation

The deposit geology for the Near Mine Domain was modelled using the lithological coding from the drill hole data to define three main rock types: Soil, Siltstone and Breccia.

Triangulated surfaces were modelled representing the base of the soil profile and the base of the siltstone package. The two minor breccia units were modelled on section using lines to create triangulated wireframes (Figures 14.2_1 and 14.2_2).

The topography surface was modelled using 1m contour data provided by Itafós which covered most of the investigated area. Outside of the available contour data the elevations of the drill hole locations were used to extend the topographic surface over the entire investigated area.

The wireframes were used to code a block model with rock codes (soil, siltstone and breccia).

AMS reviewed the geological coding as specified by Wardrop (2010) and conclude the data is sound with no material errors noted within the dataset.

Figure 14.2_1
Near Mine Domain; Soil Wireframe (Clipped to topography)

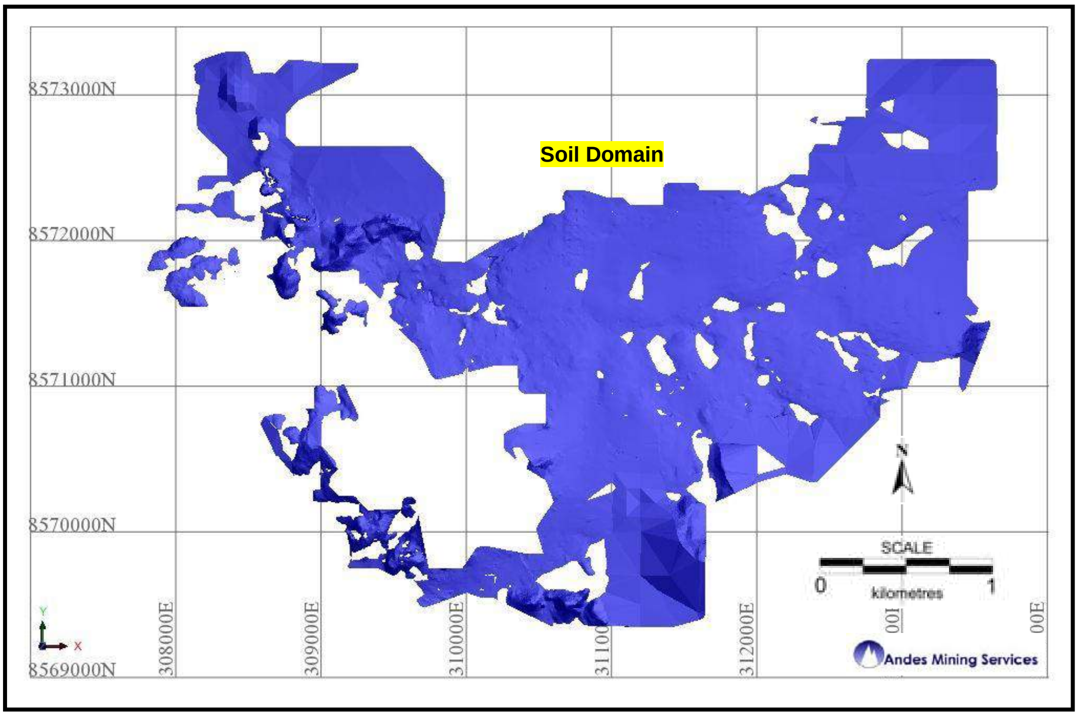
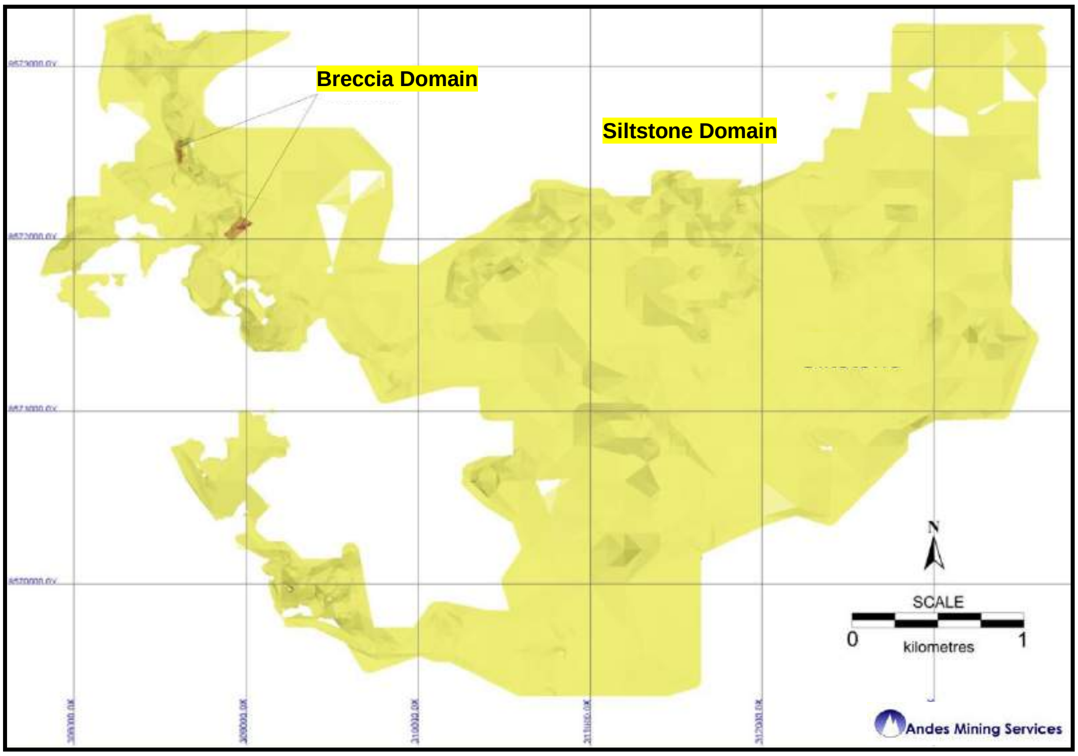


Figure 14.2_2
Near Mine Domain; Siltstone and Breccia Wireframes (Clipped to Topography)



14.2.3 Data Analysis

Assays

Wardrop completed descriptive statistics on the raw assays received from MBAC, and this data is presented below in Table 14.2_1.

Table 14.2_1 – Descriptive Statistics on Raw Assay Drill Hole Data (No Zeroes)

	Length	% P_2O_5	% Al_2O_3	% CaO	% Fe_2O_3	% SiO_2
Valid cases	33,795	33,795	33,794	33,794	33,794	33,794
Mean	**1.29**	**1.40**	**10.46**	**5.49**	**4.83**	**65.74**
Variance	0.36	6.58	18.40	95.53	7.23	296.85
Standard Deviation	0.60	2.56	4.29	9.77	2.69	17.23
Variation Coefficient	0.47	1.83	0.41	1.78	0.56	0.26
Minimum	0.05	0.005	0.005	0.005	0.09	0.83
25th percentile	1.00	0.24	7.76	0.13	3.41	62.40
Median	1.00	0.44	10.90	0.65	4.77	70.00
75th percentile	1.40	1.43	13.70	5.18	6.00	75.90
Maximum	12.92	33.07	27.30	58.50	61.00	99.30

Capping

All assay data were reviewed prior to estimating resources for possible erratic high values or outliers. The data were plotted on histograms and cumulative distribution curves as well as being subjected to a decile analysis to identify possible outliers. Wardrop concluded that capping was not warranted for the Itafós Project dataset.

Composites

In order to normalize the assay data, raw assay values are often composited to a standard length. Wardrop composited the raw assay values to a 1m length starting at the base of the drill holes and honouring the modelled geological boundaries. Any composite less than 0.5m in length was deleted from the dataset. Intersections less than 1m but greater than 0.5m was included, thereby creating a dataset of composites ranging from 0.5m to 1m in length.

Descriptive statistics of the composites are presented in Table 14.2_2.

Table 14.2_2 – Descriptive Statistics on 1m Composited Drill Hole Data (No Zeroes)

	Length	% P_2O_5	% Al_2O_3	% CaO	% Fe_2O_3	% SiO_2
Valid cases	37459	37459	37459	37459	37459	37459
Mean	**1.00**	**1.49**	**11.15**	**3.44**	**5.22**	**68.66**
Variance	0.00	6.49	13.21	42.50	5.91	148.91
Standard Deviation	0.03	2.55	3.63	6.52	2.43	12.20
Variation Coefficient	0.03	1.71	0.33	1.89	0.47	0.18
Minimum	0.50	0.0025	0.005	0.005	0.0245	0.55
25th percentile	1.00	0.26	8.82	0.12	3.97	64.40
Median	1.00	0.49	11.35	0.40	5.08	70.60
75th percentile	1.00	1.65	13.80	3.59	6.15	76.00
Maximum	1.00	30.30	27.30	49.20	59.00	98.70

14.2.4 Spatial Analysis of Grades

Wardrop used Sage 2001 software, and completed variograms for P_2O_5 within each mineralized zone at the Itafós Project deposit. Directional sample correlograms were calculated along horizontal azimuths of 0, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300 and 330 degrees. For each azimuth, sample correlograms were also calculated at dips of 30° and 60° in addition to horizontally. Lastly, a correlogram was calculated in the vertical direction. Using the 37 correlograms, an algorithm determined the best-fit model. This model is described by the nugget (C0), two nested structure variance contributions (C1, C2), ranges for the variance contributions and the model type (spherical or exponential). After fitting the variance parameters, the algorithm then fits an ellipsoid to the 37 ranges from the directional models for each structure. The final models of anisotropy are given by the lengths and orientations of the axes of the ellipsoids.

Table 14.2_3 – Correlogram Model

Element	Model	Z Rotation	Y Rotation	Z Rotation	X Range	Y Range	Z Range
P_2O_5	C_0=0.102						
	C_1=0.725	65	35	18	11.2	61.1	18.6
	C_2=0.173	-82	0	27	1551.5	406.3	44.3

Note: Rotation angles were set to correspond to Gemcom Software's rotational convention, which follows the right hand rule with rotation about Z-axis being positive when X moves towards the Y-axis; rotation about the Y-axis is positive when Z moves towards the X-axis.

14.2.5 Resource Block Model

The block model coordinates are in the Universal Transverse Mercator (UTM) NAD83 coordinate system and are oriented so that model north is parallel to true north.

The block model is comprised of blocks measuring 12.5m length by 12.5m width by 3m thickness with an origin defined as:

x = 307587.5, y = 8569193.75, z = 900.

498 columns, 342 rows and 111 levels.

The origin in Gems software is defined as the minimum x, minimum y and maximum z point.

<u>Interpolation Plan</u>

Grades were interpolated within the block model using the Ordinary Kriging (OK) interpolation method with weighting parameters based on the correlogram data presented in Table 14.2.3.

Grades were interpolated using the 1m composite values. The grades were interpolated in three separate passes. Sample selection was based on search ellipse scaled to a proportion of the ranges from the correlogram model for P_2O_5: Pass 1 at 60m (the full variogram range), Pass 2 at 120m (twice the variogram range), and Pass 3 at 210m.

Grades were only interpolated in the first two passes if at least four samples were found within the search ellipse and a maximum of 18 samples were used to interpolate any block. The third pass required a minimum of one sample and a maximum of 18 samples. Sample selection for grade interpolation was also restricted by domain; thus, any siltstone block was interpolated using only samples found within the siltstone, breccia blocks with breccia samples and soil blocks with soil samples.

Mineral Resource Classification

Mineral resources were classified in accordance with definitions provided by the Canadian Institute of Mining, Metallurgy, and Petroleum (CIM) as stipulated in NI 43-101.

The Itafós Project Mineral Resources for the five principal Near Mine Blocks were classified by Wardrop as Measured, Indicated and Inferred based on the following interpolation criteria:

- **Measured:** Blocks interpolated with at least four composites from two holes, maximum of three per hole within a 60m search radius.
- **Indicated:** Minimum of four composites from two holes, maximum of three per hole, 120m search radius.
- **Inferred:** At least one composite per block, 210m search radius.

The classification model was visually examined for reasonableness. The classification was modified to eliminate pockets of Measured Resources found within Indicated zones and pockets of Indicated Resources found within Inferred zones.

Cut-off Grade

A cut-off grade of 2.8% P_2O_5 is used in the reporting of resource estimates as requested by MBAC.

14.2.6 Mineral Resource Tabulation

The mineral resources for the Near Mine Block of the Itafós Project deposit have been classified as Measured, Indicated and Inferred Resources based on the number of composite samples and the number of drillholes used in the block estimation. No recoveries have been applied to the resource estimates as the metallurgical testwork is incomplete for all grades of fertilizer products.

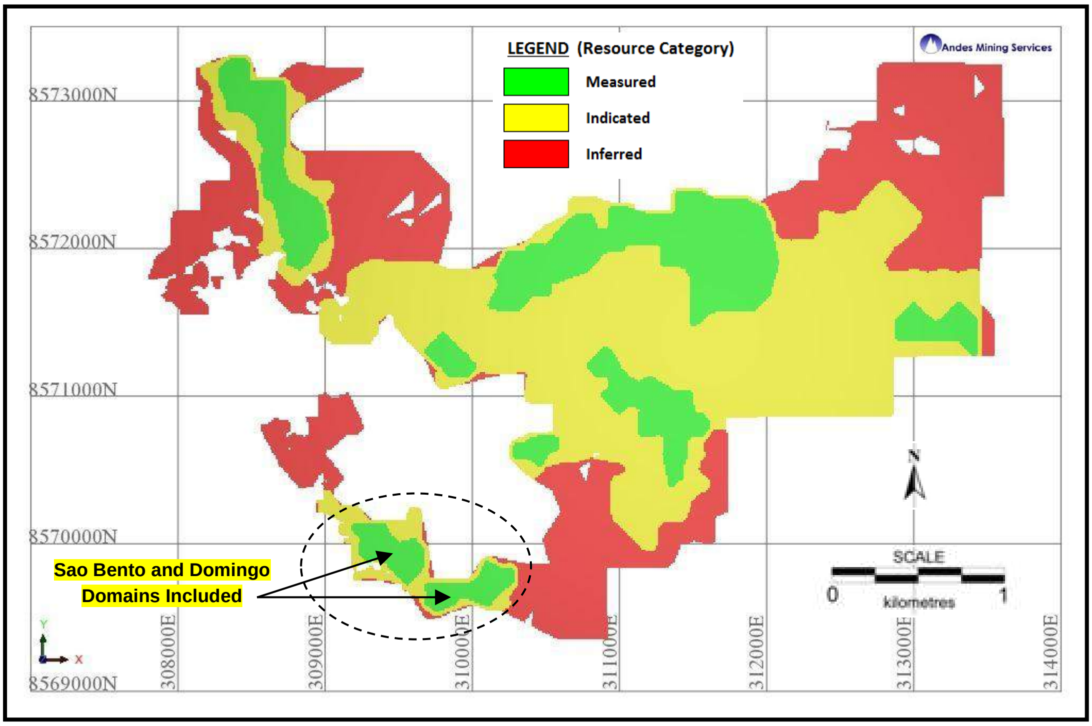
Wardrop estimated that the Near Mine Block contains 27.59 Mt of Measured and Indicated Resources averaging 4.35% P_2O_5 at a 2.8% P_2O_5 cut-off and 4.04 Mt of Inferred Resources averaging 4.00% P_2O_5 at a 2.8% P_2O_5 cut-off. This resource includes portions of the Domingo Domain (Sao Bento) as illustrated below in Figure 14.2_3.

The mineral resources are reported in Table 14.2.4 as of July 9, 2010:

Table 14.2.4 – Near Mine Mineral Resources at a 2.8% P_2O_5 Cut-off

	Density	Tonnage (Mt)	P_2O_5 (%)	Al_2O_3 (%)	CaO (%)	Fe_2O_3 (%)	SiO_2 (%)
Measured	1.54	17.48	4.46	9.00	7.81	4.30	63.81
Indicated	1.54	10.11	4.16	9.12	7.46	4.26	63.16
M & I	1.54	27.59	4.35	9.04	7.68	4.29	63.57
Inferred	1.58	4.04	4.00	8.41	6.29	4.88	66.94

Figure 14.2_3
Near Mine Mineral Resource Classification (Wardrop - July 9, 2010)

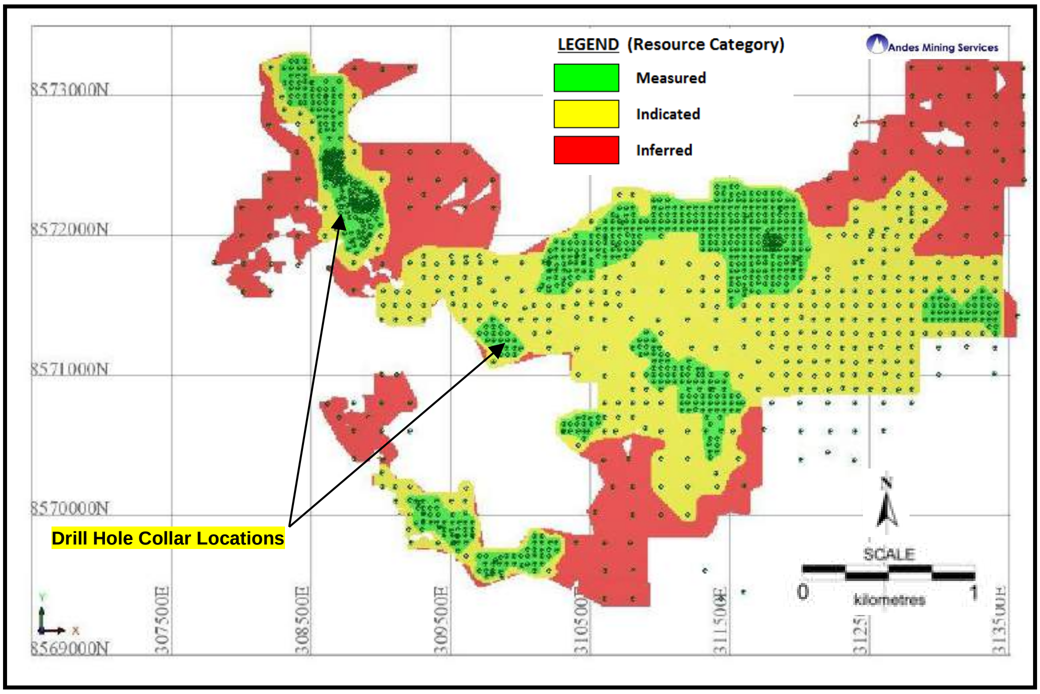


14.2.7 Block Model Validation

AMS has reviewed the Wardrop mineral Resource Estimate and has the following comments in the validation process:

- Drilling and studies completed to date have defined a measured, indicated and inferred mineral resource at the Near Mine Project. The drilling data collected, is considered to be of moderate quality and suitable for mineral resource classification to a measured and indicated status within a large portion of the mineralized domain as illustrated below in Figure 14.2_4.

Figure 14.2_4
Near Mine Mineral Resource Classification with Drill Collar Locations



- Resource classification is appropriate based on a sectional review of grades and general distribution of drilling across the project area Figures 14.2_4 to 14.2_7), however AMS recommends that the length of the search ellipse used for 1st pass (60m) and 2nd pass (120m) Mineral Resources Estimates be reviewed in future estimates. AMS believe the search distance should be extended for a continuous, flat-lying P2O5 deposits such as this, and recommend construction of new variogram graphs for the mineral resource estimate.

- AMS note the Sao Bento domain was included as part of the mineral resource estimation completed by Wardrop in July 2010 (Figure 14.2_4). AMS have removed Sao Bento from the Near Mine block model and added this portion to the Domingo mineral resource estimate for reporting purposes (Figures 14.2_5 to 14.2_7 below).

Figure 14.2_5
Near Mine Mineral Resource Classification with Sao Bento/Domingo Domain Removed

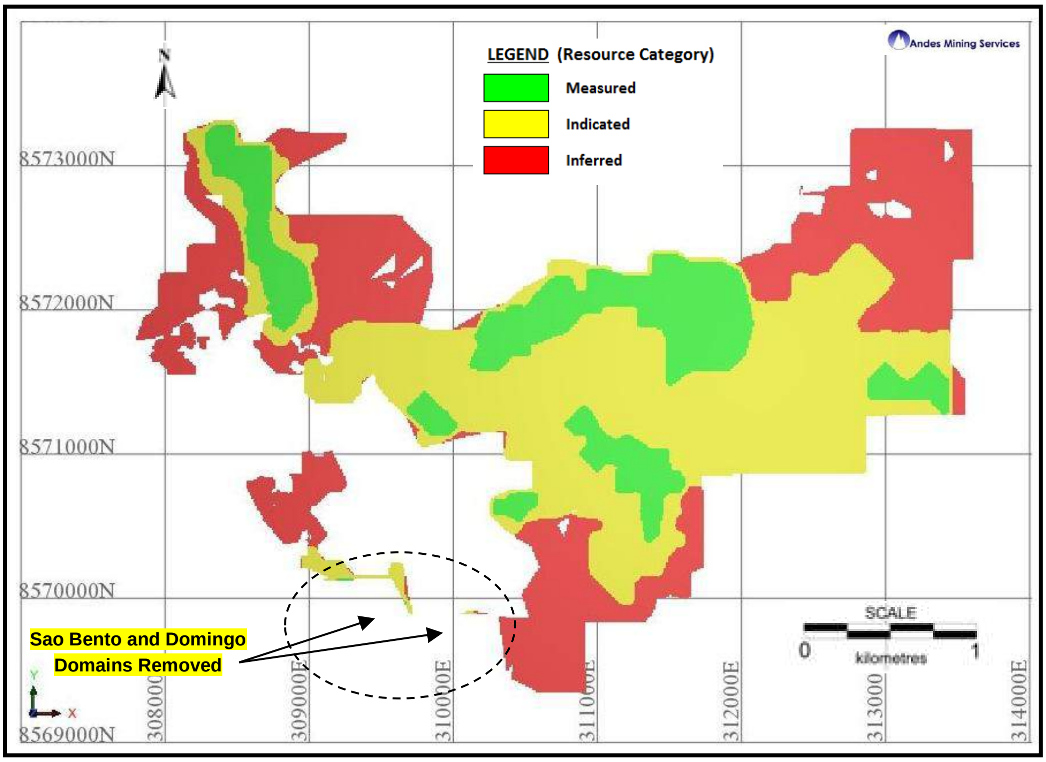


Figure 14.2_6
Near Mine Mineral Resource Classification with Near Mine Domain Wireframe

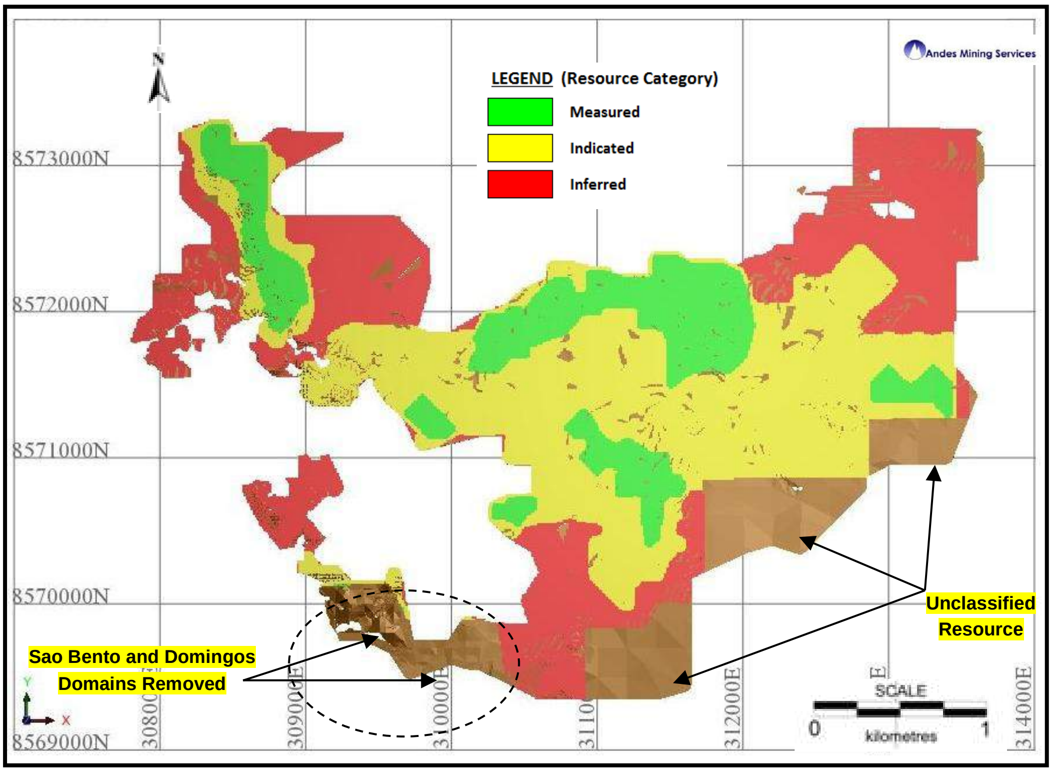
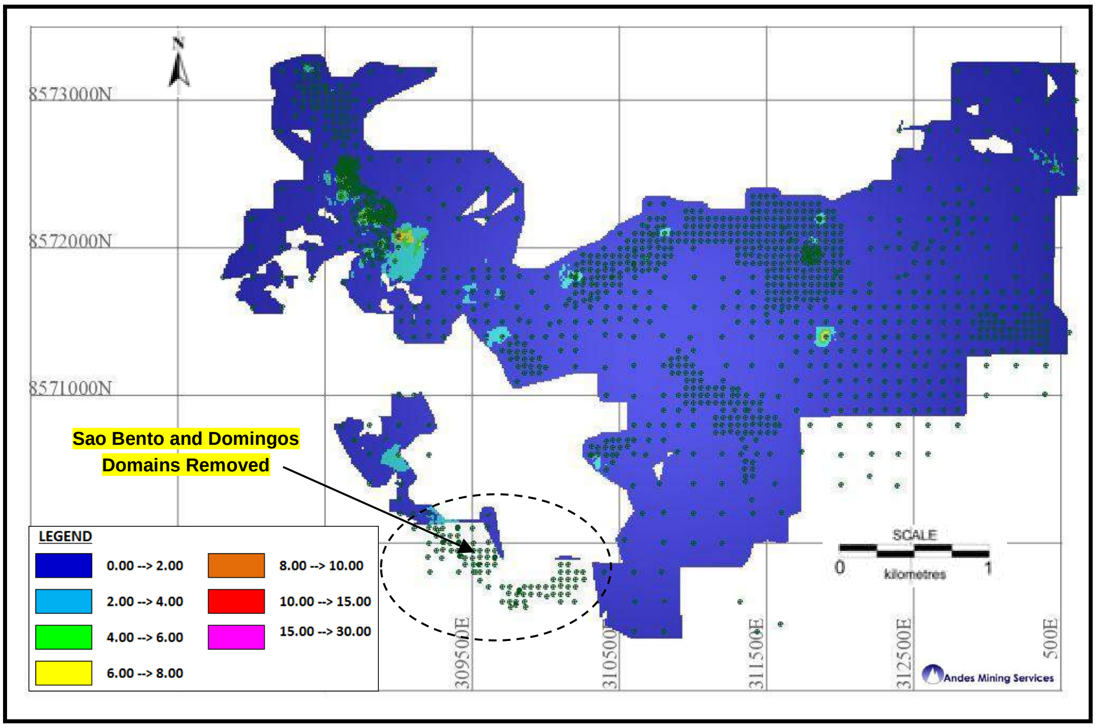


Figure 14.2_7
Near Mine Mineral Resource Classification with P_2O_5 Grade Range Displayed



- There is further upside for significant addition of measured and indicated resource through programs of infill drilling.

- Given increased geological knowledge from current mining (which will allow more detailed domain modelling mainly focussed on the limits of breccia zones), along with minor limitations identified in the current Wardrop mineral resource estimate, AMS recommends that an updated mineral resource for all domains be undertaken.

14.3 Domingos Block

MBAC (December 2011) has refined the geological wireframe and subsequent block modelling for the Domingos domain based on an initial interpretation and block model provided by Wardrop in 2010.

As stated in the April 27th, 2011 press release, systematic drilling of high-potential areas has led to identification of additional, shallower and higher than average grade phosphate mineralization in the northern Domingos Block (new area termed Sao Bento).

The new drilling campaign totalled 4,551 m of reverse circulation drilling and 768 m of diamond drilling.

14.3.1 Drill Hole Database

The original Domingos polygonal model was modelled on 60 drill holes drilled at approximately 200m to 550m centres.

The updated Domingos block model was modelled on data received from Itafós from 210 drill holes comprised of 13 diamond drill holes and 197 RC drill holes equalling 13,624 assay values.

Drilling was completed at a nominal 100m by 100m spacing with portions of infill drilling to a 50m by 50m grid spacing.

DATA VERIFICATION

MBAC reviewed the assay results of the Domingos database where a 10% check was made of these assay values and found that there were <0.01% errors in the database.

The errors were found in the sample interval lengths and corrected in the database.

14.3.2 Geological Modelling

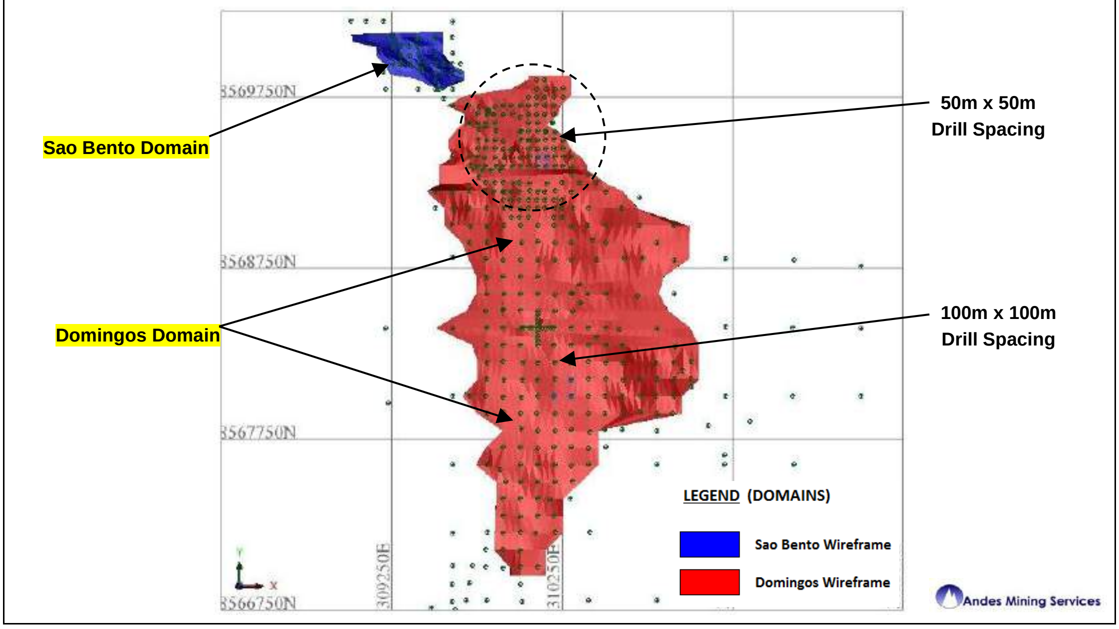
The Domingos mineralized wireframe domain(s) was modelled using a minimum 1% P_2O_5 grade range boundary, which was tightly controlled around existing drill holes.

AMS note that MBAC have removed the original rock codes that were applied to the Wardrop model completed in 2010. There is no longer any distinction between soil and siltstone rock types as previously defined by Wardrop.

The bulk density is likely to have been smoothed throughout the model and subsequently may be over estimating tonnage throughout the wireframe based on the removal of the soil profile from the interpretation.

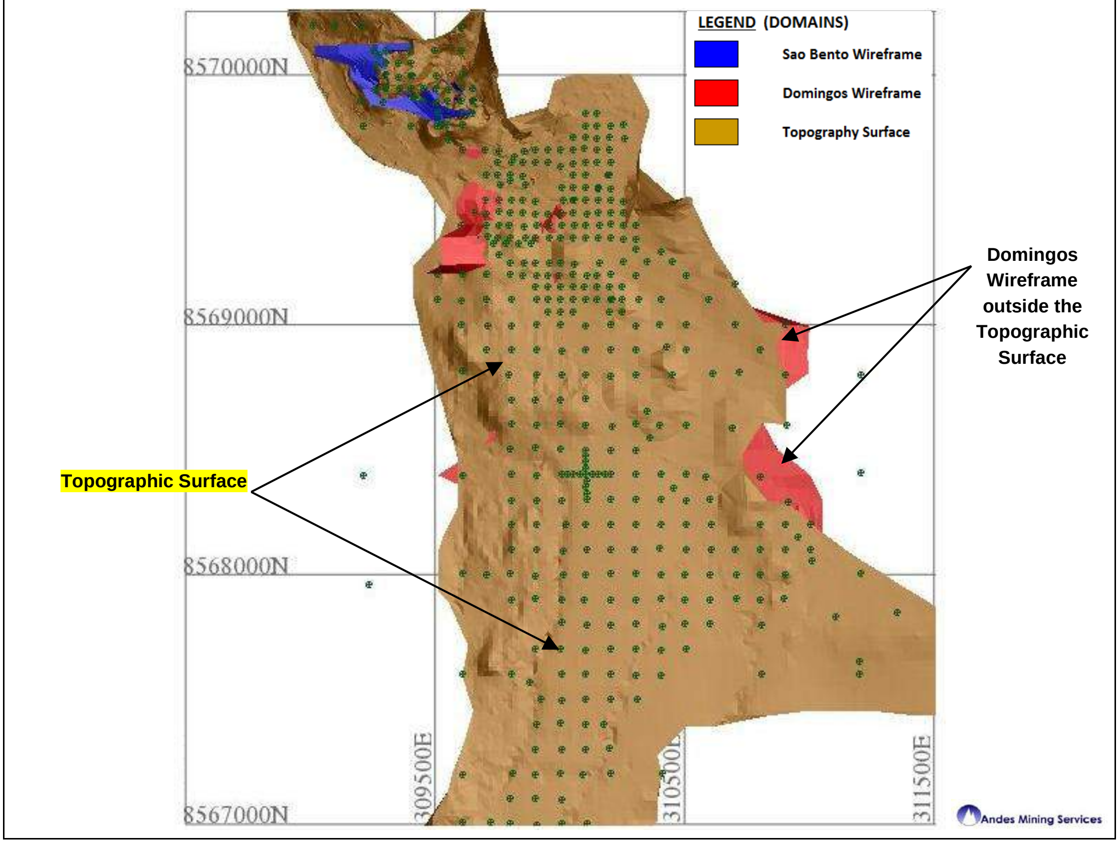
A review of the block model by AMS shows that a nominal 1.53 g/cm^3 has been used as an average density value throughout the Domingos mineralized wireframe.

Figure 14.3_1
Domingos and Sao Bento Wireframe with Drill Hole Collars



The topographic surface was modelled using 2.5m contour data provided by Itafós which covered the majority of the project area (Figure 14.3_2).

Figure 14.3_2
Domingos and Sao Bento Wireframe with Drill Hole Collars and Topography



14.3.3 Data Analysis

Assays

Descriptive statistics on the raw assays received from Itafós for the Domingos domain are presented below in Table 14.3.1.

Table 14.3.1 – Descriptive Statistics on Raw Assay Drill Hole Data (No Zeroes)

	Length	% P_2O_5	% Al_2O_3	% CaO	% Fe_2O_3	% SiO_2
Valid cases	13624	13624	13624	13624	13624	13624
Mean	1.08	1.35	10.35	5.39	4.60	65.02
Variance	0.09	8.01	29.68	91.37	8.97	400.61
Standard Deviation	0.29	2.83	5.45	9.56	3.00	20.02
Variation Coefficient	0.23	1.79	0.45	1.52	0.56	0.26
Minimum	0.10	0.01	0.01	0.01	0.01	0.66
25^{th} percentile	1.00	0.15	5.88	0.09	2.58	59.80
Median	1.00	0.31	10.50	0.31	4.38	68.60
75^{th} percentile	1.00	1.04	15.00	5.51	6.22	78.20
Maximum	4.70	30.7	31.1	53.9	57.3	99.4

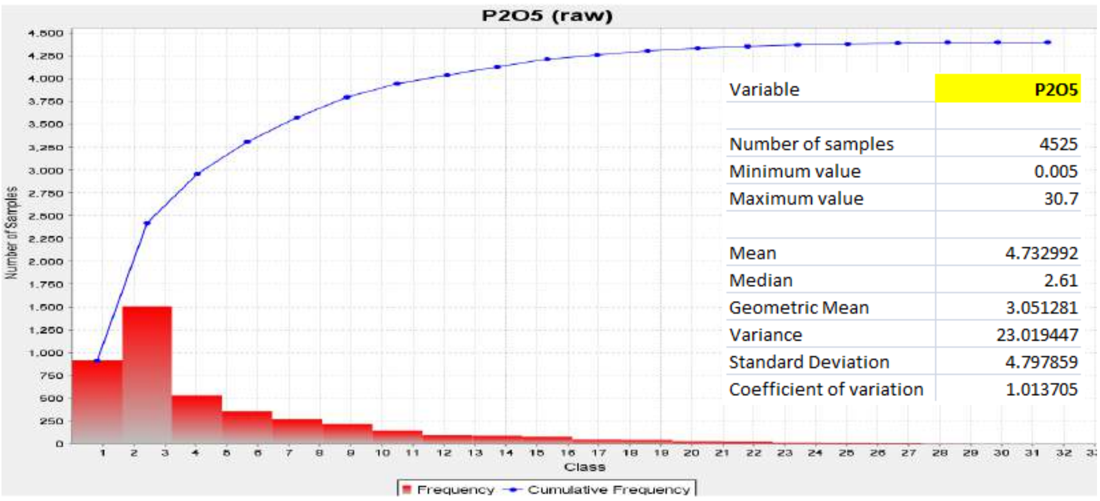
Capping

No capping was applied to the Domingos Block database. All assay data was reviewed prior to estimating resources for possible erratic high values or outliers.

Composites

Within the Domingos wireframe, MBAC composited the raw assay values to a 1m length starting at the base of the drill hole and honouring the modelled geological and grade boundaries. All composites were used in the mineral resource estimation. AMS have presented a basic graph below (Figure 14.3_3) which shows the grade distribution for P_2O_5 based on 1m composites generated within the Domingos domain.

Figure 14.3_3
1m Composite Data Statistics for Domingos Domain (Includes Sao Bento)



AMS recommends that the highest outliers should have been capped to around 20% P_2O_5.

14.3.4 Spatial Analysis of Grades

The interpolation method used to estimate the Domingos Block was Ordinary Kriging (OK). Two separate domains are defined for the Domingos wireframe with a smaller higher grade portion termed Sao Bento and the larger southern block known as Domingos.

14.3.5 Resource Block Model

The block model coordinates are in the UTM NAD83 coordinate system and are oriented so that model north is parallel to true north.

The block model is comprised of blocks measuring 12.5m length by 12.5m width by 3m thickness with an origin defined as:

x = 309302, y = 8566500, z = 910.

160 columns, 230 rows and 87 levels.

The origin in Gems software is defined as the minimum x, minimum y and maximum z point.

<u>Interpolation Plan</u>

Grades were interpolated within the block model using the OK interpolation method.

Grades were interpolated using the 1m composite values. The grades were interpolated in three separate passes. Sample selection was based on search ellipse used for the Near Mine Block; that is, scaled to a proportion of the ranges from the correlogram model for P_2O_5: Pass 1 at 60m (the full variogram range); Pass 2 at 120m (twice the variogram range) and Pass 3 at 210m.

Grades were only interpolated in the first two passes if at least four samples were found within the search ellipse and a maximum of 18 samples were used to interpolate any block. The third pass required a minimum of one sample and a maximum of 18 samples.

Sample selection for grade interpolation was also restricted by domain; thus, any Sao Bento block was interpolated using only samples found within the Sao Bento wireframe and likewise for the Domingos wireframe.

<u>Mineral Resource Classification</u>

Mineral resources were classified in accordance with definitions provided by CIM as stipulated in NI 43-101.

The Itafós Project Mineral Resources for the Domingos Block were classified by MBAC as Measured, Indicated and Inferred based on the following interpolation criteria:

- **Measured:** Blocks interpolated with at least four composites from two holes, maximum of three per hole within a 60m search radius.
- **Indicated:** Minimum of four composites from two holes, maximum of three per hole, 120m search radius.

- **Inferred:** At least one composite per block, 210m search radius.

The classification model was visually examined for issues. The classification was modified to eliminate pockets of Indicated Resources found within Inferred zones, however AMS note that small pockets of Measured resource can be found throughout the Indicated portion of the resource.

<u>Cut-Off Grade</u>

A cut-off grade of 1.5% P2O5 is used in the reporting of resource estimates and has been provided by MBAC based on optimisation studies by MBAC with the Domingos Project being located adjacent to the current plant construction site.

14.3.6 Mineral Resource Tabulation

The mineral resources for the Domingos domains of the c deposit has been classified as Measured, Indicated and Inferred based on the number of composite samples and the number of drill holes used in the block estimation.

MBAC estimated that the Domingos domain contains 5.6 Mt of Measured Resources averaging 6.04% P_2O_5 at a 1.5% P_2O_5 cut-off as well as a further 28.4 Mt of Indicated Resources averaging 4.87% P_2O_5 at a 1.5% P_2O_5 cut-off. A total of 5.2 Mt of Inferred resources have been estimated averaging 2.99% P_2O_5 at a 1.5% P_2O_5 cut-off.

A nominal 1.53 g/cm^3 has been used as a density value for all material which lies within the Domingos wireframe. AMS consider the tonnage to be overestimated in the upper portions of the resource given the lack of geological control (soil vs siltstone) when modelling the wireframe for estimation.

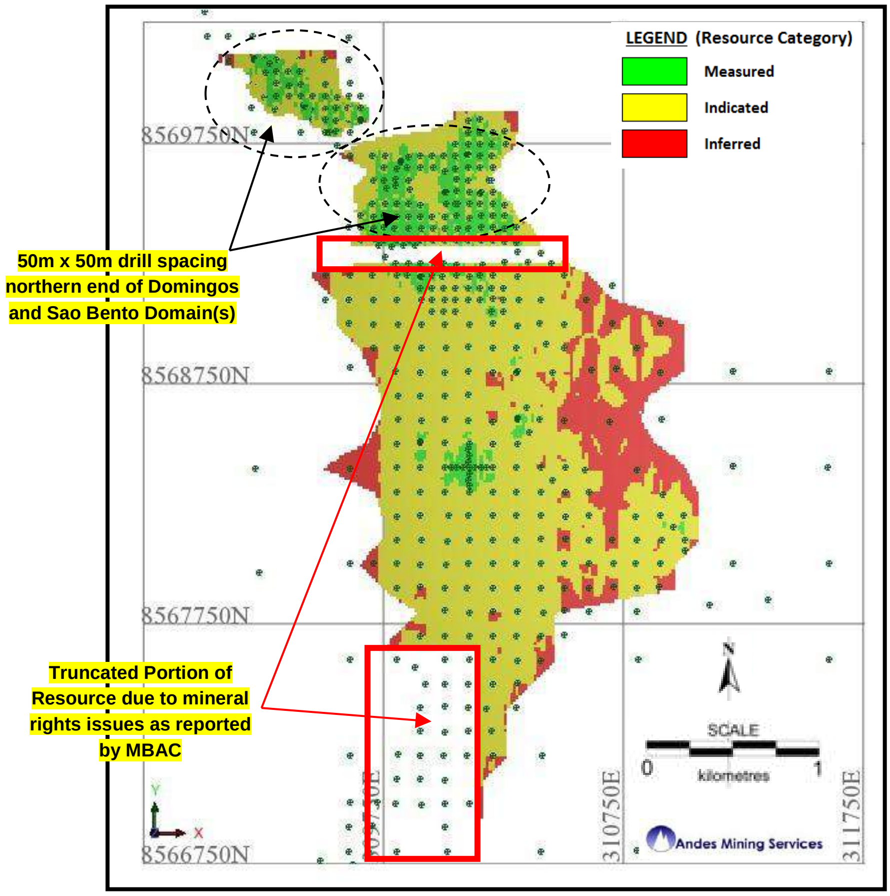
It should be noted that the southwest quadrant of the Domingos Block has been truncated from the resource estimate due to mineral rights issues. In addition, an east-west trending 50m wide band crossing the northern portion of Domingos deposit has been depleted / truncated due to mineral rights issues.

The mineral resource estimate (current to December 20, 2011) are reported in Table 14.3.2 and presented in Figure 14.3_4 below.

Table 14.3.2 – Domingo Mineral Resource Estimate (including Sao Bento) at a 1.5 % P_2O_5 Cut-off

Resource Category	Density	Tonnage (Mt)	P_2O_5 (%)
Measured	1.53	5.6	6.04
Indicated	1.53	28.4	4.87
M & I	1.53	34.0	5.06
Inferred	1.53	5.2	2.99

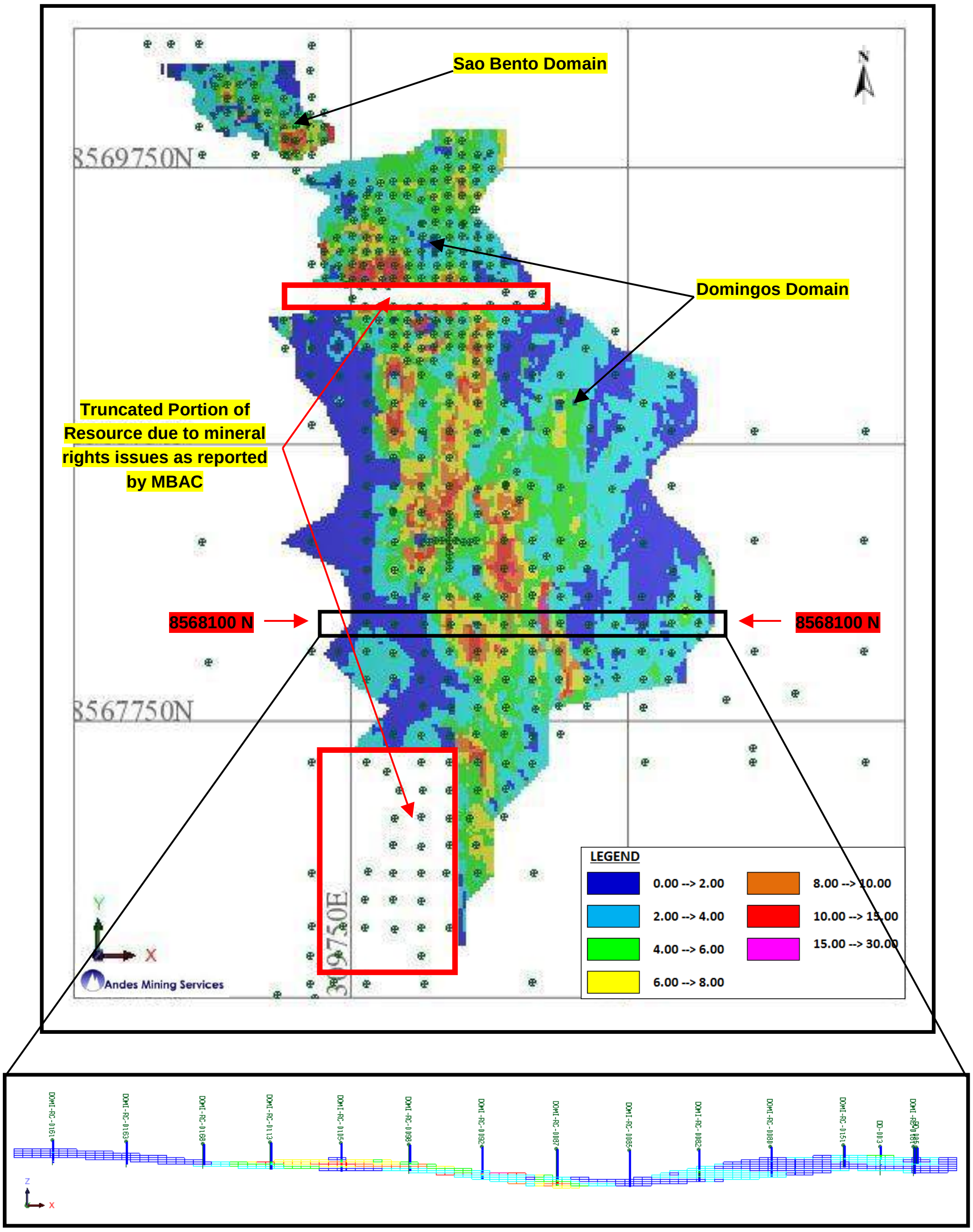
Figure 14.3_4
Plan View of Domingos Resource Classification



14.3.7 Block Model Validation

The Domingos block model was validated by querying the block model results and comparing block values versus drill hole composites on sections; this visual validation of the block model grades by section correlates well with the drill hole data (Figure 14.3_5).

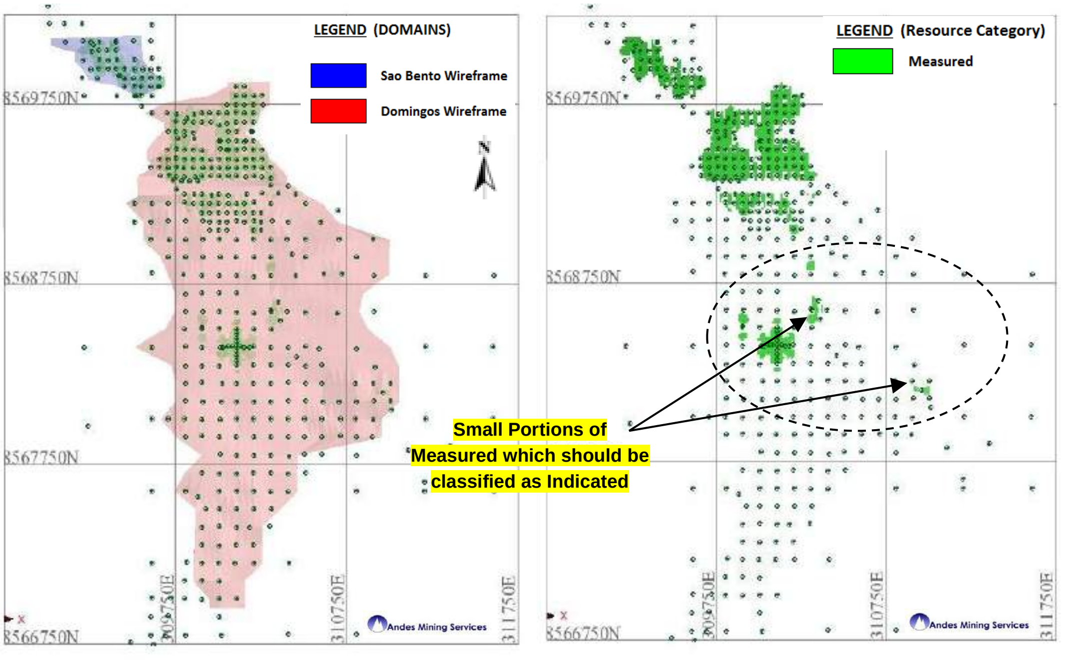
Figure 14.3_5
Domingos Mineral Resource Classification with P_2O_5 Grade Range Displayed



AMS has reviewed the wireframe and mineral resource estimate as presented by MBAC and have the following comments in the validation process:

- Drilling and studies completed to date have defined a Measured, Indicated and Inferred mineral resource at the Domingo and Sao Bento Project. The drilling data collected, is considered to be of moderate quality and suitable for mineral resource classification to a Measured and Indicated status within a large portion of the mineralized domains as illustrated above in Figures 14.3_3 and 14.3_4;
- Resource classification is appropriate based on a sectional review of grades and general distribution of drilling across the project area;
- AMS recommends the search ellipse used for 1st pass (60m) and 2nd pass (120m) be revised in future estimates. AMS note here that the search distance should be extended for a continuous, flat-lying P_2O_5 deposits such as this, and suggest that the variograms need to be recalculated;
- AMS recommend that a review of some measured resources should be undertaken given the large number of small areas that have been classified as measured based on relatively limited drilling information (Figure 14.3_6);

Figure 14.3_6
Domingos Mineral Resource Classification with Drill Collar Locations



- AMS identified the geological coding originally completed by Wardrop (2010) which included the coding of different rock types (soil and siltstone) has most recently been removed by MBAC as part of the updated mineral resource estimate completed for Domingos. There is a significant density difference between these two domains and removal will result in an over estimate of tonnage as well as grade smearing throughout the upper portions of the block model (previously coded as soil);

- AMS recommend that MBAC need to revise geological boundaries for the wireframe based on rock codes, and that a more thorough review of various densities applied to the block model should be undertaken;
- AMS recommend the topographic survey should be extended to cover the full extent of the Domingos wireframe domain as previously illustrated in Figure 14.3_2;
- AMS recommend that there is further upside for significant addition of measured resource through programs of infill drilling (50m by 50m spacing);
- AMS recommend that given the increase in geological knowledge that has resulted from the current open pit mining along with current limitations identified by AMS, that an updated mineral resource estimate be undertaken.

14.4 Canabrava Block

MBAC (December 2011) has refined the geological wireframe and subsequent block modelling for the Canabrava domain based on an initial interpretation and block model provided by Wardrop in 2010.

The refined wireframe interpretation completed by MBAC, has increased the tonnage and grade from the prior Wardrop interpretation. No additional drilling is expected for the Canabrava block in the near future, but in the opinion of AMS, there is excellent potential to increase the current mineral resources by completing further drilling in all directions.

14.4.1 Drill Hole Database

The original Canabrava polygonal model estimate completed by Wardrop (2010) was modelled on 116 drill holes drilled at approximately 200m to 450m centres.

The updated Canabrava block model is modelled on data received from Itafós from 249 drill holes comprised of 94 diamond drill holes and 155 RC drill holes equalling 6,861 assay values. Drilling was completed at a nominal 100m by 100m spacing across the entire Canabrava project area.

Data Verification

MBAC reviewed the assay results of the Canabrava database where a 10% check was made of these assay values, and found that there were <0.01% errors in the database.

The errors were found in the sample interval lengths and corrected in the database.

14.4.2 Geological Modelling

The Canabrava mineralized wireframe domains was modelled using a minimum 1% P_2O_5 grade range boundary, which was tightly controlled around existing drill holes (Figure 14.4_1).

AMS note that MBAC have removed the original rock codes that were applied to the Wardrop model completed in July 2010. There is no longer any distinction between soil and siltstone rock types as previously defined. As part of the Wardrop 2010 model, a higher grade area of siltstone was modelled and coded separately, however having reviewed the most recent geological model provided by MBAC, AMS noted the distinction between these domains has been removed, with only a single mineralized domain modelled. This issue was identified at Domingos also.

The topographic surface was modelled using 5m contour data provided by Itafós which covered the investigated area.

A review of the topographic surface by AMS shows no irregularities (Figure 14.4_2).

Figure 14.4_1
Canabrava Wireframe with Drill Hole Collar Locations

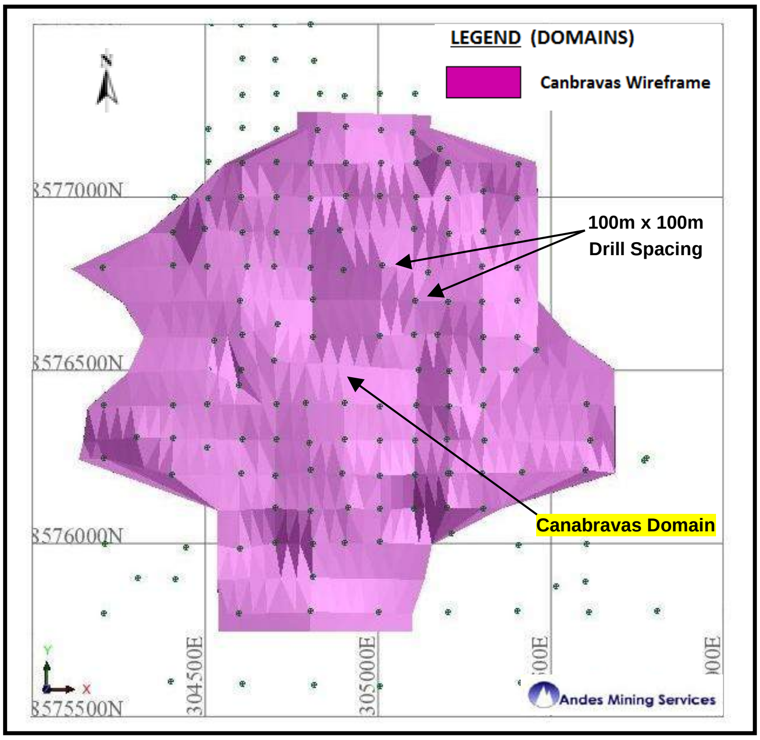
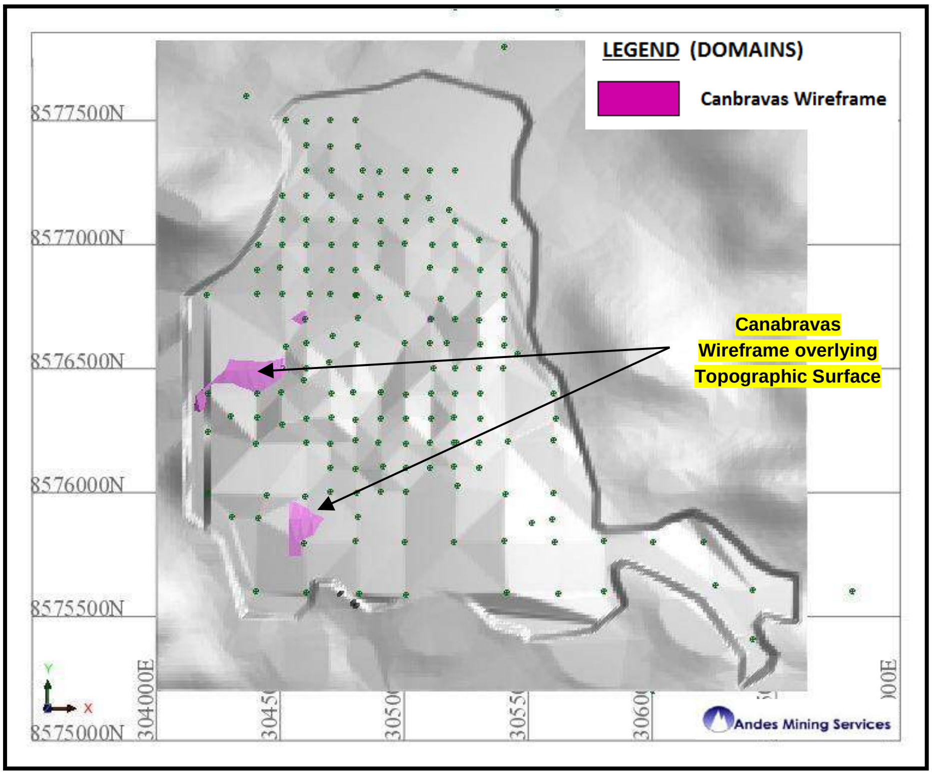


Figure 14.4_2
Canabrava Wireframe with Drill Hole Collar Locations and Topography



14.4.3 Data Analysis

Assays

Descriptive statistics on the raw assays received from Itafós for the Canabrava domain are presented below in Table 14.4.1.

Table 14.4_1 – Descriptive Statistics on Raw Assay Drill Hole Data (No Zeroes)

	Length	% P_2O_5
Valid cases	6861	6861
Mean	1.13	1.41
Variance	0.12	7.39
Standard Deviation	0.35	2.72
Variation Coefficient	0.31	1.93
Minimum	0.30	0.01
25^{th} percentile	1.00	0.15
Median	1.00	0.31
75^{th} percentile	1.00	1.33
Maximum	4.70	27.60

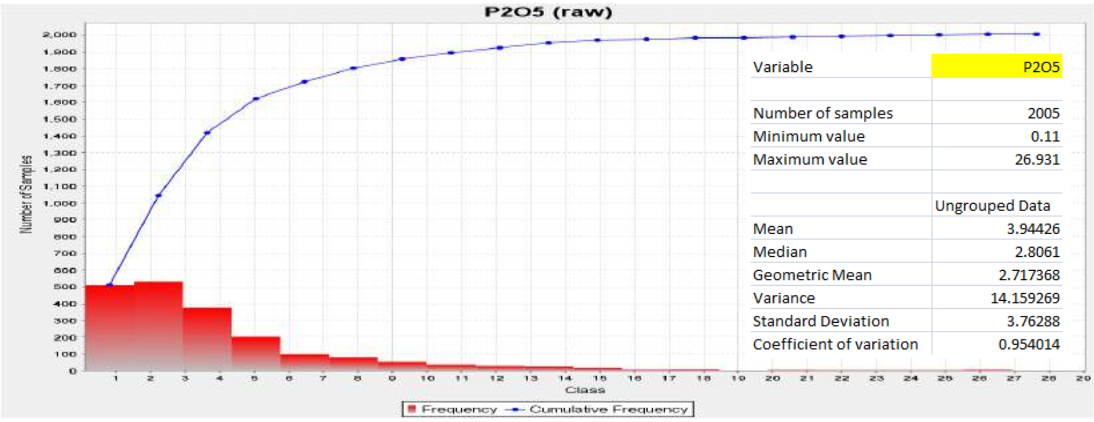
Capping

No capping was applied to the Canabrava Block database. All assay data was reviewed prior to estimating resources for possible erratic high values or outliers. AMS recommends that the highest outliers should have been capped to around 15% P_2O_5.

Composites

In the Canabrava block, MBAC composited the raw assay values to a 1m length starting at the base of the drill holes and honouring the modelled geological (grade controlled) boundaries. All composites were used in the mineral resource estimation. AMS have presented a basic graph below (Figure 14.4_3) which shows the grade distribution for P_2O_5 based on 1m composites generated within the Canabrava domain.

Figure 14.4_3
1m Composite Data Statistics for Canabrava Domain



14.4.4 Spatial Analysis of Grades

The interpolation methods used to estimate the Canabrava domain was Ordinary Kriging (OK).

The Canabrava domain data was examined visually, and was determined to be similar in style to that of the Near Mine block. Estimation parameters utilized for the Near Mine block model were subsequently applied to the Canabrava block model.

14.4.5 Resource Block Model

The block model coordinates are in the UTM NAD83 coordinate system and are oriented so that model north is parallel to true north.

The block model is comprised of blocks measuring 12.5m length by 12.5m width by 3m thickness with an origin defined as:

- x = 304,000, y = 8,275,200, z = 730
- 210 columns, 210 rows, and 70 levels

The origin in Gems software is defined as the minimum x, minimum y and maximum z point.

<u>Interpolation Plan</u>

Grades were interpolated within the block model using the OK interpolation method.

Grades were interpolated using 1m composite values. The grades were interpolated in three separate passes. Sample selection was based on the search ellipse used for the Near Mine Block; that is, scaled to a proportion of the ranges from the correlogram model for P_2O_5: Pass 1 at 60m (the full variogram range), Pass 2 at 120m (twice the variogram range) and Pass 3 at 210m.

Grades were only interpolated in the first two passes if at least four samples were found within the search ellipse and a maximum of 18 samples were used to interpolate any block. The third pass required a minimum of one sample and a maximum of 18 samples.

<u>Mineral Resource Classification</u>

Mineral resources were classified in accordance with definitions provided by CIM as stipulated in NI 43-101.

The Itafós Project Mineral Resource Estimate for the Canabrava Block was classified by MBAC as Indicated and Inferred based on the following interpolation criteria:

- **Indicated:** Minimum of four composites from two holes, maximum of three per hole, 120m search radius;
- **Inferred:** At least one composite per block, 210m search radius.

The resource model classification was visually examined for reasonableness by MBAC. The classification was modified to eliminate pockets of Indicated Resources found within Inferred zones.

Cut-off Grade

A cut-off grade of 2.8% P_2O_5 is used in the reporting of resource estimates as provided by MBAC in their optimisation studies.

14.4.6 Mineral Resource Tabulation

The mineral resource estimate for the Canabrava Block of the Itafós Project deposit have been classified as Indicated and Inferred based on the number of composite samples and the number of drill holes used in the block estimation.

MBAC have estimated that the Canabrava Block contains 20.4 Mt of Indicated Resources averaging 5.53% P_2O_5 at a 2.8% P_2O_5 cut-off and contains 3.7 Mt of Inferred Resources averaging 4.94% P_2O_5 at a 2.8% P_2O_5 cut-off.

A nominal 1.53 g/cm^3 has been used as a density value for all material which lies within the Canabrava wireframe. AMS has identified that the tonnage will be slightly overestimated in the upper portions of the mineral resource given the lack of geological control (soil vs siltstone)

The mineral resource estimate is reported in Table 14.4_3 as of December 20, 2011 and represented below in Table 14.4_3.

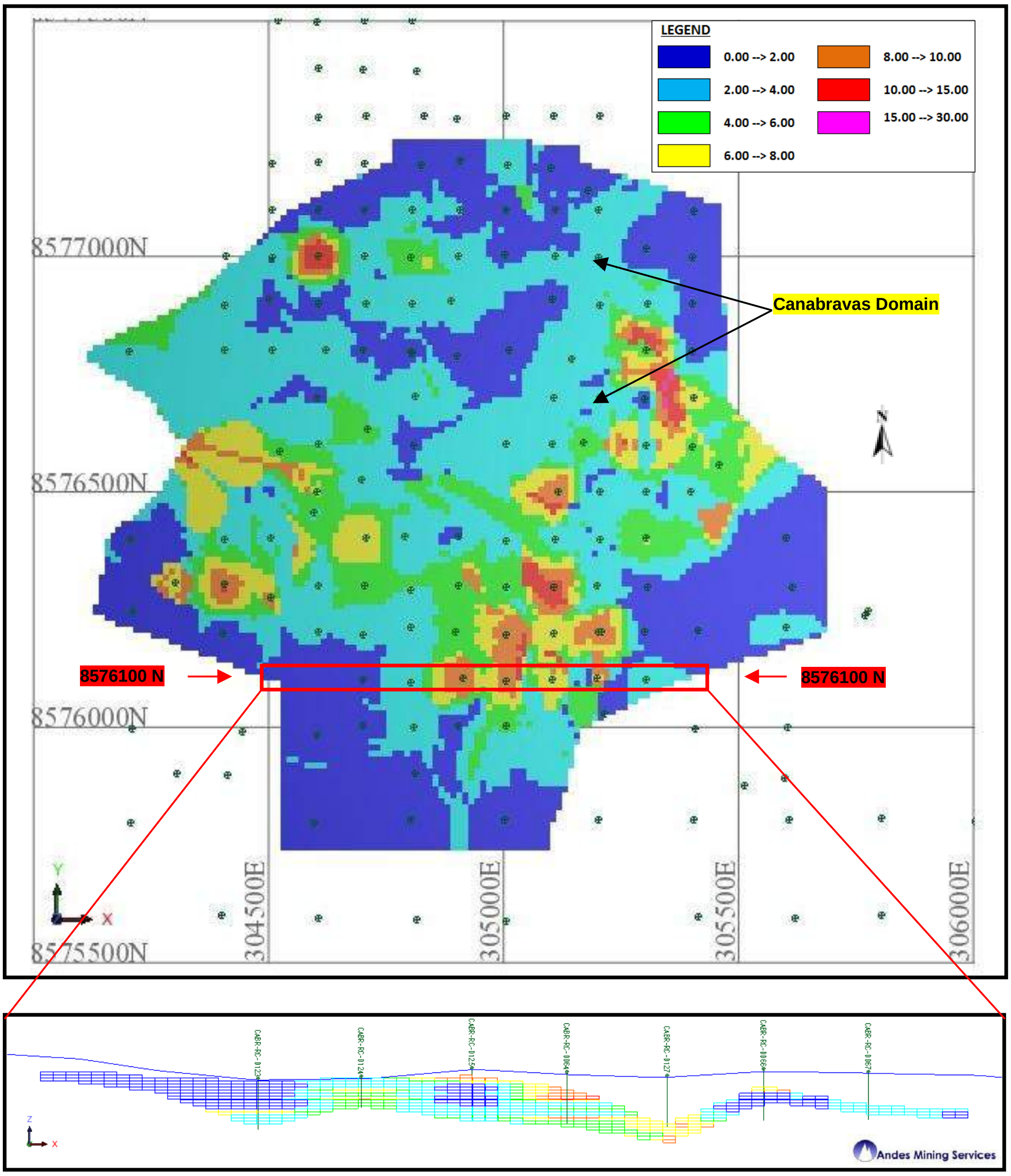
Table 14.4_2 – Canabrava Mineral Resources at a 2.8 % P_2O_5 Cut-off

Resource Category	Density	Tonnage (Mt)	P_2O_5 (%)
Measured	1.53	-	-
Indicated	1.53	20.4	5.53
M & I	1.53	20.4	5.53
Inferred	1.53	3.7	4.94

The Canabrava block model was validated by querying the block model results and comparing block values versus drill hole composites on sections; this visual validation of the block model grades by section correlated well with the drill hole data (Figure 14.4_4).

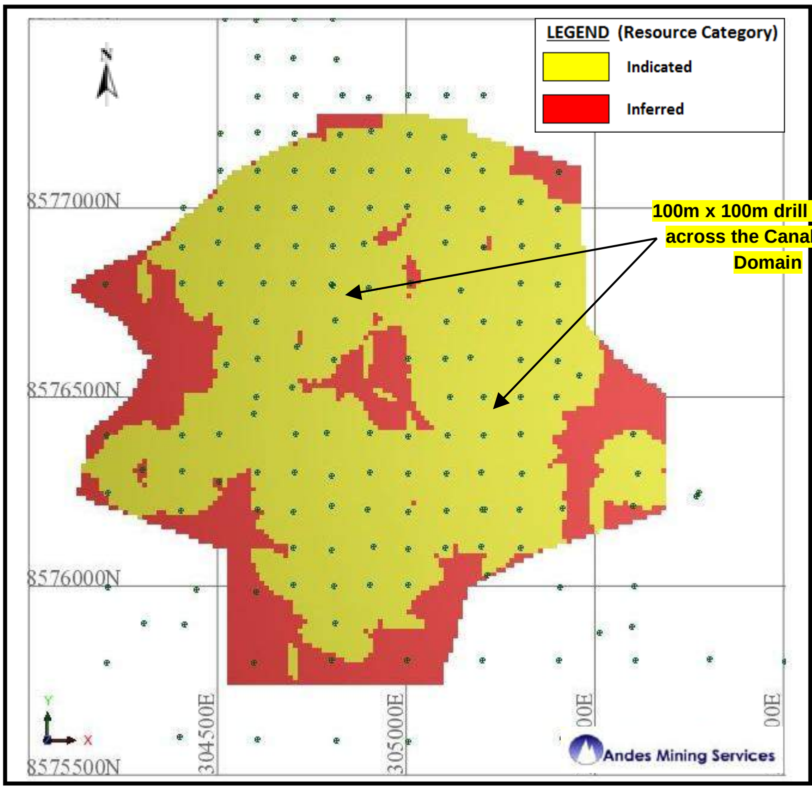
The resource classification is appropriate based on a sectional review of grades and general distribution of drilling across the project area.

Figure 14.4_4
Canabrava Mineral Resource Classification with P_2O_5 Grade Range Displayed



The mineral resource estimate for Canabrava has been classified as indicated and inferred in accordance with NI 43-101 guidelines(Figure 14.4_4).

Figure 14.4_5
Plan View of Canabrava Resource Classification

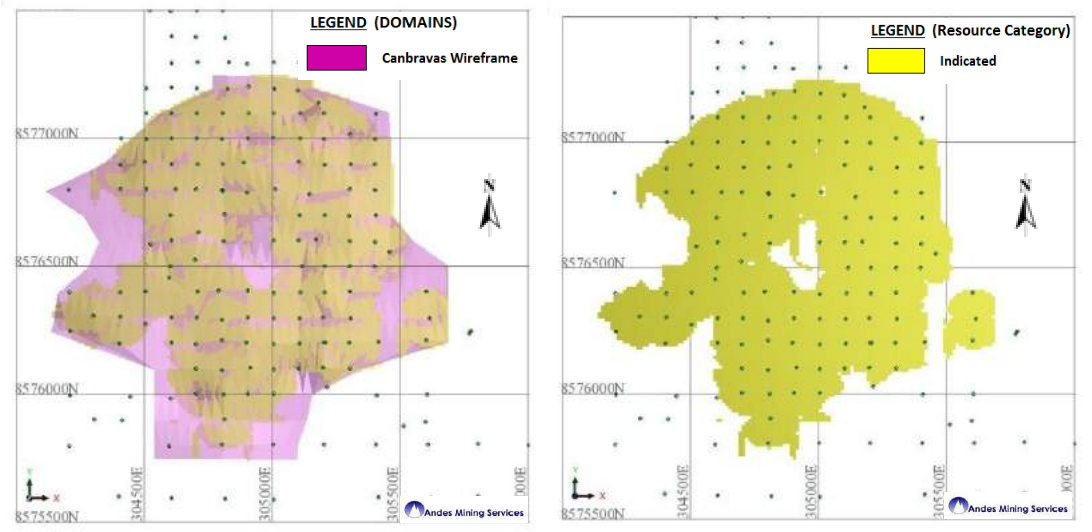


14.4.7 Block Model Validation

AMS has reviewed the wireframe and block model resource estimate as presented by MBAC and have the following recommendations in the validation process:

- Drilling and studies completed to date have defined an Indicated and Inferred mineral resource at the Canabrava Project. The drilling data collected, is considered to be of moderate quality and suitable for mineral resource classification to an Indicated status within a large portion of the mineralized domain as illustrated above in Figure 14.4_5;
- AMS identified that the geological coding originally completed by Wardrop (2010) which included the coding of different domain types (soil and siltstone) has not been utilised by MBAC in the updated mineral resource estimate. There will be a significant density difference between these two domains which will result in an over estimate of tonnage as well as grade smearing throughout the upper portions of the block model (previously coded as soil);
- AMS recommend MBAC improve the accuracy of the geological boundaries for the wireframe based on rock codes.
- AMS recommend that given the increased geological knowledge which has been acquired by current open pit mining, that an updated mineral resource estimate be completed;

Figure 14.4_6
Canabrava Mineral Resource Classification with Drill Collar Locations



14.5 Resource Estimates Summary

The statement has been classified by Qualified Person Bradley Ackroyd (MAIG (CP)) in accordance with the Guidelines of National Instrument 43-101 and accompanying documents 43-101.F1 and 43-101.CP. It has an effective date of 20 December 2011. Mineral resources that are not mineral reserves do not have demonstrated economic viability. AMS and MBAC are not aware of any factors (environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors) that have materially affected the Mineral Resource Estimate.

Table 14.5_1
Itafós Project
Measured, Indicated and Inferred Mineral Resource Grade Tonnage Report - 20 December 2011
Ordinary Kriging (OK) Block Model – 12.5mE X 12.5mN X 3mRL

Target	Tonnage (Mt)	P_2O_5 %
Near Mine (Wardrop July 9, 2010)	**2.8% cut off grade applied**	
Measured	15.2	4.38
Indicated	9.4	4.12
M&I	24.6	4.28
Inferred	3.8	3.99
Canabrava (MBAC - Nov 2011)	**2.8% cut off grade applied**	
Measured		
Indicated	20.4	5.53
M&I	20.4	5.53
Inferred	3.7	4.94
Domingos (MBAC Nov 2011)	**1.5% cut off grade applied**	
Measured	5.6	6.04
Indicated	28.4	4.87
M&I	34.0	5.06
Inferred	5.2	2.99
TOTAL M&I	**79.0**	**4.94**
TOTAL Inferred	**12.7**	**3.85**

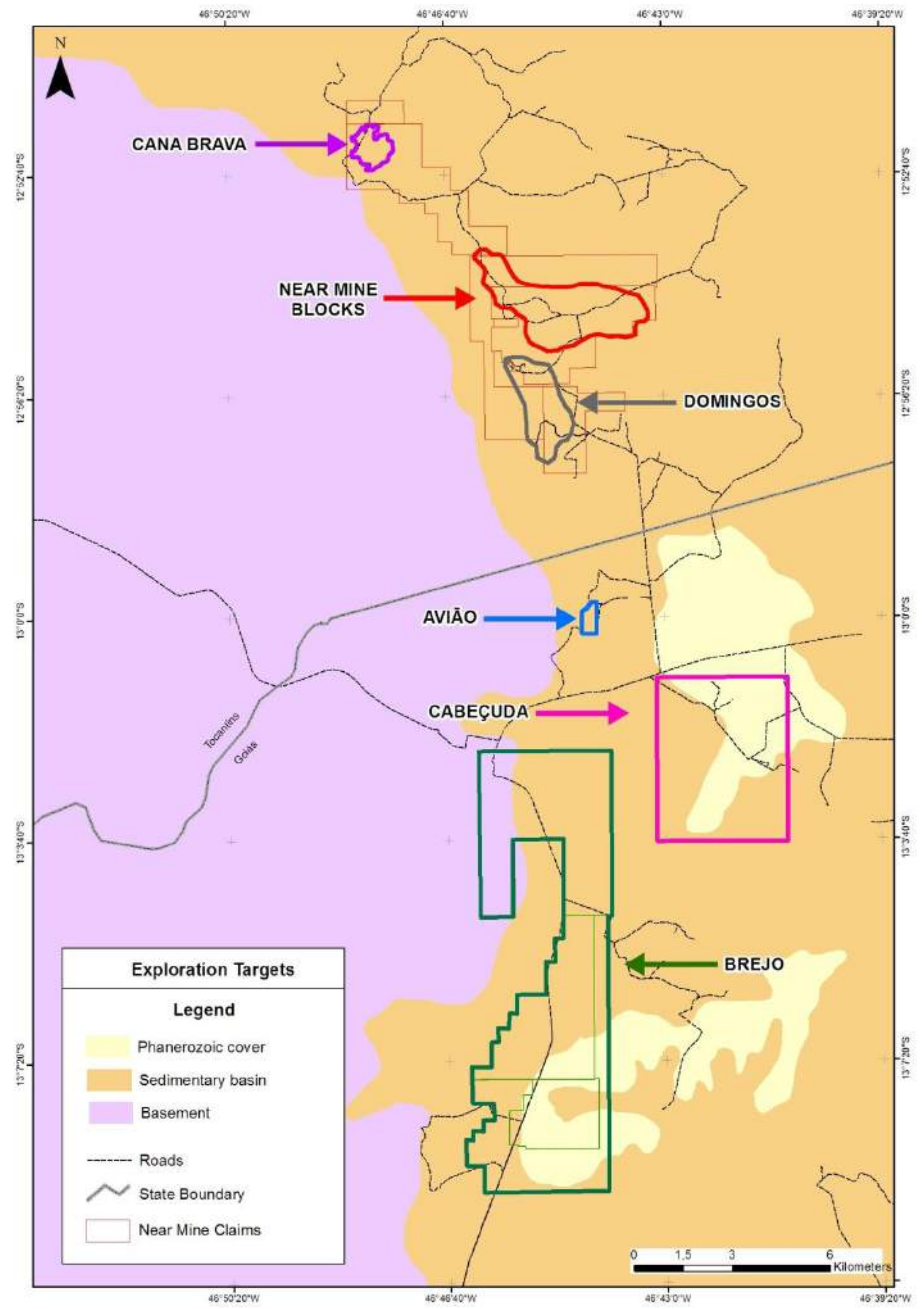
(2) The effective date of the Mineral Resource is December,20 2011
(2) The Mineral Resource Estimate for the Itafós Project deposit was constrained within lithological and grade based solids within the top 80m from surface.
(3) Mineral Resources for the Itafós Project deposit has been classified according to the "CIM Standards on Mineral Resources and Reserves: Definitions and Guidelines (July 2011) by Bradley Ackroyd (BSc (Geo) MAIG) an independent Qualified Person as defined by National Instrument 43-101.

The Measured and Indicated mineral resource estimate comprises 79.0 Mt grading 4.94% P_2O_5 (using a 1.5% cut-off for the Domingos target and a 2.8% cut-off for all other targets).

14.6 Exploration Target - Avião, Brejo and Cabeçuda Domains

In May 2010, Wardrop completed a polygonal mineral resource estimate on three zones outside of the Near Mine called Avião, Brejo and Cabeçuda Blocks (Figure 14.6_1).

Figure 14.6_1
Exploration Target Areas



For the Avião, Brejo, Cabecuda Blocks, there was not sufficient drilling to develop a geological interpretation and 3D block model. Composites were developed using two criteria:

- Greater than or equal to 2.8 % P_2O_5;
- Minimum 3m down hole length (in order to be approximately consistent with the 3m block height used in the Block Model). For intervals less than 3m, adjacent intervals were evaluated if they could be combined to form a 3m interval with a grade greater than or equal to 2.8% P_2O_5.
- Assays utilised were a combination of hand held XRF and laboratory analysis.
- Wardrop prior reported an inferred mineral resource but AMS does not have sufficient confidence to report these targets as a Mineral resource

An exploration target was generated by AGS based upon the criteria listed above. The exploration target is summarised in the table below. It is important to point out that the potential quantity and grade of the exploration target is conceptual in nature, and there has been insufficient exploration to define a Mineral Resource and that it is uncertain if further exploration will result in the determination of a Mineral Resource.

Table 14.6_1 – Exploration Target: Avião, Brejo and Cabeçuda Blocks (modified from Wardrop, 2010)

Zone	Tonnage	P_2O_5
	Mt	%
Avião	0.3 to 0.7	5 to 7
Brejo	12 to 15	5 to 7
Cabeçuda	0.6 to 1	4 to 5.5
Total	**14 to 16**	**5 to 7**

15 MINERAL RESERVE ESTIMATES

NCL was provided with three updated resource block models: Near Mine, dated July 2010 and developed by Wardrop; Cana Brava, dated December 2011 and developed internally by Itafós personnel; and Domingos, dated December 2011 and developed by MBAC and supervised by AMS.

Three dimensional block models were generated to enable grade estimation. The selected block size was based on the geometry of the domain interpretation and the data configuration. The block size of 12.5mE x 12.5mN x 3.0mRL was selected. The “percent” block modelling technique was used to represent the volume of the interpreted wireframe models. Sufficient variables were included in the block models construction to enable grade estimation and reporting.

Resource estimation for the Near Mine deposit was undertaken using Ordinary Kriging (OK) as the principal estimation methodology for P2O5. The estimation for Cana Brava and Domingos was undertaken using the Inverse Distance methodology. The OK and the Inverse Distance estimates were completed using Gems mining software.

The following corresponds to the list of variables contained in the received block model data:

- Lithology code
- Bulk density assigned by lithology type constant values (t/m3)
- %P2O5
- %Al2O3
- %SiO2
- A class code to distinguish measured, indicated, and inferred resource blocks.

Itafós personnel provided the initial topography and added by NCL to the model.

NCL did not audit the sampling data or the block model used for this project.

It is becoming common in the industry to develop resource models (particularly where nonlinear estimation techniques are applied), which essentially take into account potential dilution within the blocks, or adopt selective mining unit (SMU) as part of the resource modelling process. NCL did not manipulate the provided block models as estimated to be already diluted.

Block models included resources classified as measured, indicated and inferred. Contained measured resources are transferred to proven reserves and contained indicated resources are transferred to probable reserves. Inferred mineral resources are not converted to reserves and are instead treated as waste for mine planning purposes.

It is the opinion of NCL that the mine production schedule defines the mineral reserve for a mining project. Table 15_1 reports the mineral reserve of the Itafós Project based on the production schedule used for this study.

Table 15_1 – Total Mining Reserve Summary (1)(2)

Ore Source	Ktonnes	P_2O_5 (%)	
Proven Reserve	15,954	5.09	
Probable Reserve	48,857	5.07	
Total Reserve	**64,811**	**5.07**	
Total Material	**253,017**	**Strip ratio**	**2.90**

(1) The Mineral Reserves as set out in the table above have been estimated by Carlos Guzmán of NCL Brasil Ltda, who is a Qualified Person under NI 43-101 and Member of the AusIMM.

(2) Numbers may not add up due to rounding.

The reserve estimate has been based upon economic parameters, geotechnical design criteria and metallurgical recovery assumptions detailed in the sections above. Changes in these assumptions will impact the reserve estimate. In general, increases in operating costs, reductions in revenue assumptions or reductions in metallurgical recovery may result in increased cutoff grades, reductions in reserves and increasing strip ratios. The converse is also true. Reductions in operating costs, increases in revenue assumptions or increases in metallurgical recovery may result in reduced cut-off grades and increases in reserves.

16 MINING METHODS

16.1 Pit and Mining phase Design

16.1.1 Final Pit Design

The final pit design was based on the economic shells generated at a revenue factor equal to 1.0 and minimum cut-off grades of 1.8% P2O5 for Domingos and 2.8%P2O5 for Cana Brava and Near Mine. A constant 49.0° inter ramp angle. Table 16.1_1 shows the key open pit design parameters.

Table 16.1_1 – Open Pit Design Parameters

Bench Height	6 m (two stacked 3m benches)
Berm Width	3 m
Batter Angle	82.0°
Inter-ramp Angle	49.0°
Ramp Width	15 m
Ramp Gradient	10%

Geotechnical information is not available, but mining activity is already developed in the area which supports the adopted parameters shown in Table 16.1.1 for the current stage of the Project. During the previous stage of the project, several optimizations runs were performed for different slope angles and results indicated variations smaller than 5% on ore and waste.

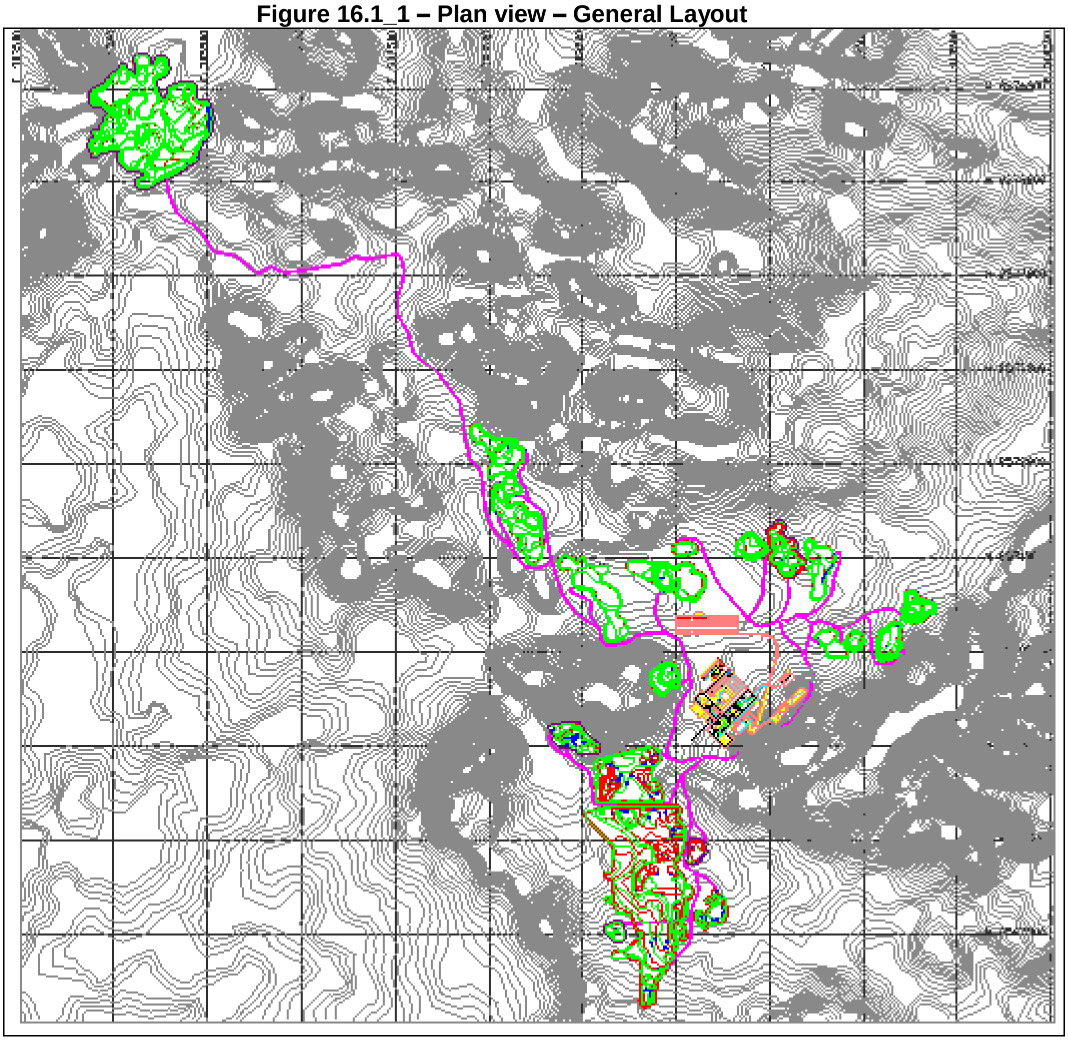
The ramps width of 15 meters can accommodate up to 50 tonne trucks. NCL used the 10% road gradient, which is common in the industry for this type of trucks.

The current mine plan is designed with 3m benches stacked to 6 meters (i.e. two stacked benches).

For the required mining rate the appropriate loading equipment is medium size front end loaders or hydraulic excavators, ranging between 3.5 m3 to 4.3m3 capacities. The minimum operating widths to achieve the required productivities with this equipment is about 25m.

Figure 16.1_1 shows the final pit design which is a result of different pits for the seven sectors (five in Near Mine, Domingos and Cana Brava), designed according to the obtained pit shell of the optimization process. The pit exits were orientated to the selected position of the processing plant. The total area disturbed by the pits is about 670 hectares

Figure 16.1_1 – Plan view – General Layout



16.1.2 Tabulation of Pit Contained Resources

Table 16.1_2 summarizes the pit contained resources for the final design pit at several different P2O5 cut-off grades.

Table 16.1_2 – Resources Contained in Final Pit at Various Cut-off Grades by Sector

Sector	Total Ore		Waste	TOTAL	
Cut-Off (%P2O5)	**Kton**	**% P205**	**Kton**	**Kton**	**Strip Ratio**
TOTAL	**61,252**	**5.3**	**191,765**	**253,017**	**3.1**
WASTE			191,765		
>COG	61,252	5.3			
DOMINGOS	**28,140**	**5.6**	**69,219**	**97,359**	**2.5**
WASTE			69,219		
1.8%-2.2%	1,709	2			
2.2%-2.6%	2,052	2.4			
2.6%-3.0%	2,083	2.8			
>3.0%	22,297	6.4			
CANA BRAVA	**18,063**	**5.2**	**59,803**	**77,866**	**3.3**
WASTE			59,803		
2.8%-3.0%	1,343	2.9			
3.0%-3.2%	1,380	3.1			
>3;2%	15,340	5.6			
NEAR MINE	**15,049**	**4.7**	**62,743**	**77,792**	**4.2**
WASTE			62,743		
2.8%-3.0%	1,296	2.9			
3.0%-3.2%	1,245	3.1			
>3;2%	12,508	5.1			

16.2 Mine Production Schedule

A mine production schedule was developed to show the ore tonnes, grades, total material and waste material by year throughout of the life of the mine. The distribution of ore and waste contained in each of the mining sectors was used to develop the schedule, assuring that criteria such as continuous ore exposure, mining accessibility, and consistent material movements were met.

16.2.1 Strip Mining Design

The pushbacks designs were defined using the concept of strip mining geometry, considering widths of 100m to 200m, lengths between 700m to 1000m and variable depths according to the ore body geometry and top waste layer.

The concept is to backfill with the waste of the current strip the one mined immediately before, minimizing the hauling distances for the waste and permanent reclamation of the mined areas.

Figure 116.2_1 – Conceptual Design for Strip Mining

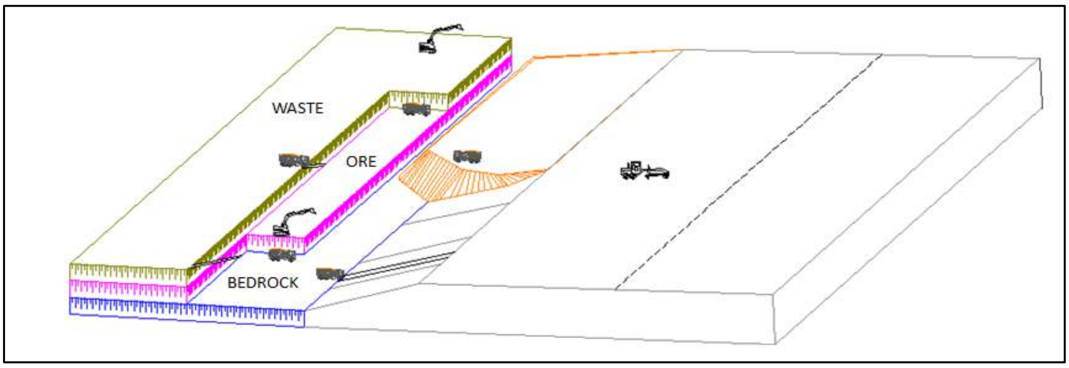
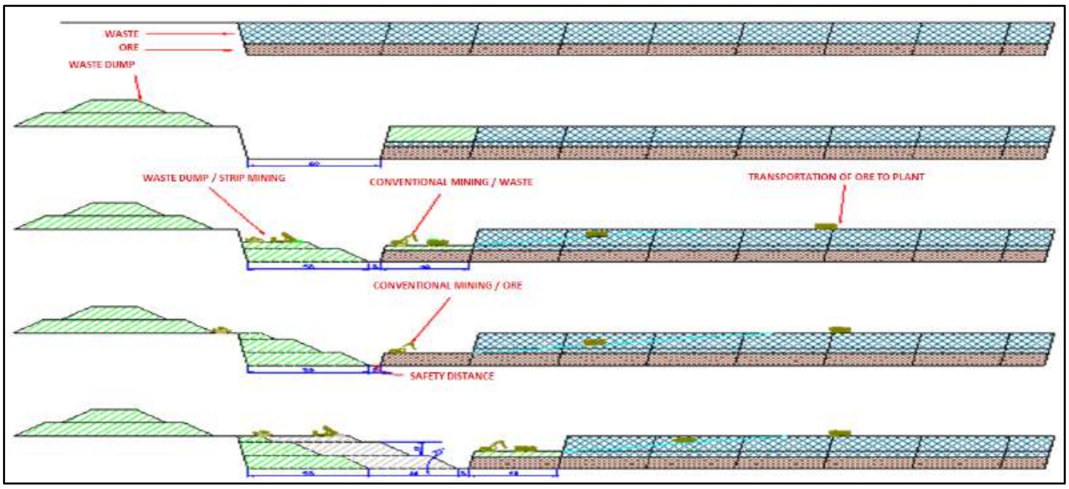


Figure 116.2_2 – Conceptual Sequence for Strip Mining



16.2.2 Mine Scheduling Methodology

NCL used an in-house developed system to evaluate several potential production mine schedules. Required annual ore tonnes and user specified annual total material movements are provided to the algorithm, which then calculates the mine schedule. Several runs at various proposed total material movement schedules were done to determine a good production schedule strategy. It is important to note that this program is not a simulation package, but a tool for calculation of the mine schedule and haulage profiles for a given set of phases and constraints that must be set by the user.

The mine plan developed by NCL does not include any special provisions for dilution because the resource block models are considered as already diluted.

Nevertheless, careful grade control must be carried out during mining to minimize misplaced ore due to the important effect of head grade on phosphate concentrate production. These efforts should include the following standard procedures:

- Implement an intense and systematic program of sampling, mapping, laboratory analyses, and reporting.

- Utilize specialized in-pit bench sampling drills for sampling well ahead of production.

- Use of excavators and benches no higher than 3 m (as presently planned) to selectively mine ore zones.

- Maintain top laboratory staff, equipment, and procedures to provide accurate and timely assay reporting.

- Utilize trained geologists and technicians to work with excavator operators in identifying, marking, and selectively mining and dispatching ore and waste.

16.2.3 Mine Schedule

According to initial estimates for processing costs, metallurgical recovery and long term price for obtained products, as detailed in Table 4.1_1, the marginal cut-off which defines the separation between ore and waste is calculated as 0.7% P2O5. As the metallurgical testwork had been carried out for material of higher grades, a value of 2.8% P2O5 was selected as the cut-off for Cana Brava and Near Mine; and a 1.8% P2O5 for Domingos.

Table 16.2_1 shows the mine production of ore for each mining year. The schedule is based on 3.9M tonnes per year to the processing plant and a production of 330 K tonnes of phosphate concentrate at 28%P2O5. The table also shows the total material movement from the mine by year, which peaks at 19.0 M tonnes per year during commercial production.

The mined waste considers several destinations for the material, to the closest possible location outside of the pits and also to abandon areas within the pits, as a way to have lower hauling distances, using the strip mining concept.

The preproduction period requires the mining of 1.1M tonnes of total material to expose sufficient ore to make it a reliable ore source for the start of commercial production in Year 1. The preproduction period will require approximately 6 months. The ore mined during preproduction will be stockpiled in the ROM-pad area near the primary crusher and then rehandled to make up part of the plant feed during commercial production.

The mining sequence was established in order to obtain the highest grade material at the beginning and postpone those sectors with lower grades and high strip ratios. The general adopted mining sequence was as follows:

a) Initiate in Domingos, area with highest grades and lowest strip ratio. Close to the plant site (shorter hauling distances)

b) Continue with Cana Brava, which has grades similar to Domingos, but at a significant higher distance from the plant (13km).

c) Finally, Near Mine, which contains the lowest grades. Mining at Near Mine begins in Year 13.

Table 16.2_1 through Table 16.2_4 show the total mine schedule and divided by area (Domingo, Cana Brava and Near Mine), considering a monthly basis from Pre-stripping to Year 2 and yearly from Year 3.

Table 116.2_1 – Mine Production Schedule

Period	Total Ore		Waste	Total
	Kt	% P2o5	Kt	Kt
apr-12		0	68	68
may-12		0	131	131
jun-12		0	203	203
jul-12		0	261	261
aug-12		0	254	254
sep-12		0	219	219
oct-12	36	10.15	171	207
nov-12	75	9.74	107	182
dec-12	119	9.15	66	185
ene-13	186	7.82	385	570
feb-13	247	5.89	473	720
mar-13	228	6.37	563	791
abr-13	266	5.46	674	940
apr-13	315	4.61	874	1,189
may-13	273	5.33	821	1,093
jun-13	247	5.88	887	1,134
jul-13	253	5.75	883	1,136
aug-13	255	5.7	841	1,096
sep-13	253	5.74	766	1,019
oct-13	238	6.1	519	757
nov-13	250	5.81	316	567
dec-13	236	6.15	329	565
feb-14	243	5.98	472	716
mar-14	250	5.8	528	778
apr-14	268	5.42	719	987
may-14	240	6.05	891	1,131
jun-14	272	5.35	822	1,093
jul-14	287	5.07	845	1,132
aug-14	247	5.9	898	1,145
sep-14	245	5.93	836	1,081
oct-14	259	5.62	764	1,023
nov-14	236	6.17	531	766
dec-14	243	5.99	332	576
2015	3,016	5.78	7,982	10,998
2016	3,016	5.78	7,982	10,997
2017	3,016	5.78	7,915	10,931
2018	3,013	5.79	8,056	11,070
2019	3,012	5.79	7,938	10,950
2020	3,015	5.78	8,056	11,071
2021	3,729	4.67	15,157	18,887
2022	3,720	4.7	15,333	19,052
2023	3,765	4.63	15,227	18,992
2024	3,734	4.67	15,280	19,014
2025	3,804	4.59	14,235	18,039
2026	3,772	4.62	14,193	17,965
2027	3,736	4.67	14,203	17,940
2028	3,788	4.63	8,769	12,557
2029	3,838	4.54	5,211	9,050
2030	3,760	4.64	4,731	8,491
2031	2,812	4.54	489	3,301
Total	64,811	5.07	188,207	253,017

Table 116.2_2 – Mine Production Schedule – Domingos

Period	Total Ore		Waste	Total
	Kt	% P2o5	Kt	Kt
apr-12	0.3	3.794	68.3	68.6
may-12	0.4	3.794	130.9	131.3
jun-12	0.5	3.794	202.7	203.2
jul-12	1.6	4.943	260.9	262.5
aug-12	8.8	5.38	253.7	262.5
sep-12	35.2	9.281	218.8	254
oct-12	64.9	10.153	171.4	236.3
nov-12	70.9	9.782	106.9	177.8
dec-12	65.5	9.29	65.8	131.3
ene-13	181.6	7.798	384.6	566.2
feb-13	243.1	5.84	472.9	716
mar-13	229.9	6.374	562.8	792.7
abr-13	312.6	5.465	673.7	986.3
apr-13	258.3	4.283	874.1	1,132
may-13	275.1	5.33	820.8	1,096
jun-13	245.5	5.882	886.9	1,132
jul-13	249.8	5.745	882.6	1,132
aug-13	254.5	5.698	841.4	1,096
sep-13	253.1	5.74	766.1	1,019
oct-13	248.4	6.097	518.7	767.1
nov-13	249.7	5.805	316.5	566.2
dec-13	237.3	6.153	328.9	566.2
feb-14	243.5	5.976	472.5	716
mar-14	265	5.802	527.7	792.7
apr-14	267.1	5.422	719.2	986.3
may-14	241.2	6.046	891.2	1,132
jun-14	274	5.351	821.9	1,096
jul-14	286.9	5.067	845.5	1,132
aug-14	234.2	5.9	898.2	1,132
sep-14	259.9	5.926	836	1,096
oct-14	255.1	5.613	764.1	1,019
nov-14	236.5	6.168	530.6	767.1
dec-14	234	5.993	332.2	566.2
2015	3,018	5.781	7,982	11,000
2016	3,018	5.781	7,982	11,000
2017	3,085	5.781	7,915	11,000
2018	2,944	5.785	8,057	11,000
2019	3,062	5.788	7,938	11,000
2020	2,854	5.855	6,385	9,239
2021	2,382	4.591	6,634	9,016
2022	191.3	5.135	178.8	370.1
Total	26,838	5.7	70,521	97,359

Table 116.2_3 – Mine Production Schedule – Cana Brava

Period	Total Ore		Waste	Total
	Kt	% P2o5	Kt	Kt
2020	90	3.5	1,671	1,761
2021	1,461	4.81	8,523	9,984
2022	3,476	4.67	15,154	18,630
2023	3,773	4.63	15,227	19,000
2024	3,444	4.72	8,206	11,650
2025	3,717	4.61	6,083	9,800
2026	2,846	5.08	1,336	4,182
2027	2,031	5.37	829	2,860
Total	20,837	4.79	57,029	77,866

Table 116.2_4 – Mine Production Schedule – Near Mine

Period	Total Ore		Waste	Total
	Kt	% P2o5	Kt	Kt
2024	276	4.03	7,074	7,350
2025	48	2.9	8,152	8,200
2026	961	3.26	12,857	13,818
2027	1,766	3.86	13,374	15,140
2028	3,731	4.63	8,769	12,500
2029	3,789	4.54	5,211	9,000
2030	3,769	4.64	4,731	8,500
2031	2,795	4.54	489	3,284
Total	17,135	4.42	60,657	77,793

Figure 16.2_3 and Figure 16.2_4 show the situation of the mine at the end of several periods.

Figure 116.2_1 – End of Periods – Domingos – Pre-Stripping through Year 2

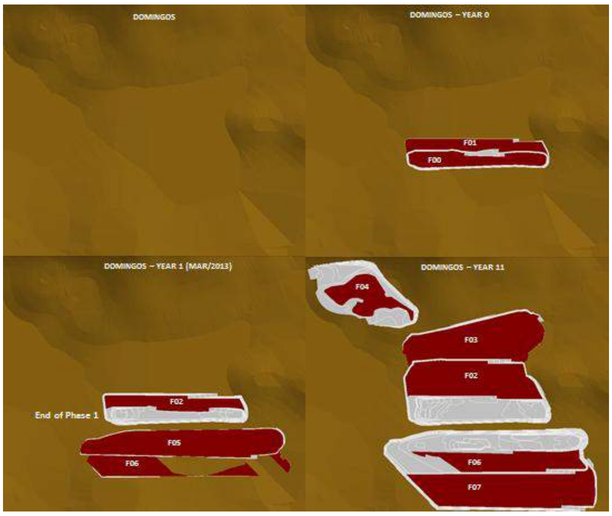
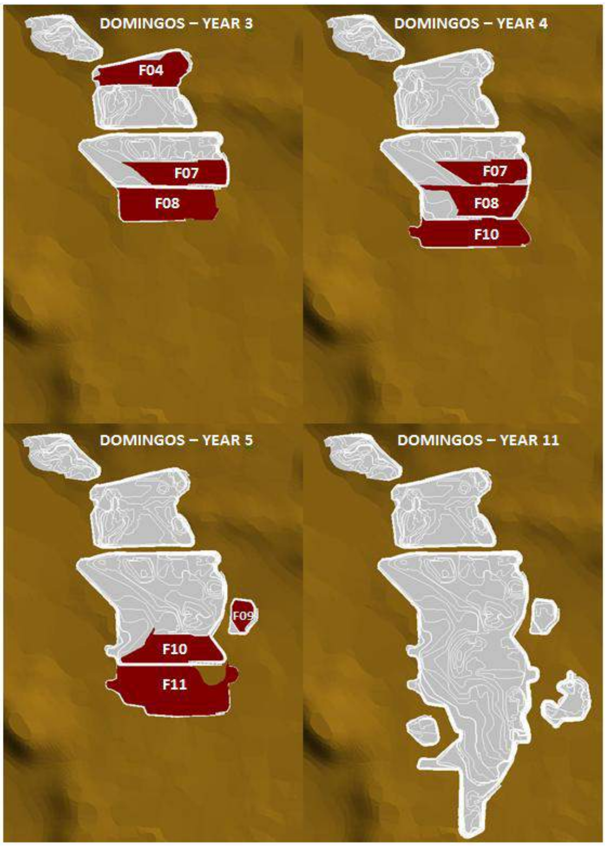


Figure 116.2_2 – End of Periods – Domingos –Year 3 through Year 11



The plant feed is close to 3.66 M tonnes per year to produce constantly 330 K tonnes of concentrate (see Table 16.2.5.)

Table 116.2_5 – Plant Feed Schedule

Period	Crusher			Stock					
	Processed			In			Out		
	kt	$\%P_2O_5$	Conc (Kt)	kt	$\%P_2O_5$	Conc (Kt)	kt	$\%P_2O_5$	Conc (Kt)
2012	230	9.52	41	76	9.01	13	57	8.98	10
2013	3,011	5.79	330	61	5.62	6	70	6.42	9
2014	3,027	5.77	330	36	5.84	4	26	5.89	3
2015	3,016	5.80	330	2	5.80	0	0	0.00	0
2016	3,016	5.80	330	3	5.80	0	0	0.00	0
2017	3,016	5.80	330	69	5.80	8	0	0.00	0
2018	3,013	5.80	330	0	0.00	0	70	5.81	8
2019	3,012	5.80	330	50	5.80	6	0	0.00	0
2020	3,015	5.80	330	0	0.00	0	71	5.79	8
2021	3,729	4.70	330	113	4.70	10	0	0.00	0
2022	3,720	4.70	331	0	0.00	0	52	4.70	5
2023	3,765	4.60	330	8	4.60	1	0	0.00	0
2024	3,734	4.70	330	0	0.00	0	14	4.69	1
2025	3,804	4.60	330	0	0.00	0	39	4.69	4
2026	3,772	4.60	330	35	4.60	3	0	0.00	0
2027	3,736	4.70	330	60	4.70	5	0	0.00	0
2028	3,788	4.60	332	0	0.00	0	57	4.66	5
2029	3,839	4.50	330	0	0.00	0	50	4.66	4

Table 116.2_5 – Plant Feed Schedule

Period	Crusher			Stock					
	Processed			In			Out		
	kt	%P_2O_5	Conc (Kt)	kt	%P_2O_5	Conc (Kt)	kt	%P_2O_5	Conc (Kt)
2030	3,760	4.60	330	9	4.60	1	0	0.00	0
2031	2,812	4.50	241	0	0.00	0	17	5.22	1
TOTAL	64,815	5.07	6,225	523	5.76	57	523	5.76	57

16.2.4 Waste Storage Facilities

The proposed mining method considers the backfilling of the previously mined strips. This concept can be theoretically applied for all of the mine life, except at the beginning of each sector. Five waste storage facilities were designed, one for Domingos, one for Cana Brava and three in Near Mine.

Table 16.2_6 shows the parameters used for the designs of the five waste dumps.

Table 116.2_6 – Geomechanichal parameters for waste Dump design

Bench height: 3 meters
Berm Width: 6 meters, every 4 benches
Batter Angle: 37°
Global Angle: 28.7°

Figure 116.2_3 – Waste Storage Facility - Domingos

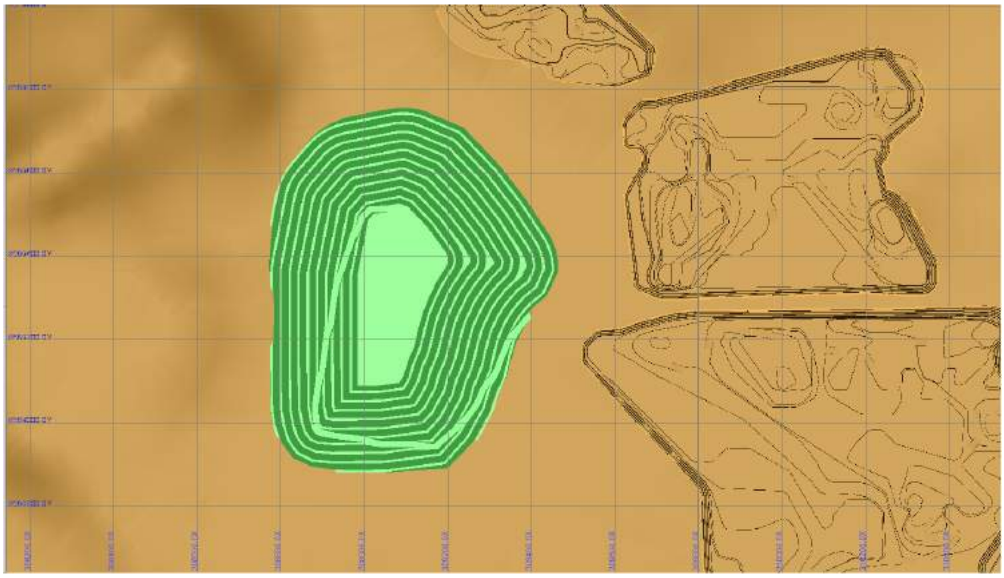


Figure 116.2_4 – Waste Storage Facility – Near Mine

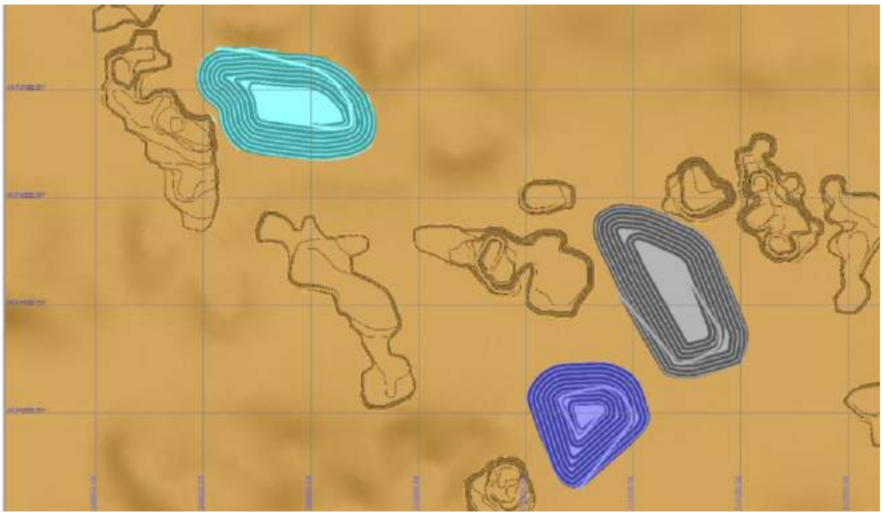
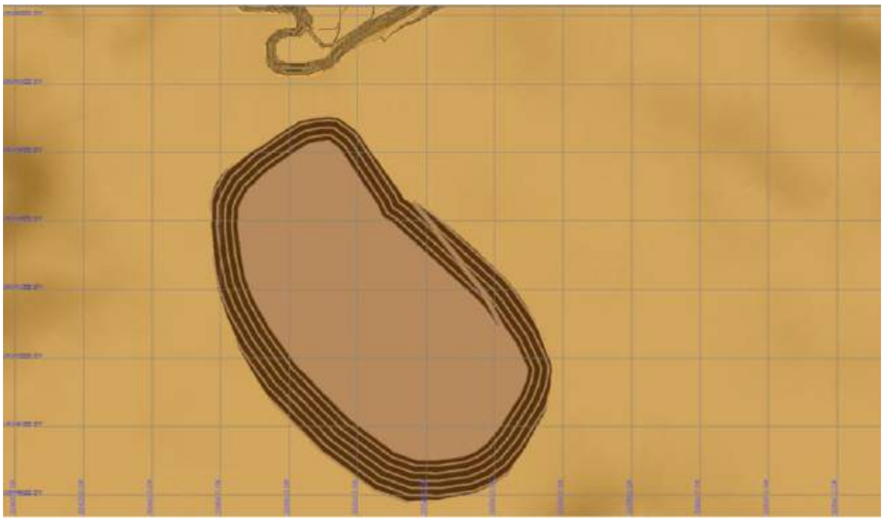


Figure 116.2_5 – Waste Storage Facility – Cana Brava



16.3 Equipment Requirement

Mine equipment requirements were calculated based on the annual mine production schedule, the mine work schedule, and equipment annual production capacity estimates.

The study is based on operating the Itafós Project mine with excavators of 3.5m3 capacities for ore and excavators of 4.3m3 for waste. Trucks with a nominal capacity of 39 tonnes and effective capacity of 27 tonnes were considered, for both, ore and waste. The difference in capacity between nominal and effective is due to the low density of the material.

This type of equipment is able to develop the require productivity to achieve a maximum annual total material movement of 20M tonnes from different pits; and also to have good mining selectivity with the excavators as defined by the grade control activities. The advantage of the smaller equipment is that it is produced in Brazil and does not have the large transportation costs and import duties associated with large equipment and large equipment parts. This aspect, combined with availability of spare parts and low local labour rates make this equipment an attractive alternative to traditional larger open pit mining equipment.

This fleet will be complemented with drilling rigs capable to drill 4½" diameter blast holes for, as 10% of material is defined as hard rock.

Auxiliary equipment includes track dozers, wheel dozers, motor graders and water truck. Additionally a reverse circulation drill rig is included for grade control purposes.

Table 16.3 provides a summary of the peak number of units required for preproduction and commercial production. This represents the equipment necessary to perform the following duties:

1. Construct roads to the initial mining areas as well as to the crusher, waste storage areas. Construct additional roads as needed to support mining activity.

2. The preproduction development required to expose ore for initial production.

3. Mine and transport ore to the primary crusher area. Mine and transport waste material from the pit to the appropriate storage areas.

4. Maintain all the mine work areas, in-pit haul roads, and external haul roads. Also maintain the waste storage areas.

5. Rehandle the ore (load, transport and auxiliary equipment) from the ROM-pad to feed the primary crusher.

6. Topsoil striping and disposal.

Table 16.3_1 – Initial and Maximum Equipment Fleet Requirement

Equipment Type	Stripping	Production (MAX)
Atlas Copco Explorac R50 Drill Control	1	1
Liebherr 964 Shovel (3.5m^3)	1	5
Liebherr 954 Shovel (4.3m^3)	0	2
Scania Trucks (39t)	5	56
CATD8T Dozer	2	2
CAT140M Motor Grader	1	1
Scania Water Truck(20m^3)	2	2

16.3.1 Drilling and Blasting Requirement

According to the geotechnical characteristics of the rock, was estimated that only 10% of the material will require drill and blast. An allowance had made for the cost, considering US$2.0/t, as part of the general mining cost.

16.3.2 Loading and Hauling Requirement

The study is based on operating the Itafós Project mine with excavators of 3.5m3 capacities for ore, operating in three meters benches. Excavators of 4.3m3 were considered for the waste, operating in double benches (6m height).

The mine schedule allows the operation simultaneously in different faces, in order to achieve the required total mining rate.

The loaded materials at the mine will be hauled to the different destinations by 39 tonnes trucks: primary crusher, waste storage facilities and low-grade stockpile.

The general criteria used for designing the haul roads were the following:

- Maximum gradient of 10%
- Width of 15m.
- Berms of 1.5m high and 1.0m wide
- Maximum truck speed of 5km/hr
- Clearance turning radius of 20m.

The effective capacity of the trucks corresponds to the number of passes, times the mass of each pass. The number of passes is calculated as the rounded value of the minimum between the limit of the volumetric capacity and the weight capacity limit. As an example, for the ore loaded by the 3.5m3 excavator, the volumetric limit corresponds to 4.7 passes and the mass limit to 7.4 passes. Therefore, the number of passes is 5 (4.7 rounded up to 5) and the effective truck capacity is 26.1 tonnes.

16.3.3 Auxiliary and Support Equipment

Major auxiliary equipment refers to the major mine equipment that is not directly responsible for production, but which is scheduled on a regular basis. Equipment operating requirements, operating hours and personnel requirements were estimated for this equipment.

The primary function of the auxiliary equipment is to support the major production units, and provide safe and clean working areas. Equipment types included in the auxiliary mine fleet are:

- Caterpillar D8T Track dozer
- Caterpillar 140M Motor Grader
- Scania Water Truck (20000 liter)
- Atlas Copco Explorac 50 (RC Drill Rig)

The primary duties assigned to the auxiliary equipment are as follows:

- Mine development including access roads, drop cuts, temporary service ramps, safety berms, etc.
- Waste rock storage area control. This includes maintaining access to the dumping and stockpile areas and maintaining the travel surfaces.
- Ore stockpile storage area control. This includes maintaining access to the dumping and stockpile areas and maintaining the travel surfaces.
- Maintenance and cleanup in the mine and waste storage areas.
- Drilling for grade control purposes, developed in advance in relation with production drilling.

Additional equipment to support mining activities was estimated:

- Flatbed Truck
- Mechanics Truck (4x4)
- Scania Fuel Truck (12000 litre)
- Backhoe Loader (1 cu m)
- Pickup Truck (4x4)
- Light Plants

17 RECOVERY METHODS

17.1 Beneficiation plant and drying

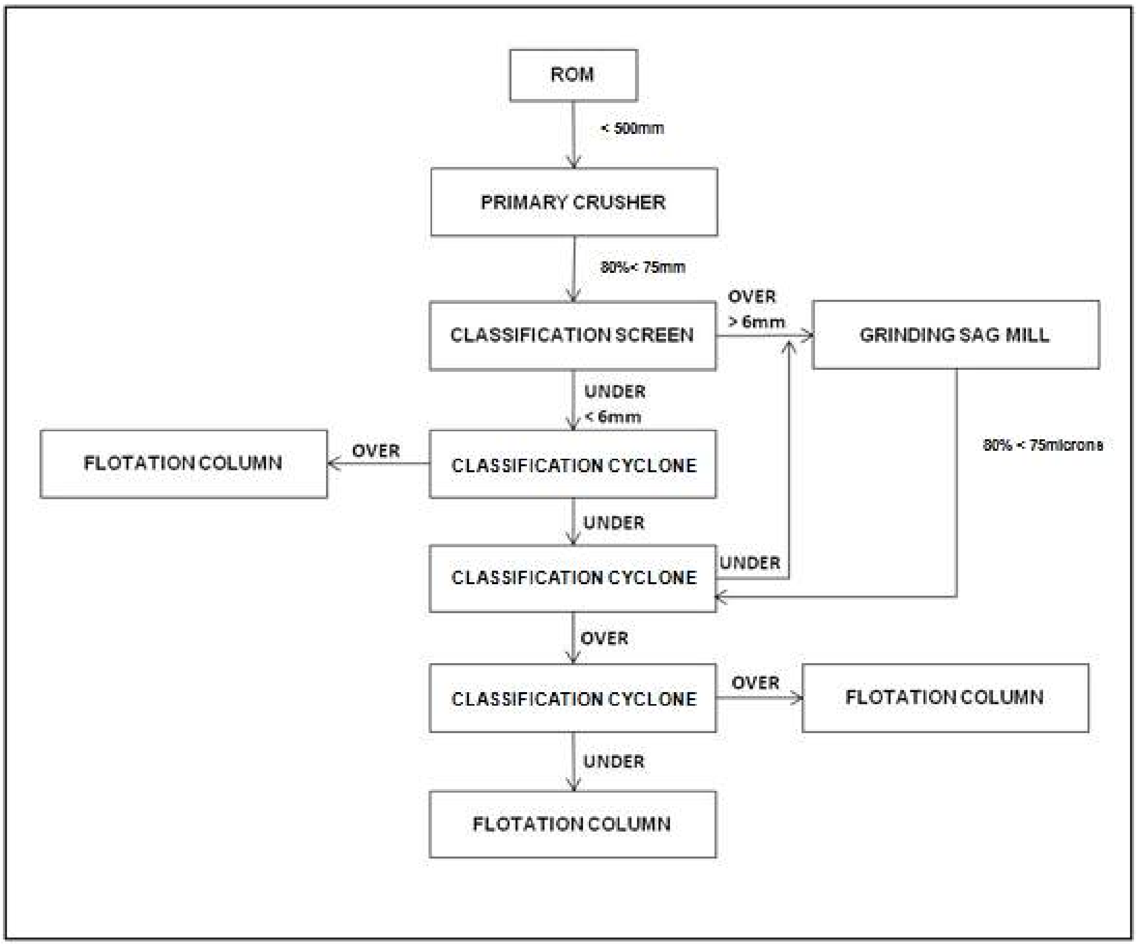
The mineral processing plant was designed based on the metallurgical test work completed and consider the following main design parameters:

- An ore with a feed grade of 5.32 % P2O5;
- Production of 330,000 t/year of concentrate assaying 28% P2O5 with a metallurgical recovery of 54% from the column flotation of the conventional and produced slimes fractions;
- Production of 94,000 t/year of concentrate assaying 15% P2O5 with a metallurgical recovery of 8.4% from the column flotation of the natural slimes; and
- Total availability of 89%.

The plant has been designed to treat 3.5 million tonnes/year of ROM, considering the parameters above. The samples tested in the pilot plant had grades varying from 4.4 to 6.3% P2O5 and the average mass and P2O5 partition obtained in the steps of the process was used to calculate the material balance.

The process adopted consists of the following steps, as shown in the figure below:

- Primary crushing of the ROM material;
- Grinding of the coarse fractions in a SAG mill; and
- Classification of the ore into three size fraction streams to produce the materials denominated as natural slimes, produced slimes and conventional.



Each one of these size fractions is floated in columns to produce the three concentrates.

Natural slimes concentrate with a grade of 15% will be dewatered in a thickener and a press filter. The cake will be dried in rotary drier and sent for shipment.

Produced slimes concentrate will be thickened in a pond and the underflow will be pumped to the acidulation plant.

Conventional concentrate will be reground to 95% passing 44 microns to improve reactivity, submitted to magnetic separation to reduce iron content and then will be dewatered in a thickener and a press filter. The cake will be stock piled and reclaimed to the acidulation plant where it will be combined with the slimes concentrate produced.

All the tailings are combined and sent to the tailings dam by gravity. The crushing plant was designed to avoid dry operations as much as possible in order to maximize plant availability, due to the sticky characteristics of the Arraias Tocantins ore. Therefore, it was decided to use only one crushing stage followed by a SAG milling circuit to avoid clogging conveyor belts and screens which can occur when secondary and tertiary crushing stages are utilized.

Pilot plant results showed that column flotation presented a better performance than mechanical cells. For this reason column cells were selected as the flotation equipment.

The major equipment items including the crusher, SAG mill, thickeners and filters were sized based upon specific laboratory test results conducted on samples of the ore, mill feed and concentrates.

17.2 Sub processes Description

17.2.1 Crushing

ROM ore is discharged directly into a 160 m3 feed bin prior to screening or is alternatively stockpiled on the ROM pad for reclamation at a later time using a FEL (front end loader). The screen feed bin is fitted with a 500 mm aperture fixed grizzly. The grizzly undersize material reports to the screen feed bin which is then directed to an apron feeder whilst a mobile rock breaker is used to break down grizzly oversize material to below 600 mm in size. If the quantity of the oversize rock in the ROM ore is high then the FEL relocates this oversize material to an oversize rock stockpile for treatment at a later time.

17.2.2 Grinding/Classification/Desliming

The apron feeder product discharges to a 150 mm opening vibrating grizzly screen feeder. The grizzly oversize material is then directed to an "MMD type" sizer, which is a patented rolls type crusher. The grizzly undersize product and the product from the crusher are then combined on a single conveyor and delivered by belt conveyor to two homogenization stockpiles of approximately 23.333 m3 capacity each. This provides 8 days of available feed to the primary grinding mill. The stockpiles feed will be made by stacker in the first year of operation and It will be used a reclaimer after that.

A FEL will be used to reclaim the ore from the homogenization stockpiles in the first year in operation. The reclaimed material will be directed to a bin and then to a belt conveyor fitted with a weightometer device which records the throughput rate of the primary grinding mill.

The homogenization stockpile material is then conveyed and discharged onto a three deck vibrating screen. The bottom deck undersize material of less than 6.35 mm (<¼") is then directed to an attrition scrubber fitted with two agitators. The attrition scrubber product overflows by gravity into a slurry hopper. The slurry from the hopper is then pumped to a pre-classification hydro-cyclone cluster of 15" diameter hydro-cyclones. A belt conveyor receives the combined +6.35 mm (>¼") material from the three screen decks and is directed to a low aspect SAG mill. The SAG mill discharge material is then screened using a screening trommel with oversize material (> ¼") reporting back to SAG mill feed conveyor via two separate conveyors. The trommel undersize material reports through to the SAG mill discharge hopper. The material is then pumped to the classification hydro-cyclone cluster consisting of 15" diameter hydro-cyclones.

The overflow from the pre-classification hydro-cyclone cluster is discharged via gravity into another slurry hopper and is then pumped to a bank of natural slimes dewatering hydro-cyclones. The underflow from the pre-classification hydro-cyclone cluster is then discharged via gravity into the SAG mill discharge hopper where it is combined with SAG mill discharge trammel undersize product. It is then combined with additional process water and pumped to the grinding circuit classification hydro-cyclones which also consist of 15" diameter hydro-cyclones.

The overflow from the natural fines dewatering hydro-cyclones cluster returns to the attrition scrubber slurry hopper as additional hopper process make-up water whilst the dewatering cyclones underflow is directed to the natural slimes flotation circuit conditioning tank.

The overflow material from the grinding circuit classification hydro-cyclones is then directed to another slurry hopper and then pumped to a bank of de-sliming hydro-cyclones, whilst the grinding circuit classification hydro-cyclone underflow material returns by gravity to the feed of the SAG mill and joins the mill re-circulating load.

The underflow from the de-sliming hydro-cyclones is then directed to a conventional flotation circuit employing roughing and cleaning flotation whilst the overflow is collected in another hopper and pumped to another set of dewatering hydro-cyclones. The overflow from the dewatering hydro-cyclones cluster returns to the de-sliming hydro-cyclones cluster feed hopper and the underflow from the dewatering cyclones is then directed to a conditioning tank prior to flotation. The circuit is then described as produced slimes flotation circuit consisting of roughing and scavenging.

17.3 Flotation

17.3.1 Conventional Flotation

The underflow from the de-sliming hydro-cyclones cluster flows by gravity directly to 2 flotation conditioning tanks in series fitted with mechanical agitators. Slurry flows by gravity from one conditioning tank to the next. Slurry from the 2nd conditioning tank overflows into a slurry hopper and is pumped to 2 conventional rougher flotation column cells in series.

The rougher flotation concentrate from both column cells flows by gravity to a slurry hopper and it is pumped to 2 conventional cleaner flotation columns in series while the rougher flotation tailings is discharged into a slurry hopper and is pumped to the tailings dam and sampled for process control purposes.

The concentrate from the conventional cleaner flotation columns flows by gravity to a slurry hopper and is then pumped to the regrind classification hydro-cyclones cluster. The cleaner flotation tailings are directed back to the slurry hopper that feeds rougher flotation columns as a circulating load.

17.3.2 Produced slimes Flotation

The underflow from the produced slimes dewatering hydro-cyclones cluster flows by gravity directly to the 2 conditioning tanks in series, each tank fitted with a mechanical agitator. Slurry flows from one conditioning tank to the next after being conditioned with reagents. Slurry overflowing from the second conditioning tank flows by gravity to a slurry hopper and then pumped to a single fine product rougher flotation column.

The concentrate from the produced slimes rougher flotation column is then directed to the concentrate slime produced pond.

The tailings from the produced slimes rougher flotation column then flows by gravity to a conditioning tank fitted with a mechanical agitator where further reagents are introduced. The conditioning tank product is then pumped at the fine products scavenger flotation column.

The concentrate from the produced slimes scavenger flotation column then combined with the produced slimes rougher flotation concentrate and flows concentrate slime produced pond. The tailings from the scavenger flotation column are then sampled and pumped to the tailings dam.

17.3.3 Natural slimes Flotation

The underflow from the dewatering hydro-cyclones cluster reports to 2 conditioning tanks in series fitted with mechanical agitators. Slurry overflows from the 1st first conditioning tank to the 2nd conditioning tank. Slurry from the 2nd conditioning tank overflows and flows by gravity to a slurry hopper and pumped to the natural fines rougher flotation columns. Two rougher flotation columns are fitted in series.

The concentrate from the natural slimes rougher flotation columns flows by gravity to the natural slimes thickener whilst the tailings from the natural slimes rougher flotation column reports to a slurry hopper via gravity and is then pumped to the tailings dam after being sampled.

17.3.4 Regrind and Magnetic Separation

The conventional cleaner flotation concentrate will be directed to regrind mill. It will combine with the regrind mill discharge in the to the regrind mill discharge hopper. This combined slurry is then pumped to the regrind mill classification hydro-cyclone. The cyclone underflow flows by gravity to the regrind mill which closes the circuit. The regrind mill hydro-cyclone overflow will be directed to a slurry tank and will be pumped to the magnetic separation circuit.

The magnet material from the roll magnetic separator reports via gravity to the tailings dam. The non-magnetic material then flows to a slurry tank via gravity and is then pumped to the main concentrate thickener.

17.3.5 Thickening and Filtration

The overflow water from the natural fines thickener flows by gravity to the tank and is then pumped to the process water system tank. The underflow from the natural fines thickener is then pumped to a conditioning tank fitted with a mechanical agitator and then pumped through a conventional press filter. The filtrate water combines with the thickener overflow water from the natural fines thickener. Two belt conveyors in series transfer the moist cake to the dryer chute.

The overflow from the main concentrate thickener flows by gravity to a tank and is combined with the natural fines thickener overflow and filtrate water. Filtrate water from the main concentrate filter system is then combined into a single tank and pumped to the process water system tank. The main thickener underflow is pumped to a conditioning tank fitted with a mechanical agitator and then pumped to a conventional press filter. Three belt conveyors in series deliver the filter cake to the phosphate rock concentrate stockpile.

A FEL reclaims material from the phosphate rock concentrate stockpile onto to belt conveyor, which then feeds to a conditioning tank fitted with a mechanical agitator which also receive the fines from the concentrate produced slime pond, achieving 70% wt. The phosphate rock concentrate is then pumped from the conditioning tank to the acidulation section of the plant.

17.3.6 Drying

The filter cake from the natural fines filter is fed to the dryer chute via a belt conveyor. Gas from the furnace which burns firewood is used to heat the dryer. The firewood is transported to the furnace by hand. The furnace operates with the assistance of exhaust fans and a screw conveyor to remove ashes from the furnace. The filter cake material with 10% moisture or less is then withdrawn from the dryer to a conveyor system and discharged forming a cake pile.

The hot air expelled from the dryer passes through a cyclone process to capture ultrafine material. The cyclone underflow is discharged back to the conveyor feeding the cake pile and the cyclone overflow reports to a sleeve filter. Ultra fines captured in the sleeve filter are also fed to the cake pile conveyor using a screw feeder system. The filtered air that has passed through the filter is then released to the environment after passing through an exhaust fan and stack.

17.4 Reagents Plant & Equipment

17.4.1 Caustic Soda

Thirty tonne trucks transport the caustic soda at 50% w/w in solution. A reagent transfer pump then transfers this caustic from the trucks to the caustic storage tank with a capacity of approximately seven days production.

Part of the caustic stored in the tank is pumped to the soy oil emulsion preparation tank. Water may be introduced to the caustic soda circuit to clean the transfer piping and prevent from scaling with crystallized caustic soda.

The remaining caustic soda is pumped to a tank fitted with mechanical agitator to prepare a 10% w/w caustic soda where water is added to dilute the caustic soda. After being diluted to 10% w/w, the caustic soda solution is then pumped to a storage tank and then pumped to the first conditioning tanks in each of the three flotation circuits for pH control.

17.4.2 Soy Bean Oil

Thirty tonne trucks transport the pure soy oil to the plant. A reagent transfer pump then transfers the oil to a soy oil storage tank which has a residence time of seven days production capacity. This tank then feeds to a soy oil emulsion preparation tank fitted with a mechanical agitator using another transfer pump. Caustic soda at 50% w/w in solution and hot water (90 a 95 ºC) from the boiler are introduced to this tank.

Before the soy oil and caustic soda at 50% w/w are added, water is added to the preparation tank to one third full. After this water is added a reagent pump adds the soy oil for approximately five minutes and then the caustic transfer pump transfers the caustic soda to complete the batch. The transfer valve remains closed until the operation of emulsion preparation is complete. During the emulsion preparation, the mechanical agitator is running to facilitate saponification. The preparation takes approximately two hours to be complete which includes the batch mix period. Once saponification is completed, further water is added until a 10% w/w concentration of soy oil is completed. It is assumed that two batches per 8 shift will be conducted and consequently two transfers to the distribution tank will be completed and capable of plant supply for 8 hours.

When the required residence time is completed, the transfer valve is opened and a pump delivers the emulsion to a distribution tank. The final proportion of the preparation tank will be an emulsion consisting of 0.3 parts caustic soda, 1 part of soy oil and 18.7 parts water (resulting in a concentration at 10%). This solution remains in the distribution tank and is delivered continuously to the both of the conditioning tanks in the conventional flotation circuit, the second conditioning tank in the fines flotation circuit and the second conditioning tank in the natural fines flotation circuit using a transfer pump.

17.4.3 Flocculants

Flocculant will be delivered in bulker bags and when required be fed to the conditioning tank hopper manually and then subsequently report to the flocculant mixing tank where water will be introduced to prepare the solution at 1% w/w. The conditioned flocculant solution is then transferred to the flocculant distribution tank with seven days of production residence time. Then a pump transfers the flocculant solution to the natural fines thickener and the concentrate thickener after passing through the dilution mixing system which adds further water and dilutes the solution to 0.05% w/w. In the case of pump failure a reserve pump is installed to distribute the solution.

17.4.4 Sodium Silicate

Thirty tonne trucks will deliver a 50% w/w sodium silicate solution. A reagent pump transfers the sodium silicate to a storage tank with seven days production capacity. The sodium silicate storage tank solution is then pumped to a sodium silicate preparation tank fitted with a mechanical agitator (5075-AG-001).

Before the sodium silicate solution is added, water is added to the preparation tank up to 30% of the tank volume. Subsequently, a reagent pump adds the sodium silicate solution for approximately five minutes to prepare the batch. The transfer valve remains closed until this operation is complete. During the sodium silicate preparation, water is introduced continuously to the preparation tank whilst the agitator operates continuously during the solution preparation process. The time required to prepare the solution is one hour which includes the batch preparation time. It has been assumed two batches per shift will be made and consequently two transfers to the distribution tank will be capable of supplying the plant for 8 hours.

When the batch preparation process is completed, water and reagent feed to the tank preparation will be cut off. The transfer valve will be opened by the finalization of the required residence time and a pump delivers to the distribution solution tank.

The final proportion in the preparation tank will be a solution at four parts of water to one part of sodium silicate (resulting in a final concentration at 10%). The sodium silicate solution in the distribution tank will have approximately eight hours of residence time at production capacity with solution being continuously transferred to the first conditioning tanks in each of the three separate flotation circuits.

17.5 Sulphuric Acid Plant

Process phases are as follows:

- Storage of sulphur;
- Sulphur melting and filter;
- Sulphur burning in reaction with oxygen air;
- SO2 conversion into SO3
- SO3 gases scrubber and absorption in appropriate tower;
- Cooling and storage of acid product.

Storage of sulphur:

The solid sulphur with purity grade higher than 99.5% is unloaded from the delivery trucks to the reception unity, equipped with hopper and conveyor belts, and from that point to the stacker which sends it to the stockyard, with capacity for 30,000 tonnes of sulphur. The floor of the stockyard is made with concrete and is impermeable to avoid that acid pluvial waters touch the soil. The stockyard is also canted so that the acid pluvial water can be canalized to a sump where it is neutralized.

Sulphur melting and filter

The solid sulphur is removed from the stockpile and transferred to the melting tank where it receives a quantity of lime to reduce the acidity of the sulphur. Inside the tank, equipped with steam coils, the sulphur is melted at 120 degrees Celsius. From the melting tank, the liquefied sulphur is pumped to another tank where is added the diatomite, and agent that aids filtering the sulphur, allowing the removal of impurities.

Sulphur Burning

The filtered liquid sulphur is pumped to the burner, termically isolated oven, where in contact with dry air starts the combustion and creates SO2. Chemical reaction as follows:

$$S + O2 \text{ ------- } SO2 + Heat$$

The oxidation of sulphur is an exothermic reaction and the heat released is used for energy generation.

The dry air that fuels the burner is captured from the atmosphere by a blower that sends the humid air into a drying tower. These tower uses sulphuric acid, with 98% concentration, that when in contact with the air removes the humidity of the air using ceramic fillings.

The gas generated in the burner reach 1000 degrees Celsius and goes to a recovery boiler where, by thermal exchange, generates steam and has its temperature decreased to 430 degrees Celsius.

SO2 conversion into SO3

After the boiler, the SO2 gas and the O2 gas go to the converter where by catalytic action of the Vn2O5 (Vanadium Pentoxide) reacts generating SO3. Chemical reaction as follows:

$$SO_2 + \frac{1}{2} O_2 \text{ -------- } SO_3 + \text{Heat}$$

The oxidation of sulphur dioxide is an exothermic reaction and the heat released is used for energy generation.

The converter has 4 catalytic layers and in every layer the reaction above is realized until exiting the final layer with SO3 concentration of 99.75%

The heat released in the layers is used to generate steam and electric power.

At full capacity, the plant can generate up to 7.5MW of power.

SO3 Absorption

The plant has two absorption towers of SO3 with similar function as the dryer tower. However, their function is to absorb the SO3 using the sulphuric acid, with 98% concentration, that was used in the dryer tower to absorb the humidity.

Cooling and storage of acid product

The sulphuric acid is now sent to a mixing tank where it is added water to adjust its concentration to 98.5%. From the mixer tank, most of the acid goes to a heat exchanger where it is cooled and returns to the towers. The residual acid goes to another heat exchanger, cooled and finally to a storage tank, as the final product, the sulphuric acid with 98.5% concentration.

The storage tank has a capacity of 6000 tonnes of sulphuric acid. The tank is also equipped with pumping systems that sends the sulphuric acid to the fertilizing area or load it to delivery trucks.

17.6 Acidulation

The phosphate rock from the stockpile will be reclaimed by a front end loader to a belt conveyor to feed the repulping tank.

After being repulped, the slurry will be pumped to the intensive mixer where sulphuric acid (H2SO4) will be introduced. The reactional slurry product from the intensive mixer will direct to the curing belt (DEN). After 10 to 15 minutes residence time, the reactional slurry will solidify and it will pass through a lump breaker before being transferred to the cure warehouse by belt conveyors.

During the chemical reaction in the DEN, silicon tetrafluoride (SiF_4) will be released. The gases with fluorine content will be transferred to the absorption system where it will transform into fluosilicic acid (H_2SiF_6) and hydrated silica ($SiO_2.2H_2O$) by counter current contact with water. The concentration of this suspension will be 18 to 20% H_2SiF_6 and it will be withdrawn from the gas treatment system to the surge tank

The scrubbers will be fitted with sealing tanks and liquor circulation pumps. Reposition water will be fed onto the final stage tank and a chimney will release the gases to the atmosphere after being treated according to relevant environmental standards.

Subsequently, the suspension with 3 to 6% solid content will be pumped to the press filter to remove the hydrated silica. The silica cake will combine with the acidulate material from the DEN and both will be transferred to the cure warehouse. The filtered fluosilicic acid will report to the reservoir tank and then to shipment and/or neutralization.

The flow-sheet for the acidulation plant is showed in Figure 17.6_1.

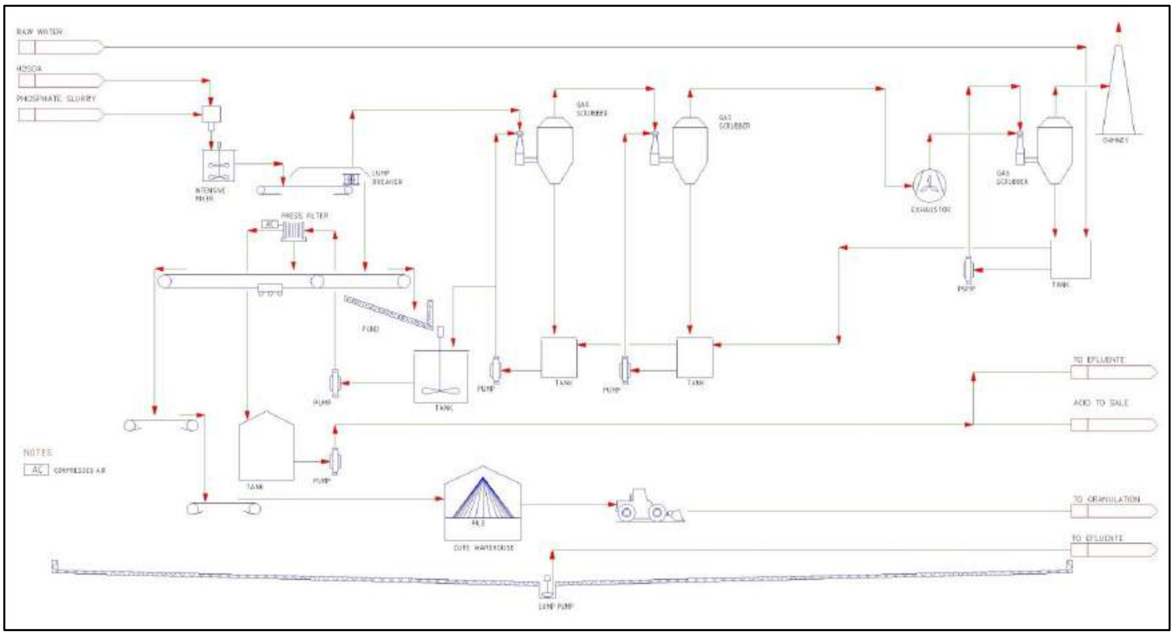


Figure 17.6_1 – Acidulation Flow-Sheet

17.7 Granulation

The single superphosphate powder (SSP) from the cure warehouse will be transferred to the granulator drum where ammonia, water, and slurry from the gas treatment system will be introduced. The gases produced in the granulator will direct to the gas treatment system while the product will direct to the rotary dryer.

Heat from the combustion chamber which burns firewood will be used in the dryer. The ashes from the furnace will be disposed accordingly.

The gas generated when granulated SSP passes through the dryer will be treated in the gas treatment system consisting of a pneumatic cyclones and venturi scrubber before being released to the atmosphere.

When drying operation is completed, the granulated SSP will report to the hot screening. The oversize from the hot screening will direct to the cold screening after passing through the rotary cooler. Gases produced in the cooler will report to a bag filter to remove the particulate material, which will return to the process. Conveyors will withdraw the undersize from the hot screening and feed the recycle bin as circulating load.

The cold screening screens will be fitted with two decks. The oversize from the upper decks will feed a chain mill and the product will be delivered to the recycle bin. The undersize from the upper decks will combine with the oversize from the lower decks and will be stockpile in the granular product pile.

The undersize from the lower decks will combine with the hot screening undersize and chain mill product in the recycle bin. The material from the bin will be the circulating load to feed the granulator.

All dust collecting points located along the granulation plant will report to the bag filter. Then the clean air will be released to the environment after passing through an exhaust fan and chimney. Conveyors will transport the powder retained in the filtering process to the recycle bin.

Granulation stage flow-sheet is shown in Figure 17.7_1.

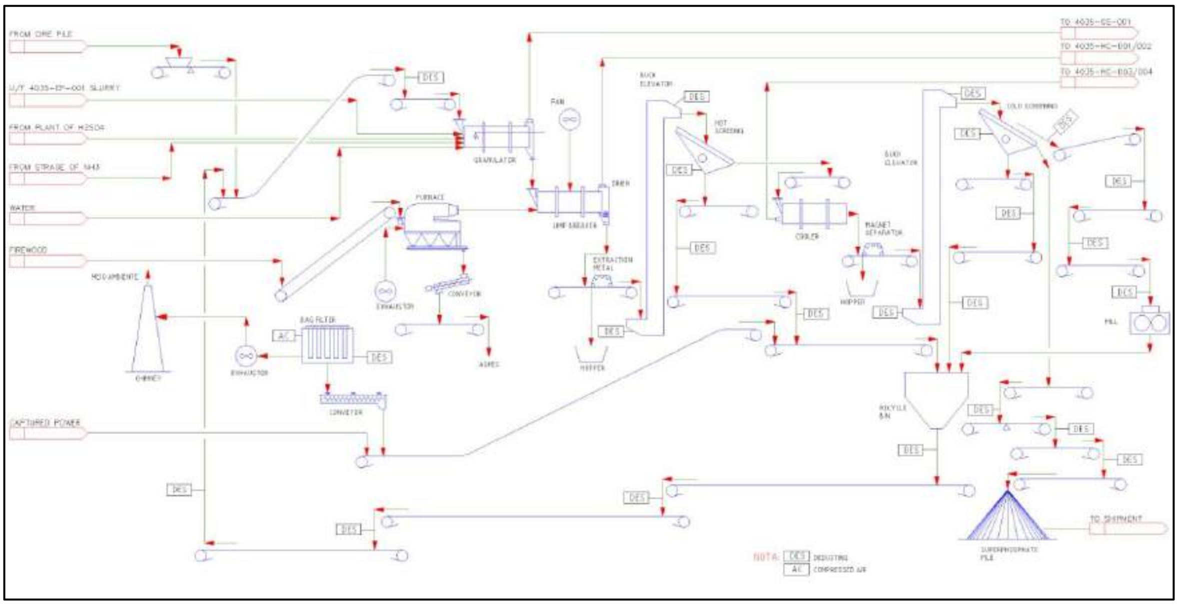


Figure 17.7_1 – Granulation Flow Sheet

17.8 Gas Treatment System

Gases from granulator and dryer will feed the gas treatment system. Gases from the granulator will report to the gas scrubber to absorb ammonia and fluorine as well as particulate material removal in a venturi scrubber.

Gases from the dryer will report to pneumatic cyclones to remove the particulate material. A conveyor will withdraw the underflow material from the cyclone to the recycle bin. The overflow will report to the gas scrubber to absorb fluorine and remove the remaining particulate material in a venturi scrubber.

The scrubbers will be fitted with sealing tank and liquor circulation pumps.

Reposition water of the system will be fed into the dryer scrubber sealing tank. The granulator and the dryer scrubber sealing tanks will be purged and the resulting slurry will report to the liquid effluent treatment station locate at granulation plant battery limits.

The purged slurry will report to a lamella thickener. The overflow will be recirculated in the sealing tanks while the underflow (slurry) will be pumped to the granulator.

Gas treatment system flow-sheet is shown in Figure 17.8_1.

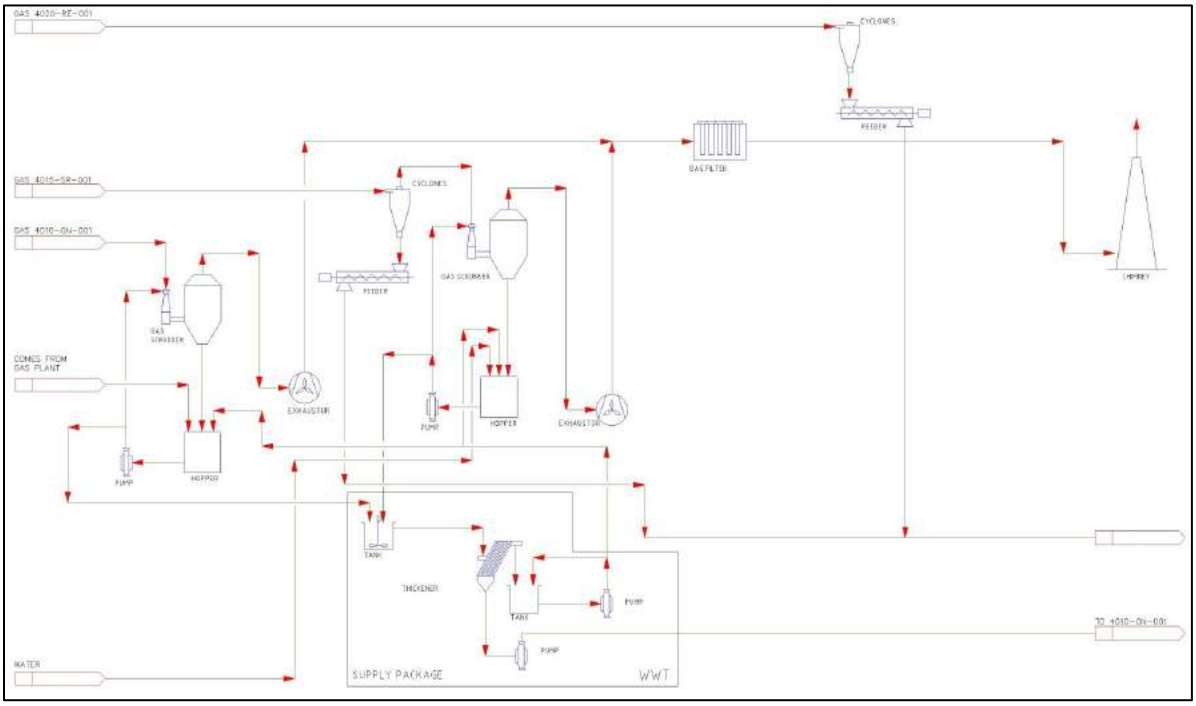


Figure 17.8_1 – Gas Treatment System Flow Sheet

17.9 Shipment

Primarily, a front end loader will transfer the granulate product from the stockpile into a hopper fitted with a belt conveyor to feed the big bags system located on the trucks. The trucks will be positioned in a road scale to assure the load correct weight.

It is proposed that, in the future, a front end loader will reclaim the material from the granulate stockpile to a two-deck vibrating screens. The oversize from the first deck will report to a chain mill and return as circulating load.

The oversize from the second deck will direct to a coating drum where coating additive will be introduced. The undersize from the second deck will flow by gravity to a hopper for further reprocessing.

The coating agent will be transported by 30 t trucks and pumps will transfer it to the storage tank. Then pumps will transfer the coating agent to the coating drum passing through a heat exchanger to reduce viscosity as required.

Later this material will feed four bins and after being properly weighed, it will be directed by gravity to bags positioned in the trucks or directly to trucks.

All dust collecting points located along the shipment plant will report to the dedusting system comprised of a bag filter. Then the clean air will be released to the environment after passing through an exhaust fan and chimney. Conveyors will transport the powder retained in the filtering process to bags to be re-processed.

Shipment flow-sheet is shown in Figure 17.9_1.

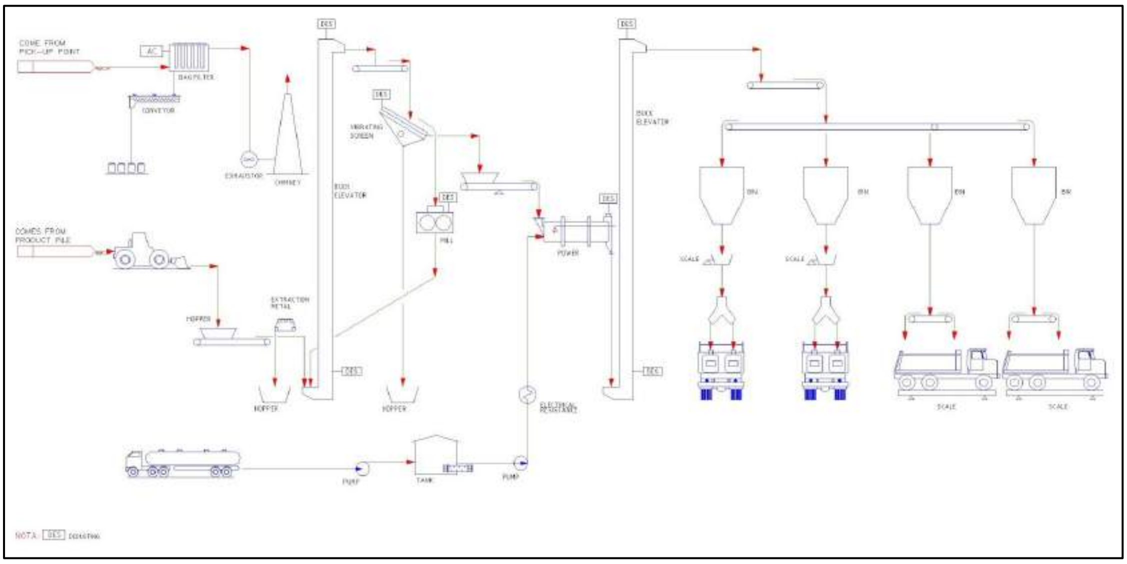


Figure 17.9 – Shipment Flow Sheet

17.10 Water accumulation and Tailings Disposal

The study of the dams for waste disposal and pickup of new water for the ITAFÓS enterprise, located in the municipality of Campos Belos, State of Goiás, was completed by Pimenta de Ávila Consultoria Ltda.

The location studies of the dam axis were comprised in the location of 03 (three) axes for picking up raw water and 10 (ten) axes for the one of waste containment. Drawing IO-100-DS-20599 depicts the location of the 13 located axes.

The typical sections of the two dams (pickup and waste) are even, composed by compacted filling and internal drainage designed in carpet and vertical filter in sand.

The Pickup dam project was designed for implementing in a configuration stage, whereas the waste containment dam was designed in two configuration stages: the first configuration is the initial dam, corresponding to the first three years of plant operation. The second configuration is the final dam corresponding to the 20 years of the enterprise's working life. The plant's water demand lies at 700 m³/hr (0.194 m³/s), working during 7,776 hours/year.

The axis defined as the best option for the phosphate project is located at the drainage of the (stream) Córrego Bezerra downstream from the confluence of the (stream) Córrego Poção. The dam crest was projected at the elevation El. 607 m and 10.0 m wide. The upstream talus inclination is 1V:2H in all its extension and it is coated by rip-rap 1 m thick. The downstream talus has an inclination equal to 1V:2H between shoulders, located at every 10.0 m of difference of level and 5.0 meters wide. These shoulders are protected with a laterite layer 0.15 m thick and the talus between them must be protected by grass.

The reservoir inundation area is approximately 97.2 hectares, considering up to the overflow sill elevation. The vegetation suppression area, comprising the massif and reservoir area and accesses make up, approximately, 127.4 ha.

The foreseen axis of the dam is, in average, 7.8 km distant from the refining plant. The reservoir volume is 7.3 x 106 m³ and the compacted massif volume is 180,000 m³, making up a total CAPEX cost of R$ 4,263,836.70. The operating costs of the Dam consist in maintenance, such as, cleaning of the surface drainages, allocation of the staff responsible for monitoring and maintaining the structure in wood working conditions. A dam operation annual cost in the order of R$ 260,000.00 is estimated.

The waste containment dam is located on the drainage of the (stream) Córrego Bezerra upstream from the pickup dam and corresponds to the first three years of plant operation.

The crest for the initial dam was projected at the elevation El. 650 m and 10.0 m wide. The upstream talus inclination is 1V:2H in all its extension and it is coated by rip-rap de 1 m wide. The upstream talus inclination is 1V:2H between shoulders, located at every 10.0 m of difference of level and 5.0 meters wide. These shoulders are protected with a laterite layer 0.15 m thick and the talus between them must be protected by grass.

The foreseen axis of the dam is, in average, 8.5 km distant from the refining plant. The reservoir volume is 7.5 x 106 m³ and the compacted massif volume is 465,000 m³. The reservoir inundation area is approximately 270 hectares, considering up to the overflow sill elevation. The vegetation suppression area, comprising the massif and reservoir area and accesses make up, approximately, 277.4 ha.

The final waste dam configuration corresponds in wall-raising downstream from the initial configuration axis. The final dam crest was projected at the elevation El. 660 m and 10.0 m wide. The upstream talus inclination is 1V:2H in all its extension and it is coated by rip-rap 1 m thick. The downstream talus has an inclination equal to 1V:2H between shoulders, located at every 10.0 m of difference of level and 5.0 meters wide. These shoulders are protected with a laterite layer 0.15 m thick and the talus between them must be protected by grass.

The foreseen axis of the dam is, in average, 8.5 km distant from the refining plant. The reservoir volume is 53.1 x 106 m^3 and the compacted massif volume to raise the dam is 1.34 x 106 m^3, making up a total CAPEX cost of R$ 11,161,601.88. The costs referent to operating and OPEX the Dam consist in the construction of wall-raising with a volumetric capacity of a 5-year operation and in maintenance, such as, cleaning of the surface drainages, allocation of the staff responsible for monitoring and maintaining the structure in wood working conditions.

Four raisings are foreseen for the project in question in the years 2, 6, 11, 15 and 19. The investment for each wall-building is estimated in R$ 4,059,900.00; additionally, the annual cost of maintenance in the order of R$ 130,000.00.

The reservoir inundation area is approximately 433.2 hectares, considering up to the overflow sill elevation. The vegetation suppression area, comprising the massif and reservoir area and accesses make up, approximately, 737.1 ha.

For both dams, overflow structures of the open channel on surface type were designed. The hydrological simulation of the dam is based on the daily operation of the reservoir for a certain critical year. For defining the critical year, the year with a smaller annual average specific efficiency is adopted. According to the surface geological-geotechnical mapping, the spillways will be excavated in fractured rock, which results in using a protection layer in sprayed concrete and reinforced concrete in the swift segment.

18 PROJECT INFRASTRUCTURE

18.1 Access Roads

- Access Road 1: this 198.01 m in length road will connect the dam plateau to the treated water plateau;

- Access Road 2: this road will connect the workshop of the access road to the ROM plateau and its length will be 203.51 m;

- Access Road 3: this road will commence at the chemical plant plateau close to the cooling tower, will pass through the ramp 08, ending at the chemical plant plateau close to the workshop. The length will be 388.73 m;

- Access Road 4: this road will access the ROM plateau from the homogenization plateau and its length will be 193.57 m;

- Access to ROM plateau: this road will connect the crushing plateau to the ROM plateau and its length will be 1370.72 m.

18.2 Earthworks

The following assumptions have been taken into consideration to develop the earthworks design:

- Studies based on the layout drawings as defined by the mechanical arrangement and topography developed by Pimenta de Ávila;

- An allowance of 30 cm thickness layer was made for cleaning;

- Borrow material will come from the pit;

- Earth distribution considered the transportation average distance and reuse of cut off material.

18.3 Drainage

The drainage system design will incorporate environmental protection requirements and will provide gutter, drains, culverts, stairs for descending water, water collecting box and ditches capable to impound and conduct water flows properly.

18.4 Plant Buildings

Plant buildings will consist of:

- Workshop;

- Central Stores.

18.5 Administrative Buildings

Administrative buildings will encompass:

- Main Entrance;
- Weigh Control;
- Administrative Office;
- Ambulatory and Fire Brigade;
- Restaurant;
- Change Room;
- Laboratory and Process Office.

18.6 Water System

Water system for the Itafós Project will encompass the following water systems:

- Waste water treatment system: capable to process 30,000 l/d;
- Raw water impoundment and distribution;
- Recycled water system;
- Water treatment system;
- Fire water.

18.7 Compressed Air

Compressed air system will supply service, instrument and process air as follows:

- Service and instrument air to the plant;
- Service and instrument air to the workshop;
- Air for flotation.

18.8 Electrical system

Electrical power will be supplied to the main substation via a 60 kV transmission line with approximately 16.3 km from CELG (Goias State Energy Co.) substation in Campos Belos municipality, state of Goiás. The transmission line will be a single radial circuit and it will feed all secondary substations to be located in the plan as follows:

- Chemical Plant Substation;
- Beneficiation Plant Substation;
- Water Intake Substation;
- Sulphuric Acid Plant Substation;
- Mill Substation.

19 MARKET STUDIES AND CONTRACTS

In order to analyse the fertilizer market in the MBAC target region, MB Agro, a consulting company specialized in the Brazilian Fertilizer Market, has prepared a study, forecasting future fertilizer demand and analysing domestic supply as well as local infrastructure.

MBAC target region is represented by the central-northern and north-eastern Brazil, including the main MBAC potential regions as western Bahia state, Northern Goiás state, North-eastern Mato Grosso State and Tocantins state as marked in blue in Figure 19_1.

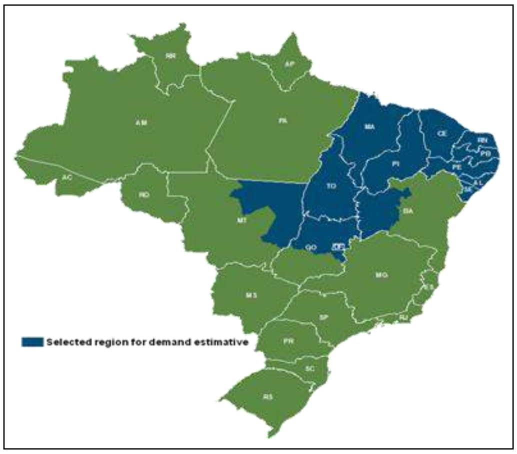


Figure 19_1 – Selected Region for the Demand Estimate

The study includes (i) the agricultural potential; (ii) an overview of the global and domestic fertilizer supplement and demand; (iii) the assumptions and calculations of MBAgro model; (iv) the forecast of future fertilizer and crops consumption; and (v) an prospect of the domestic infrastructure.

The first topic shows current information about the size of the target region's agricultural market, contemplating an overview of micro-regions soil characteristics, crops' production & productivity and cultivation areas.

The second section explains the composition of MBAgro model and the model results. Assumptions and calculations are detailed describes, showing all numbers used for the model development. As the results are presented, the numbers are analysed and compared in order to describe MBAC opportunities and threats.

19.1 Agricultural Potential of the Area

Within the Brazilian territory which has 851 million hectares, the present study focuses its analysis on states with important agricultural potential. Composed by Northeast Area, plus Tocantins, Mato Grosso and Goiás states delimited as the region of interested to the project, the area under consideration totals 308 million hectares. Table 19_1 shows the states in the interest region.

Table 19.1_1 – States in the Interest Region

Area (1000 ha)	
Maranhão	33,198
Piauí	25,153
Ceará	14,883
Rio Grande do Norte	5,280
Paraíba	5,644
Pernambuco	9,831
Alagoas	2,777
Sergipe	2,191
Tocantins	27,762
Bahia	56,469
Mato Grosso	90,336
Goiás	34,589
Total	308,112

Source: IBGE

Of this total, some regions in the states of Mato Grosso, Bahia and Goiás are excluded for not belonging to the radius of influence of plants on question. Therefore, the rest of those states were considered in the analysis, as well as throughout Northeast, the northeast of Mato Grosso, the North of Goiás and the West of Bahia.

The project would have a target area of approximately 188.49 million hectares, distributed among the states as shown in Table 19.1_2.

Table 19.1_2 – Area Covered by the Study (in 1000 hectares)

TO	27,762
MA	33,198
PI	25,153
CE	14,883
RN	5,280
PB	5,644
PE	9,831
AL	2,777
SE	2,191
West BA	16,465
North MT	26,917
North GO	18,389
Total	188,490

Source: IBGE. Prepared by MB Agro

Brazil, being one of the countries with the world's largest agricultural area and one of the few countries that still has room to expand the production area, is facing growing global demand for food and biofuel. All of these factors are very favourable for growth in agriculture in Brazil.

Considering the agricultural potential of the soils, taking into account factors such as fertility, characteristics physical and morphology, main constraints and topography, the territory is classified as having 46.5% of this area with good potential, 23.5% with average potential and 30% with poor potential. The map on Figure 19_2 shows the agricultural potential of soils.

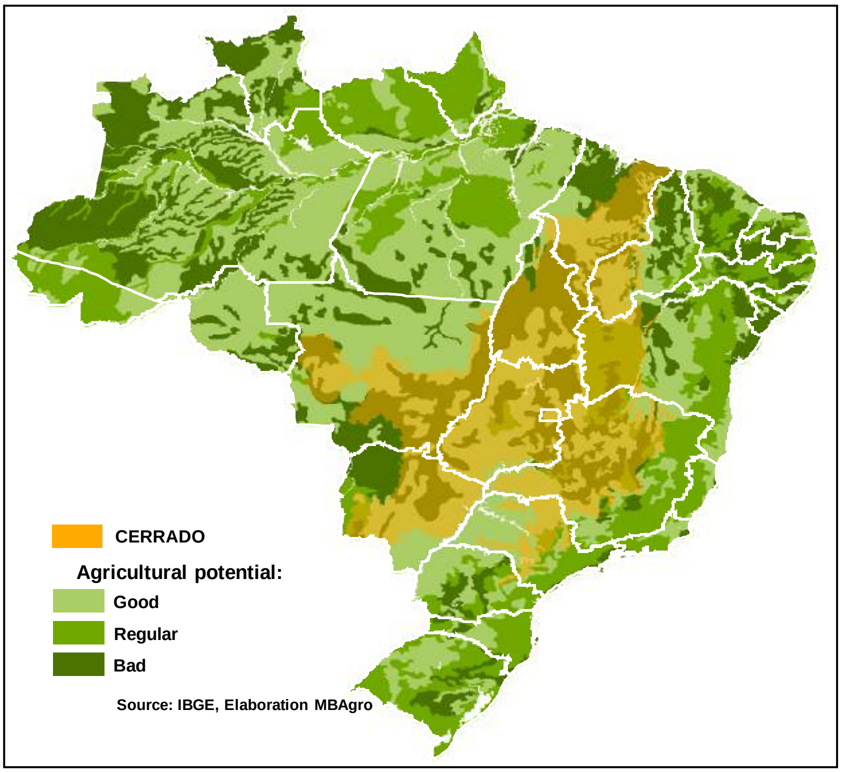


Figure 19.1_1 – Agricultural Potential of the Soils

In the region considered in the study, about 58% of the area is classified as good agricultural potential, 9% as average and 34% as poor. Table 19_3 shows the agricultural potential.

Table 19.1_3 – Agricultural Potential

	BR		Selected region	
Good	396	47%	253	58%
Regula	200	24%	38	9%
Bad	255	30%	148	34%
Total	851	100%	439	100%

An important part of the area covered in the study is located in the Brazilian Grassland. The region boasts two well-marked seasons: dry winter and rainy summer. The soils of the grassland have great variation in their morphologic and physical characteristics.

However, some chemical characteristics such as high quantity of iron and aluminium, deficiency of nutrients and high capacity of fixation of phosphorus are present throughout its extension. Therefore, the soils are poor and the fertility is created by applying fertilizer and limestone.

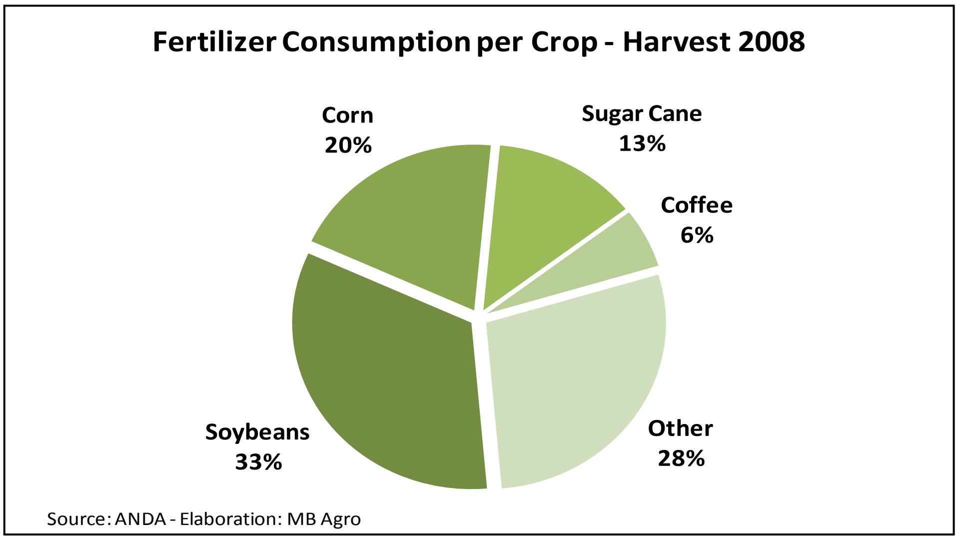
The consumption of fertilizers in Brazil has increased 5.0% every year for the last 23 years. In 2008, it reached, according to the National Association for the Promotion of Fertilizers ("ANDA"), 9.4 million tonnes of nutrients (NPK), which means a volume of 22.4 million tonnes of intermediate products. The internal production made up 40% of this demand totalling 8.8 million tonnes.

The ports of Paranaguá, Santos and Rio Grande are the main gateways into the country. Though these ports and others, the products are directed to main consumer states including São Paulo, Paraná, Rio Grande do Sul, Mato Grosso, Minas Gerais and Goiás. Bahia, Mato Grosso do Sul and Maranhão are also becoming major consumers of these inputs.

19.2 Market Model

To design the NPK and Sulphur Brazilian demand, we developed a model that combines economic information with plant nutrition for each product.

The structure of the model is in the production projection for each crop (cotton, corn, soybeans, coffee, bean and sugarcane) which make up most of the domestic demand for NPK. Figure 19_3 shows the participation of the farming in Brazilian fertilizer consumption (2008).



Although there is available area for expansion in Brazil, the traditional regions, especially the South region, there is no more room for expansion. In these states, the supply growth will be driven by productivity more than area. This variable was also controlled in our projections and results. Production for the selected region are presented in Table 19.2_1:

Table 19.2 – Projection and Results and Production

Area (1000 ha)

Year	TO	MA	PI	CE	RN	PB	PE	AL	SE	BA	MT	GO	Total
2008	591	1,381	967	1,405	591	534	1,059	623	308	308	1,433	1,013	10,214
2012	667	1,459	1,146	1,681	667	550	1,263	702	316	316	1,659	1,368	11,793
2017	755	1,634	1,187	1,595	755	577	1,290	745	316	316	1,959	1,523	12,653
2020	819	1,776	1,221	1,535	819	605	1,310	777	318	318	2,171	1,633	13,303
2025	950	2,093	1,310	1,449	950	664	1.361	835	324	324	2,590	1,864	14,713
2030	1,119	2,546	1,446	1,381	1,119	739	1,425	901	332	332	3,107	2,156	16,601
2035	1,336	3,195	1,640	1,324	1,336	831	1,506	975	341	341	3,747	2,538	19,109
2040	1,614	4,127	1,910	1,280	1,614	944	1,.598	1,057	353	353	4,538	3,026	22,414

Source: MB Agro

For the region, it was estimated that the total cultivated area should rise from 10.6 million hectares, in 2008, to 22.4 million ha in 2040. The region known as MAPITO+BA should represent almost 5 million hectares in growth of cultivated area and the States of Mato Grosso and Goiás, 3 and 2 million of hectares, respectively.

In relation to the cultivated area, although we have taken into consideration the potential of area for agriculture in each State, we considered the area actually cultivated and not the available area.

Table 19.21.2_2 – Culture Analysis

Area (1000 ha)

Year	Cotton	Coffee	Sugarca ne	Beans	Corn (1°)	Corn (2°)	Soybean	Total
2008	385	31	1,143	1,611	2,478	238	3,023	8,909
2012	423	32	1,235	1,686	2,557	195	3,343	9,471
2017	440	39	1,502	2,058	2,808	402	3,644	10,894
2020	458	35	1,597	2,064	2,723	441	4,041	11,359
2021	466	40	1,632	2,049	2,699	455	4,189	11,530
2025	505	42	1,792	2,039	2,619	519	4,865	12,382
2030	572	38	2,047	2,037	2,553	616	5,945	13,807
2035	661	46	2,374	2,056	2,514	735	7,365	15,751
2040	776	42	2,791	2,101	2,498	879	9,237	18,324

Source: IBGE, MB Agro

In the cultivations analysed, the crops that should provide further growth of area are sugarcane and soybean. For the sugarcane, the projection shows that the area should reach 2.8 million hectares in the selected region, an increase of 144%. The soybean crop is also important for the region. The area should increase 3 million hectares and reach 9.2 million ha.

For production, it is estimated that the region should increase from 96 million tonnes to 360 million until 2040, with sugarcane and soy primarily responsible for the increase. To meet expected demand, the sugarcane production should grow 260% and soybean, 435% in the target region of the study.

Table 19.2_3 – Production

Production (1000 t)

Year	Cotton	Coffee	Sugarcane	Beans	Corn (1°)	Corn (2°)	Soybean	Total
2008	1,382	33	80,856	912	3,245	448	9,566	96,443
2012	1,594	35	91,922	945	4,575	1,474	11,570	112,115
2017	1,918	37	109,155	989	4,774	1,826	14,863	133,563
2020	2,148	39	121,778	1,017	4,902	2,079	17,326	149,288
2025	2,600	41	147,850	1,067	5,127	2,587	22,488	181,760
2030	3,161	44	182,327	1,120	5,372	3,229	29,384	224,638
2035	3,861	47	228,588	1,178	5,637	4,042	38,662	282,016
2040	4,738	50	291,478	1,241	5,926	5,073	51,230	359,737
Var	3,356	17	210,622	329	2,682	4,625	41,664	263,294

Source: IBGE, MB Agro

Given the areas and expected productivities in question, we estimated that demand for NPK should rise from 1 million tonnes in 2008 to 4.7 million tonnes in 2040. The demand will continue to grow driven largely by the need for phosphate and potash.

The values for nutrients are shown in the Table 19.2_4 which also provides information on sulphur demand, which is expected to grow 255% and reach 689 thousand tonnes in 2040.

Table 19.29.2_4 – NPK Consumption – Target Region (thousand tonnes)

Year	N	P_2O_5	K	Total	S
2,008	172	404	464	1,041	194
2,012	212	506	564	1,283	216
2,017	239	664	686	1,589	255
2,020	259	763	772	1,793	285
2,025	300	959	969	2,227	346
2,030	353	1,226	1,231	2,810	428
2,035	423	1,596	1,588	3,608	538
2,040	517	2,106	2,075	4,698	689

Source: MB Agro

The Sulphur Demand and the Potential Market of SSP

The Brazilian soils are known to be poor in nutrients especially in the grassland region, as mentioned previously. These soils have a deficit of sulphur. It can be affirmed that there are few alternatives for sulphur nutrition. In practice, basically you have the option of the SSP and the gypsum, which is a scarce product in a lot of areas of the country, especially in the interest area of the project.

Looking more closely at the sulphur demand, it is noted from the table above that there is today respectable extraction of S by crops considered in our study. If we consider that the demand of 194 thousand tonnes of sulphur for the region in question in 2008 was only supplied by SSP, we would have in the area an equivalent demand to 1.85 million tonnes of this product (Scenario I).

However, also based on the table 16.17, which also shows the estimated P2O5 demand at the region, a different scenario was indicated. Based on a non official estimative 50% of the total demand of P2O5 could be reached just by the SSP product. Therefore, considering that the SSP has 18% of P2O5 (which is the most common SSP grade), it is possible to inferred that the SSP demand at the region in 2008 could be, approximately, 1.12 million tonnes (Scenario II).

Comparing both assumptions, it is possible to note that there is a gap of 0.73 million tonnes between both possible demands. This difference, however, can prove that the Scenario II (which is being considered as base case) is conservative, because there is evidence to assume that the sulphur demand will be mainly supplied by SSP.

The geographical location of the gypsum (the other sulphur supply alternative) is really a disadvantage for the target region crops' producers, because the product are produce kindly far away and the product has a low S content by tonne, resulting in a large freight costs by S content.

Table 19.2_5 shows the comparison between both SSP demand scenarios due to illustrate the SSP potential market at the target region:

Table 19.2_5 – SSP Demand by both Scenarios (1000 tonnes)

Year	Scenario I	Scenario II	Difference
2,008	1,846.1	1,123.3	722.8
2,012	2,055.1	1,405.1	650.0
2,017	2,431.6	1,844.4	587.2
2,020	2,714.1	2,118.3	595.8
2,025	3,297.8	2,663.1	634.7
2,030	4,075.6	3,405.5	670.1
2,035	5,125.1	4,434.4	690.6
2,040	6,561.7	5,849.7	712.0

Source: MB Agro

It can thus be seen that even with relative easy access to the port (what could facilitate MAP import), the development of the agricultural area in the region will require much greater use of SSP compared to MAP and gypsum.

20 ENVIROMENTAL STUDIES, PERMITTINGS AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Study (“EIS”), Impact Report (“RIMA”) and Public Hearing

An Environmental Impact Study (EIS) about the potential impacts over the project’s site, including a detailed Operations Plan description, is required by the NATURATINS (Environmental Agency of Tocantins State) before any construction and mine operations can begin. The Operations Plan consists of the basic mine plan, infrastructure, and operational aspects of the Project. The EIS consists in the reviewing of the Plan of Operations to understand the project impact over the natural resources, fauna, flora and the neighbouring communities, including its cultural and historical heritage. The Environmental Impact Report (EIR) consists of a document that presents only the most important parts of all content of the

Environmental Study, written in a colloquial language, in order the matter to be easily understood and discussed by the population.

The Environmental Study was submitted to NATURATINS, in July, 2010. The NATURATINS has up to six months to evaluate the Environmental Study and deliver the Impact Report to National Environmental Agencies i.e. IBAMA and other environmental related regulatory agencies that are required to review the project viability.

The Public Hearing, in accordance with the CONAMA 009/1987 (the Federal Council that rules the Brazilian environmental licensing process) have the objective to show to all the people living near from the project area, the environmental impacts and other changes that will be potentially caused by the project. In this Public Hearing the Company must be present to present information about the project and answer all questions from the people who live around the project and representatives of governmental and nongovernmental organizations, and collect comments and suggestions about the project. The public hearing shall occur according to the criteria of the NATURATINS. Additional Public Hearings could occur if requested by authority of the civil prosecutor or by manifestation signed from more than 50 people from the community that live near from the project. The company has the responsibility to facilitate the location and transportation to the proposed Public Hearing site.

Actually, the Public Hearings occurred in September 21, 2010, at the Arraias Church Hall, when were present almost 600 people, discussing and debating about the EIR of Arraias Project. Based on this event and after the studies presented evaluation, the NATURATINS issued the Preliminary License (permit) in December 2010. This document means that the project is feasible from an environmental standpoint.

The next step was to present the Basic Environmental Project (BEP) which consists of a set of actions, plans and programs that aims to prevent, reduce or avoid the environmental impacts that could be caused by the project’s construction over the surrounding natural resources and the communities.

The BEP was approved after review by NATURATINS, which issued the Installation License (permit) for the project by March 2011, which enabled the start of construction. Others permits were necessary and obtained, like water grant from National Water Agency, because the project uses a federal water to obtain water, and deforestation permits.

During the construction, environmental teams were working to ensure compliance with the environmental commitments. Thus, with the approaching end of construction and environmental commitments executed, the company requested the NATURATINS the Operating License (permit) to start to produce. Itafós has received operating permits for the water dam, the tailings dam and the beneficiation plant. The remaining licenses will be issued in the next weeks as construction is completed.

20.1.1 Environmental Study (“EIS”) Conclusions

The EIS study was prepared to substantiate the environmental licensing process of the phosphate project at Arraias, Tocantins state. The study objective is to present a diagnosis of the area impacted by the project, as well as identifying future scenarios considering phosphate plant set up or not, seeking a discussion on the environmental based on evaluation of the environmental impacts on the region.

According to the concept of “environmental impact” presented at the CONAMA 001/1986 it is clear that the project will have a series of adverse impacts on the region, given its interference with the fauna and flora, and to the surface water of the Bezerra River, a tributary to the Paranã River, member of the Tocantins River Basin.

The Project has considered large investments, roughly R$ 350 million, in a region that is mostly underdeveloped. For this reason it is expected that the impact of this investment will significantly benefit the socio-economic aspects of the Arraias city. Jobs generated will range up to 2,500 during the construction phase and 328 direct and 800 indirect jobs during operations. A virtuoso cycle is expected, compounded by the employment increase, services demand and wealth distribution. This cycle will attract companies to relocate to the region and supply the demands generated by the project, affecting all sectors of the city economy, especially the services sector.

Other benefits include tax generation. The tax, “CFEM - Contribuição Financeira sobre a Exploração Mineral” or financial contribution on Mineral Exploration has to be paid to the Union monthly. This tax rate is 2% of the total revenue from a mineral product. In case, the mineral product is used internally as raw material for another industrial process this amount is calculated based upon the total producing cost of the mineral product. The tax revenue is divided 65% to the city, 23% to the State and 12% remaining with the Union. The city must comply with certain fiscal requirements in order to receive this amount.

Other taxes and contributions are also due, as determined by the Brazilian Fiscal Law. Among them is, the Social Contribution on Net Earnings (CSLL), the contribution to the Social Integration Program (PIS), the Contribution for the Financing of the Social Security (CONFINS), the contribution for the National Institute for the Social Security and the Income Tax.All these contributions are due to the Federal Government, as the Income Tax. The ICMS (or VAT tax) is charged by the State and transferred to the cities. Third party services are provided by companies located at Arraias and the Services Tax is due to the city.

The Study estimates that 71% of the identifiable impacts are reversible, meaning that a significant portion of the impacts defined for the Project will not be to the detriment of the future generations. This would only occur in the event of any compromise on the current environmental resources.

It is clear from the final evaluation of this Study that the Project is evenly balanced considering the environmental impacts at all levels.

During the implementation phase, for example, there will be a concentration of important impacts related to the interference with various mediums. This is usually expected in the implementation phases of new projects, in regions where pasture and agriculture are predominant, or even in unexplored regions. As the project has a large dimension it is considered that a large area will be affected and most of these impacts will happen during the implementation phase.

Almost all these impacts can be mitigated, reduced or compensated by measures described in the Environmental Impact Study presented to Naturatins. Relating to the socio-economic impact, it is clear that most of the impacts are beneficial, such as employment generation, tax generation, and commercial development of the region, among others.

The eventual adverse aspects as increase in crime rate, prostitution and drug problems can and will be mitigated by preventive actions promoted by the company and by the city. As long as these measures are adopted these adverse impacts can be controlled.

In the case of low and medium impacts, it can be viewed as the same effect. The Project may have eventual adverse impact on the Environment, but it will offer compensations in the socio economic area, promoting the regional development.

Another important fact is that the Project is considered as “Public Utility”, according to the resolution CONAMA 369 from March, 28th, 2006.

By the end of life of the Project the mined areas, the water and tailing dams would have modified the landscape, although they will be prepared for minimize this impact. It is important to say that although some restrictions for future utilization of these areas may apply, some other opportunities can be foreseen in the strategy adopted for closure.

The industrial area of the Project, after disassembly, residue removal and other activities, the site can be used for new industrial activities that will utilize a portion of the infrastructure (power supply, dams, administrative buildings, etc.).

The reservoirs can be reused as they will be monitored. At the end of the Project this data can be used for appropriate designation of these structures, be it for water supply, leisure, agriculture use, human consumption etc.

In the case of non-approval of the Project this end up will denying the North, Northeast and Mid-East region of Brazil a supply of domestic fertilizer to be used in agribusiness, as well as denying the much awaited socio economic development of the Arraias city and the Tocantins State. At the Federal level, the Project is expected to save the country from importing approximately US$ 3 billion in fertilizers, during the life of the mine.

Finally, it can be said that the Project may interfere with the environmental. However with the implementation of appropriate management, control, mitigation, recovery and compensation measures it can be concluded that the Project is viable in its socio environmental focus.

20.2 Impact Generation and Mitigating Actions

(Solid waste, liquid discharge and gas emission)

20.2.1 Reclaim Ponds

Rain in the region is concentrated in the period from October to March. Rain water that falls in the project area and in the vicinity will drain directly to a containment system for rainwater, and will be treated and returned to the process. To control potential problems of sediment being carried from the access roads at the project site during the rainy season, a drainage plan will be developed. All plant equipment plant will have a containment system to avoid possible leaks in the liquid process, which will be neutralized and directed to correct disposal and return to the process.

20.2.2 Tailings Facility

The tailings will be positioned naturally to maximize water reuse. The dam project will allow the settling of the solids, while promoting a recovery of the liquid part contained in the waste. The advantages of tailings disposal in this area is the ability to maximize the use of water or during periods of excessive evaporation, the ability to use a source of clean water containing limited fines and the ability to intercept and detain the full potential of formed acid solutions.

20.2.3 Mining Waste

The mining waste will be arranged within the limits of the tailings dam. The tailings will be used in the first three years of operation until the area is filled to the maximum level, after which the tailing dam capacity will be increased.

20.2.4 Solid Waste

A plan for management of hazardous solid waste will be developed so that all materials that are acid-generating or that can impact the groundwater and surface water will be dispersed with a high potential for burnout to prevent the generation of acid as by-products.

20.2.5 Granulation Process

Single Super Phosphate (“SSP”) powder from the curing barn will be transported to the drum granulator. Ammonia, water and mud from the gas treatment system will also be added to the granulator. The granulator will generate gases that will be sent for gas treatment. The dryer will receive heat from the furnace that is fuelled by wood through the drag conveyor. The ashes of the furnace will return to the process. When the SSP granules pass through the dryer, this will also generate gases that will be sent to the gas treatment, so they can receive proper treatment before being released into the atmosphere, according to environmental standards. In the granulation area all captured dust will be directed to the system of bag filters. After filtration, clean air will be released to the atmosphere through exhaust fans and stacks. The powder resulting from filtration will be transported by screw conveyors to be reused.

20.2.6 Acidulation Plant

The material from the pile of rock phosphate will be taken over by loader and will be sent to the conditioning tank. After this conditioning, the pulp will pass through the thinner, where dilution occurs with the addition of sulphuric acid (H_2SO_4). During the chemical reaction, the release of silicon tetrafluoride (SiF_4) occurs. The gases containing fluorine will be transferred to the gas treatment system. Gases properly handled and under the best environmental standards are sent to the atmosphere through the chimney. The filtered hydrofluosilicic acid will go to the storage tank and then it will be transferred to the dispatch and or to neutralization. The most pronounced advantages are energy efficiency and no generation of by-products.

20.2.7 Gas Treatment System

The gas processing system will receive the gases from the granulator and dryer. Gas from the granulator will go to the gas scrubber for absorption of fluorine and ammonia in cross flow with water. The gases from the dryer will go to the pneumatic cyclones to remove particulate material. The underflow goes to a screw conveyor and is subsequently recycled. The overflow will go to the gas scrubber for absorption of fluorine and removal of particulate material in cross flow with water. A makeup water system will be fed in the last stage of gas cleaning and finally the properly treated gas (under the best environmental standards) is sent to the atmosphere through the chimney. There will be a permanent monitoring system in all chimneys in order to guarantee that the air released to the atmosphere will be according to the parameters established by the Brazilian federal law.

20.2.8 Dust Control Measures

Engineering controls, such as good design and proper implementation, will provide the primary control for dust as they will prevent dust emission. Physical controls will provide an additional protection to ensure that dust is managed in accordance with regulatory requirements.

20.2.9 Ore Haulage and Waste Dumping Dust Control

Waste dumping is not expected to create dust as the material will be wet coming out of the mine. The moisture will not separate from the rock until after the material has been dumped into the facility located in the bottom of the current pit structure.

20.2.10 Access Road Dust Control

The roads connecting Campos Belos to the main cities and commercial centres are paved and in good condition. The main access road into the project is of gravel construction. Recycled water will be used to humidify the main roads to minimize dust emission.

20.3 Area Description

20.3.1 Hydrograph

The area on the project belongs to the basin of the Amazon River. The study area is part of the vast Amazon River basin. The area is drained by Bezerra River, a tributary of the Paraná River, which flows into the Tocantins River, which in turn is a tributary of the Amazon.

20.3.2 Flora

Located in the extreme southeast of the state of Tocantins in Arraias, the region is within the domain of the Cerrado. Cerrado is the second largest biome of Brazil and occupies an area of about 213 million hectares, mainly in central Brazil but also reaching areas in the north, northeast and southeast. This biome is characterized by great diversity and heterogeneity of different vegetation types. Environmental diversity is the predominant feature, considering the diversity of soils, geology, geomorphology and climatic conditions and where we can find vegetation heterogeneity, such as riparian vegetation, and dry savannah. The Cerrado, a Brazilian version of the savannah, is the typical vegetation of that region and has virtually all been substituted by pasture.

20.3.3 Fauna

The fauna species in the region of Arraias are typically of the Brazilian Savannah ("Cerrado"), but also found in other habitats, where the availability of resources are greater, reflecting the high diversity and endemism. The group of terrestrial vertebrates that have a higher rate of endemism are the reptiles and amphibians. The mammal fauna of the savannah has about 194 species, 18 of which are just found in that biome. Many of these species are considered threatened with extinction due to habitat loss. They need large areas for their survival and the management of these species depends on thorough knowledge of their behavior. The Savannah has an extremely rich and diverse fauna with numerous species, representing almost 50% of all species occurring in Brazil. Most of birds that live in the Cerrado use it for breeding. The quantity of species which are found particulary in the Cerrado biome are not very numerous. These species are mostly associated with open habitats, but most of these species are somehow dependent on forest habitats. Birds that reproduce in the Cerrado are dependent or semi dependent on dry forest.

20.3.4 Sociology

The municipality of Arraias has its history linked to the exploitation of gold. In the mid-eighteenth century, a Jesuit mission settled in a village with the name of Boqueirão Tapuio near where the city of Arraias is today. People from a destroyed Quilombo (community of former slaves' descendants, where the land was donated by the government and protected by federal legislation) started to arrive in the region, occupying an area known as Chapada dos Negros.

The municipality has a population of 10,984 inhabitants ethnically mixed but predominantly black, spread over an area of 5,398 km ^{2}. Of this population, approximately 55% live in urban areas. The most significant age group ranges between 0 and 14 years, representing 37% of the population.

The city's economy, as in most small Brazilian cities, is concentrated in the services sector, followed by the agriculture and industry sectors. The city has great untapped tourism potential.

21 CAPITAL AND OPERATING COSTS

The Capital Cost Expenditure (CAPEX) and Operating Cost Expenditure (OPEX) have been updated since the previous report. The new estimative for Itafós project development have been estimated to February/2013 rates. The accuracy assumed to prepare the CAPEX and the OPEX is ±5% due the advanced stage of the plant construction. The exchange rates applied to the CAPEX calculation was US$ 1.00 = R$ 2.086 and the OPEX was US$ 1.00 = 2.10.

The CAPEX and OPEX assumed for the Itafós Project are summarised in table 21_1 and table 21_2 below (see appendix 1 for detailed CAPEX):

Table 21_1 – Capex Assumptions

Account	Description	OVERALL TOTAL		%
Equipment	Electrical	R$	29,457,000	4.4%
	Mechanical	R$	198,385,000	29.4%
	Spare Parts	R$	366,780	0.1%
Materials	Electrical	R$	6,041,424	0.9%
	Miscelaneous, including electrical equipment	R$	7,736,800	1.1%
	Steel Structure	R$	53,450,000	7.9%
	Instrumentation / Telecommunication	R$	5,104,029	0.8%
	Miscelaneous	R$	34,234,123	5.1%
	Piping	R$	19,765,345	2.9%
	Cataliser	R$	7,507,200	1.1%
Erection	Electro-mechanical erection	R$	103,000,000	15.3%
Civil Works	Civil	R$	53,000,000	7.9%
	Archtecture	R$	16,453,423	2.4%
	Dams	R$	29,000,000	4.3%
	Infrastructure	R$	27,456,987	4.1%
Indirect	Comissioning and training	R$	1,557,390	0.2%
	Land Acquisition	R$	8,000,000	1.2%
	MECS Technology	R$	4,311,200	0.6%
	Engineering	R$	29,000,000	4.3%
	First fill / Start Up	R$	1,356,197	0.2%
	Management	R$	11,342,999	1.7%
	Engineering Insurance	R$	2,100,000	0.3%
	Erection Supervision	R$	1,302,413	0.2%
	Owner team	R$	15,171,690	2.3%
	Social projects	R$	1,600,000	0.2%
	Legal Costs	R$	1,800,000	0.3%
	Environment	R$	5,500,000	0.8%
Contingency		R$	-	0.0%
Total		R$	674,000,000	100%
%		USD	323,106,424	

Table 21_2 – Opex Assumptions

DESCRIPTION	UNIT	2013	2014	2015	2016	2017	2018	2019
Mining Cost	USD/t SSP	56.20	31.98	31.11	33.08	38.04	33.86	35.28
Labour Cost	USD/t SSP	26.22	12.53	12.55	12.55	12.59	12.83	12.59
Maintenance Cost	USD/t SSP	8.52	4.26	4.26	4.26	4.28	4.36	4.28
Energy Cost	USD/t SSP	15.39	10.46	10.54	10.55	10.55	10.54	10.55
Reagents Cost	USD/t SSP	39.99	35.08	34.96	34.96	34.97	34.94	34.96
Sulfur Cost	USD/t SSP	36.62	28.05	26.97	26.97	26.97	26.95	26.97
Ammonia Cost	USD/t SSP	13.02	14.64	14.62	14.62	14.63	14.61	14.62
CFEM	USD/t SSP	2.19	1.29	1.28	1.32	1.42	1.33	1.36
TOTAL	USD/t SSP	198.15	138.29	136.29	138.30	143.44	139.44	140.61

22 ECONOMIC ANALYSIS

MBAC team used the discounted cash flow model to estimate the “fair value” of the Arrais project relying on the technical, commercial and economic information and data available by the time of this release.

The DCF model uses the discounted free cash flow of every future year to determine the most accurate value of the project in a specific date. For the purpose of our model we are using January 2013 as the initial date of the project and any expenditure from previous years are capitalized by the rate of discount.

22.1 Principal Assumptions

When constructing the model we considered all prices FOB MBAC site (Arrais – TO). The current Single Super Phosphate ("SSP") price is considered in the model as a projected price for the life of the mine levied by 2% inflation (CPI) on a yearly basis after 2014. All costs in Brazilian Reais were levied by the estimated inflation of 4.5% (IGPM) on a yearly basis.

We are also assuming that the recovery of P_2O_5 during the mine life is 53% and that the increase in the operating cost after the first years is a result of the estimated decrease of the P2O5 grade during the mine life.

The principal assumptions made in the DCF model are summarised in Table 22_1:

Table 22_1 – Input Factors for DCF Model

DESCRIPTION	Value
Proven and probable reserves (million tonnes)	64.8
Mine life (years)	19
CAPEX ($ millions)	$323.1
Payback period (years)	4.5
SSP Selling Price 2013 per tonne (FOB Arraias – US$)	$280
SSP Selling Price 2014 per tonne (FOB Arraias – US$)	$325
Sulphur Price per tonne (CIF Arraias – US$)	$240
Ammonia Price per tonne (CIF Arraias – US$)	$1,200
Grinding Ball Price per tonne (CIF Arraias – US$)	$1,781
Sodium Silicate Price per tonne (CIF Arraias – US$)	$352
Caustic Soda Price per tonne (CIF Arraias – US$)	$467
Soybean Oil Price per tonne (CIF Arraias – US$)	$1,514
Energy (US$/Mwh)	$87
Operating cost (SSP) p/tonne – first 5 years (excl. 2013)	139
Operating cost (SSP) p/tonne – over mine life (US$ 2013)	1612
Foreign exchange (BRL/USD)	2.1
Average run-of-mine ("ROM") P_2O_5 grade – first 10 years	5.56%
Average run-of-mine ("ROM") P_2O_5 grade – over mine life	5.08%
Discount Rate (WACC)	10.00%
CPI per year	2.00%
Brazilian CPI per year (IGPM)	4.50%
Plant Recovery for P2O5	53.0%

22.2 Cash Flow forecast

After applying all the assumptions, the DCF model has a NPV of USD 254.2m, an IRR of 21% and payback period of 4.5 years. The cash flow forecast can be seen in Table 22_2.

22.3 Taxes and Royalties

The Brazilian corporate income tax rate is 34%, but because of fiscal incentives the tax will be reduced to 15.25% for the next 10 years, between 2013 and 2022. The DCF model already incorporates these fiscal incentives.

The royalties for the Brazilian government are 2% of the revenue of the selling of mineral products. However, considering the fact that MBAC is selling SSP that have already been transformed through a chemical process, MBAC royalties on the Itafós Project are calculated based on the cost of the mineral products. This refers to the productions cost up to the beneficiation of that ore.

22.4 Sensitivity Analysis

Although the Itafós Project is now in its final stage of construction there are always uncertainties in any new venture. That is why it was necessary to present the effect of changes in the major components that can still affect the project, in the form of sensitivity analyses.

PROJECT NPV (USD m)

		CAPEX Variation (%)				
		-10%	-5%	0%	+5%	+10%
SSP PRICE	375	443.4	430.2	417.0	403.8	390.6
	350	361.5	348.4	336.3	323.1	309.9
	325	280.6	267.4	254.2	240.9	227.7
	300	198.3	185.1	171.9	158.7	145.5
	275	116.0	103.9	90.6	77.3	64.0

PROJECT NPV (USD m)

		Total Cost Variation (%)				
		-10%	-5%	0%	+5%	+10%
SSP PRICE	375	483.3	450.2	417.0	384.7	351.7
	350	401.4	368.3	336.3	303.0	269.6
	325	319.5	287.4	254.2	220.8	187.4
	300	238.4	205.2	171.9	138.6	106.2
	275	156.2	122.9	90.6	57.0	23.2

The NPV is most sensitive to changes in SSP price than any other factor, but changes in variable cost also significantly impact the NPV. If facing lower SSP prices the company should focus on variable cost reductions to lower the impact on the NPV.

Table 22_2: DCF Model

PRODUCTION	UNITS	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Ore Available	(000 tonnes)	64,811	62,561	59,526	56,508	53,490	50,405	47,462	44,400	41,456	37,613	33,946	30,172	26,453	22,688	18,881	15,084	11,353	7,564	3,795
Processed Ore	(000 tonnes)	2,250	3,035	3,018	3,018	3,085	2,944	3,062	2,944	3,843	3,667	3,773	3,720	3,765	3,807	3,797	3,731	3,789	3,769	3,795
Processed P2O5 Grade	(%)	5.79%	5.77%	5.78%	5.78%	5.78%	5.79%	5.79%	5.78%	4.67%	4.70%	4.63%	4.67%	4.59%	4.62%	4.67%	4.63%	4.54%	4.64%	4.54%
Plant Recovery Factor P2O5	(%)	33.7%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Concentrate Phosphate Produced	(000 tonnes)	156.8	312.8	311.8	311.9	310.8	304.7	310.8	304.2	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	301.7	298.0
Sulphuric Acid Consumed	(000 tonnes)	84.3	180.4	173.1	173.2	172.5	169.2	172.5	168.9	167.5	167.5	167.5	167.5	167.5	167.5	167.5	167.5	167.5	167.5	165.4
SSP Produced	(000 tonnes)	220.2	518.4	516.8	516.9	515.0	505.0	515.0	504.1	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	493.9
CASH FLOW																				
Sales Revenue	**(USD '000)**	**93,033**	**203,418**	**209,647**	**214,340**	**219,084**	**219,988**	**228,856**	**229,666**	**234,926**	**239,172**	**244,947**	**250,353**	**255,902**	**262,253**	**268,501**	**273,864**	**280,030**	**287,024**	**290,844**
(-) Sales Costs and Expenses	(USD '000)	(15,022)	(24,153)	(25,815)	(26,800)	(27,940)	(28,635)	(30,090)	(30,863)	(32,395)	(33,352)	(34,754)	(36,066)	(37,434)	(39,059)	(40,673)	(42,030)	(43,650)	(45,555)	(47,119)
Net Revenue	**(USD '000)**	**78,011**	**179,266**	**183,832**	**187,540**	**191,144**	**191,354**	**198,765**	**198,804**	**202,531**	**205,820**	**210,193**	**214,287**	**218,468**	**223,194**	**227,828**	**231,835**	**236,380**	**241,470**	**243,726**
(-) Fixed Costs	(USD '000)	(3,058)	(2,508)	(2,661)	(2,714)	(2,775)	(2,864)	(2,887)	(2,983)	(3,057)	(3,118)	(3,180)	(3,244)	(3,309)	(3,375)	(3,442)	(3,511)	(3,581)	(3,653)	(3,753)
(-) Variable Costs	(USD '000)	(53,723)	(79,505)	(79,823)	(81,710)	(85,097)	(82,606)	(85,602)	(87,474)	(100,028)	(102,019)	(104,988)	(107,132)	(107,978)	(106,799)	(111,337)	(105,979)	(100,099)	(101,845)	(100,152)
(-) CFEM	(USD '000)	(155)	(160)	(163)	(166)	(178)	(169)	(183)	(176)	(200)	(189)	(198)	(200)	(201)	(213)	(220)	(214)	(216)	(228)	(228)
(-) G&A	(USD '000)	(6,565)	(7,718)	(7,873)	(8,030)	(8,191)	(8,354)	(8,522)	(8,692)	(8,866)	(9,043)	(9,224)	(9,408)	(9,597)	(9,789)	(9,984)	(10,184)	(10,388)	(10,595)	(10,807)
EBITDA	**(USD '000)**	**14,510**	**89,374**	**93,312**	**94,919**	**94,904**	**97,361**	**101,573**	**99,479**	**90,380**	**91,452**	**92,603**	**94,302**	**97,383**	**103,019**	**102,844**	**111,947**	**122,095**	**125,148**	**128,786**
(-) Depreciation & Depletion	(USD '000)	(23,850)	(24,732)	(25,080)	(25,453)	(25,886)	(26,161)	(26,651)	(26,960)	(28,086)	(28,366)	(28,878)	(29,272)	(29,753)	(30,240)	(30,695)	(8,908)	(8,619)	(8,241)	(7,094)
EBIT	**(USD '000)**	**-9,340**	**64,642**	**68,232**	**69,466**	**69,018**	**71,200**	**74,922**	**72,520**	**62,294**	**63,086**	**63,725**	**65,031**	**67,631**	**72,779**	**72,149**	**103,039**	**113,477**	**116,907**	**121,692**
(-) Income Taxes	(USD '000)	(118)	(5,337)	(8,750)	(9,404)	(9,783)	(10,449)	(11,338)	(11,017)	(9,504)	(9,625)	(21,676)	(22,120)	(23,004)	(24,755)	(24,540)	(35,043)	(38,592)	(39,758)	(41,115)
(+) Depreciation & Amortization	(USD '000)	23,850	24,732	25,080	25,453	25,886	26,161	26,651	26,960	28,086	28,366	28,878	29,272	29,753	30,240	30,695	8,908	8,619	8,241	7,094
(+/-) Change in Working Capital	(USD '000)	(13,448)	(1,813)	(3,495)	(390)	(444)	83	(743)	(85)	(837)	(360)	(491)	(433)	(386)	(347)	(578)	(113)	(137)	(500)	22,278
(-) Capital Expenditures	(USD '000)	(83,667)	(4,979)	(5,450)	(5,559)	(5,670)	(5,783)	(5,899)	(6,017)	(6,137)	(6,260)	(6,385)	(6,513)	(6,643)	(6,776)	(6,912)	(7,050)	(7,191)	(7,335)	-
Project Cash Flow		**(82,721.83)**	**77,245.45**	**75,617.86**	**79,566.38**	**79,007.15**	**81,210.76**	**83,592.77**	**82,360.38**	**73,901.95**	**75,207.34**	**64,050.92**	**65,236.49**	**67,349.77**	**71,140.59**	**70,814.03**	**69,740.56**	**76,175.94**	**77,555.52**	**109,949.25**

(-) CAPEX 2012	(USD '000)	(242,800)

WACC	(%)	10%
PROJECT NPV	(USD '000)	254,155
IRR	(%)	21%

23 ADJACENT PROPERTIES

There are no adjacent or nearby phosphate permits to those of MBAC.

24 OTHER RELEVANT DATA AND INFORMATION

MBAC is not aware of other relevant data pertaining to the Itafós Project.

25 INTERPRETATION AND CONCLUSIONS

MBAC has undertaken a systematic exploration program that has been successful in defining significant resources of phosphate in close proximity to one of the largest agricultural centres in Brazil.

Further scope exists to improve the geological and mineral resource estimation confidence in the regions currently defined as an inferred mineral resource.

Given increased geological knowledge from current mining activity along with minor limitations identified by AMS in the current mineral resource estimate, AMS recommends that an updated mineral resource for all domains be undertaken.

AMS concludes that there are no fatal flaws in the current resource data.

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

The Itafós Project deposit, encompassing Domingos, Canabrava and Near Mine, represents a significant ore reserve.

The mine plan has not been fully optimized and it is likely that further scheduling work will smooth out some of the grade and ore extraction variations seen in this study. The optimized mine plan may mean that higher-grade ore is available to the mill sooner in the schedule, thus having a positive effect on the discounted cash flow.

Finally, the economics of the project present a very positive rate of return for the investment. Even considering possible variations in the sales price, operating costs and others as seen in the sensitivity analysis the project economics can be considered very attractive

26 RECOMMENDATIONS

26.1 Exploration and Resources

Drilling and studies completed to date have defined a mineral resource at the Itafós Project. The data collected is considered to be of moderate quality and suitable for resource estimation.

Further scope exists to improve the geological and mineral resource estimation confidence in the regions currently defined as an inferred mineral resource. AMS makes the following specific recommendations:

- Infill drilling across the Domingos and Canabravas domains to a 50m by 50m spacing in order to quantify further Measured resource category material.
- Given increased geological knowledge from current mining activity (which will allow more detailed domain modelling mainly focussed on the limits of breccia zones), along with minor limitations identified by AMS in the current mineral resource estimate, AMS recommends that an updated mineral resource for all domains be undertaken.

26.2 Mineral Resource and Evaluation Budget

MBAC has also provided AMS with an ongoing exploration and evaluation budget, summarised in Table 26.2_1 below.

Table 26.2_1
Itafós Project
Proposed Resource and Evaluation Expenditure

Activity	**Total (US$)**
Infill Drilling (50 x 50m Grid)	$ 300,000
Assay Testwork	$ 30,000
Updated Resource Studies	$ 40,000
Travel and accommodation	$ 20,000
Field supervision and support	$ 30,000
Administration	$ 30,000
Sub-total	**$** 450,000

The proposed expenditure of US$ 450,000 is considered to be consistent with the potential of the Itafós Project and is adequate to cover the costs of the proposed programs.

Other recommendations as mine plan optimization will be pursued by the own team of the project management, and the costs are already included as operating costs.

27 REFERENCES

AusIMM. 1995. Code and Guidelines for Assessment and Valuation of Mineral Assets and Mineral Securities for Independent Expert Reports (The Valmin Code) Issued April 1998. AusIMM.

AusIMM. 1998. Code and Guidelines for Assessment and Valuation of Mineral Assets and Mineral Securities for Independent Expert Reports (The Valmin Code), issued April 1998. The Australasian Institute of Mining and Metallurgy.

MBAC (Oct, 2010) - Technical Report on Arraias Tocantins Feasability Study

28 DATE AND SIGNATURE PAGE

The “qualified persons” (within the meaning of NI43-101) for the purposes of this report are Beau Nicholls, who is an associate of AMS and Bradley Ackroyd, who is an employee of AMS, Carlos Guzmán from NCL and Homero Delboni from HDA.

The effective date of this report is 27 March, 2013.

(signed by)

Beau Nicholls B.Sc Geol. MAIG
Associate Consulting Geologist
Andes Mining Services Ltd.

Signed on the 27 March 2013

(signed by)

Bradley Ackroyd B.Sc Geol. MAIG
Principal Consulting Geologist
Andes Mining Services Ltd.

Signed on the 27 March 2013

(signed by)

Carlos Guzmán
Principal Mining Engineer
NCL Brasil Ltda

Signed on the 27 March 2013

(signed by)

Homero Delboni
HDA Serviços S/SLtda

Signed on the 27 March 2013

29 CERTIFICATES OF QUALIFIED PERSONS

Andes Mining Services Ltd.

Certificate of Qualified Person

I, Beau Nicholls, do hereby certify that:

1. I have been working since 2010 as an Associate Consulting Geologist with the firm Andes Mining Services Ltd. of Avenue Diagonal 550, Departmento 203, Miraflores, Lima, Peru 18. . My residential address is 463 Alameda Das Quaresmeiras, Rio Acima - MG, Brazil, CEP - 34300-000
2. I am a practising geologist with 18 years of Mining and Exploration geological experience. I have worked in Australia, Eastern Europe, West Africa and the Americas. I am a member of the Australian Institute of Geoscientists ("MAIG")
3. I am a graduate of Western Australian School of Mines – Kalgoorlie and hold a Bachelor of Science Degree in Mineral Exploration and Mining Geology (1994)
4. I have practiced my profession continuously since 1995
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 not visited the Itafos Arraias SSP Project Project.
7. I am responsible for sections 7 to 12, and jointly responsible for sections 1 to 7 and 23 to 26 of the technical report dated effective 27 March 2013 and titled "Updated Technical Report Itafós Arraias SSP Project, Tocantins State, Brazil"(the "Report")
8. I am independent of MBAC Fertilizer Corp 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 Itafos Arraias SSP Project of MBAC Fertilizer Corp and I do not beneficially own, directly or indirectly, any securities of MBAC Fertilizer Corp or any associate or affiliate of such company
11. I have been involved with MBAC Fertilizer Corp for two years
12. As of the date of this certificate, 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 at Belo Horizonte, Brazil, on March 27th, 2013

(signed by)

Beau Nicholls BSc(Geology) MAIG
Associate Consulting Geologist

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 12 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 Itafos Arraias SSP Project between the 25th and 27th February 2013.
7. I am responsible for section 14, and jointly responsible for sections 7 to 12 of the technical report dated effective 27 March 2013 and titled “Updated Technical Report Itafós Arraias SSP Project, Tocantins State, Brazil”(the “Report”)
8. I am independent of MBAC Fertilizer Corp 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 Itafós Arraias SSP Project of MBAC Fertilizer Corp and I do not beneficially own, directly or indirectly, any securities of MBAC Fertilizer Corp or any associate or affiliate of such company.
11. I have been involved with MBAC Fertilizer Corp for one year.
12. As of the date of this certificate, 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 March 27th, 2013

(signed by)

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

Certificate of Qualified Person

I, Homero Delboni Junior of HDA Serviços S/S Ltda., together with Bradley Ackroyd and Beau Nichols from Andes Mining and Carlos Guzman from NCL, prepared the report entitled "Updated Technical Report Itafós Arraias SSP Project, Tocantins State, Brazil " dated March 27, 2013 prepared for MBAC Fertilizer Corp. (the "Technical Report") do hereby certify that:

1. I am the Owner of HDA Serviços S/S Ltda. with registration number of CNPJ 01.750.221/0001-40 of Rua Cel. Raul Humaitá Vila Nova, 44 cj.61 – Indianópolis São Paulo, SP 04522-010.
2. I graduated with a Bachelor of Engineering Degree in Mining and Minerals Processing from USP (Brazil) in 1983, concluded a Masters in Engineering in Minerals Processing in USP (Brazil) in 1989 and obtained a Ph.D. in Minerals Processing Engineering at UQ – Julius Kruttschnitt Mineral Research Centre, Brisbane (Australia) in 1999.
3. I am a Member of the CIM - Canadian Institute of Mining, Metallurgy and Petroleum; and a registered member of SME - Society for Mining, Metallurgy and Exploration.
4. I have worked as a Minerals Processing engineer for a total of 30 years since my graduation from university.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined by NI 43-101), and my past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I have read the NI43-101 and this Independent Technical Report titled "Updated Technical Report Itafós Arraias SSP Project, Tocantins State, Brazil" (the "Technical Report"), dated March 27th, 2013 has been prepared in compliance with the NI 43-101 guidelines.
7. I am responsible for the preparation required under NI 43-101 for section 13 and sections 17 to 22 of the report entitled "Updated Technical Report Itafós Arraias SSP Project, Tocantins State, Brazil"
8. As of the amendment date of the Technical Report, to the best of my knowledge, information and belief the Technical Report contains all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
9. I am independent of MBAC Fertilizer Corp pursuant to section 1.5 of the Instrument.
10. As of the date of this certificate, 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.

Signed and dated this 27th day of March, 2013

Homero Delboni Junior, Ph.D. HDA Serviços S/S Ltda.

Certificate of Qualified Person

I, Carlos Guzmán of NCL Brasil Ltda, do hereby certify that:

1. I am a Principal Mining Engineer of NCL Brasil Ltda, with a business address at Alameda da Serra 500/315, Nova Lima, Minas Gerais, Brazil.

2. I am a graduate of the Universidad de Chile and hold a Mining Engineer title (1995).

3. I am a practicing mining engineer registered with the Australasian Institute of Mining and Metallurgy (FAusIMM 229036) and Registered Member of the Chilean Mining Commission.

4. I have practiced my profession continuously since 1995.

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

6. I have read the Canadian National Instrument 43-101 and this Independent Technical Report titled "Updated Technical Report Itafós Arraias SSP Project, Tocantins State, Brazil" (the "Technical Report"), dated March 27th, 2013 has been prepared in compliance with this Instrument and Form 43-101F1.

7. My most recent visit to the Project was on April 6th, 2010, for the purposes of inspection on the Property.

8. I am responsible for the reserves estimate and mining study, specifically sections 15 and 16 and also jointly responsible for sections 23 to 26 of the Technical Report.

9. As of the date of the Technical Report, to the best of my knowledge, information and belief the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading. I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Report, the omission to disclose which makes the Technical Report misleading.

10. I am independent of MBAC Fertilizer Corp. as defined by Section 1.5 of NI 43-101.

11. I have had prior involvement with the Property that is subject of the Technical Report and MBAC Fertilizer Corp for three years.

Dated and signed, March 27th, 2013

(signed by)
Carlos Guzmán – NCL Brasil Ltda.
Principal Mining Engineer (FAusIMM , RM Chilean Mining Commission)

APPENDICES

Account	Description	AREA: 0050 - Infrastructure	2000 - Beneficiation	2700 - Shipment	3000 - Acidulation	4000 - Granulation	5000 - Acid Plant	5050 - Inputs / Reagents	6000 - Utility Systems	7000 - Administration and Plant Ancillary Facilities	8000 - Power, Automation and Telecommunication	OVERALL TOTAL	%
Equipment	Electrical	-	2,253,606	-	868,962	-	-	-	187,781	-	26,146,651	R$ **29,457,000**	4.4%
	Mechanical	-	73,602,306	533,160	10,343,611	25,591,498	76,301,049	3,641,001	8,173,476	198,898	-	R$ **198,385,000**	29.4%
	Spare Parts	-	-	-	-	-	366,780	-	-	-	-	R$ **366,780**	0.1%
Materials	Electrical	-	-	-	-	-	-	-	-	-	6,041,424	R$ **6,041,424**	0.9%
	Miscelaneous, including electrical equipment	-	-	-	-	-	7,736,800	-	-	-	-	R$ **7,736,800**	1.1%
	Steel Structure	5,165,650	16,982,730	5,554,920	5,021,288	17,982,745	-	714,457	-	2,028,210	-	R$ **53,450,000**	7.9%
	Instrumentation / Telecommunication	-	1,540,335	531,549	391,466	385,702	-	669,347	507,890	-	1,077,740	R$ **5,104,029**	0.8%
	Miscelaneous	-	19,621,590	141,074	3,097,912	7,820,124	-	1,061,299	2,434,412	57,713	-	R$ **34,234,123**	5.1%
	Piping	-	9,050,529	-	146,948	-	-	226,721	10,341,147	-	-	R$ **19,765,345**	2.9%
	Cataliser	-	-	-	-	-	7,507,200	-	-	-	-	R$ **7,507,200**	1.1%
Erection	Electro-mechanical erection	-	30,046,958	1,460,364	4,909,975	12,315,055	35,521,613	1,768,777	7,241,633	431,216	9,304,410	R$ **103,000,000**	15.3%
Civil Works	Civil	3,630,739	20,236,475	1,049,313	1,863,510	5,401,251	15,396,196	1,578,976	88,316	1,142,471	2,612,753	R$ **53,000,000**	7.9%
	Archtecture	-	-	-	-	-	-	-	-	16,453,423	-	R$ **16,453,423**	2.4%
	Dams	29,000,000	-	-	-	-	-	-	-	-	-	R$ **29,000,000**	4.3%
	Infrastructure	27,456,987	-	-	-	-	-	-	-	-	-	R$ **27,456,987**	4.1%
Indirect	Comissioning and training	206,419	722,810	35,143	107,611	275,197	-	45,301	138,252	26,656	-	R$ **1,557,390**	0.2%
	Land Acquisition	8,000,000	-	-	-	-	-	-	-	-	-	R$ **8,000,000**	1.2%
	MECS Technology	-	-	-	-	-	4,311,200	-	-	-	-	R$ **4,311,200**	0.6%
	Engineering	2,551,517	8,934,581	434,394	1,330,172	3,401,683	9,749,275	559,961	1,708,919	329,497	-	R$ **29,000,000**	4.3%
	First fill / Start Up	121,434	425,222	20,674	63,307	161,896	440,000	26,650	81,332	15,682	-	R$ **1,356,197**	0.2%
	Management	1,503,417	5,264,474	255,955	783,770	2,004,355	-	329,943	1,006,937	194,148	-	R$ **11,342,999**	1.7%
	Engineering Insurance	278,337	974,645	47,387	145,104	371,079	-	61,084	186,421	35,944	-	R$ **2,100,000**	0.3%
	Erection Supervision	-	746,490	5,367	117,858	297,511	-	40,376	92,616	2,196	-	R$ **1,302,413**	0.2%
	Owner team	1,810,986	4,554,094	238,905	696,395	1,810,355	3,571,349	259,109	778,902	469,748	981,847	R$ **15,171,690**	2.3%
	Social projects	1,600,000										R$ **1,600,000**	0.2%
	Legal Costs	1,800,000										R$ **1,800,000**	0.3%
	Environment	5,500,000										R$ **5,500,000**	0.8%
Contingency		-	-	-	-	-	-	-	-	-	-	R$ **-**	0.0%
Total		**R$ 88,625,485**	**R$ 194,956,846**	**R$ 10,308,204**	**R$ 29,887,890**	**R$ 77,818,450**	**R$ 160,901,462**	**R$ 10,983,001**	**R$ 32,968,035**	**R$ 21,385,802**	**R$ 46,164,825**	**R$ 674,000,000**	**100%**
%		**13%**	**29%**	**2%**	**4%**	**12%**	**24%**	**2%**	**5%**	**3%**	**7%**	**USD 323,106,424**	