REPORT

SEC S-K 1300 Technical Report Summary

Mosaic Fertilizantes: Complexo Mineração de Tapira

Submitted to:

The Mosaic Company

101 East Kennedy Blvd
Suite 2500
Tampa, Florida 33602

Submitted by:

WSP USA Inc.

701 Emerson Road, Suite 250, Creve Coeur, Missouri 63141

+1 314-984-8800

31406539.009-001-TRS-Rev0

Effective Date: December 31, 2023

Report Date: February 20, 2024

Table of Contents

TABLES

FIGURES

1.0 EXECUTIVE SUMMARY

1.1 Property Description and Ownership

Complexo Mineração de Tapira (CMT) is located in the western portion of the state of Minas Gerais, in the southeast of Brazil to the north of the town of Tapira and approximately 35 kilometers (km) south-southeast of the city of Araxá. The mine is located 420 km by road from the Minas Gerais state capital of Belo Horizonte, via the BR-262 highway to Araxá and then the BR-146 highway to Tapira. CMT complex consists of a mine and a phosphate beneficiation plant. The beneficiation plant produces phosphate conventional and ultrafine concentrate which is sent by pipeline (conventional) and truck (ultrafine) to a local Mosaic chemical plant for finished product production.

The Tapira mining complex has been in operation since 1978 and has produced more than 70 Million tonnes (Mt) of phosphate concentrate. The current capacity of the beneficiation plant is 2 Million tonnes per year (Mtpy).

CMT is owned by Mosaic Fertilizantes P&K S.A. (Mosaic Fertilizantes), which is a subsidiary of The Mosaic Company, who acquired the asset from Vale S.A. (Vale) in January 2018.

Mosaic currently holds a total of eight Mining Concessions and one Mining Concession Application that encompass CMT.

1.2 Geology and Mineralization

The Tapira phosphate deposit is part of a series of Late-Cretaceous, carbonatite-bearing alkaline ultramafic plutonic complexes belong to the Alto Paranaiba Igneous Province. The Tapira igneous rocks intrude the phyllites, schists, and quartzites of the Late-Proterozoic Brasília mobile belt. The Tapira igneous complex is roughly elliptical, 35 square kilometers (km^2) in area and consists predominantly of alkaline pyroxenite rocks with subordinate carbonatite, serpentinite (dunite), glimmerite, syenite, and ultramafic potassic dikes.

The tropical weathering regime prevailing in the region and the inward drainage patterns developed from the weathering-resistant quartzite margins of the dome structures resulted in the development of an extremely thick soil cover in most of the complexes. The extreme weathering process was responsible for the residual concentration of apatite. The main geological types identified in the deposit are a combination of the igneous protoliths (bebedourites, phoscorites, and carbonatites) and the products of the weathering process.

1.3 Status of Exploration

The geological structure of the alkaline complex of Tapira was first recognized in 1953, through magnetometric and radiometric investigations carried out by the Brazil-Germany Project. Extensive exploration works were undertaken between 1971 and 1973, with particular focus on the occurrences of titanium. From 1973 to 1977, the exploration priorities changed to occurrences of phosphate, with the aim of replacing the massive imports of fertilizers in the agricultural sector which was then undergoing a period of expansion in Brazil.

Exploration drilling started in 1967 and has continued in 2023. Including the 2022 drilling program that Mosaic completed, a total of 2,192 core drill holes as well as and 11,103 percussive drill holes were completed at CMT..

1.4 Development and Operations

The Tapira mine has been in operation since 1978.

All required fixed and permanent infrastructure of power, pipelines and primary roadways, and mine access are established. Drainage, water controls, and mine access roads and ramps are established for current operations and will be expanded and continued as the pit progresses through its planned life of operations.

The ore at Tapira is recovered using open-pit conventional truck and shovel mining methods, due to the proximity of the ore to the surface and the physical characteristics of the deposit.

Since this is a well-established operation, the deposit, mining, beneficiation, and environmental aspects of the mine are very well understood. The knowledge for CMT is based on the collective experience of personnel from Mosaic site operations and technical disciplines gained during years of phosphate mining and ore beneficiation. This knowledge is supported by years of production data and observations from CMT.

A Life-of-Mine (LOM) plan and pit design are established for 2024 to 2057. LOM plan pit design is based on current geotechnical and hydrology designs, and extraction limits, which are dictated by mining recovery and dilution factors, Cut-off Grade (COG) estimation, and economic pit optimization analysis. Pit design includes detailed design factors for wall slopes, berm widths, pit bottom, and access ramp grades and widths.

The LOM plan includes annual forecasts of waste removal and transportation and ore extraction. Waste is placed in one of 6 designated and designed Overburden Storage Facilities (OSFs). Two of the OSFs are designated for higher grade titanium overburden. Ore is transported to a single concentrator plant destination.

The mine plan life is approximately 34 years, as of December 31, 2023, with Run-of-Mine (ROM) ore tonnages delivered to the beneficiation plant ranging from 12.6 to 18.9 Mtpy on a wet basis, resulting in the production of approximately 2.0 Mtpy of concentrated phosphate.

The mining equipment fleet planned includes a range of 3 to 11 hydraulic excavators, 27 to 52 end-dump haul trucks, and mine support equipment to support the mine plan production requirements. Hourly workforce will range from 355 to 493 workers supported by approximately 40 operational and technical staff.

1.5 Mineral Resource Estimate

This sub-section contains forward-looking information related to Mineral Resource estimates for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geological and grade interpretations and controls and assumptions and forecasts associated with establishing the prospects for economic extraction.

The Mineral Resources were estimated based on the long-standing exploration drilling and sampling completed at CMT since 19676. The drilling results were loaded into the geological database, verified, and vetted for errors, and then used in the geological model to create the lithology and weathering surfaces. The geological model was used in creating the block model, where geological domains based on the lithology and weathering surfaces were utilized to interpret grade, density, and mass recovery in a geologically appropriate manner. Exploratory Data Analysis (EDA) and geostatistical analysis were completed on the raw and composite data sets to help define interpolation parameters and Mineral Resource classifications. The Mineral Resources were restricted based on an optimized pit limit that considered COG, price, mining costs, infrastructure limitations, and mineral licenses.

The Mineral Resources are exclusive of Mineral Reserves and include approximately 78.0 Mt of Measured and Indicated Mineral Resources with a P_2O_5ap grade of 8.6%. There is an additional 181.2 Mt of Inferred Mineral Resources with a P_2O_5ap grade of 9.2%.

1.6 Mineral Reserve Estimate

This sub-section contains forward-looking information related to Mineral Reserve estimates for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes and grade, modifying factors including mining and recovery factors, production rate and schedule, mining equipment productivity, commodity market and prices and projected operating and capital costs.

A Mineral Reserve estimate has been prepared for CMT. Reserves are limited by the CMT property boundary, and the ultimate pit designed for the LOM plan, which was limited with an economic optimized pit analysis.

The reserve estimate includes mining modifying adjustments for mining ore recovery, mining dilution, and ore concentration recovery factors. The reserve estimate is limited to a COG of 5.0% P_2O_5ap, as well as certain geometallurgical beneficiation criteria, including:

- Diluted CaO to P_2O_5 ratio between 0.9 and 3.0
- Within one of four mineralized domains characterized by lithology and alteration

The beneficiation plant generates conventional (coarse) and ultrafine concentrates from the CMT ore. The mass recovery of coarse concentrate is forecast based on the results of laboratory flotation tests performed on drill core samples. The mass recovery of coarse concentrate is predicted based on a mass recovery regression equation as a function of the ROM Fe_2O_3, CaO and P_2O_5 chemical compositions.

The mass recovery is calculated from a series of linear regression formula, updated frequently, as a function of ROM chemical composition and the P_2O_5 grade of the ROM. Regression formulas are developed by metallurgical domain types and closely adhere to the testing results and prediction results. See Section 10.4.1 for detailed mass recovery linear regression formula.

The CMT Mineral Reserve, as of December 31, 2023, is estimated at 443.6 Mt ROM (dry) with a diluted grade of 9.3% P_2O_5 and a diluted grade of 9.0% P_2O_5ap delivered to the concentrator plant and 67.7 Mt (dry) concentrated phosphate tonnes at 35.0% P_2O_5 post concentration process plant. This includes:

- 131.7 Mt of Proven Reserve at a 9.1% P_2O_5ap grade (diluted), resulting in 19.7 Mt of concentrate with a 35.0% P_2O_5 post beneficiation plant.
- 311.9 Mt of Probable Reserve with an 8.9% P_2O_5ap grade (diluted), resulting in 48.0 Mt of concentrate at 35.0% P_2O_5.

1.7 Capital and Operating Costs

This section contains forward-looking information related to capital and operating cost estimates for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this section including prevailing economic conditions continue such that unit costs are as estimated in constant (or real) dollar terms, projected labor and equipment productivity levels and that contingency is sufficient to account for changes in material factors or assumptions.

The annual production estimates were used to determine annual estimates of capital and operating costs. All cost estimates were in real 2023 Brazilian Reais (R$) terms. Total capital costs included R$4.5 B of sustaining capital and opportunity costs. Annual operating costs were based predominantly on historical consumption factors and unit costs. They included costs for ongoing reclamation, final reclamation, and mine closure. Annual total cost of rock production varied from R$320 per tonne to R$480 per tonne, with an average total cost of production for a tonne of phosphate rock concentrate at R$403.

1.8 Economic Analysis

This section contains forward-looking information related to economic analysis for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including estimated capital and operating costs, project schedule and approvals timing, availability of funding, projected commodities markets, and prices.

For reporting for Mosaic's total financial statistics, the Discounted Cashflow (DCF) was converted from Reais to United States Dollars (US$) at an exchange rate of R$4.86 = U$1.00.

For the economic analysis, a DCF model was developed. Because Tapira is a captive operation supplying rock to other Mosaic-owned plants, there is no transparent mined phosphate rock commodities price market in Brazil. Mineral reserves for Tapira were estimated based on an internal transfer price. This internal transfer price was set as a constant number of $112.62 per tonne (R$547.34 per tonne).

The QP considers the accuracy of cost estimates to be well within a Prefeasibility Study (PFS) standard and sufficient for the economic analysis supporting the Mineral Reserve estimate for CMT.

1.9 Permitting Requirements

This section contains forward-looking information related to economic analysis for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including estimated capital and operating costs, project schedule and approvals timing, availability of funding, projected commodities markets, and prices.

All mining permits have transferred from Vale S.A to Mosaic Fertilizantes. In addition, there is a mining research request in progress associated with CMT.

All environmental licenses were valid at the time this report was prepared or had a renewal application filed in the Environmental Agency within the legal deadline. According to Mosaic, there are action plans in progress to comply with the environmental conditions that are not met yet within the environmental licenses. CMT's environmental controls are related to monitoring the quality of wastewater, surface and groundwater and air, as well as waste management. Additional environmental controls are in place for air emissions, air quality, and noise.

A hydrotechnical study concluded in 2019 for Mosaic (POTAMOS, 2019) presented as a general diagnosis of water use that the CMT mining operation does not present a potential risk related to water supply. However, this study presented recommendations for improvements related to water management. Although water supply is not considered a risk for the CMT operation, the impacts of the existing water management practices on the surrounding areas can be considered a water supply risk to communities around the mine area.

The Mine site has an Emergency Action Program for Mining Dams. Plans for expansion of tailings dams will be required to support the LOM and reserves. Additional permits will be required and may involve a study on different technological alternatives for tailings disposal.

CMT's Closure Plan was updated in 2020/2021 and includes: Closure plan based on the then current configuration of CMT (end of 2020), and Site closure plan based on the mine final configuration. In the Conceptual Closure Plan (2021), the closure cost for current configuration (Volume 1) was estimated at R$ 310.7 M, (current value - base 2020). The closure cost estimate was subsequently updated in 2021 based on updated unit costs, with a total of R$ 565.3 M in (end of 2021).

1.10 Qualified Person's Conclusions and Recommendations

In the Qualified Person's (QP) opinion, the geological data, sampling, modeling, and estimate are carried out in a manner that both represents the data well and mitigates the likelihood of material misrepresentations for the statements of Mineral Resources. Recommendations for the Mineral Resources are focused on improving local variability for short range planning purposes that could be completed by site teams to provide improvements to short-term recovery and grade control. They are not seen as having an impact on the prospect of economic extraction.

In the QP's opinion, the operational and mine planning data, process recovery testing and modeling, LOM Plan, and estimation are carried out in a manner that both represents the data and operational experience and methodology well and mitigates the likelihood of material misrepresentations for the statements of Mineral Reserves.

2.0 INTRODUCTION

2.1 Registrant Information

This Technical Report Summary (TRS) for the CMT mine site, located near the city of Tapira, Minas Gerais State in central Brazil was prepared by WSP USA Inc. (WSP) and The Mosaic Company (Mosaic).

CMT is owned by Mosaic Fertilizantes, which is a subsidiary of The Mosaic Company, who acquired the asset from Vale S.A (Vale) in January 2018. CMT complex consists of a mine and a phosphate concentration plant. The beneficiation plant produces phosphate conventional and ultrafine concentrate which is sent by pipeline (conventional) and truck (ultrafine) to a local Mosaic chemical plant for finished product production.

2.2 Terms of Reference and Purpose

The terms of reference for this TRS include:

- The date of this TRS Report is February 14, 2024, while the effective date of the resource and reserve estimate is December 31, 2023. It is the Qualified Person's opinion that there are no known material changes impacting resources and reserves between December 31, 2023, and February 14, 2024.
- United States English spelling
- Metric units of measure
- Grades are presented in weight percent (wt. %)
- Coordinate system is presented in metric units using Corrego Alegre 1961, UTM Zone 23 South
- Constant US Dollars and Brazilian Reais as of August 2023
- The purpose of this TRS is to report Mineral Resources and Mineral Reserves for CMT

Key acronyms and abbreviations for this TRS include those items included in Table 2.1.

Table 2.1: Abbreviations and Acronyms

Abbreviate/Acronym	Definition
°C	degrees Celsius
3D	three-dimensional
ABNT	Brazilian Association of Technical Standards
Al_2O_3	Aluminum oxide
amsl	above mean sea level
ANM	Agência Nacional de Mineração, Brazilian National Mining Agency
ARO	Asset Retirement Obligation
B	billion
BaO	Barium oxide
CaO	Calcium oxide
CAPEX	Capital Expenditure
CAT	Caterpillar
CFEM	Financial Compensation for the Exploitation of Mineral Resources
cm/s	centimeters per second
CMT	Complexo Mineração de Tapira
COG	Cut-off Grade
COGS	Cost of Goods Sold
CRM	Certified Reference Material
CVFT	Consórcio Vale Fosfértil Tapira
DCF	Discounted Cashflow
DNPM	National Department of Mineral Production
EDA	Exploratory Data Analysis
EL.	elevation
ESIA or EIA	Environmental and Social Impact Assessment
Fe_2O_3	Iron oxide
FIR	Regular Inspection Sheet
FOS	Factor of Safety
GEOSOL	SGS GEOSOL – Geologia e Sondagens
GISTM	Global Industry Standard on Tailings Management
Golder	Golder Associates Inc.
Golder	Golder Associates USA Inc.
ha	hectare
K	hydraulic conductivity
K_2O	Potassium oxide
km	kilometer
km^2	square kilometer
LIMS	Low Intensity Magnetic Separation
LOI	loss on ignition
LOM	Life-of-Mine
LOMP	Life-of-Mine Plan
LP	Preliminary License - Licença Previa
m	meter
M	Million
m/d	meters per day
m/s	meter per second
M^2/d	cubic meters per day
m^3/h	cubic meters per hour

Abbreviate/Acronym	Definition
MgO	Magnesium oxide
mm	millimeter
mm^3	cubic millimeter
MnO	Manganese oxide
Mosaic	The Mosaic Company
Mosaic Fertilizantes	Mosaic Fertilizantes P&K S.A.
MR	Mass Recovery
Mt	Million tonnes
Mt	million tonnes (Metric)
Mtpy	Million tonnes per year
Na_2O	Sodium oxide
NN	Nearest Neighbor
NPV	Net Present Value
OK	Ordinary Kriging
OMS	Operating, Maintenance, and Surveillance
OPEX	Operating Expenditure
OSF	Overburden Storage Facility
PDR	Waste Deposition Piles (Pilhas de Disposição de Rejeito)
PFS	Prefeasibility Study
PIAP	Alto Paranaiba Igneous Province
PSB	Dam Safety Plan
QA/QC	Quality Assurance/Quality Control
QP	Qualified Person
R$	Brazilian Reals
R&D	Research and Development
RISR	Regular Safety Inspection Report
ROM	Run-of-Mine
RSA	Fresh Rock
RSI	Semi-weathered Rock
S	Sulfur
SG&A	Selling, General, and Administrative
SiO_2	Silicon dioxide
S-K 1300	United States Security and Exchange Commission's regulation Subpart S-K 1300
SPT	Standard Penetration Test
SSP	Single Superphosphate
t	tonne
TiO^2	Titanium dioxide
TRS	Technical Report Summary
TSF	Tailings Storage Facility
US$	United States Dollars
V	volts
Vale	Vale S.A.
Vale Fertilizantes	Vale Fertilizantes S.A.
WHIMS	Wet High Intensity Magnetic Separators
WST	Water Services and Technologies
wt.%	weight percent
µm	micrometer

2.3 Sources of Information

The compilation and estimation of Mineral Resources and Mineral Reserves used public and private data sources. The supply of the private data sources from Mosaic included a drill hole database, geological model, internal documentation, laboratory certificates, pit optimizations, mine plans and other mine planning files.

A detailed list of cited reports is noted in Section 24.0 of this TRS.

2.4 Personal Inspection Summary

WSP QPs traveled to site on November 8 and 9, 2021. The areas visited by the WSP QPs are noted in the below sub-sections. Prior to the site visit, the WSP QPs participated in multiple conference calls and meetings to discuss the Mineral Resources and Mineral Reserves at CMT.

2.4.1 Jerry DeWolfe

The QP, as defined in S-K 1300, responsible for the preparation of the Mineral Resources for the Mine is Mr. Jerry DeWolfe, P. Geo., Senior Geological Consultant at WSP. Mr. DeWolfe visited CMT from November 8 to 9, 2021.

During the site visit, Mr. DeWolfe reviewed the regional and deposit geology with senior personnel from the CMT geology and mining teams. Mr. DeWolfe visited the CMT core shed to review the deposit geology, core logging, sampling, analytical Quality Assurance and Quality Control (QA/QC), and core/sample chain of custody and archiving processes. Mr. DeWolfe also visited the CMT onsite sample preparation facilities and observed the sample preparation process.

Mr. DeWolfe visited the operating mine and surrounding area and observed active long-term (exploration), short-term (pre-production) and grade control (production) drilling, logging, and sampling process. This visit included verification of drill hole locations for drill holes that were used in the modeling process as discussed in Section 9.0 of this TRS.

During the site visit, Mr. DeWolfe interviewed site personnel regarding drilling, logging, sampling, and chain of custody procedures to evaluate the appropriateness of the data to be used to develop a geological model and to estimate the Mineral Resources for the Mine.

Mr. DeWolfe also held discussions with the CMT Short Range Geology and Mine Planning team to better understand how the short and intermediate grade control sampling, modeling and estimation procedures and results for the mine and stockpiles were prepared in support of the mine planning and operations teams.

2.4.2 Terry Kremmel

The QP, as defined in S-K 1300, responsible for the preparation of this Mineral Reserve estimates provided in this TRS is Mr. Terry Kremmel, PE, Vice President Mining Engineering at WSP. Mr. Kremmel visited CMT from November 8 to 9, 2021.

During the site visit, Mr. Kremmel reviewed the general geology of the Resources with the Resource QP, including inspecting drill core samples at the Tapira Core Shed. Mr. Kremmel visited and observed the Primary and Secondary Crushing/Sizing operations and ROM ore stockpile including the Stacker/Reclaimer Blending System. Mr. Kremmel also visited the Tapira onsite laboratory facilities and observed procedures for sample preparation as well as the Physical laboratory and Chemical Assay laboratory. Mr. Kremmel visited the beneficiation plant and observed the primary stages of ore beneficiation, including milling, sizing/classification, fines separation and flotation stages.

Mr. Kremmel visited and inspected the operating mine and observed conditions of the haul roads and ramps, highwall conditions, operational benches, equipment, overburden and ore extraction, loading and haulage, pit and surface drainage, OSFs, beneficiation Tailings Storage Facilities (TSFs) and associated impoundment dams, impoundment stability monitoring systems, surface water (stormwater) drainage systems, and site support infrastructure (workshops and maintenance facilities, warehouses, explosive magazines, site access fuel storage and power supply).

Mr. Kremmel also held discussions with Short Range Mine Planning team to better understand how the short and intermediate mine plans were developed and interrelations between planning and operations teams.

2.5 Previously Filed Technical Report Summary Reports

This is the second TRS filed for the CMT mine site. The first TRS was dated February 17, 2022, with an effective Mineral Resource and Mineral Reserve estimation date of December 31, 2021.

3.0 PROPERTY DESCRIPTION

3.1 Property Location

CMT is located in the western portion of the state of Minas Gerais, in the southeast of Brazil (Figure 3.1) to the north of the town of Tapira and approximately 35 km south-southeast of the city of Araxá. The mine is 420 km by road to the Minas Gerais state capital of Belo Horizonte, via the BR-262 highway to Araxá and then the MGC 146 highway to Tapira.

The Property extends from approximately UTM 7,805,000 N to 7,799,500 N, and from 304,000 E to 310,000 E (Corrego Alegre 1961, UTM Zone 23 South), and is centered approximately at 19°52'S/46°51'W. Elevations at the Property range from 1,100 meters (m) to 1,350 m above mean sea level (amsl). The total surface area for the CMT is 10,143 hectares (ha).

3.2 Mineral Rights

3.2.1 Name and Number of Mineral Rights

The CMT mineral assets are part of a Consortium named "Consórcio Vale Fosfértil Tapira" (CVFT) created by Decree number 98.962 (February 16, 1990), process number 930.785/1988 (4,355.76 ha) granted to Vale (previously Vale do Rio Doce S.A.) and Vale Fertilizantes Fosfatados S.A. – Fosfértil, the rights were then purchased by Mosiac. The consortium includes the mining permits listed in Table 3.1.

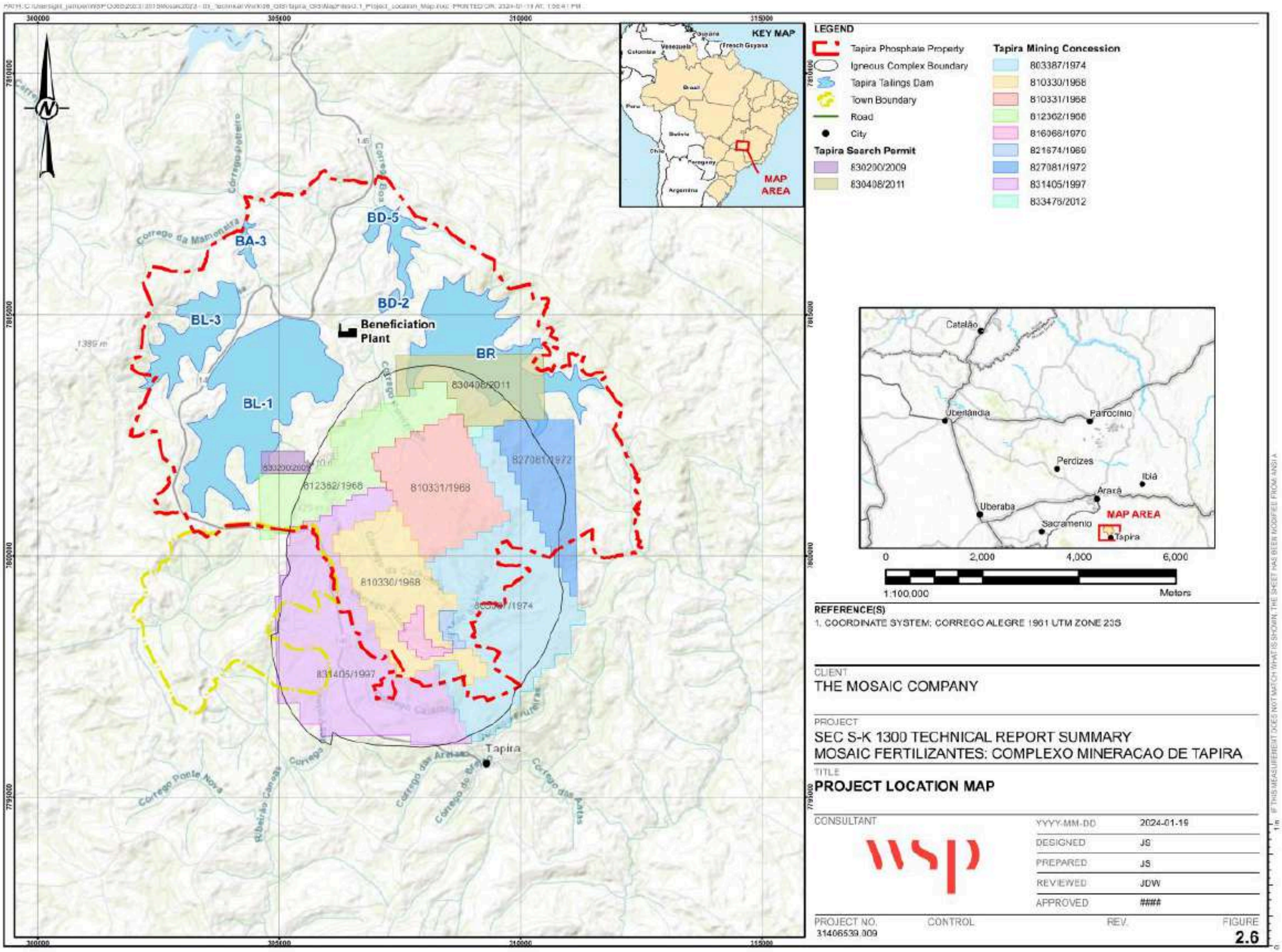
The mining permits are generally managed through the consortium, but there are instances where the individual permits are referenced. CMT operates via the Tapira Mining Consortium, created by the decree n°98.962 on February 16, 1990, using the mining right Agência Nacional de Mineração, Brazilian National Mining Agency (ANM) 930.785/1988.

Table 3.1: List of Mining Permits for CMT

Mining Permits	Granted to	Area (ha)
810.330/1968	Mosaic Fertilizantes P&K Ltda	483.12
810.331/1968	Mosaic Fertilizantes P&K Ltda	500.13
812.362/1968	Mosaic Fertilizantes P&K Ltda	464.04
821.674/1969	Mosaic Fertilizantes P&K Ltda	20.01
816.066/1970	Mosaic Fertilizantes P&K Ltda	47.83
827.081/1972	Mosaic Fertilizantes P&K Ltda	339.39
803.387/1974	Mosaic Fertilizantes P&K Ltda	947.34
831.405/1997	Mosaic Fertilizantes P&K Ltda	1,040.31
833.476/2012	Mosaic Fertilizantes P&K Ltda	10.48
Total		**3,852.65**

3.2.2 Description on Acquisition of Mineral Rights

Mining rights in Brazil are governed by the Mining Code, Decree 227, dated February 27, 1967, and further regulation enacted by ANM. This governmental agency, which controls the mining activities throughout Brazil, was recently created as a replacement of the former National Department of Mineral Production (DNPM). All sub-soil situated within Brazilian territory is deemed state property, with the mining activities subject to specific permits granted by the ANM.


KEY MAP
MAP AREA
LEGEND
Tapira Phosphate Property
Igneous Complex Boundary
Tapira Tailings Dam
Town Boundary
Road
City
Tapira Search Permit
830200/2009
830408/2011
Tapira Mining Concession
803387/1974
810330/1968
810331/1968
812362/1968
816066/1970
821674/1969
827081/1972
831405/1997
833476/2012
BA-3
BD-5
BD-2
BL-3
BL-1
BR
Beneficiation Plant
Tapira
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
MAP AREA
1:100,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
PROJECT LOCATION MAP
CONSULTANT
YYYY-MM-DD 2024-01-19
DESIGNED JS
PREPARED JS
REVIEWED JDW
APPROVED ####
PROJECT NO. 31406539.009
CONTROL
REV.
FIGURE 2.6

3.3 Description of Property Rights

CMT has an overall surface rights area of 8,008 ha distributed in 18 different property registrations. The surface area within the ultimate pit is currently mostly controlled by Mosaic. There is a small area near the Bom Jardim Settlement that is not within the current property rights. This area can be seen in Figure 3.1, to the southwest of the red Property Limit line. The relocation of the Bom Jardim Settlement will be necessary to fully realize the LOM tonnages, see Section 3.6.

3.4 Royalty Payments

Mosaic pays the Brazilian mining royalties (*Compensação Financeira pela Exploração de Recursos Minerais* - CFEM) in an amount of 2% of the net sales revenue with respect to the extraction of ore. There are no royalty payments to property owners.

3.5 Significant Encumbrances to the Property

There are no known significant encumbrances to CMT at the time of this report.

3.6 Other Significant Factors and Risks Affecting Access

The relocation of state highway MG-146 includes re-locating the Fazenda Nova Bom Jardim Settlement (local village), which is located to the west of the Mosaic currently controlled surface area. Risks include social risk during settlement relocation negotiations and an economic risk since Mosaic has not yet acquired the surface rights. This area is included in the currently controlled mining permits and is therefore, not seen as a significant encumbrance to CMT. Mosaic has started planning for the relocation of this highway prior to 2036, beginning with conceptual studies evaluating the alternative locations and potential capital expense.

The capacity requirements are not currently in place for all tailings disposal for total LOM capacity requirements. However, CMT has an ongoing permitting and development plan to support the mining operations that will continue through the LOM requirements.

4.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

4.1 Topography and Land Description

The CMT area is marked by gently undulating relief modified by the elevation of the Tapira dome, which forms a plateau with a dome structure with principal axes of 7.4 km by 6 km and elevations around 1,300 m amsl. The preservation of the lateritic plateau is due to the existence of a quartzite ring that surrounds the igneous bodies.

The Tapira region is drained by the water bodies of the Prata Basin, more precisely by tributaries that flow from the Paraná River. The regional drainage pattern is dendritic, with slight tendency towards greater drainage in the SW/NE direction. Locally, however, considering the intrusion, the drainage pattern has an annular radial shape, emphasizing the dome shape of the area.

The area west of Minas Gerais is composed of a particular type of savanna known as the cerrado. Remnants of riparian forest are found near spring areas.

4.2 Access to the Property

The CMT property is located 3 km north of the town of Tapira and approximately 35 km south-southeast of the city of Araxá, in the southeast of Brazil in Minas Gerais State. The town of Tapira can be accessed by road from Belo Horizonte via the BR-262 and MGC-146 state highways travelling west-northwest for approximately 420 km. The MGC-146 highway is a well-maintained, asphalt road with a speed limit of 80 kilometers per hour (km/hr) and a weight limit of 45.0 tonnes. The maximum height allowed is 4.40 m due to a power line running above the access road.

There is currently no rail or airport access at Tapira. The closest rail and airport access is in the city of Araxá.

4.3 Climate Description

The local climate is temperate, and the annual rainfall varies between 1,300 millimeters (mm) and 1,800 mm. The maximum monthly rainfall of approximately 300 mm occurs in December and January. Temperatures vary from a summer maximum of 28 degrees Celsius (°C) in February to a winter minimum of 12°C in July.

The climate does not have a significant impact on mining operations, and mining normally take place all year, with minor effects during the rainy season.

4.4 Availability of Required Infrastructure

CMT is located in a highly developed region known as Alto Parnaíba. This region is known for its excellent, modern infrastructure with high standards of living compared with other regions in Brazil. The local infrastructure available to the CMT is excellent, as it is situated within a well-established mining area, 35 km from the well-developed city of Araxá and within 25 km of two other mining operations.

The supply of electricity to CMT occurs via a 138 kiloVolt (kV) transmission line that is operated by CEMIG. CMT has a total receipt of 38 megawatts (MW) and an annual power usage around 300 GW. The main substation receives 138 kV in 3 oil-type transformers which is transferred to secondary substations. From the secondary substations, power is distributed to the end-use areas at 127 volts (V), 220 V, 280 V, 440 V, or 4,160 V.

Water intake comes from the Ribeirão do Inferno and artesian wells, as well as recovered water from the taillings dams. Additionally, there are 4 artesian wells at the Tapira plant. The industrial reuse system used to recover water from the dams includes 4 pumps (BL01) and 2 pumps (BR) and 36" pipes covering varying distances to the different dam areas. The distance from BRI dam is approximately 9 km with a rated capacity of 4,400 cubic meters per hour (m^3/hr). The distance from BL1 dam is approximately 3 km with a rated capacity of 8,000 m^3/hr. The distance from BR dam is approximately 2 km with a rated capacity of 4,750 m^3/hr.

Mine buildings in the CMT complex are connected to a corporate local area network (LAN) through an MPLS link and an internet connection. The unit has a telephone system with coverage in all locations of the Mining Unit. The unit's radio system includes a base station and control rooms from which all mining equipment and transport trucks are dispatched and controlled and a control room for the beneficiation plant. It is used for better quality and more efficient communication, with signal repeaters covering all operations of the complex. Three stations provide cover for the operations in the whole site. Additionaly, all vehicles in the mine area are equipped with radios and the personnel of the operational areas have portable radios.

5.0 HISTORY

CMT has been in operation since 1978 and has produced more than 70 Mt of phosphate concentrate. Since 1978, Titanium Dioxide (TiO_2) bearing material, mainly in the form of anatase, has been stockpiled, with more than 200,000 tonnes awaiting the implementation of an economical beneficiation method.

The geological structure of the alkaline complex of Tapira was first recognized in 1953, through magnetometric and radiometric investigations carried out by the Brazil-Germany Project. There was an agreement between the two countries to carry out regional geophysical aero-survey programs, performed by the Geological Survey of Brazil in the 1950s, 1960s, and 1970s.

In 1968, three major private groups – Pedro Maciel, Companhia Meridional de Mineração (CMM), and Companhia Brasileira de Metalurgia e Mineração (CBMM) – had exploration research requests granted by DNPM. In the beginning of 1971, Vale (previously known as Companhia Vale do Rio Doce) joined Pedro Maciel to create the company Titan International S.A., which changed its name to Rio Doce Titânio in later years. Vale acquired the rights of Pedro Maciel at the end of 1971, with the mining rights incorporated into the company Mineração Rio Paranaíba (VALEP). At the time, a series of intensive and detailed systematic works were undertaken, and important occurrences of phosphate, titanium, niobium, rare earths, and vermiculite were identified.

Extensive exploration works were undertaken between 1971 and 1973, with particular focus on the occurrences of titanium. From 1973 to 1977, the exploration priorities changed to occurrences of phosphate, with the aim of replacing the massive imports of fertilizers in the agricultural sector which was then undergoing a period of expansion in Brazil. In 1977, the Fosfértil (Fertilizantes Fosfatados S.A.) company as created under the administration of Petrofértil (a subsidiary of Petrobras, the Brazilian state oil company). In 1992, Fosfértil was privatized, and a pool of investors held the company shares.

In 2010, Vale acquired complete control of Fósfertil and after created a new company, Vale Fertilizantes S.A. which included other fertilizer assets. At the start of 2018, Mosaic Fertilizantes acquired the assets of Vale Fertilizers, including the Tapira mineral deposit.

Details on the various historical through to recent exploration campaigns in the CMT area are presented in Section 7.0. Table 5.1 shows the historical production of CMT from 2014 to 2023.

Table 5.1: Historical Production for CMT (Last 10 Years)

Tapira Complex	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Ore Mined	Mt (wet)	17.3	15.7	16.1	17.2	14.5	10.3	16.1	15.5	14.7	15.4
P_2O_5 Feed Content	%	8.3	8.5	8.6	8.5	8.4	8.7	8.9	8.5	8.9	9.3
Titanium	Mt (wet)	0.0	0.0	0.0	0.0	6.8	9.6	4.7	7.2	4.4	4.5
Waste	Mt (wet)	32.9	17.2	37.2	41.8	27.0	27.2	31.8	38.4	45.1	31.5
Total Waste	**Mt (wet)**	**32.9**	**17.2**	**37.2**	**41.8**	**33.9**	**36.8**	**36.6**	**45.6**	**49.4**	**36.0**
Average Haul Distance - Ore	km	2.62	2.94	3.54	3.38	2.28	2.5	2.6	2.2	2.5	4.0
Average Haul Distance - Waste	km	2.67	3.14	3.19	3.06	2.52	2.9	2.6	2.3	2.5	2.6
Average Haul Distance - Total	**km**	**2.7**	**3.0**	**3.3**	**3.2**	**2.4**	**2.8**	**2.6**	**2.3**	**2.4**	**3.0**
Stripping Ratio	t/t	1.9	1.1	2.3	2.4	2.3	3.6	2.3	2.9	3.4	2.3
Total Movement	Mt (wet)	50.1	32.9	53.2	59.0	48.4	47.0	52.6	61.1	64.1	51.3

6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 Regional Geology

The Tapira phosphate deposit is part of a series of Late-Cretaceous, carbonatite-bearing alkaline ultramafic plutonic complexes belonging to the Alto Paranaiba Igneous Province. The Tapira igneous rocks intrude the phyllites, schists, and quartzites of the Late-Proterozoic Brasília mobile belt.

During the Late Cretaceous, the western portion of Minas Gerais State and the adjacent portion of southern Goiás State were the site of the emplacement of many mafic to ultramafic, ultrapotassic alkaline rocks, collectively known as the Alto Paranaiba Igneous Province (PIAP). This intense magmatic activity was represented by various types of intrusive (dikes, pipes, vents, diatremes, plutonic complexes) and extrusive (lavas and pyroclastics) bodies. The igneous rock types that occur in the PIAP include kimberlites, olivine-lamproites, and kamafugites, in addition to large intrusive complexes composed of ultramafic plutonic rocks (mainly dunites and alkali-pyroxenites), phlogopite-picrite dikes and carbonatites.

The ultrapotassic magmatism in the PIAP mainly occurred along the Alto Paranaiba Arch, a NW-SE trending structure which separates the Paraná and Sanfranciscana basins. Carbonatite complexes occur in several of the alkaline igneous provinces surrounding the Paraná Basin. The regional geology is illustrated in Figure 6.1.

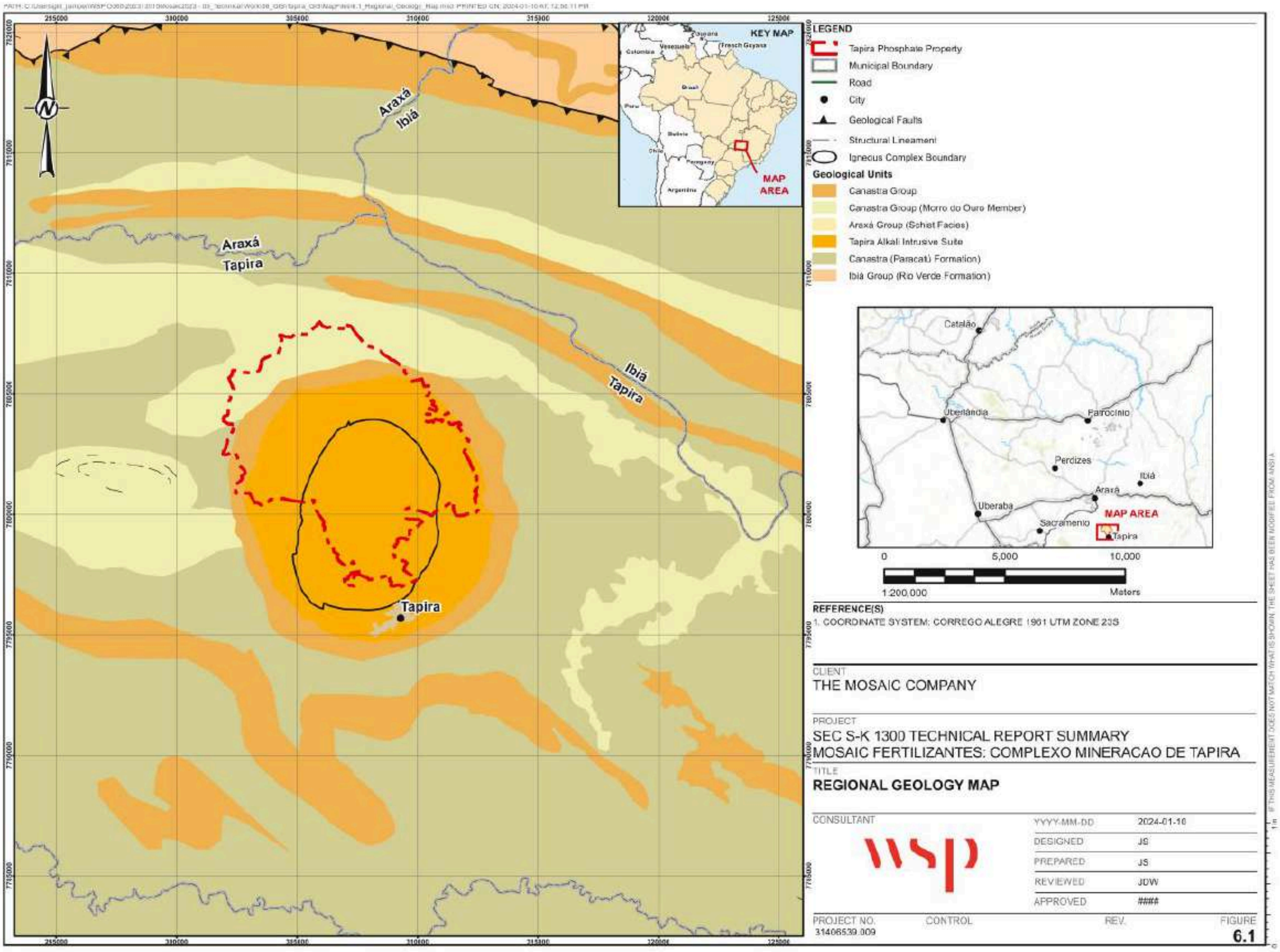
6.2 Local and Property Geology

The Tapira igneous complex is roughly elliptical, 35 square kilometers (km^2) in area and consists predominantly of alkaline pyroxenite rocks with subordinate carbonatite, serpentinite (dunite), glimmerite, syenite, and ultramafic potassic dikes. Locally, the pyroxenites are divided into:

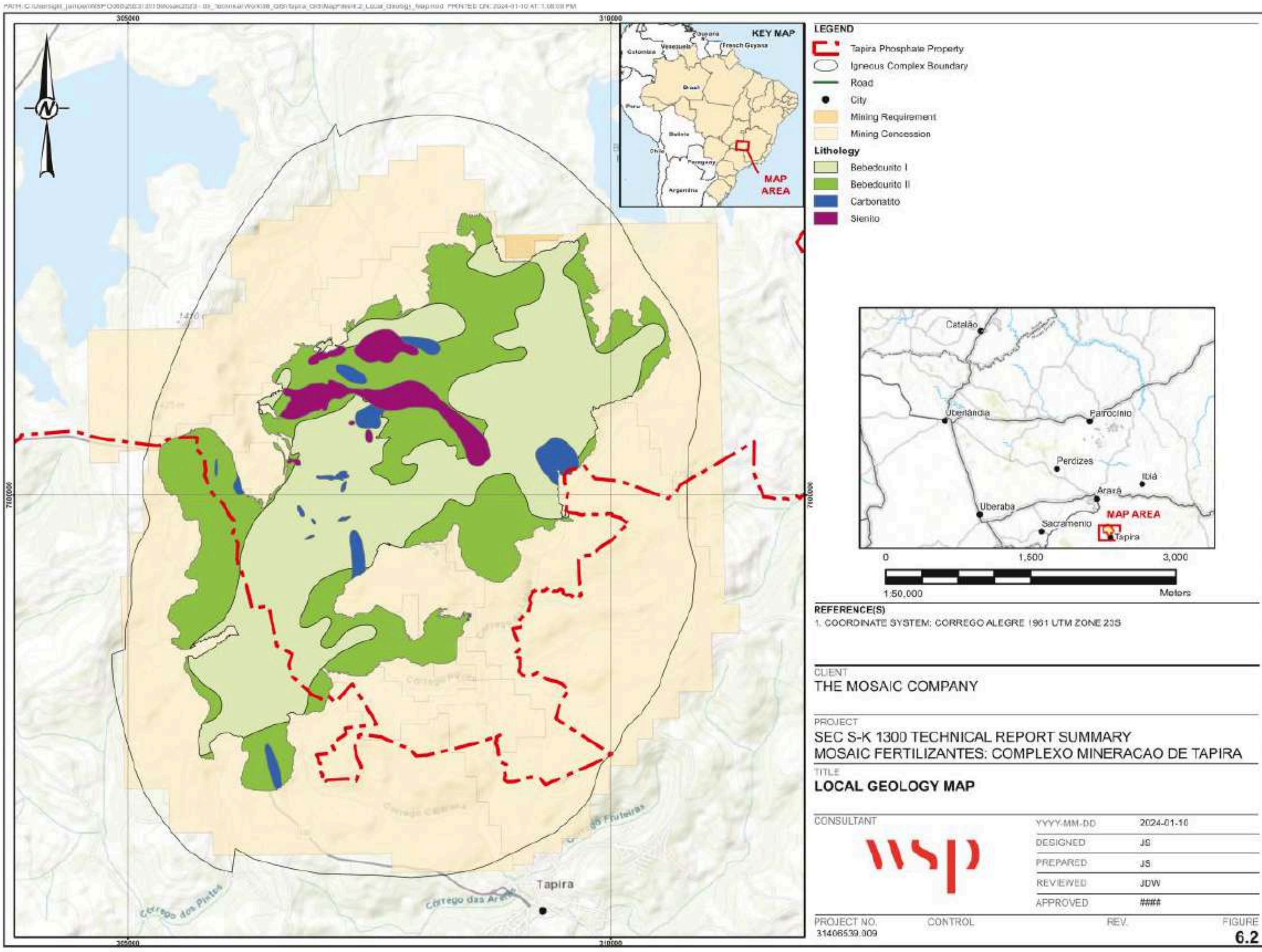
1. Bebedourites: a local name for a variety of biotite pyroxenite composed essentially of aegirine-augite, and biotite with perovskite and opaques.
2. Phoscorites: plutonic ultramafic rocks, containing magnetite, apatite, and one of the silicates, forsterite, diopside, or phlogopite. Phoscorites almost always occur in close association with carbonatites.

The tropical weathering regime prevailing in the region and the inward drainage patterns developed from the weathering-resistant quartzite margins of the dome structures resulted in the development of an extremely thick soil cover in most of the complexes. Surface outcrops are very rare and the best samples for geochemical studies are restricted to drill cores.

This deposit is thought to be an igneous intrusion where the lithologies are intermixed and subject to heavy weathering. For that reason, a geological stratigraphic column does not adequately reflect the vertical and lateral domaining of the intrusive rock types and the overprinting weathering horizons. WSP instead has provided a local geological map in Figure 6.2, and cross section, Figure 6.3 , which, in the opinion of the QP, appropriately depicts the geological setting of the deposit.



LEGEND
Tapira Phosphate Property
Municipal Boundary
Road
City
Geological Faults
Structural Lineament
Igneous Complex Boundary
Geological Units
Canastra Group
Canastra Group (Morro do Ouro Member)
Araxá Group (Schist Facies)
Tapira Alkali Intrusive Suite
Canastra (Paracatu) Formation
Ibiá Group (Rio Verde Formation)
KEY MAP
MAP AREA
Araxá
Ibiá
Araxá
Tapira
Ibiá
Tapira
Tapira
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
MAP AREA
Tapira
0
5,000
10,000
1:200,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
REGIONAL GEOLOGY MAP
CONSULTANT
YYYY-MM-DD 2024-01-10
DESIGNED JS
PREPARED JS
REVIEWED JDW
APPROVED ####
PROJECT NO. 31406539.009
CONTROL
REV.
FIGURE 6.1



KEY MAP
MAP AREA
LEGEND
Tapira Phosphate Property
Igneous Complex Boundary
Road
City
Mining Requirement
Mining Concession
Lithology
Bebedourito I
Bebedourito II
Carbonatito
Sienito
Catalão
Uberlândia
Patrocínio
Perdizes
Araxá
Ibiá
Uberaba
Sacramento
Tapira
0
1,500
3,000
1:50,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
LOCAL GEOLOGY MAP
CONSULTANT
wsp
YYYY-MM-DD 2024-01-10
DESIGNED JS
PREPARED JS
REVIEWED JDW
APPROVED ####
PROJECT NO. 31406539.009
CONTROL
REV.
FIGURE 6.2
305000
310000
Córrego dos Pintos
Córrego das Areias

6.3 Mineralization

The Tapira phosphate deposit was formed by the supergenic alteration of bebedourites, phoscorites, and carbonatites rich in apatite. The extreme weathering process was responsible for the residual concentration of apatite. The weathering processes are typically related to the partial hydrolysis of silicate rocks and the dissolution of carbonates, with a general loss of calcium (Ca), magnesium (Mg), potassium (K), and silica (Si), and the accumulation of aluminum (Al), iron (Fe), and titanium (Ti), from the base to the top.

The main geological types identified in the deposit are a combination of the igneous protoliths (bebedourites, phoscorites, and carbonatites) and the products of the weathering process.

According to the level of weathering, the products are:

- Aloterite: The top layer consisting of intense reddish autochthonous soils.
- Top isalterite (saprolite): Profile with an average depth of 25 m with clayish-sandy material that can be yellow to reddish. Homogenization of mineral phases does not allow the rock structures to be identified.
- Bottom isalterite (saprolite): Profile with an average depth of 25 m, resulting from the advanced weathering of the altered rock horizon. Some primary rock structures can still be observed, but the overall appearance is that of homogenous altered soil. This is the mainly phosphate mineralized horizon.
- Semi-weathered rock: Weathered horizon in which the rock structure is mostly preserved.
- Fresh rock: Mainly bebedourites and phoscorites intruded by carbonatite veins.

The combination of the weathering types with the rock types resulted in the following mining typologies:

- ALO (aloterite): a residual autochthonous reddish soil derived from the intensive weathering process of the ultramafic alkaline rocks, with high grades of Al and Fe, and a complete absence of Ca and Mg.
- ISAT (top isalterites): Saprolites derived from the alkali-peridotites (bebedourites and phoscorites.) With the evolution of the weathering process, at the top of the profile the apatite begins to be destroyed and the formation of minerals of the Crandalite group (aluminum and iron phosphates, of no economic interest) appeared. The Perovskite alteration gives rise to Anatase (TiO_2) in high concentrations and defines the Titanium Horizon. These are located at the top of the isalterite profile and a more intensively altered product of weathering. Primary rock structures are rarely seen and the levels of CaO and P_2O_5 are much lower than the lower ISAB-BEB. The amount of TiO_2 (anatase and ilmenite) is remarkably high and this layer has been stockpiled and has the potential for titanium production in the future.
- ISAB-BEB (bottom isalterite/bebedourite): Saprolites formed by intense weathering of bebedourites, leaching of Ca and Mg with a residual concentration of P, Ti, Al, Fe, and the generation of a phosphate ore horizon with a high concentration of apatite and low grade of perovskite located below the ISAT layer, as well as being rich in phosphate (apatite). Contact with the upper layer is clearly marked by the sharp reduction in CaO levels. It represents (with ISAB-FCR) the main phosphorous mineralized units.
- ISAB-FCR (bottom isalterite/phoscorite): Saprolites located on the same level as the ISAB-BEB layer and formed by the intense weathering of phoscorite dikes and carbonatites intruding in bebedourites. The phosphorous grade is a little higher than in the ISAB-BEB.

- RSI-BEB (semi-weathered rock/bebedourite): Semi-weathered layer formed by moderate alteration of the bebedourites. Many primary structures and the mineralogy of the bebedourites are still preserved. CaO grades are higher than ISAB-BEB and the P_2O_5 grades are normally lower.
- RSI-FCR (semi-weathered rock/phoscorite): Semi-weathered layer formed by the non-intense alteration of the phoscorites mixed with bebedourites. Many primary structures and mineralogy are still preserved. These rocks are rich in apatite but the total phosphorous grades are lower than in the ISAB-FCR.
- RSA-BEB: Fresh rock, the original bebedourites (a variety of alkali-peridotites) rock with an anomalous grade of perovskite ($CaTiO_3$) and apatite ($Ca_5(PO_4)_3(OH, F, Cl)$), normally green due to the high presence of pyroxenites.
- RSA-FCR: Fresh rock, the original phoscorite mixed with bebedourites (a variety of alkali peridoties) rock with an anomalous grade of perovskite ($CaTiO_3$) and apatite ($Ca_5(PO_4)_3(OH, F, Cl)$), normally green due to the high presence of pyroxenites.

Figure 6.3 shows a typical vertical section of the Tapira phosphate deposit showing weathering (upper section) and lithology (lower section) domains.

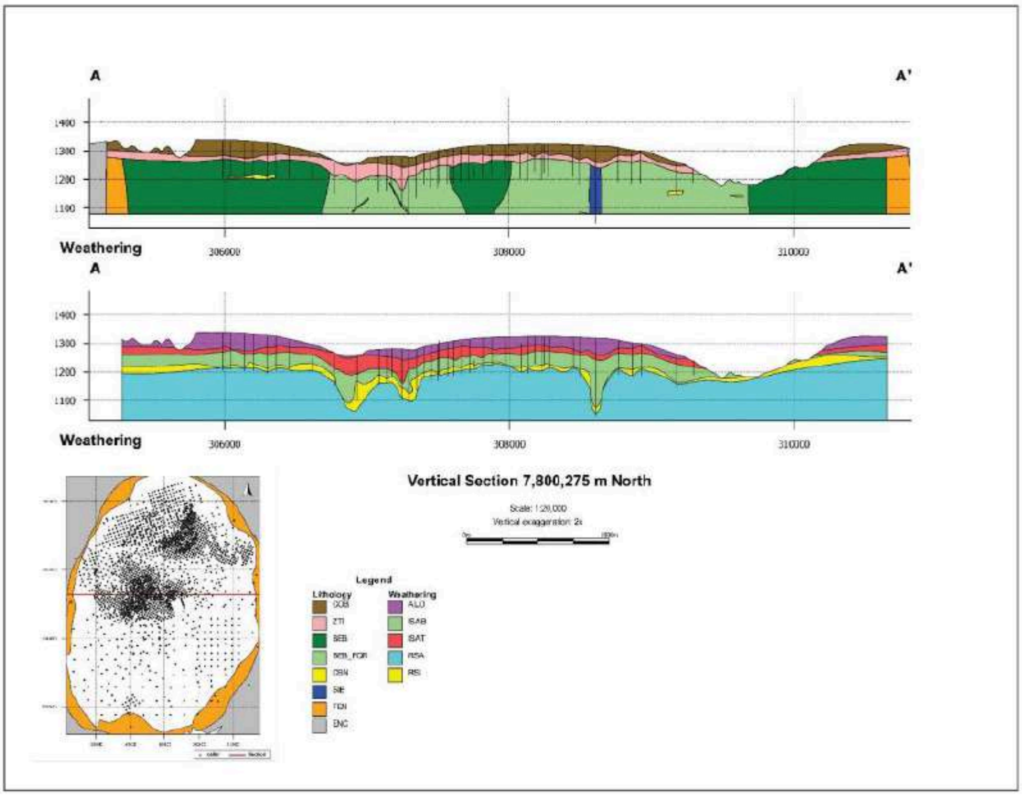


Figure 6.3: Vertical Cross Section - Weathering and Lithology Models

7.0 EXPLORATION

7.1 Exploration Work

The Tapira alkaline dome was discovered by the geologists of the Brazilian government during studies carried out in 1953-1954. Geophysical programs were developed in 1953 by the Geological Service of Brazil and consisted of aeromagnetic and aeroradiometric surveys.

Between 1966 and 1969, the National Department of Mineral Production (DNPM, now ANM) performed a detailed mapping of the regional dome structures and started the first drilling program. This exploration work was the first regional information about the regional mineral potential for phosphate, niobium, and titanium. Afterwards, many drilling campaigns were conducted by the Brazilian government and private companies.

Detailed petrological, geochemical, and isotropic studies were carried out by Brod in 1999, describing the Tapira complex as a plutonic series, consisting of wehrlites, pyroxenites (bebedourites) and syenite, and a carbonatite series, composed of calcitic, calcitic-dolomitic, and dolomitic types. Based on mineral chemistry data, Brod has suggested that part of the wehrlite could be cumulates formed from a phoscoritic magma.

7.1.1 Topographic Survey

Between 2008 and 2011, Vale executed geological mapping containing the main lithological units of the Tapira mine, on a scale of 1:1,000. In 2013, Vale contracted a laser topographic survey covering an area of approximately 98 km^2. The work was performed by the Geoid Laser Mapping Company and resulted in orthophotographs and digital models on a scale of 1:5,000.

7.2 Geological Exploration Drilling

Drilling campaigns at the CMT were carried out under the supervision of the following companies:

- DNPM – Departamento Nacional de Produção Mineral (1966 – 1969)
- DOCEGEO – Companhia vale do Rio Doce (now Vale S.A.) (1971 – 1978)
- CMM – Companhia Meridioonal de Mineração (1974 – 1977)
- MVL – Mineração Vargem da Lapa (1987)
- VALEP – (1978 – 1982)
- Fosfértil (1982 – 2009)
- Vale S.A. / Vale Fertilizantes S.A. (2010 – 2017)
- Mosaic Fertilizantes P&K S.A. (2018 – current)

A total of 2,192 core drill holes were executed from 1967 to 2022 and 11,103 percussive drill holes have been completed at CMT by Vale/Mosaic since 2014.

Table 7.1 summarizes the core drilling campaigns performed at the Tapira phosphate mine. All the data were taken from the Mosaic database and the existing physical records of the Tapira mine.

Figure 7.1 shows a map with the drilling locations for CMT.

Table 7.1: Summary of Exploration Core Drilling Campaigns

Year	Owner Company	Executor Company	No. of Holes	Total Length (m)
1967-1969	DNPM	Geosol	45	3,439
1973-1978	DOCEGEO	Geosol / T. Janer	171	12,100
1974-1978	CMM	Geosol	104	5,329
1978-1982	VALEP	Geosol	101	6,567
1987	MVL	Geosol	8	903
1983-1997	Fosfértil	T. Janer / Fosfértil	129	11,808
1998-2001	Fosfértil	Hidropoços	115	13,647
2002-2006	Fosfértil	Hidropoços / Hidrigel	286	32,050
2007	Fosfértil	Hidrigel	24	2,773
2010	Vale Fertilizantes	Hidrigel	19	1,747
2011-2012	Vale Fertilizantes	Geosol	121	15,086
2013-2016	Vale Fertilizantes	Rede	422	52,566
2017	Vale Fertilizantes	Geosol	79	8,035
2018	Mosaic	Geosol	71	7,576
2019	Mosaic	Geosol	81	9,726
2020	Mosaic	Geosol	115	8,775
2021	Mosaic	Geosol	207	20,203
2022	Mosaic	Geosol	94	8,991
		Total	**2,192**	**221,321**

The initial DNPM drilling grid was 800 m x 800 m. The DOCEGEO campaign reduced it to 200 m x 200 m in some areas and to 400 m x 400 m in others. The CMM campaign repeated the grid of 800 m x 800 m and later moved to 400 m x 400 m, with drill holes reaching the fresh rock. The purpose of the VALEP campaigns was to carry out infill drilling over the pre-existing grid. The Fosfértil and Vale campaigns were designed mainly in a 50 m x 50 m infill drilling grid.

Fosfértil utilized NX (54 mm core diameter) and NW (57.2 mm core diameter) drill core sizes from 1998 to 2005 and HQ (63.5 mm core diameter) and HW (76 mm core diameter) drill core sizes from 2005 to 2006. Vale used HQ and HQ2 (67.2 mm core diameter) drill core sizes for all its drilling campaigns from 2010 to 2019, and Mosaic continued to use the same drill core size.

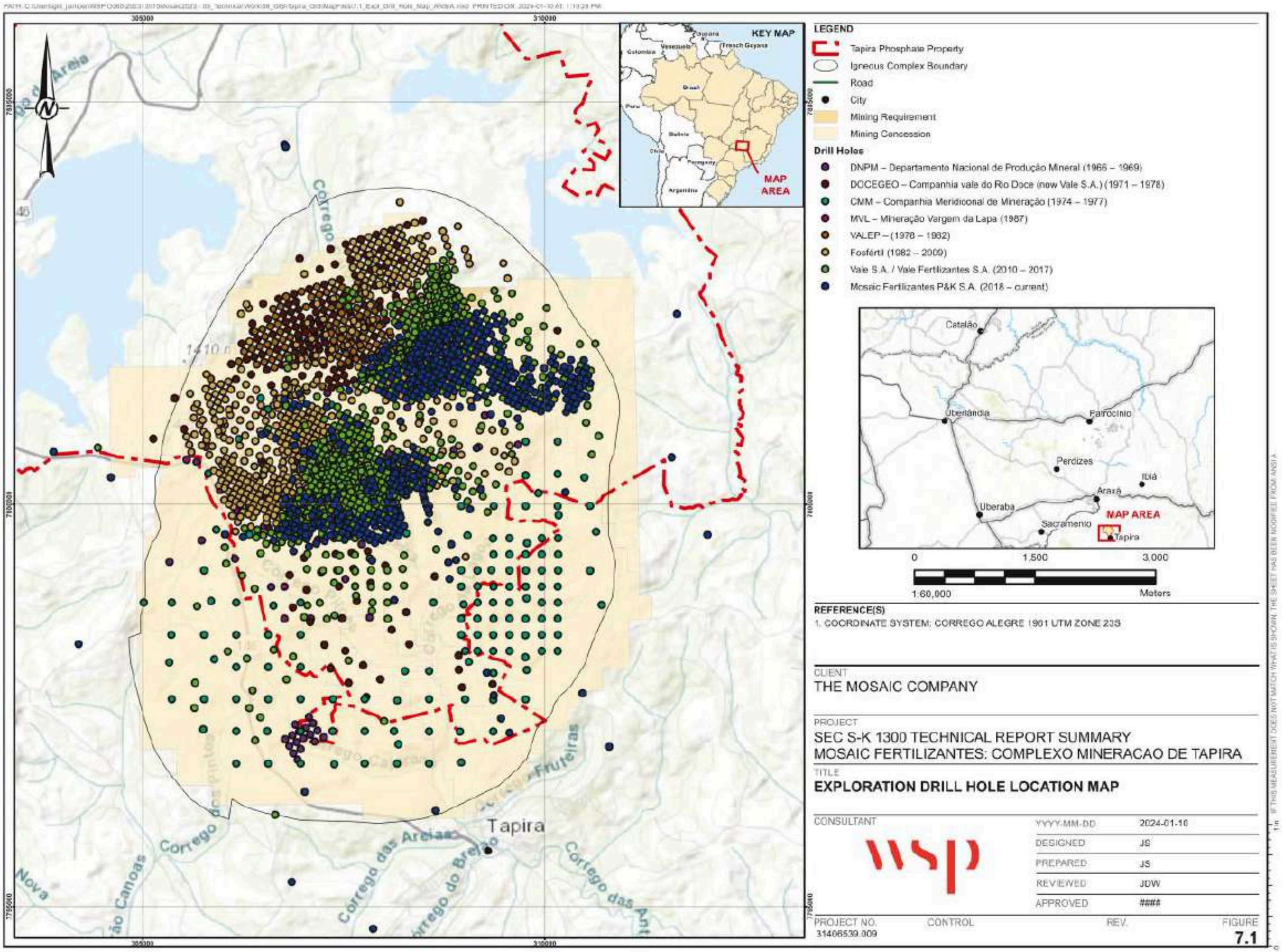
Although 754 drill holes have depths of over 120 m, only 150 drill holes were surveyed. The sampling procedures between the drilling contractors were not uniform:

- DNPM campaign: sampled every 2 m.
- DOCEGEO campaign: sampled every meter.
- CMM campaign: the drill holes were initially sampled every 1 m and posteriorly every 2 m.

- VALEP campaign: sampling was performed at irregular lengths, with a mean of 6 m.
- MVL: the drill holes were sampled every 2 m.
- Fosfértil campaigns: sampling was performed at irregular lengths, with a mean of 5 m.
- Vale campaigns: drill holes executed from 2010 to May 2012 were sampled with a standard length of 5 m, whereas the drill holes performed from the second semester of 2012 to 2017 used a standard sampling length of 3 m.
- Mosaic campaigns: samples are carried out with a standard length of 5 m, though can vary by up to 50% of the sample support size in the extremities of the lithological contacts and/or the weathering horizon.

7.2.1 Qualified Person's Statement on Exploration Drilling

The QP has reviewed the available exploration data and procedures. The data are well documented via original digital and hard copy records and were collected using industry standard practices in place at the time. All data has been organized into a current and secure spatial relational database. The data has undergone thorough internal and third-party data verification reviews, as described in Section 9.0 of this TRS. The QP is not aware of any drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results of the historical or recent exploration drilling.



KEY MAP
MAP AREA
LEGEND
Tapira Phosphate Property
Igneous Complex Boundary
Road
City
Mining Requirement
Mining Concession
Drill Holes
DNPM – Departamento Nacional de Produção Mineral (1966 – 1969)
DOCEGEO – Companhia vale do Rio Doce (now Vale S.A.) (1971 – 1976)
CMM – Companhia Meridional de Mineração (1974 – 1977)
MVL – Mineração Vargem da Lapa (1987)
VALEP – (1976 – 1992)
Fosfértil (1992 – 2009)
Vale S.A. / Vale Fertilizantes S.A. (2010 – 2017)
Mosaic Fertilizantes P&K S.A. (2018 – current)
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
Tapira
MAP AREA
0
1,500
3,000
1:60,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
EXPLORATION DRILL HOLE LOCATION MAP
CONSULTANT
YYYY-MM-DD
2024-01-10
DESIGNED
JS
PREPARED
JS
REVIEWED
JDW
APPROVED
####
PROJECT NO.
31406539.009
CONTROL
REV.
FIGURE
7.1
Tapira
Corrego das Areias
Corrego do Brejo
Corrego Fruteiras
Corrego
305000
310000

7.3 Hydrological Sampling and Hydrogeological Drilling

7.3.1 Hydrological Sampling

Córrego da Mata is the main watercourse present in the CMT region, its tributaries are Córrego de Cachoeira, Córrego Pilões, and Córrego Canjarana. Other watercourses in the area are Córrego Canoas, Capão Escuro and Pailozinho. There are spillways that monitor these main watercourses.

All points have a seasonal regime, with flows that follow rainfall, which are higher in rainy periods and lower in dry seasons. The flows observed in the dry period are termed the base flow of the watercourse, as they are almost entirely composed of underground flow.

Mosaic monitors surface water quality at CMT in 24 locations, with a frequency ranging from monthly to biannual monitoring. The hydrogeological sampling does not undergo any QA/QC program with its testing.

7.3.2 Hydrogeological Sampling and Drilling

The presence of underground water in the CMT occurs through two types of aquifers:

1. Granular aquifers: associated with the weathering horizon in the interior of the dome, the aloterite, isalterite, and semi-weathered rock horizons. The behavior of these aquifers is that of a porous medium.
2. Fissural aquifers: associated with compact rocks, due to the presence of discontinuities both in the ultramafic-alkaline carbonatitic rock (the mineralization source rock) and in the schist and quartzite host rocks of the Precambrian period of the Canastra Group.

The groundwater flow pattern within the complex is generally to the south toward the outlet of the Córrego da Mata Basin. Flow inversions sometimes occur in the northern portion (with natural flow in the northeast direction toward the BR-01 tailings dam) and in the north sector of the pit where the natural flow towards the Córrego da Mata is reversed in the direction of the Córrego Paiolzinho due to the mining operations. In the region of Front 2/Bigorna, the current water level is between 1,220 and 1,135 amsl and is influenced by the mining operations and pumping of wells. In the northeast region of the pit (Fronts 4, 5, and 6) the water level is predominantly between 1,280 and 1,220 m amsl and is influenced by the lowering of water level from the mining advance (without pumping). In the region of the dams, the underground water level and consequently its flow is influenced by the formation of lakes along drainage channels. Around the BL-01 dam, the water level is between 1,280 and 1,160 meters where the underground flow is northwest towards the Retiro Stream. The groundwater flow in the region around the BR-01 tailings dam converges into the lake.

Tubular wells were installed around the pit for lowering the water level, and daily static and dynamic readings of the water level are collected for inclusion into the hydrogeological model.

Mosaic monitors groundwater quality at CMT in 12 locations with a frequency ranging from quarterly to annually. The hydrogeological sampling does not undergo any QA/QC program with its testing.

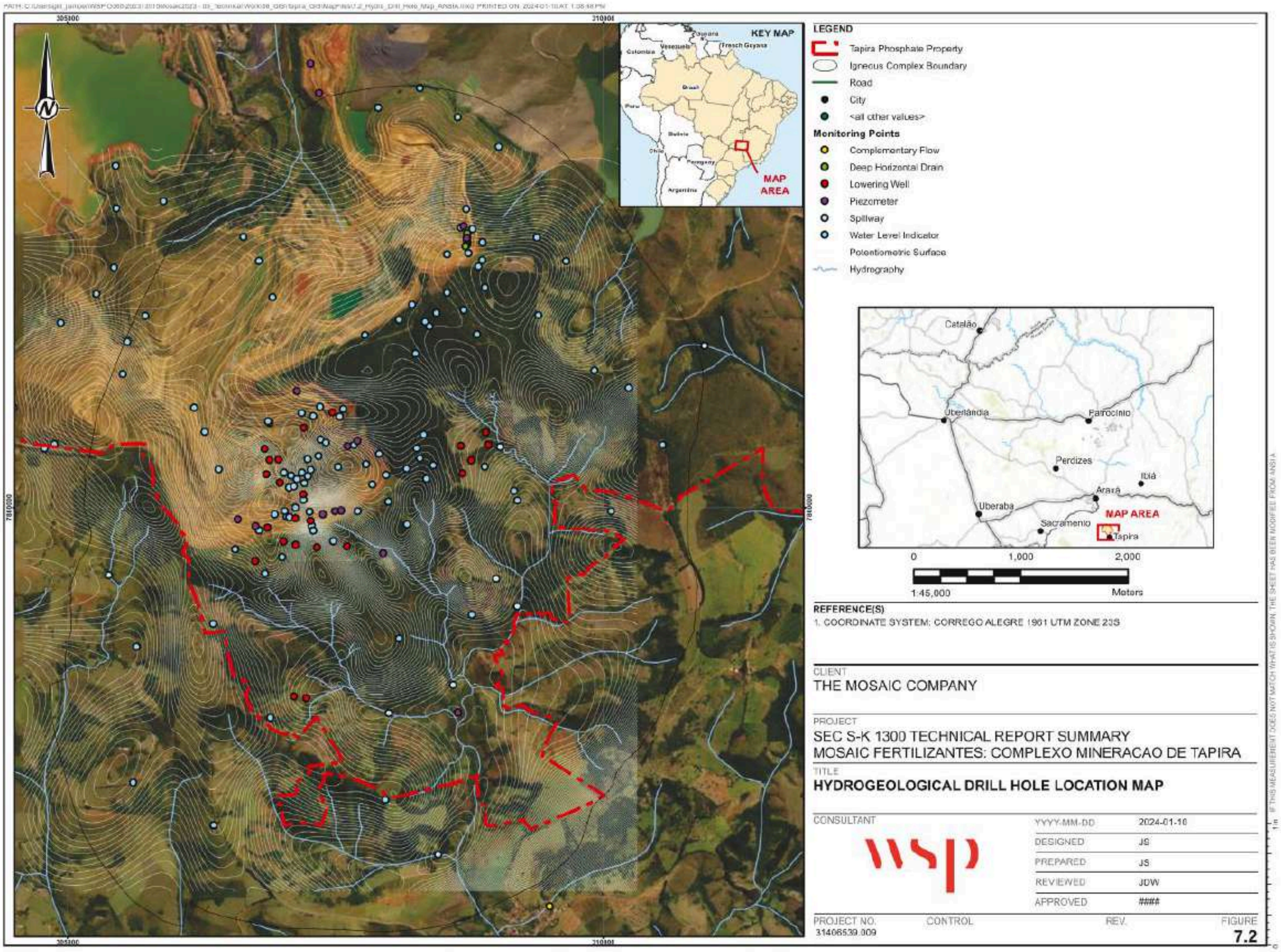
The hydrogeological drill hole and sampling map is shown in Figure 7.2.

Figure 7.3 shows the ground water flow in the region of the dome where the Tapira mining complex is located. The groundwater mainly flows to the south, towards the outlet of the Córrego da Mata Basin. Locally, the water flows toward the northern region, principally in a north easterly direction toward the BR-01 tailings dam and the pit.

Another type of monitoring is the water level in the complex which aims to measure variation over time and is performed by the reading of piezometers and water level indicators. A total of 8 piezometers and 82 water level indicators were installed around the pit.

Conceptual hydrogeological models consist of the study of the hydraulic parameters of the aquifers in the region, which delineate the mining complex and include hydraulic conductivity (horizontal and vertical), transmissivity, and storage. This data was provided by the MDGEO in 2008, 2012, 2014, 2016, and 2021, and by Water Services and Technologies (WST) in 2022. To obtain the hydrodynamic parameters, in 2001 the Água Consultores company carried out permeability tests – infiltration of the variable load in the clay and turf coverings and alluvial deposits. In accordance with the Brazilian Association of Technical Standards (ABNT) the tests carried out complied with NBR-12545. In these tests, the mean hydraulic conductivity values obtained were around 0.05 meters per day (m/day; 10-5 centimeters per second [cm/s]) in the valley bottoms and 0.20 m/day (10-4 cm/s) at higher elevations (over 1,300 m amsl).

The transmissivity and storage values of the aquifers were obtained through the pumping tests carried out in the observation wells in compliance with regulation NBR-15495, entitled "Monitoring Wells in Granular Aquifers." The result showed transmissivity values of between 60 and 70 cubic meters per day (m^2/day) in the Bigorna region, due to the upper aquifers located in the weathering horizon.


KEY MAP
MAP AREA
LEGEND
Tapira Phosphate Property
Igneous Complex Boundary
Road
City
<all other values>
Monitoring Points
Complementary Flow
Deep Horizontal Drain
Lowering Well
Piezometer
Spillway
Water Level Indicator
Potentiometric Surface
Hydrography
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
MAP AREA
Tapira
0
1,000
2,000
1:45,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
HYDROGEOLOGICAL DRILL HOLE LOCATION MAP
CONSULTANT
YYYY-MM-DD 2024-01-10
DESIGNED JS
PREPARED JS
REVIEWED JDW
APPROVED ####
PROJECT NO. 31406539.009
CONTROL
REV.
FIGURE 7.2

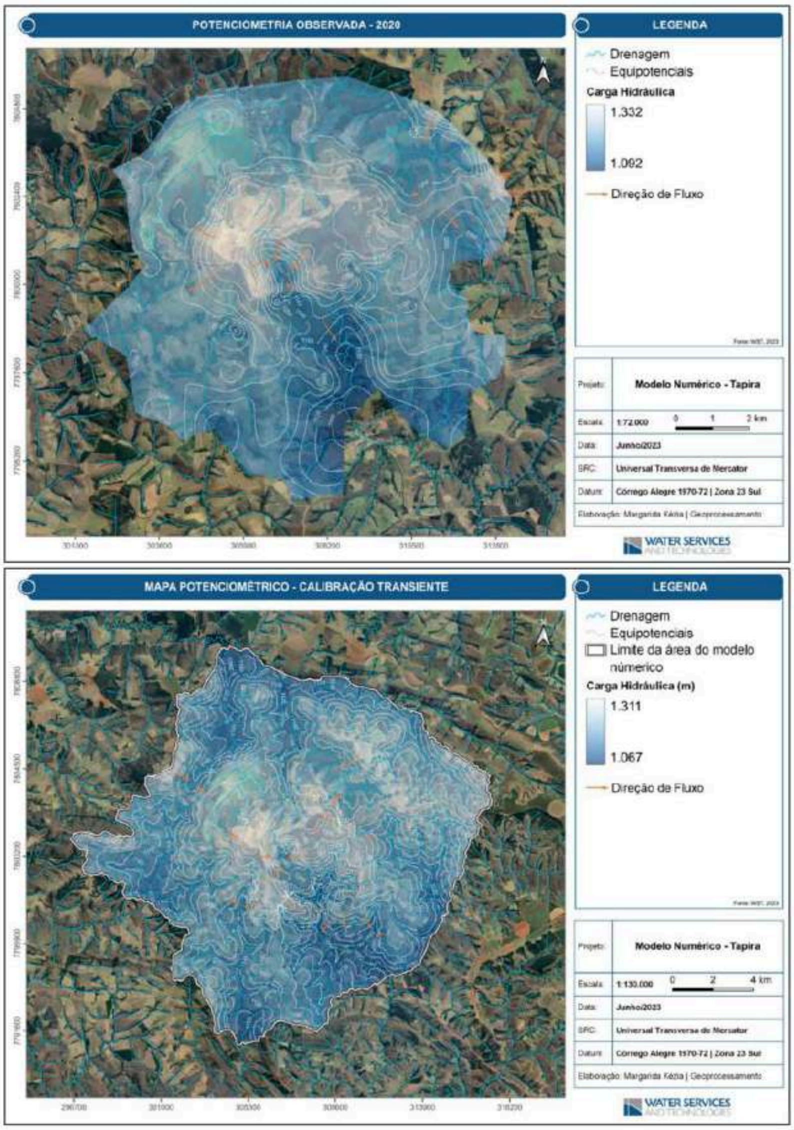


Figure 7.3: Potentiometric Map of the Interior of the Dome (top) and Map of Directions of Ground Water Flow (bottom)

The horizontal and vertical hydraulic conductivity values (Kh and Kv) and the storage values for the confined and free aquifers (Ss and Sy) were obtained from the calibration of the numerical model developed by MDGEO, in 2008, 2012 to 2014, 2016, and 2021, and by WST in 2022. The compilation of these results is summarized Table 7.2 and Table 7.3.

Table 7.2: Hydraulic Conductivity and Storage Values Obtained from the Calibration for the Years 2008, 2012, 2014, 2016, and 2021

Year	Lithology	Kh (Kx and Kv) (m/day)	Kv (Kz) (m/day)	Ss (1/m)	Sy (-)
2008	Compact phosphate	0.01	0.005	0.0005	0.005
	Friable phosphate + semi-compact (ore P2O5)	0.4	0.04	0.007	0.11
	Titanium (Ti ore)	0.75	0.075	0.008	0.13
	Clayey overlying layers (red, yellow and peat)	0.15	0.015	0.002	0.002
	Kaolinite (constrained occurrence)	0.15	0.015	0.002	0.002
2012 to 2014	Fresh Rock	0.008	0.008	0.00001	0.001
	Fractured Rock	0.3	0.2	0.0003	0.03
	Isalterite	0.5	0.33	0.0011	0.11
	Isalterite (magnetite pockets)	1.5	0.75	0.0022	0.22
	Aloterite	0.2	0.1	0.0004	0.04
2016	Fresh Rock	0.008	0.008	0.00001	0.001
	Fractured Rock	0.05	0.025	0.0002	0.02
	Isalterite (undivided)	0.3	0.1	0.0008	0.08
	Aloterite	0.1	0.05	0.0003	0.03
	Isalterite (magnetite-titanium)	1.8	0.9	0.003	0.3
	Isalterite - Silexite	0.5	0.33	0.00001	0.001
	Isalterite - Fenite	0.15	0.1	0.0008	0.08
	Isalterite - Fenite	1.4	1	0.0012	0.12
	Isalterite - Carbonatite	1.2	0.8	0.0011	0.11
2021	Fresh Rock	0.008	0.008	0.00001	0.008
	Fractured Rock	0.05	0.025	0.0003	0.04
	Aloterite	0.1	0.05	0.0003	0.03
	Isalterite (magnetite-titanium)	1.8	0.9	0.0022	0.17
	Isalterite - Fenite	0.15	0.1	0.0001	0.001
	Isalterite – Bebedourite+Phoscorite	1.4	1	0.0011	0.11
	Isalterite - Carbonatite	1.2	0.8	0.0012	0.012
	Isalterite – Bebedourite	0.1	0.05	0.0025	0.025
	Isatelrite - Sienito	0.12	0.08	0.001	0.05
	Xisto – Fresh Rock	0.008	0.008	0.000001	0.00001
	Xisto – Altered Rock	0.8	0.8	0.0003	0.03

Table 7.3: Calibrated Values of Hydraulic Conductivity, Effective Porosity, and Recharge Rates of Each Hydrogeological Unit Represented in the 2022 Model

Hydrogeological Unit	Subdivision	Kxx / Kyy / Kzz (m/s)	Sy	Recharge Rate
Aloterite	-	5.04E-07	0.03	18%
Isalterite	Phoscorite	9.00E-07	0.1	25%
	Carbonatite	2.91E-06		
	Undifferentiated Alkalies	5.20E-07		
Semi-weathered Rock	Layer 1	1.00E-05	0.1	0%
	Layers 2 to 18	1.00E-07	0.01	-
Fresh Rock	Layer 1	1.00E-05	0.1	0%
	Layer 2	1.00E-06	0.05	-
	Layer 3	1.00E-07	0.05	-
	Layer 4 to 18	3.00E-08	0.001	-
Fenite	Soil	8.30E-06	0.1	25%
	Semi-weathered Rock	1.00E-07	0.01	-
	Fresh Rock	7.00E-08	0.005	-
Quartzite	Soil	1.00E-05	0.17	25%
	Semi-weathered Rock	1.00E-06	0.12	-
	Fresh Rock	1.00E-07	0.05	-
Xisto	Soil	8.00E-07	0.03	13%
	Semi-weathered Rock	1.00E-07	0.02	-
	Fresh Rock	5.00E-08	0.01	-
Geological Fault – Damage Zone	-	1.00E-05	0.001 - 0.10	18% - 25%
DAM BL-01 & BR-01	-	8.00E-07	0.03	0

Note: Kxx, Kyy, Kzz = Hydraulic Conductivity; Sy = Effective Porosity

7.3.3 Hydrogeological Modeling

The numerical modeling of the groundwater flow of CMT was developed in Visual Modflow software, version 2011, based on the mathematical method of finite differences. The methodology used consisted of the integration of the increment of the modeled area and the revision of the geological model, recalibration in a transient discharge state, simulation of the advance of the mining, and assessment of the alterations in water availability.

The assembly and calibration stages of the model seek to numerically represent the conceptual hydrogeological model. They mainly involve the definition of the physical limits of the model, the definition and allocation of the contour conditions, the distribution of the geology and respective hydrodynamic properties, and the representation of the tubular wells and the other drainage structures of the cave, as well as the hydrogeological monitoring.

The description of the numeric model is produced using data to simulate the natural conditions of the subsurface environment of the modeled area. It begins with the limits of the model and the grid, with an area of around 223 km² and a depth of 420 m. The groundwater flow is represented by a steady state and a transient state. The numeric elements inserted into the model are the contour conditions and determine the relationships between the hydraulic loads and the ground water flow of the area. These physical/hydrogeological elements consider inactive cells (null flow); recharge, a mean multi-year rainfall in the Tapira region over an 11-year period of 1,591 millimeters per year (mm/year), of which 20% was attributed to precipitation and 80% to evapotranspiration and surface runoff; specified potential and drainage.

The modeled area is approximately 162 km², covering the entire Alkaline Complex of Tapira (Domo) and the Córrego da Mata basin, as well as other sub-basins around the complex. The model covers a rectangular area 13,300 m long by 12,200 m wide and 400 m deep.

The main grid has 100 x 100 m cells, and for added detail the Bigorna region, the grid was refined to 20 x 20 m cells. The vertical axis (Z) was divided into a series of 20 intervals of 20 m from 1,330 to 930 m amsl, totaling 400 m in depth.

The description of the hydrogeological units in the model was essentially based on the lithostructural (physical) characteristics of each mapped unit. Hydraulic conductivity (K), storage (Ss and Sy) and porosities (Peffetiva, Ptotal) values were assigned. The model was based on the description of the hydrogeological units using, in an intrinsic manner, the litho-structural characteristics of each unit mapped, while the assembly and the calibration also considered the water level, piezometer and vertical draining indicators. The balance zones calculated the water balance in pre-determined cells and correspond to the volume of water that flows into and out of said cell. These zones were attributed to the cells located along the streams in the interior of the boundaries, which receive the outflow of the drains, and for which there exists monitoring data, through spillways or measurement apparatuses.

Drain-type conditions were applied to streams and drainage structures in the pit. This property was assigned to cells along the tracing of all streams within the modeled boundary. The drains applied in the previous work, under the mine pit, simulating the pit drainage channels, were kept in the present model.

Steady and transient state calibrations were performed. For the calibration of the model in steady state, May 2007 was considered as a reference before the continued operation of the first tubular well. A transient calibration was performed to adjust the storage values of the hydrogeological units. This was carried out from June 2007 to July 2020 with a division of 53 stress periods.

The water levels calculated by the model show a good approximation with the water levels monitored by the instruments. The normalized mean square error - normalized root mean square, used as a calibration parameter for all instruments, presented a value of 6.0%.

The multi-year average of precipitation in the Tapira region for the last 32 years is 1,628 mm/year. Considering recharge as the percentage of precipitation that infiltrates the land and feeds aquifers, a rate of 20% of precipitation (326 mm/year) was initially assigned, corresponding to a base value adopted for recharge in crystalline terrains under humid climate (Bertachini, 1987). In this case, the remaining 80% (1,303 mm/year) correspond mainly to evapotranspiration and runoff.

The recharge percentages that provided the best water level calibration in the modeled area were 25% (407 mm) of the total precipitation in natural ground, 37% (602 mm) in mine pit and 13% (212 mm) in area outside the Dome.

Constant head condition was applied to the active cells of Dams BL (elevation 1,215 m amsl) and BR (elevation 1,195 m amsl), to the northwest and northeast of the model, respectively.

The hydraulic conductivity varies between 8x10E-3 and 1.8 m/d, for the healthy rock and Titanio zone. For the transient case, the values of storage coefficients from 1x10e-05 to 2.5x10e-03 were estimated.

Considering the instruments and the available water level database and the results obtained in the model, it can be said that a good calibration of the groundwater level was achieved in the model, especially in the instruments in the Bigorna region.

From the hydrogeological, recalibrated numeric model, the MDGEO company finalized a study that carried out simulations of the advance of the mining and the lowering of the water level until the year 2032 in the area delimited by the CMT.

Additional monitoring includes measurement of the flow rates of the streams to monitor surface discharges and possible impacts caused by the project on the water availability of the region. This monitoring is performed through spillways and micro-pulleys, with a total of 26 spillways, Parshall and Sump channels, which aim to monitor the flow produced inside the mine.

7.3.4 Qualified Person's Opinion

It is the QP's opinion that monitoring methodologies applied to surface water, groundwater, and the drilling and pumping test activities to obtain hydraulic parameters are appropriate and have been completed by qualified companies inside the normative, which allows for the data's appropriate use in the hydrogeological model. Furthermore, the hydrogeological model complies with good calibration practices and has an adequate representation. With respect to the hydrochemical samples, these were taken and reported according to the authority's requirements. All these activities are appropriate for establishing a Mineral Reserves estimate as summarized in this TRS. The QP is not aware of any hydrological and hydrogeological drilling, sampling, testing, and modeling factors that could materially affect the accuracy and reliability of the results of the hydrological and hydrogeological studies.

7.4 Geotechnical Drilling

Several geotechnical investigation campaigns have been conducted at CMT since 1999. The geotechnical campaigns have been executed following the guidelines included in the standards developed by the Brazilian Association of Technical Standards (or ABNT), particularly:

- NBR 8044 "Geotechnical Project – Procedures": establishes the procedures to be observed in geotechnical studies and projects; and
- NBR 13029 "Development and Presentation of Plans for the Disposal of Waste Rock Heaps": establishes the minimum requirements for the development and presentation of the plan of the heaps to be used for the disposal of waste rock in order to comply with safety, operational, economic, and decommissioning conditions.

The geotechnical investigation campaigns executed to date include site investigation and laboratory testing. The site investigation includes:

- Standard penetration test (SPT)
- Test pits with collection of non-deformed samples

- Exploratory drilling and collection of non-deformed samples and field analyses, for the determination of density by the sand bottle or drive-cylinder method. These actions follow the recommended procedures set out in Directives ABNT/NBR-6484, NBR-9604, NBR-9820, NBR-7185 (sand bottle test), and NBR-9813 (drive-cylinder test). The geotechnical testing does not undergo any QA/QC program with its testing.

There are water level indicators and piezometers installed on the slopes as well as surface benchmarks on the benches of the mine, in accordance with directive ABNT/NBR-13895 (Figure 7.2).

A series of laboratory testing campaigns have been executed to characterize the type and strength of the materials found at CMT. The laboratory testing programs included:

- Atterberg limits (NBR-6459 and NBR-7180)
- Soil samples - Preparation for compaction and characterization tests (NBR-6457)
- Soil - Grain size analysis (NBR-7181)
- Specific mass of the solids (NBR-6508)
- Soil - Compaction test (NBR-7182)
- Los Angeles abrasion test (NBR - NM51)
- Soil - Determination of the coefficient of permeability from granular soils at constant head (NBR-13292)
- Determination of void ratio (NBR-12004 and 12051)

In 2019, WALM prepared a report summarizing the geotechnical investigation campaigns carried out by Mosaic Fertilizantes at CMT between 1995 and 2019. An additional geotechnical investigation campaign was conducted in 2021 and the studies were updated accordingly. A summary of the geotechnical investigation campaigns can be seen in Table 7.4.

Table 7.4: Compilation of Data from the Geotechnical Analysis Campaigns at CMT

Year	Drill holes	Laboratory tests	Material
1999	-	Triaxial CIU	Kaolinized Soil
2005-2006	10 test wells	Triaxial CIU and saturated CIU	Yellow clay, Titanium and friable phosphate
2008	50 test wells (20 samples)	Specific weight of grains Natural specific weight Triaxial CIU and Saturated CIU	Yellow clay, Titanium and friable phosphate
2013	15 drill holes (13 samples)	Triaxial CIU and saturated CIU	Isalterite, friable phosphate, Titanium, Syenite, Yellow Clay and Isalterite/Kaolin
2015	12 test wells	Triaxial CIU and saturated CIU	Syenite, Friable Phosphate, Titanium and Clays
2021	14 test wells	Triaxial CIU and saturated CIU	Isalterite, friable phosphate, Titanium, Syenite, Yellow Clay and Isalterite/Kaolin

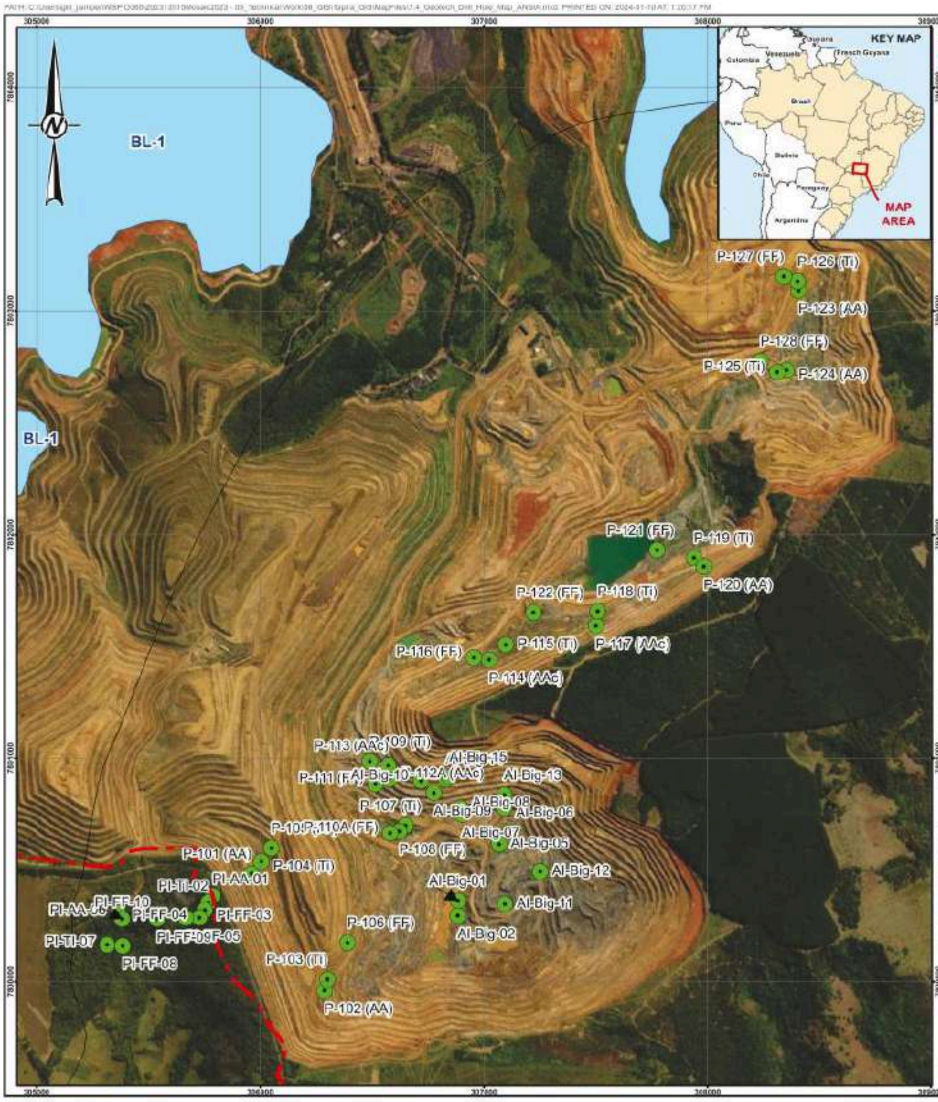
Strength parameters of the different materials found at CMT were determined based on the results of the laboratory tests. The properties of the different units are presented in Table 7.5. The locations of the geotechnical drill holes are illustrated in Figure 7.4. A summary of the geotechnical studies at CMT is presented in document, WBH122-17-MOSC075-RTE-0001.

Table 7.5: Material Geotechnical Properties

Material	Weathering	γ wet (kN/m³)	γ sat (kN/m³)	Triaxial CIU nat		Triaxial CIU sat	
				c' (kPa)	ϕ' (°)	c' (kPa)	ϕ' (°)
Waste Dump / PDE		19	-	10	32	-	-
Cover	Aloterite	18	20	50	29	42	32
Titanium	Isalterite Topo	20	21	40	30	30	33
Bebedourite / Phoscrete	Friable Phosphate (Bottom Isalterite)	22	22	23	29	21	32
Bebedourite / Phoscrete	Semi-compact Phosphate (Semi-weathered Rock)	24	22	100	35	50	35
Bebedourite / Phoscrete	Compact Phosphate (Fresh Rock)	24	24	200	35	100	35
Syenite/ Kaolinized Soils		22	22	37	31	35	29
Fenite		17	-	31	25	-	-

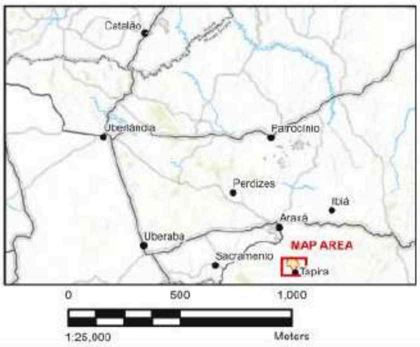
7.4.1 Qualified Person's Opinion

The QP has reviewed the available geotechnical data and procedures. The data are well documented via original digital and hard copy records and were collected using industry standard practices in place at the time. The data has undergone thorough internal and third-party data verification reviews, as described in Section 9.0 of this TRS. The QP is not aware of any geotechnical drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results of the historical or recent geotechnical drilling.



LEGEND

- Tapira Phosphate Property
- Igneous Complex Boundary
- Tapira Tailings Dam
- Geotechnical Drill Hole



REFERENCE(S)

1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S

CLIENT

THE MOSAIC COMPANY

PROJECT

SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA

TITLE

GEOTECHNICAL DRILL HOLE LOCATION MAP

CONSULTANT

YYYY-MM-DD	2024-01-10
DESIGNED	JS
PREPARED	JS
REVIEWED	JDW
APPROVED	####

PROJECT NO. 31406539.009 CONTROL REV. FIGURE **7.4**

8.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

8.1 Site Sample Preparation Methods and Security

Sample preparation and analysis for two time periods, 1988-2009 and 2010-Present, are detailed in the subsections below.

8.1.1 Drilling Campaigns from 1983 to 2009 (Fosfértil)

From 1988 to 2009, samples were collected by Fosfértil staff and contractors. Drilling logs were prepared by geologists in relation to the geological and geotechnical characteristics and uploaded in the Datamine Studio software. A sampling plan was executed using intervals with a length of 5.0 m, considering the geological and weathering contacts. The minimum accepted sample length was 0.5 m, and the maximum was 7.0 m.

Half-core samples were taken with a special sampling spoon for friable materials or cut using a diamond saw for compact materials. Samples were stored in large plastic bags, weighed, and tagged. The mean weight of each sample was 9.5 kg. One-half of the sample was sent to the Fosfértil analytical laboratory, the other was archived in a core storage facility on site.

Sampling and tagging were carried out by SRJ Geologia e Serviços Ltda (a local contractor) at the mine preparation facility and were assayed at the Fosfértil laboratory. The preparation protocol consisted of drying and crushing to 100%-½", Jones-splitting of 250 gram (g) to 300 g aliquots, and pulverization to 100%-150 microns (µm; 100 mesh). Pulp rejects were returned and are currently stored at the Tapira storage facility. Sample preparation was conducted by Fosfértil geology personnel at the lab. The mine laboratory has been used to assay the exploration samples since 1998. From 2002 onwards, pulverized samples were assayed by pressed pellet x-ray fluorescence (XRF) for total P_2O_5, CaO, SiO_2, MgO, Al_2O_3, Fe_2O_3, and TiO_2 grades. Assay results were reported on signed, printed certificates, and digital certificates in Word format, including Excel tables, were submitted to the geologists via e-mail.

8.1.2 Drilling Campaigns from 2010 to Present (Vale and Mosaic)

After the acquisition of CMT by Vale in 2010 and then Mosaic in 2018, the procedures for sampling and assaying did not change significantly. The main guidelines for sampling and assaying were:

- 2010 to May 2012: Intervals with a length of 5.0 m broken by geology and weathering. The collected samples had a minimum length of 2.5 m and a maximum of 7.5 m. Geological units shorter than 2.5 m were incorporated into a larger sample.
- May 2012 to 2017: Intervals with a length of 3.0 m broken by geology and weathering. The collected samples should have a minimum length of 1.5 m and a maximum of 4.5 m.
- Since 2018: The protocol used prior to 2012 was adopted again. The collected samples should have a minimum length of 2.5 m and a maximum of 7.5 m. Geological units shorter than 2.5 m were incorporated into a bigger sample.
- The sample intervals were marked on the core boxes with sequential numbering.
- After 2012: Intervals with less than 60% core recovery were not sampled and are marked with the code NS in the database.

- All sample information was logged directly into DHLogger_GDMS system by the geologist.
- Half-core samples were taken with a special sampling spoon for friable materials or cut using a diamond saw for compact materials. Samples were stored in large plastic bags, weighed, and tagged.
- Logging was performed by Mosaic (previously Vale) geologists and sampling and tagging were prepared by the contractors.
- After sampling the remaining material was kept in the box and stored in the core shed.
- Sample submission forms were prepared for dispatch to the physical and chemical analysis laboratories.
- Analyses were performed in internal laboratories between 2010 and 2011. In 2012 the analyses were performed by SGS Laboratory, located in Vespasiano, in the state of Minas Gerais, Brazil. From 2013 to 2022, all long-term samples were analysed by ALS Laboratory, located in Lima, Peru, with the short-term samples analysed internally. Up until the middle of 2020, all samples were prepared at the internal CMT laboratory; however, from mid-2020 all long-term samples were sent to ALS in Lima for preparation and analysis. Short-term samples continue to be analysed internally.
- The analytical laboratories hold the following certifications:
  - SGS Laboratory, Vespasiano city, Brazil: ISO 9001, ISO 14001, Brazil Certificate of Accreditation (Environmental Laboratory), Regional Chemical Council (2nd Region Minas Gerais) Company Certificate.
  - ALS Laboratory, Lima Peru: ISO 17025 - Standards Council of Canada Certificate of Accreditation.

Chemical analyses were performed for the following major elements: P_2O_5, CaO, MgO, Al_2O_3, Fe_2O_3, SiO_2, BaO, K_2O, MnO, Na_2O, TiO_2, and Loss on Ignition (LOI). Other minor elements were also analyzed. SGS used the ICP method while the CMT internal laboratory and ALS used the XRF method for the major elements. All samples analyzed in 2012 by SGS were discarded and re-assayed by ALS using the XRF method in 2013.

Figure 8.1 shows the current sampling and testing procedures in use at Mosaic.

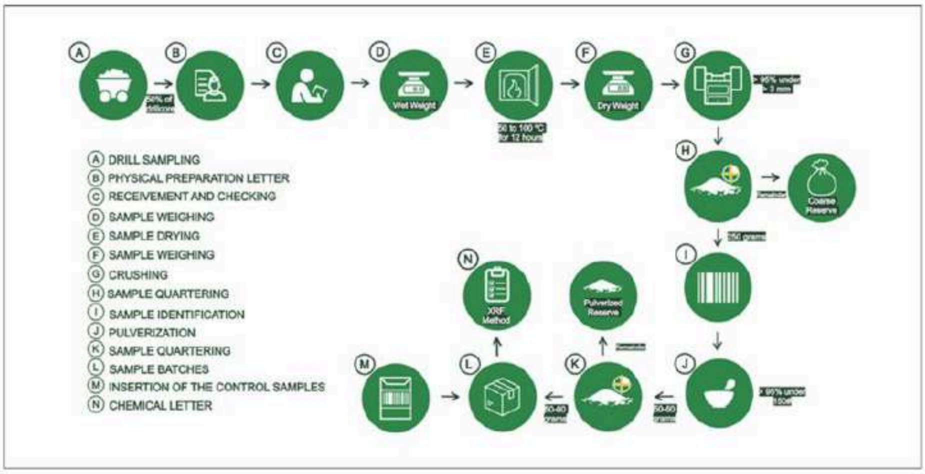


Figure 8.1: Current Mosaic Sampling and Assay Flowsheet

8.2 Laboratory Sample Preparation Methods and Analytical Procedures

8.2.1 Density

The density measurements used for Mineral Resource evaluation were performed by Vale after 2010, and Mosaic after 2018. Density data collected prior to 2010 was removed from the database and not used due the lack of details of the methods and procedures used.

A total of 13,404 density determinations were carried out using the following methods. Table 8.1 summarizes the mean dry density values by weathering and lithology unit.

8.2.1.1 Archimedes Principle Hydrostatic Balance (drill hole samples)

The drill core samples were weighed before packaging in thin plastic (natural weight) and weighted again after being sealed (natural weight plus packaging). The samples were placed in a container filled with water and the weight of the sample in water was measured with the aid of a bespoke tool that is attached to the hydrostatic scale. After weighing the samples in water, the samples were unpackaged and dried for 24 hours. After drying, they were weighed again to obtain the dry weight. Density was then calculated as follows:

$$Density_{Nat} = \frac{W_{Nat}}{\left((W_{Nat} + P_{Air}) - (W_{Nat} + P_{Wat})\right) - \left((W_{Nat} + P_{Air}) - (W_{Nat})\right)}$$

Where:

W = Weight
P = Packaging
Nat = Natural (Air)
Wat = Water

8.2.1.2 Excavation with Sand Fill (in-situ samples)

The basic principle of the sand replacement method was to measure the in-situ volume of the hole from which the material was excavated, based on the weight of the sand of known density that fills the hole. The in-situ density of the material was given by the weight of the excavated material divided by the in-situ volume.

8.2.1.3 Core Cutter (in-situ samples)

The core cutter method was used to determine the field density. A core of known volume was dug into the surface and then weighed, first empty and secondly with the material collected. Density was calculated by dividing mass by volume.

The number of measurements and the average density values for each weathering and lithological domain used in the resource model are shown in Table 8.1.

Table 8.1: Mean Density Values by Weathering and Lithology Unit

Weathering	Lithology	No. of Samples	Method	Mean Dry Density (g/cm^3)
ALO	-	996	SF, CC and AM	1.62
ISAT	-	1,332	SF, CC and AM	1.68
ISAB	FCR/CBN	2,098	SF, CC and AM	1.88
	BEB	1,220	SF, CC and AM	1.80
	SIE	185	SF, CC and AM	1.88
RSI	FCR/CBN	2,893	SF, CC and AM	2.45
	BEB	1,605	SF, CC and AM	2.55
	SIE	153	AM and SF	2.41
RSA	FCR/CBN	1,362	AM	2.91
	BEB	860	AM	3.02
	SIE	127	AM	2.68
-	FEN	16	AM	2.19
	ENC	44	AM	1.90
Total		12,891		

Notes: SF = Excavation with Sand Fill, CC = Core Cutter, AM = Archimedes Method

8.3 Quality Control and Quality Assurance Programs

Vale initialized the analytical QA/QC program in the Tapira phosphate mineral deposit in 2010. The program includes the generation of reference materials certified with their own matrixes, or in other words, each unit has its own Certified Reference Material (CRM), leading to greater adherence of the results. From 2012 on, a specialist team was created to guarantee the effective control of these processes.

8.3.1 Historical Analytical Quality Control at CMT

Considering the absence of analytical quality control programs before 2010, in 2011 Vale carried out a core borehole re-sampling of previous drilling campaigns to verify the information quality of the database. This re-sampling was conducted under the supervision of AMEC Minproc (AMEC).

Vale collected crushed samples from core boreholes drilled from 1981 to 2007. The re-sampling was performed by the Vale technical team and the sample physical preparation was conducted by the Tapira internal laboratory. The samples were analyzed in the SGS Geosol laboratory in Vespasiano, Brazil. A further 20% of all samples were also analyzed at the ALS laboratory in Lima, Peru and 10% of all samples were also analyzed in the CMT internal laboratory.

In general, the analytical accuracy and precision in relation to the elements analyzed were considered within acceptable limits. No significant contamination was found for the elements analyzed during preparation and analysis.

8.3.2 Analytical Quality Control (2010 to Present)

Vale and then Mosaic relied partly on the internal analytical QC measures implemented by the SGS, ALS and CMT internal laboratories. In addition, they implemented external analytical control measures consisting of inserting CRM samples, blank material, and coarse and pulverized duplicate assays in all sample batches submitted for assaying. Control samples are inserted at a minimum rate of 15% per batch.

Pulverized and coarse duplicates were analyzed by the CMT internal laboratory (January 2010 to July 2012), the SGS Geosol laboratory in Vespasiano, Brazil (Oct 2012 to February 2013) and the ALS Minerals laboratory in Lima, Peru (October 2013 to present).

The blank material is a not a certified commercial product and was not specifically prepared for Mosaic. Ten chemical analyses for each purchased blank were prepared by Mosaic for validation.

From October 2011, three different CRMs were created from Tapira samples and certified for Al_2O_3, BaO, CaO, Fe_2O_3, MgO, P_2O_5, SiO_2, and TiO_2 grades. Besides those certificates, CRMs created from Araxá phosphate mineral deposit have also been used in CMT analytical QA/QC programs since November 2013. All the CMT CRM standards were recertified by Iluka Resources Ltd (Iluka) in October 2015.

In 2018/2019 the CRMs were recertified by KYMI Ltda. (KYMI) of Belo Horizonte, Brazil. KYMI performed statistical calculations and subsequent evaluations to redefine the acceptance limits. P_2O_5 grades of the reference material range from 4.94% to 12.11%. Table 8.2: shows the specifications of the CRMs used by Mosaic in the Tapira phosphate mineral deposit.

In addition, since May 2016 pulverized samples originally assayed at ALS have been sent to SGS for umpire laboratory testing.

The controls of the chemical laboratory generally consist of the monitoring of CRMs, using the same principles to validate the results in terms of accuracy proposed by international methods of chemical analysis. The equation used in these guidelines for the evaluation of the results of the analysis of the standards or CRM is:

$$V_c - V_m \leq 3\sqrt{((std.\,Error)^2 + a^2)}$$

Where:

Vc = Certified value
Vm = Value obtained from the analysis of the CRM
3 = Parameter of quality assurance of the action
Std.Error = Standard error in the certified material statistics
α =Sampling process error of primary laboratory

Table 8.2: Specifications of Certified Reference Materials used by Mosaic for Tapira

CRM	Certified Value (P_2O_5%)	Standard Deviation	Lab Deviation	Source
CMA03-10	4.936	0.0324	0.1126	KYMI Ltda
CMT01-19	12.105	0.0599	0.1194	KYMI Ltda
CMT02-19	11.385	0.0479	0.1440	KYMI Ltda
CMT03-19	8.369	0.0383	0.1090	KYMI Ltda

To control the precision, duplicates were used. Each type of duplicate controls a separate stage of the process. Field duplicates control the accuracy of the measurement process, from the sampling stage to sample preparation and analysis. Crushed duplicates, meanwhile, allow for the monitoring of sample preparation, while pulverized samples can be used to monitor only the analytical process.

There are two types of control of pulverized samples, namely, reproducibility and repeatability. For the control of reproducibility, a certain quantity of pulverized samples is duplicated and sent to the secondary laboratory. The differences found in these pairs are a measure of analytical reproducibility, allowing for the fact that laboratories do not strictly follow the same analytical routines. The control of repeatability, meanwhile, is not strictly necessary in geological testing, as the conditions of the laboratory vary between the batches received (analysts, reagents, equipment, calibration curves and other elements may change). What is controlled in such cases is the precision of the laboratory, defined in ISO 5725-3 as an intermediate measure of precision.

For QA and precision verification, crushed and pulverized duplicates were used. These are referred to in the company's internal terminology as CDP and PDS, respectively. All the samples are currently validated as being within the acceptable limits and liberation parameters of their pre-defined batches, established in accordance with the internal procedures set out in the requirements listed above.

8.4 Qualified Person's Opinion

The QP has reviewed the available sampling preparation, analytical and sample security (chain of custody) procedures, and validations applied to the CMT data after 1984, as well as the quality control program implemented since 2010. The data and methods are well documented via original digital and hard copy records and were collected using industry standard practices in place at the time. All data has been organized into a current and secure spatial relational database. The data has undergone thorough internal and third-party data verification reviews, as described in Section 9.0 of this TRS. The QP is not aware of any sampling, analytical, or sample security factors that could materially affect the accuracy and reliability of the results of the historical or recent exploration drilling. The QP considers that the sampling and analytical data collected after 1984 are of sufficient quality to support Mineral Resource evaluation.

9.0 DATA VERIFICATION

9.1 Site Visit Data Verification

As part of the data and methodology verification process, the WSP QPs performed a personal inspection site visit at CMT during November 8 and 9, 2021. The site visit was completed in fulfilment of the requirement that the Mineral Resource or Mineral Reserves QP(s) perform a current site visit to the Mine in support of preparation of any S-K 1300 Mineral Resource and/or Mineral Reserve statements, or TRS.

The purpose of the site visit was to allow the QPs to observe key aspects of the Mine site and operations including deposit geology, current and previous exploration programs, mining operations, mineral beneficiation operations and site infrastructure. Key members of the CMT geology and mining operations teams and senior management teams were engaged with the WSP QPs throughout the site visit to allow for in depth discussion and verification of current and historical methods and results and to discuss any concerns and recommendations.

Activities performed by the QPs during the site visit included the following:

- General overview of the deposit geology, exploration, and mining operations history with the CMT mining operations and senior management teams.
- Observed several active drill rigs completing exploration core drilling as part of the annual CMT long-term (exploration) drilling program. The drill site review included a review of the drill hole location and final surveying methods, drilling methods, core recovery, and boxing methodology and drill core chain of custody.
- Performed collar location checks on seven exploration drill holes that were included in the current geological model (see further discussion below).
- Visited the CMT core shed and reviewed drill core from two long-term core drill holes. This review included a discussion on core handling and security, drill core logging, sample identification and selection, field (blind) analytical QA/QC sample insertion, drill core storage and sample reject (coarse and pulp) storage.
- Reviewed geological data collection, data management, interpretation, geology and grade modeling and Mineral Resource estimation procedures with the CMT geology team.
- Observed several active drill rigs completing grade control and blast hole drilling as part of the current mining operations grade control and drill and blast processes. The grade control process review included observation of the manual quartering and sample selection process used to select the grade control and metallurgical samples for analysis at the onsite laboratory.
- Visited the onsite sample preparation, chemical laboratory, and metallurgical laboratory to review grade control and metallurgical sample receiving, sample preparation, analysis, QA/QC procedures and sample and reject storage procedures for the CMT short-term sampling.
- Visited the ore handling system including primary and secondary crushing, belt conveying and homogenization stockpile with stacker/reclaimer system.
- Visited the mining operation and observed current conditions for the haul roads, pit ramps and access, pit wall stability, mining equipment, mine operations, blasting procedures, pit, and surface water management and OSFs and operations.

- Visited the process tailings storage facilities, observed conditions and operations, and discussed planned expansions of the impoundments with the site team.
- Visited the CMT process plant operations, including the milling operations (rod-and-ball mills, and low intensity magnetic separation), hydrocyclone (fines separation and classification), and the coarse, fine, and ultrafine flotation process (rougher and fine bed flotation and fine columnar flotation), as well as product storage facilities.
- Visited the various support infrastructure facilities used to support the operation, including the power station, product loadout, workshops and warehouses, service facilities and explosives storage facilities.
- Met with the permitting and environmental team to discuss any environmental/permitting issues and status of planned permitting activities.
- Met with the site short-term planning team to discuss current resource update methodologies for updating the resource model, and methods for updating current short-range mine plans.

It should be noted that both historical and current long-term (exploration) samples at CMT were submitted to offsite, third-party commercial laboratories for analyses; the third-party laboratories were not visited as part of the QP site visit.

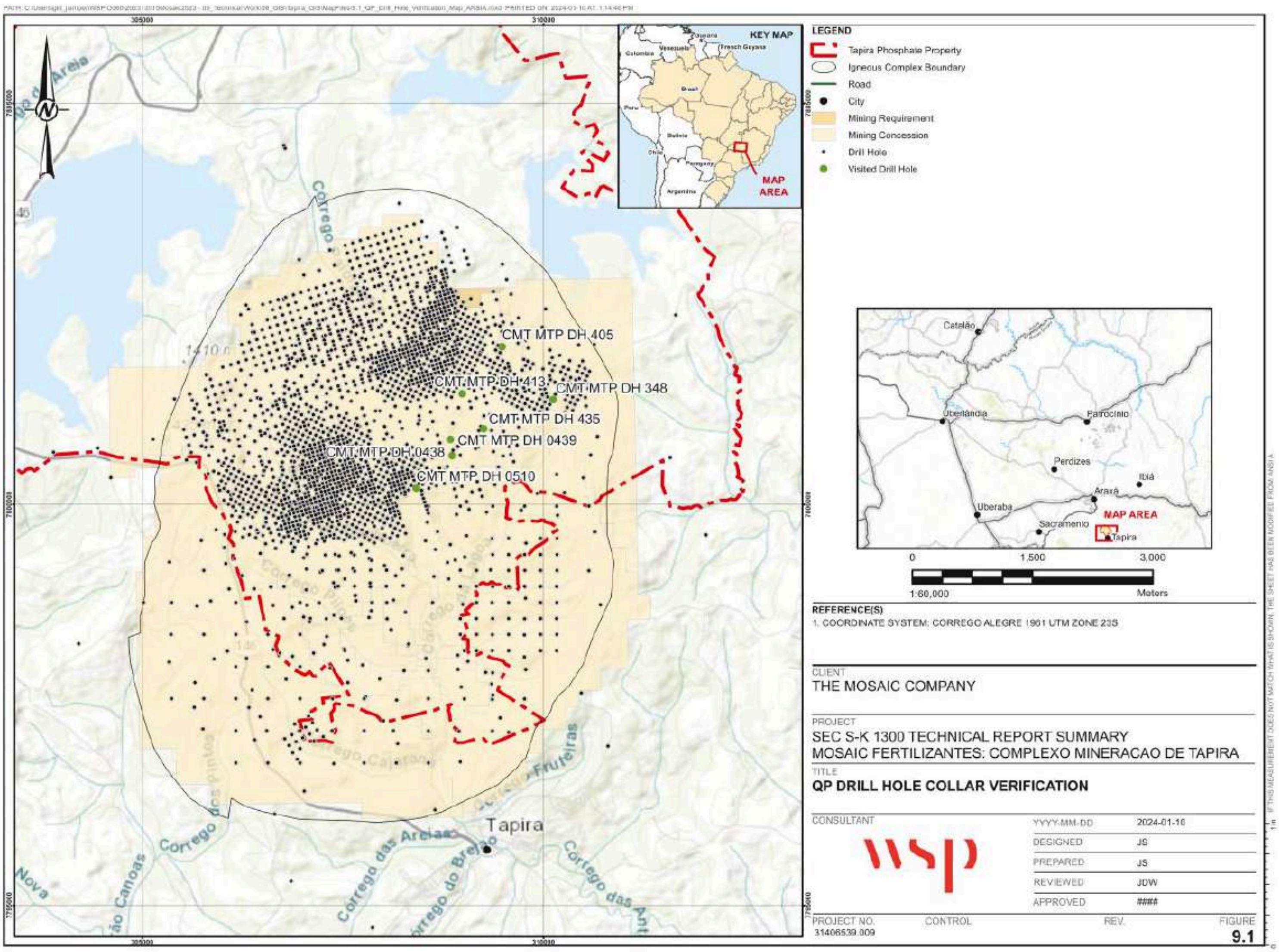
As presented in the bullets above, the QP visited collar locations for seven exploration drill holes that were included in the current geological model database; one additional drill hole that was completed after the modeling database was finalized was also visited. Given the current pit limits, many of the CMT exploration drill holes used to develop the geological model now fall within the current pit limits; as a result, drill holes available for verification purposes during the site visit were limited to the resource area outside of the current mining operations limits. Figure 9.1 presents the locations of the drill holes verified during the site visit.

The drill hole collar locations were typically marked by a cement slab with a short section of PVC pipe sticking up from the slab serving as a monument for the drill collar. The drill hole collar monuments had a metal drill hole identification tag recording the drill hole name, completion date, total depth, azimuth, dip, and collar coordinates.

The drill hole collar positions were verified by the QP using a handheld non-differential GPS. Table 9.1 presents a summary of the drill hole collar coordinates recorded during the site visit along with the comparison against the drill hole collar coordinates recorded in the geological database. In general, the drill hole collar positions were found to be within the allowable tolerances given the relative precision of the original drill hole collar survey and the handheld GPS coordinates collected by the QP during the site visit.

Table 9.1: CMT Site Visit Drill Hole Collar Coordinates Verification

DHID	GPS			CMT Database			Difference			Notes
	Easting (m)	Northing (m)	Elevation (m)	Easting (m)	Northing (m)	Elevation (m)	Easting (m)	Northing (m)	Elevation (m)	
CMT MTP DH 413	308.990	7,801,384	1,337	308.988	7,801,381	1,331	-1	-4	-6	
CMT MTP DH 435	309.255	7,800,944	1,327	309.221	7,800,974	1,325	-34	30	-2	No collar found
CMT MTP DH 348	310.121	7,801,309	1,336	310.119	7,801,308	1,330	-3	-1	-6	
CMT MTP DH 405	309.486	7,801,968	1,305	309.487	7,801,965	1,303	1	-3	-2	
CMT MTP DH 0439	308.841	7,800,811	1,272	308.844	7,800,810	1,269	3	-1	-3	
CMT MTP DH 0438	308.863	7,800,611	1,278	308.864	7,800,609	1,276	1	-1	-2	
CMT MTP DH 0510	308.416	7,800,206	1,321	308.416	7,800,204	1,321	0	-2	0	
						Average	-5	3	-3	



KEY MAP
LEGEND
Tapira Phosphate Property
Igneous Complex Boundary
Road
City
Mining Requirement
Mining Concession
Drill Hole
Visited Drill Hole
MAP AREA
CMT MTP DH 405
CMT MTP DH 413
CMT MTP DH 348
CMT MTP DH 435
CMT MTP DH 0439
CMT MTP DH 0438
CMT MTP DH 0510
Tapira
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
0
1,500
3,000
1:60,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
QP DRILL HOLE COLLAR VERIFICATION
CONSULTANT
YYYY-MM-DD
2024-01-10
DESIGNED
JS
PREPARED
JS
REVIEWED
JDW
APPROVED
####
PROJECT NO.
31406539.009
CONTROL
REV.
FIGURE
9.1

9.2 Mineral Resources

WSP reviewed the following items, as discussed in the sub-sections below, as part of its geological data, modeling, and Mineral Resource estimation verification.

9.2.1 Assay Certificates

The modeling database includes a total of 61,434 assay samples with P_2O_5 values. Signed PDF assay certificates for 37,950 of those samples were provided for review, including 7,511 new samples since 2019. WSP reviewed the provided post-2019 assay certificates from both ALS and the internal laboratory and found only 7 assays that had different values in the database than those in the assay certificates.

Of the 61,434 samples in the assay database, 17,971 were included in the four resource domains with P_2O_5 values. Assay certificates were provided for 13,826 of these samples (76%) and of the assay certificates reviewed only 3 samples had different values in the database than in the assay certificates.

9.2.2 Quality Assurance and Quality Control Programs

WSP reviewed Mosaic's documentation relating to the QA/QC programs that were completed in the post-mortem phase as well as the current exploration phases. This review included an evaluation of the amount of CRM standards, duplicates, and blanks that were incorporated into the sampling plans as well as an evaluation of the CRM composition and suitability for use relative to the style and grade range of the mineralization.

9.2.3 Block Model

WSP reviewed in detail the modeling inputs, procedures, parameters, and results for the lithological, weathering and grade modeling. The interpolation of the grade parameters was justified with WSP's independent analysis and comparison of additional modeling techniques. The results of the comparison showed that the grade interpolation on a global scale did not materially change with different interpolation techniques.

9.2.4 Variography

WSP reviewed in detail the assumptions and data that went into the P_2O_5 variogram analysis. This was completed by re-creating the variograms using the data provided and analyzing the variograms to determine if the same results could be read from the graphs. Overall, WSP did not find material errors in the assumptions or interpretation of the variograms.

9.2.5 Mineral Resource Constraints and Assumptions

WSP reviewed the constraints and assumptions that were made in establishing the Mineral Resource pit shell. The Mineral Resource pit shell was also validated visually based on cross section review of the pit shell and the block model coded for resource definition criteria for domain and COGs.

9.2.6 Limitations on Data Verification

The WSP QP was not directly involved in the exploration drilling and sampling programs that formed the basis for collecting the data used in the geological modeling and Mineral Resource estimates for CMT. As a result, the WSP QP was not able to observe the drilling, sampling, or sample preparation while in progress; and therefore, WSP has had to rely on forensic review of the exploration program data, documentation, and standard database validation checks to ensure the resultant geological database is representative and reliable for use in geological modeling and Mineral Resource and Reserve estimation.

The WSP QP is not aware of any other limitations on or failure to conduct appropriate data verification.

9.2.7 Statement on Adequacy of Data

The WSP QP responsible for the estimation of CMT Mineral Resources has verified the data used in the preparation of the geological model and resultant Mineral Resource estimate, including collar survey, downhole geological data and observations, sampling, analytical, and other test data underlying the information or opinions contained in the written disclosure presented in this TRS.

The Mineral Resource QP, by way of the data verification process described in this Section, has used only that data, which were deemed by the QP to have been generated with proper industry standard procedures, were accurately transcribed from the original source and were suitable to be used for the purpose of preparing geological models and Mineral Resource estimates. Data that could not be verified to this standard were reviewed for information purposes only but were not used in the development of the geological models, or Mineral Resource estimates, presented in this TRS.

9.3 Mine Plan, Cost Model, and Mineral Reserves Review

WSP reviewed the following items, as discussed in the sub-sections below, as part of its mine planning, cost model, and Mineral Reserves data verification.

9.3.1 Geotechnical

WSP reviewed the 2021 geotechnical report summarizing the stability analysis of the Final Pit. Stability analyses were performed in multiple locations in the final pit, resulting in segregation of the mining area into seven geotechnical zones and 4 geotechnical sectors with varying face angles and berm widths. The resulting mine design meets the standards dictated by Mosaic to have a minimum safety factor of 1.3.

9.3.2 Mining Methods

The proximity of the mineralized ore to the surface results in the use of surface mining methods to extract the material. The shape of the mineralized zone further defined the surface mining design as an open-pit mine using excavators and trucks as the primary mining equipment. The drill-and-blast work was contracted to Enaex Britante with both ANFO and emulsion used as blasting agents to fracture the rock to a manageable size. The rock was then hauled to the beneficiation plant (ore), or to the ex-pit storage facilities (waste).

9.3.3 Cut-off Grade and Modifying Factors

WSP reviewed the calculations used to establish the COG of 5.3% P_2O_5 referred to in Section 12.2.5. These calculations summarize the amount of apatite concentrate produced per wet tonne of ore, at about a 1.73 (60.6% / 35.0%) multiple of the assayed P_2O_5 grade. Therefore, the mass recovery of an assayed 5.3% P_2O_5 grade becomes 9.2%, which computes to about 79.6 kilograms of concentrate for 867.1 kilograms of dry ore. At this COG, the block is amenable to beneficiation, but further block valuation calculations determine whether the block will have a positive cashflow. CMT has historically used a 5.0% COG.

CMT applies modifying factors to the ore blocks by examining lithological and weathering boundaries, the portion of a block which will come into contact with a neighboring waste block and what the grade of that neighboring waste block is. The CMT mine does not apply any additional mining recovery factors to the ore extraction, assuming their equipment is selective enough to be able to mine to the boundary of the ore and the waste as defined by the interpolated rock unit triangulations.

9.3.4 Pit Optimization

WSP reviewed the pit optimization inputs and assumptions provided by Mosaic by conducting an independent pit optimization exercise using the same input values, beginning topography, and permit boundaries. The pit optimization is based on a script used to place a value on the blocks after looking at the mining and beneficiation costs.

WSP concluded that the ultimate pit shell and waste/ore quantities provided by Mosaic were reasonable given the pit optimization inputs and that this ultimate pit shell provides a positive economic value.

9.3.5 Mine Design

The ultimate pit shell selected from the pit optimization exercise was refined to yield the final pit shell by integrating operational design characteristics, including ramp locations and grades, OSF locations, mining width and height, and other practical mining considerations, given pit geometry. The mine is divided into 4 different fronts: Bigorna, Frente 2, Frente 5 and Frente 6. Access ramps are designed with a maximum slope of 8%. Benches are designed to have a 12-m to 15-m width and a 10-m height, with varying face angles depending upon the mine area, the lithology, and weathering.

9.3.6 Production Schedule

Production sequencing was carried out using the Deswik interactive scheduler which allows the user to visually plan multiple ongoing mining faces simultaneously. Ore blocks were selected using the "digline" functionality in Deswik, while waste blocks were placed into the nearest OSF with available capacity. WSP reviewed the phase delineations and quantities provided by Mosaic and verified that the mining sequence was reasonable and will support the planned production for the LOM Plan.

9.3.7 Labor and Equipment

WSP reviewed the productivity calculations used for equipment fleet size estimations, including equipment capacity, availability and utilization percentages, equipment operating hours, and haul distances. The truck fleet is adequately sized for the requirements of the mine and matches well with the selected excavators.

The operational plan of CMT includes the use of four teams on 12-hour shifts, operating 24 hours per day, 365 days per year, with a staff of approximately 470 hourly employees. To calculate the required personnel, the annual count of loading/transportation equipment is multiplied by the number of teams (4), and the equipment availability and then increased by a factor 10% to account for the 75th percentile of availability and 13.3% for absenteeism.

9.3.8 Limitations on Data Verification

The WSP QP is not aware of any other limitations on or failure to conduct appropriate data verification.

9.3.9 Statement on Adequacy of Data

The WSP QP responsible for Mine Planning and Mineral Reserve estimates has verified the data used in the preparation of the mine design and resultant Mineral Reserve estimate, including geotechnical design criteria, COG calculations, mine modifying factors, production schedule, labor and equipment estimates, and other test data underlying the information, or opinions, contained in the written disclosure presented in this TRS.

The QP has used only that data which was deemed by the QP to have been generated with proper industry standard procedures, was accurately transcribed from the original source and was suitable to be used for the purpose of preparing the mine design and Mineral Reserve estimates. Data that could not be verified to this standard was reviewed for information purposes only but was not used in the development of the mine design, or Mineral Reserve estimates, presented in this TRS.

10.0 MINERAL BENEFICIATION AND METALLURGICAL TESTING

10.1 Metallurgical Testing and Analytical Procedures

10.1.1 Test Work and Program History

The Tapira beneficiation plant has been operating since 1978 and during that time the ownership has changed three times. Vale acquired the Tapira operations in 2010 and in early 2018 Mosaic Fertilizantes acquired Vale Fertilizers assets, including the Tapira operations. The test programs performed for the original owner more than 45 years ago to develop process design criteria are not available to Mosaic.

10.1.2 Historical Test Work Results

The results of the historical tests that were used in the development of the beneficiation plant are not available to Mosaic.

Mosaic has eleven standard procedures covering core drilling, core logging, core sampling, preparation of samples for chemical analysis and for characterization testing.

Currently, drill core samples are used for density determinations (whole cores) and for chemically analysis (prepared cores). Also, samples of cuttings from percussion drills are tested.

The samples containing at least 4% P_2O_5 are considered potential ore and are subjected to routine characterization tests consisting of milling to a P80 of 208 µm, low intensity magnetic separation to reject magnetite, and size classification to reject <37 µm fines. The >37 µm (400 mesh) fraction is attritioned at 60% solids and pH 8.6 for 10 minutes and then fines separated at 37 um. The <37 µm fraction is rejected, while the >37 µm fraction is subjected to three or more flotation tests to examine the grade recovery relationship at different reagent dosages.

The magnetic reject, the -37 µm rejects, the flotation tailings, and the flotation concentrate are dried, weighed, and chemically analyzed. The results of geometallurgical testing, including reagent dosages are made available to the mine planning team. The laboratory process does not investigate ultra-fine flotation. Ultra-fine concentrate is predicted as a percentage of conventional concentrate.

Additional characterization tests, as listed below, are performed on core samples selected by the mine planning team.

- Chemical composition of the run-of-mine: Chemical analysis of the global sample including P_2O_5, CaO, Al_2O_3, Fe_2O_3, SiO_2, TiO_2, MgO, BaO, Nb_2O_5, S, CO_2, and LOI.
- Size by size chemical composition of the crushed sample (<3 mm) and of the ground sample (<0.208 mm). The wet screened size fractions are analyzed for the same elements as the global sample.
- Flotation tests with different typologies and different grades for process optimization.

The core samples subjected to routine characterization tests provide geometallurgical data for long-term planning. The samples from percussion drilling subjected to routine characterization tests provide data for short-term planning. Selected samples, representing four main lithotypes as identified in Table 10.1, are examined. Domains 6 and 7, which have a higher ratio of $CaO:P_2O_5$, are more problematic than Domains 3 and 4.

Table 10.1: Main Lithotypes

Domain	Lithotype
3	Isalterite/BEB
4	Isalterite/BEB-FCR
6	Semi-weathered/BEB
7	Semi-weathered/BEB-FCR

10.2 Representativeness of Metallurgical Testing

The short-term data base, established from testing 9,239 samples from percussion drilling, indicated that the average ROM grade was 8.87% P_2O_5 and that the average mass and metallurgical recoveries were 13.18% and 51.38% respectively. The long-term database, established from 4,632 drill core samples, indicated that the average ROM grade was 9.07% P_2O_5 and that the average mass and metallurgical recoveries were 12.61% and 48.27%, respectively.

The number of samples is large enough to represent the four main ore domains.

10.3 Laboratory Used for Metallurgical Testing

The geometallurgical testing and chemical analyses of the geometallurgical samples are performed by the Tapira internal laboratory. Certified laboratories (ALS in Lima, Peru and SGS in Vespasiano – MG) are also used. The SGS lab analyzes the drill core samples and is also used as a check laboratory. All samples analyzed in 2012 by SGS were discarded and re- assayed in 2013 by ALS using XRF method.

Paired data from the Tapira Internal Laboratory, SGS and ALS were validated by Mosaic staff through bias charts, quantile-quantile, and relative precision plots for the following elements: P_2O_5, CaO, MgO, Fe_2O_3, SiO_2 and Al_2O_3.

The data examined showed that the assay results can be reproduced by SGS and ALS from coarse and pulp duplicates with high confidence. The Tapira Internal Laboratory also presented results with high confidence. In addition, for the three laboratories, all duplicate pairs have a correlation coefficient of at least 0.99.

The analytical laboratories hold the following certifications:

- SGS Laboratory, Vespasiano city, Brazil: ISO 9001, ISO 14001, Brazil Certificate of Accreditation (Environmental Laboratory), Regional Chemical Council (2nd Region Minas Gerais) Company Certificate
- ALS Laboratory, Lima Peru: ISO 17025: Standards Council of Canada Certificate of Accreditation

10.4 Recovery Estimates

10.4.1 Mass Recovery

This sub-section contains forward-looking information related to mass recovery for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant feed characteristics that are different from the historical operations or from samples tested to date, and, equipment and operational performance that yield different results from the historical operations and historical and current test work results.

The density and chemical analyses of ore samples were used for kriging the grades of blocks of ore. The interpolated mean values of P_2O_5, CaO, and Fe_2O_3 were used for each for the weathering domains.

Mass recovery, an important parameter impacting the operating cost, is determined by the following relationship:

Mass Recovery = 100 x concentrate mass / ROM mass

The geometallurgical test data are evaluated periodically to establish an equation for predicting mass recovery as a function of ROM chemical composition. The bench test database was subdivided into the deciles of metallurgical recovery and individualized as a homogenous domain, treating isalterite and semi-weathered horizons separately. For each metallurgical recovery domain, a linear regression was developed (Table 10.2. for ISAB and Table 10.3 for RSI), capable of predicting Mass Recovery according to the P_2O_5 grade of the ROM, with close adherence between the test results and the predicted results. The current equation for predicting the mass recovery of conventional phosphate concentrate from Tapira ore is presented below. Section 11.1.9 of this Report provides more information on the block model interpolation of the mass recovery regression equation.

Table 10.2: Linear Regression Equations used to Predict Mass Recovery (ISAB horizon)

Indicator	Linear Regression	R^2
ID_100	Mass Recovery = -3.90595 + 1.29102 * P_2O_5	0.67
ID_200	Mass Recovery = -3.23931 + 1.40167 * P_2O_5	0.76
ID_300	Mass Recovery = -2.01713 + 1.41655 * P_2O_5	0.79
ID_400	Mass Recovery = -2.45084 + 1.60326 * P_2O_5	0.84
ID_500	Mass Recovery = -1.19864+ 1.60015* P_2O_5	0.87
ID_600	Mass Recovery = -0.675597 + 1.6648 * P_2O_5	0.88
ID_700	Mass Recovery = -0.36394 + 1.75184 * P_2O_5	0.94
ID_800	Mass Recovery = 1.830943 * P_2O_5	0.99
ID_900	Mass Recovery = 1.928374 * P_2O_5	0.99
ID_1000	Mass Recovery = 2.022531 * P_2O_5	0.99

Table 10.3: Linear Regression Equations used to Predict Mass Recovery (RSI horizon)

Indicator	Linear Regression	R^2
ID_100	Mass Recovery = 0.541734 * P_2O_5	0.93
ID_200	Mass Recovery = 0.814935 * P_2O_5	0.96
ID_300	Mass Recovery = -0.984993 + 1.172184 * P_2O_5	0.71
ID_400	Mass Recovery = -0.78843 + 1.319323 * P_2O_5	0.79
ID_500	Mass Recovery = -0.506689 + 1.419933* P_2O_5	0.87
ID_600	Mass Recovery = -1.23431 + 1.69144 * P_2O_5	0.92
ID_700	Mass Recovery = -0.509149 + 1.712097 * P_2O_5	0.94
ID_800	Mass Recovery = -0.76669 + 1.88907 * P_2O_5	0.96
ID_900	Mass Recovery = 1.913369 * P_2O_5	0.99
ID_1000	Mass Recovery = 0.96556 + 1.95716 * P_2O_5	0.98

The predicted mass recovery is for conventional concentrate because the laboratory testing does not include preparation and flotation of the ultrafine flotation feed. The ultrafine concentrate is typically about 8% of the total concentrate.

From 2016 through 2022, the actual mass recovery of total concentrate (conventional plus ultrafine concentrates) averaged 14.58%.

The QP is not aware of any other beneficiation factors or deleterious elements, than those discussed previously, that could have a significant effect on potential economic extraction.

10.4.2 Metallurgical Recovery

This sub-section contains forward-looking information related to metallurgical recovery for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant feed characteristics that are different from the historical operations or from samples tested to date, , equipment and operational performance that yield different results from the historical operations and historical and current test work results.

The metallurgical recovery is calculated from the mass recovery, the concentrate % P_2O_5, and the ROM % P_2O_5 according to the following equation:

Metallurgical recovery = 100 x Mass recovery x Concentrate % P_2O_5 / ROM % P_2O_5

From 2016 through 2022, the actual metallurgical recovery based on total concentrate tonnes and %P_2O_5 averaged 58.5% and had an annual maximum of 62.2%.

10.4.3 Concentrate Quality

The monthly concentrate quality during 2018 through 2022 are summarized in Table 10.4. The minimum and maximum values for each year are monthly averages. The coarse concentrate typically contains slightly higher %P_2O_5 and slightly lower %Fe_2O_3 than the fine concentrate. The total (combined coarse and fine) concentrate consistently averages more than 35% P_2O_5 and less than 2.8% Fe_2O_3.

Table 10.4: Annual Concentrate Quality

Coarse[1]	2018			2019			2020			2021			2022		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
P_2O_5%	35.15	35.49	36.36	35.11	35.3	35.59	35.1	35.32	35.57	35.03	35.15	35.43	35.04	35.27	35.55
Fe_2O_3%	1.84	2.2	2.42	1.86	2.31	2.81	2.29	2.58	2.73	2.04	2.28	2.74	1.94	2.48	2.66
Al_2O_3%	0.24	0.36	0.44	0.34	0.36	0.47	0.28	0.37	0.48	0.29	0.35	0.47	0.15	0.4	0.51
MgO%	0.27	0.35	0.47	0.18	0.35	0.52	-	0.41	0.64	0.42	0.55	0.74	0.35	0.48	0.62
CaO%	48.96	49.51	50.37	47.91	49.02	50.17	47.43	48.28	48.93	47.71	48.95	49.73	50.36	49.03	48.16
Fine[2]															
P_2O_5%	35.17	35.41	35.68	34.73	35.11	35.67	34.06	34.86	35.26	34.64	35.05	35.32	34.64	35.09	35.46
Fe_2O_3%	1.65	2.28	3.09	1.51	2.43	3.68	2.11	2.73	3.62	1.79	2.34	3.44	1.9	2.47	2.89
Total[3]															
P_2O_5%	35.18	35.49	36.3	35.14	35.28	35.55	35.02	35.28	35.53	35.03	35.14	35.39	35.07	35.26	35.52
Fe_2O_3%	1.83	2.21	2.48	1.83	2.32	2.89	2.31	2.59	2.79	2.07	2.3	2.79	1.94	2.48	2.67

For forecasting purposes Mosaic assumes that both the conventional and ultrafine concentrates will contain 35% P_2O_5 by weight. As shown by Table 10.4, this assumption is slightly conservative.

Mass recoveries are forecast by a regression equation developed from geometallurgical test data and ore chemical analyses. Typically, mining activity causes the ore grade to be diluted and Mosaic takes dilution into account before applying the predictive equation.

The forecast metallurgical recovery is calculated from the forecasts of mass recovery and concentrate % P_2O_5 and the diluted ROM %P_2O_5.

10.5 Qualified Person's Opinion

It is the QP's opinion that the metallurgical and analytical testing and historical data is adequate for the estimation of mass and metallurgical recovery estimation factors and estimation of Mineral Reserves.

11.0 MINERAL RESOURCE ESTIMATES

11.1 Key Assumptions, Parameters, and Methods

11.1.1 Geological Database

The CMT database contains 2,278 diamond core drill holes and 13,843 percussive drill holes. Not all drill holes had lithology and assay information. All validated data were used to prepare the three-dimensional (3D) geological model of the deposit, but only the diamond core drill holes performed after the year of 1989 with linear core recovery >60% were used to perform the Mineral Resource grade estimations. The core drill holes from 1967-1980 did not include any QA/QC; and therefore, are not used in the Mineral Resource grade estimations. Core drilling from 1981-2007 are supported by a "post-mortem" QA/QC data validation process and core drill holes from 2010 onward are supported by a full QA/QC program. Core drilling from 1981-1983 was excluded from the Mineral Resource grade estimations due to poor survey and core recovery records.

Table 11.1 and Table 11.2 summarize the drill hole data used.

Table 11.1: Summary of Drill Holes Used for the Models

Model	Drill Hole Type	Year	Drill Hole Count	Total Length (m)	Assayed Samples
Geological	DDH	1967-2022	2,266	223,697	61,434
	Percussive	2016-2022	12,401	122,360	14,542
	Total		**14,667**	**346,057**	**75,976**
Resource Grade Estimation	DDH	1989-2022	1,556	168,933	43,975

Table 11.2: Diamond Core Drill Hole Campaigns by Year and Use in Mineral Resource Evaluation Activities

Year	Number of Drill Holes	Length (m)
Geological Interpretation Only - No QA/QC validation		
1967	24	2,302
1968	36	2,161
1969	16	1,350
1972	1	83
1973	1	27
1974	80	4,502
1975	120	9,782
1976	88	4,031
1977	22	981
1979	30	1,726
1980	38	1,856
1981	20	1,671
1982	19	1,729
1983	14	822
1984	28	2,085
1985	18	1,512
1986	13	1,140
1987	20	2,318
1988	16	1,753
Total	**604**	**41,831**

Year	Number of Drill Holes	Length (m)
Geological Interpretation + Resource Estimation - No QA/QC but post-mortem validation		
1989	9	938
1990	9	953
1991	2	208
1992	4	437
1993	4	490
1994	7	911
1995	4	460
1996	7	762
1997	5	595
1998	16	1,707
1999	25	2,670
2000	29	3,465
2001	46	5,934
2002	51	5,930
2003	32	3,652
2004	67	7,170
2005	86	9,952
2006	42	4,296
2007	24	2,773
Total	**469**	**53,304**

Year	Number of Drill Holes	Length (m)
Geological Interpretation + Resource Estimation - QA/QC program		
2010	20	1,880
2011	14	1,521
2012	107	13,566
2013	106	13,616
2014	157	19,464
2015	107	14,028
2016	56	6,018
2017	80	8,082
2018	61	7,576
2019	83	9,785
2020	115	8,776
2021	205	20,048
2022	94	8,991
Total	**1,205**	**133,349**

11.1.2 Core Recovery

The mean recovery of the drill core samples for the four resource domains was 93.58% (see discussion of domains below). For compositing, only samples with more than 60% recovery were used. Samples with a recovery rate below 60% and above 100% were excluded before the compositing process, along with samples with a final chemical balance of over 102%. The number of samples with core sample recovery below 60% represents 1.20% of the total sample population while the number of samples with core sample recovery greater than 100% represents less than 0.01% of the total sample population. While such samples exhibit only small differences in their mean grade values, they were excluded from the Mineral Resource estimation and categorization processes.

11.1.3 Domain Classification

The geological interpretation for CMT considered the lithologies and the weathering, accordingly. The rocks and the products of the weathering characteristics are described in Section 6.3.

Two models were built for the Tapira mineral deposit: a weathering model and a lithological model. A combination of both models was used to define the domains used for Mineral Resource estimation.

The weathering model consisted of the following rock types:

- Aloterite (ALO)
- Top Isalterite (ISAT)
- Bottom Isalterite (ISAB)
- Semi-weathered Rock (RSI)
- Fresh Rock (RSA)

The geological model consisted of the following rock types:

- Soil (COB)
- Phoscorite + Bebedourite (FCR)
- Bebedourite (BEB)
- Carbonatite (CBN)
- Syenite (SIE)
- Fenite (FEN)
- High Titanium Zone (ZTI)
- Enclosing Rocks (ENC)

The database included codes for 11 different logged geological domains, which represent a combination of lithologies and weathering horizons. Only four have significant phosphorous grades and are included in the Mineral Resource statement:

- Domain 3: ISAB-BEB (Bottom Isalterite Bebedourite)
- Domain 4: ISAB-FCR (Bottom Isalterite-Phoscorite)
- Domain 6: RSI-BEB (Semi-weathered Bebedourite)
- Domain 7: RSI-FCR (Semi-weathered Phoscorite)

Correlation coefficients were completed to help define the domains. Except for the strong correlation of P_2O_5 and CaO in the isalterites, the linear correlations between variables in the mineralized domains tend to be moderate to weak. In general, Fe_2O_3 shows moderate negative correlations with CaO, MgO, and SiO_2.

Table 11.3 summarizes the key grade parameter statistics of the four main geological domains for all the core drilling campaigns. In general, the most weathered types (ISAB-FCR and ISAB-BEB) were richer in P_2O_5, Al_2O_3, and Fe_2O_3 and poorer in CaO, SiO_2, and MgO, evidencing the lateritic supergenic process. Compared with the BEB types, the FCR types were slightly higher in P_2O_5 and CaO, though the differences were not clearly marked.

Table 11.3: CMT Raw Data Statistics for the Main Geological Domains including all Core Drilling Data (1967-2022)

Domain	Variable	No. Samples	Minimum	Maximum	Mean	Std. Dev.	Variance	Var. Coeff.	Q1	Median	Q3
ISAB-BEB (ED3)	P_2O_5	7,407	0.18	33.00	8.36	3.16	9.96	0.38	6.21	8.18	10.15
	CaO	7,245	0.14	48.00	11.84	4.73	22.34	0.40	8.80	11.75	14.61
	MgO	5,474	0.10	22.48	4.63	2.90	8.39	0.63	2.50	4.26	6.17
	Fe_2O_3	5,688	4.31	62.24	25.74	7.83	61.25	0.30	20.74	24.87	29.91
	SiO_2	2,765	1.48	63.45	24.09	8.60	74.00	0.36	18.70	24.30	29.10
	Al_2O_3	2,765	0.01	28.60	4.79	2.36	5.56	0.49	3.39	4.49	5.66
ISAB-FCR (ED4)	P_2O_5	7,999	0.35	34.81	10.46	3.93	15.44	0.38	7.85	10.10	12.63
	CaO	7,889	0.03	45.30	14.38	5.53	30.60	0.38	10.85	14.17	17.60
	MgO	7,234	0.07	18.23	3.94	3.02	9.12	0.77	1.41	3.40	5.68
	Fe_2O_3	7,290	6.10	74.93	27.74	8.51	72.43	0.31	22.25	26.51	31.96
	SiO_2	6,251	0.33	73.70	21.14	8.52	72.54	0.40	15.41	21.52	26.70
	Al_2O_3	6,251	0.01	30.90	4.33	2.26	5.13	0.52	2.92	4.09	5.37
RSI-BEB (ED6)	P_2O_5	5,567	0.19	23.59	5.02	2.31	5.34	0.46	3.65	4.77	6.10
	CaO	5,386	0.55	51.00	17.39	5.96	35.51	0.34	12.95	17.98	21.65
	MgO	4,324	0.16	26.39	8.30	2.48	6.16	0.30	6.80	8.31	9.71
	Fe_2O_3	4,388	1.26	68.18	17.19	5.29	27.98	0.31	14.06	16.35	19.41
	SiO_2	2,549	2.41	66.70	29.54	6.98	48.75	0.24	25.60	30.63	33.88
	Al_2O_3	2,549	0.01	14.15	2.55	1.36	1.85	0.53	1.66	2.35	3.18
RSI-FCR (ED7)	P_2O_5	5,690	0.10	35.90	5.75	2.65	7.02	0.46	4.14	5.46	6.88
	CaO	5,632	0.35	55.10	19.91	5.86	34.30	0.29	16.69	20.00	22.80
	MgO	5,134	0.08	22.17	9.99	3.11	9.64	0.31	8.14	9.99	12.00
	Fe_2O_3	5,157	1.00	55.01	18.02	5.87	34.48	0.33	14.70	16.88	19.93
	SiO_2	4,679	1.05	65.20	25.95	7.35	54.06	0.28	21.50	26.40	30.98
	Al_2O_3	4,679	0.01	15.23	2.26	1.34	1.80	0.59	1.44	2.11	2.81

11.1.4 Geological Modeling

Seequent Leapfrog Geo™ (Leapfrog) software was used to construct the solids for both the lithological and weathering models.

The topography that was used to constrain the model included an unmined topographic surface as well as the CMT mined topography surface as of March 10, 2023. The unmined topography surface was sourced from a low-resolution historical survey and a laser aerial survey. The low-resolution survey was only used in areas where un-mined surfaces were not available due to mining activities at the time of the laser aerial survey. Figure 11.1 and Figure 11.2 illustrate the lithology and weathering models.

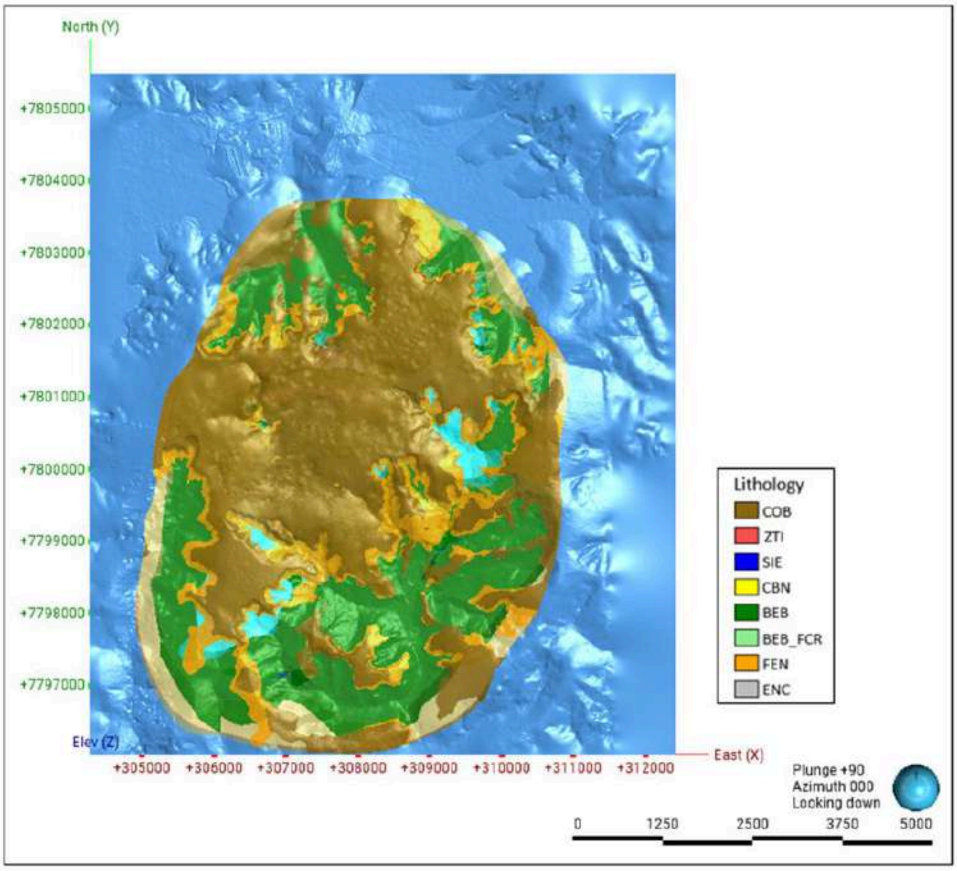


Figure 11.1: Lithology Model

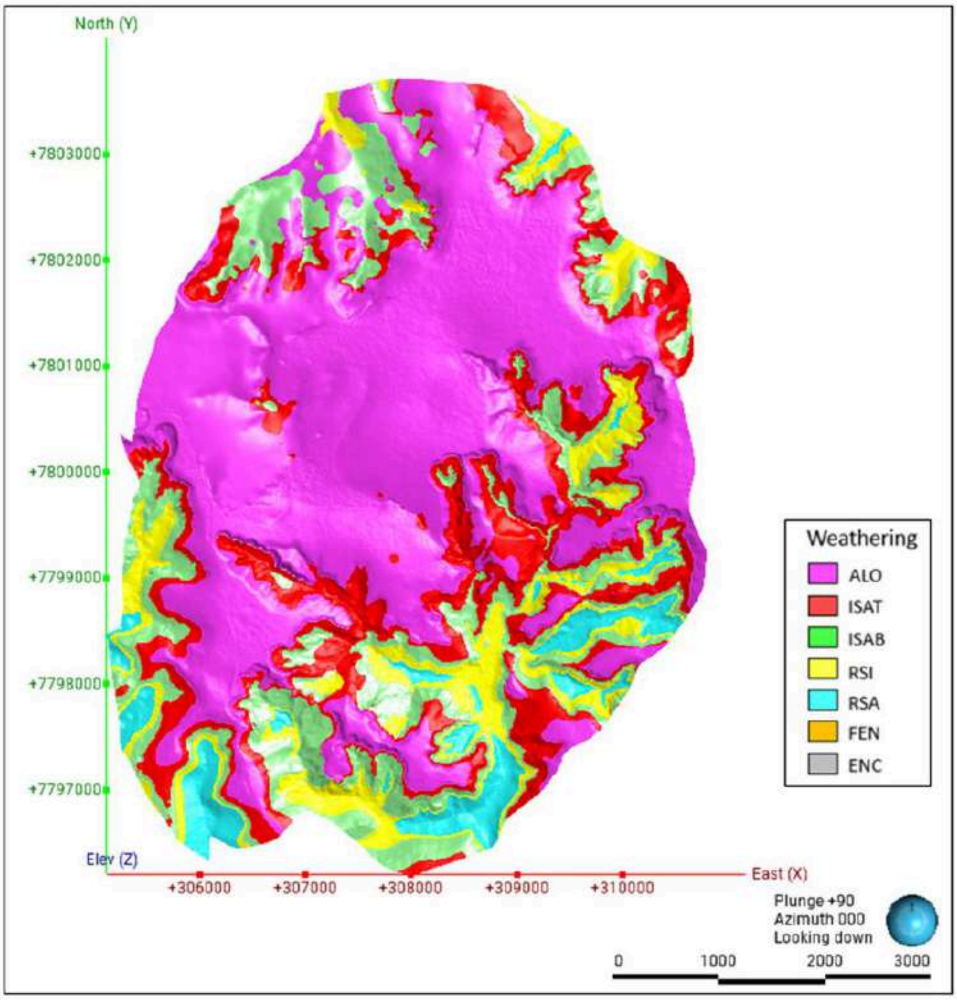


Figure 11.2: Weathering Model

11.1.5 Assay Compositing

The CMT database contained samples that were collected at irregular length intervals according to the changes in the visual and physical properties of the drill core. Since 2018, and during the Fosfértil campaigns, sampling was performed on 5 m intervals. During the period from 2012 to 2017 (Vale Fertilizantes Campaigns) sampling was performed on 3 m intervals. In all cases, the geological contacts and weathered profile were used to limit the sample intervals (samples honored geological and weathering boundaries).

Figure 11.3 shows the distribution of raw sample lengths for the four mineralized horizons. The large counts of 3 m and 5 m lengths represent the procedures adopted by Mosaic and the previous asset owners.

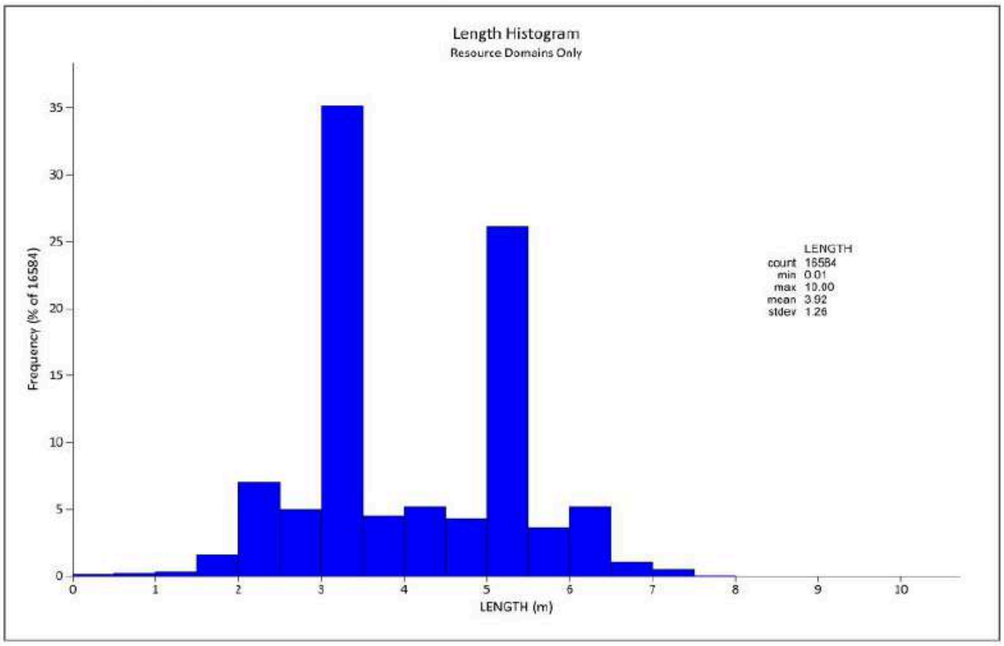


Figure 11.3: Histogram of Raw Sample Length for Resource Domains

The procedure used to prepare the composite database was:

1. Samples from the same mineralized horizon were grouped in 5 meters length composite, to respect data and the minimum mining unit.
2. Composites shorter than 2.5 m were removed from the final composite dataset.
3. Samples with a core recovery rate below 60% and above 100% were excluded before the compositing process, along with samples with a final chemical balance of over 102%.

Figure 11.4 shows the distribution of the sample lengths after compositing. The composite lengths intervals that were less than 2.5 m were removed to mitigate the problem of statistical support during block grade estimation. Additionally, the samples without QA/QC validation were removed before the compositing process.

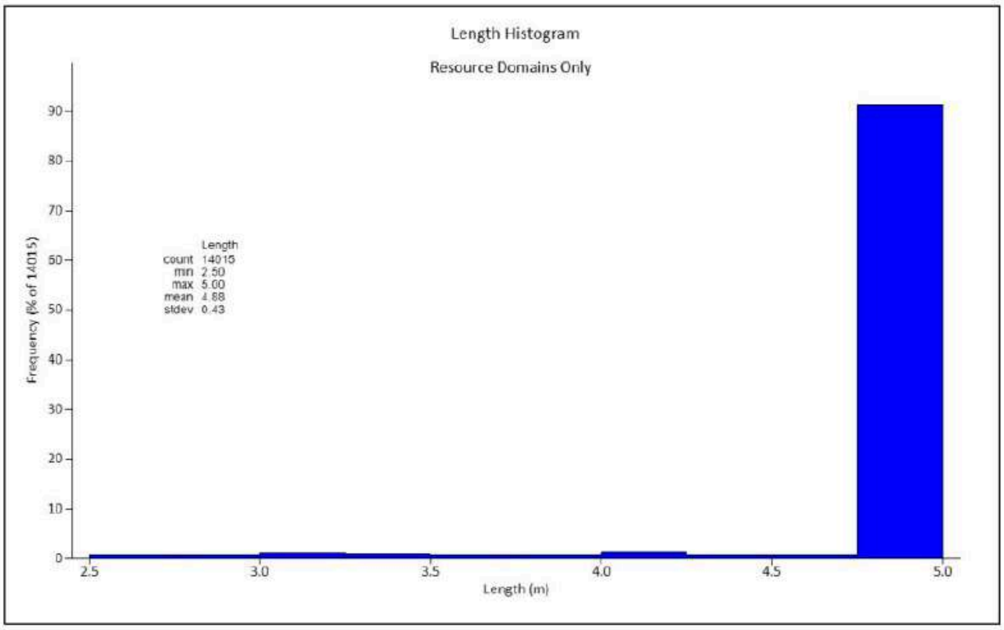


Figure 11.4: Histogram of Composite Sample Length for Resource Domains

Histograms were used to evaluate the grade distributions after the compositing process and showed that there was no significant difference between the two sizes of composites (3 m and 5 m). Future modeling efforts should include a simplified, uniform compositing basis. This will likely have changes to local estimates but will likely not have material changes to the global estimate.

The number of samples excluded during the compositing process was approximately 9% of the total sample count, being lower in the isalterite horizon at 7% and approximately 9% in the semi-weathered rock horizon.

11.1.6 Evaluation of Outliers

An outlier is a data measurement that differs significantly from other observations, whether due to variability in the measurement or experimental error. Outliers sometimes distort the results of an estimation by altering the means of the population. An evaluation of outliers for P_2O_5, SiO_2, and Fe_2O_3 grades for the mineralized domains was performed as part of the data evaluation and modeling process. The anomalous grades were treated separately during the estimation process.

Outliers were defined as the 98-99th percentile of the data range depending on the domain. During the grade estimation, outliers were limited spatially to only influence the model by one block. No capping or top-cutting was applied.

11.1.7 Variography

Variography is used to model the continuity of spatial phenomena such as the distribution of grades in a mineralized body. At CMT, variography was used to establish the principal directions and ranges of anisotropy for the various grade parameters, by domain, in support of grade modeling and Mineral Resource estimation.

ISATIS.neo™ (Isatis) software was used for the preparation of experimental variograms and variogram models. A summary of the variogram parameters for each grade variable within the four resource domains is shown in Table 11.4. The model variograms for P_2O_5 are shown in Figure 11.5.

Table 11.4: Variogram Model Parameters - Resource Domains

Domain	Variable	Rotation			Variogram Model						
		Azimuth	Plunge	Dip	Nugget Effect	Structure No.	Type	Total Sill	Range (m)		
									Major	Semi	Minor
ED3 - ISAB/BEB	P_2O_5	70	0	0	1.16	1	Spherical	3.77	116	72	21
						2	Spherical	2.39	818	1,199	64
	CaO	60	0	0	2.93	1	Spherical	7.46	141	132	77
						2	Spherical	7.32	1,695	2,833	21
	MgO	140	0	0	0.00	1	Spherical	2.63	88	85	26
						2	Spherical	2.79	2,577	1,906	33
	SiO_2	150	0	0	2.08	1	Spherical	40.05	85	80	31
						2	Spherical	24.40	920	791	15
	Al_2O_3	160	0	0	0.36	1	Spherical	1.48	79	116	45
						2	Spherical	2.70	1,103	1,644	34
	Fe_2O_3	140	0	0	5.54	1	Spherical	28.08	89	111	22
						2	Spherical	16.79	1,670	1,180	36
	Density (Dry)	170	0	0	0.03	1	Spherical	0.02	54	80	21
						2	Spherical	0.01	298	500	38
ED4 - ISAB/FCR	P_2O_5	130	0	0	2.42	1	Spherical	5.63	80	116	20
						2	Spherical	3.82	750	588	107
	CaO	130	0	0	3.73	1	Spherical	11.66	66	118	74
						2	Spherical	9.45	1,644	950	17
	MgO	40	0	0	0.19	1	Spherical	5.45	63	67	25
						2	Spherical	2.38	423	626	51
	SiO_2	150	0	0	9.12	1	Spherical	28.64	82	69	50
						2	Spherical	24.16	1,010	838	20
	Al_2O_3	160	0	0	0.36	1	Spherical	2.14	96	76	53
						2	Spherical	1.62	896	923	16
	Fe_2O_3	160	0	0	5.54	1	Spherical	36.10	73	122	22
						2	Spherical	20.21	904	587	102
	Density (Dry)	110	0	0	0.03	1	Spherical	0.02	60	62	33
						2	Spherical	0.02	1,695	1,976	42
ED6 - RSI/BEB	P_2O_5	60	0	0	0.46	1	Spherical	1.52	80	172	21
						2	Spherical	1.59	1,538	1,796	66
	CaO	50	0	0	0.59	1	Spherical	14.32	66	78	47
						2	Spherical	6.91	1,644	2,184	16
	MgO	70	0	0	0.36	1	Spherical	1.82	88	57	24
						2	Spherical	2.23	2,171	1,874	40
	SiO_2	100	0	0	3.41	1	Spherical	21.53	141	69	66
						2	Spherical	12.00	2,674	3,981	26
	Al_2O_3	160	0	0	0.55	1	Spherical	0.59	88	87	38
						2	Spherical	0.99	1,432	1,678	32
	Fe_2O_3	50	0	0	3.07	1	Spherical	8.53	51	65	24
						2	Spherical	9.48	1,155	881	39
	Density (Dry)	30	0	0	0.04	1	Spherical	0.05	54	53	18
						2	Spherical	0.06	98	147	30
ED7 - RSI/FCR	P_2O_5	150	0	0	0.75	1	Spherical	3.01	31	105	21
						2	Spherical	1.63	956	759	55
	CaO	150	0	0	4.35	1	Spherical	10.48	77	78	52
						2	Spherical	9.09	469	592	27
	MgO	70	0	0	0.95	1	Spherical	2.91	77	57	30
						2	Spherical	4.79	1,341	1,005	127
	SiO_2	150	0	0	5.31	1	Spherical	13.78	122	69	158
						2	Spherical	24.94	1,712	1,094	43
	Al_2O_3	150	0	0	0.19	1	Spherical	0.35	88	87	93
						2	Spherical	0.74	939	983	67
	Fe_2O_3	160	0	0	4.59	1	Spherical	12.61	51	59	24
						2	Spherical	11.77	223	192	154
	Density (Dry)	50	0	0	0.05	1	Spherical	0.04	83	78	24
						2	Spherical	0.04	866	498	71

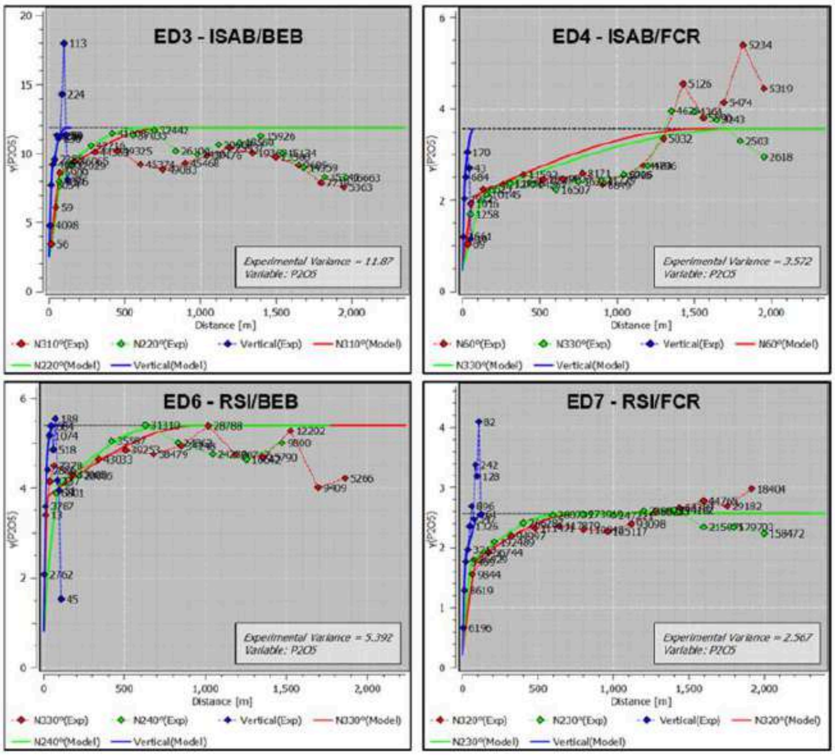


Figure 11.5: P_2O_5 Variograms by Domain

11.1.8 Block Model Parameters, Density, and Grade Estimation

This sub-section contains forward-looking information related to density and grade for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual in-situ characteristics that are different from the samples collected and tested to date, equipment and operational performance that yield different results from current test work results.

11.1.8.1 Block Model Parameters

The Isatis software package was used to create a grid of regular blocks of 25m x 25m x 5m. The dimensions of the block model are presented in Table 11.5 and the variables of the block model are presented in Table 11.6.

Table 11.5: Block Model Dimensions

Dimension	Block Size (m)	Origin (m)	Offset (m)	Number of Blocks
X	25	304,700	6,500	260
Y	25	7,795,800	8,250	330
Z	5	850	650	130

Table 11.6: Block Model Variables

Variable	Description	Variable	Description
al2o3	Aluminum oxide	p2o5	Phosphate oxide
bao	Barium oxide	p2o5ap	Content of apatitic phosphate
cao	Calcium	p2o5cf	P2o5 grade in the phosphate rock
class	Resource classification	rcp	Ratio cao / p2o5
comp	Compacity	rend_cv	Mass recovery conventional concentrate (coarse circuit)
dens_bs	Dry density	rend_t	Total mass recovery
dens_bu	Wet density	rend_uf	Mass recovery ultra thin concentrate (fine circuit)
domain	Alphanumeric weathering + lithology	rlama	Mud recovery
drymass	Total mass dry base	rmag	Magnetite recovery
fe2o3	Iron oxide	rmet_cv	Metallurgical recovery conventional circuit
fe2o3cf	Fe2o3 grade in the phosphate rock	rock	Total mass of block
id_domain	Numeric weathering + lithology	runder	Flotation recovery
id_intem	Numeric weathering	sio2	Silica oxide
id_lito	Numeric lithology	tio2	Titanium oxide
intem	Alphanumeric weathered	topo	Variable used to create model survey reference
lito	Alphanumeric lithology	type	Mineral resource with cut off
mgo	Magnesium oxide	umi_bs	Moisture dry base
mine	Flag used to reference survey	umi_bu	Moisture wet base
nb2o5	Niobium oxide		

Two key calculated field equations used in the block modeling were RCP and P_2O_5ap; these calculated fields were defined as follows:

1. RCP was the ratio between the CaO and P_2O_5 of the block.
2. P_2O_5ap was the P_2O_5 associated with apatite and calculated by the evaluation of the CaO / P_2O_5 ratio. If the CaO / P_2O_5 ratio was greater than or equal to 1.34, P_2O_5ap was equal to the total of P_2O_5; if the CaO / P_2O_5 ratio was less than 1.35, P_2O_5ap was equal to the CaO / 1.35 ratio.

Hard boundaries were used for the grade estimation of the four main domains defined in the geological interpretation: ISAB-BEB (Domain 3); ISAB-FCR (Domain 4); RSI-BEB (Domain 6); and RSI-FCR (Domain 7).

Table 11.7 shows the domains flagged in the block model. Those highlighted in grey are the phosphorous rich domains that are included in the Mineral Resource statement.

Table 11.7: Block Model Estimation Domains

Estimation Domain	Description
ED1	ALO/COB
ED2	ISAT/ZTI
ED3	ISAB/BEB
ED4	ISAB/FCR
ED5	ISAB/SIE
ED6	RSI/BEB
ED7	RSI/FCR
ED8	RSI/SIE
ED9	RSA/BEB
ED10	RSA/FCR
ED11	RSA/SIE

Grade contact analysis was undertaken between the defined weathering horizons of the same rock types, and it was found that the P_2O_5 grade means exhibit a sharp disruption close to the geological contact (as shown in Figure 11.6). This justifies the use of the geological domains as hard boundaries for mineral resource estimation, even though the contact is not hard for all elements.

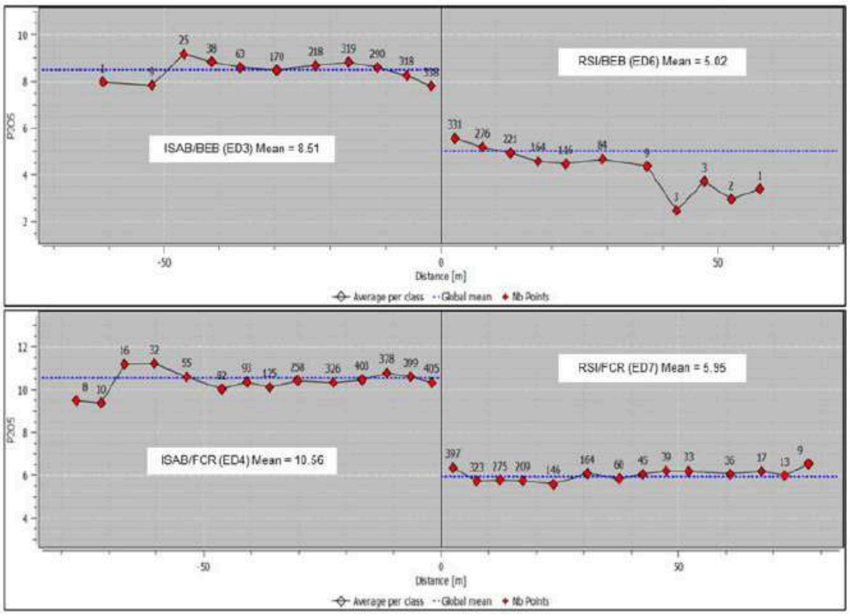


Figure 11.6: Contact Analysis for P_2O_5 for the Four Main Resource Domains

The volumes of the solids of the geological model were compared to the volumes of the blocks and no significant differences were found.

11.1.8.2 Density

Dry density for the Mineral Resource domains was interpolated into the block model using Ordinary Kriging (OK) in Isatis. Mean dry density values were applied to the waste rock domains.

Kriging was carried out with two estimation passes with progressively relaxed search ellipsoids and data requirements (see Table 11.8). In all cases, the ellipsoid orientations are based on the variogram model. The search neighborhood sizes for the first and second estimation passes did not exceed the full variogram ranges of the Dens_bs (dry density). For the blocks that were not estimated in the second OK estimation pass, the Nearest Neighbor (NN) interpolated value was adopted. Domains 3 and 4 were analyzed through variography independently and domains 6 and 7 were analyzed through variography together, though estimated separately.

Table 11.8: Dry Density OK Parameters for Resource Domain Estimation

Domain	Pass	No. of Samples			Search Orientation			Search Ranges (m)		
		Min No. Samples	Opt No. Samples per Octant	No. Sectors	Azimuth	Plunge	Dip	Major	Semi	Minor
ISAB-BEB (ED3)	1	8	3	8	170	0	0	250	150	20
	2	6	2	8	170	0	0	500	350	40
	3	2	1	8	170	0	0	1,350	900	100
	4	2	1	8	170	0	0	4,500	4,500	450
ISAB-FCR (ED4)	1	8	3	8	110	0	0	250	150	20
	2	6	2	8	110	0	0	500	350	40
	3	2	1	8	110	0	0	1,350	900	100
	4	2	1	8	110	0	0	4,500	4,500	450
RSI-BEB (ED6)	1	8	3	8	30	0	0	250	150	20
	2	6	2	8	30	0	0	500	350	40
	3	2	1	8	30	0	0	1,350	900	100
	4	2	1	8	30	0	0	4,500	4,500	450
RSI-FCR (ED7)	1	8	3	8	130	0	0	250	150	20
	2	6	2	8	130	0	0	500	350	40
	3	2	1	8	130	0	0	1,350	900	100
	4	2	1	8	130	0	0	4,500	4,500	450

11.1.8.3 Estimation of Grades

Grade was interpolated into the block model in Isatis using OK. The grade variables are listed in Table 11.9.

Table 11.9: Variables Estimated by Ordinary Kriging

Variable	Description
P_2O_5	Phosphate Oxide
Al_2O_3	Aluminium Oxide
BaO	Barium Oxide
CaO	Calcium Oxide
Fe_2O_3	Iron Oxide
K_2O	Potassium Oxide
LOI	Loss on Ignition
MgO	Magnesium Oxide
MnO	Manganese Oxide
Na_2O	Sodium Oxide
SiO_2	Silica Oxide
TiO_2	Titanium Oxide

For all the elements, four estimation passes were used with progressively relaxed search ellipsoids and data requirements (Table 11.10). In all cases, the ellipsoid orientations were based on the appropriate variogram model. The same ranges were used for all variables and are based on the P_2O_5 variogram. The search neighborhood sizes for the first and second estimation passes did not exceed the full variogram ranges of the P_2O_5. The third and final estimation run was approximately twice the variogram ranges of the P_2O_5.

The blocks near samples with anomalous values were analyzed to verify spatial distribution, and to ensure they fell within the main resource domains ED3, ED4, ED6 and ED7. A capping strategy was not used in the estimation for these anomalous values as they were spatially constrained and determined not to have a significant influence on the surrounding blocks.

Table 11.10: P_2O_5 OK Parameters for Resource Domain Estimation

Domain	Pass	No. of Samples			Search Orientation			Search Ranges (m)		
		Min No. Samples	Opt No. Samples per Octant	No. Sectors	Azimuth	Plunge	Dip	Major	Semi	Minor
ISAB-BEB (ED3)	1	8	3	8	70	0	0	250	150	20
	2	6	2	8	70	0	0	500	350	40
	3	2	1	8	70	0	0	1,350	900	100
	4	2	1	8	70	0	0	3,500	3,500	300
ISAB-FCR (ED4)	1	8	3	8	130	0	0	250	150	20
	2	6	2	8	130	0	0	500	350	40
	3	2	1	8	130	0	0	1,350	900	100
	4	2	1	8	130	0	0	3,500	3,500	300
RSI-BEB (ED6)	1	8	3	8	60	0	0	250	150	20
	2	6	2	8	60	0	0	500	350	40
	3	2	1	8	60	0	0	1,350	900	100
	4	2	1	8	60	0	0	3,500	3,500	300
RSI-FCR (ED7)	1	8	3	8	150	0	0	250	150	20
	2	6	2	8	150	0	0	500	350	40
	3	2	1	8	150	0	0	1,350	900	100
	4	2	1	8	150	0	0	3,500	3,500	300

11.1.9 Mass and Metallurgical Recovery

This sub-section contains forward-looking information related to mass and metallurgical recovery for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant feed characteristics that are different from the historical operations or from samples tested to date, equipment and operational performance that yield different results from the historical operations and historical and current test work results.

The Mass Recovery (MR) variable represents the quantity of concentrate recovered by the concentration plant. It is an extremely important variable used to define the production and cost of a mineral block. Mass Recovery was estimated using linear regression equations, using the P_2O_5 ROM grade as a regressor, combined with the estimate of metallurgical recovery indicators using the indicator kriging method.

The bench test database was subdivided into the deciles of metallurgical recovery and was modeled as a homogeneous indicator using the numeric model algorithm in Leapfrog. For each metallurgical recovery indicator, a linear regression was developed (Table 11.11 and Table 11.12), capable of predicting Mass Recovery according to the P_2O_5 grade of the ROM, with close adherence between the test result and the predicted result.

The results of bench tests are not at the same concentrated grades basis, which causes issues with correlation. Mosaic recalculated the MR to a concentrated grade 35.5%, which standardized the data in order to create the linear regressions.

Table 11.11: Linear Regression Equations used to Predict Mass Recovery in the Resource Block Model (ISAB horizon)

Indicator	Linear Regression	R^2
ID_100	Mass Recovery = -3.90595 + 1.29102 * P_2O_5	0.67
ID_200	Mass Recovery = -3.23931 + 1.40167 * P_2O_5	0.76
ID_300	Mass Recovery = -2.01713 + 1.41655 * P_2O_5	0.79
ID_400	Mass Recovery = -2.45084 + 1.60326 * P_2O_5	0.84
ID_500	Mass Recovery = -1.19864+ 1.60015* P_2O_5	0.87
ID_600	Mass Recovery = -0.675597 + 1.6648 * P_2O_5	0.88
ID_700	Mass Recovery = -0.36394 + 1.75184 * P_2O_5	0.94
ID_800	Mass Recovery = 1.830943 * P_2O_5	0.99
ID_900	Mass Recovery = 1.928374 * P_2O_5	0.99
ID_1000	Mass Recovery = 2.022531 * P_2O_5	0.99

Table 11.12: Linear Regression Equations used to Predict Mass Recovery in the Resource Block Model (RSI horizon)

Indicator	Linear Regression	R^2
ID_100	Mass Recovery = 0.541734 * P_2O_5	0.93
ID_200	Mass Recovery = 0.814935 * P_2O_5	0.96
ID_300	Mass Recovery = -0.984993 + 1.172184 * P_2O_5	0.71
ID_400	Mass Recovery = -0.78843 + 1.319323 * P_2O_5	0.79
ID_500	Mass Recovery = -0.506689 + 1.419933* P_2O_5	0.87
ID_600	Mass Recovery = -1.23431 + 1.69144 * P_2O_5	0.92
ID_700	Mass Recovery = -0.509149 + 1.712097 * P_2O_5	0.94
ID_800	Mass Recovery = -0.76669 + 1.88907 * P_2O_5	0.96
ID_900	Mass Recovery = 1.913369 * P_2O_5	0.99
ID_1000	Mass Recovery = 0.96556 + 1.95716 * P_2O_5	0.98

The regressions were validated using scatter plot graphs, which indicated that the predicted values of MR are close to the real values of MR obtained in the bench tests.

The result of the MR estimate using the specific linear regressions for each kriging indicator was validated with drift analysis graphs, comparing the result of the estimate with the results of the database of the bench tests of the samples from the drill holes.

The metallurgical recovery of the isalterite blocks was calculated in the resource model using Equation 1.

Equation 1:

$$Metallurgical\ Recovery = Mass\ Recovery * \left(\frac{P2O5_{concentrate}}{P2O5_{ROM}}\right)$$

Several geometallurgical tests were carried out by the mine staff using samples collected from the percussive and core drilling. To validate the regression equation a reconciliation study was conducted. This consisted of comparing the local declustered mean value for Mass Recovery from the technological tests, with the RM value predicted by the regression equation. A NN approach was used for the declustering of data.

11.1.10 Model Validation

The validation of the grade estimation was performed using the following approaches:

- Verification of global statistical comparison:
  - Estimated grades of P_2O_5, CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3, and density were validated against the declustered and non-declustered composite grades, for the four resource domains.
- Drift analysis using the NN estimate for declustering of composites:
  - Swath plots were produced for the P_2O_5, CaO, SiO_2, Al_2O_3, Fe_2O_3, and density grades for each domain, comparing the kriged block model grades with NN declustered composite grades. In general, the kriging grades matched the nearest neighbor values, and no significant bias was identified.
- Sensitivity Analysis changing the neighborhood estimation parameters and treatment of outliers:
  - Sensitivity analysis was carried out with variations in both the search range and the number of composites used in the first and second pass of the estimate.
- Reconciliation:
  - Annual reconciliations between the long-term resource model and the beneficiation plant reports were carried out from 2017 to 2022. In general, the reconciliation demonstrates that the Tapira Mineral Resource model exhibits strong adherence in the estimation of grades, metallurgy, and mass.

11.2 Mineral Resource Estimate

This sub-section contains forward-looking information related to Mineral Resource estimates for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geological and grade interpretations and controls and assumptions and forecasts associated with establishing the prospects for economic extraction.

For estimating the Mineral Resources for CMT, the following definition as set forth in the S-K 1300 Definition Standards adopted December 26, 2018, was applied.

Under S-K 1300, a Mineral Resource is defined as:

> "…is a concentration or occurrence of material of economic interest in or on the Earth's crust in such form, grade or quality, and quantity that there are reasonable prospects for economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cutoff grade, likely mining dimensions, location or continuity, that, with the assumed and justifiable technical and economic conditions, is likely to, in whole or in part, become economically extractable. It is not merely an inventory of all mineralization drilled or sampled."

Based on the geological model, grade model, parameters for establishing prospects for economic extraction, and the Mineral Resource classification discussed in this Section, the CMT in-situ Mineral Resources are summarized in Table 11.13. The Mineral Resources are exclusive of Mineral Reserves and include approximately 78.0 Mt of Measured and Indicated Mineral Resources with a P_2O_5ap grade of 8.6%. There are an additional 181.2 Mt of Inferred Mineral Resources with a P_2O_5ap grade of 9.2%.

Table 11.13: Exclusive In-Situ Mineral Resource Estimate as of December 30, 2023

Geological Domain	Category	In Situ Tonnage, Dry Basis (Mt)	In Situ P_2O_5 (wt. %)	In Situ P_2O_5 ap (wt. %)	Total Concentrate Mass Recovery (%)	Total Concentrate Metallurgical Recovery (% P_2O_5)
ISAB	Measured	19.4	9.3	8.9	13.1	48.4
RSI		3.3	7.1	7.1	10.2	49.4
	Measured	**22.7**	**9.0**	**8.7**	**12.7**	**48.6**
ISAB	Indicated	45.1	9.5	9.0	12.8	47.3
RSI		10.2	6.9	6.9	11.6	56.3
	Indicated	**55.3**	**9.0**	**8.6**	**12.5**	**48.9**
ISAB	Measured + Indicated	64.5	9.4	9.0	12.9	47.6
RSI		13.6	6.9	6.9	11.3	54.6
	Measured + Indicated	**78.0**	**9.0**	**8.6**	**12.6**	**48.8**
ISAB	Inferred	155.3	9.8	9.6	17.5	63.8
RSI		25.9	6.9	6.9	11.7	58.7
	Inferred	**181.2**	**9.4**	**9.2**	**16.7**	**63.0**

Notes:
1. Reference topography of December 30, 2023
2. COG of P_2O_5ap ≥ 5.0% and 0.9 ≤ RCP ≤ 3.0
3. Mineral Resource tonnages are exclusive of Mineral Reserve tonnages

Table 11.14 summarizes the differences between the 2021 and 2023 Mineral Resource estimates. Measured and Indicated Mineral Resources have decreased overall by 51.8 Mt since 2021, due largely to depletion from mining, as well as downgrading of Measured to Indicated Mineral Resources in the Cafezal and East areas using a more conservative estimation methodology. The Inferred Mineral Resource has increased by 68.4 Mt due to additional drilling data acquired since 2019, as well as revised classification in the south region. The total Mineral Resource estimate has increased overall by 16.6 Mt since the 2021 TRS.

Table 11.14: Difference in Exclusive Mineral Resource Estimates from 2021 to 2023

Classification	In Situ Tonnage, Dry Basis (Mt)	In Situ P_2O_5 (wt. %)	Total Concentrate Mass Recovery (%)	Total Concentrate Metallurgical Recovery (% P_2O_5)
Measured	-40.1	0.6	1.2	-4.1
Indicated	-11.7	1.0	2.6	-4.3
Measured + Indicated	**-51.8**	**0.8**	**2.0**	**-4.2**
Inferred	68.4	0.7	2.6	10.6
Total Resource	**16.6**	**0.9**	**3.2**	**6.0**

A detailed discussion on selection of the of COGs is presented in Section 12.2.5 of this TRS.

11.3 Basis for Establishing the Prospects of Economic Extraction for Mineral Resources

This sub-section contains forward-looking information related to establishing the prospects of economic extraction for Mineral Resources for the M ine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including COG assumptions, costing forecasts and product pricing forecasts.

The requirement of "reasonable prospects for economic extraction" generally implies that quantity and grade estimates meet certain economic limits, and that Mineral Resources are reported at an appropriate cut-off level, considering extraction scenarios and beneficiation recoveries." To determine the quantities of material that offer "reasonable prospects for economical extraction" in an open pit, the Datamine Net Present Value (NPV) Scheduler® software package was used to evaluate the profitability of each resource block based on its value. The following restrictions were used for the generation of the Mineral Resource pit:

- Measured, Indicated, and Inferred blocks inside mining concessions and exploration permits with a final report approved by ANM, but excluding physical structures such as crusher and waste piles.
- Revenue factor of 1.0 with sales price of R$1,939.57 per tonne of phosphatic concentrate.
- P_2O_5ap ≥ 5% and 0.9 ≤ RCP ≤ 3.

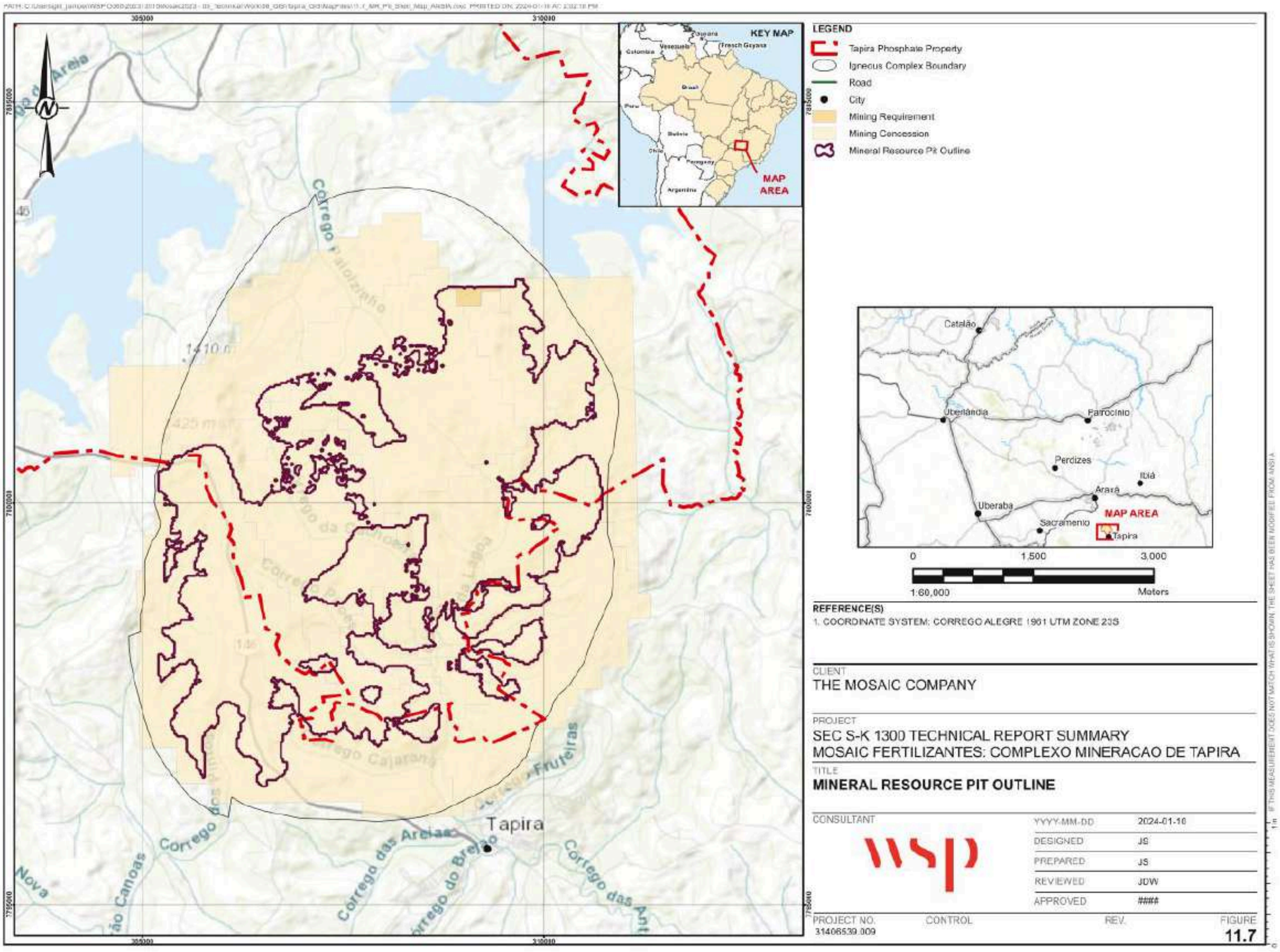
Where:

- RCP is the ratio of CaO to P_2O_5.
- P_2O_5ap is the P_2O_5 associated with apatite and is calculated by assessing the CaO/ P_2O_5 ratio. If the CaO/ P_2O_5 ratio is greater than or equal to 1.35, P_2O_5ap will be equal to total P_2O_5; if the CaO/ P_2O_5 ratio is less than 1.35, P_2O_5ap is equal to CaO/1.35 ratio.

The cost parameters are summarized in Table 11.15 and the Mineral Resource pit shell is shown in Figure 11.7.

Table 11.15: Mineral Resource Optimization Pit Limit Parameters

Parameters	Unit	Value
Mining Cost		
DMT Fixed to Ore	R$/tmov	3.37
DMT Variable to Ore	R$/tmov/km	1.7
DMT Fixed to Waste	R$/tmov	5.64
DMT Variable to Waste	R$/tmov/km	1.9
Beneficiation Cost		
Fixed	R$/t RoM	7.63
Variable	R$/t RoM	14.22
Concentrate Grade		
P_2O_5	%	35.0%
Sales Cost		
Process (Chemical Plant)	R$/tconc	969.95
SG&A	R$/tconc	22.66
R&D	R$/tconc	31.35
Sustaining	R$/tconc	167.75


LEGEND
Tapira Phosphate Property
Igneous Complex Boundary
Road
City
Mining Requirement
Mining Concession
Mineral Resource Pit Outline
KEY MAP
MAP AREA
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
Tapira
0
1,500
3,000
1:60,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
MINERAL RESOURCE PIT OUTLINE
CONSULTANT
wsp
YYYY-MM-DD 2024-01-10
DESIGNED JS
PREPARED JS
REVIEWED JDW
APPROVED ####
PROJECT NO. 31406539.009
CONTROL
REV.
FIGURE 11.7
Tapira
Corrego Palmital
Corrego das Areias
Corrego do Brejão
Corrego Fruteiras
Corrego Cajarana
1410 m
1425 m
146
305000
310000
7805000
7800000
7795000

The results of the Mineral Resource pit optimization were used only for the purpose of testing "reasonable prospects for economic extraction" and do not represent an attempt to estimate Mineral Reserves. Mineral Reserves can only be estimated after the application of all modifying factors.

11.4 Mineral Resource Classification

This sub-section contains forward-looking information related to Mineral Resource classification for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geological and grade continuity analysis and assumptions.

According to the S-K 1300 regulations, to reflect geological confidence, Mineral Resources are subdivided into the following categories based on increased geological confidence: Inferred, Indicated, and Measured, which are defined under S-K 1300 as:

> "Inferred Mineral Resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. The level of geological uncertainty associated with an inferred mineral resource is too high to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Because an inferred mineral resource has the lowest level of geological confidence of all mineral resources, which prevents the application of the modifying factors in a manner useful for evaluation of economic viability, an inferred mineral resource may not be considered when assessing the economic viability of a mining project, and may not be converted to a mineral reserve."

> "Indicated Mineral Resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of adequate geological evidence and sampling. The level of geological certainty associated with an indicated mineral resource is sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Because an indicated mineral resource has a lower level of confidence than the level of confidence of a measured mineral resource, an indicated mineral resource may only be converted to a probable mineral reserve."

> "Measured Mineral Resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of conclusive geological evidence and sampling. The level of geological certainty associated with a measured mineral resource is sufficient to allow a qualified person to apply modifying factors, as defined in this section, in sufficient detail to support detailed mine planning and final evaluation of the economic viability of the deposit. Because a measured mineral resource has a higher level of confidence than the level of confidence of either an indicated mineral resource or an inferred mineral resource, a measured mineral resource may be converted to a proven mineral reserve or to a probable mineral reserve."

The Mineral Resource classification process was defined through the relationship between the variogram range and 95% of data variance (D95) considering the analysis of the P_2O_5 variable for the ISAB-BEB domain. The Mineral Resource classification also considers the quality of the data that were used. As a result, to complete the Mineral Resource classification, only drill holes covered by the post-mortem QA/QC program (1990 to 2007) and drill holes that were submitted to a formal QA/QC program (starting in 2010) were utilized. To classify the Mineral Resources the following steps were used:

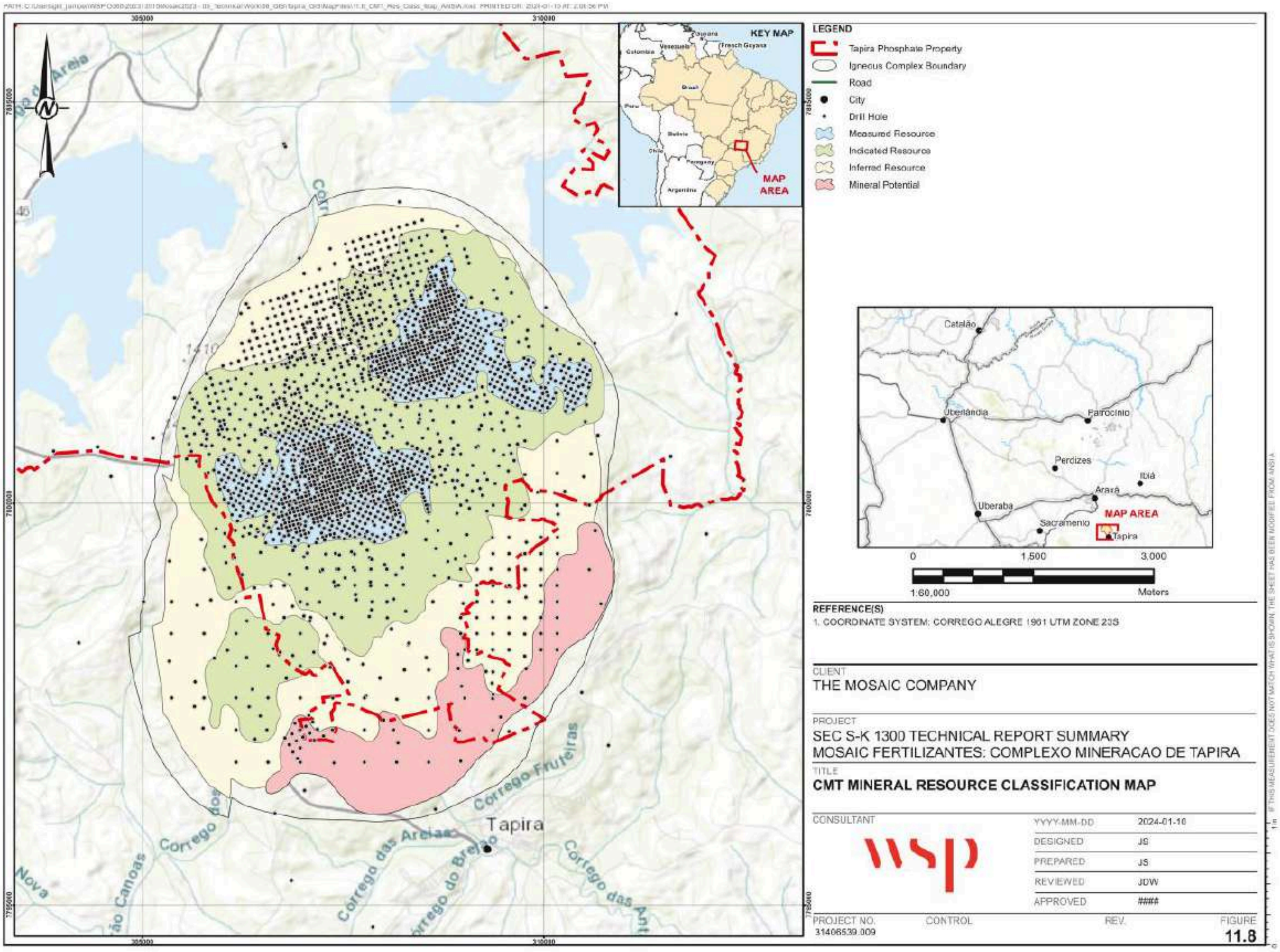
- Measured Resources: D95/2 into the first search ellipsoid with a minimum of eight samples and at least five samples from drill holes after 2010.
- Indicated Resources: blocks estimated in the first search ellipsoid with a minimum of 8 samples and less than 5 samples from drill holes after 2010, or blocks estimated in the second search ellipsoid within a range less than D90 and with a minimum of 6 samples.
- Inferred Resources: blocks estimated in the third search ellipsoid with a minimum of 4 samples and a maximum range equal to twice the total range (1,380 m).

Table 11.16 summarizes the parameters used in the Mineral Resource classification. Figure 11.8 illustrates the Mineral Resource Classification.

Table 11.16: CMT Mineral Resource Classification

Category	No. Samples				Search Ranges (m)		
	Min	Max	Max Samples per Oct	No. of Octants	Major	Semi	Minor
Measured	8	24	3	8	100	100	15
Indicated	6	16	2	8	690	560	35
Inferred	4	16	2	8	1,380	1,120	70

A post-processing procedure was performed to reduce the number of isolated blocks of one Mineral Resource classification inside another predominate classification. This procedure re-flagged the blocks with a rolling average and constructed solids around them. The final Mineral Resource classification reflects the most accurate vision of the geological continuity and confidence of the existing information.


KEY MAP
LEGEND
Tapira Phosphate Property
Igneous Complex Boundary
Road
City
Drill Hole
Measured Resource
Indicated Resource
Inferred Resource
Mineral Potential
MAP AREA
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
Tapira
0
1,500
3,000
1:60,000
Meters
REFERENCE(S)
1. COORDINATE SYSTEM: CORREGO ALEGRE 1961 UTM ZONE 23S
CLIENT
THE MOSAIC COMPANY
PROJECT
SEC S-K 1300 TECHNICAL REPORT SUMMARY
MOSAIC FERTILIZANTES: COMPLEXO MINERACAO DE TAPIRA
TITLE
CMT MINERAL RESOURCE CLASSIFICATION MAP
CONSULTANT
wsp
YYYY-MM-DD 2024-01-10
DESIGNED JS
PREPARED JS
REVIEWED JDW
APPROVED ####
PROJECT NO. 31406539.009
CONTROL
REV.
FIGURE 11.8
Tapira
Corrego Fruteiras
Corrego das Areias
Corrego do Brejão
Corrego das Ant
Corrego
Nova
ão Canoas
305000
310000
7805000
7800000
7795000

11.5 Mineral Resource Uncertainty Discussion

The sources of uncertainty for the Mineral Resources evaluation include the following topics, along with their location in this report:

- Sampling or drilling methods – Section 7.2 and 8.0
- Data processing and handling – Section 11.0
- Geologic modeling – Section 11.1.4
- Block modeling – Section 11.1.8
- Tonnage estimation – Section 11.2

The sampling and drilling methods present a low source of uncertainty based on the current standards that are in place with Mosaic and those that have been in place for the recent exploration history. The items that help reduce uncertainty with the sampling and drilling methods include the fact that drill holes were cored with HQ2 size core. The core was then measured and logged and sampled with guidance from the CMT geological team. A specification of 60% linear core recovery was used to limit samples that were used in the modeling process. The core was then sent to accredited laboratories where QA/QC programs were implemented and were actively monitored for laboratory performance.

Once the assay results were received from the laboratories, the data was input into the geological database along with the collar, drill hole information, lithology records and weathering records. The lithology and weathering records from the core logging was validated based on the assay results by the CMT geological team to adhere with known trends for the various domains. The data handling was secure in the geological database and this process also demonstrated a low level of uncertainty for the Mineral Resource estimate.

The validated database was loaded into the geological modeling software, where surfaces for lithology and weathering were modeled and validated based on drill holes, geological trends, and operational experience. The current geological model appears to define the Measured and Indicated Mineral Resource areas of the pit well. Uncertainty for these areas can be classified as low for a global estimate; however, there will likely be minor local variability when the area is mined and compared back to the model. This is common as the geological model is just that, a model that is used to estimate tonnages. The model for the measured and indicated portions of the deposit is appropriate to use for conversion to Mineral Reserves.

Areas of the geological model in the Inferred Mineral Resource portion of the deposit will require future drilling and exploration to better define and understand the lithological variation before they can be upgraded to Measured or Indicated Mineral Resources. The level of uncertainty for the lithological model is moderate for the Inferred Mineral Resource areas due to the type of geological deposit that is being modeled. The weathering model is simpler since weathering originates from the surface and generally follows the topography. For this reason, the uncertainty of the weathering profiles are low-moderate for the Inferred Mineral Resource areas. As with the Measured and Indicated Mineral Resource areas, the global uncertainty is lower than the local uncertainty due to the ability to average over the areas when estimating globally.

The geological model was then imported into the block model where the lithology and weathering surfaces were utilized to domain the deposit into geological domains to support the grade estimation. This step was completed with care and diligence by the CMT geologists who are very well versed in the geological environment of CMT and, therefore, the uncertainty is low.

The drill hole data was then composited, and a geostatistical analysis was completed to better understand the variability of the grades by domain. There were appropriate data counts and understanding of the geostatistical processes for this analysis to be completed by the CMT geologists. However, this type of analysis is only a tool to help predict the grades through block modeling. With more drilling and data in the geostatistical analysis, the geostatistical results could change if an area of the deposit has significantly different variability in grade. Based on the understanding of the current deposit, this is unlikely, but could occur in the inferred areas where drill spacing is greater.

The geostatistical results were used to interpret grades and densities into the block model. The results were verified by CMT geologists through global statistics, drift analysis, and reconciliations. Like the geological modeling, uncertainty for areas classified as Measured and Indicated Mineral Resources are low globally, but low-moderate for local variability. For Inferred Mineral Resources, the uncertainty is higher based on a larger drill spacing and is low-moderate for global variability and moderate for local variability. The block model for the measured and indicated portions of the deposit is appropriate to use for conversion to Mineral Reserves.

The Mineral Resource tonnages were limited with the use of an optimized pit shell where reasonable prices and COGs were used. Additionally, areas with significant infrastructure such as the primary crusher and conveyor were excluded from the estimate. The estimate was completed by utilizing the block model with the resource categorization and the resource pit limit. Areas of uncertainty for the resource estimate include:

- A substantial change in price that would affect the resource pit shell limit.
- Changes in grade based on additional drilling that would influence the amount of tonnages that would be excluded with the COG.

In summary, given all the considerations in this Section and report, the uncertainty in the tonnage estimate for the Measured Mineral Resources, is low, Indicated Mineral Resources estimates is low to moderate, and Inferred Mineral Resources is moderate, as shown in Table 11.17.

Table 11.17: Mineral Resources Uncertainty

Uncertainty Item	Measured Uncertainty	Indicated Uncertainty	Inferred Uncertainty
Sampling and Drilling Methods	Low	Low	Low
Data Processing and Handling	Low	Low	Low
Geological Modeling – Globally/Locally	Low/Low	Low/Low-Moderate	Low-Moderate/Moderate
Geologic Domaining	Low	Low	Low
Geostatistical Analysis	Low	Low	Moderate
Block Modeling – Globally/Locally	Low/Low	Low/Low-Moderate	Low-Moderate/Moderate
Tonnage Estimate	Low	Low-Moderate	Moderate

11.6 Assumptions for Multiple Commodity Resource Estimate

This does not apply to the Mineral Resource estimate for CMT.

11.7 Qualified Person's Opinion on Factors that are Likely to Influence the Prospect of Economic Extraction

As CMT is an operation with more than 40 years of operational experience and data, it is the QP's opinion that the relevant technical and economic factors necessary to support economic extraction of the Mineral Resource have been appropriately accounted for at CMT. The QP is not aware of any issues that require further work that are likely to influence the prospect of economic extraction for the Mineral Resources stated in this TRS.

Recommendations that are detailed in Section 23.1 are related to improving local variability for short range planning purposes that could be completed by site teams to provide improvements to short-term recovery and grade control. They are not seen as having an impact on the prospect of economic extraction.

12.0 MINERAL RESERVE ESTIMATES

12.1 Key Assumptions, Parameters, and Methods

This sub-section contains forward-looking information related to the key assumptions, parameters, and methods for the Mineral Reserve estimates for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes and grade and mine design parameters.

12.1.1 Geologic Resource Model

The geological model previously described in Section 11.0 and used to estimate Mineral Resources was the basis for the estimate of Mineral Reserves. The geological model is based on core drilling from 1983 to 2022. A Mineral Resource pit was developed to define and limit the estimation of mineral resources to the "reasonable prospects for economic extraction."

The Tapira geological model is a sub-blocked model detailing lithological and weathering contacts. As such, two models were built for the Tapira mineral deposit:

1. Lithological model composed of 8 identified rock types.
2. Weathering model composed of 5 identified rock units.

A combination of both models was used to define geologic domains for Mineral Resource estimation. The geological domains were used as grade estimation zones in the resource model. Table 12.1 summarizes the modeled domains and highlighted resource domains in the isalterite and semi-weathered rock zones.

Four of the geological domains contain significant phosphorous content and were included in the Mineral Resource Statement:

1. ISAB-FCR: Bottom Isalterite/Phoscorite
2. ISAB-BEB: Bottom Isalterite/Bebedourite
3. RSI-FCR: Semi-weathered Rock/Phoscorite
4. RSI-BEB: Semi-weathered Rock/Bebedourite

Table 12.1: Block Model Estimation Domains

Rock_Type	Type	ID_LITO	Estimation Domain
ALO-COB	Waste	5	1
ISAT-ZTI	Titanium	6	2
ISAB-BEB	**Ore**	**1**	**3**
ISAB-FCR	**Ore**	**2**	**4**
ISAB-CBN	**Ore**	**3**	
ISAB-SIE	Waste	4	5
ISAB-FEN	Waste	98	-
ISAB-ENC	Waste	99	-
RSI-BEB	**Ore**	**1**	**6**
RSI-FCR	**Ore**	**2**	**7**
RSI-CBN	**Ore**	**3**	
RSI-SIE	Waste	4	8
RSI-FEN	Waste	98	-
RSI-ENC	Waste	99	-
RSA-BEB	Waste	1	9
RSA-FCR	Waste	2	10
RSA-CBN	Waste	3	
RSA-SIE	Waste	4	11
RSA-FEN	Waste	98	-
RSA-ENC	Waste	99	-

Each block within the resource block model was normalized to 25 m by 25 m by 5 m in the XYZ dimensions.

Each block within the resource block model contained over 200 variables describing the block contents for lithological and weathering codes, metallurgical grades, density, moisture, mass and metallurgical recovery, concentrate grades, volumes, and in-situ and recovered tonnages.

12.1.2 Mine Design Criteria

The general mine design criteria used to estimate mineral reserves are listed below:

1. Surface, open-pit mining approach
2. Haul road design width of 15 m
3. Berm width of 12 m or 15 m and bench height of 10 m
4. Typical ramp width of 27 m
5. Maximum ramp grade 8%
6. Effective wall angles by geotechnical design sector are summarized in Section 13.2.1.

Mosaic currently holds a total of 9 mining permits within the Tapira Complex, with easement areas in place for the purposes of tailings disposal, electrical transmission lines, and ore beneficiation infrastructure. The MG-146 highway is currently located within the final pit extents; funds have been included in the projected capital costs to acquire the necessary property and relocate the road. The potential mining area was limited to the currently permitted area, with appropriate offsets applied. After applying all boundaries and appropriate offsets, the ultimate mining pit designs were constructed based on this boundary using the following pit parameters:

- COG of 5.0% P_2O_5 ap (diluted) – Described further in Section 12.2.5
- RCP (ratio between CaO and P_2O_5 in a block) between 0.9 and 3.0
- Within one of the four mineralized domains shown in Table 12.1 (highlighted domains)
- Loss and dilution based on parameters of neighboring blocks, as described in Section 12.2.1.
- General mine design criteria listed above.
- Geotechnical parameters, as described in Section 13.2.1.
- Process recovery methodology and factors described in Section 10.4.

Using these designs and the parameters mentioned above, an ultimate mining pit design was developed, the potential reserves were calculated and limited within the pit design, and an economic analysis was performed (see Section 19.0).

The point of reference of the Mineral Reserves estimate is:

- ROM ore delivered to the process plant.
- The Concentrate Reserve Estimate is the reserve produced and recovered in the beneficiation plant (post beneficiation).

All reserves are as of December 31, 2023.

12.2 Modifying Factors

This sub-section contains forward-looking information related to the modifying factors for the Mineral Reserve estimates for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including modifying factors including dilution and mining and recovery factors, beneficiation assumptions, property limits, commodity price, cut off grades, pit optimization assumptions and the ultimate pit design.

Modifying factors are applied to mineralized material within the measured and indicated resource classifications to establish the economic viability of Mineral Reserves. A summary of modifying factors applied to the CMT mine Mineral Reserve estimate is provided below.

12.2.1 Dilution, Loss, and Mine Recovery

Dilution in mining can be defined as the addition of waste material to the ore during the mining process and can be due to a lack of selectivity, or in some cases, inadequate operational configuration. The process considers the neighborhood relationship between an ore block with the adjacent blocks, weighting the grades by a predetermined distance, and by the density of the blocks. The dilution effects result in a reduction of the in-situ P_2O_5 grade for the mining model as well as a reduction in mass recovery. The factors that cause dilution are diverse and include:

- Nature of ore contacts and boundaries
- Pit boundary zones
- Block size and position
- Sample density
- Geological complexity
- Selectivity of mining and equipment size
- Mining method and type of crushing

Dilution can be internal (caused by intrinsic deposit factors) or external (caused by operational factors). Dilution cannot be fully eliminated as it is impossible to have the exact accuracy of the mining limits; however, it can be estimated and considered, thus minimizing the differences between the mine plan and the actual operations.

A script was developed by the Mosaic Long-Term Mine Planning team to calculate the diluted grades of the ore blocks based upon the information found in the block model, specifically the contacts between and grades of the ore and waste blocks and the geotechnical design parameters. Dilution is calculated only for the ore blocks that have at least one adjacent waste block using a contact dilution approach, which occurs through contact of the ore and waste layers, as well as operational dilution which occurs through both ore/waste contact and the face angle of the benches. Contact dilution occurs in the regions between the ore and waste zones. The portion of the ore mined in this contact region will be diluted by the waste, since it is impossible to completely segment these two layers during mining. This difficulty in segmenting the ore and waste also occurs with operational dilution, because it is not possible to mine block by block due to the size of the mining equipment and the mining geometry that must be followed.

Figure 12.1 shows an example of an ore block surrounded by five blocks of waste. In three of the five blocks, dashed lines represent the part of the contact blocks that will be extracted together with the ore during mining. The dilution is calculated by the equation:

$$\text{Dilution Content} = \frac{((\text{Ore Block Mass x Ore Block Grade}) + (\text{Contact Block x Waste Block Grade}))}{\text{Ore Block Mass} + \text{Contact Block Mass}}$$

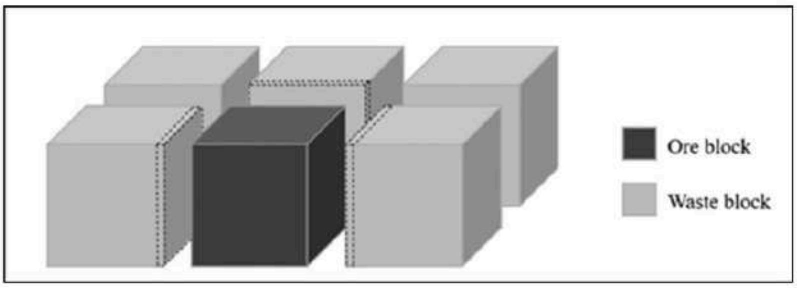


Figure 12.1: Ore Block Surrounded by Waste Blocks

The pit design requires additional geotechnical considerations such as the overall angle, the face angle, and the berm size. With this information, it is possible to calculate the masses of the triangular prisms formed by the influence of the face angle as shown in Figure 12.2 and Figure 12.3. These two prisms are located exactly in the transition zone between ore and waste blocks and indicate the amount of waste to be added to the ore mined (upper prism) and amount of ore lost or unmined indicated by the lower prism. In these two cases, calculations are obtained by:

$$\text{Mass of Lower Triangular Prism} = \frac{\left(\frac{x}{2} \times \frac{\text{ZINC}}{2}\right) \times YINC \times Density}{2}$$

$$\text{Mass of Upper Triangular Prism} = \frac{\left(\frac{x}{2} \times \frac{\text{ZINC}}{2}\right) \times YINC \times Density\ of\ Adjacent\ Block}{2}$$

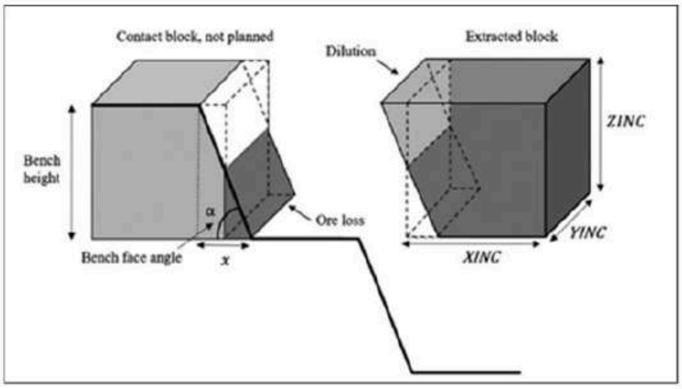


Figure 12.2: Dilution of the Blocks Located on the Edge of the Mine/Waste Interface Due to the Influence of the Face Angle

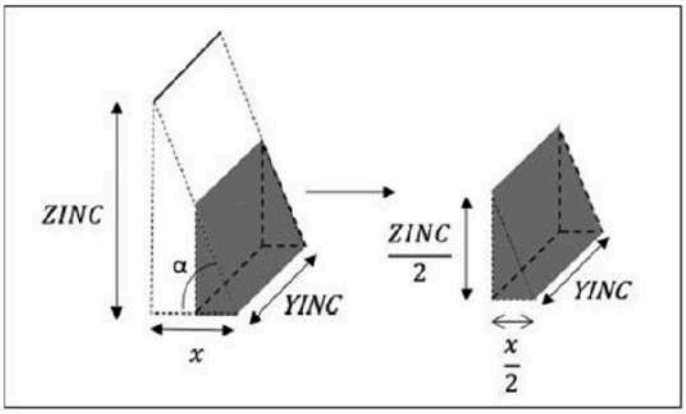


Figure 12.3: Trigonometry to Calculate the Mass of the Upper and Lower Prisms

To calculate the diluted grade, the mass of the triangular prism designated as diluted will be added to the block mass, and the mass of the triangular prism designated as loss will be subtracted from it. The equations below present the steps to calculate the loss, dilution, final mass of the block, and diluted grade given the influence of the face angle:

*Mining Loss = Mass of Lower Block * Grade of Ore Block*

*Mining Dilution = Mass of Upper Block * Grade of Contact Block*

Final Mass of Block = Mass of Ore Block + Mass of Upper Block – Mass of Lower Block

$$\text{Diluted Grade} = \frac{(\text{Mass of Ore Block} * \text{Grade of Ore Block}) - \text{Mining Loss} + \text{Mining Dilution}}{\text{Final Mass of Block}}$$

Geological dilution is based on mineralized contacts, modeled weathering, and lithology. In the case of Tapira, the ISAB-FCR, ISAB-BEB, RSI-FCR, and RSI-BEB were considered ore for the purposes of dilution estimation. The contaminant grade comes from the neighboring waste blocks, and the ore grade is weighted by the percentage of waste in the ore block.

The Tapira Mine does not apply any additional mining recovery factors to the ore extraction, assuming their equipment is selective enough to be able to mine the boundary of the ore and waste as defined by the interpolated rock unit triangulations. The portion of overburden outside the geological modeling envelope is incorporated into the waste. For simplicity, densities and moistures were not weighted, so there is no change in the original ore mass, only in the ore grade. An evaluation was carried out and it was determined that this difference is immaterial.

12.2.2 Beneficiation

Mass recovery, an important parameter impacting the operating cost, is determined by the following relationship:

Mass Recovery = 100 x concentrate mass / ROM mass

The geometallurgical test data are evaluated periodically to establish an equation for predicting mass recovery as a function of ROM chemical composition. The bench test database was subdivided into the deciles of metallurgical recovery and individualized as a homogenous domain, treating isalterite and semi-weathered horizons separately. For each metallurgical recovery domain, a linear regression was developed (Table 12.2 for ISAB and Table 12.3 for RSI), capable of predicting Mass Recovery according to the P_2O_5 grade of the ROM, with close adherence between the test results and the predicted results. The current equation for predicting the mass recovery of conventional phosphate concentrate from Tapira ore is presented below.

Table 12.2: Linear Regression Equations used to Predict Mass Recovery (ISAB horizon)

Indicator	Linear Regression	R^2
ID_100	Mass Recovery = -3.90595 + 1.29102 * P_2O_5	0.67
ID_200	Mass Recovery = -3.23931 + 1.40167 * P_2O_5	0.76
ID_300	Mass Recovery = -2.01713 + 1.41655 * P_2O_5	0.79
ID_400	Mass Recovery = -2.45084 + 1.60326 * P_2O_5	0.84
ID_500	Mass Recovery = -1.19864+ 1.60015* P_2O_5	0.87
ID_600	Mass Recovery = -0.675597 + 1.6648 * P_2O_5	0.88
ID_700	Mass Recovery = -0.36394 + 1.75184 * P_2O_5	0.94
ID_800	Mass Recovery = 1.830943 * P_2O_5	0.99
ID_900	Mass Recovery = 1.928374 * P_2O_5	0.99
ID_1000	Mass Recovery = 2.022531 * P_2O_5	0.99

Table 12.3: Linear Regression Equations used to Predict Mass Recovery (RSI horizon)

Indicator	Linear Regression	R^2
ID_100	Mass Recovery = 0.541734 * P_2O_5	0.93
ID_200	Mass Recovery = 0.814935 * P_2O_5	0.96
ID_300	Mass Recovery = -0.984993 + 1.172184 * P_2O_5	0.71
ID_400	Mass Recovery = -0.78843 + 1.319323 * P_2O_5	0.79
ID_500	Mass Recovery = -0.506689 + 1.419933* P_2O_5	0.87
ID_600	Mass Recovery = -1.23431 + 1.69144 * P_2O_5	0.92
ID_700	Mass Recovery = -0.509149 + 1.712097 * P_2O_5	0.94
ID_800	Mass Recovery = -0.76669 + 1.88907 * P_2O_5	0.96
ID_900	Mass Recovery = 1.913369 * P_2O_5	0.99
ID_1000	Mass Recovery = 0.96556 + 1.95716 * P_2O_5	0.98

The predicted mass recovery is for conventional concentrate because the laboratory testing does not include preparation and flotation of the ultrafine flotation feed. The ultrafine concentrate is typically about 8% of the total concentrate.

The metallurgical recovery is calculated from the mass recovery, the concentrate % P_2O_5, and the ROM % P_2O_5 according to the following equation:

Metallurgical recovery = 100 x Mass recovery x Concentrate % P_2O_5 / ROM % P_2O_5

12.2.3 Property Limits

The December 31, 2023, Mineral Reserve estimate for Tapira has been constrained by an ultimate pit design developed from a nested pit optimization exercise and bound by Mosaic's mining concessions shown in Table 12.4. Additional information on the pit optimization process used to define the economic limits of the ultimate pit design is provided in Section 12.2.6.

Table 12.4: Mining Concessions Used as a Mineral Reserves Estimate Constraint

Mining Permits	Granted to	Area (ha)
810.330/1968	Mosaic Fertilizantes P&K Ltda	483.12
810.331/1968	Mosaic Fertilizantes P&K Ltda	500.13
812.362/1968	Mosaic Fertilizantes P&K Ltda	464.04
821.674/1969	Mosaic Fertilizantes P&K Ltda	20.01
816.066/1970	Mosaic Fertilizantes P&K Ltda	47.83
827.081/1972	Mosaic Fertilizantes P&K Ltda	339.39
803.387/1974	Mosaic Fertilizantes P&K Ltda	947.34
831.405/1997	Mosaic Fertilizantes P&K Ltda	1,040.31
833.476/2012	Mosaic Fertilizantes P&K Ltda	10.48
Total		**3,852.65**

12.2.4 Commodity Price Used

The commodity price of R$ 1,939.57 that was used for the COG assessment, pit optimization, and Mineral Reserve estimate is based on a composite value of all Fertilizantes product sales and was provided by Mosaic for WSP to rely upon.

The time frame of the price is December 31, 2023.

12.2.5 Cut-off Grade Estimate

Per the definitions in S-K 1300, "For the purposes of establishing 'prospects of economic extraction', the COG is the grade that distinguishes material deemed to have no economic value from material deemed to have economic value." In simpler terms, the COG is the grade at which revenue generated by a block is equal to its total cost resulting in a net value of zero.

For material to be processed as ore at the CMT beneficiation facilities, not only must the material generate enough revenue to cover costs to be treated as ore, but it must also meet certain geometallurgical beneficiation criteria, including:

- Diluted P_2O_5ap grade greater than 5.0%
- Diluted RCP greater than or equal to 0.9 and less than 3.0
- Within one of the four mineralized domains shown in Table 12.1

Mosaic has used a break-even COG approach, as shown below, to define the minimum grade that must be met for an ore block to generate enough revenue to cover the total cost of mining ore and any increment of waste that must be mined to recover the ore (i.e., strip ratio).

$$Value = \$0 = Revenue - Total\ Cost \Rightarrow Revenue = Total\ Cost$$

$$Revenue = Saleable\ Product * (Price - Selling\ Cost)$$

$$Total\ Cost = Mining\ Cost + Processing\ Cost$$

$$\Rightarrow Revenue = Mining\ Cost + Processing\ Cost$$

The mass recovery of ore material which defines the amount of concentrate recovered from a tonne of plant feed is a function of ROM P_2O_5, Fe_2O_3, and CaO grade on a dry basis.

For vertically integrated companies such as Mosaic, the product sold is not the concentrate generated by the beneficiation plant, but one of numerous performance, phosphate, feed, and industrial products generated by a chemical plant, each of which has different specifications and prices. The calculation of a concentrate "selling price", therefore, requires that the value added by the additional treatment that the phosphate concentrate undergoes at the chemical plant be "net-backed" to the mines. Net-back pricing is a complicated process that requires a complete understanding of the business and markets. The Mineral Reserves QP has, therefore, relied on Mosaic's calculation of net-back pricing in the determination of COG.

Using an anticipated net-back price of concentrate, the historical costs of mining, beneficiation, and selling, and the historical metallurgical recovery of P_2O_5 at CMT, a break-even ROM COG 5.3% P_2O_5ap was estimated to delineate ore from waste (Table 12.5). This COG was assumed at a constant value of R$ 1,939.57 per tonne of concentrate for 2023 and beyond and does not consider fluctuations in pricing.

As previously noted, the break-even COG calculated by Mosaic includes not only the cost to mine ore, but the cost to mine an increment of waste required to access ore. The marginal COG is used to determine the minimum grade at which the block can be processed and still be profitable. Unlike the breakeven COG, the marginal COG does not include the cost of mining the block, only the processing and downstream costs. The marginal COG is used in situations where a block with a grade lower than the breakeven COG must be mined in order to access underlying higher grade material. In this case, since the block must be removed anyway, then it is necessary to evaluate if it is more cost-efficient to treat the block as waste or to process the block as ore by comparing the grade of the block to the marginal COG.

Table 12.5: COG Calculations

Item	Breakeven COG	Marginal COG
Tonnes wet (t)	1	1
Tonnes dry (t)	0.87	0.87
Grade	5.30%	2.12%
P_2O_5 grade ROM[2]	4.6%	1.8%
Metallurgical Recovery (%)	60.6%	60.6%
P_2O_5 Concentrate Grade (%)	35.0%	35.0%
P_2O_5 content conc. (t)	0.03	0.01
Mass recovery (%)[3]	9.2%	3.7%
Concentrate (t)[4]	0.08	0.03
Total Cost[1]	154.5	61.8
Selling Price	1,939.6	1,939.6
Profit R$/t	0.0	0.0

Notes:
1. Total cost includes cost of mining waste and ore.
2. As required to result in a block value of zero.
3. Mass Recovery = ROM P_2O_5 x Metallurgical Recovery / P_2O_5 Concentrate.
4. Concentrate = Mass Recovery x ROM Ore (dry basis).

The calculations in Table 12.5 summarize the amount of apatite concentrate produced per wet tonne of ore. The grade tonnage curve shown in Figure 12.4 highlights about 490 Mt of ore within the block model that are at or above a 5.3% P_2O_5ap breakeven COG. While 5.3% is the breakeven COG, Mosaic continues to use a standard operational 5% P_2O_5ap COG to remain consistent with existing mine planning and reserve estimation. The quantity of reserves between the 5.0% and 5.3% P_2O_5 grade is estimated to be 5.1 Mt as shown in Table 12.6. This is approximately 1.1% of the total reserves for Tapira. The QP therefore believes that it is reasonable to continue using a 5.0% operational COG since only 1.1% of the total reserves are between 5.0% and 5.3% P_2O_5 and all of the reserves are above the marginal COG.

Table 12.6: Reserve between Operational COG and Breakeven COG

Reserve Tonnes	Cutoff 5.3% P_2O_5	Cutoff 5% P_2O_5	Difference	Variance
Proven	**145,987,479**	**147,241,066**	**1,253,587**	**0.85%**
isa	117,833,904	118,433,737	599,833	0.51%
rsi	28,153,575	28,807,329	653,754	2.27%
Probable	**308,687,330**	**312,580,976**	**3,893,646**	**1.25%**
isa	245,340,298	246,016,176	675,878	0.27%
rsi	63,347,032	66,564,800	3,217,768	4.83%
Total	**454,674,809**	**459,822,042**	**5,147,233**	**1.12%**
isa	363,174,202	364,449,913	1,275,711	0.35%
rsi	91,500,607	95,372,129	3,871,522	4.06%

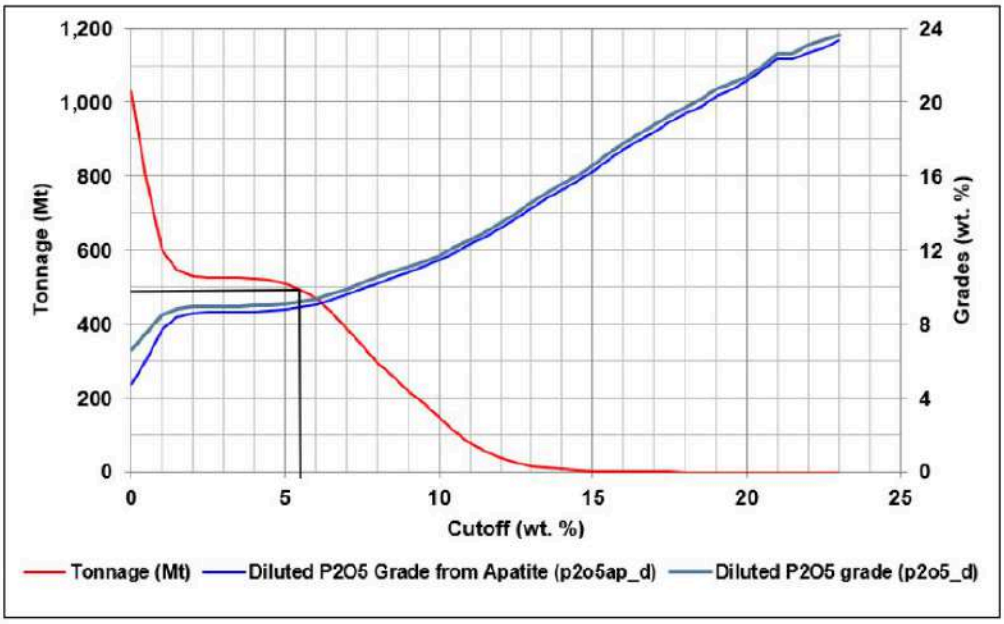


Figure 12.4: Tapira Grade-Tonnage Curve

12.2.6 Pit Optimization Methodology and Ultimate Pit Selection

The Tapira operation utilizes standard pit optimization methodology in Datamine NPV Scheduler to determine the extent of economically mineable reserves. The value of individual blocks is calculated in Datamine Studio OP using a script which assigns costs and, in the case of ore blocks, revenue. The script, which is based on a set of profit function parameters, assigns fixed and variable costs for the following:

1) Ore Mining
2) Waste Mining
3) Ore beneficiation

The script assigns value to the ore blocks based on the average revenue generated from a tonne of beneficiated phosphate rock. The value per tonne is calculated as revenue from the sale of fertilizer products minus the costs downstream of the beneficiation plant, i.e., the chemical plant costs to produce the saleable products. The pit optimization is based on the script used to place a value on the blocks.

The average transportation distance is estimated block by block in Datamine Studio OP using a script to assign fixed and variable distance definitions. The tool calculates the centroid distance of each block within a given area to its position within the overburden storage facility. Distance calculations account for the gradient of ramps and are prorated by a factor of 1.285, depending upon the assigned waste location to account for curves.

The total area available to be mined is 4,379 ha. As shown in Table 12.7, multiple mining concessions were used to constrain the pit optimization so that mining would not occur outside these limits. Additionally, two areas known as the East and West property and the INCRA Settlement were applied "obstacle limits" such that a minimum Net Present Value (NPV) must be achieved to mine in these areas.

Table 12.7: Tapira Pit Optimization Mining Concessions and Their Impact on Pit Optimization

Mining Concession	Comments
Mosaic Property Limits	Not used to constrain optimization
ANM 803.387/1974	Used to constrain pit optimization
ANM 810.330/1968	Used to constrain pit optimization
ANM 810.331/1968	Used to constrain pit optimization
ANM 812.362/1968	Used to constrain pit optimization
ANM 816.066/1970	Used to constrain pit optimization
ANM 821.674/1969	Used to constrain pit optimization
ANM 827.081/1972	Used to constrain pit optimization
ANM 831.405/1997	Used to constrain pit optimization
ANM 833.476/2012	Used to constrain pit optimization
East and West Property	Obstacle limit NPV > R$35M
INCRA Settlement	Obstacle limit NPV > R$180M

A nested pit analysis was performed in NPV scheduler using the economic inputs shown in Table 12.8. A series of profit factors were applied to the selling price at R$1,939.57 per tonne of concentrate to determine the highest and lowest value ore within the deposit. A summary of the resultant pit tonnages, best case NPV, and worst case NPV at profit factors ranging from 1% to 100% of the base ore block value is provided as Figure 12.5. Based on this nested pit analysis, Mosaic chose the pit with a profit factor of 46% (i.e., Pit 46) as the basis of the ultimate pit design described in Section 12.2.7.

Table 12.8: Tapira Economic Inputs

Description	Units	Basis	2023 Cycle[1]	2023 Cycle - Updated
Mining Cost				
Waste				
Fixed	R$/t	wet	5.64	15.94
Variable	R$/t-km	wet	1.90	1.72
Ore				
Fixed	R$/t	wet	3.37	3.31
Variable	R$/t-km	wet	1.70	1.80
Processing Cost	**R$/t**	**wet**	**21.85**	**18.13**
Selling Costs				
Cost of Chemical Plant	R$/t Concentrate	dry	969.94	840.05
SG&A	R$/t Concentrate	dry	22.66	22.44
R&D	R$/t Concentrate	dry	31.35	31.04
Sustaining	R$/t Concentrate	dry	167.75	172.45
Turn Around & Idle	R$/t Concentrate	dry	61.74	61.62
Total	R$/t Concentrate	dry	1,253.45	1,127.60
Selling Price	**R$/t Concentrate**	**dry**	**1,939.57**	**1,925.74**

Notes: 1. 2023 Cycle costs were used in the Pit Optimization exercise, but the updated costs reflect the most current cost estimates at the time of this report.

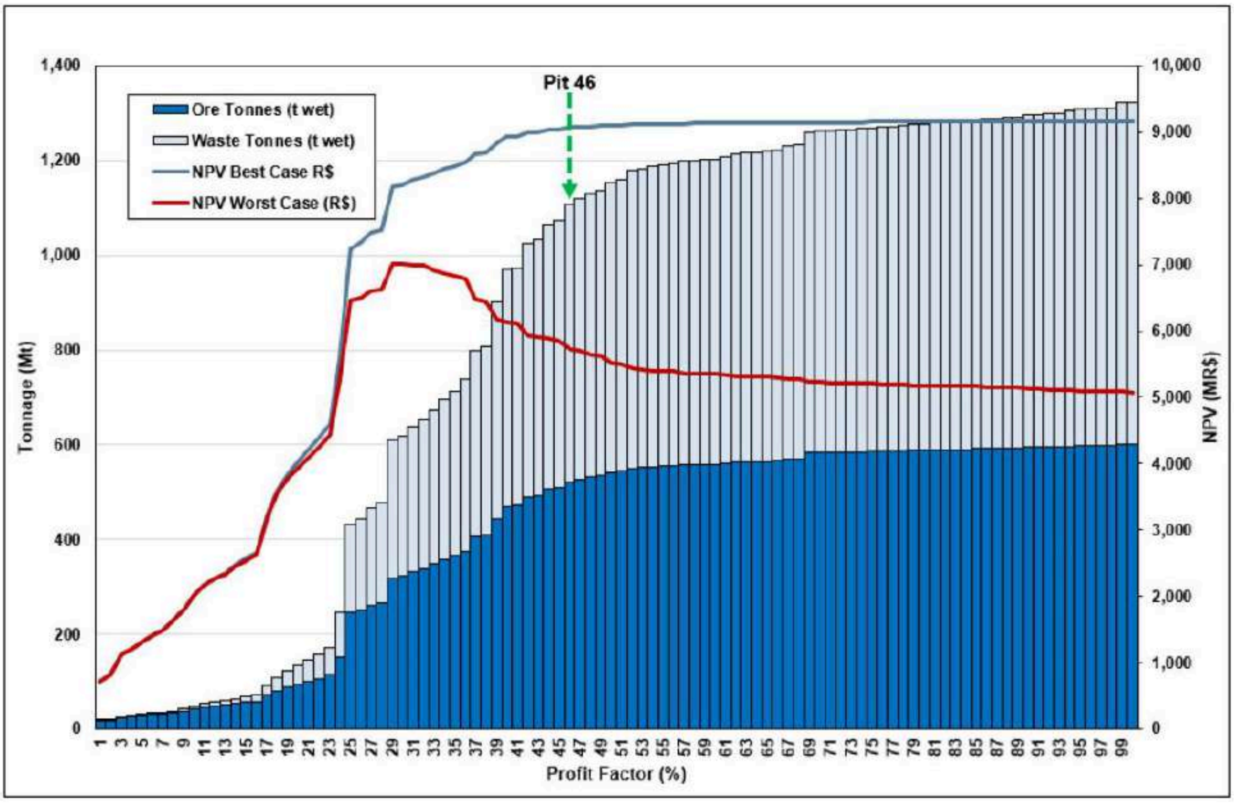
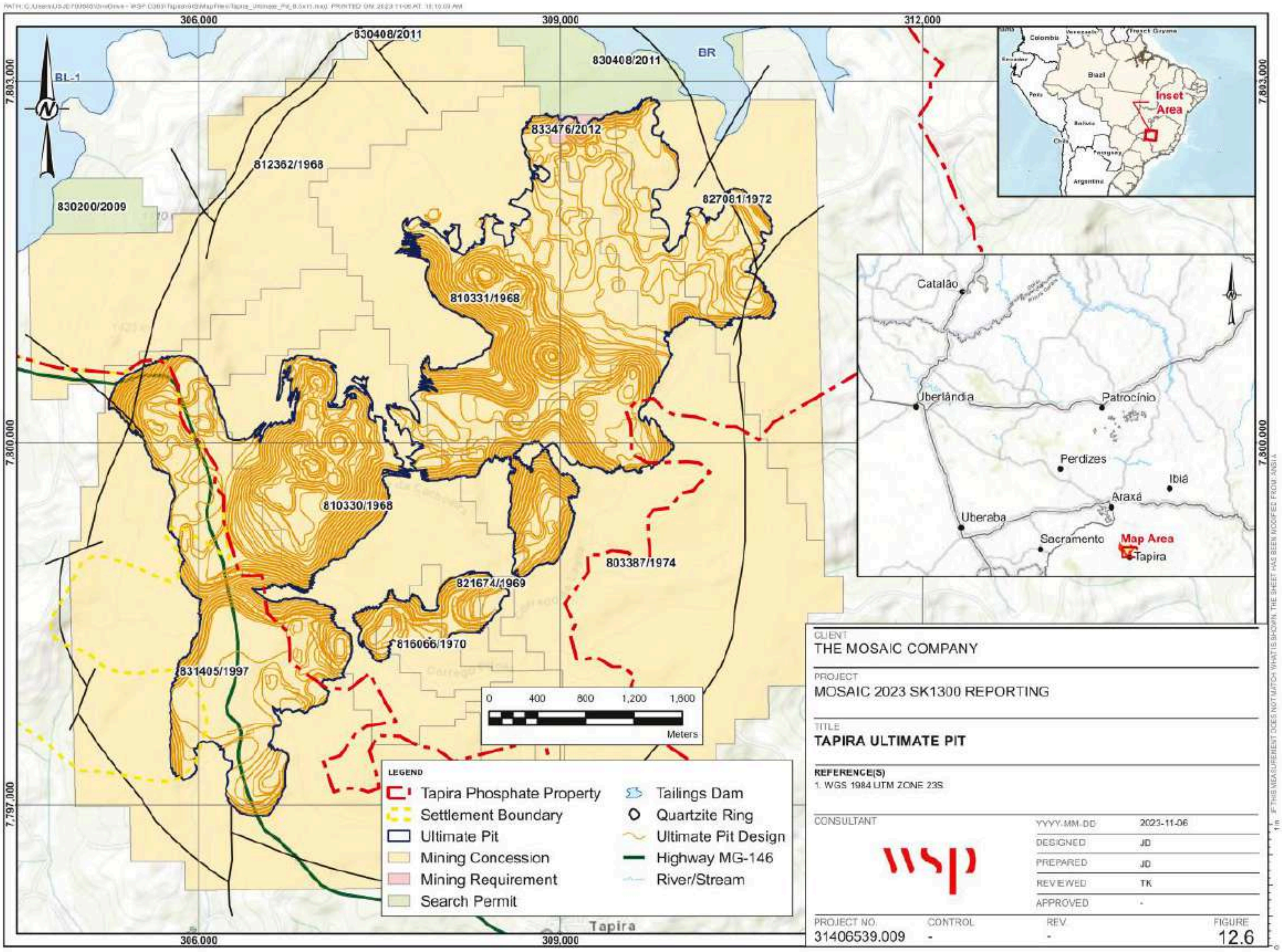


Figure 12.5: Summary of Tapira Nested Pit Analysis

12.2.7 Ultimate Pit Design

The ultimate pit design that forms the basis of the CMT Mineral Reserve estimate was based on Pit 46 selected from the nested pit analysis described in Section 12.2.6. The ultimate pit design considers geotechnical and hydrological factors that are described in Section 13.2. A map showing the design and extents of the ultimate pit is provided as Figure 12.6.


306,000
309,000
312,000
7,803,000
7,800,000
7,797,000
BL-1
BR
830408/2011
812362/1968
830200/2009
833476/2012
827081/1972
810331/1968
810330/1968
803387/1974
821674/1969
816066/1970
831405/1997
Tapira
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
Map Area
Tapira
Inset Area
0 400 800 1,200 1,600
Meters
LEGEND
Tapira Phosphate Property
Settlement Boundary
Ultimate Pit
Mining Concession
Mining Requirement
Search Permit
Tailings Dam
Quartzite Ring
Ultimate Pit Design
Highway MG-146
River/Stream
CLIENT
THE MOSAIC COMPANY
PROJECT
MOSAIC 2023 SK1300 REPORTING
TITLE
TAPIRA ULTIMATE PIT
REFERENCE(S)
1. WGS 1984 UTM ZONE 23S
CONSULTANT
wsp
YYYY-MM-DD 2023-11-06
DESIGNED JD
PREPARED JD
REVIEWED TK
APPROVED -
PROJECT NO. 31406539.009
CONTROL -
REV. -
FIGURE 12.6

12.3 Mineral Reserve Classification

This sub-section contains forward-looking information related to the Mineral Reserve classification for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes, grade, and classification.

For estimating the Mineral Reserves for Tapira, the following definition as set forth in the S-K 1300 Definition Standards adopted December 26, 2018, was applied.

Under S-K 1300, a Mineral Reserve is defined as:

> "... an estimate of tonnage and grade or quality of indicated and measured mineral resources that, in the opinion of the qualified person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted."

Mineral Reserves are subdivided into classes of Probable Mineral Reserves and Proven Mineral Reserves, which correspond to Indicated and Measured Mineral Resources, respectively, with the level of confidence reducing with each class. Mineral Reserves are always reported as the economically mineable portion of a Measured and/or Indicated Mineral Resource, and take into consideration the mining, beneficiation, metallurgical, economic, marketing, legal, environmental, infrastructure, social, and governmental factors (the "Modifying Factors") that may be applicable to the deposit.

12.4 Mineral Reserve Estimate

This sub-section contains forward-looking information related to Mineral Reserve estimates for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes and grade, modifying factors including mining and recovery factors, production rate and schedule, mining equipment productivity, commodity market and prices and projected operating and capital costs.

Based on the mining boundaries and modifying factors discussed above, the beneficiation plant recovery methods and factors discussed in Section 13.0, and the Economic Assessment, discussed in Section 19.0, CMT contains the economically minable Mineral Reserves listed in Table 12.6. The Mineral Reserves include approximately 443.6 Mt of ROM ore with a P_2O_5ap grade of 9.0%, that is expected to yield 67.7 Mt of Concentrate with a P_2O_5ap grade of 34.7%. The point of reference for Mineral Reserves is as delivered to the beneficiation plant as of December 31, 2023.

Table 12.9: CMT - Summary of ROM and Concentrate Mineral Reserves at December 31, 2023 Based on a Fixed Net-Back Price of Concentrate

Classification	ROM Tonnage, dry basis (Mt)	P_2O_5ap_d Grade (%)	ROM P_2O_5_d Grade (%)	Concentrate Tonnage, dry basis (Mt)	Total Concentrate P_2O_5 Grade (%)	Total Concentrate Mass Recovery (%)	Total Concentrate Metallurgical Recovery (%)
Proven	131.7	9.1	9.5	19.7	34.6	15.0	55.6
Probable	311.9	8.9	9.3	48.0	34.7	15.4	58.8
Grand Total	**443.6**	**9.0**	**9.3**	**67.7**	**34.7**	**15.3**	**57.8**

Notes:
The reference point for COG and pit optimization analysis is tonnes of concentrate at a price of R$1,939.57/tonne concentrate (2022 price evaluation).
COG of P_2O_5ap ≥ 5.0% and 0.9 ≤ RCP ≤ 3.0 was applied to Mineral Reserves.
Mineral Reserves are stated ROM as of December 31, 2023.

12.5 Qualified Person's Opinion on Risk Factors that could Materially Affect the Mineral Reserve Estimates

The Tapira mine has been in operation for over 40 years. Since this is a well-established operation, the deposit, mining, beneficiation, and environmental aspects of the Mine are very well understood. The knowledge for CMT is based on the collective experience of personnel from Mosaic site operations and technical disciplines gained during years of phosphate mining and ore beneficiation. This knowledge is supported by years of production data and observations from CMT.

The primary risks, that could materially affect the Mineral Reserve estimate, would include:

- A long-term, global material decrease in fertilizer product prices for sales that are not protected under long-term sales agreements
- Inflation rates with corresponding changes in capital and operating costs
- Production rates
- Exchange rates
- Tax rates
- Changing environmental regulations, and
- Change in political climate

13.0 MINING METHODS

13.1 Production Tasks

The Tapira mine has been in operation for over 40 years. Since this is an established operation, the deposit, mining, beneficiation, and environmental aspects of the Mine are very well understood. The geological knowledge for CMT is based on the collective experience of personnel from Mosaic site operations geology, mining, metallurgy, and other technical disciplines gained during years of phosphate mining in Brazil and within the PIAP. This knowledge is supported by years of production data and observations from CMT and other Mosaic surface mining operations in Brazil.

The ore at Tapira is recovered using open-pit conventional truck and shovel mining methods due to the proximity of the ore to the surface and the physical characteristics of the deposit. Mining operations progress in a four-step process, which includes clear and grub, drilling and blasting, overburden removal, and ore production. In the development phase, drainage and water control are established, and then the required infrastructure consisting of power, pipelines, and roadways is established.

13.1.1 Clear and Grub

Surface areas to be disturbed during the mining process are progressively cleared of vegetation using track dozers, as necessary.

13.1.2 Drilling and Blasting

Blasting at Tapira is conducted by Enaex Britante. The main explosive in use is emulsion and the blast design includes 4.5 to 5-inch diameter holes, in a 10-meter bench with a blasting grid ranging from 2.1 m x 2.5 m up to 3.8 m by 4.4 m. Typical powder factors range from 200 g/t up to around 330 g/t.st.

13.1.3 Overburden Removal and Storage

Waste is hauled to one of the 6 ex-pit overburden storage facilities, serving different areas and types of waste from the mine. Waste containing notably higher grades of titanium is hauled to one of the three titanium stockpiles. Overburden material is loaded by a Hitachi EX1200 or Hitachi EX2500 bucket-class hydraulic mining excavator loading Caterpillar (CAT) 777 90-tonne haul trucks or Komatsu 730E 180-tonne haul trucks. Dozers assist the loading fleet with general clean-up and material removal, as necessary. Overburden material is hauled to one of the ex-pit OSFs and dozers are used to push overburden down the sides of the OSFs on an as-needed basis. Total waste haulage routes using mine access ramps will vary over the life of the operation but generally range from about 2.5 km to 7.9 km.

13.1.4 Ore Production

Primary ore loading operations use bucket-class hydraulic mining excavators loading CAT 777 end-dump haul trucks of 90-t capacity. The excavators are supplemented by dozers. Ore material is hauled up the active mining face and ex-pit to the beneficiation plant. Total ore haulage routes using mine access ramps will vary over the life of the operation but range from about 3.4 km to 8.0 km. Ore material is unloaded at a stockpile at the beneficiation plant where is it further handled by beneficiation plant front-end loaders. After it is dropped at the beneficiation plant, the ore material is crushed, sized, and stockpiled for further beneficiation.

Figure 13.1 demonstrates a typical open-pit operation utilizing excavators in backhoe configuration and haul trucks to remove both ore and overburden. The general sizing and depth of the mine at most stages of the operation requires multiple working benches on the advancing faces. This will allow consistent mine development with a continued pushback and assist with continuous ore deliveries to the beneficiation plant.

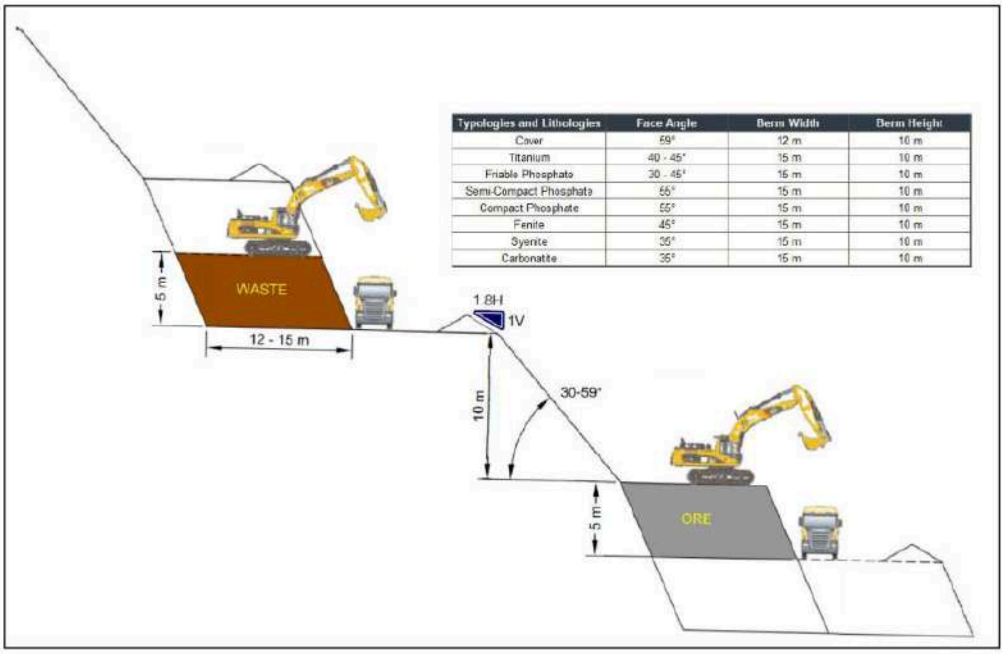


Figure 13.1: Tapira Typical Mining Configuration

13.2 Parameters Relative to the Mine Design and Plans

This sub-section contains forward-looking information related to mine design for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geotechnical and hydrogeological.

13.2.1 Geotechnical

The geotechnical units at Tapira are defined by the lithology and weathering models. The geotechnical units found at Tapira are predominantly friable, without control of discontinuities or anisotropy in the mechanical behavior of these materials. The stability of the final pit slopes was analyzed in 2D using limit equilibrium methods and considered a rotational mode of failure, which is appropriate for the characteristics of the materials found in Tapira. The resistance parameters used in the stability analysis are summarized in Table 13.1.

Table 13.1: Geotechnical Parameters used in the Stability Analysis

Lithology	Weathering	γ nat (kN/m³)	γ sat (kN/m³)	Triaxial CIU Nat		Triaxial CIU Sat	
				c' (kPa)	φ' (°)	c' (kPa)	φ' (°)
Waste Dump / PDE		19	-	10	32	-	-
Cover	Aloterite	18	20	50	29	42	32
Titanium	Isalterite Topo	20	21	40	30	30	33
Bebedourite / Phoscrete	Friable Phosphate (bottom isalterite)	22	22	23	29	21	32
Bebedourite / Phoscrete	Semi-compact Phosphate (Semi-weathered Rock)	24	22	100	35	50	35
Bebedourite / Phoscrete	Compact Phosphate (Fresh Rock)	24	24	200	35	100	35
Syenite / Kaolinized Soils		22	22	37	31	35	29
Fenite		17	-	31	25	-	-

Notes: γ nat – Natural Density
γ sat – Saturated Density
CIU – Consolidated Isotropic Undrained
c' – cohesion
φ – friction angle

The results of the stability analysis indicate that at an inter-ramp and global scale the slopes are stable, with factors of safety exceeding the acceptance criteria. At a local scale, benches in saturated condition are unstable and dewatering will be required to locally lowering the phreatic surface by 5 m to obtain a Factor of Safety (FOS) greater than 1.3 at a bench scale. The design parameters for the Tapira pit are shown in Table 13.2.

Table 13.2: Proposed Geometric Parameters for Tapira Pit Design

Typologies and Lithologies	Face Angle	Berm Width	Berm Height
Cover	59°	12 m	10 m
Titanium	40 - 45°	15 m	10 m
Friable Phosphate	30 - 45°	15 m	10 m
Semi-Compact Phosphate	55°	15 m	10 m
Compact Phosphate	55°	15 m	10 m
Fenite	45°	15 m	10 m
Syenite	35°	15 m	10 m
Carbonatite	35°	15 m	10 m

The Tapira geotechnical model is divided into 7 different zones, with the possibility of further subdivision into 4 geotechnical sectors. The divisions are based upon the unique combination of lithology and weathering in each area, with recommended design parameters as shown in Table 13.3.

Table 13.3: Recommended Design Parameters for Tapira Final Pit

Mining Area	Sector	Weathering	Lithology	Description	Bench Height (m)	Face Angle (a)	Berm (m)	Slope Angle (b)
Model Field>>>	gt_sector	id_intem	id_lito			gt_face	gt_berm	gt_slope
ZONE I		100		Alcoterite	10	59	12	29
ZONE II	0	1200		Top Isalterite - General	10	45	15	22
	3	1200		Top Isalterite - Green Sector				
	4	1200		Top Isalterite - Red Sector				
	0	2200		Base Isalterite - General				
	1	2200		Base Isalterite - Blue Sector				
		0		Host Rock and Fenite				
ZONE III	1	1200		Top Isalterite - Blue Sector	10	40	15	20
	2	1200		Top Isalterite - Orange Sector				
ZONE IV	2	2200		Base Isalterite - Orange Sector	10	30	15	17
	3	2200		Base Isalterite - Green Sector				
ZONE V	4	2200		Base Isalterite - Red Sector	10	35	15	19
			6	Sienite Lithology				
			5	Carbonitite				
ZONE VI		300		Semi-Weathered Rock (RSI)	10	55	15	24
		400		Fresh Rock (RSA)				
ZONE VII			41	Dumps	10	27	15	16

13.2.2 Hydrogeological

Hydrological and Hydrogeological drilling, sampling, and characterizations are described in Section 7.3 of this TRS.

The groundwater flow pattern within the complex is generally to the south toward the outlet of the Córrego da Mata Basin. Flow inversions sometimes occur in the northern portion (with natural flow in the Northeast direction toward the BR-01 tailings dam) and in the north sector of the pit where the natural flow towards the Córrego da Mata is reversed in the direction of the Córrego Paiolzinho due to the mining operations. In the region of Front 2/Bigorna, the current water level is between 1,220 and 1,130 meters influenced by the mining operations and pumping of wells. In the northeast region of the pit (Fronts 4, 5, and 6) the water level is predominantly between 1,280 and 1,310 meters influenced by the lowering of water level from the mining advance (without pumping). In the region of the dams, the underground water level and consequently its flow is influenced by the formation of lakes along drainage channels. Around the BL-01 dam the water level is between 1,280 and 1,160 meters where the underground flow is northwest towards the Retiro Stream. The groundwater flow in the region around the BR-01 tailings dam converges into the lake.

The mine's dewatering system consists of 11 deep tubular wells, with water levels monitored daily. Additionally, there are 27 spillways with flow rate monitoring, 10 of which lie within the Alkaline Complex. Historical flow information used in the model development and calibration indicates that the volumes pumped by the wells are predominantly located in a range of orders of magnitude from 20 to 150 m^3 by month throughout the monitoring period from May 2010 to July 2022. Future mining plans will require an increase in the dewatering rates. Monthly dewatering flows in the simulated future mining plans were around 500 m^3/hr for the dry months and over 1,000 m^3/hr for the rainy months. The projected dewatering flow rates must be produced by dewatering wells, sump pumping, and surface drainage. For a large portion of the mining area, dewatering should occur predominantly by gravity. Water above elevation 1,220 is drained by gravity while below this level, the water drains to a sump and requires pumping for removal. Surface water runoff from the yards and service locations is collected by open-air drainage systems (channels).

Storm contact water collected from the overburden storage facility collector channels as well as other mine contact water is drained to the BL1 impoundment. Water discharges from the BL1 impoundment to the BA3 impoundment for water solids settlement and clarification and then discharged to the BRI impoundment.

The BR impoundment receives the beneficiation plant fines tailings and provides make-up water back to the beneficiation plant while collecting and storing the fines. Overflow water discharges to the BD5 impoundment for solids settling and water clarification. Mine dewatering and mine sediment collection pond water is discharged to the BD2 collector impoundment and then also discharged to BD5 for clarification. Clarified water is discharged to the BRI impoundment.

All water discharged off the property is through the BRI overflow into the nearby river.

13.3 Mine Design Factors

This sub-section contains forward-looking information related to mine design and production plans for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including mining strategy and production rates, expected mine life and mining unit dimensions.

Mine planning at CMT follows the typical standards for open-pit mining. The processes involved include:

1. Application of dilution and recovery factors
2. Development of a value for each of the blocks in the model
3. Estimation of COG
4. Perform pit optimization and select optimal pit shell to be used for the basis of the ultimate pit design
5. Run NPV scheduler to provide guidance on phase designs and mine development
6. Ultimate pit design
7. Development of phase designs
8. Development of mine planning targets and constraints, and
9. Preparing Deswik based LOM plan

The unconstrained theoretical ultimate pit shell derived from the pit optimization process was modified to incorporate more detailed design specifications to transform the pit shell into a functional open-pit mine. The resulting pit design was referred to as the Operational Pit. The operational pit was also limited by the following constraints:

1. Mining restrictions, including legal and environmental impacts
2. Overall slope angle, and
3. Operational design characteristics, including ramp locations and grades, OSF locations, mining width and height, and other practical mining considerations, given pit geometry.

The design road width of 15 m is approximately 2.5 times the width of the largest truck, the CAT 777. This allows for two-way traffic with an adequate separation distance along main haulage routes. Access ramps are designed with a maximum slope of 8%. Benches are designed to have a 12 m to 15 m width and a 10-m height, with varying face angles depending upon the mine area, the lithology, and weathering as noted in Table 13.3. Given the ultimate pit limits, annual waste and ore tonnages were generated for the CMT mine plan periods with corresponding mining production sequences. The mine design was split into 28 phases. Figure 13.2 shows where the phases are located within the ultimate pit boundaries and Table 13.4 shows the corresponding tonnages produced by each phase over the LOM.

Table 13.4: Mining Quantities by Phase through 2057

Phase Name	Ore	Titanium	Waste
	MTonnes - Wet	MTonnes - Wet	MTonnes - Wet
Phase 01	4.58	0.00	2.45
Phase 02	0.33	1.49	8.14
Phase 03	3.89	1.76	7.99
Phase 04	4.19	2.58	12.95
Phase 05	2.67	0.44	1.27
Phase 06	5.34	0.60	12.46
Phase 07	3.01	0.00	0.30
Phase 08	0.00	0.20	1.03
Phase 09	1.62	2.32	12.03
Phase 10	1.06	0.01	0.10
Phase 11	0.19	0.00	0.20
Phase 12	4.87	5.30	3.09
Phase 14	8.58	1.55	21.87
Phase 14-1	5.39	0.51	6.01
Phase 14-2	9.47	0.41	38.83
Phase 15	25.22	14.96	48.13
Phase 16	23.08	3.53	16.35
Phase 17	31.40	5.52	42.14
Phase 18	6.09	4.22	7.46
Phase 19	15.03	15.36	6.95
Phase 21	21.41	10.43	13.17
Phase 22	8.08	0.00	7.83
Phase 23	24.07	1.22	23.53
Phase 24	60.39	1.44	51.66
Phase 25	47.33	22.78	42.71
Phase 26	44.99	23.15	26.45
Phase 27	28.46	8.32	10.68
Phase 28	114.30	8.01	94.77
Total	505.04	136.11	520.55

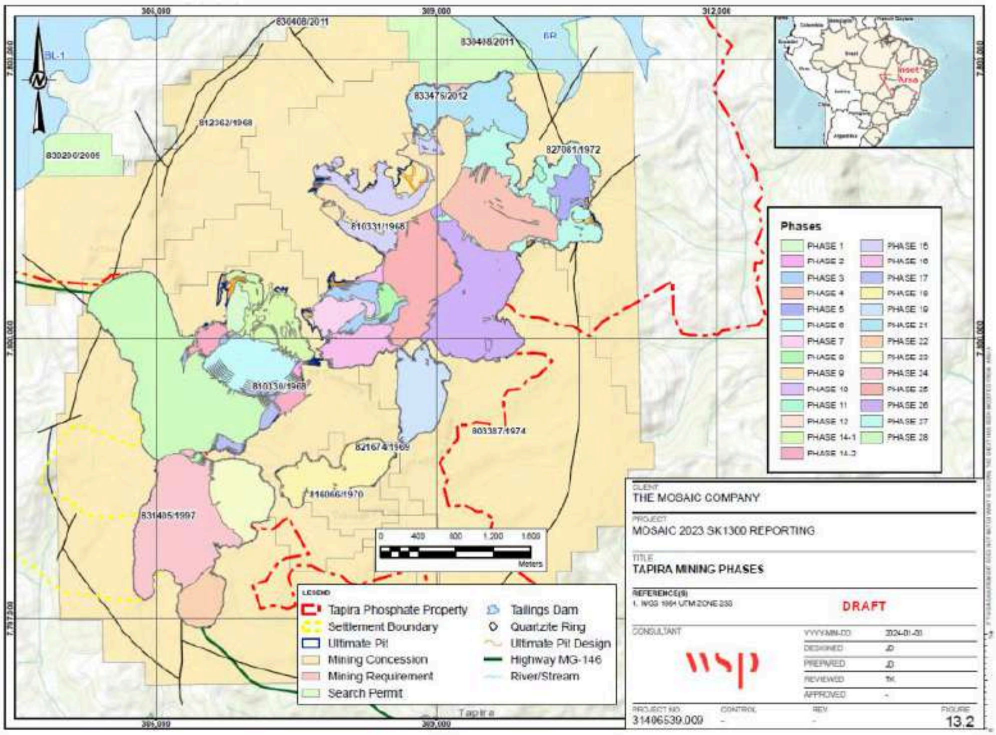


Figure 13.2: Mining Phases

13.3.1 Mining Strategy and Production Rate

Annual concentrate production at Tapira is scheduled to be approximately 2.0 Mtpy with a corresponding ore production of approximately 13.5 Mtpy (dry basis). The annual waste tonnage generally decreases over the mine life with about 37 Mt of waste in 2024-2029 down to around 23 Mt of waste from 2030-2044. Annual waste tonnages decrease further to less than 6 Mt in 2050-2054. The annual LOM plan production summary statistics are shown on Table 13.5: Tapira LOM Plan Production Statistics

. Annual plant feed, mass recovery, and plant feed grade are shown in Figure 13.3, annual concentrate production is shown in Figure 13.4, and annual waste and ore quantities are shown in Figure 13.5.

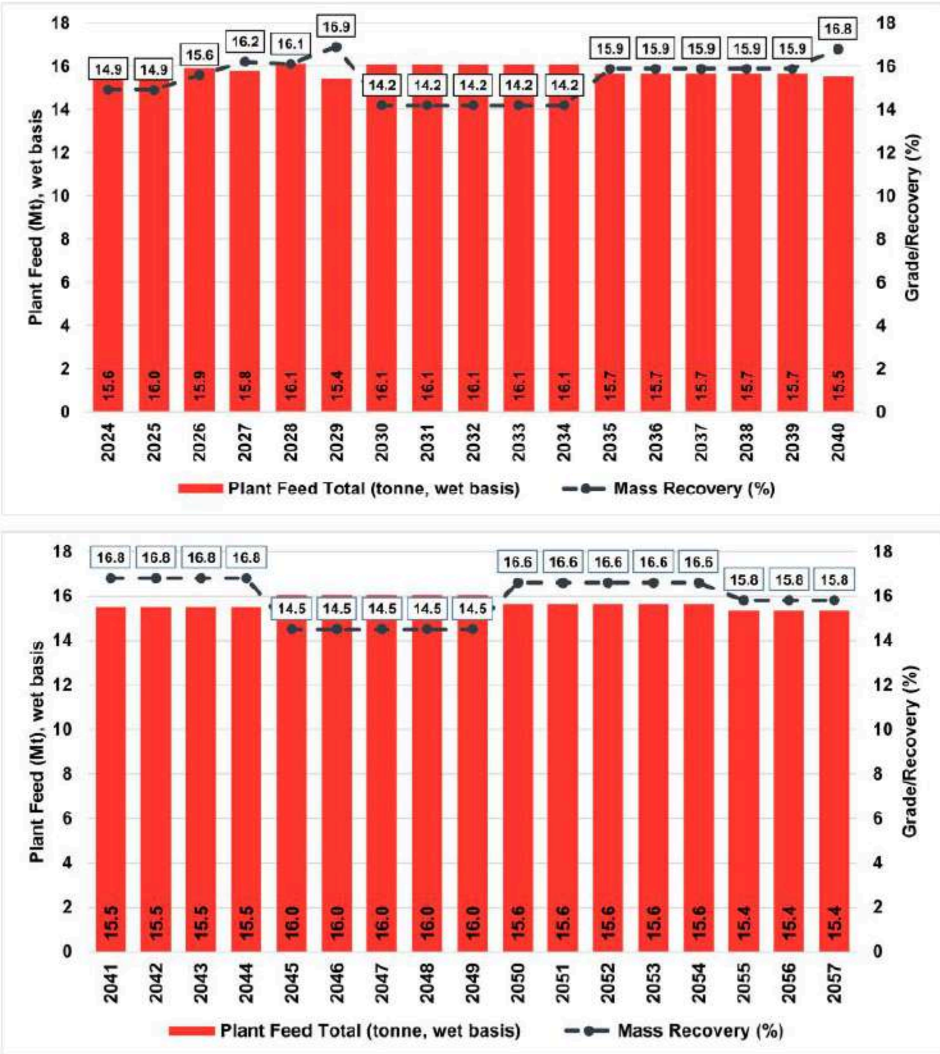
Table 13.5: Tapira LOM Plan Production Statistics

Description	Unit	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Plant Feed Total	Mt (wet)	**794.07**	15.61	16.00	15.91	15.80	16.14	15.42	16.10	16.10	16.10	16.10	16.10	15.68
Plant Feed Total	Mt (dry)	**444.32**	12.94	13.26	13.19	13.10	13.38	12.79	13.35	13.35	13.35	13.35	13.35	13.00
Concentrate	Mt (dry)	**69.45**	1.93	1.98	2.06	2.12	2.16	2.16	1.90	1.90	1.90	1.90	1.90	2.07
Mass Recovery	%	**15.63**	14.93	14.91	15.60	16.21	16.11	16.91	14.20	14.20	14.20	14.20	14.20	15.89
CaO	%	**15.19**	16.93	14.18	11.07	12.42	13.92	12.62	13.74	13.74	13.74	13.74	13.74	15.13
Fe_2O_3	%	**25.44**	26.64	27.66	29.00	30.96	27.76	30.65	27.26	27.26	27.26	27.26	27.26	26.05
MgO	%	**5.48**	5.83	5.04	3.62	2.78	3.82	2.93	4.17	4.17	4.17	4.17	4.17	4.17
P_2O_5ap	%	**8.97**	9.30	8.94	8.78	8.72	8.82	9.03	8.62	8.62	8.62	8.62	8.62	9.65
RCP	%	**1.69**	1.82	1.59	1.26	1.42	1.58	1.40	1.59	1.59	1.59	1.59	1.59	1.57
Waste Mined	Mt (wet)	**666.17**	39.17	36.64	39.00	37.00	38.30	37.00	22.00	22.00	22.00	22.00	22.00	21.88
Titanium	Mt (wet)	**137.81**	2.92	6.95	7.88	16.20	11.23	15.06	9.47	9.47	9.47	9.47	9.47	1.68
Waste	Mt (wet)	**677.91**	36.24	29.69	31.12	20.80	27.07	21.94	12.53	12.53	12.53	12.53	12.53	20.20
Stripping Ratio	t/t	**1.25**	2.34	2.19	2.37	2.21	2.41	2.33	2.33	2.33	2.33	2.33	2.33	1.31
Total Movement	Mt (wet)	**1,201.14**	55.93	53.40	55.76	53.76	54.26	52.86	39.49	39.49	39.49	39.49	39.49	38.64

Description	Unit	Total	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Plant Feed Total	Mt (wet)	**794.07**	15.68	15.68	15.68	15.68	15.52	15.52	15.52	15.52	15.52	16.05	16.05
Plant Feed Total	Mt (dry)	**444.32**	13.00	13.00	13.00	13.00	12.87	12.87	12.87	12.87	12.87	13.31	13.31
Concentrate	Mt (dry)	**69.45**	2.07	2.07	2.07	2.07	2.16	2.16	2.16	2.16	2.16	1.92	1.92
Mass Recovery	%	**15.63**	15.89	15.89	15.89	15.89	16.80	16.80	16.80	16.80	16.80	14.50	14.50
CaO	%	**15.19**	15.13	15.13	15.13	15.13	13.65	13.65	13.65	13.65	13.65	17.15	17.15
Fe_2O_3	%	**25.44**	26.05	26.05	26.05	26.05	25.40	25.40	25.40	25.40	25.40	23.71	23.71
MgO	%	**5.48**	4.17	4.17	4.17	4.17	5.17	5.17	5.17	5.17	5.17	7.62	7.62
P_2O_5ap	%	**8.97**	9.65	9.65	9.65	9.65	8.37	8.37	8.37	8.37	8.37	9.12	9.12
RCP	%	**1.69**	1.57	1.57	1.57	1.63	1.69	1.63	1.63	1.63	1.63	1.88	1.88
Waste Mined	Mt (wet)	**666.17**	21.88	21.88	21.88	21.88	22.63	22.63	22.63	22.63	22.63	14.78	14.78
Titanium	Mt (wet)	**137.81**	1.68	1.68	1.68	1.68	2.69	2.69	2.69	2.69	2.69	1.48	1.48
Waste	Mt (wet)	**677.91**	20.20	20.20	20.20	20.20	49.85	49.85	49.85	49.85	49.85	13.30	13.30
Stripping Ratio	t/t	**1.25**	1.31	1.31	1.31	1.31	1.00	1.00	1.00	1.00	1.00	0.48	0.48
Total Movement	Mt (wet)	**1,201.14**	38.64	38.64	38.64	38.64	37.44	37.44	37.44	37.44	37.44	30.83	30.83

Description	Unit	Total	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057
Plant Feed Total	Mt (wet)	**794.07**	16.05	16.05	16.05	15.64	15.64	15.64	15.64	15.64	15.36	15.36	15.36
Plant Feed Total	Mt (dry)	**444.32**	13.31	13.31	13.31	12.97	12.97	12.97	12.97	12.97	12.73	12.73	12.73
Concentrate	Mt (dry)	**69.45**	1.92	1.92	1.92	2.15	2.15	2.15	2.15	2.15	2.01	2.01	2.01
Mass Recovery	%	**15.63**	14.50	14.50	14.50	16.60	16.60	16.60	16.60	16.60	15.80	15.80	15.80
CaO	%	**15.19**	17.15	17.15	17.15	17.24	17.24	17.24	17.24	17.24	17.93	17.93	17.93
Fe_2O_3	%	**25.44**	23.71	23.71	23.71	22.89	22.89	22.89	22.89	22.89	19.73	19.73	19.73
MgO	%	**5.48**	7.62	7.62	7.62	7.52	7.52	7.52	7.52	7.52	7.39	7.39	7.39
P_2O_5ap	%	**8.97**	9.12	9.12	9.12	9.23	9.23	9.23	9.23	9.23	8.77	8.77	8.77
RCP	%	**1.69**	1.88	1.88	1.88	1.87	1.87	1.87	1.87	1.87	2.04	2.04	2.04
Waste Mined	Mt (wet)	**666.17**	14.78	14.78	14.78	6.22	6.22	6.22	6.22	6.22	0.50	0.50	0.50
Titanium	Mt (wet)	**137.81**	1.48	1.48	1.48	0.19	0.19	0.19	0.19	0.19	0.00	0.00	0.00
Waste	Mt (wet)	**677.91**	13.30	13.30	13.30	6.03	6.03	6.03	6.03	6.03	0.50	0.50	0.50
Stripping Ratio	t/t	**1.25**	0.48	0.48	0.48	0.26	0.26	0.26	0.26	0.26	0.04	0.04	0.04
Total Movement	Mt (wet)	**1,201.14**	30.83	30.83	30.83	21.03	21.03	21.03	21.03	21.03	12.67	12.67	12.67

Notes: Values for 2030-2054 were provided in 5-year increments. The mass totals in this figure distribute the 5-year totals evenly over each year. The average qualities and mass recovery for the 5-year increment were applied over each year of the 5-year period. Values for 2055-2057 were provided as a 3-year increment. The mass totals in this figure distribute the 3-year totals evenly over each year. The average qualities and mass recovery for the 3-year increment were applied over each year of the 3-year period.



Notes: Values for 2030-2054 were provided in 5-year increments. The plant feed totals in this figure distribute the 5-year totals evenly over each year. The average mass recovery for the 5-year increment was applied over each year of the 5-year period. Values for 2055-2057 were provided as a 3-year increment. The plant feed totals in this figure distribute the 3-year totals evenly over each year. The average mass recovery for the 3-year increment was applied over each year of the 3-year period.

Figure 13.3: Annual Ore Plant Feed and Grade with Mass Recovery

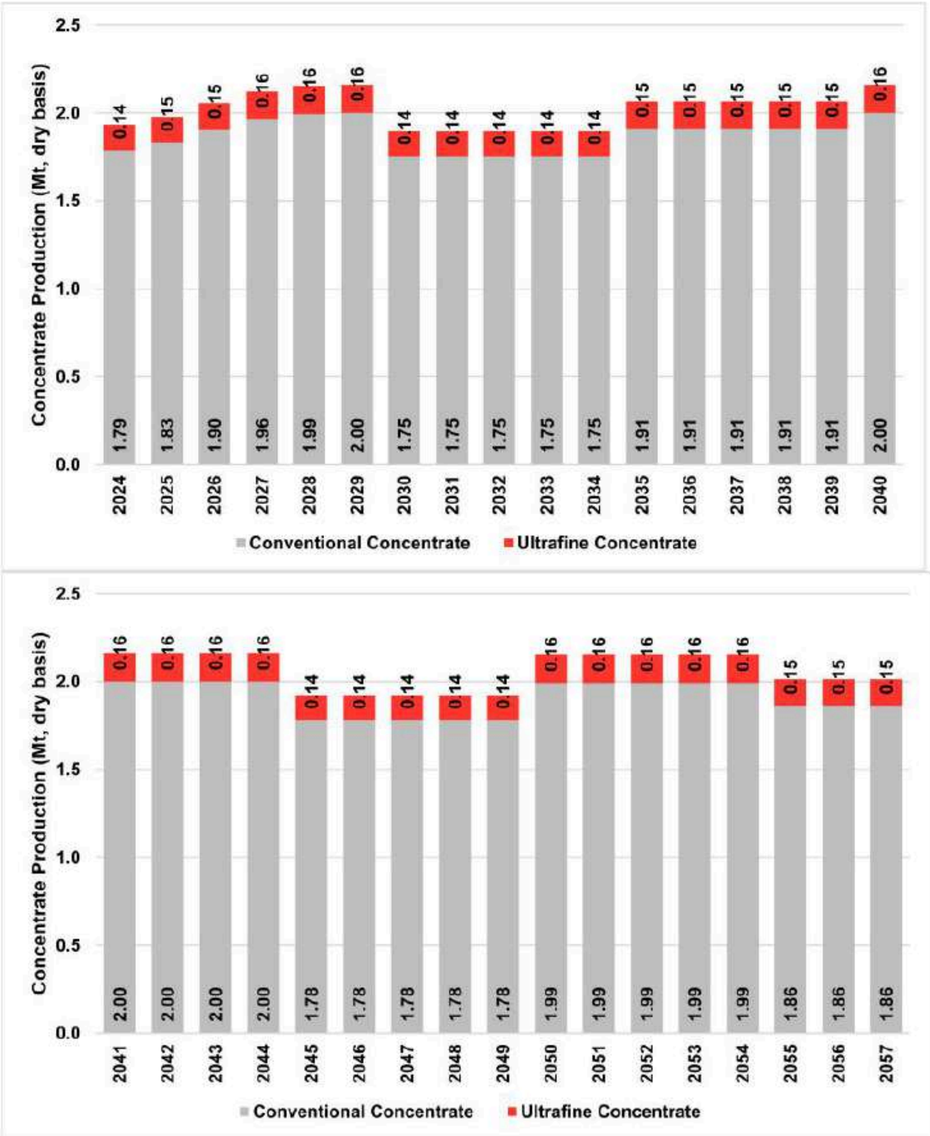


Figure 13.4: Annual Concentrate Production

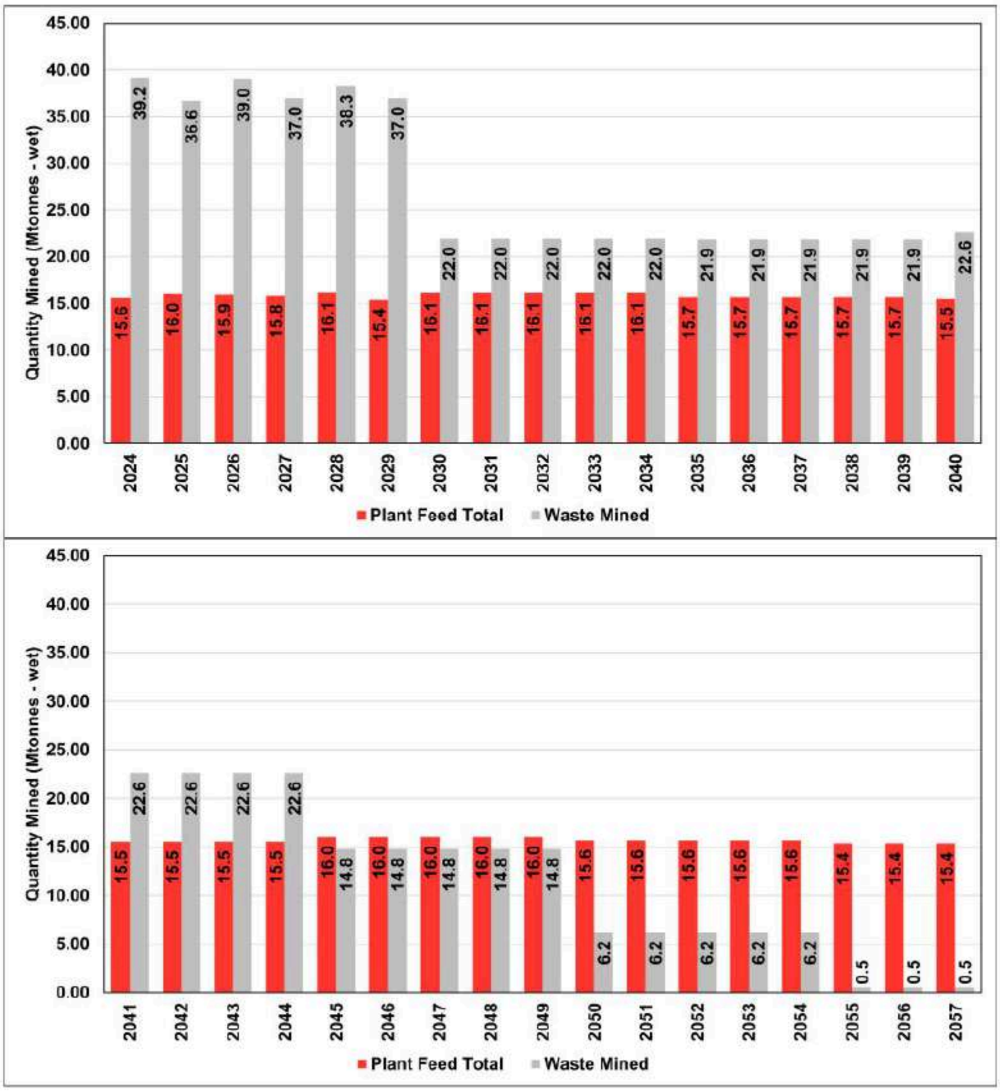


Figure 13.5: LOM Plan Annual Production (ROM)

13.3.2 Expected Mine Life

Current Tapira Mine life is approximately 34 years, ending in 2057, with an average ROM ore production rate of 13.1 Mtpy (dry) resulting in annual concentrate production of about 2.0 Mtpy.

13.3.3 Mining Unit Dimensions

The operational pit will have benches that are 12-15 m wide by 10 m high to match the digging profiles of the selected excavators. Split benches are also incorporated into the mine design at a height of 5 m, and decoupling berms are incorporated into the mine design for geotechnical stability, as needed. The face angles and overall slope angles vary by geotechnical sector and are laid out in Table 13.3. Haul roads will have a minimum width of 15 m and a maximum ramp grade of 8%.

13.4 Stripping and Backfilling Requirements

Phosphate ore at the Tapira Mine is hauled to the primary crusher while titanium ore is hauled to a stockpile for storage and possible future beneficiation. Waste is hauled to one of six ex-pit OSFs. As the mine progresses, the main haul roads are planned to be moved over time to stay near the edge of the ultimate pit. The design specifications of each OSF are listed in Table 13.6Table 13.6: OSF Design Specifications

.

Table 13.6: OSF Design Specifications

Waste Dump	Phase	Capacity	Bench Height	Berm Width	Slope Face Angle
		Mm^3	m	m	
E04	1	9.08	10	10	1V : 2H
E06	1	30.18	10	10	1V : 2H
	2	58.11	10	10	1V : 2H
E07	1	4.85	10	10	1V : 2H
	2	11.55	10	10	1V : 2H
E08	1	3.14	10	10	1V : 2H
	2	11.95	10	10	1V : 2H
	3	37.04	10	10	1V : 2H
	4	67.90	10	10	1V : 2H
	5	59.26	10	10	1V : 2H
E09	1	11.72	10	10	1V : 2H
	2	15.90	10	10	1V : 2H
	3	28.48	10	10	1V : 2H
T04	1	7.93	10	10	1V : 2H
	2	44.65	10	10	1V : 2H
T05	1	9.83	10	10	1V : 2H
	2	20.46	10	10	1V : 2H
T06	1	89.93	10	10	1V : 2H
PXT	1	1.02	10	10	1V : 2H

Average annual one-way haulage distances for the LOM Plan are estimated in Deswik using the Landfill and Haulage Simulator (LHS) module for the defined waste and ore haulage routes and considering the operations schedules of the OSFs. A summary of average one-way haulage distances for the waste and titanium for the LOM Plan is provided in Table 13.7.

Table 13.7: LOM Plan Average Waste Haul Distances (km)

Deposit	2024	2025	2026	2027	2028	2029	2030-2034
PDE E06	2.0	2.4	2.2	-	-	-	4.0
PDE E07	2.0	2.3	3.7	-	-	4.3	-
PDE E08	3.2	2.7	4.6	-	2.1	2.2	6.3
PDE E09	-	-	2.7	4.0	3.8	3.8	3.6
Waste Average	**2.9**	**2.5**	**3.6**	**4.0**	**3.8**	**4.1**	**5.2**
T04	5.3	7.2	5.7	-	5.2	-	8.1
T05	5.2	3.6	4.0	3.0	4.6	4.6	4.5
T06	-	-	-	-	-	2.0	3.4
Titanium Average	**5.3**	**4.6**	**4.6**	**3.0**	**4.6**	**4.0**	**5.2**

Deposit	2035-2039	2040-2044	2045-2049	2050-2054	2055-2057	LOM Avg
PDE E06	4.1	7.1	7.9	-	-	**5.0**
PDE E07	-	-	-	-	-	
PDE E08	4.6	6.1	-	4.1	5.8	
PDE E09	6.7	-	-	-	-	
Waste Average	**5.1**	**6.4**	**7.9**	**4.1**	**5.8**	
T04	8.9	7.3	6.2	7.3	-	**4.8**
T05	4.7	-	-	-	-	
T06	3.3	3.3	3.3	-	-	
Titanium Average	**4.9**	**7.2**	**6.0**	**7.3**	**-**	

13.5 Mining Fleet, Machinery, and Personnel Requirements

This sub-section contains forward-looking information related to equipment selection for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including labor and equipment availability and productivity.

The mine uses a combination of equipment for material extraction and transportation. The production equipment is leased. Currently, the largest haul truck on site has a capacity of approximately 196 tonnes and is used for waste haulage. Fleet sizing is estimated based on historical performance. Historical loading times and delays by equipment fleets are tracked and used to estimate loading productivity. The maximum hourly truck productivity is calculated by dividing the truck capacity by the cycle time. The capacity is then multiplied by the utilization factor and the availability factor and is then derated by a factor of 5% to 10% to account for non-productive engine hours to get an effective hourly productivity per unit. The total material movement required is divided by the effective hourly productivity to yield the minimum required fleet size. The availability for the leased mining equipment is required to be at least 85%, and utilization ranges from 56% to 65%. Excavator productivity estimates include dividing the associated truck capacity by the truck loading and maneuvering time and incorporate an over-capacity factor and idle time.

The current fleet consists of approximately 49 trucks and will increase to a maximum of 52 in 2029. The fleet size remains around 50 trucks until 2045 when it decreases to 39 trucks and then down to roughly 30 trucks in the latter years of the mine plan. The excavator fleet size is generally between 5 and 12 excavators, with 3-4 excavators assigned to ore and a variable amount of excavators used for mining titanium and waste removal depending on the material movement requirements. Annual fleet sizes for excavators and haul trucks are shown in Figure 13.6 and Figure 13.7, respectively. For the support equipment, the fleet size is maintained throughout the LOM with the support equipment specified below:

- CAT 416E – Backhoe Loader
- CAT 420E – Backhoe Loader
- CAT 140K – Motor Grader
- CAT 320 - Excavator
- CAT 950H – Wheel Loader
- CAT 966H – Wheel Loader
- CAT D6 – Dozer, and
- Volvo EC700 – Excavator

The operational plan of the Tapira Mine includes the use of 4 teams on 12-hour shifts, operating 24 hours per day, 365 days per year with a staff of approximately 240 hourly employees. To calculate the required personnel, the annual count of loading/transportation equipment is multiplied by the number of teams (4), and the equipment availability, and then increased by 13.3% to account for absenteeism. The annual estimate of the required workforce size is shown in Figure 13.8.

The operational management structure includes a General Manager that is over the whole complex and is assisted by the Mine Manager, Plant Manager, Maintenance Manager, ADM Supervisor, TO Leader, Site Secretary, and Performance Analyst. The Mine Manager oversees mining operations including the Production and infrastructure supervisors, mining technicians and engineers, and any interns on site. Production supervisors on each shift are responsible for mining technicians and the Level I, Level II, and Level III equipment operators on each shift. The Beneficiation Plant Manager oversees beneficiation plant production supervisors for each shift, as well as a development/control supervisor and a beneficiation plant mining engineer.

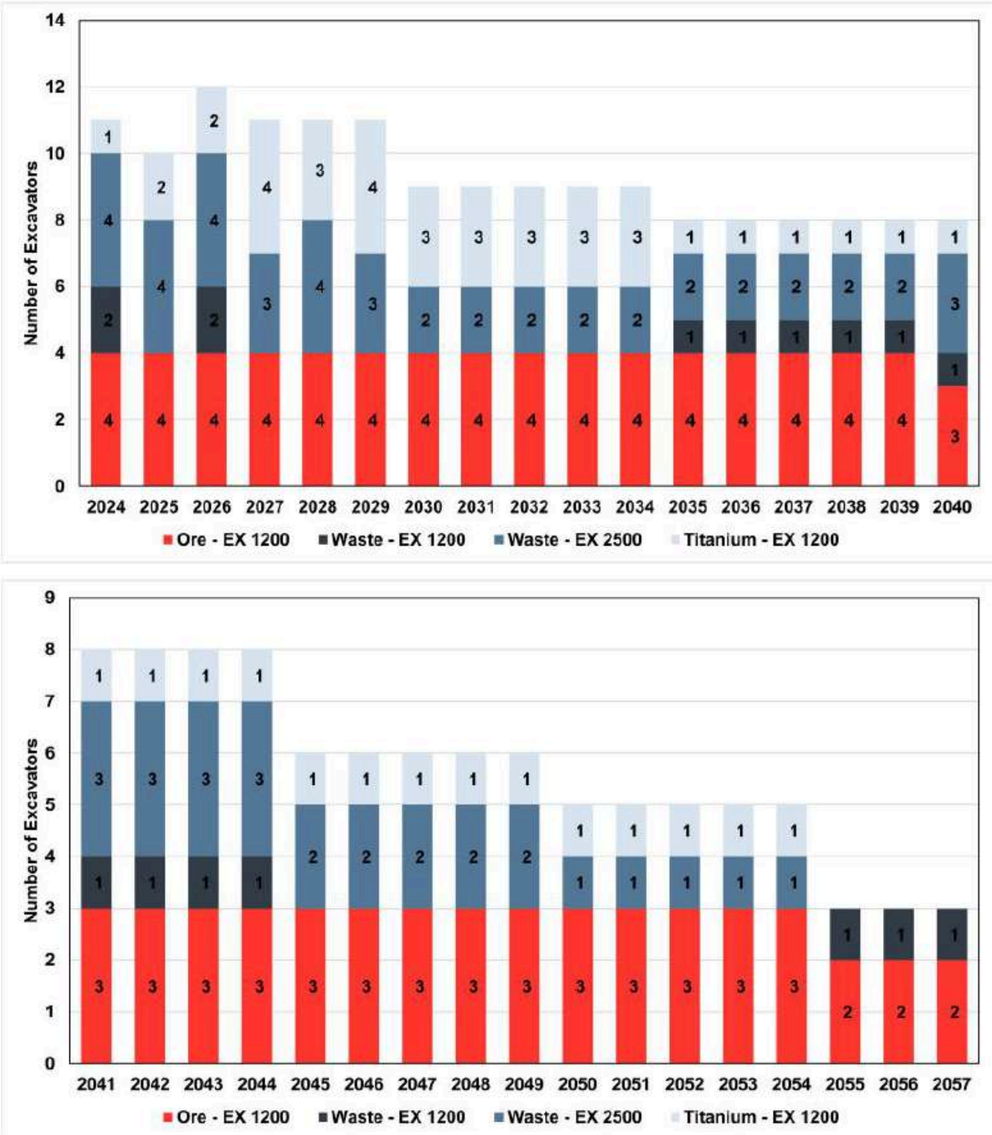


Figure 13.6: Annual Excavator Fleet Size

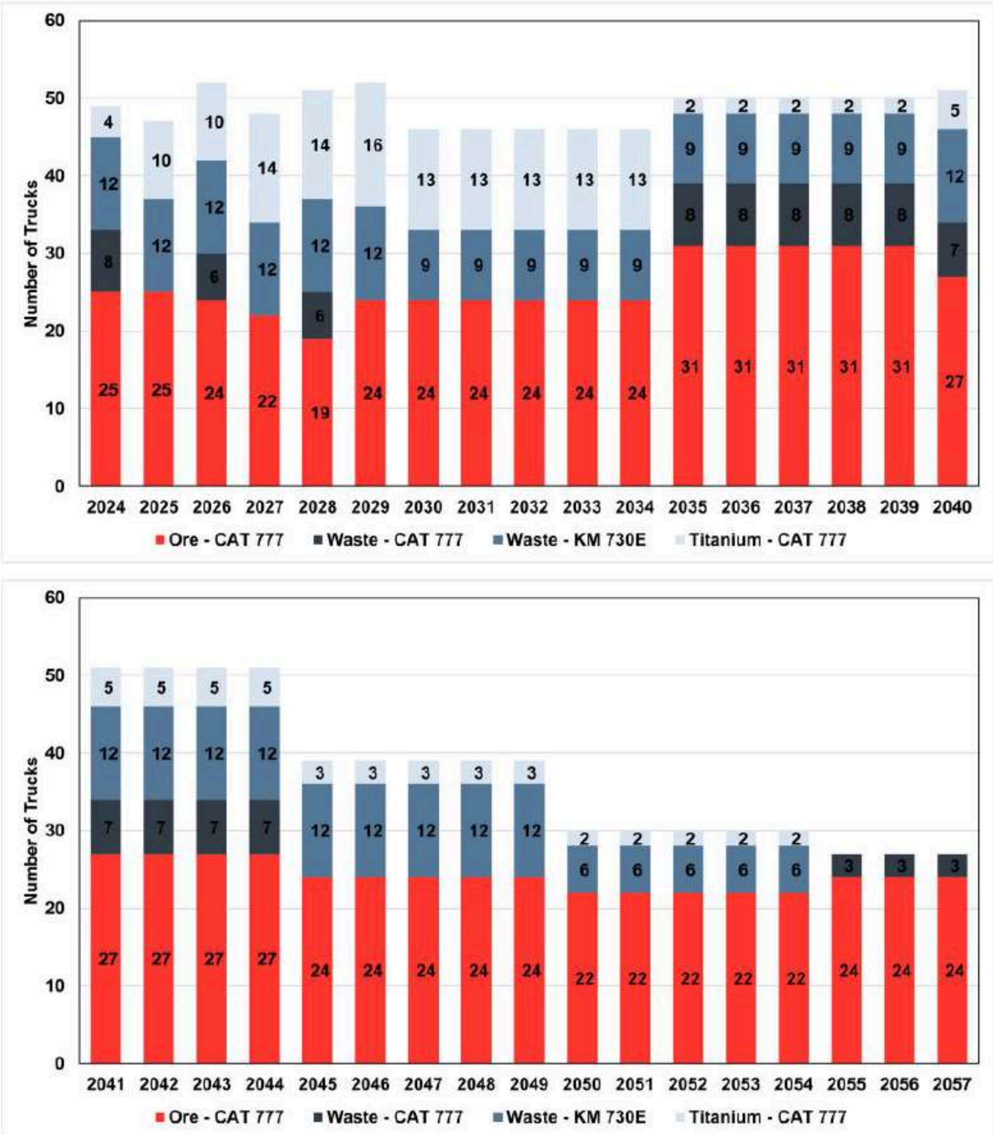


Figure 13.7: Annual Haul Truck Fleet Size

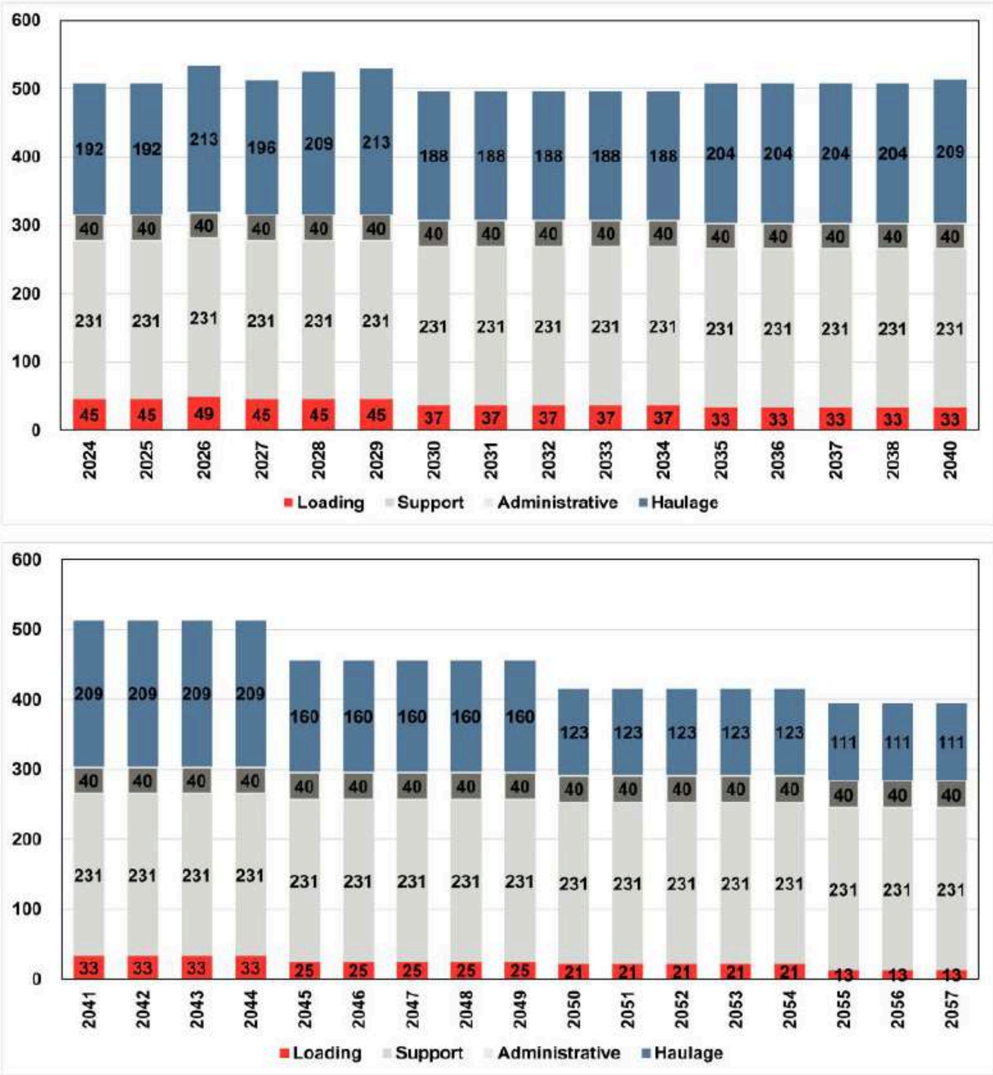


Figure 13.8: Tapira Workforce Life-of-Mine Plan

14.0 BENEFICIATION AND RECOVERY METHODS

14.1 Beneficiation Plant

14.1.1 Crushing and Blending

Coarse crushing reduces the ROM ore to pass 4 inches and places the crushed ore on one of two blending storage piles. Mine haul trucks unload the ROM ore into the primary gyratory crusher. The primary discharge is conveyed to the secondary toothed roll crusher. The secondary discharge is conveyed to a stacker that places the ore on one of two longitudinal blending piles. The piles are nominally 700 m long and 13 m high.

Fine crushing reclaims ore from the blending piles and reduces the particle size to granular ore (19/7 mm) and friable ore (<7 mm) by screening and a 3rd and 4th stage of crushing using cone crushers. The granular ore is conveyed to the granular milling and flotation circuit. The friable ore is slurried with water and pumped to the friable ore milling and flotation circuit. A block flow diagram of the fine crushing circuit is presented in Figure 14.1.

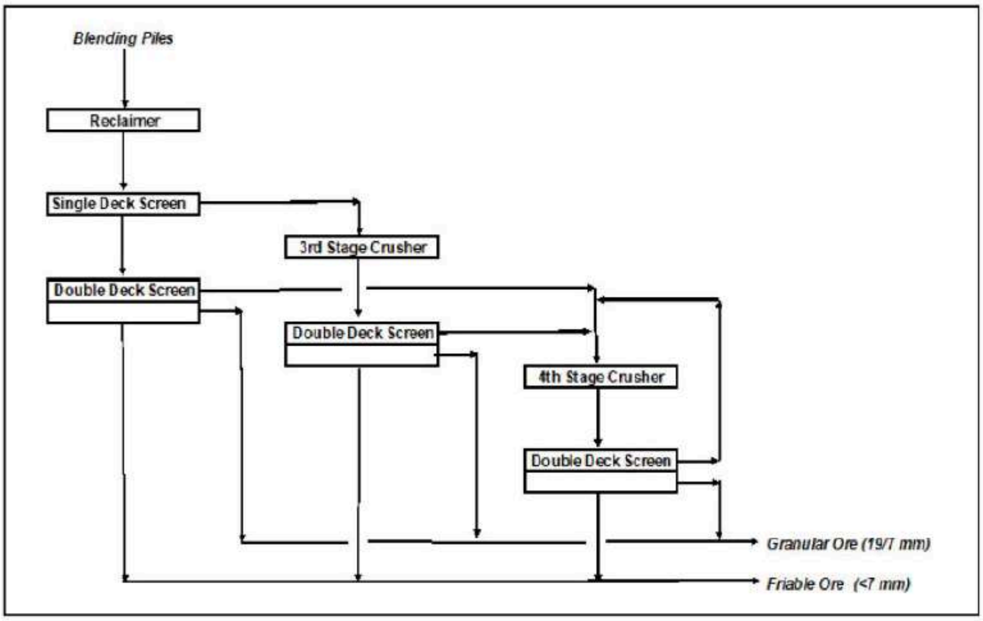


Figure 14.1: Fine Crushing Circuit Block Flow Diagram

14.1.2 Granular Ore Milling and Flotation

This circuit comprises an open circuit rod mill, a closed-circuit ball mill, Low Intensity Magnetic Separation (LIMS), three stages of fines separation, two sets of parallel conditioning tanks, and four stages of flotation using mechanical flotation cells.

slide128

stage of LIMS. The magnetic product is rejected, and the nonmagnetic product is pumped to the closed-circuit classification cyclone. The cyclone overflow is about 80% passing 210 µm.

The classification cyclone overflow is fines separated, attrition scrubbed, and fines separated again to recover coarse flotation feed. The fines separation cyclone overflows are combined, and fines separated a third time to recover fine phosphate, which is attrition scrubbed and fines separated a fourth time. The overflows from the 3rd and 4th fines separation cyclones are rejected as friable fines.

The fine feed is conditioned with flotation reagents and then floated in a column cell. The column cell tailings are refloated (scavenged) in mechanical cells. The scavenger cell tailings are the fine tailing. The concentrates (froth products) from the column cell and scavenger machine are combined and pumped to the coarse feed rougher mechanical flotation cells.

The coarse feed is conditioned with flotation reagents and then floated in rougher mechanical flotation cells. The rougher tailings are scavenged in mechanical flotation cells and the scavenger tailings are the coarse circuit tailings. The scavenger concentrate is recycled to rougher flotation. The rougher concentrate is densified by cyclones. The dilute cyclone overflow is treated by cleaner flotation in mechanical cells. The cleaner concentrate is combined with the cyclone underflow and treated by the final cleaner flotation cells. The final cleaner tailings are recycled to the rougher concentrate cyclone and the final cleaner concentrate is the friable circuit concentrate.

The coarse and fine flotation circuits (six circuits combined) produce three final products to include fine tailings, coarse tailings, and the friable component of conventional concentrate Friable ore milling and flotation are illustrated in Figure 14.3.

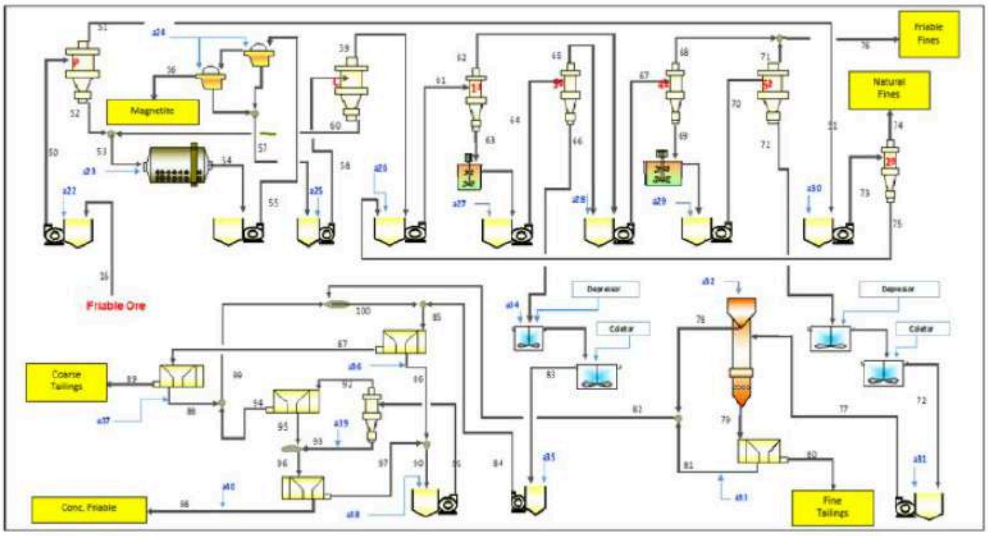


Figure 14.3: Friable Ore Milling and Flotation Block Flow Diagram

14.1.4 Granular and Friable (Conventional) Concentrate Preparation

This circuit removes paramagnetic minerals from the granular and friable flotation concentrates and then grinds the final concentrate to a particles size suitable for slurry pipeline transport to the Uberaba Chemical Complex.

The granular and friable concentrates are combined and treated by Wet High Intensity Magnetic Separators (WHIMS) that reject paramagnetic minerals. The nonmagnetic product is ground by two closed-circuit ball mills. The ground slurry (cyclone overflows) is dewatered to about 60% solids by a combination of cyclones and thickeners and pumped into agitated storage tanks. The conventional concentrate preparation circuit is illustrated in Figure 14.4.

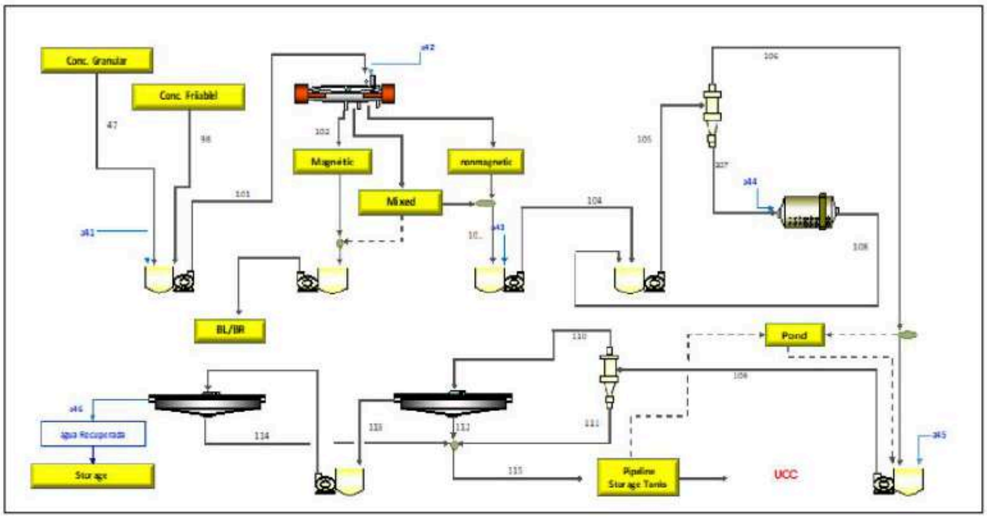


Figure 14.4: Conventional Concentrate Preparation Circuit

14.1.5 Microfines Separation

This circuit recovers ultrafine phosphate from the granular and friable fines. The granular and friable fines are subjected to several stages of fines separation in 2-inch diameter cyclones to recover feed for the ultrafine flotation circuit.

This circuit, shown in Figure 14.5, and the subsequent ultrafine flotation circuit allow the metallurgical recovery to be increased by about 5%.

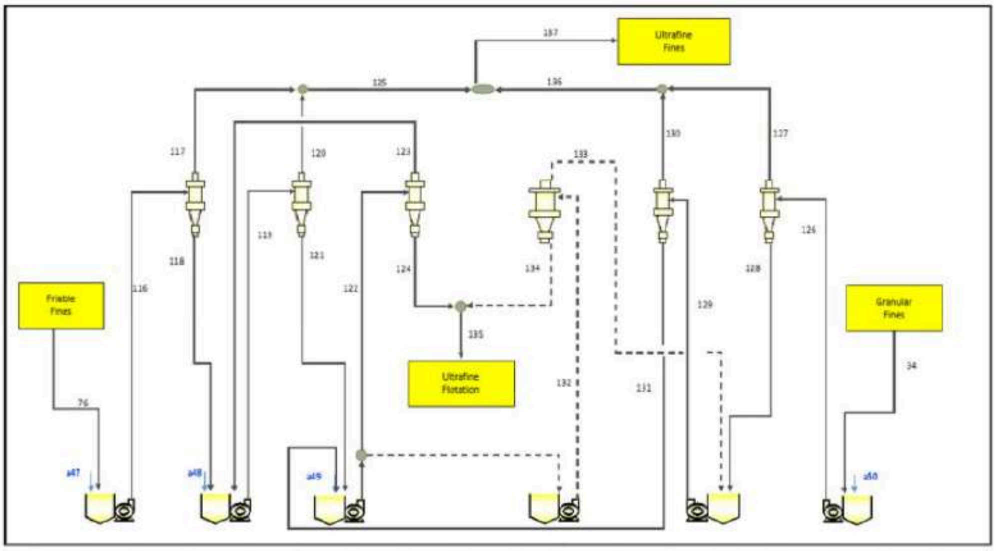


Figure 14.5: Microfines Separation Circuit

14.1.6 Ultrafine Flotation

This circuit upgrades the ultrafine feed to ultrafine concentrate. The ultrafine feed is conditioned with flotation reagents and then subjected to rougher and cleaner flotation in two column cells. The froth product from the cleaner column cell is the ultrafine concentrate. The cleaner column tailings are recycled to the rougher column cell. The rougher column tailings are scavenged by mechanical flotation cells. The scavenger flotation tailings are the ultrafine tailings, and the scavenger cell concentrate is recycled to the rougher column cell. The three stages of flotation yield two final products to include ultrafine tailings and ultrafine concentrate. The ultrafine concentrate is dewatered by a belt filter and placed on a storage pile.

14.1.7 Product Storage and Transportation

The nonmagnetic product from the WHIMS is reground by two parallel ball mills operating in closed circuit with 15-inch diameter cyclones to produce material suitable for transport by a slurry pipeline (about 94% passing 150 µm). The ground coarse concentrate is dewatered to about 60% solids by cyclones and a thickener. The solids in the cyclone overflow are recovered by the thickener and combined with the cyclone underflow and are placed into one of four agitated storage tanks. The concentrate slurry is withdrawn from the agitated storage tanks by centrifugal pumps that can recirculate the slurry or feed the pumping station. The pumping station has parallel piston pumps that develop sufficient pressure to force the slurry through a 124-km pipeline to the Uberaba Chemical Complex.

The fine concentrate filter cake is reclaimed from storage piles by a frontend loader and placed in highway haul trucks that transport the fine concentrate to Mosaic's Uberaba Chemical Complex.

14.2 Beneficiation Plant Throughput and Design, Equipment Characteristics, and Specifications

This sub-section contains forward-looking information related to the beneficiation plant throughput and design, equipment characteristics, and specifications for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant feed characteristics that are different from the historical operations or from samples tested to date, equipment and operational performance that yield different results from the historical operations, historical and current test work results, and beneficiation recovery factors.

The major process equipment and some material handling equipment are described in the following ten equipment lists.

- Coarse crushing:
  - Plate feeders – 2
  - Vibrating grizzly screens – 2
  - Primary crusher – 1
  - Secondary Crusher – 2
  - Stacker – 1
  - Ore receiving silos – 6
  - Belt conveyors – 10
- Fine crushing:
  - Bucket wheel reclaimer – 2
  - Belt conveyors – 13
  - Single deck vibrating screen -2
  - Double deck vibrating screen – 7
  - Tertiary cone crusher – 1
  - Quaternary cone crusher – 1
  - Quaternary impact crusher – 1
- Milling and Magnetic Separation:
  - Belt conveyors – 5
  - Rod mills – 2
  - Ball Mills – 5
  - Friable pre-classification feed pumps - 4
  - Friable pre-classification distributors – 4
  - Friable pre-classification cyclones – 32 (4 x 8)
  - Friable classification feed pumps – 4
  - Friable classification distributors – 4
  - Friable classification cyclones – 20 (4 x 5)
  - Friable 2 pre-classification feed pumps - 4
  - Friable 2 pre-classification distributors – 4
  - Friable 2 pre-classification cyclones – 20 (4 x 5)
  - Granular classification feed pump – 1

- Granular classification cyclones – 5
- Granular rougher LIMS - 4
- Friable rougher LIMS – 12
- Friable cleaner LIMS – 4

- Fines separation, Attrition, and Conditioning:
  - 1st Friable fines separation feed pump – 2
  - 1st Friable fines separation feed distributor – 2
  - 1st Friable fines separation cyclones – 12 (2 x 6)
  - 2nd Friable fines separation feed pump – 2
  - 2nd Friable fines separation feed distributor – 4
  - 2nd Friable fines separation cyclones – 24 (4 x 6)
  - 3rd Friable fines separation feed pump – 2
  - 3rd Friable fines separation feed distributor – 2
  - 3rd Friable fines separation cyclones – 8 (2 x 4)
  - 4th Friable fines separation feed pump – 2
  - 4th Friable fines separation feed distributor – 6
  - 4th Friable fines separation cyclones – 72 (6 x 12)
  - 6th Friable fines separation feed pump – 1
  - 6th Friable fines separation feed distributor – 4
  - 6th Friable fines separation cyclones – 48 (4 x 12)
  - 1st Granular fines separation feed pump – 1
  - 1st Granular fines separation feed distributor – 1
  - 1st Granular fines separation cyclones – 5 (1 x 5)
  - 2nd Granular fines separation feed pump – 1
  - 2nd Granular fines separation feed distributor – 1
  - 2nd Granular fines separation cyclones – 9 (1 x 9)
  - 3rd Friable fines separation feed pump – 1
  - 3rd Friable fines separation feed distributor – 1
  - 3rd Friable fines separation cyclones – 2 (1 x 2)
  - 3rd Friable standby fines separation feed pump – 1
  - 3rd Friable standby fines separation feed distributor – 1
  - 3rd Friable standby fines separation cyclones – 6 (1 x 6)
  - Friable attrition cells – 12 (4 x 3)
  - Granular attrition cells – 4 (2 x 2)
  - Friable attrition cells - 4
  - Granular fine feed conditioners - 2
  - Granular coarse feed conditioners - 2
  - Friable fine feed conditioners - 2
  - Friable coarse feed conditioners – 3
- Flotation:
  - Friable coarse feed 4-way rotary distributors – 2
  - Friable coarse rougher flotation cells - 32 (4 x 8)
  - Friable coarse scavenger flotation cells - 32 (4 x 8)
  - Friable coarse cleaner flotation cells - 15 (3 x 5)
  - Friable coarse recleaner flotation cells - 12 (3 x 4)

  - Friable fine rougher column cells – 2
  - Friable fine scavenger flotation cells – 8 (1 x 8)
  - Granular coarse rougher flotation cells - 8 (1 x 8)
  - Granular coarse scavenger flotation cells - 16 (2 x 8)
  - Granular coarse cleaner flotation cells - 4 (1 x 4)
  - Granular coarse recleaner flotation cells - 3 (1 x 3)
  - Granular fine rougher column cell – 1
  - Friable coarse rougher 26-inch cyclones
- Ultrafine Circuit:
  - Trash screen – 1
  - 1st stage cyclones – 896
  - 2nd stage cyclones – 336
  - 3rd stage cyclones – 112
  - Ultrafine feed conditioning tanks – 2
  - Ultrafine rougher flotation column – 1
  - Ultrafine cleaner flotation column – 1
  - Ultrafine scavenger flotation cells – 4
  - Ultrafine concentrate thickener – 1
  - Ultrafine drum filter – 1
  - Belt conveyors – 3
- Reagents:
  - Starch dosing feeders – 3
  - Starch dilution tanks – 2
  - Starch causticizing tanks – 2
  - Ultrafine soap holding tanks - 4
  - Ultrafine saponification tanks – 4
  - Ultrafine starch dilution tank – 1
  - Ultrafine starch causticizing tank – 1
  - Ultrafine starch holding tank – 1
  - Caustic soda dilution tank – 2
  - Synthetic collector preparation tank – 1
  - Starch pneumatic feeders – 4
  - Vegetable oil collector storage tank – 2
  - Hidrocol storage tank – 1
  - Caustic soda storage tanks – 2
  - Synthetic collector storage tanks – 2
- WHIMS:
  - Wet high intensity magnetic separators – 6
- Regrinding:
  - Conventional concentrate regrind ball mills – 2
  - Classification cyclones – 4
- Concentrate Thickening:
  - Conventional concentrate thickener – 2

- Concentrate dewatering cyclones – 4
- Concentrate storage tanks – 4
- Concentrate piston pumps – 4

Minimum, average, and maximum annual data for 2017 through 2022 are presented in Table 14.1.

Table 14.1: Plant Availability and Throughput

Item	Units	Minimum	Average	Maximum
ROM, wet basis	Mtpy, wet	11.15	14.76	15.7
ROM, dry basis	Mtpy, dry	9.16	12.3	13.27
Operating hours/yr.	hr/yr	6,111	7,921	8,351
Conventional concentrate	Mtpy	1.19	1.64	1.78
Ultrafine concentrate	Mtpy	0.11	0.14	0.16
Total concentrate	Mtpy	1.3	1.78	1.94

The six-year averages in the above table are pulled down by the below par performance during 2019. The five-year averages indicate annual ROM tonnages of 15.5 Mt (wet) and 12.92 Mt (dry). Similarly, the four-year average for annual operating operation was 8,283 hours.

The production plan through 2057 averages 8,262 operating hours annually, which should be possible if there are no marketing constraints or major unexpected operating problems. Similarly, the planned maximum annual ore throughput is 16.1 Mt (wet) and 13.4 Mt (dry), which should be possible also. The forecast mass recoveries range from 14.2% to 16.9% and average 15.7%, which seems optimistic compared to the last six years; however, the average ROM %P_2O_5 over the next 37 years exceeds the average ROM %P_2O_5 (8.5%) during the last five years. The variation in ROM %P_2O_5 explains about 58% of the variation in mass recovery.

14.3 Projected Requirements for Energy, Water, Process Materials, and Personnel

This sub-section contains forward-looking information related to the projected requirements for energy, water, process materials and personnel for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant requirements that yield different results from the historical operations.

The consumption of flotation reagents, grinding media, electric power, and water per tonne of concentrate are summarized in Table 14.2.

Table 14.2: Tapira Consumptive Use 2018 through 2022

Item	Units [1]	2018	2019	2020	2021	2022
Collectors [2]	kg/t	3.05	3.23	3.21	2.43	2.87
Corn Starch	kg/t	2.13	2.57	2.54	2.58	2.06
Caustic Soda	kg/t	1.31	1.64	1.67	1.46	1.34
Grinding Media [3]	kg/t	1.08	1.04	1.07	1.14	1.21
Diesel Oil	L/t	0.17	0.37	0.28	0.48	0.40
Electricity	kWh/t	157.49	172.45	156.68	156.60	161.30
Water [4]	m^3/t	5.76	8.76	6.27	6.72	7.33

Notes:
1. Per tonne of total concentrate
2. Vegetable and synthetic collectors combined
3. Rods and balls
4. Makeup water

14.3.1 Water

Water is supplied to the administrative and production sectors of the mine site by the Ribeirão do Inferno and artesian wells, as well as from the taillings dams. The industrial reuse system used to recover water from the dams includes 10 pumps (4 operating and 6 on stand-by) and 36" pipes covering varying distances to the different dam areas. The rated capacity of the pipes is 4,400 m^3/hr from the BR1 dam, 10,400 m^3/hr from the BL1 dam, and 4,900 m^3/hr from the BR dam. The tailings from the Tapira plant are disposed of in the BR dam (coarse tailings) and the BL1 dam (fine talings/sludge). Approximately 10.9 million m^3/yr are deposited in the dams and are subjected to natural sedimentation.

14.3.2 Electricity

The Tapira Plant is powered by CEMIG and Vale Energia Concessionaires, with a total receipt of 40 MW. Annually, the beneficiation plant uses around 305 GW and the contract between Mosaic and the power suppliers establishes the minimum required off-take along with a 3% charge for line losses.

14.3.3 Reagents

Four flotation reagents are used at Tapira: a pH modifier (caustic soda), a depressant (corn starch), and two fatty acid type collectors (vegetable & synthetic). The flotation feed pulps are first conditioned with pH modifier and depressant. Next the flotation feed pulps are conditioned with the collectors. The collectors adsorb on the surfaces of the apatite particles and make the apatite particles hydrophobic.

14.3.3.1 Caustic Soda

Caustic soda ($NaOH$) is received as a 50% strength solution by tanker truck. The 50% solution is pumped into a storage tank and then transferred as needed to use tanks where it is diluted to a 10% solution with water. The 10% solution is used to:

- Adjust the pH of the flotation feed slurry in the conditioning tanks
- To causticize the corn starch
- To saponify the vegetable collector

14.3.3.2 Corn Starch

Corn starch is received as a powder by tanker truck and pneumatically transferred into a storage silo. Batches of powder are agitated with water and the 10% solution of caustic soda to obtain a 3% solution of causticized starch. The 3% solution is used to precondition the flotation feed slurry to depress gangue minerals during flotation.

14.3.3.3 Vegetable Collector

The fatty (carboxylic) acid is received by tanker truck and pumped into a storage tank. Batches of fatty acid are agitated with water and the 10% solution of caustic soda to prepare a 5% solution of saponified collector. The 5% solution is used to condition the flotation feed slurry and render the surface of the apatite particles hydrophobic.

14.3.3.4 Synthetic Collector

The synthetic collector is also received by tanker truck and pumped into a dedicated storage tank. Batches of synthetic collector are agitated with water to prepare a 30% solution. The 30% solution is used to augment the collection of apatite.

14.3.4 Personnel

Beneficiation plant operations are overseen by a plant manager, with a Production Officer, Development and Control Supervisor, and Mining Engineer beneath him. Each shift has a production supervisor and Mineral Operators classified as Level 1, Level 2, Level 3 with each shift having 22-23 operators.

15.0 INFRASTRUCTURE

This section contains forward-looking information related to locations and designs of facilities comprising infrastructure for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts, or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Project development plan and schedule, available routes and facilities sites with the characteristics described, facilities design criteria, access, and approvals timing.

The CMT property is located 3 km north of the town of Tapira and approximately 35 km south-southeast of the city of Araxá, in the southeast of Brazil in Minas Gerais State. The town of Tapira can be accessed by road from Belo Horizonte via the BR-262 and MGC-146 state highways travelling west-northwest for over 420 km. Figure 15.1 includes an overview map of the infrastructure at CTV.

The CMT property has 5 access points:

1. Main Entrance with 4 gates and 4 turnstiles
2. Temporary Access for the Construction of the BL1 dam
3. Abutment of the BL1 dam
4. Access to the BD5 dam
5. Access to the former coffee plantation/mine area.

The first four access points are off the MGC-146 highway from Tapira, while the last access road is primarily used by people from other communities.

The tailings from Tapira's beneficiation plant are disposed of in the BR (coarse tailings) and BL1 (fine tailings/sludge) dams at a rate of approximately 10.9 million m^3 per year. Overburden is stored in one of six separate ex-pit overburden storage facilities (OSFs), and the material high in Titanium is placed in one of two titanium storage facilities for possible future beneficiation.

There are 14 administrative buildings in the Tapira complex including laboratories, offices, restaurants, and changing rooms. There is one warehouse at Tapira which consists of a shed and a patio for storage. The Tapira Plant has a central maintenance workshop with an area of 6,626 m^2 and auxiliary workshops with 428.04 m^2 of area.

The Tapira beneficiation plant is powered by the CEMIG Concessionaires, with a total receipt of 40 MW. The main substation receives 13.8 kV in 3 oil-type transformers which transfer 13.8 kV to secondary substation. From the secondary substations, power is distributed to the end-use areas at 110 V, 220 V, 380 V, 440 V, or 4,160 V. There is approximately 1 km of distribution line mounted on metallic structures from the concessionaires to the beneficiation plant. There are also overhead lines from the main substation to serve remote areas of the beneficiation plant, such as the primary crusher, mining face, dams, secondary crusher, and pump houses.

There are two fuel stations at Tapira, one in the plant area with a capacity of 30 m^3 and one in the mine area with a capacity of 270 m^3. The 270 m^3 fueling station at the Mine has 6 - 15 m^3 tanks, 3 – 20 m^3 tanks, and 4 – 30 m^3 tanks. There is a spilled oil collection system, as well as a water and oil separator box connected to the drainage network. The fuel storage tanks have containment basins/dikes which can contain any leakage or spills resulting from damage to the tanks. There is also infrastructure in place to allow for transfer of material out of the tanks if necessary.

Tapira's water intake comes from the Ribeirão do Inferno and artesian wells, as well as recovered water from the tailings dams. There are 4 artesian wells at the Tapira plant: the Mine well, the well at the Outpatient Facility, the well at the Caixa Central, and the well at the water treatment station. The water collection system consists of a tower located in the center of the BR1 dam. The water exits the tower through a pipe that feeds the system's pumps. There are currently 4 pumps with a nominal capacity of 1,000 m^3/hr, two of which are on stand-by while the other two operate. The catchment is located 8 km from the CMT and pumped to CMT through a 32-inch pipe.

In addition to the BR1 collection system, CMT has an industrial water reuse system that has two withdrawals, one at the sludge dam (BL01) and one at the tailings dam (BR). The BL01 collection system consists of 4 pumps with an average flow rate of 2,600 m^3/hr and is located 3 km from the plant. From this catchment system, the water is pumped to CMT through 36" pipes. The BR collection system consists of 2 pumps with an average flow rate of 2,450 m^3/hr and is located 2 km from the plant. The water from this catchment system is pumped to CMT through 36" pipes.

Tapira's fire protection includes a mobile fire-fighting system, fire extinguishers, signaling boards, and fire hydrants. There are enough fire extinguishers located around the beneficiation plant that are inspected monthly and hydrostatically tested every five years. There is one 80 m^3 water reservoir in the mine and a 54 m^3 reservoir in the administrative area to be used for firefighting. The hose shelters contain all the equipment in working condition and undergo frequent inspections. The runoff from the surface disturbance is collected by open-pit drainage systems without measurements and/or sampling of runoff.

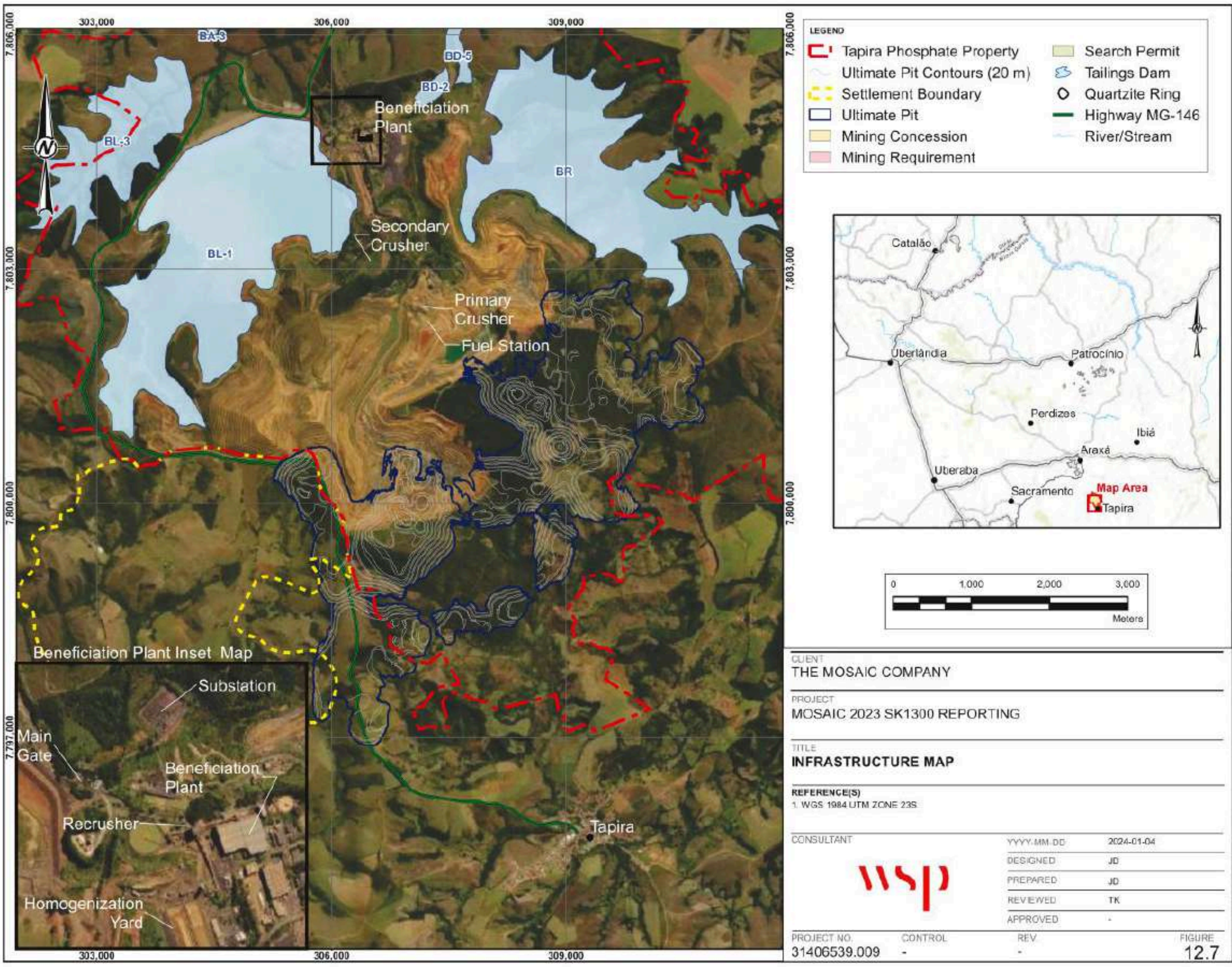
The primary customers of CMT are Mosaic's Uberaba Chemical Complex, and the Araxá Chemical Plant, with an annual production of approximately 2,000,000 tonnes of material. CMT has a shipping capacity of 6,000 tpd of conventional phosphate concentrate and 1,000 tpd of ultrafine phosphate concentrate. Ultrafine phosphate concentrate is stored in open yards and is manually loaded into trailers and the filling time of each truck is approximately 15 minutes. The CMT beneficiation plant has a total storage capacity of about 47,800 tonnes, which corresponds to 7 days of typical production.

There are three explosives magazines on site: One with explosives, one with the accessories (boosters, and fuses), and an emulsion tank. The explosives depots are located on firm, dry, flood-free ground with a clearing of at least 20 m around the buildings and fencing installed to control access.

The CMT Processing Plant produces two products that can be shipped to the Uberaba Chemical Complex and Araxá Chemical Plant (primary customers of that): Conventional Concentrate and Ultrafine Concentrate. Before being shipped, the conventional concentrate is stored in 4 pulp tanks or in a pond and this total storage capacity for conventional concentrate is 46,000 tonnes and 10,000 tonnes for ultra-fine concentrate. The pipeline where the conventional concentrate is pumped to the Uberaba unit is 123 km long with 9.625-inch pipes. The pumping system consists of 4 positive displacement pumps, each capable of pumping 125 m^3/h. Of the 4 pumps available, 2 are used for pumping the pulp and the other 2 remain on stand-by. The pulp that is dispatched is prepared in the 4 concentrate tanks, which are adapted to the specifications of the product that is dispatched in batches of ore.

The daily dispatch capacity for conventional concentrate is 6,000 t/day, so if all the storage capacity is used (46,000t), the time needed to consume this stock will be approximately 8 days. The ultra-fine concentrate is shipped to the Uberaba and Araxá units by road. An average process time of 1 day is considered for shipping this concentrate, both to Araxá (which is 45 km away from CMT) and to Uberaba (which is 170 km away from CMT). This estimate considers an average speed of 80 km/h for the trucks. The daily shipping capacity for ultra-fine concentrate is 1,000 t/day, so if all the storage capacity is used (10,000 t), the time needed to consume this stock will be approximately 10 days.

There is no receipt of raw material at the Tapira Mineral Complex.



LEGEND
Tapira Phosphate Property
Ultimate Pit Contours (20 m)
Settlement Boundary
Ultimate Pit
Mining Concession
Mining Requirement
Search Permit
Tailings Dam
Quartzite Ring
Highway MG-146
River/Stream
303,000
306,000
309,000
7,806,000
7,803,000
7,800,000
7,797,000
BA-3
BD-5
BD-2
BL-3
BL-1
BR
Beneficiation Plant
Secondary Crusher
Primary Crusher
Fuel Station
Tapira
Beneficiation Plant Inset Map
Substation
Main Gate
Beneficiation Plant
Recrusher
Homogenization Yard
Catalão
Uberlândia
Patrocínio
Perdizes
Ibiá
Araxá
Uberaba
Sacramento
Map Area
Tapira
0
1,000
2,000
3,000
Meters
CLIENT
THE MOSAIC COMPANY
PROJECT
MOSAIC 2023 SK1300 REPORTING
TITLE
INFRASTRUCTURE MAP
REFERENCE(S)
1. WGS 1984 UTM ZONE 23S
CONSULTANT
wsp
YYYY-MM-DD 2024-01-04
DESIGNED JD
PREPARED JD
REVIEWED TK
APPROVED -
PROJECT NO. 31406539.009
CONTROL -
REV. -
FIGURE 12.7

16.0 MARKET STUDIES

This section contains forward-looking information related to commodity demand and prices for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this section including prevailing economic conditions, commodity demand and prices are as forecasted over the LOM period.

16.1 Markets

Phosphorus is one of the three primary crop nutrients required for plant growth and is not substitutable. Phosphate rock[1] is the raw material feedstock utilized to produce virtually all phosphate fertilizers worldwide, as well as being the phosphate feedstock for animal feed ingredients and industrial and food products. Production of phosphate end-products is most commonly achieved by reacting the phosphate rock with sulphuric acid to produce intermediate phosphoric acid, which is then used as the precursor for nearly all high-analysis granular phosphate fertilizers (e.g., ammonium phosphates) as well as most animal feed and industrial/food phosphates. A less common process route involves reacting phosphate rock with sulphuric acid to produce single superphosphate, a low-analysis phosphate fertilizer.

The global market for phosphate rock is estimated to be approximately 214 million metric tonnes in 2024 and has grown at a compound annual rate of around 1.8% over the past two decades, though has slowed modestly in the past several years (CRU Phosphate Rock Database, 2023). Going forward, global phosphate rock demand is expected to continue to grow, with Mosaic and independent analysts typically projecting a growth rate of 1-2% per annum. This growth ensures sufficient market demand for continued production at Mosaic's Brazil phosphate rock mines[2]. In fact, such demand growth will necessitate some combination of new mining capacity globally or higher operating rates at existing mines to meet the growing demand.

Global phosphate rock trade has been rangebound at around 30 Mt for the past two decades.

Mosaic's Brazil phosphate rock mines produce circa 4 Mt of phosphate rock concentrate per annum which is further processed into finished products at Mosaic's downstream phosphate production facilities in the country – i.e., phosphoric acid intermediate product – then phosphate fertilizers and animal feed phosphates – or Single Superphosphate (SSP).

The open-pit mining and beneficiation practices at the Brazil mines results in a phosphate rock product with a grade of ~76% BPL (~35% P_2O_5) and is amendable as feedstock for phosphoric acid or SSP.

The circa 2 Mt of phosphate rock produced at the Tapira mine annually (grading >35% P_2O_5) is utilized as feedstock for the Uberaba downstream phosphates plant.

[1] Phosphate rock is the term utilized to describe phosphate ore that has been mined and/or beneficiated to produce a material that is suitable for further processing into downstream products such as fertilizer.

[2] Mosaic currently operates four phosphate rock mines in Brazil – Catalão, Tapira, Araxá/Patrocínio and Cajati.

16.2 Commodity Price Forecasts

The commodity price forecasts utilized in the analysis are derived from an independent third party, CRU, which is a reputable supplier of market forecasts across a range of commodities including phosphate rock. CRU's market studies cover the entire supply chain, focusing on supply, demand, trade and prices by country and product. However, there is no quoted benchmark for phosphate rock in Brazil, as the rock produced is almost exclusively consumed by captive downstream operations. As such, an internal transfer price forecast was constructed by deducting mining and beneficiation costs as well as chemical plant related costs.

To do so, CRU's benchmark forecast for downstream products – into which Mosaic's Brazil phosphate rock is processed – were utilized. The phosphate fertilizer price forecast from CRU utilized in this report is MAP CFR Brazil, from CRU's Phosphate Fertilizer Market Outlook dated November 2023.

This price was then adjusted for freight based on Mosaic's freight standards to derive a FOB plant netback, then a weighted adjustment is applied to reflect the historical pricing differential for the various phosphate end-products other than MAP that are produced with Tapira phosphate rock, to arrive at an average annual fertilizer price for the years 2024-2028.

Table 16.1 shows the average CRU CFR MAP price forecast price for the years 2024-2028 averaged $512 (R$2,490) per metric tonne.

Table 16.1: CRU CFR MAP Pricing

Item	2024	2025	2026	2027	2028	2029-2057	Average 2024-2028	Average 2024-2057
MAP CFR Brazil (US$)	540	518	518	493	493	490	512	509
MAP CFR Brazil (R$)	2,624	2,517	2,517	2,396	2,396	2,380	2,490	2,472

Note: An exchange rate of R$4.86 = US$1.00 was applied
Source: CRU's Phosphate Fertilizer Market Outlook dated November 2023

The pricing of the non-MAP products produced with the Tapira phosphate rock – e.g., SSP, TSP, and DCP – tend to track closely to the price of MAP over time, and the typical pricing differential was then applied to the forecast. The CRU CFR MAP price forecast was used to predict the Tapira product combination and was an average revenue of R$2,033 per metric tonne, which was used for all years of the LOM plan. The Tapira revenue price differs from the price used in the Mineral Resource and Mineral Reserve pit optimization price of R$1,939.57 since it is based on an updated analysis of product pricing from 2023. The Mineral Resource and Mineral Reserve pit optimization price was applicable at the time that the pit optimization analysis was completed (2022).

This forecast finished product price was utilized as the basis to then calculate a gross margin available to fund the upstream mining and processing of phosphate rock. The gross margin available for Tapira was calculated as R$694 per metric tonne. Under this approach, the internal transfer phosphate rock price cannot exceed the gross margin available. The DCF in Section 19.0 was calculated using an internal transfer phosphate rock price to show a Net Present Value of zero. The internal transfer price per tonne in the DCF is R$547 which is less than the gross margin available. This analysis demonstrates that the margin available for phosphate rock exceeds the total costs of phosphate rock production. Refer to the economic section of the report for further detail on this methodology.

The exchange rate utilized in the analysis was derived internally utilizing a consensus view of forecasts from several third parties and is based on an August 2023 analysis. A forecast of 4.86 Real per US Dollar was utilized for the forecast period. Based on the current fluctuation in the Brazilian Real, this forecast is considered conservative and appropriate for this TRS report.

16.3 Contracts

Effectively all phosphate rock produced at Mosaic's Brazil mines is consumed at Mosaic's downstream facilities.

17.0 ENVIRONMENTAL STUDIES, PERMITTING, AND PLANS, NEGOTIATIONS, OR AGREEMENTS WITH LOCAL INDIVIDUALS OR GROUPS

17.1 Environmental Studies

The main activities carried out at CMT include apatite mining and beneficiation. CMT includes one mine, six waste rock piles, three titanium piles, three sediment retention dikes, one water dam, a crushing plant, a beneficiation plant, three tailings storage facilities (BR, BL-1, and magnetite dike) and an ore pipeline, that connects CMT to the Uberaba Chemical Complex.

17.1.1 Environmental and Social Impact Assessment

An Environmental and Social Impact Assessment (ESIA, EIA in the Portuguese acronym) was prepared by in 2016 (MULTIGEO, 2016) for CMT. The Area of Direct Influence (AID in the Portuguese acronym) considered in the ESIA for the biotic and physical environments was defined by the head of the drainage basin of the Potreiro, Paiolzinho, Boa Vista, Areia, and da Mata streams, as well as the rest of its hydrographic basin, which encompasses the structures of CMT. The AID for the socioeconomic component defined in this ESIA comprised the municipalities of Tapira and Araxá, both in Minas Gerais state.

17.1.2 Biodiversity

Regarding the floristic diversity of the region where CMT is located, a floristic survey carried out as part of the ESIA for tailings dam BL-1 (MULTIGEO, 2017b) identified 243 botanical species, belonging to 69 families of which Fabaceae was the most representative.

Among the species recorded, four stand out for falling into categories of vulnerable or endangered at the national or state level, namely: *Araucaria angustifolia* (Araucári), *Euterpe edulis* (Juçara), *Ocotea odorífera* (Canela-sassafrás) and *Cedrela fissilis* (Acaiacá). In addition, one species of peki (*Caryocar Brasiliense*) and two species of ipe (Handroanthus ochraceus and Handroanthus serratifolius) are declared as of common interest, permanent preservation and immune to cutting in the state of Minas Gerais by State Law No. 9,743/1988.

At CMT an area of 4,290 ha (60.6% of the total CMT area: 7,080 ha) has some type of vegetation cover. This amount includes approximately 331 ha of eucalyptus reforestation (corresponding to 4.7% of the CMT area) and 1,307 ha of native vegetation (corresponding to 18.4% of the CMT area). Approximately 2,794 ha (39.5%%) correspond to areas occupied by infrastructure dedicated to mining and mineral beneficiation (GOLDER, 2021).

A fauna survey carried out as part of the ESIA for tailings dam BL-1 (MULTIGEO, 2017b) presented conclusions that include:

- Birdlife: The study indicated the occurrence of 121 species in the region where CMT is located. These species are distributed in 42 families. Three species fall into some category of extinction threat in Brazil and/or Minas Gerais, according to the MMA (2014b) and COPAM (2010), namely: *Taoniscus nanus* (inhambu-carapé), *Crax fasciolata* (curassow) and *Jabiru mycteria* (tuiuiú).
- Mammalian fauna: The study identified 42 species of mammals belonging to 16 families. Five species fall into some category of extinction threat in Brazil or Minas Gerais, according to the MMA (2014b) and COPAM

(2010): *Mymercophaga tridactyla* (giant anteater), *Chrysocyon brachyurus* (Guara wolf), *Puma yagouarondia* (Moorish cat), *Puma concolor* (Puma), *Pecari tajacu* (Cateto / Caititu).

- Herpetofauna: The study identified 16 species of amphibians distributed in 5 families and 3 species of reptiles distributed in 3 families. No endemic or endangered species were observed.
- Ichthyofauna: The study identified 17 species belonging to 9 families. The order *Characiformes* was the most abundant in the region, with 46.8% of the individuals captured in the survey. One of the species identified in the survey (*Brycon nattereri* - Pirapitinga) is considered threatened at the federal and state level.

17.1.3 Archaeological and Speleological Studies

In a survey that was part of the ESIA, an archaeological site named "Valter Dentista" was identified at CMT. It was detailed in the Preliminary Report of Archeology and in the Archaeological Management Program, both presented to Instituto do Patrimônio Histórico e Artístico Nacional, IPHAN (The National Historic and Artistic Heritage Institute) to comply with a requirement of the process of renewing the environmental operation permit. In response, IPHAN issued a consent regarding the management proposal, indicating compensatory actions such as the possibility of transferring archaeological collections to an Archaeological Museum in the municipality and the creation of a Foundation, responsible for the administration of the museum. The compensatory action refers to the publication of a book and that was completed within the deadline indicated in the consent issued by IPHAN. On June 13, 2022, IPHAN issued a document indicating that two of the compensatory actions would be converted to financial compensation, totalizing R$ 320,000.

The ESIA for raising the tailings dam BL-1 (MULTIGEO, 2017b) included a speleological survey that concluded that there are no caves at CMT. One of the reasons for that is the presence of a weathering layer about 160 m thick with a soil that is predominantly clayey, making the development of caves impossible (MULTIGEO, 2017b).

17.1.4 Socio-Economic Study

According to Multigeo (2016) the area of indirect influence of CMT for the socioeconomic context consisted of the municipalities of Tapira and Araxá. In December 2023 CMT had a total of 782 direct employees and approximately 715 contractors. Approximately 80% of the direct employees live in Araxá and 15% in Tapira, in the state of Minas Gerais (GOLDER, 2021).

In 2010 the Gini index, that measures concentration of wealth in a scale of 0 (complete equality) to 1 (complete inequality) was 0.48 in Araxá and 0.54 in Tapira, below the average in Minas Gerai state (0.56) and Brazil (0.60). In 2010 the HDI (Human Development Index) was 0.772 in Araxá and 0.712 in Tapira (both considered high), above (Araxá) and below (Tapira) the average in Minas Gerais state (0.731) and Brazil (0.727), both classified as high.

According to Golder (2021) no references were found about the existence of Quilombolas (communities with slave descendants) or indigenous population in the region where CMT is in the official database consulted: Palmares Foundation (for Quilombolas) and FUNAI (for indigenous population). The closest Quilombola community identified was located approximately 76 km north of CMT.

17.1.5 Baseline Water Quality and Water Quantity Study

Multigeo (2011) carried out a confirmatory investigation at CMT in seven areas previously classified as potentially containing exceedances, with a total of 35 boreholes drilled for sampling surface and subsurface soil. The results indicated the following parameters with concentrations above soil quality standards: barium (11 boreholes), cobalt (1 borehole at a workshop) and nickel (1 borehole at a subcontractor area). The study indicated that barium occurred uniformly in all areas studied, as result of the lithology of the region, and the concentrations above soil quality standards were not resulting from the CMT operation.

Multigeo (2017a) carried out a confirmatory investigation at CMT in four areas corresponding to fuel stations, with a total of 10 boreholes drilled for sampling soil and analysis of BTEX, PAH e TPH. No concentrations above soil quality standards were identified in this investigation.

Ramboll (2018) prepared a conceptual site model indicating 25 areas of interest (AOI) related to soil and groundwater quality based on previous investigation works (as above) and characteristics of the areas / operations. No further confirmatory investigations were conducted at these areas. Mosaic is planning to carry out an additional investigation in these areas in 2022, which consist of a voluntary action (i.e., not demanded by the environmental regulator).

Golder (2021) reviewed groundwater quality monitoring results from 2016 to 2019, corresponding to 12 locations at CMT that are monitored with a frequency ranging from quarterly to annual. In general, the results indicated compliance with groundwater quality standards, with exception of few barium results, that presented concentrations above the soil quality standard. As indicated above, the barium results may be related to the local geology.

Mosaic monitors surface water quality in 24 locations with a frequency ranging from monthly to biannually. According to Mosaic (2020), in a compilation of data from 2016 to 2020, some sporadic values above regulatory water quality standards were observed in some monitoring locations, including: pH, dissolved oxygen, coliforms, BOD, turbidity, aluminum, dissolved iron, manganese, phosphorus, nitrate, total phenols.

17.2 Requirements and Plans for Waste and Tailings Disposal, Site Monitoring, and Water Management during Operations and After Mine Closure

This sub-section contains forward-looking information related to waste and tailings disposal, site monitoring and water management for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including waste disposal volumes increase from historical values and predicted values, that regulatory framework is unchanged during the Study period, and no unforeseen environmental, social or community events disrupt timely approvals.

CMT's environmental controls are related to monitoring the quality of wastewater, surface and groundwater and air, as well as waste management.

17.2.1 Effluents

Wastewater from site operations is discharged into the tailings dams. Sewage and oily effluents are treated in specific systems before being discharged into the tailings dams.

Mosaic monitors wastewater quality at CMT in the following locations:

- Oil/water separators / oily water treatment plants: 9 locations.
- Sanitary sewage (septic tanks): 16 locations.
- Outlet of tailing dams and dikes: 7 locations.

Monitoring results from January 2020 to October 2023 were available for review (file: Gerenciador de Monitoramentos Ambientais-CMT 2020 a 2023.xlsm) for 7 locations corresponding to wastewater discharge from tailings dams and 9 locations corresponding to the discharge of an oil/water separator. Results from 2021 to 2023 indicated in general compliance with the applicable wastewater discharge standards. A notable exception was the concentration of total suspended solids in the effluent from BD2, that exceed the standard in most of the monthly monitoring results available, including 7 values 50 times or higher than the standard (100 mg/L).

17.2.2 Waste Management

Mosaic has a Solid Waste Management Plan at CMT that defines procedures for collection, temporary storage, and final destination of wastes. Structures for temporary storage of wastes at CMT include a deposit (warehouse) for hazardous wastes including cover, masonry walls, concrete floor and drainage system directed to a sump. (MOSAIC, 2020).

The Reserve Audit carried out in 2014 considered the need to develop a more detailed waste (overburden) management plan, because the waste management plan did not indicate a clear direction for waste capacity after 2030. A waste rock Master Plan was updated in December 2023 to address waste capacity for the remainder of the mine life.

17.2.3 Air Quality

Mosaic monitors emissions from equipment at CMT. In case of concentrations above the air quality standard, the equipment is sent for maintenance, and it is authorized to restart operation only after complying with standard.

Mosaic monitors air quality (Total Suspended Particulate – TSP) in five locations around the Site with biannual frequency since May 2022. Results from May 2022 to May 2023 available for review were in compliance with the national air quality standard for TSP.

17.2.4 Surface and Groundwater Quality

Mosaic monitors surface water quality at CMT in 24 locations with a frequency ranging from weekly to annual. Regarding the content of phosphorus in surface waters around CMT, a background study supports the establishment of a concentration of 0.344 mg/L as the maximum permissible concentration for phosphorus in surface waters. Monitoring results from January 2020 to October 2023 were available for review (file: Gerenciador de Monitoramentos Ambientais-CMT 2020 a 2023.xlsm) and indicated general compliance with the applicable surface water quality standards.

Mosaic monitors groundwater quality at CMT in 34 locations with a frequency ranging from weekly to annually. These locations include piezometers, groundwater abstraction wells and wells used for lowering the water table in the mine. Monitoring results from January 2020 to October 2023 were available for review (file: Gerenciador de Monitoramentos Ambientais-CMT 2020 a 2023.xlsm) and indicated general compliance with the applicable groundwater quality standards.

17.2.5 Tailings Management and Monitoring

CMT has two tailings dams, three dams for sediment containment and water clarification, and one water dam:

- Dam BA3: The BA-3 Dam was built in 1980 to contain any solids that may be spilled by the BL-1 dam or the contribution basin, controlling its reservoir and preventing the emission of suspended solids into the Potreiro stream, located downstream.
- Dam BD2: It was built in 1979 by Fosfértil, former owner of the Tapira Mining Complex, using local soil compacted by traffic, with the purpose of containing solids carried by the beneficiation plant's discharges.
- Dam BD5: It is a structure designed to contain the solids carried from the beneficiation plant and mine area as well as the solids that may not eventually be contained in the BR dam area, located upstream of this structure. It was built in 1987, with the raisings in 1995, 1999, and 2012.
- Dam BR: It was built in 1980 and it is located at the head of the Boa Vista stream and upstream from the BD5 dam. The BR Dam was designed for tailings containment. The reservoir occupies a considerable portion of the basin's drainage area, being sectioned in half by the tailings thrown at its left abutment. Currently, the crest elevation is 1,200 m and there are four additional raises planned (El. 1,210 m, El. 1,220 m, El. 1,230 m, and El. 1,235 m).
- Dam BL-1: According to document No. BL1 43-70-2020 April 1977, the initial project of the BL1 Dam was prepared by the companies Paulo Abib Eng. and WA Waler & Associates, in 1977, with the purpose of storing of the phosphate plant's tailings, owned by the company Mineração Vale do Paranaíba SA. According to this document, an initial dike was designed, in compacted soil, and with a crest at El. 1,160 m. A rockfill dike was also built, located about 237 m downstream of the initial dike, with a crest at an elevation of 1,145 m. It was bult in 1977, with raisings concluded in 2008, 2015, 2019, and a reinforcement and rising concluded in 2021.Currently, the crest elevation is 1,225 m.
- Dam BRI: It was built in a single stage in 1978, with the purpose of storing and capturing water for use in the Phosphate ore beneficiation process.

17.2.5.1 Corporate Policy and Guidelines

All documentation regarding the tailings dams is included in the Dam Safety Plan (PSB) of each structure on the SGPSB - Management System for Dam Safety Plan platform. The existing documentation is consistent with the requirements of Brazilian dam safety legislation: Law 12,334 of September 20, 2010, and Resolution 95, dated February 7, 2022, established by National Mining Agency (ANM in the Portuguese acronym).

17.2.5.2 Tailings Characterization

The latest Tailings Master Plan report was developed by Walm in 2022 (WA02821013-1-GT-RTE-0002). Since then, various studies for tailings disposal were carried out in term of disposal plan for BL1 and BR dam with the combination of stacking the coarse tailings from cyclones operations forming the Waste Deposition Piles (PDRs). Next year after those studies concluded, the tailings master plan will be updated.

From Tapira unit we have three types of tailings generated which include ultrafines, coarse tailings and magnetite. Table 17.1 considers the parameters of dry density for the types of tailings produced.

Table 17.1: Tailings Dry Density

Parameter	Ultrafines	Coarse Tailings	Magnetite
Hydraulic Disposal (t/m^3)	1.10	1.50	-
Compaction (t/m^3)	-	1.80	2.90

17.2.5.3 Operations and Monitoring for Compliance

The Operating, Maintenance, and Surveillance (OMS) Manual for the Tapira Structures was updated in 2023.

The geotechnical monitoring of Tapira's tailings dams includes field inspections and measurements of the installed instrumentation equipment. Field visual inspections are performed every two weeks by traversing the structures looking for anomalies that may impact the dam integrity and its associated structures, while the readings of the instruments follow a specific frequency for each type of instrument installed. Both activities are executed by the Mosaic technical team, as requested in the current Brazilian legislation.

The data obtained during field inspections are recorded on a Regular Inspection Sheet (FIR) every two weeks, which is inserted in the SIGBAR/SIGDEP Monitoring Plan. A monthly assessment is done by Geoconsultoria (owner of the SIGBAR/SIGDEP Monitoring System) with the issuance of a technical report containing the readings performed and the instruments interpretation. All documentation generated by the information obtained through routine and regular inspections is inserted in the Dam Safety Plan (PSB) of each dam, located on the platform SGPSB - Management System for Dam Safety Plan.

The Tapira site includes a dedicated monitoring room from which all Fertilizantes site impoundments are monitored via remote sensing devices and cameras.

17.2.5.4 Engineer of Record and Inspection Report Reviews

The latest regular safety inspection reports available for the second semester of 2023 for the structures BA3 (MO-23004-GT-RT-0025), BD2 (MO-23004-GT-RT-0023), BD5(MO-23004-GT-RT-0024), BR (MO-23004-GT-RT-0020), BL-1(MO-23004-GT-RT-0021), and BRI (MO-23004-GT-RT-0022) identified no issues that directly interfere with the stability of the structures.

The Dam Regular Safety Inspection Report (RISR) is carried out with biannual frequency and a Periodic Security Review must occur every 3 years for structures classified with high potential damage associated (BR, BL1, BD5, BR1, and BD2) and 5 years for structures classified with medium potential damage associated (BA3 Dam).

17.2.5.5 Compliance Monitoring and Report Documentation

The monitoring and control system for geotechnical parameters consists of monitoring the behavior of the structure in comparison to the expected behavior using data on pore pressures in the foundation and embankment, the reservoir's water level, the drained flow, the movement and settlement of the foundation and embankment.

For this purpose, in the currently operating structures, monitoring instruments were installed, using the SIGBAR management system, which is divided into modules, each covering an aspect related to the safety of dams.

For all the structures there are documents that indicate levels to represent a normal, attention, alert, or emergency situation for the installed instrumentation control. These documents were issued in 2016 for the structures BR, BL1, BRI, BD2, BD5, respectively, FF44CR05, 04, 06, 02, 03, and in 2004 for structure BA3 (FF42CR01).

The readings periodicity of the instruments was established in the operating manuals of the structures, all prepared by Mosaic itself between 2017 and 2019.

The minimum frequency of readings of survey monuments is monthly, water level indicators, piezometers and flow meters are every two weeks, although it can be weekly in rainy seasons. The reservoir water level is read weekly. The pluviometry was not reported.

All documentation regarding the tailings dams is included in the Dam Safety Plan (PSB) of each structure on the SGPSB - Management System for Dam Safety Plan platform.

17.2.5.6 Design Capacity

The characteristics of the tailings dams used in the Tapira LOMP are summarized in Table 17.2.

Table 17.2: Current and Designed Characteristics of Tailings Dams

Tailings Dam	Crest Elevation [m]		Reservoir Volume [Mm³]		Current Height [m]	Operation		Classification (4)
	Design[1]	Current	Design	Capacity[3]		Start	End	
BL1	1,225	1,225	210[2]	15	98	1977	2026	Very High
BR	1,235	1,200	230	185.3	61	1980	2057	Very High
PDR 2A	1,235	NA	10	10	60	2034	2038	Significant
PDR 2B	1,225	NA	56	56	90	2038	2054	NA
PDR 2C	1,280	NA	19	19	110	2054	2057	NA
PDM 2	1,228	NA	36	36	56	2027	2057	NA

Notes:
1. Considering the last raise
2. Latest Dam Safety Review
3. Consider the currently volume avaiable
4. Global Industry Standard on Tailings Management (GISTM) Classification

A tailings disposal plan was prepared for Tapira by Walm in 2022 (WA02821013-1-GT-RTE-0002), which considered the generation of tailings during the LOMP, detailed in Table 17.3 and Table 17.4.

Table 17.3: Tailings Volume to be Stored in TSF

Period	Slurry + Ultrafine Tailings (Mm3)	Coarse Tailings (Mm3)	Period	Slurry + Ultrafine Tailings (Mm3)	Coarse Tailings (Mm3)
2024	4.54	3.31	2041	4.45	3.34
2025	4.52	3.38	2042	4.44	3.33
2026	4.42	3.38	2043	4.20	3.15
2027	4.51	3.31	2044	4.31	3.23
2028	4.50	3.35	2045	4.46	3.35
2029	4.42	3.13	2046	4.32	3.24
2030	4.46	3.08	2047	4.52	3.39
2031	4.18	3.07	2048	4.46	3.35
2032	4.10	3.21	2049	4.15	3.11
2033	4.10	3.16	2050	4.29	3.22
2034	4.28	3.24	2051	4.30	3.23
2035	4.21	3.26	2052	4.45	3.34
2036	4.31	3.23	2053	4.49	3.37
2037	4.48	3.36	2054	4.40	3.30
2038	4.46	3.34	2055	4.51	3.38
2039	4.49	3.37	2056	4.97	2.98
2040	4.49	3.37	2057	4.38	3.23

Table 17.4: Stockpiled Tailings and Magnetite

Period	Coarse Tailings (Mm^3)	Magnetite (Mm^3)	Period	Coarse Tailings (Mm^3)	Magnetite (Mm^3)
2024	2.76	0.42	2041	2.78	0.42
2025	2.82	0.43	2042	2.77	0.42
2026	2.81	0.43	2043	2.63	0.40
2027	2.76	0.42	2044	2.69	0.41
2028	2.79	0.42	2045	2.79	0.42
2029	2.61	0.40	2046	2.70	0.41
2030	2.56	0.39	2047	2.82	0.43
2031	2.56	0.39	2048	2.79	0.42
2032	2.67	0.41	2049	2.59	0.39
2033	2.63	0.40	2050	2.68	0.41
2034	2.70	0.41	2051	2.69	0.41
2035	2.72	0.41	2052	2.78	0.42
2036	2.69	0.41	2053	2.81	0.43
2037	2.80	0.43	2054	2.75	0.42
2038	2.79	0.42	2055	2.82	0.43
2039	2.81	0.43	2056	2.48	0.38
2040	2.81	0.43	2057	2.74	0.42

The tailings disposal strategy in the document can be summarized as follows:

- Coarse tailings:
  - 2022-Aug/2023: Launch in "Dam BL1" (El. 1,225.00m) (existing structure);
  - Sep/2023-Sep/2024: Mechanized launch in the base area of the "PDR Teste", located on the left abutment arm of the "BR Dam" (El. 1,200.00m) (existing structure);
  - Sep/2024-Oct/2025: Launching upstream of the "BR Dam" reservoir (El. 1,200.00m) (existing structure);
  - Oct/2025-Dec/2025: Disposal in "PDR-I" (structure to be built);
  - Jan/2026-Mar/2027: Launching from the crest to create a beach for the raising of the "BR Dam" (El. 1,210.00m) (existing structure, to be raised – preliminary environmental license already issued);
  - Mar/2027-Aug/2030: Disposal in "PDR-I" (structure to be built);
  - Aug/2030-Jan/2035: Disposal in PDR-II" (structure to be built);
  - Jan/2035-Nov/2036: Launching from the crest to create a beach for the raising of the "BR Dam" (El. 1,230.00m) (existing structure, to be raised);
  - Nov/2036-Dec/2057: Disposal in PDR-II (structure to be built).

- Mud + Ultrafines:
  - 2022-Mar/2027: Launch in "Dam BL1" (El. 1,225.00m) (existing structure);
  - Mar/2027-2057: Launch at "BR Dam" (El. 1,210.00m and El. 1,230.00m) (existing structure, to be raised);
- Magnetite:
  - Jan/2024-Dec/2025: Construction material for the raising mass of the "BR Dam" (El. 1,210.00 m) (structure to be built);
  - Mar/2030-Dec/2034: Construction material for the raising mass of the "BR Dam" (El. 1,220.00 m and El. 1,230.00 m) (structure to be built);
  - Jan/2035-Dec/2057: Fixed monthly sales rate (material will be sold);
  - Jan/2035-Dec/2057: Disposal in "PDM-2" (structure to be built).

17.2.6 Water Management

A hydrotechnical study concluded in 2019 for Mosaic (POTAMOS, 2019) presented as a general diagnosis of water use that CMT does not present a potential risk related to water supply. However, this study presented recommendations for improvements related to water management, such as the need to rectify the water use permits of the dams by changing the minimum flow rate, developing and implementing a water resources management system, conducting studies to assess the impact of mining operations on watercourses adjacent to the mine area, defining correct replacement flows; and improvements related to the monitoring system such as the daily reading of the residual flow in all dams as a necessary measure to meet the demands of the Water Management Agency (IGAM) that has intensified the inspection due to the critical period of hydrological recession in recent years in the State of Minas Gerais. The study also highlights the need to update the water balance of the industrial unit annually due to the frequent changes in the hydrological regime and the review of studies on water supply and availability in the basins in which CMT is located. The recommendations relating to piping facilities and flow meters are in progress to be implemented at CMT through Capital Expenditure (Capex) improvements over the next few years.

Although water supply is not considered a risk for the CMT operation, the impacts of the existing water management practices on the surrounding areas can be considered a risk. Communities around the mine area have limited access to water resources and that access is directly influenced by CMT's operations CMT has a flow replacement system in three streams. Issues related to water use tend to become more relevant in a context of changes in the hydrological regime due to climate change and greater control by the agencies responsible for the management of water resources.

Near the CMT area there is a rural settlement called "Assentamento Fazenda Nova Bom Jardim" (Fazenda Nova Bom Jardim Settlement), an agrarian reform project of the Instituto Nacional de Colonização e Reforma Agrária - INCRA (National Institute of Colonization and Agrarian Reform). The settlement, adjacent to the CMT mine area, has 10 (ten) settled families that collect water from springs and local streams. Due to changes in water availability caused by lowering the water table within the mine pit, CMT provides the replacement of flows in Canoas, Cachoeira and Bálsamo streams.

17.3 Permitting Requirements

This sub-section contains forward-looking information related to permitting requirements for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including regulatory framework is unchanged for Study period and no unforeseen environmental, social or community events disrupt timely approvals.

The current Brazilian legislation generally includes the following steps in the environmental permitting process:

- Preliminary License (*Licença Previa* – LP): authorizes the permitting process based on the assessment of the environmental feasibility of an activity. In the case of mining operations usually requires the presentation of an ESIA.
- Installation License (*Licença de Instalação* – LI): authorizes the installation of the structures that will be used for the activity.
- Operation License (*Licença de Operação* - LO: authorizes the operation of the activity.

Table 17.5 presents environmental licenses and other material permits for CMT. All environmental permits were valid at the time this report was prepared or had its renewal application filed in the Environmental Agency within the legal deadline; according to the Brazilian legislation, in the latter case the permits are still valid until a final decision of the Environmental Agency is provided.

Table 17.5: Environmental Authorizations for Tapira

Authorization[a]	Number	Description	Issued on	Validity
Preliminary, Installation and Operation License	4683/2020	Deposits T2 and T4	October 30, 2020	October 30, 2030
Preliminary, Installation and Operation License	076/2021	Deposit E6	July 30, 2021	July 30, 2031
Preliminary, Installation and Operation License	083/2021	First expansion of the deposit T4	August 27, 2021	August 27, 2031
Preliminary License	091/2021	Raising tailings dam BR to 1210 m	October 26, 2021	October 26, 2026
Operation License	194/2010 (135/2020)	Operation of the Site, including exploitation of phosphate ore, ultrafine unit, tailings dam and ore pipeline.	November 12, 2010	November 12, 2016[c]
Operation License	028/2012	Operation of the Site - increase	February 10, 2012	February 10, 2018(d)
Operation License	072/2015	Fuel stations at the mine and near the central office	December 13, 2013	December 13, 2019[e]
Operation License	118/2011	Operation of expansion of waste rock pile E1	August 12, 2011	August 12, 2015[f]
Operation License	055/2018	Tailings dam BL-1 up to the elevation 1220 m.	May 10, 2018	May 10, 2028
Corrective Operation License	097/2017	Raising tailings dam BL-1 from 1215.0 m to 1217.5 m	August 11, 2017	August 11, 2027
Simplified Environmental License	182/2018	Expansion of the fuel station at the mine	October 3, 2018	October 3, 2028
Operation License	5079/2022	Operation of tailings dam BL-1 up to the elevation 1225 m.	January 28, 2022	January 28, 2032
Water grant	1906074/2019	Groundwater abstraction at the mine area: 7 m^3/h; 18 h/day, 365 days/year.	August 31, 2019	August 31, 2024
Water grant	1904333/2019	Groundwater abstraction near the water treatment plant 6.6 m^3/h; 10 h/day; 365 days/year.	June 14, 2019	June 14, 2024
Water grant	1905254/2019	Groundwater abstraction near the water tank (tower): 11.82 m^3/h; 18 h/day, 365 days/year.	July 30, 2019	July 30, 2024
Water grant	01376/2009	Water dam with abstraction – Ribeirão do Inferno: 917 L/s (3301 m^3/h); 24 h/day; 12 months/year. Maximum monthly volumes allowed: 245,609 m^3 in January, Marco, May, July, August, October and December, 221,840 m^3 in February and 237,686 in April, June, September and November. BR. Requires to maintain residual flow of 70% of Q7,10.[b]	December 12, 2013	June 6, 2014(g)
Water grant	01375/2010	Tailings dam BR. Requires to maintain residual flow of 70% of Q7,10.	December 12, 2013	May 19, 2015[h]
Water grant	03380/2017	Tailings dam BL-1. Requires to maintain residual flow of 100% of Q7,10.	October 10, 2017	December 11, 2023
Water grant	01376/2010	Sediment retention dike DB5. Requires to maintain residual flow of 70% of Q7,10.	December 12, 2013	May 19, 2015[i]

Table 17.5 (cont.)

Authorization[a]	Number	Description	Issued on	Validity
Water grant	1904383/2019	Channeling tributary to Boa Vista stream.	June 19, 2019	June 19, 2024
Water grant	1904693/2019	Water dam in the Protreiro stream with no abstraction	July 18, 2019	July 18, 2024
Water grant	1906017/2019	Groundwater abstraction near the medical clinic: 1.2 m³/h; 18 h/day, 365 days/year.	October 26, 2019	October 26, 2029
Water grant	2105716/2022	Lowering water table at the mine	August 27, 2022	August 27, 2031
Water grant	1907484/2021	Channeling E6	August 8, 2021	August 8, 2031
Water grant	39591/2019	Dike at E6 deposit	March 6, 2020	March 6, 2030
Certification on insignificant water use	275078/2021	Dike at the mine – T4 deposit	July 23, 2021	July 23, 2024
Authorization for environmental intervention	LO 046/2021 APU-119890/2021	Removal of vegetation for expansion of the mine: fronts 4 and 5	May 14, 2021	May 14, 2023
Authorization for environmental intervention	138/2017 APU-1972601/2013	Removal of vegetation for drilling works	February 20, 2012	February 10, 2018[j]
Authorization for environmental intervention	138/2017 APU-1168053/2017	Removal of vegetation for expansion of the mine: fronts 2, 4 and 4	November 14, 2017	February 10, 2018[k]
Authorization for environmental intervention	LO 283/2022	Removal of vegetation for mie expansion until 2027 and deposit T6	July 7, 2022	July 7, 2028

Notes:
(a) Licenses, autorizations and water grants issued by SEMAD (*Secretaria de Estado de Meio Ambiente e Desenvolvimento Sustentável* – Minas Gerais State Environment Regulator).
(b) $Q_{7,10}$: average flow rate of seven days and ten years of recurrence
(c) Renewal request was filed on April 28, 2014, within the deadline required in the license.
(d) Renewal request was filed on April 28, 2014, within the deadline required in the license.
(e) Renewal request was filed on August 12, 2019, within the deadline required in the license.
(f) Renewal request was filed on April 28, 2014, within the deadline required in the license.
(g) Renewal request was filed on April 16, 2014, within the deadline required in the license.
(h) Renewal request was filed on October 28, 2014, within the deadline required in the license.
(i) Renewal request was filed on October 28, 2014, within the deadline required in the license.
(j) Renewal request was filed on February 9, 2018, within the deadline required in the license.
(k) Renewal request was filed on February 5, 2018, within the deadline required in the license.

17.4 Plans, Negotiations, or Agreements with Local Individuals, or Groups

This sub-section contains forward-looking information related to plans, negotiations or agreements with local individuals or groups for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including that regulatory framework is unchanged for Study period; no unforeseen environmental, social or community events disrupt timely approvals.

The Mosaic Institute is the social pillar of Mosaic Fertilizantes whose objectives are to promote mutual, sustainable development in the surrounding communities based on regional reality, operational activity, social indices, propensities, and the needs and wants of the inhabitants. The Institute's activities are based on four platforms: Water, Food, Education, and Local Development. The programs developed by the Mosaic Institute at CMT include (GOLDER, 2021):

- Food: The actions aim, among others, to promote training in healthy eating, food safety and combating waste. Food donations, implementation of school gardens, lectures and training on topics related to healthy eating, food safety, combating waste, as well as other mobilization and social engagement actions are carried out. In 2019 the program involved 290 direct beneficiaries in Tapira and 1,160 indirect beneficiaries.
- Water: The Water Notice is a project that launches social competition notices for the selection of projects that seek to value and encourage water resource management practices, and preservation actions capable of ensuring the availability of water for present and future generations. In 2020, the second edition of the project was launched, which included twelve initiatives spread across several cities where Mosaic operates. The projects included are developed by civil society organizations and higher education and research institutions; each project will receive up to R$45,000 during the implementation of the proposal.
- Education:
  - The School Project is developed through the Public Management program, through the elaboration of a socioeconomic diagnosis and proposition of actions together with local public managers. Among the actions carried out in Tapira, the program involved the elaboration of actions that have an impact on education, with the mapping of potential sites and receiving educational institutions. Through the mobilization and articulation with local leaders and public authorities, a solution laboratory is proposed. In Tapira, the program carried out actions on two fronts, involving 20 municipal employees.
  - The "Mosaic Educa" Program has as its main objective the strengthening of basic education through the improvement and reorganization of structures, concomitant with the training of educational managers and students, in school management and in encouraging reading. The program already has actions in the municipalities of Paranaguá, Catalão, Uberaba and Candeias. With four schools involved, the Mosaic Educa Program has 4,800 benefited students, in addition to 350 trained professionals, who benefit around 200 schools. Indirectly, 2,200 families are served through the program to strengthen basic education. In Tapira, it will be implemented after the completion of the construction works for the Municipal Children's Education Center in the municipality.

17.5 Descriptions of any Commitments to Ensure Local Procurement and Hiring

In addition to the Mosaic Institute initiatives, the Environmental Education and Citizenship Program (PEAC in the Portuguese acronym) includes a series of actions to meet the local residents' needs and works to promote educational actions with a focus on environmental education for both internal and external audiences. It also plays a role in publicizing environmental legislation and being responsible for creating opportunities for discussions on the local realities of related topics.

17.6 Mine Closure Plans

This sub-section contains forward-looking information related to mine closure for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including prevailing economic conditions continue such that unit costs are as estimated in constant (or real) dollar terms, projected labor and equipment productivity levels are appropriate at time of closure and estimated infrastructure and mining facilities are appropriate at the time of closure.

CMT's Closure Plan was updated in 2020/2021 (GOLDER, 2021) and it was split into two volumes, as follows:

1. Volume I: Closure plan based on the current configuration of CMT (end of 2020).
2. Volume II: Supplementary information related to CMT closure based on its final configuration (2060).

Based on a qualitative analysis of post-closure land use alternatives, rehabilitation / revegetation with native species was selected as CMT.

The closure actions included:

- Open pits: erosion control, surface drainage, revegetation.
- Waste rock piles: erosion control, surface drainage, and revegetation.
  - Waste rock piles E1, E2, T1, and T2 were considered as already closed and no addition actions were proposed for the closure of these structures.
- Sediment retention dikes:
  - BA3: Removal of the dike and sediments, grading, surface drainage and revegetation.
  - BD2: Grading, surface drainage and revegetation.
  - BD5: Water removal, lowering the crest of the dike, filling up the reservoir with material from the embankment, grading, surface drainage, revegetation.
- Industrial and administrative areas: dismantling and demolition, surface grading, surface drainage and revegetation.
- Storage yards: Demolition of concrete floor (where exists), grading and revegetation.
- Ponds: Grading and revegetation.
- Tailings storage facilities:
  - Tailings dam BL1: Water removal, grading the reservoir surface, replacement of the concrete spillway by a rock filled spillway, surface drainage, revegetation.
  - Tailings dam BR: Water removal, lowering the crest of the embankment, filling up the reservoir with material from the embankment, grading, replacement of the concrete spillway by a rock filled spillway, surface drainage, revegetation. Lake 3 on the reservoir will be maintained and the water level will be controlled by surface drainage system to be implemented.
  - Magnetite pile: Grading, surface drainage, cover with soil and overburden, revegetation.

- Water dam: Dismantling and removal of equipment and structures, water removal, removal of the dike, geomorphic adjustment of the reservoir to restore the former river channel, revegetation.
- Ore pipeline: Removal of all aerial pipeline and its support structures (underground pipeline would not be removed), revegetation of areas with exposed soil after removal of the pipeline.

The LOM closure cost was estimated in the Conceptual Closure Plan (2021) based on 2020 unit prices, and then updated in October 2021, based on the review of some unit prices. The updated LOM closure cost in 2021 was R$ 565.3 M. Adjusting this value based on the accumulated inflation[3] in Brazil from October 2021 to December 2023 (15.23%) and work planned for 2021-2023 results in a LOM closure cost of R$ 390.4 M.

17.7 Qualified Person's Opinion on the Adequacy of Current Plans to Address Any Issues Related to Environmental Compliance, Permitting, and Local Individuals, or Groups

It is the WSP QP's opinion that the current Mosaic's actions and plans are appropriate to address the identified issues related to environmental compliance, permitting, relationship with local individuals or groups, and tailings management.

[3] INCC index was used, corresponding to inflation of civil construction prices.

18.1 Risks Associated with Estimation Methods

It should be noted that at the time that the capital costs were prepared when Brazil was experiencing high inflation rates and is, therefore, considered a risk to the capital cost estimates.

Beneficiation plant improvement capital will be subject to engineering uncertainty. The capital estimates are done to a PFS level, which is sufficient to support Mineral Reserve estimation.

Beneficiation sustaining capital would be replacement of major components and is expected to have minimal risk as the equipment being replaced is well known for cost, productivity, and application and is based on Mosaic historical purchase prices.

19.0 ECONOMIC ANALYSIS

This section contains forward-looking information related to economic analysis for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including estimated capital and operating costs, project schedule and approvals timing, availability of funding, projected commodities markets and prices.

19.1 Principal Assumptions

- Sales price: The price and value of phosphate rock produced by Tapira was developed based on a comparison of available gross margin compared to the cost of phosphate rock production at CMT. See Section 16.0 for additional information on pricing methodology.
- Production: The total phosphate ore production schedule for Tapira is based on supplying about 64.2 M tonnes of conventional concentrate, and 5.2 M tonnes of Ultrafine concentrate over the LOM.
- FX Rate: WSP converted the DCF from Brazilian Reais to US Dollars, at an exchange rate of R$4.86 = US$1.00.
- Inflation: No inflation was applied to costs or revenues.
- Diesel Prices: The prices range from R$4.00/L to R$4.41/L for S-500, and R$4.06/L to R$4.49/L for S-10.
- Discount Rate: A discount rate of 13.69% was used to account for cost of capital and project risk.

19.2 Cashflow Forecast

The cashflow for production from the Tapira Mine is shown in Table 19.1 in R$. Table 19.2 represents the cashflow in US$. An exchange rate of R$4.86 = US$1.00 was applied.

Table 19.1: Cashflow (real 2023 R$ terms)

		Tapira	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	Assumptions	Sales Price (R$ / Tonne)	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34
		Production (000's Tonnes)	1,933	1,978	2,057	2,124	2,156	2,162	1,895	1,895	1,895	1,895	1,895	2,066
		FX Rate (BRL to USD)	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86
		Diesel Price: S-500 (R$/L)	5.41	5.19	5.13	5.26	5.39	5.53	5.67	5.67	5.67	5.67	5.67	5.67
		Diesel Price: S-10 (R$/L)	5.49	5.27	5.22	5.34	5.48	5.62	5.76	5.76	5.76	5.76	5.76	5.76
000's R$	Revenue	Concentrate	1,058,033	1,082,750	1,125,958	1,162,318	1,179,914	1,183,432	1,037,286	1,037,286	1,037,286	1,037,286	1,037,286	1,130,704
		Other Revenue												
		Sales Revenue (Tapira Mine)	1,058,033	1,082,750	1,125,958	1,162,318	1,179,914	1,183,432	1,037,286	1,037,286	1,037,286	1,037,286	1,037,286	1,130,704
	Costs of Production	Mining	664,478	538,776	564,806	541,102	556,202	554,043	478,167	478,167	478,167	478,167	478,167	486,130
		Processing	298,167	301,626	307,939	313,401	315,935	316,558	295,480	295,480	295,480	295,480	295,480	309,106
		Other Operating Costs	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146
		Resource Taxes, Royalties and Other Government Levies or Interests	17,956	17,495	18,168	17,790	18,155	18,123	16,105	16,105	16,105	16,105	16,105	16,534
		Cash Costs of Production (Excluding Taxes)	869,791	847,548	879,890	861,739	879,284	877,747	780,793	780,793	780,793	780,793	780,793	801,382
	Allocated Costs	Other Costs	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717
	Income Taxes	Income Tax	30,013	39,806	40,095	51,900	49,485	50,092	37,887	37,124	36,295	35,446	33,578	49,767
	Closure	Reclamation and Closure	116	88	1	-	3,325	6,182	8,789	39,594	12,192	662	-	-
	Capital Expenditures	Capital Expenditures	328,181	263,900	274,917	226,127	274,980	76,017	88,222	82,380	86,238	84,861	179,318	153,748
	Working Capital	Net Change in Working Capital	(5,386)	(2,755)	1,857	(2,687)	1,166	(239)	(5,117)	-	-	-	-	(606)
	Cash Flow	Annual Net Cash Flow	(212,354)	(113,049)	(118,687)	(22,268)	(76,198)	125,791	80,891	51,574	75,946	89,702	(2,225)	80,162

		Tapira	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
	Assumptions	Sales Price (R$ / Tonne)	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34
		Production (000's Tonnes)	2,066	2,066	2,066	2,066	2,162	2,162	2,162	2,162	2,162	1,923	1,923	1,923
		FX Rate (BRL to USD)	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86
		Diesel Price: S-500 (R$/L)	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67
		Diesel Price: S-10 (R$/L)	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76
000's R$	Revenue	Concentrate	1,130,704	1,130,704	1,130,704	1,130,704	1,183,432	1,183,432	1,183,432	1,183,432	1,183,432	1,052,767	1,052,767	1,052,767
		Other Revenue												
		Sales Revenue (Tapira Mine)	1,130,704	1,130,704	1,130,704	1,130,704	1,183,432	1,183,432	1,183,432	1,183,432	1,183,432	1,052,767	1,052,767	1,052,767
	Costs of Production	Mining	485,130	485,130	485,130	485,130	483,077	483,092	483,092	483,092	483,077	430,188	430,188	430,188
		Processing	309,106	309,106	309,106	309,106	316,455	316,455	316,455	316,455	316,455	297,445	297,445	297,445
		Other Operating Costs	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146
		Resource Taxes, Royalties and Other Government Levies or Interests	16,534	16,534	16,534	16,534	16,644	16,644	16,644	16,644	16,644	15,147	15,147	15,147
		Cash Costs of Production (Excluding Taxes)	801,382	801,382	801,382	801,382	806,679	806,694	806,694	806,694	806,679	734,780	734,780	734,780
	Allocated Costs	Other Costs	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717
	Income Taxes	Income Tax	48,811	46,939	45,628	44,281	54,543	53,018	51,379	49,630	46,495	30,555	28,431	26,146
	Closure	Reclamation and Closure	-	-	-	-	-	-	-	-	-	-	-	-
	Capital Expenditures	Capital Expenditures	84,143	157,263	104,876	102,326	103,176	103,493	104,844	104,986	175,778	101,813	101,964	100,506
	Working Capital	Net Change in Working Capital	-	-	-	-	(935)	1	-	-	(1)	(3,190)	-	-
	Cash Flow	Annual Net Cash Flow	150,117	79,869	132,567	136,464	173,608	173,665	174,153	175,761	108,121	143,946	142,729	146,471

Table 19.1 (cont.)

Tapira			2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	Total/ Average
Assumptions		Sales Price (R$ / Tonne)	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	547.34	543.17
		Production (000's Tonnes)	1,923	1,923	2,154	2,154	2,154	2,154	2,154	2,014	2,014	2,014	69,453
		FX Rate (BRL to USD)	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86
		Diesel Price: S-500 (R$/L)	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.61
		Diesel Price: S-10 (R$/L)	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.70
000's R$	**Revenue**	Concentrate	1,052,767	1,052,767	1,178,754	1,178,754	1,178,754	1,178,754	1,178,754	1,102,422	1,102,422	1,102,422	**37,724,770**
		Other Revenue											
		Sales Revenue (Tapira Mine)	1,052,767	1,052,767	1,178,754	1,178,754	1,178,754	1,178,754	1,178,754	1,102,422	1,102,422	1,102,422	**37,724,770**
	Costs of Production	Mining	430,188	430,188	351,994	351,994	351,994	351,994	351,994	281,159	281,159	281,159	**15,305,798**
		Processing	297,445	297,445	315,765	315,765	315,765	315,765	315,765	303,912	303,912	303,912	**10,436,622**
		Other Operating Costs	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	7,146	**242,964**
		Resource Taxes, Royalties and Other Government Levies or Interests	15,147	15,147	13,901	13,901	13,901	13,901	13,901	12,180	12,180	12,180	**535,885**
		Cash Costs of Production (Excluding Taxes)	734,780	734,780	674,904	674,904	674,904	674,904	674,904	592,218	592,218	592,218	**25,985,384**
	Allocated Costs	Other Costs	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	29,717	**1,010,378**
	Income Taxes	Income Tax	23,482	20,531	63,664	60,023	55,873	50,834	44,402	38,182	25,210	232	**1,162,316**
	Closure	Reclamation and Closure	-	-	-	-	-	-	-	161	11,343	307,900	**338,773**
	Capital Expenditures	Capital Expenditures	106,593	106,224	106,256	101,950	99,607	100,767	102,922	101,222	103,770	99,915	**(4,493,279)**
	Working Capital	Net Change in Working Capital	-	-	(9,029)	-	-	-	-	(5,875)	-	-	**(32,501)**
	Cash Flow	Annual Net Cash Flow	143,049	146,368	299,340	298,258	304,752	308,630	312,908	334,419	327,985	60,261	**4,231,255**

Note: Costs are rounded to the nearest thousand R$. Rounding as required by the reporting guidelines may result in apparent summation differences.

Table 19.2: Cashflow (real 2023 USD$ terms)

	Tapira	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Assumptions	Sales Price (USD / Tonne)	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62
	Production (000's Tonnes)	1,933	1,978	2,057	2,124	2,158	2,162	1,895	1,895	1,895	1,895	1,895	2,066
	FX Rate (BRL to USD)	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86
	Diesel Price: S-500 (USD/gal)	4.21	4.04	4.00	4.09	4.20	4.31	4.41	4.41	4.41	4.41	4.41	4.41
	Diesel Price: S-10 (USD/gal)	4.28	4.11	4.06	4.16	4.27	4.37	4.49	4.49	4.49	4.49	4.49	4.49
000's USD – Revenue	Concentrate	217,702	222,788	231,679	239,160	242,781	243,504	213,433	213,433	213,433	213,433	213,433	232,655
	Other Revenue												
	Sales Revenue (Tapira Mine)	217,702	222,788	231,679	239,160	242,781	243,504	213,433	213,433	213,433	213,433	213,433	232,655
Costs of Production	Mining	116,148	110,859	116,215	111,356	114,445	114,001	98,388	98,388	98,388	98,388	98,388	99,821
	Processing	61,351	62,063	63,362	64,486	65,007	65,135	60,798	60,798	60,798	60,798	60,798	63,602
	Other Operating Costs	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
	Resource Taxes, Royalties and Other Government Levies or Interests	3,995	3,600	3,738	3,661	3,736	3,729	3,314	3,314	3,314	3,314	3,314	3,402
	Cash Costs of Production (Excluding Taxes)	178,969	174,393	181,047	177,313	180,923	180,606	160,657	160,657	160,657	160,657	160,657	164,893
Allocated Costs	Other Costs	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115
Income Taxes	Income Tax	5,175	8,190	8,250	10,679	10,182	10,307	7,796	7,639	7,468	7,293	5,909	10,240
Closure	Reclamation and Closure	24	18	0	-	684	1,272	1,808	8,147	2,509	136	-	-
Capital Expenditures	Capital Expenditures	67,527	54,300	56,567	46,528	56,580	15,641	18,153	16,951	17,745	17,461	36,897	31,635
Working Capital	Net Change in Working Capital	(1,109)	(567)	382	(553)	240	(49)	(1,053)	-	-	-	-	(125)
Cash Flow	Annual Net Cash Flow	(43,694)	(23,261)	(24,421)	(4,582)	(15,679)	25,883	16,644	10,612	15,627	18,457	(458)	16,494

	Tapira	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Assumptions	Sales Price (USD / Tonne)	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62	112.62
	Production (000's Tonnes)	2,066	2,066	2,066	2,066	2,162	2,162	2,162	2,162	2,162	1,923	1,923	1,923
	FX Rate (BRL to USD)	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86
	Diesel Price: S-500 (USD/gal)	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41	4.41
	Diesel Price: S-10 (USD/gal)	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49
000's USD – Revenue	Concentrate	232,655	232,655	232,655	232,655	243,504	243,504	243,504	243,504	243,504	216,619	216,619	216,619
	Other Revenue												
	Sales Revenue (Tapira Mine)	232,655	232,655	232,655	232,655	243,504	243,504	243,504	243,504	243,504	216,619	216,619	216,619
Costs of Production	Mining	99,821	99,821	99,821	99,821	99,399	99,402	99,402	99,402	99,399	88,516	88,516	88,516
	Processing	63,602	63,602	63,602	63,602	65,114	65,114	65,114	65,114	65,114	61,203	61,203	61,203
	Other Operating Costs	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470	1,470
	Resource Taxes, Royalties and Other Government Levies or Interests	3,402	3,402	3,402	3,402	3,425	3,425	3,425	3,425	3,425	3,117	3,117	3,117
	Cash Costs of Production (Excluding Taxes)	164,893	164,893	164,893	164,893	165,983	165,986	165,986	165,986	165,983	151,189	151,189	151,189
Allocated Costs	Other Costs	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115	6,115
Income Taxes	Income Tax	10,043	9,658	9,388	9,111	11,223	10,909	10,572	10,212	9,567	6,287	5,850	5,380
Closure	Reclamation and Closure	-	-	-	-	-	-	-	-	-	-	-	-
Capital Expenditures	Capital Expenditures	17,313	32,359	21,579	21,055	21,230	21,295	21,573	21,602	36,168	20,949	20,980	20,680
Working Capital	Net Change in Working Capital	-	-	-	-	(192)	0	-	-	(0)	(656)	-	-
Cash Flow	Annual Net Cash Flow	30,888	16,228	27,277	28,079	35,722	35,775	35,834	36,165	22,247	29,619	29,368	30,138

slide167

As shown in Table 19.1 and Table 19.2, the following parameters were calculated or generated:

- Sales Revenue: The total sales revenue of $7.82 B (R$38.01 B) only includes the concentrate sales. Other revenues do not apply for the Tapira mine. The LOM Internal Transfer Price of $112.60/t (547.21) is calculated by setting the NPV to zero at the targeted discount rate of 13.69%.
- Mining and Beneficiation Cost: The total mining and beneficiation cost were $3.1 B (R$15.3 B) and $2.1 B (R$10.4 B) respectively. See Section 18.0 for more details.
- Other Operating Costs: The total other operating costs of $50.0 M (R$243.0 M) is a LOM sum of a fixed annual cost of $1.47 M (R$7.1 M), which includes legal expenses, Instituto Mosaic (community relations), health insurance for retirees, legal contingency, and others.
- Royalties and other government Levies or Interests: For the Tapira property, there are no royalties for mining operations on site. CFEM (2%) is calculated based on the costs of rock production.
- Cash Costs of Production: The total cash cost of production, excluding taxes, is $5.7 B (R$27.9 B).
- Other costs: The other costs include a total cost of $87.2 M (R$423.9 M) for SG&A, which is an annual fixed cost of $2.57 M (R$12.5 M), and a total cost of $120.7 M (R$586.4 M) for Other COGs (Facilities Idling, R&D, turnaround, inventory, etc.), which is an annual fixed cost of $3.6 M (R$17.3 M).
- Taxes: The tax rate for the DCF was set at 25%.
- Reclamation and Closure: The Closure costs continued until 2068. For simplicity, the cashflow is presented through the final year of mining with the Closure costs beyond the final year of mining accumulated, discounted (at the 13.69% discount rate) and included in the Closure cost estimate in year 2057. The total discounted LOM cost of Closure cost accretions is $80.3 M (R$390.4 M).
- Capital Expenditures: The total capital expenditures include sustaining and opportunity capital and is $924.5 M (R$4.5 B). See Section 18.0 for more details.
- Net Change in Working Capital: The working capital is calculated by using total annual days, accounts receivable, accounts payable, and inventory. It is assumed that the remaining working capital is recovered in the final year which makes the sum of all calculated working capital equal to zero.
- Cashflow: The cashflow is calculated by subtracting all operating, taxes, capital costs, and closure cost accretion from the total revenue.
- Net Present Value: The NPV was set to zero, by setting the Internal Transfer Price to a constant value of $112.60 (R$547.21).

19.3 Sensitivity Analysis

The sensitivity analysis was carried out by independently varying the price, operating cost, and capital cost. The results of the sensitivity analysis are shown in Table 19.3 and Table 19.4.

Table 19.3: Sensitivity Analysis (Millions of Reais)

Item	-20%	-10%	0%	10%	20%
Price	(1,302)	(602)	-	601	1,202
Operating Cost	920	460	-	(460)	(945)
Capital	270	135	-	(135)	(270)

Note: Costs are rounded to the nearest million R$. Rounding as required by the reporting guidelines may result in apparent summation differences.

Table 19.4: Sensitivity Analysis (Millions of US Dollars)

Item	-20%	-10%	0%	10%	20%
Price	(268)	(124)	-	124	247
Operating Cost	189	95	-	(95)	(194)
Capital	56	28	-	(28)	(56)

Note: Costs are rounded to the nearest million US$. Rounding as required by the reporting guidelines may result in apparent summation differences.

Because the Mosaic phosphate mines are captive suppliers of phosphate concentrate to Mosaic Chemical Plant(s), market demand risk is negligible. Market price risk is dependent on the ability of Mosaic to pay the mining, beneficiation, and transport costs of the run-of-mine phosphate ore over the study period. Mosaic's ability to cover the mining and beneficiation costs is dependent upon sales of fertilizer products produced from the Chemical Plant(s) and the Gross Margin Available (Total Revenue - Chemical Plant Operating Costs). Phosphate ore is economical if the price of concentrate is lower than the Gross Margin Available.

20.0 ADJACENT PROPERTIES

There is no information used in this TRS that has been sourced from adjacent properties. The phosphate mineralization for this deposit is limited to the igneous complex, which is fully enclosed within the CMT mining permits. Due to this, material changes to the Mineral Resource and Mineral Reserve estimates are not likely if adjacent property information is included in future estimates.

Adjacent property mining occurs within the region, however within different igneous complexes.

21.0 OTHER RELEVANT DATA AND INFORMATION

It is the opinion of the QPs that all material information has been stated in the above sections of this TRS.

22.0 INTERPRETATION AND CONCLUSIONS

This section contains forward-looking information related to Mineral Resources and the LOM plan for the Mine. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were forth in this sub-section including geological and grade interpretations and controls and assumptions and forecasts associated with establishing the prospects for economic extraction, grade continuity analysis and assumptions, Mineral Resource model tonnes and grade and mine design parameters, actual plant feed characteristics that are different from the historical operations or from samples tested to date, equipment and operational performance that yield different results from the historical operations and historical and current test work results, mining strategy and production rates, expected mine life and mining unit dimensions, prevailing economic conditions, commodity demand and prices are as forecast over the LOM period, waste disposal volumes increase from historical values and predicted values, that regulatory framework is unchanged during the Study period, and no unforeseen environmental, social or community events disrupt timely approvals, regulatory framework is unchanged for Study period and no unforeseen environmental, social or community events disrupt timely approvals, and estimated capital and operating costs, project schedule and approvals timing, availability of funding, projected commodities markets and prices.

Based on current project status, the QP's are not recommending additional work at this time. However, the following recommendations have been identified to further enhance internal processes and planning.

22.1 Mineral Resources

The following is a summary of the key interpretations and conclusions relating to geology and Mineral Resource estimation:

- The CMT geology team has a clear understanding of the interaction of lithology and weather as it related to controlling the phosphate mineralization of interest.
- The geological and deposit related knowledge has been appropriately used to develop and guide the exploration, modeling and estimation processes used by the CMT geology team.
- Exploration data collection methods and results were well documented for both historical and recent exploration campaigns. The exploration data collection methods followed industry standard practices that were in place at the time of the various exploration campaigns.
- CMT has conducted appropriate internal and external third-party data verification and data validation work on both historical and recent exploration data to ensure the geological database is reliable, representative, and free of material errors or omissions.
- Data that did not meet the standards for reliability were removed entirely from the modeling database or were used in a limited capacity (i.e., lithology modeling, but not grade interpolation).
- The resultant validated geological database is considered reliable, representative and it is the QPs view that it is fit for purpose in developing a geological model and for the preparation of Mineral Resource estimates as well as for use in other modifying factors studies, including mine design and scheduling and Mineral Reserve estimation.

- The geological interpretation and modeling methodology is appropriate for the style of mineralization and data available for CMT. The modeling methodology followed current industry standard practices.
- Modeling of the lithology and weathering domains and interpolation of the grade parameters was guided by sound geological interpretation and detailed geological, statistical, and geostatistical analysis and interpretation of the validated geological data.
- The mature nature of the operation and a solid understanding of the confidence of continuity of the geological domains of interest has supported the establishment of Reasonable Prospects for Economic Extraction for the CMT phosphate Mineral Resources reported in this TRS.
- The classification of Mineral Resources into confidence classes Measured, Indicated, and Inferred considered spatial variability of geological domains (both lithology and weathering) and grade parameters as well as geological confidence and uncertainty in the various methods and results used to develop the estimate, spanning exploration through estimation.
- The impact of geological uncertainty and risk has been evaluated across various key stages of the data collection, modeling and estimation process. A high-level summary of the assessment of geological uncertainty is as follows:
  - Measured Mineral Resources are considered to have a low degree of geological uncertainty across all elements evaluated.
  - Indicated Mineral Resources are also considered to have a low degree of geological uncertainty across most items, except for local scale variability in geological and grade modeling, where broader spatial distribution and confidence of continuity (relative to Measured category) may result in low-moderate uncertainty in these elements. This is not seen as a risk to the global estimate of Mineral Resources for CMT but could have local short range impact on future mining operations if not addressed via infill/production drilling and so forth.
  - Inferred Mineral Resources are considered to have a mix of low to moderate degree of geological uncertainty across all elements evaluated. As with the low-moderate risks identified in the Indicated Mineral Resource category above, the risks in the Inferred Mineral Resource category are primarily relating to spatial distribution of data and confidence of continuity, and again are seen as potential impacts on local rather than global estimates. Geological uncertainty in the Inferred Mineral Resource category can likely be reduced via future infill and production drilling.
- As CMT is an operation with almost 45 years of operational experience and data, the QP does not see any issues that require further work relating to relevant technical and economic factors that are likely to influence the prospect of economic extraction.
- Geological and Mineral Resource recommendations for CMT relate to improving confidence/understanding of the local variability for short range planning purposes that could be completed by site teams to provide improvements to short-term recovery and grade control. These are not seen as having an impact on the prospect of economic extraction.

The QP for the Mineral Resource estimates does not believe that there are significant risks or uncertainties associated with the Mineral Resource estimate, as discussed in Section 11.5 and Section 11.7.

22.2 Mineral Reserves

The following is a summary of the key interpretations and conclusions relating to the mine plan components and Mineral Reserve estimation:

- The Tapira mine is a well-established operation. The deposit, mining, beneficiation, and environmental aspects of the Mine are very well understood. The operational and technical knowledge has been appropriately used in the development of the LOM Plan and Mineral Reserve estimation.
- Years of historical operational data and observations have been well documented.
- The Mineral Reserve estimate summarized in Section 12.4 is based on a PFS level LOM plan, employing proven industry and practical methods of mining applicable to the type of ore deposit, demonstrated to be economic through a companion OPEX/CAPEX costing estimate.
- The Mineral Reserve estimate has been prepared to comply with all disclosure standards for Mineral Reserves under S-K 1300 reporting requirements, including:
  - Consideration of the economically mineable part of Measured and Indicated Mineral Resource estimates
  - Proper application of modifying factors to the Mineral Resources, including:
    - Estimation/modeling of allowances for mining loss and inclusion of mining diluting materials
    - Pit optimization
    - COG estimation
    - Process mass and metallurgical recovery estimates based on industry standardized testing
  - Consideration of:
    - Mining and beneficiation practices and requirements
    - Metallurgical factors
    - Infrastructure requirements
    - Economic and marketing factors
    - Legal, government, environmental, and social obligations
  - Classification of the estimated Mineral Reserves as Proven and Probable
- Mining of phosphate ore at CMT relies on typical open-pit type of unit operations to remove, transport and store overburden and other non-ore bearing material, and extraction and transportation of ore to the beneficiation plant. The CMT operation has equipment for open-pit mining of the appropriate fleet size and capacity, and labor staffing to support the LOM production plan.
- Process recovery relies upon standardized metallurgical and analytical testing. The metallurgical and analytical testing and historical data is adequate for the estimation of mass and metallurgical recovery estimation factors and estimation of Mineral Reserves.

- Process mass recovery estimations are based on linear regression equations based on laboratory flotation testing and have historically provided a good estimation of predictive values of phosphate recovery.
- The Tapira beneficiation process is similar to other processes treating Brazilian igneous phosphate ores. The capacity of the beneficiation plant is sufficient to support the LOM production plan.
- Sufficient infrastructure is in-place to support the Tapira mining and beneficiation operations with planned expansion as necessary to support the LOM Plan, including:
  - Project rail and road access
  - OSFs
  - Process TSFs
  - Water and pipelines
  - Power supply and local electric distribution lines
  - Mine and beneficiation maintenance and support facilities
- Critical environmental studies have been completed, including a 2016 ESIA. Critical community issues which have been identified include potential impacts on impoundment dam failures.
- All requirements for environmental monitoring for effluents, air quality and surface/groundwater quality are in place. A waste management plan is in place. Currently, 30 environmental permits in place.
- Mine closure plans and cost estimates are completed, representing current land disturbance conditions and anticipated land disturbance conditions at the end of the LOM.

The primary risks, that could materially affect the Mineral Reserve estimate, would include:

- A long-term, global material decrease in fertilizer product prices for sales that are not protected under long-term sales agreements
- Inflation rates with corresponding changes in capital and operating costs
- Production rates
- Exchange rates
- Tax rates
- Changing environmental regulations
- Change in political climate

The relocation of state highway MG-146 includes re-locating the Fazenda Nova Bom Jardim Settlement, which is located to the west of the Mosaic currently controlled surface area. Risks include social risk during negotiations and an economic risk since Mosaic has not yet acquired the surface rights. This area is included in the currently controlled mining permits; and is therefore, not seen as a significant encumbrance to CMT.

The capacity requirements are not currently in place for all tailings disposal for total LOM capacity requirements. However, CMT has an ongoing permitting and development plan to support the mining operations that will continue through the LOM requirements.

23.0 RECOMMENDATIONS

23.1 Mineral Resources

The recommendations listed below are focused on improving local variability for short-range planning purposes that could be completed by site teams to provide improvements to short-term recovery and grade control. They are not seen as having an impact on the prospect of economic extraction.

- Further investigation on the impacts of alternative grade interpolation methods such as surface normal, dynamic anisotropy, and so forth.
- Consider further interpretive controls on the leapfrog lithological domain modeling to improve geological reasonableness of the domain modeling.
- Future modeling efforts should include a simplified, uniform compositing basis. This will likely have changes to local estimates, but will likely not have material changes to the global estimate.

23.2 Mineral Reserves

The recommendations listed below are focused on supporting the LOM Plan requirements and to ensure maximum recovery of stated reserves. These recommendations will have an economic impact on economic extraction:

- Continue design and permitting efforts to ensure the re-route of the MG-146.
- Continue and complete negotiations (technical, financial and social aspects) to successfully relocate Fazenda Nova Bom Jardim Settlement.
- Continue with design and permitting efforts required to expand tailings facility capacity as necessary to support the long-term extraction of reserves.

24.0 REFERENCES

CRU International Ltd., Phosphate Rock Database, November 2023.

CRU International Ltd., Phosphate Fertilizer Market Outlook, November 2023.

GOLDER, 2021. Plano Conceitual de Fechamento do Complexo de Mineração de Tapira.

MOSAIC, 2020. Resultados Automonitoramento – 2020 – Atendimento a Condicionante nº 5 da Licença de Operação nº 028/2012 Substituído pelo Nº 138/2017. (file: Relatório Automonitoramento 2019.pdf)

MULTIGEO, 2017a. Investigação Ambiental da Qualidade do Solo nos Quatro Postos de Abastecimento de Combustíveis.

MULTIGEO, 2017b. Estudo de Impacto Ambiental. Alteamento da Barragem BL-1.

MULTIGEO, 2016. Estudo de Impacto Ambiental - Complexo de Mineração de Tapira.

MULTIGEO, 2011. Investigação Confirmatória de Passivo Ambiental em Áreas Industriais.

PÓTAMOS, 2019. Diagnóstico do uso da água nas unidades industriais Araxá – Tapira, Tapira – Cajati. (file: CAJ - CAJATI - POTMOS0001-1-TC-APT-0004.pdf)

RAMBOLL, 2018. Conceptual Site Model - Areas Of Interest.

25.0 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

The Qualified Persons for Mineral Resources and Mineral Reserves have relied upon the registrant to supply information that was used in the following Sections:

- Description of mineral and property rights
- Section 11.3 – Resource pit shell costs and pricing for Mineral Resources
- Section 12.2.4 and 12.2.5 – COG costs and pricing for Mineral Reserves
- Section 12.2.6 – Pit Optimization costs and pricing for Mineral Reserves
- Section 16.0 – Market Studies
- Section 19.0 – Economic Analysis

For the information relating to mineral and property rights in this TRS, WSP relied on Mosaic's permitting and environmental team. WSP has not researched property or mineral rights for CMT as we consider it to be reasonable to rely on Mosaic's permitting and environmental team who is responsible for maintaining this information.

WSP has also relied on Mosaic's finance team for details regarding applicable taxes, royalties, exchange rates, product pricing, and market studies as noted in the COG and pit optimization for Mineral Resources and Mineral Reserves, Market Studies, and the Economic Analysis. It is WSP's opinion that it is reasonable to rely on Mosaic for this information as Mosaic has been operating CMT since 2018.

wsp.com